

# ***VTM-420HD/SD***

## ***Television Signal Monitor***

### ***Installation and Operation Handbook***

#### **FIVE-YEAR LIMITED WARRANTY**

Videotek warrants that this product is free from defects in materials and workmanship for a period of five years from the date of purchase, except for CRTs and batteries, which are warranted for a period of one year. During this warranty period, Videotek will, at its option, repair or replace defective products at no charge for the parts or labor.

For warranty service or repair, this product must be returned to a service facility designated by Videotek in the original packing or its equivalent. The purchaser shall insure the product and prepay shipping charges to Videotek, and Videotek shall insure the product and pay shipping charges to return the product to the purchaser.

The foregoing warranty shall not apply to defects or damage resulting from improper or inadequate maintenance by the purchaser, connecting the product to incompatible equipment, misuses, operation outside any environmental specification for the product, improper site preparation or maintenance, or attempts by personnel other than authorized Videotek representatives to repair or service the product.

No other warranty is expressed or implied. Videotek specifically disclaims the implied warranties of merchantability and fitness for a particular purpose. The remedies provided by the foregoing warranty are the purchaser's sole and exclusive remedies. Videotek shall not be liable for any direct, indirect, special, incidental or consequential damages, whether based on contract, tort, or otherwise.

Printed May 2004

Item #061754 Rev. F

Copyright © 2002 - 2005 by Videotek

All rights reserved.

Contents of this publication may not be reproduced in any form without permission of Videotek.

This instrument, in whole or in part, may be protected by one or more US (US Patent 6,069,607) or foreign patents or patent applications.

Specifications subject to change without notice.

---

IBM is a registered trademark of International Business Machines Corporation.

PS2 is a registered trademark of International Business Machines Corporation.

Dolby, AC-3, Dolby E, and the double D symbol are registered trademarks of Dolby Laboratories.

Videotek and the Videotek logo are registered trademarks of Videotek

*SpyderWeb* is a registered trademark of Videotek

CineSound is a registered trademark of Videotek

## VIDEOTEK SOFTWARE LICENSE AND WARRANTY

The software which accompanies this license (the "Software") is the property of Videotek or its licensors and is protected by copyright law. While Videotek continues to own the Software, you will have certain rights to use the Software after your acceptance of this license. Except as may be modified by a license addendum which accompanies this license, your rights and obligations with respect to the use of this Software are as follows:

- You may:
  - i. Use one copy of the Software on a single computer;
  - ii. Make one copy of the Software for archival purposes, or copy the software onto the hard disk of your computer and retain the original for archival purposes; and
  - iii. After written notice to Videotek, transfer the Software on a permanent basis to another person or entity, provided that you retain no copies of the Software and the transferee agrees to the terms of this agreement.
- You may not:
  - i. Copy the documentation which accompanies the Software;
  - ii. Sublicense, rent, or lease any portion of the Software;
  - iii. Reverse engineer, decompile, disassemble, modify, translate, make any attempt to discover the source code of the Software, or create derivative works from the Software; or
  - iv. Use a previous version or copy of the Software after you have received a disk replacement set or an upgraded version as a replacement of the prior version.
- Limited Warranty:

Videotek warrants that the media on which the Software is distributed will be free from defects for a period of sixty (60) days from the date of delivery of the Software to you. Your sole remedy in the event of a breach of this warranty will be that Videotek will replace any defective media returned to Videotek within the warranty period. Videotek does not warrant that the Software will meet your requirements or that operation of the Software will be uninterrupted or that the Software will be error-free.

THE ABOVE WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS. YOU MAY HAVE OTHER RIGHTS, WHICH VARY FROM STATE TO STATE.

- Disclaimer of Damages:

REGARDLESS OF WHETHER ANY REMEDY SET FORTH HEREIN FAILS OF ITS ESSENTIAL PURPOSE, IN NO EVENT WILL VIDEOTEK BE LIABLE TO YOU FOR ANY SPECIAL, CONSEQUENTIAL, INDIRECT OR SIMILAR DAMAGES, INCLUDING ANY LOST PROFITS OR LOST DATA ARISING OUT OF THE USE OR INABILITY TO USE THE SOFTWARE EVEN IF VIDEOTEK HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

SOME STATES DO NOT ALLOW THE LIMITATION OR EXCLUSION OF LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES SO THE ABOVE LIMITATIONS OR EXCLUSION MAY NOT APPLY TO YOU.

IN NO CASE SHALL VIDEOTEK LIABILITY EXCEED THE PURCHASE PRICE FOR THE SOFTWARE. This disclaimer and limitations set forth above will apply regardless of whether you accept the Software.

- U.S. Government Restricted Rights:

RESTRICTED RIGHTS LEGEND. Use, duplication, or disclosure by the Government is subject to restrictions as set forth in subparagraph © (1) (ii) of the Rights in Technical Data and Computer Software clause at DFARS 252 227-7013 or subparagraphs © (1) and (2) of the Commercial Computer Software-Restricted Rights clause at 48 CFR 52.227-19, as applicable, Videotek, 243 Shoemaker Road, Pottstown, PA 19464.

- General:

This agreement will be governed by the laws of the Commonwealth of Pennsylvania. This Agreement may only be modified by a license addendum which accompanies this license or by a written document which has been signed by both you and Videotek. Should you have any questions concerning this Agreement, or if you desire to contact Videotek for any reason, please write:

Videotek  
243 Shoemaker Road  
Pottstown, PA 19464-6433

## OPERATOR'S SAFETY SUMMARY



**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.

To ensure 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.
- 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.

These symbols may appear on Videotek equipment:

### Explanation of Symbols



Read the *Operator's Handbook* or the *Service and Instruction Manual* and observe the safety symbols used.



Caution: shock hazard



Protective ground connection



Unit ground



Equipotentiality



Ground

Blank Page

# Contents

---

## Section 1 ♦ Introduction

|                                 |     |
|---------------------------------|-----|
| Video Standards Supported ..... | 1-2 |
|---------------------------------|-----|

## Section 2 ♦ Installation

|  |      |
|--|------|
| Inspecting the Shipment.....                               | 2-1  |
| Configuring the VTM-420HD/SD Communications Interface..... | 2-1  |
| Communication Ports .....                                  | 2-1  |
| Rack mounting the VTM-420HD/SD .....                       | 2-3  |
| Connecting the VTM-420HD/SD .....                          | 2-4  |
| Ethernet Setup (Option) .....                              | 2-5  |
| Ethernet Setup (Option) .....                              | 2-6  |
| Testing the Configuration .....                            | 2-8  |
| Configuring the VTM-420HD/SD for Remote Control .....      | 2-11 |
| Using the Bypass Feature .....                             | 2-14 |

## Section 3 ♦ Operation

|   |      |
|---|------|
| Front Panel Controls and Indicators.....  | 3-1  |
| Unit ID.....  | 3-3  |
| XVGA Display.....   | 3-3  |
| Waveform, Vector, and Audio Graticule Scales .....  | 3-5  |
| Waveform Graticule Scales.....  | 3-5  |
| Vector Graticule Scales.....  | 3-8  |
| NTSC-J Simulation.....  | 3-10 |
| Audio Ballistics .....  | 3-10 |
| Audio Input/Output (Option 7, 7A, and 8).....   | 3-11 |
| Dolby Operation .....   | 3-11 |
| CineSound™ Audio Display .....  | 3-12 |
| Factory-Default Settings.....   | 3-13 |
| Video Inputs.....   | 3-14 |
| Selecting Video Inputs.....   | 3-14 |
| Selecting Filters .....   | 3-14 |
| Selecting Sweep Modes.....  | 3-14 |
| Selecting a Display Format .....  | 3-14 |
| Expanding the Display Capability of INPUT SWEEP or FILTER Using the EDIT/CLEAR Button ..... | 3-14 |
| Selecting Multiple Inputs and Filters.....  | 3-15 |
| AUDIO, VECTOR, and WAVEFORM ZOOM Buttons.....   | 3-15 |
| Expanding the Audio Display .....   | 3-15 |

## Contents

|   |      |
|---|------|
| Expanding the Vector Display .....                                    | 3-16 |
| Expanding the Waveform Display .....                                  | 3-16 |
| Scrolling Through or Clearing the Alarm List .....                    | 3-16 |
| Ethernet Interface (Option).....                                      | 3-16 |
| ROUTER CONTROL.....   | 3-17 |
| EXTERNAL GPI .....  | 3-17 |
| INPUT GPI .....   | 3-17 |
| OUTPUT GPI .....  | 3-18 |
| LTC/CLOCK .....   | 3-18 |
| Navigating the SETUP MENU.....  | 3-19 |
| CLOSED CAPTION DISPLAY .....  | 3-41 |
| SAFE AREA .....   | 3-41 |
| PANEL AND PRESET LOCKOUT .....  | 3-41 |
| Configuring the Optional Audio Display .....                          | 3-42 |
| Dolby Selections.....   | 3-44 |
| Using the Cursors.....  | 3-45 |
| Recalling and Storing Front Panel and SETUP MENU Configurations ..... | 3-45 |
| Placing the Waveform and Vector Display in Line Select Mode.....      | 3-46 |
| Moving the Waveform .....   | 3-46 |
| Rotating the Vector Display in Composite Mode.....                    | 3-46 |
| Capturing and Transferring the Entire XVGA Display .....              | 3-46 |
| CAPTURE ON ALARM .....  | 3-47 |
| Setting Alarms .....  | 3-48 |
| Alarm Message Contents and Limitations.....                           | 3-49 |
| Alarm Descriptions .....  | 3-50 |
| Digital Waveform Alarm Error Types .....                              | 3-50 |
| CRC Alarms .....  | 3-52 |
| Audio Alarm Error Types.....  | 3-53 |
| Time Code Alarm Error Types .....                                     | 3-53 |
| Using the Keyboard Commands .....                                     | 3-54 |
| Calibration Interval .....  | 3-56 |
| <b>Section 4 ♦ Troubleshooting</b>                                    |      |
| Cold Starting the VTM-420HD/SD .....                                  | 4-1  |
| Power-up Cold Start.....  | 4-1  |
| Front Panel Cold Start.....   | 4-2  |
| Updating the VTM-420HD/SD Using VFlash .....                          | 4-2  |
| Problems, Causes, and Solutions .....                                 | 4-4  |
| <b>Appendix A ♦ Specifications</b>                                    |      |

## Contents

|                                  |     |
|----------------------------------|-----|
| Video .....                      | A-1 |
| Reference .....                  | A-2 |
| XVGA Output.....                 | A-2 |
| XVGA Monitor Requirements .....  | A-2 |
| Audio (Option 7, 7A, or 8).....  | A-3 |
| Time Code .....                  | A-3 |
| Controls .....                   | A-4 |
| Communications.....              | A-5 |
| CRC Error Display .....          | A-6 |
| Closed Captioning Displays ..... | A-6 |
| Magnification .....              | A-6 |
| Output Aspect Ratio .....        | A-6 |
| Signal Strength Display .....    | A-7 |
| External Routing Control .....   | A-7 |
| Power Requirements .....         | A-7 |
| Mechanical .....                 | A-7 |
| Environmental.....               | A-8 |
| Standard Accessories .....       | A-8 |
| Options .....                    | A-8 |

### **Appendix B ♦ Service Support**

### **Appendix C ♦ Pinouts**

### **Appendix D ♦ Remote Control Unit (RCU-420HD/SD)**

|   |     |
|---|-----|
| Installing the RCU-420HD/SD .....               | D-1 |
| Operating the RCU-420HD/SD .....                | D-2 |
| Troubleshooting.....                            | D-3 |
| Specifications .....                            | D-3 |
| Power Requirements (External Power Supply)..... | D-3 |
| Mechanical .....                                | D-3 |
| Environmental .....                             | D-3 |
| Standard Accessories .....                      | D-4 |
| Pinouts.....                                    | D-4 |

### **Appendix E ♦ Option 7, 7A, and 8 Field Upgrade Instructions**

|                            |     |
|----------------------------|-----|
| Introduction .....         | E-1 |
| Upgrade Instructions ..... | E-1 |

### **Appendix F ♦ Glossary**

### **Index**

**Figures**

Figure 1-1. VTM-420HD/SD Front and Back Panels ..... 1-3

Figure 2-1. Terminating the Remote Port ..... 2-2

Figure 2-2. Mounting the VTM-420HD/SD in a Rack ..... 2-3

Figure 2-3. VTM-420HD/SD Back Panel Connectors ..... 2-4

Figure 2-4. VTM-420HD/SD Dedicated PC Connection ..... 2-7

Figure 2-5. VTM-420HD/SD Network PC Connection ..... 2-7

Figure 2-6. Alarm Settings Preferences Screen ..... 2-9

Figure 2-7. Frame Capture Auto Settings Preferences Screen ..... 2-9

Figure 2-8. Connection Information Screen ..... 2-10

Figure 2-9. Connecting the RCU-420HD/SD Remote Control Panel ..... 2-11

Figure 2-10. Connecting a PC Running *SpyderWeb* Software ..... 2-12

Figure 2-11. Connecting Multiple VTM-420HD/SDs to a PC Using RS-422 ..... 2-12

Figure 2-12. Multiple VTM-420HD/SD/3xx/4xx Network PC Connection ..... 2-13

Figure 2-13. Using the Bypass Feature ..... 2-14

Figure 3-1. VTM-420HD/SD Front Panel Controls and Indicators ..... 3-1

Figure 3-2. Sample Simultaneous XVGA Display ..... 3-3

Figure 3-3. Digital 525 Displayed as Composite (NTSC) Shown in Zoom Mode (75% Chroma)  
..... 3-5

Figure 3-4. Digital 525 Display (75% Chroma) ..... 3-6

Figure 3-5. Digital 625 Display (75% Chroma) ..... 3-6

Figure 3-6. Digital 1080i 59.94 Hz Display (75% Chroma) ..... 3-7

Figure 3-7. Vector Graticule Component Markings ..... 3-8

Figure 3-8. Vector Display Zoom on Center (NTSC Full Screen) ..... 3-8

Figure 3-9. Vector Graticule Differential Gain and Differential Phase Markings ..... 3-9

Figure 3-10. Vector Graticule NTSC Markings ..... 3-9

Figure 3-11. Vector Graticule PAL Markings ..... 3-10

Figure 3-12. CineSound Audio Display ..... 3-12

Figure 3-13. Sample Alarm Message ..... 3-49

Figure C-1. ANALOG AUDIO IN/OUT 37-pin, Male, D-sub Connector For Audio Options ..... C-1

Figure C-2. RS-232/422 COMM 9-pin, Female, D-sub Connector ..... C-2

Figure C-3. REMOTE 9-pin, Male, D-sub Connector ..... C-2

Figure C-4. GPI/TALLY, LTC/CLOCK 26-pin, Female, D-sub Connector ..... C-3

Figure C-5. GPI/TALLY, LTC/CLOCK Breakout Board ..... C-3

Figure C-6. XVGA IN 15-pin, Male, D-sub Connector ..... C-5

Figure C-7. XVGA OUT 15-pin, Female, D-sub Connector ..... C-5

Figure C-8. KEYBOARD 6-pin, Female, Connectors ..... C-6

Figure C-9. Ethernet Connector ..... C-6

Figure C-10. Router Control Connector ..... C-7



## Contents

|  |     |
|--|-----|
| Figure D-1. RCU-420HD/SD Front Panel .....                               | D-1 |
| Figure D-2. RCU-420HD/SD Back Panel Connectors .....                     | D-1 |
| Figure D-3. RCU-420HD/SD TO MAIN UNIT 9-pin, Male, D-sub Connector ..... | D-4 |

## Tables

|  |      |
|--|------|
| Table 2-1. Parts Required to Rack mount the VTM-420HD/SD .....                                       | 2-3  |
| Table 2-2. Description of Back Panel Connectors .....  | 2-4  |
| Table 3-1. Description of Front Panel Controls and Indicators .....                                  | 3-1  |
| Table 3-2. Description of Simultaneous XVGA Display .....  | 3-3  |
| Table 3-3. Video Formats and Units of Measure .....  | 3-5  |
| Table 3-4. Video Formats and Critical Amplitude Limits .....   | 3-7  |
| Table 3-5. CineSound Audio Input Mapping .....   | 3-12 |
| Table 3-6. Default Settings .....  | 3-13 |
| Table 3-7. Input and Display Format Relationship .....   | 3-14 |
| Table 3-8. SETUP MENU Groups .....   | 3-19 |
| Table 3-9. VIDEO SETUP Menu .....  | 3-20 |
| Table 3-10. AUDIO SETUP Menu (Option 7, 7A, or 8) .....  | 3-24 |
| Table 3-11. WAVEFORM ALARMS Menu .....   | 3-33 |
| Table 3-12. AUDIO ALARMS Menu (Option 7, 7A, or 8) .....   | 3-34 |
| Table 3-13. TIME CODE ALARMS Menu .....  | 3-34 |
| Table 3-14. I/O AND COMMUNICATIONS Menu .....  | 3-35 |
| Table 3-15. DISPLAY SETUP Menu .....   | 3-39 |
| Table 3-16. Description of Sample Alarm Message .....  | 3-49 |
| Table 3-17. Waveform Alarm Error Types .....   | 3-50 |
| Table 3-18. Audio Alarm Error Types .....  | 3-53 |
| Table 3-19. Time Code Alarm Error Types .....  | 3-53 |
| Table 3-20. Keyboard Commands .....  | 3-54 |
| Table 4-1. VTM-420HD/SD: Problems, Causes, and Solutions .....                                       | 4-4  |
| Table C-1. Pinouts for ANALOG AUDIO IN/OUT Connector and Audio Breakout Board .....                  | C-1  |
| Table C-2. RS-232 COMM Connector Pinouts (for RS-232 and RS-422) .....                               | C-2  |
| Table C-3. REMOTE Connector Pinouts .....  | C-2  |
| Table C-4. Pinouts for GPI/TALLY/LTC/CLOCK Connector and GPI/TALLY/LTC/CLOCK<br>Breakout Board ..... | C-4  |
| Table C-5. XVGA IN Connector Pinouts .....   | C-5  |
| Table C-6. XVGA OUT Connector Pinouts .....  | C-5  |
| Table C-7. KEYBOARD Connector Pinouts .....  | C-6  |
| Table C-8. ETHERNET Connector Pinouts .....  | C-6  |
| Table C-9. Router Control Connector Pinouts .....  | C-7  |

## Contents

|  |     |
|--|-----|
| Table D-1. Description of RCU-420HD/SD Back Panel Connectors ..... | D-1 |
| Table D-2. RCU-420HD/SD: Problems, Causes, and Solutions .....     | D-3 |
| Table D-3. Pinouts for RCU-420HD/SD TO MAIN UNIT Connector .....   | D-4 |

# Section 1 ♦ Introduction

---

The Videotek on-screen multiformat Television Signal Monitor (VTM-420HD/SD), with patented\* technology, provides the most cost-effective quality assurance in the industry today. The VTM-420HD/SD evaluates video, audio, and time code. It reports, *in real time*, any detected noncompliance.

Standard features include:

- Waveform, vector, picture, and optional audio displays on a single XVGA monitor
- Two auto-detect serial digital video inputs
- Accepts SMPTE 292M High Definition
- Accepts SMPTE 259M-C Standard Definition (601 SDI)
- On-screen signal strength indication
- Two router control ports (Videotek RS-12 series)
- Multiple waveforms, line selects, and cursors
- Closed Caption monitoring
- Unattended signal quality verification
- Time Code input with display
- User-definable alarms
- Alarm log with a time and date stamp
- XVGA loop and bypass
- *SpyderWeb*<sup>™</sup> PC software for remote control of the VTM-420HD/SD
- Five-year warranty

Options include:

- An XVGA frame capture and storage utility
- Analog, AES/EBU, and embedded audio with or without Dolby<sup>®</sup> Digital and Dolby E<sup>®</sup>
- RCU-420HD/SD Remote Control Unit
- VTM mobile to add portability to the VTM-420HD/SD
- Ethernet communications port

\*US Patent 6,069,607. Other US and foreign patents pending.

The VTM-420HD/SD is the perfect solution for the unattended signal quality monitoring of multiple sites:

- Satellite uplinks and downlinks
- Remote transmitter sites
- Tape-to-tape or tape-to-server transfers
- NLE digitizing and rendering
- Network and/or remote feeds
- STL
- Any HDTV node that requires quality analysis of video, audio, and time code parameters

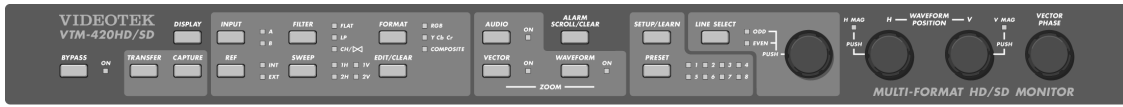
## **Video Standards Supported**

The VTM-420HD/SD supports the following video standards:

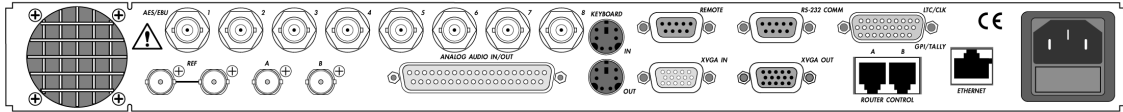
- 1080i/60
- 1080i/59.94
- 1080i/50
- 1080p/30
- 1080p/29.97
- 1080p/25
- 1080p/24
- 1080p/23.98
- 1080p/30sF
- 1080p/29.97sF
- 1080p/25sF
- 1080p/24sF
- 1080p/23.98sF
- 720p/60
- 720p/59.94
- 720p/50
- 720p/30
- 720p/29.97
- 480p/59.94 carried in 1080i/59.94
- 525/59.94
- 625/50

The VTM-420HD/SD front and back panels are illustrated in **Figure 1-1**.

**Figure 1-1. VTM-420HD/SD Front and Back Panels**



**Front Panel**



**Back Panel**

See Appendix D, “Remote Control Unit (RCU-420HD/SD)” for more information on the RCU-420HD/SD.

## Introduction

Blank Page

## Section 2 ♦ Installation

---

This section provides information about inspecting, installing, and optionally configuring the VTM-420HD/SD.

### Inspecting the Shipment

Before installing the VTM-420HD/SD, inspect the box and the contents. Report any damage to the shipper and telephone the Videotek Customer Service Department for service support (see Appendix B, “Service Support”).

The box contains the following:

- One VTM-420HD/SD
- One *VTM-420HD/SD Installation and Operation Handbook*
- One breakout connector (for GPI/TALLY, LTC/CLOCK); if the audio option has been purchased, one additional breakout connector or 37-pin connector is also supplied.
- Hardware kit, Item Number 222730, for rackmounting the VTM-420HD/SD
- One *SpyderWeb* CD-ROM
- A warranty registration card

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

### Configuring the VTM-420HD/SD Communications Interface

The following subsections provide instructions to rack mount, connect, and configure the unit.

#### Communication Ports

A VTM-420 HD/SD has three communication ports:

The VTM-420HD/SD has one Ethernet port and two serial ports:

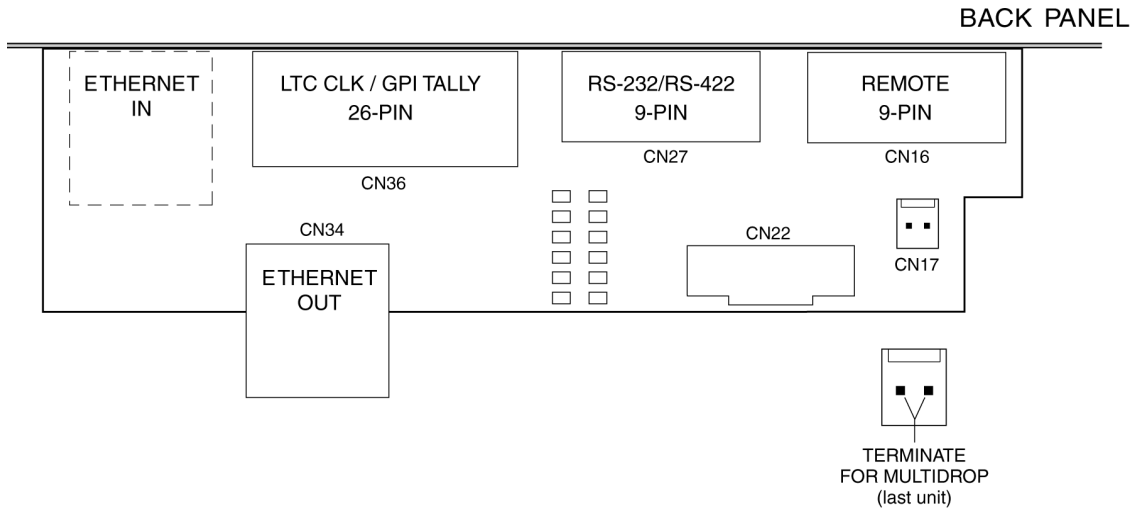
- The optional ETHERNET port is permanently configured for 10/100BaseT.
- The RS-232 COMM port is factory-configured for RS-232 operation, but it can be reconfigured for RS-422 multidrop operation. This is a software setup located in the I/O and Communications menu. For multidrop operation, select RS-422 TERMINATED in the I/O AND COMMUNICATIONS/SERIAL PORT menu for the last VTM-420 HD/SD using the RS-232 COMM port. For all other units in the multidrop operation, select RS-422 UNTERMINATED.

To configure the unit:

1. Press the SETUP/LEARN button.
2. Use the WAVEFORM POSITION-H Knob (H Knob) to select the I/O AND COMMUNICATIONS menu.

3. Press the H knob.
  4. Use the H knob to select the serial port.
  5. Press the H knob.
  6. Use the H knob to select the format communications desired (RS-232, RS-422 UNTERMINATED, or RS-422 TERMINATED).
  7. Once selected, press the WAVEFORM POSITION-V knob three times to exit.
- The REMOTE port is permanently configured for RS-422 operation. It can be connected to one RCU-420 HD/SD remote control panel and looped to multiple VTM-420 HD/SDs. For multiple configurations only, this port should be terminated on the last VTM-420 HD/SD via an internal jumper, as shown in **Figure 2-1**.

**Figure 2-1. Terminating the Remote Port**



**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.

**NOTE:** The factory default for CN17 is not terminated when using one RCU-420HD/SD and one VTM-420HD/SD.

To set termination on the remote port:

1. Remove the top cover.
2. Locate CN17 on the I/O board.
3. Place the jumpers across the pins to terminate.
4. Attach the top cover.

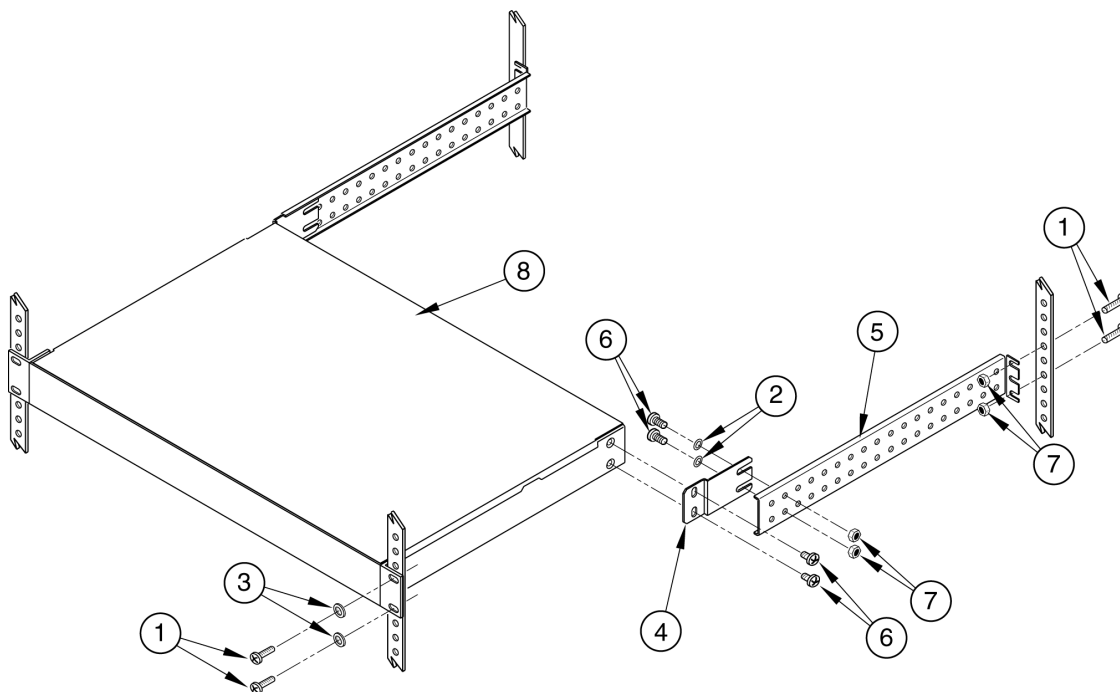
For more information on the RCU-420HD/SD, see Appendix D, “Remote Control Unit (RCU-420HD/SD).”



## Rack mounting the VTM-420HD/SD

When selecting the permanent mounting location for the VTM-420HD/SD, ensure that the flow of air to the ventilation holes on the top and sides of the chassis is not obstructed. Rack mounting of the VTM-420HD/SD is illustrated in **Figure 2-2**. The parts required to rack mount the VTM-420HD/SD are listed in **Table 2-1**.

**Figure 2-2. Mounting the VTM-420HD/SD in a Rack**



**Table 2-1. Parts Required to Rack mount the VTM-420HD/SD**

| Key | Item Number | Quantity            | Description                                |
|-----|-------------|---------------------|--|
| 1   | 044030      | 8 (4 for each side) | Screw 10-32 X 3/4" pan head Phillips black |
| 2   | 044040      | 4 (2 for each side) | Washer flat #10                            |
| 3   | 045020      | 4 (2 for each side) | Nylon washer 7/16" X 3/16" X 1/32"         |
| 4   | 200061      | 2 (1 for each side) | Extension bracket mount                    |
| 5   | 200070      | 2 (1 for each side) | Extension bracket                          |
| 6   | 243200      | 8 (4 for each side) | Screw 10-32 X 3/8" pan head Phillips       |
| 7   | 044060      | 8 (4 for each side) | Hardware lock nut 10-32                    |
| 8   | 1 Unit      | -                   | Standard 1.75" rack height unit            |

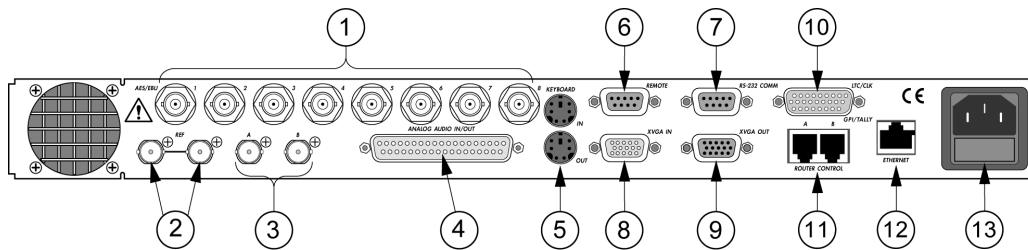
To rack mount the VTM-420HD/SD:

1. Install the extension bracket mounts (KEY 4) on the back of the unit using screws (KEY 6).
2. Install the VTM unit in a rack by fastening it through the rack ears in the front of the unit using screws (KEY 1) and washers (KEY 3).
3. Temporarily hold the extension bracket (KEY 5) in place and note the pair of holes that align with the slots on the extension bracket mount (KEY 4).
4. Assemble the screws (KEY 6), washers (KEY 2), and locknuts (KEY 7) loosely in the proper holes.
5. Slip the extension bracket (KEY 5) into position and install and tighten the remaining hardware.

## Connecting the VTM-420HD/SD

The back panel connectors are illustrated in **Figure 2-3**, and the function of each connector is described in **Table 2-2**.

**Figure 2-3. VTM-420HD/SD Back Panel Connectors**



**Table 2-2. Description of Back Panel Connectors**

| Key | Label                             | Description  |
|-----|-----------------------------------|--|
| 1   | AES/EBU<br>1, 2, 3, 4, 5, 6, 7, 8 | Optional female BNC connectors for AES/EBU and Dolby (OPTION 8, 8A, or 9) digital audio input                          |
| 2   | REF                               | Female BNC connectors for blackburst or Tri-level reference input (passive loop-through). If used, terminate with 75 Ω |
| 3   | A, B                              | Female BNC connectors for HD or SD. Internal 75 Ω termination  |
| 4   | ANALOG AUDIO<br>IN/OUT            | Optional 37-pin, male, D-sub connector. The supplied breakout board can be used for solderless connections*            |
| 5   | KEYBOARD IN, OUT                  | DIN connectors for an IBM PS2® (or similar make) keyboard*   |
| 6   | REMOTE                            | 9-pin, female, D-sub connector for the remote control panel*   |
| 7   | RS-232 COMM                       | 9-pin, female, D-sub connector for a configurable serial port to a PC*   |
| 8   | XVGA IN                           | 15-pin, high-density, male, D-sub connector for XVGA input*  |
| 9   | XVGA OUT                          | 15-pin, high-density, female, D-sub connector for XVGA output*   |
| 10  | LTC/CLK, GPI/TALLY                | 26-pin, high-density, female, D-sub connector for LTC, Clock, GPI, and TALLY input*                                    |

\*See Appendix C, "Pinouts," for the connections.

(Table continues on next page)

**Table 2-2. Description of Back Panel Connectors (continued)**

| <b>Key</b> | <b>Label</b>           | <b>Description</b>                                  |
|------------|------------------------|---|
| <b>11</b>  | ROUTER CONTROL<br>A, B | RJ11 to control RS-12 series routing switchers A, B |
| <b>12</b>  | ETHERNET               | RJ45, female, 10/100 Base-T connection (option)     |
| <b>13</b>  | No Label (POWER)       | IEC 115 VA max                                      |

\*See Appendix C, "Pinouts," for the connections.

## Ethernet Setup (Option)

1. Prior to the VTM-420HD/SD Ethernet configuration, obtain Transmission Control Protocol/Internet Protocol (TCP/IP) addresses from the System Administrator or from the Internet Service Provider (ISP).

These addresses are:

- A static IP address (unless Dynamic Host Configuration Protocol (DHCP) will be used)
- A Subnet Mask
- An optional Gateway IP

Be sure to record all addresses. The IP address and Subnet Mask are always necessary. The Gateway address is not needed unless the VTM-420HD/SD is routed to an outside network.

Record the addresses:

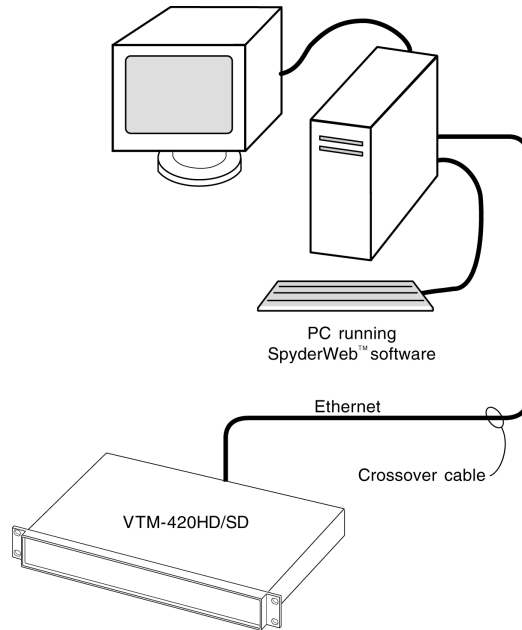
|   |  |
|---|--|
| <b>VTM-420HD/SD Interface Static IP Address</b> |  |
| <b>VTM-420HD/SD Interface Subnet Mask</b>       |  |
| <b>Gateway IP Address</b>                       |  |

2. Identify a host PC to configure and test the VTM-420HD/SD.  
The configuration and testing consists of installing and running the *SpyderWeb* application and setting network addresses in the VTM-420HD/SD menu system.

## Installation

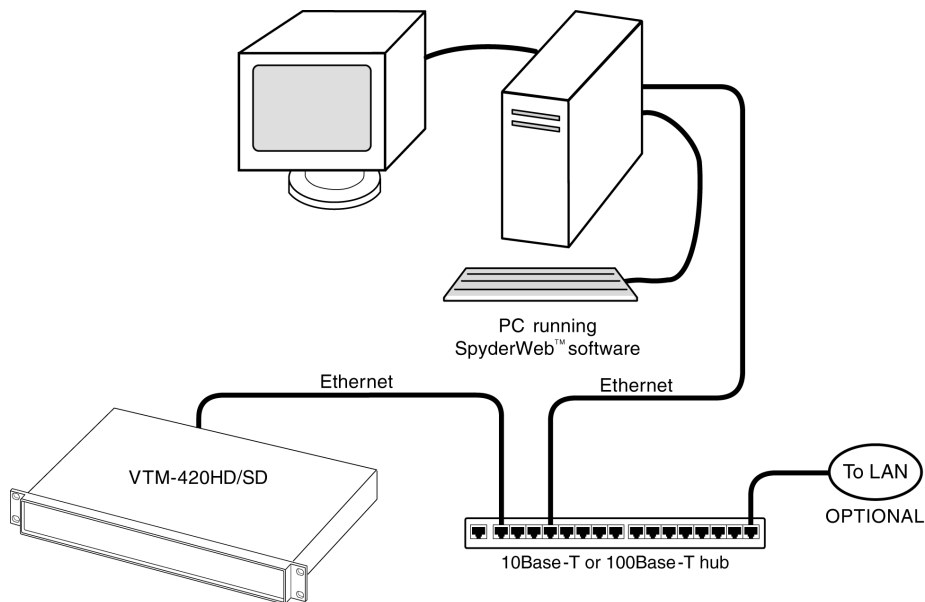
- 3a. For a dedicated PC connection, connect the host PC with a network card to the “ETHERNET” connector on the back panel of the VTM-420HD/SD, using a CAT5 crossover cable (not included). See **Figure 2-4**.

**Figure 2-4. VTM-420HD/SD Dedicated PC Connection**



- 3b. For a network connection, connect the network hub to the back panel of the VTM-420HD/SD using a CAT5 network cable (not included). See **Figure 2-5**.

**Figure 2-5. VTM-420HD/SD Network PC Connection**



#### 4. Ethernet Configuration

- a) Press the “SETUP/LEARN” button on the VTM front panel.
- b) Using the Horizontal Waveform Position knob (H knob), highlight the I/O AND COMMUNICATIONS menu, and then press the H knob to enter the submenu.
- c) Rotate the H knob scroll down until the ETHERNET SETUP submenu appears.
- d) Press the H knob to enter the ETHERNET SETUP submenu.
- e) (If using DHCP) Turn the H knob to highlight DHCP ENABLE. Press the H knob to toggle the state to ON. The IP Address retrieved from the DHCP server is under its appropriate submenu.

(If not using DHCP) Turn the H knob to select IP ADDRESS. Press the H knob. Enter the value obtained from the system administrator using the Waveform Position V knob (V knob) to change the value selected and turn the H knob to highlight the next value.

- f) Press the V knob to exit the submenu and save the value.
- g) Repeat steps e and f to change the Subnet Mask and Gateway.

**NOTE:** Test the configuration before proceeding!

### Testing the Configuration

1. Install *SpyderWeb* onto the host PC. Refer to the *SpyderWeb Installation Guide* for instructions.
2. Run *SpyderWeb*.
3. To enter the VTM IP address in *SpyderWeb*, the option exists to either:
  - Select the SETTINGS button in the “Alarms” group on the main *SpyderWeb* window. The Alarm Settings Preferences screen, shown in **Figure 2-6**, appears.
  - Select the SETTINGS button in the “Frame Capture” group on the main *SpyderWeb* window. The Frame Capture Auto Settings Preference screen, shown in **Figure 2-7**, appears.
  - Select VIEW from the main menu bar, and then select PREFERENCES. The Connection Information screen, shown in **Figure 2-8**, appears.

Figure 2-6. Alarm Settings Preferences Screen

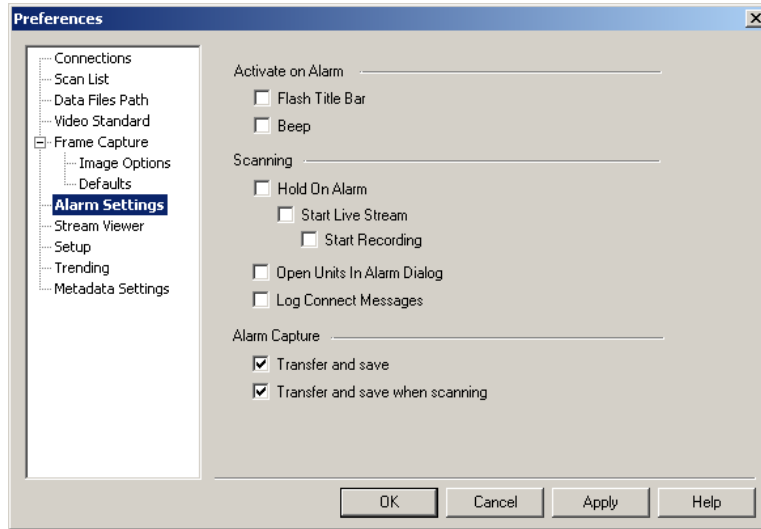
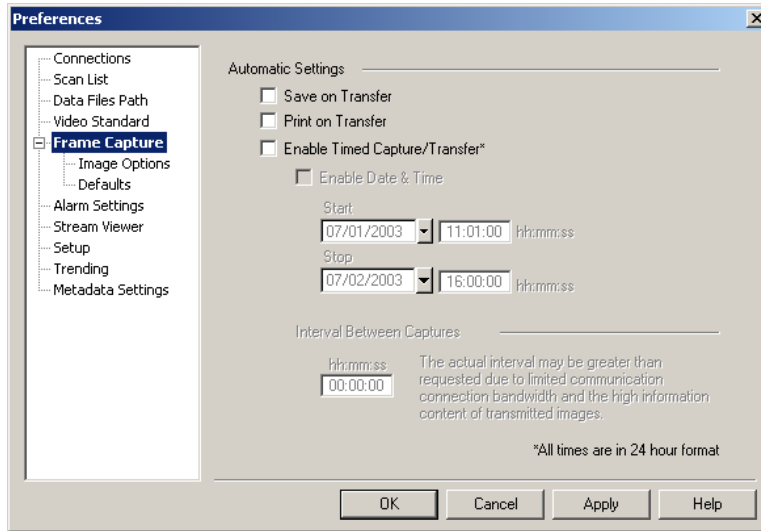
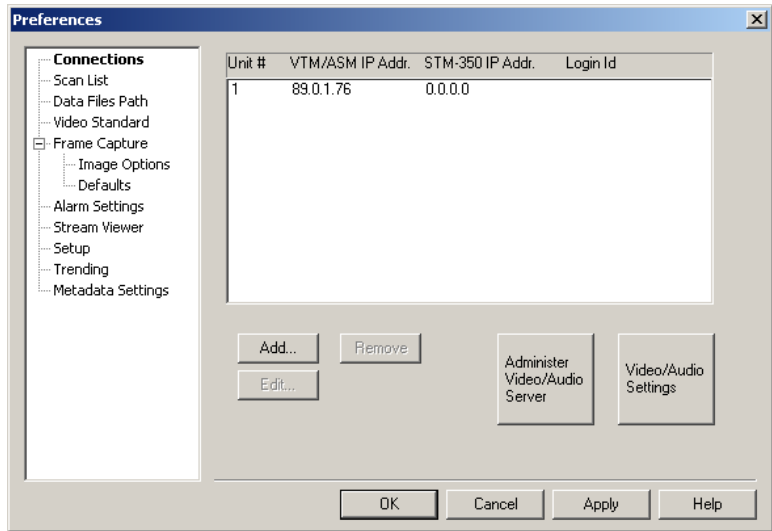


Figure 2-7. Frame Capture Auto Settings Preferences Screen



4. Click “Connection Information” on the Configuration Tree.  
The Connection Information screen appears:

Figure 2-8. Connection Information Screen



**NOTE:** The fields for “STM-350 IP Addr.,” “Login Id”, and “Password” are used only for the STM-350 streaming test and measurement product and is not required for VTM-420HD/SD network Operation.

- To add information for a new VTM unit, click ADD.
  - To edit information about an existing VTM unit, highlight the line to be edited and click EDIT.
5. The “Unit (ID) #” is the VTM unit number. The VTM unit number is menu-selected through the VTM and must match the *SpyderWeb* setting.

**NOTE:** The included *SpyderWeb* software can only be configured for single unit operation “Unit ID 1”.

6. Enter or edit the VTM-420HD/SD Ethernet Interface IP Address (“VTM/ASM IP Addr.”) into the *SpyderWeb* Connection Information dialog. Refer to Ethernet Setup (Option) on page 2-6.
7. Click OK twice to return to the *SpyderWeb* main dialog.
8. Verify that *SpyderWeb* is communicating with the VTM. *SpyderWeb* connects when the VTM Unit ID number is selected:
  - Use the *SpyderWeb* “Unit #/Source” controls to select the unit ID of the VTM-420HD/SD.
  - The number in the “Unit #/Source” window turns from red to green when a connection is made. The time of connection is dependant upon the network traffic.

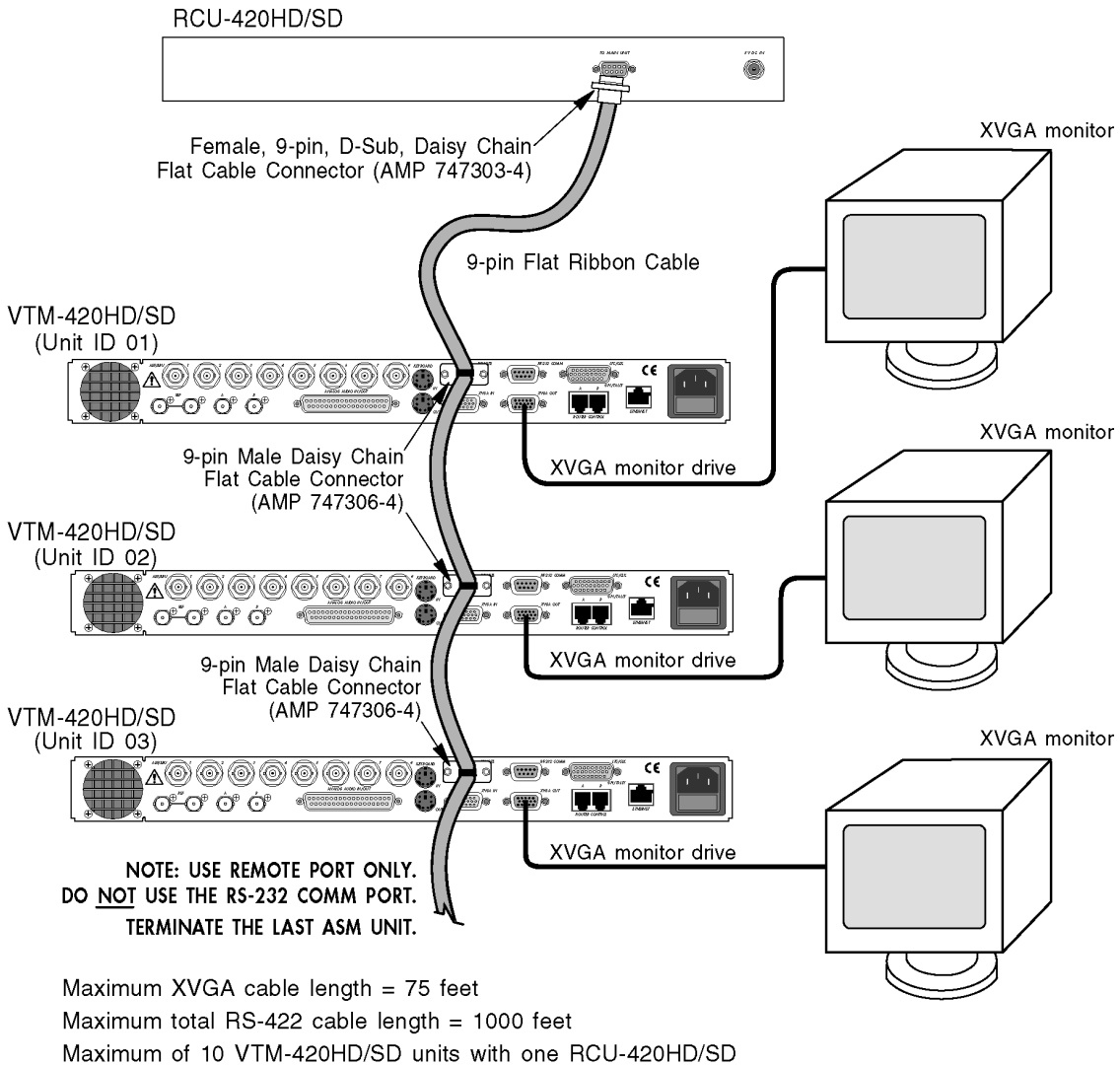


## Configuring the VTM-420HD/SD for Remote Control

For the following configurations, the interconnecting cables can be extended using electronic distribution. There are several ways to configure the VTM-420HD/SD for remote control:

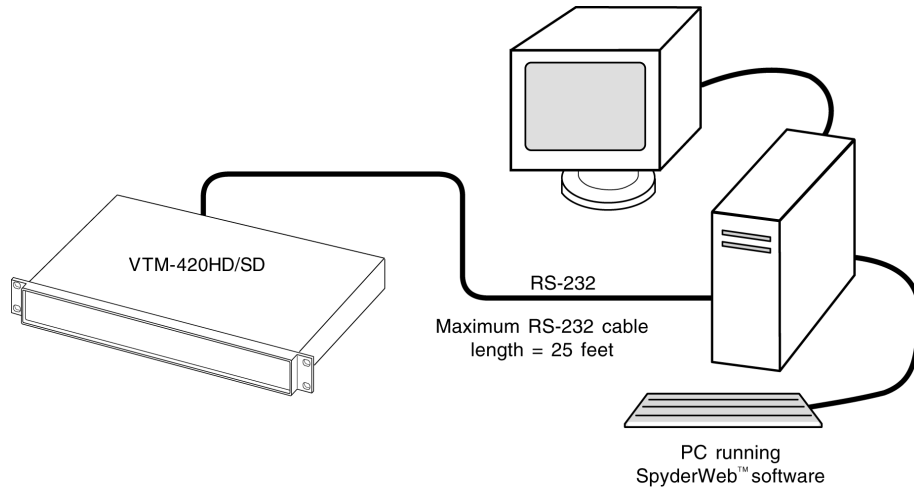
- One RCU-420HD/SD connected to one VTM-420HD/SD using the REMOTE port.
- One RCU-420 HD/SD connected to multiple VTM-420 HD/SDs using a multidrop cable that connects to the REMOTE ports on the back of the VTMs and to the TO MAIN UNIT port on the back of the RCU. All VTMs must have unique unit IDs, as described in Unit ID on page 3-3. The REMOTE port must be terminated on the last VTM-420 HD/SD via internal jumpers, as shown in **Figure 2-1** on page 2-2. A sample REMOTE connection is illustrated in **Figure 2-9**.

**Figure 2-9. Connecting the RCU-420HD/SD Remote Control Panel**



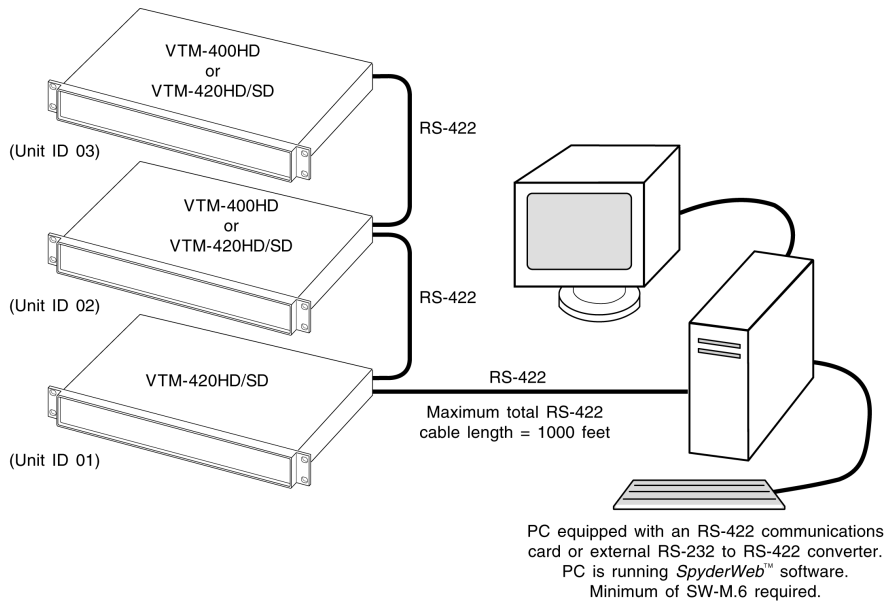
- One PC, running *SpyderWeb* software, connected to one VTM-420HD/SD using the RS-232 port, as illustrated in **Figure 2-10**.

Figure 2-10. Connecting a PC Running *SpyderWeb* Software



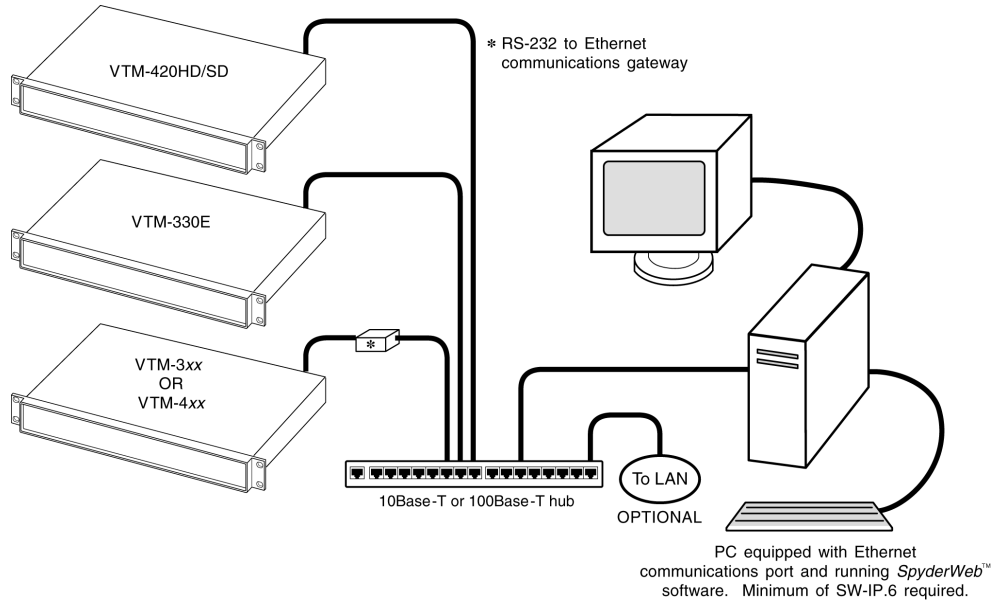
- One PC, running *SpyderWeb* software and equipped with an RS-422 communication card, connected to multiple VTM-420 HD/SDs using the RS-232 COMM port and unique unit IDs, as illustrated in **Figure 2-11**. All VTMs must have unique unit IDs, as described in Unit ID on page 3-3. For the last VTM-420 HD/SD, select RS-422 TERMINATED in the I/O AND COMMUNICATIONS/SERIAL PORT to terminate the RS-422 port. For all other units in the multidrop operation, select RS-422 UNTERMINATED.

Figure 2-11. Connecting Multiple VTM-420HD/SDs to a PC Using RS-422



- One PC running multi-connection *SpyderWeb* software and equipped with an Ethernet card connected to multiple VTMs equipped with an external RS-232 to Ethernet communications gateway or a direct connection to the VTM-420HD/SD, as illustrated in **Figure 2-12**.

Figure 2-12. Multiple VTM-420HD/SD/3xx/4xx Network PC Connection



As many as 99 VTM-420 HD/SD/3xx/4xxs can be connected on one network, but this requires a unique unit ID for each unit. The unit ID is factory set to 01. The Unit ID value, located in the I/O and Communications menu, can be changed. To change the unit ID, *connect one unit at a time* and then access the Setup menu by using one of the following:

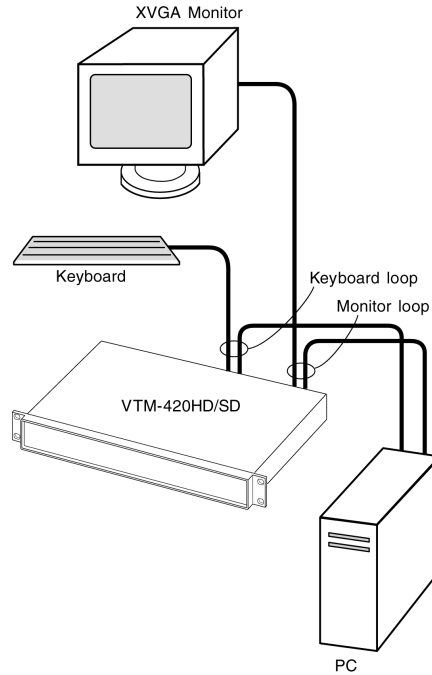
- The front panel of the VTM
- The appropriate RCU panel
- A PC running *SpyderWeb* software

**NOTE:** The included *SpyderWeb* software can only be configured for single unit operation. For multi-unit configuration software contact a Videotek representative.

## Using the Bypass Feature

The bypass feature can be used in conjunction with an existing PC and monitor to save space and improve system efficiency, as illustrated in **Figure 2-13**.

**Figure 2-13. Using the Bypass Feature**



**BYPASS** can be used to switch the monitor display from the PC output to the VTM-420HD/SD output. When viewing the VTM-420HD/SD output, the keyboard can access all VTM-420HD/SD front panel functions.

**NOTE:** In order for the PC to properly communicate with the PC keyboard port, the VTM-420HD/SD must be powered on.

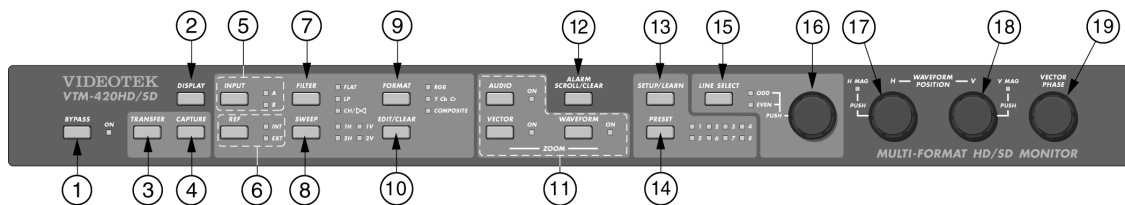
## Section 3 ♦ Operation

**NOTE:** If utilizing **Options 7B, 8A, and 9**, see the 4B, 5B, 7B, 8A, 8B, 9A and 9B Installation and Operation Handbook for operation instructions.

### Front Panel Controls and Indicators

The front panel controls and indicators are illustrated in **Figure 3-1**, and each control and indicator function is described in **Table 3-1**.

**Figure 3-1. VTM-420HD/SD Front Panel Controls and Indicators**



**Table 3-1. Description of Front Panel Controls and Indicators**

| Key | Label                            | Description   |
|-----|----------------------------------|---|
| 1   | BYPASS                           | Press to toggle BYPASS on and off: <ul style="list-style-type: none"> <li>When BYPASS is <i>on</i> (the ON LED is illuminated), the XVGA input and keyboard input signals are routed to the XVGA OUT and KEYBOARD OUT connectors.</li> <li>When BYPASS is <i>off</i>, the XVGA output is the VTM-420HD/SD signal, and the keyboard connected to KEYBOARD IN controls the VTM-420HD/SD.</li> </ul> |
| 2   | DISPLAY                          | Press to cycle through a full-screen display of picture, waveform, vector, optional audio, optional captured display, and then back to a simultaneous display of picture, waveform, vector, audio, and alarm information.   |
| 3   | TRANSFER                         | This is an optional feature. Press to transfer the captured display to a PC running <i>SpyderWeb</i> software. The PC is connected via RS-232/RS-422 or Ethernet.   |
| 4   | CAPTURE                          | This is an optional feature. Press to store the current screen, which then can be transferred or displayed.   |
| 5   | INPUT                            | Press to select video input A, video input B, or inputs A and B.  |
| 6   | REF                              | Press to select internal reference (INT) or external reference (EXT).   |
| 7   | FILTER                           | Press to select the FLAT, LP (Low Pass), or CH (Chroma)/▶◀(Bowtie) filter.  |
| 8   | SWEEP                            | Press to select 1H, 2H, 1V, or 2V sweep display mode.   |
| 9   | FORMAT                           | Press to select RGB, YCbCr, or Composite display mode. For an NTSC-J simulated signal when in 525/60 Composite mode, set the NTSC PEDESTAL (located in VIDEO Setup/Video General setup menu) to OFF.  |
| 10  | EDIT/CLEAR                       | Use to display individual components.   |
| 11  | AUDIO, VECTOR, and WAVEFORM ZOOM | <ul style="list-style-type: none"> <li>Press to display an expanded portion of each section.</li> <li>Press and hold AUDIO ZOOM until peak hold is cleared.</li> </ul>  |

(Table continues on next page)

**Table 3-1. Description of Front Panel Controls and Indicators (continued)**

| Key | Label                  | Description   |
|-----|------------------------|---|
| 12  | ALARM<br>SCROLL/CLEAR  | Press to scroll through the current alarm list using the WAVEFORM POSITION-V knob. Press and hold to clear the current alarm list.  |
| 13  | SETUP/LEARN            | Press to enter or exit the SETUP MENU. Press the SETUP and PRESET buttons simultaneously to enter the preset store function. Press SETUP again to store the current display and setup parameters into memory.   |
| 14  | PRESET                 | Press to step through the eight preset memories.  |
| 15  | LINE SELECT (button)   | Press to toggle the line select display on or off.  |
| 16  | LINE SELECT (knob)     | <ul style="list-style-type: none"> <li>▪ Press the knob to select odd or even fields.</li> <li>▪ Rotate the knob to select an individual line.</li> </ul>   |
| 17  | WAVEFORM<br>POSITION-H | <ul style="list-style-type: none"> <li>▪ When not in SETUP mode, press this knob to cycle through the horizontal magnifications. Rotate the knob to move the waveform display left or right.</li> <li>▪ When in SETUP mode, press the knob to select a menu item. Rotate the knob to move the menu cursor or change a menu value.</li> </ul>        |
| 18  | WAVEFORM<br>POSITION-V | <ul style="list-style-type: none"> <li>▪ When not in SETUP mode, press this knob to cycle through the vertical magnifications. Rotate to move the waveform display up or down.</li> <li>▪ When in SETUP mode, press the knob to exit one level in the menu. Rotate the knob to move the on-screen cursor lines or change the menu value.</li> </ul> |
| 19  | VECTOR PHASE           | <ul style="list-style-type: none"> <li>▪ Rotate to change the phase alignment of the vector display (Composite only).</li> <li>▪ When in the SETUP mode, press to toggle between last setup screen and normal display mode.</li> </ul>  |

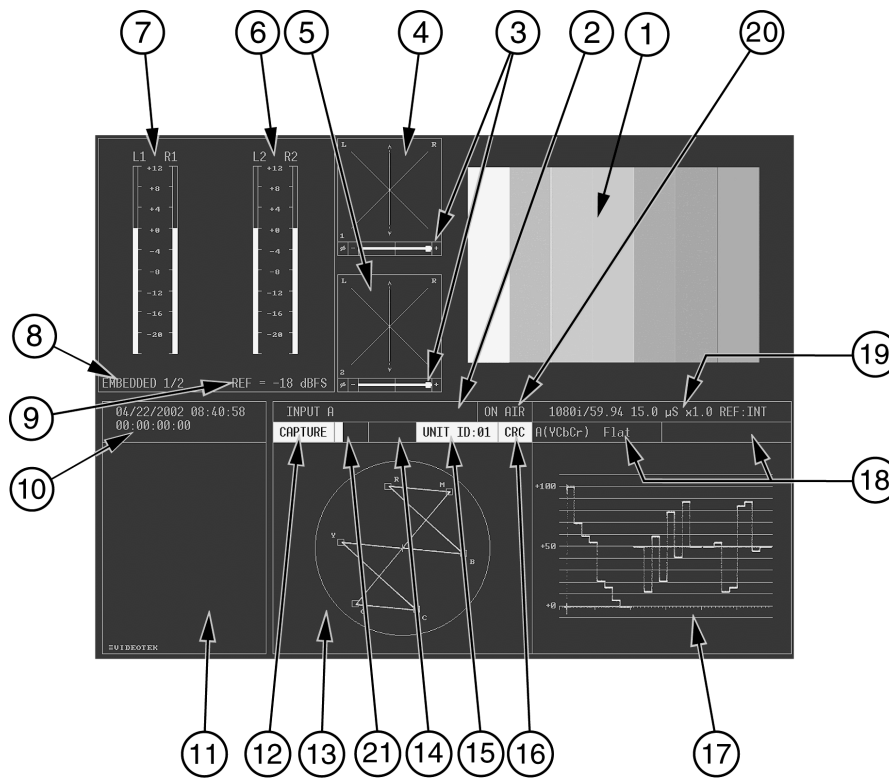
## Unit ID

The unit ID is the identification number of the VTM-420 HD/SD. It can be set to any number within a range of 1 to 99 and should be different than the identification numbers of other units in the same system configuration. Set the VTM-420 HD/SD unit ID in the I/O AND COMMUNICATIONS menu.

## XVGA Display

A sample XVGA display is illustrated in **Figure 3-2** and described in **Table 3-2**. This simultaneous display shows picture, waveform, vector, audio, and alarm information.

**Figure 3-2. Sample Simultaneous XVGA Display**



**Table 3-2. Description of Simultaneous XVGA Display**

| Key | Description  |
|-----|--|
| 1   | Picture of the selected input  |
| 2   | Source ID display; the default shows the input selection, but the text can be changed by connecting a keyboard (see “Using the Keyboard Commands” shown on page 3-54).                                       |
| 3   | Audio phase bar; the default condition indicates a 0 degree phase difference when the yellow moving marker is at the far right; 90 degrees is the center position, and 180 degrees at the far left position. |
| 4   | Lissajous (X,Y) display of audio input pair 1 (option with 1 or 2 pair selected)   |
| 5   | Lissajous (X,Y) display of audio input pair 2 (option with 2 pair selected)  |

*(Table continues on next page)*

**Table 3-2. Description of Simultaneous X VGA Display (continued)**

| Key | Description   |
|-----|---|
| 6   | Audio input pair 2 level meters (option with 2 pair selected)   |
| 7   | Audio input pair 1 level meters (option with 1 or 2 pair selected)  |
| 8   | Indicates the optional audio input being displayed  |
| 9   | Indicates the optional audio input reference level (selectable on the AUDIO SETUP menu)   |
| 10  | Date and time of internal clock and time code readout   |
| 11  | Alarm display and SETUP MENU  |
| 12  | Capture status: <ul style="list-style-type: none"> <li>▪ Green = The capture option is installed and ready for use</li> <li>▪ Yellow = A transfer to the PC is in process and a new capture cannot be performed</li> <li>▪ Clear = The capture option is not installed</li> </ul> |
| 13  | Vector display of selected inputs   |
| 14  | Indicates the selected Preset number; nothing appears when in the default mode.   |
| 15  | Indicates the unit ID number, which can be changed on the I/O AND COMMUNICATIONS Menu. <ul style="list-style-type: none"> <li>▪ Green = Remote connection indication</li> <li>▪ Red = No connection</li> </ul>  |
| 16  | CRC/EDH status: <ul style="list-style-type: none"> <li>▪ Green = CRC/EDH detected and OK</li> <li>▪ Red = CRC/EDH errors detected</li> <li>▪ Clear = No EDH detected</li> </ul>   |
| 17  | Waveform display of selected input(s)   |
| 18  | The current waveform is divided into two cells: when multiple inputs or filters are applied, the status may be different for each cell.   |
| 19  | Indicates the input format, divisions of horizontal scale, vertical gain multiplier, and reference selection  |
| 20  | An ON AIR indication that is controlled through GPI #7 on the back panel: <ul style="list-style-type: none"> <li>▪ Red = GPI dry-contact closed</li> <li>▪ Clear = GPI dry-contact open</li> </ul>  |
| 21  | Signal Strength Display Meter   |



# Waveform, Vector, and Audio Graticule Scales

## Waveform Graticule Scales

The waveform graticule scales change according to the video format displayed, as listed in **Table 3-3**.

**Table 3-3. Video Formats and Units of Measure**

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

**Figures 3-3, 3-4, 3-5, and 3-6** show examples of the critical amplitude limits, and **Table 3-4** lists the critical amplitude limits, which are indicated on the screen by special dashed lines for the video formats that can be displayed by the VTM-420HD/SD.

**Figure 3-3. Digital 525 Displayed as Composite (NTSC) Shown in Zoom Mode (75% Chroma)**

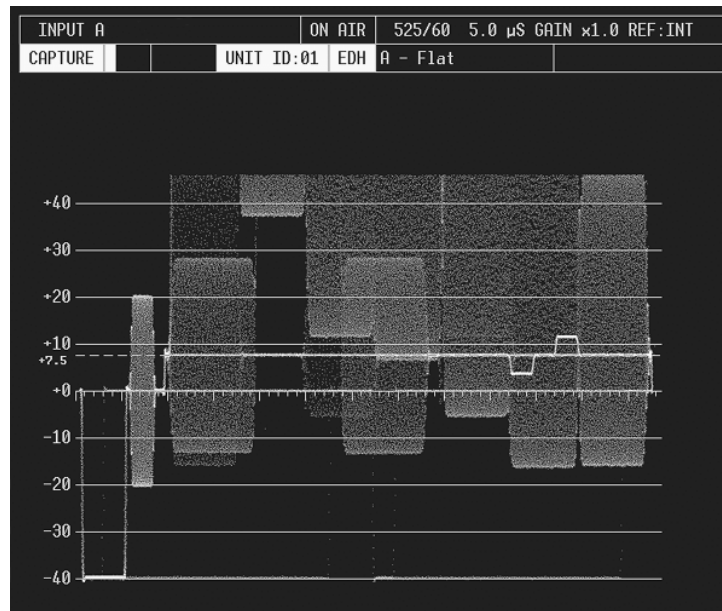


Figure 3-4. Digital 525 Display (75% Chroma)

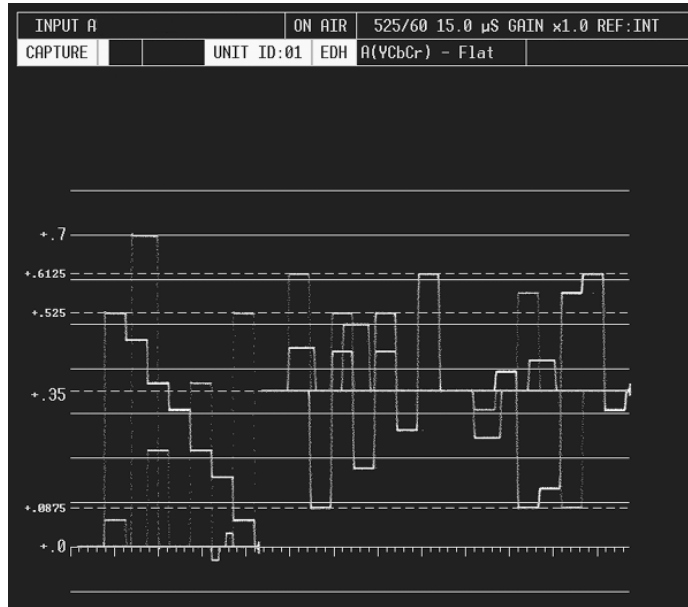


Figure 3-5. Digital 625 Display (75% Chroma)

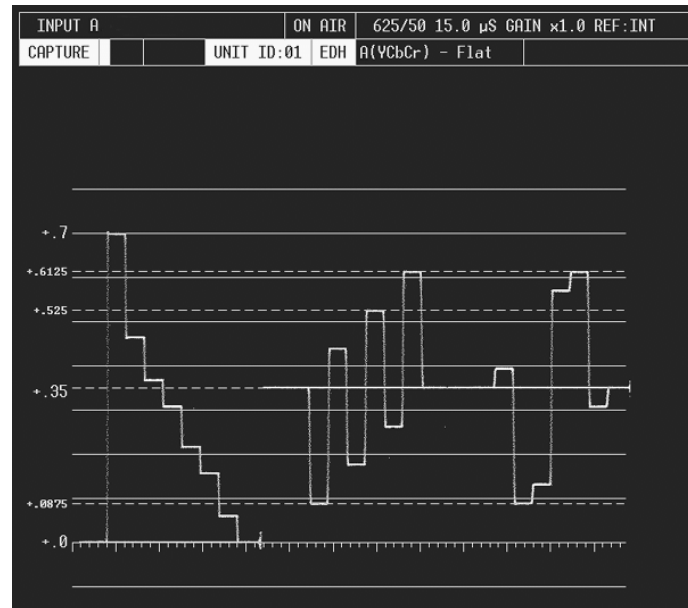


Figure 3-6. Digital 1080i 59.94 Hz Display (75% Chroma)

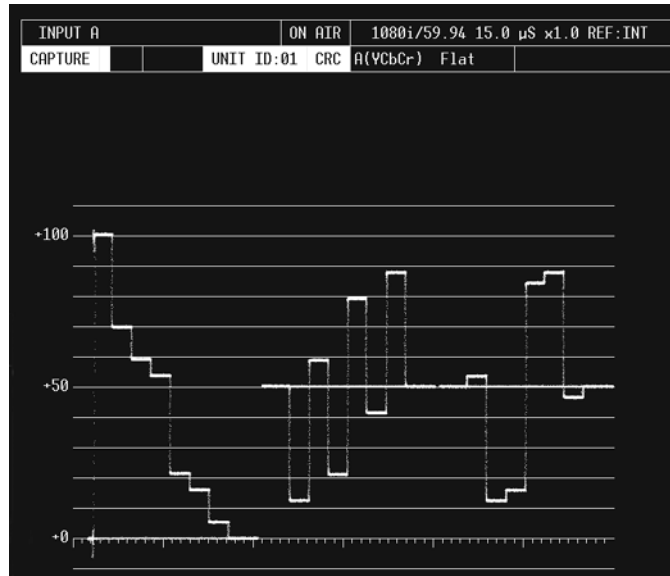


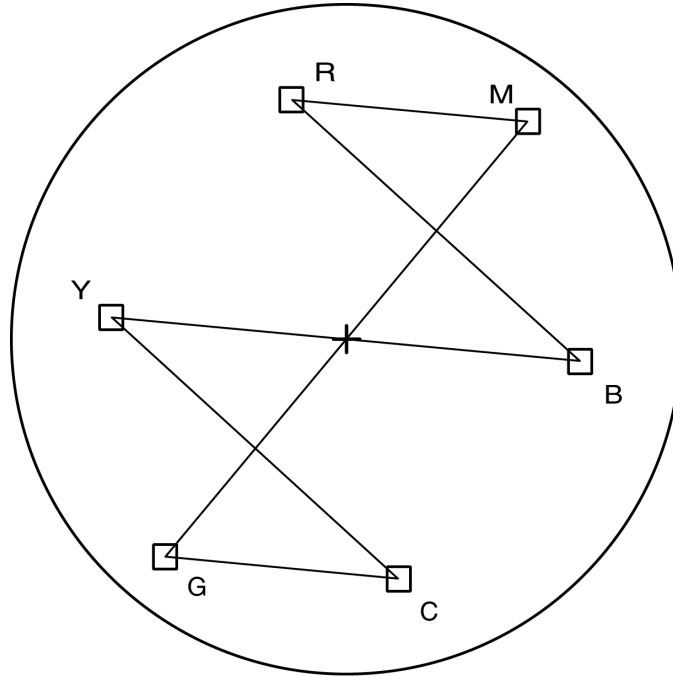
Table 3-4. Video Formats and Critical Amplitude Limits

| Video Format                                | Critical Amplitude Limits   |
|---|---|
| High Definition and Standard Definition     | 0.6125 V = upper 75% chroma limit<br>0.525 V = 75% luminance limit<br>0.0350 V = 50% point; black for color difference channels<br>0.875 V = lower 75% chroma limit |
| Standard Definition 525 as Composite (NTSC) | 7.5 IRE – black level   |

## Vector Graticule Scales

The vector graticule scales also change according to the video format displayed. These scales are illustrated in **Figure 3-7**, **Figure 3-8**, **Figure 3-9**, **Figure 3-10**, and **Figure 3-11**.

**Figure 3-7. Vector Graticule Component Markings**



**Figure 3-8. Vector Display Zoom on Center (NTSC Full Screen)**

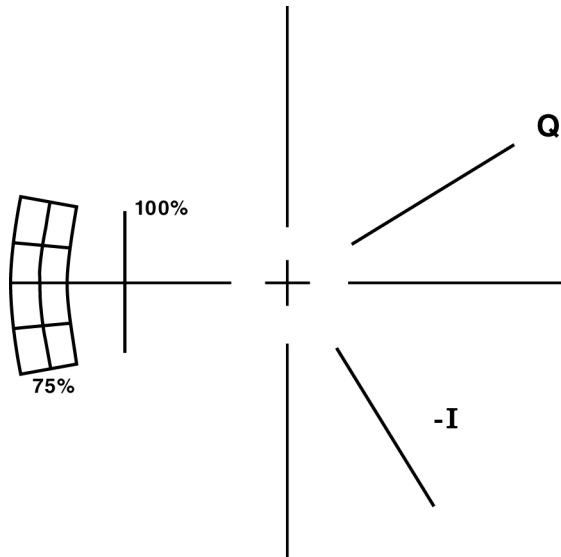


Figure 3-9. Vector Graticule Differential Gain and Differential Phase Markings

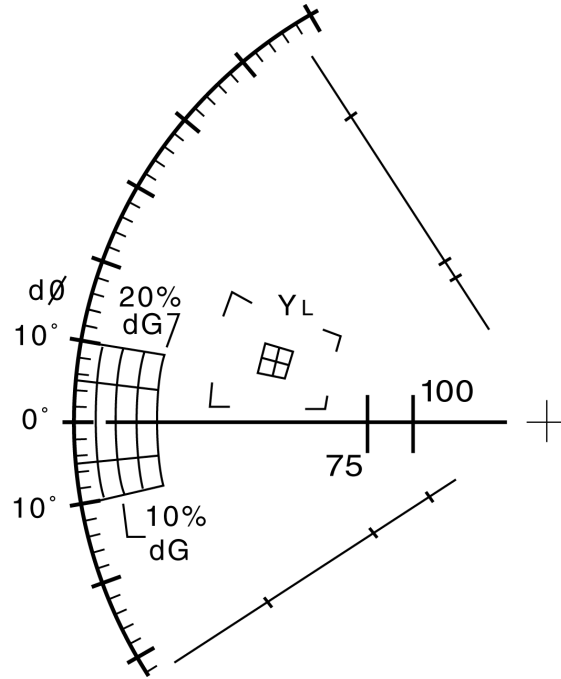


Figure 3-10. Vector Graticule NTSC Markings

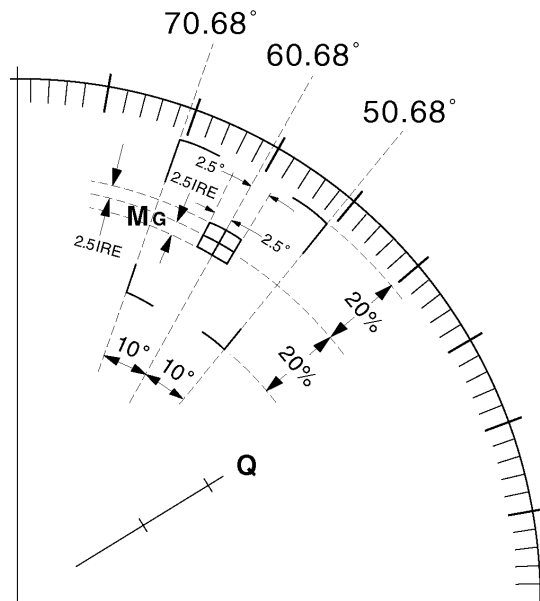
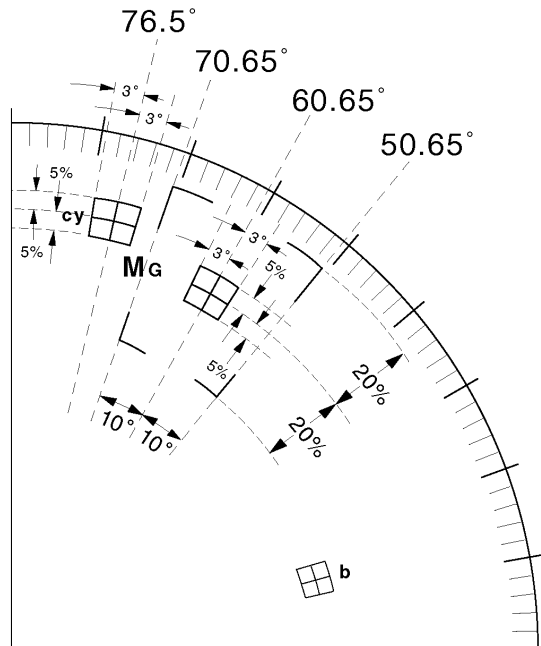


Figure 3-11. Vector Graticule PAL Markings



## NTSC-J Simulation

When in 525/60 Composite mode, set the NTSC PEDESTAL (located in VIDEO Setup/Video General setup menu) to OFF in order to simulate an NTSC-J signal.

## Audio Ballistics

The audio scales and ballistics are based on the IEC 268-10 and 268-17 standards. These standards describe meter scale markings and both attack and delay times for meter movement. The following meter responses can be selected:

- NORMAL
- PEAK
- PEAK HOLD\*
- PEAK HOLD INFINITE
- TRUE PEAK
- TRUE PEAK HOLD\*
- TRUE PEAK HOLD INFINITE
- VU + PEAK
- VU + PEAK HOLD\*
- VU + PEAK HOLD INFINITE
- VU + TRUE PEAK
- VU + TRUE PEAK HOLD\*
- VU + TRUE PEAK HOLD INFINITE

- **RESET PEAK HOLD**

PEAK HOLD INFINITE can be cleared by selecting RESET on the AUDIO SETUP menu or by pressing and holding AUDIO ZOOM.

\*NOTE: PEAK HOLD TIME is a user-selectable duration value of 1 to 10 seconds for PEAK HOLD. The duration only applies to the fall (not the rise) of the PEAK value.

## Audio Input/Output (Option 7, 7A, and 8)

NOTE: If utilizing **Options 7B, 8A, and 9**, see the 4B, 5B, 7B, 8A, 8B, 9A and 9B Installation and Operation Handbook for operation instructions.

The VTM-420HD/SD Options 7, 7A, and 8 accept up to 8 AES/EBU, analog and embedded inputs, and provides up to 8 analog output channels (with enhanced SNR for Option 7A). Option 8 also includes Dolby D and Dolby E inputs.

Configure the audio display type and parameters using the AUDIO SETUP menu. Audio can be displayed as:

- 1 stereo meter pair and 1 lissajous with phase bar
- 2 stereo meter pair and 2 lissajous with phase bars
- 6 channels of vertical bar meters with phase bars
- 6 channel CineSound™ with phase bars
- 8 channels of vertical bar meters with phase bars
- 8 channel CineSound with phase bars

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

## Dolby Operation

Option 8 can be configured in the Setup menu.

1. Press the SETUP/LEARN button to display the SETUP MENU.
2. Rotate the WAVEFORM POSITION-H knob (H knob) to select the AUDIO SETUP menu.
3. Press the H knob.
4. Rotate the H knob to select Configure Input A or B.
5. Press the H knob.
6. Rotate the H knob to select Dolby to access the Dolby menu selections.

In the Dolby menu, the audio format and meters that show on the screen can be automatically detected or manually selected in the Dolby Display option. The meters are displayed in either a CineSound or standard meter format. The CineSound or Vertical options are selected by Display Type.

Any one of the digital inputs can be routed for Dolby processing. The data derived from the Dolby processing is sent to the meters for display. A downmix or Dolby channel is available on audio output 1 for monitoring purposes. The output downmix

is chosen from the menu. Other Dolby related configurations are available in the Dolby configuration menu.

## CineSound™ Audio Display

CineSound, shown in **Figure 3-12**, is a unique audio display that provides an intuitive view of 5.1 and 7.1 channels of surround-sound audio. The default meter movement is from the center outward but can be reversed by a selection in the AUDIO SETUP menu. Two additional channels of audio can be viewed next to the CineSound display, which provides a total of eight channels on the screen. When the CineSound display is selected, the audio inputs follow a SMPTE 320M mapping scheme described in **Table 3-5**.

Figure 3-12. CineSound Audio Display

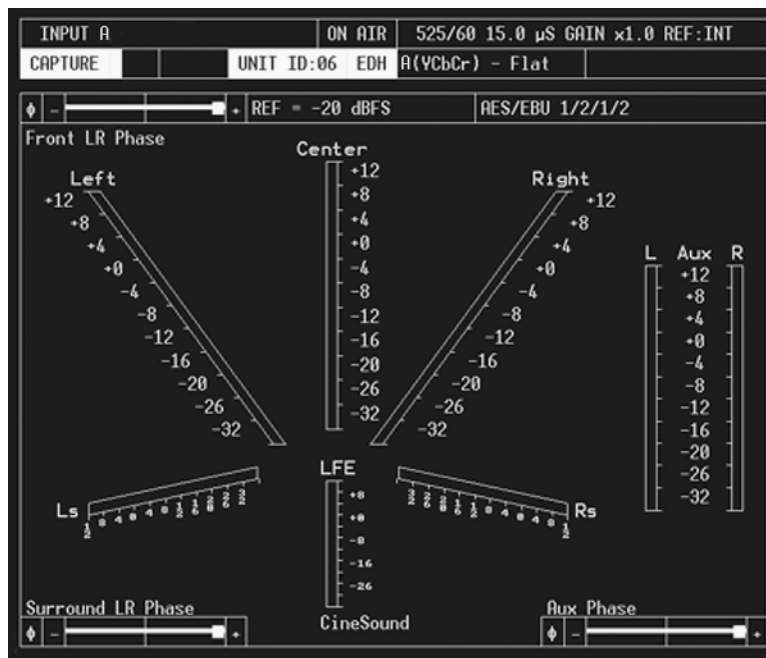


Table 3-5. CineSound Audio Input Mapping

| Analog Input | AES/EBU Input | CineSound Display Assignment | 8-Bar Display Assignment |
|--------------|---------------|------------------------------|--------------------------|
| 1            | 1             | Left                         | 1 Left                   |
| 2            | 1             | Right                        | 1 Right                  |
| 3            | 2             | Center                       | 2 Left                   |
| 4            | 2             | Low Frequency Effects (LFE)  | 2 Right                  |
| 5            | 3             | Left Surround (LS)           | 3 Left                   |
| 6            | 3             | Right Surround (RS)          | 3 Right                  |
| 7            | 4             | Left Aux                     | 4 Left                   |
| 8            | 4             | Right Aux                    | 4 Right                  |



## Factory-Default Settings

The VTM-420HD/SD assumes the factory-default settings when it is first powered on. These default settings are listed in **Table 3-6**. The numbers in the “Key” column correspond to the callouts in Figure 3-1.

**Table 3-6. Default Settings**

| Key | Label                            | Default Setting                   |
|-----|----------------------------------|-----------------------------------|
| 1   | BYPASS                           | Unit not bypassed                 |
| 2   | DISPLAY                          | Simultaneous display              |
| 3   | TRANSFER                         | No transfers performed            |
| 4   | CAPTURE                          | No captures performed             |
| 5   | INPUT A and B                    | INPUT A selected                  |
| 6   | REF                              | Internal Reference (INT) selected |
| 7   | FILTER                           | Flat                              |
| 8   | SWEEP                            | 1H                                |
| 9   | FORMAT                           | Y <sub>C</sub> B <sub>C</sub> R   |
| 10  | EDIT/CLEAR                       | Edit mode off                     |
| 11  | AUDIO, VECTOR, and WAVEFORM ZOOM | ZOOMS off                         |
| 12  | ALARM SCROLL/CLEAR               | Off                               |
| 13  | SETUP/LEARN                      | Setup mode off                    |
| 14  | PRESET                           | No PRESET selected                |
| 15  | LINE SELECT (button)             | Off                               |
| 16  | LINE SELECT (knob)               | Disabled                          |
| 17  | WAVEFORM POSITION-H              | Centered                          |
| 18  | WAVEFORM POSITION-V              | Blanking level on 0 line          |
| 19  | VECTOR PHASE                     | N/A                               |

The VTM-420HD/SD can be configured for many signals and custom displays. Review any site-specific signal monitoring requirements and use the **SETUP MENU** to configure the VTM-420HD/SD. The VTM-420HD/SD retains all configuration changes in Nonvolatile RAM (NVRAM).

## Video Inputs

The VTM-420HD/SD accepts two video serial digital standards: High Definition and Standard Definition.

### Selecting Video Inputs

Press INPUT next to the A and B LEDs to select A, B, or A+B. The default condition for A+B is the PARADE mode. Inputs A+B are available in RGB and YC<sub>B</sub>C<sub>R</sub> formats when both inputs are the same video standard.

**NOTE:** Enter the SETUP MENU to change to the OVERLAY mode.

### Selecting Filters

There are three filters available: Flat, Low Pass, and Chroma/Bowtie. Press FILTER to select the next filter. Multiple filters can function simultaneously (see Selecting Multiple Inputs and Filters on page 3-15).

### Selecting Sweep Modes

Press SWEEP to select one of the four sweep modes: 1H (1 Horizontal line), 2H (2 Horizontal lines), 1V (1 Vertical field), and 2V (2 Vertical fields). Under the DISPLAY SETUP menu, there are two settings for the VGA FRAME RATE that affect the appearance of the waveform in vertical sweep modes: VESA 60 Hz and OPTIMIZE FOR INPUT. Select VESA 60 Hz to keep the monitor output fixed at 60 Hz. This ensures that interruption of the input signal does not cause the monitor to go blank. OPTIMIZE FOR INPUT locks the monitor very close to the input sweep rate.

### Selecting a Display Format

Press FORMAT to select one of three display formats: RGB, YC<sub>B</sub>C<sub>R</sub>, or COMPOSITE. **Table 3-7** lists the relationships between the input and display formats:

**Table 3-7. Input and Display Format Relationship**

| Input/Format | RGB | YC <sub>B</sub> C <sub>R</sub> | Composite |
|--------------|-----|--------------------------------|-----------|
| HD           | Yes | Yes                            | No        |
| SD           | Yes | Yes                            | Yes       |

### Expanding the Display Capability of INPUT SWEEP or FILTER Using the EDIT/CLEAR Button

Press EDIT/CLEAR in conjunction with INPUT, SWEEP, or FILTER to expand the display capability. In the Composite format mode, select 2H sweep. A different cell will be highlighted each time the EDIT/CLEAR button is pressed. Two cells comprise the horizontal waveform display. The active cell (available for edit) is indicated at the top of the waveform display area; cell #1 is to the left and cell #2 is to the right.

When viewing a digital input, press EDIT/CLEAR to sequence through the individual components. For example, when viewing a digital input in  $YC_B C_R$  format, repeatedly press EDIT/CLEAR to select the Y channel,  $C_B$  channel,  $C_R$  channel, or all three channels combined. The next section, called Selecting Multiple Inputs and Filters, describes how to use the buttons in combination.

## Selecting Multiple Inputs and Filters

Multiple inputs can be displayed if they are in the same format, and filter-with-input combinations can be displayed by using a combination of the INPUT, FILTER, SWEEP, and EDIT/CLEAR buttons. Below are some combination display examples.

To display the INPUT A and B OVERLAY:

1. Press SETUP/LEARN to access the SETUP MENU.
2. Rotate the WAVEFORM POSITION-H knob (H knob) to move the cursor to VIDEO SETUP.
3. Press the H knob.
4. Rotate the H knob to select WAVEFORM SETUP.
5. Press the H knob.
6. Rotate the H knob to select WAVEFORM OVERLAY.
7. Press the H knob.
8. Rotate the H knob to select OVERLAY.
9. Press the WAVEFORM POSITION-V knob four times to exit.

To display the INPUT A and B Y (luminance) channel PARADE:

1. Press INPUT until the A and B LEDs are illuminated.
2. Press FORMAT to select  $YC_B C_R$ .
3. Press EDIT/CLEAR until cell #1 indicates A(Y) and cell #2 indicates B(Y).  
The default condition of digital inputs A + B is an overlay of  $YC_B C_R$ .

## AUDIO, VECTOR, and WAVEFORM ZOOM Buttons

There are three ZOOM buttons: WAVEFORM, VECTOR, and AUDIO. The following subsections explain the use of the buttons.

### Expanding the Audio Display

- To expand the audio scales around the 0 dB reference point and enable increased resolution of readings, press AUDIO ZOOM.
- To clear the peak-hold scale indicator, press and hold AUDIO ZOOM for approximately two seconds.

## Expanding the Vector Display

Press VECTOR ZOOM to select one of five expanded display options:

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

As with AUDIO ZOOM, the VECTOR ZOOM is helpful when an increased resolution of phase or saturation readings is required.

## Expanding the Waveform Display

Press WAVEFORM ZOOM to select one of two display options:

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

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

## Scrolling Through or Clearing the Alarm List

- To scroll up or down the alarm list using the WAVEFORM POSITION-V knob, press ALARM SCROLL/CLEAR.
- To clear the alarm list, press and hold ALARM SCROLL/CLEAR for approximately two seconds.

For more information on setting and reading alarms, see Setting Alarms on page 3-48.

## Ethernet Interface (Option)

The VTM-420HD/SD Ethernet interface provides a high-speed communication link to the Videotek *SpyderWeb* application over standard LAN and Internet networks. The interface conforms to industry Ethernet standards:

- Connection by 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, and DHCP enable are all programmable from the I/O AND COMMUNICATIONS menu.

## ROUTER CONTROL

There are two RJ11 router control ports located on the back panel. The ports are used to control Videotek RS series routers. One RS series router can be connected to each port. The router can be switched manually or set to scan all inputs, which is especially useful when the alarms are activated. The router can be set to continuously scan selected inputs searching for alarm conditions. All alarm conditions detected by the VTM-420HD/SD will be logged on the display (maximum 100 alarms), or a PC (running *SpyderWeb* software) can produce a continuous log file.

Router control is accessed in the SETUP menu under the VIDEO SETUP/VIDEO GENERAL/INPUT A or B ROUTER menu. Selecting ROUTER will allow manual control, and SCANNER will force the router to sequentially switch through all activated inputs. DWELL TIME is used on each input for the selected time. Manual control has two methods of operation:

- Selecting INPUT A or B ROUTER in the VIDEO SETUP menu.
- Pressing and holding the INPUT button while rotating the WAVEFORM POSITION H knob (H knob), which cycles through all the enabled router channels. This function is disabled when in the SETUP menu.

Each input (INPUT A1 to INPUT A12/INPUT B1 to INPUT B12) of the router can also be given a unique name that will be placed in the log file when an alarm is detected on that input. The names are entered using a keyboard connected to the back panel.

## EXTERNAL GPI

The INPUT and OUTPUT General Purpose Interface (GPI) has nine input GPI and two output GPI connections. The pin-out and default functions are listed in **Table C-4** on page C-4 in Appendix C.

## INPUT GPI

The input GPIs have two selectable functions. The first function allows external control of the unit using the default settings. The second function of the GPI shows an onscreen alarm with a user-selected identification from an external input.

To setup GPI for USER FUNCTION:

1. Press SETUP/LEARN to display the SETUP MENU.
2. Rotate the WAVEFORM POSITION-H knob (H knob) to move the cursor to I/O AND COMMUNICATIONS.
3. Press the H knob.
4. Rotate the H knob to move the cursor to GPI INPUT FUNCTION.
5. Press the H knob.
6. Rotate the H knob to select the desired input.
7. Press the H knob.
8. Rotate the H knob to select USER GPI.

9. Press the H knob.
10. Use the keyboard to insert a new name.
11. Press the WAVEFORM POSITION-V knob five times to exit.

## OUTPUT GPI

There are two OUTPUT GPIs with a list of 37 GPI alarm activations to choose from. All GPI alarm activation selections are set to the default OFF. When a selection is set to ON it allows the GPI to function according to the GPI Output Polarity Setting (NORMALLY OPEN, NORMALLY CLOSED). The default polarity setting is NORMALLY OPEN. These settings are found in the I/O AND COMMUNICATIONS menu.

## LTC/CLOCK

There are inputs for an external Longitudinal Time Code (LTC) and Clock (CLK) on the GPI/TALLY, LTC/CLK connection listed in **Table C-4** on page C-4 in Appendix C. The LTC/CLK shows when and how long an error occurs. When an error develops, the captured time of that error from the internal clock is expressed with the specific alarm in the lower-left corner of the screen. The Time Code selection and the Clock can be set in the I/O AND COMMUNICATIONS menu.

## Navigating the SETUP MENU

Press SETUP/LEARN to display or exit the SETUP MENU. Use the following knobs to navigate and select values on the SETUP MENU:

- WAVEFORM POSITION-H
  - Rotate the knob left or right to move the menu cursor or to change a value or condition in a menu.
  - Press the knob to select a menu item.
- WAVEFORM POSITION-V
  - Rotate the knob to change a selected value or move a graticule cursor line.
  - Press the knob to exit one level.
- VECTOR PHASE
  - Press the knob to toggle between last setup screen and normal display mode.

Enter the Setup mode to display the SETUP MENU. The SETUP MENU consists of seven major groups, which are listed in **Table 3-8**.

**Table 3-8. SETUP MENU Groups**

| Group                         | Description   |
|-------------------------------|---|
| <b>VIDEO SETUP</b>            | General video setup conditions, standards, cursors, and vector position |
| <b>AUDIO SETUP*</b>           | Levels, scales, and audio-follow configurations                         |
| <b>WAVEFORM ALARMS</b>        | Waveform alarm-limit configurations for SD and HD                       |
| <b>AUDIO ALARMS*</b>          | Alarm-limit configurations for audio signals                            |
| <b>TIME CODE ALARMS</b>       | Alarm-limit configurations for time codes                               |
| <b>I/O AND COMMUNICATIONS</b> | Communication, clock, and GPI settings                                  |
| <b>DISPLAY SETUP</b>          | Intensity, graticule colors, and special display conditions             |

The tables on the following pages detail the group menus.

\* **NOTE:** If utilizing **Options 7B, 8A, and 9**, see the 4B, 5B, 7B, 8A, 8B, 9A and 9B Installation and Operation Handbook for operation instructions.

Table 3-9. VIDEO SETUP Menu

|                        |                          |                          |          |   |
|------------------------|--------------------------|--------------------------|----------|---|
| <b>VIDEO – GENERAL</b> | <b>REFERENCE INPUT</b>   | BLACKBURST               | -        | - |
|                        |                          | TRI-LEVEL                | -        | - |
|                        | <b>NTSC PEDESTAL</b>     | OFF                      | -        | - |
|                        |                          | ON (7.5 NRE)             | -        | - |
|                        | <b>VIDEO A CONFIGURE</b> | 1080i/60                 | -        | - |
|                        |                          | 1080i/59.94              | -        | - |
|                        |                          | 1080i/50                 | -        | - |
|                        |                          | 1080p/30                 | -        | - |
|                        |                          | 1080p/29.97              | -        | - |
|                        |                          | 1080p/25                 | -        | - |
|                        |                          | 1080p/24                 | -        | - |
|                        |                          | 1080p/23.98              | -        | - |
|                        |                          | 1080p/30sF               | -        | - |
|                        |                          | 1080p/29.97sF            | -        | - |
|                        |                          | 1080p/25sF               | -        | - |
|                        |                          | 1080p/24sF               | -        | - |
|                        |                          | 1080p/23.98sF            | -        | - |
|                        |                          | 720p/60                  | -        | - |
|                        |                          | 720p/59.94               | -        | - |
|                        |                          | 720p/50                  | -        | - |
|                        |                          | 720p/30                  | -        | - |
|                        |                          | 720p/29.97               | -        | - |
|                        |                          | 480p/59.94               | -        | - |
|                        |                          | 625/50                   | -        | - |
|                        |                          | 525/60                   | -        | - |
|                        |                          | AUTODETECT               | -        | - |
|                        |                          | <b>VIDEO B CONFIGURE</b> | 1080i/60 | - |
|                        | 1080i/59.94              |                          | -        | - |
|                        | 1080i/50                 |                          | -        | - |
|                        | 1080p/30                 |                          | -        | - |
|                        | 1080p/29.97              |                          | -        | - |
|                        | 1080p/25                 |                          | -        | - |
|                        | 1080p/24                 |                          | -        | - |
|                        | 1080p/23.98              |                          | -        | - |
| 1080p/30sF             | -                        |                          | -        |   |
| 1080p/29.97sF          | -                        |                          | -        |   |
| 1080p/25sF             | -                        |                          | -        |   |

(Table continues on next page)



Table 3-9. VIDEO SETUP Menu (*continued*)

|                               |                                 |                      |                     |   |
|-------------------------------|---------------------------------|----------------------|---------------------|---|
| <b>VIDEO – GENERAL (CONT)</b> | <b>VIDEO B CONFIGURE (CONT)</b> | 1080p/24sF           | -                   | - |
|                               |                                 | 1080p/23.98sF        | -                   | - |
|                               |                                 | 720p/60              | -                   | - |
|                               |                                 | 720p/59.94           | -                   | - |
|                               |                                 | 720p/50              | -                   | - |
|                               |                                 | 720p/30              | -                   | - |
|                               |                                 | 720p/29.97           | -                   | - |
|                               |                                 | 480p/59.94           | -                   | - |
|                               |                                 | 625/50               | -                   | - |
|                               |                                 | 525/60               | -                   | - |
|                               |                                 | AUTODETECT           | -                   | - |
|                               | <b>INPUT A ROUTER</b>           | <b>CONFIGURATION</b> | OFF                 | - |
|                               |                                 |                      | ROUTER              | - |
|                               |                                 |                      | SCANNER             | - |
|                               |                                 | DWELL TIME           | OFF/1 TO 60 SECONDS | - |
|                               | INPUT A1 TO INPUT A12           | OFF/ON RENAME        | -                   |   |
|                               | <b>INPUT B ROUTER</b>           | <b>CONFIGURATION</b> | OFF                 | - |
|                               |                                 |                      | ROUTER              | - |
|                               |                                 |                      | SCANNER             | - |
|                               |                                 | DWELL TIME           | OFF/1 TO 60 SECONDS | - |
|                               | INPUT B1 TO INPUT B12           | OFF/ON RENAME        | -                   |   |
|                               | <b>EXIT BYPASS ON ALARM</b>     | OFF                  | -                   | - |
|                               |                                 | ON                   | -                   | - |
|                               | <b>SAFE AREA</b>                | OFF                  | -                   | - |
|                               |                                 | CORNERS ONLY         | -                   | - |
|                               |                                 | BOX                  | -                   | - |
|                               | <b>CLOSED CAPTION DISPLAY</b>   | <b>SD</b>            | OFF                 | - |
|                               |                                 |                      | CC1                 | - |
|                               |                                 |                      | CC3                 | - |
|                               |                                 | <b>HD</b>            | OFF                 | - |
|                               |                                 |                      | CC1                 | - |
|                               |                                 |                      | CC3                 | - |
|                               | <b>CLOSED CAPTION SIZE</b>      | SMALL                | -                   | - |
|                               |                                 | LARGE                | -                   | - |

(Table continues on next page)

Table 3-9. VIDEO SETUP Menu (*continued*)

|                           |                              |                                  |                                     |   |
|---------------------------|------------------------------|----------------------------------|-------------------------------------|---|
| <b>WAVEFORM SETUP</b>     | <b>BLANKING</b>              | FULL                             | -                                   | - |
|                           |                              | SHOW SAV/EAV                     | -                                   | - |
|                           |                              | SHOW ALL                         | -                                   | - |
|                           | <b>CAL PULSE</b>             | OFF                              | -                                   | - |
|                           |                              | ON                               | -                                   | - |
|                           | <b>WAVEFORM OVERLAY</b>      | PARADE                           | -                                   | - |
|                           |                              | OVERLAY                          | -                                   | - |
|                           | <b>HD WAVEFORM GRATICULE</b> | VOLTS                            | -                                   | - |
|                           |                              | PERCENT                          | -                                   | - |
|                           | <b>PAL WAVEFORM SCALE</b>    | UNITS                            | -                                   | - |
|                           |                              | VOLTS                            | -                                   | - |
|                           | <b>VECTOR SETUP</b>          | <b>VECTOR H POSITION</b>         | -128 TO +128<br>(DEFAULT is CENTER) | - |
| <b>VECTOR V POSITION</b>  |                              | -128 TO +128 (Default is CENTER) | -                                   | - |
| <b>VECTOR STANDARD SD</b> |                              | 75%                              | -                                   | - |
|                           |                              | 100%                             | -                                   | - |
| <b>VECTOR STANDARD HD</b> |                              | 75%                              | -                                   | - |
|                           |                              | 100%                             | -                                   | - |
| <b>VECTOR PAL OVERLAY</b> |                              | NORMAL                           | -                                   | - |
|                           | OVERLAY                      | -                                | -                                   |   |
| <b>CURSOR SETUP</b>       | <b>AMPLITUDE</b>             | OFF/ON                           | -                                   | - |
|                           |                              | REF                              | -                                   | - |
|                           |                              | DELTA                            | -                                   | - |
|                           | <b>TIME</b>                  | OFF/ON                           | -                                   | - |
|                           |                              | REF                              | -                                   | - |
|                           |                              | DELTA                            | -                                   | - |
|                           | <b>PHASE</b>                 | OFF/ON                           | -                                   | - |
|                           |                              | REF                              | -                                   | - |
|                           |                              | DELTA                            | -                                   | - |
| <b>CAPTURE SETUP</b>      | <b>CAPTURE DISPLAY</b>       | HOLD IN DISPLAY CYCLE            | -                                   | - |
|                           |                              | CAPTURE ONLY                     | -                                   | - |
|                           | <b>CAPTURE/SEND</b>          | MANUAL                           | -                                   | - |
|                           |                              | AUTO                             | -                                   | - |
|                           | <b>CAPTURE TRIGGER</b>       | FROM ALARM (OFF)                 | -                                   | - |
|                           |                              | FROM CLOCK (OFF)                 | -                                   | - |

(Table continues on next page)

Table 3-9. VIDEO SETUP Menu (*continued*)

|                             |                             |                              |        |   |
|-----------------------------|-----------------------------|------------------------------|--------|---|
| <b>CAPTURE SETUP (CONT)</b> | <b>CAPTURE TRIGGER TIME</b> | DAY (01-31)                  | -      | - |
|                             |                             | HOUR (00-23)                 | -      | - |
|                             |                             | MINUTE (00-59)               | -      | - |
|                             |                             | SECOND (00-59)               | -      | - |
|                             | <b>RETURN TO ACTIVE PIC</b> | MANUAL                       | -      | - |
|                             |                             | AUTO                         | -      | - |
|                             | <b>CAPTURE ON ALARM</b>     | FIRST ALARM                  | -      | - |
|                             |                             | LAST ALARM                   | -      | - |
|                             | <b>ALARMS TO CAPTURE</b>    | <b>AUDIO PEAK</b>            | OFF/ON | - |
|                             |                             | <b>AUDIO PHASE</b>           | OFF/ON | - |
|                             |                             | <b>AUDIO QUIET</b>           | OFF/ON | - |
|                             |                             | <b>AUDIO DATA</b>            | OFF/ON | - |
|                             |                             | <b>AES/EBU PHASE</b>         | OFF/ON | - |
|                             |                             | <b>EDH (SD)</b>              | OFF/ON | - |
|                             |                             | <b>LOSS OF CARRIER</b>       | OFF/ON | - |
|                             |                             | <b>LOSS OF VIDEO</b>         | OFF/ON | - |
|                             |                             | <b>LTC LOSS OF TIME CODE</b> | OFF/ON | - |
|                             |                             | <b>TIME CODE FRAMING</b>     | OFF/ON | - |
|                             |                             | <b>CRC ERROR (HD)</b>        | OFF/ON | - |
|                             |                             | <b>LTC CONTINUITY</b>        | OFF/ON | - |
|                             |                             | <b>DVITC CONTINUITY</b>      | OFF/ON | - |
|                             |                             | <b>DVITC CRC</b>             | OFF/ON | - |
|                             |                             | <b>GPI ALARM 1-9</b>         | OFF/ON | - |
|                             |                             | <b>SAV (SD)</b>              | OFF/ON | - |
|                             |                             | <b>LINE LENGTH (SD)</b>      | OFF/ON | - |
|                             |                             | <b>FIELD LENGTH (SD)</b>     | OFF/ON | - |
|                             |                             | <b>RESV'D VALUES (SD)</b>    | OFF/ON | - |
|                             |                             | <b>ANC CHECKSUM (SD)</b>     | OFF/ON | - |
|                             |                             | <b>ANC PARITY (SD)</b>       | OFF/ON | - |
|                             |                             | <b>ANC PLACEMENT (SD)</b>    | OFF/ON | - |
|                             |                             | <b>NO VIDEO (SD)</b>         | OFF/ON | - |
|                             |                             | <b>RGB GAMUT UPPER</b>       | OFF/ON | - |
| <b>RGB GAMUT LOWER</b>      | OFF/ON                      | -                            |        |   |
| <b>LUM GAMUT UPPER (SD)</b> | OFF/ON                      | -                            |        |   |

(Table continues on next page)

Table 3-9. VIDEO SETUP Menu (continued)

|                      |                          |                      |        |   |
|----------------------|--------------------------|----------------------|--------|---|
| CAPTURE SETUP (CONT) | ALARMS TO CAPTURE (CONT) | LUM GAMUT LOWER (SD) | OFF/ON | - |
|                      |                          | PK GAMUT UPPER (SD)  | OFF/ON | - |
|                      |                          | PK GAMUT LOWER (SD)  | OFF/ON | - |

Table 3-10. AUDIO SETUP Menu (Option 7, 7A, or 8)

|                  |              |                 |                           |            |                 |         |
|------------------|--------------|-----------------|---------------------------|------------|-----------------|---------|
| CONFIGURE INPUTS | INPUT A TO B | AUDIO TYPE      | ANALOG                    | -          | -               | -       |
|                  |              |                 | AES/EBU                   | -          | -               | -       |
|                  |              |                 | EMBEDDED                  | -          | -               | -       |
|                  |              |                 | DOLBY AES (OPTION 8)      | -          | -               | -       |
|                  |              |                 | DOLBY EMBEDDED (OPTION 8) | -          | -               | -       |
|                  |              | AUDIO DISPLAY   | 2 CHANNELS                | INPUT PAIR | PAIR 1          | -       |
|                  |              |                 |                           |            | PAIR 2          | -       |
|                  |              |                 |                           |            | PAIR 3          | -       |
|                  |              |                 |                           |            | PAIR 4          | -       |
|                  |              |                 |                           |            | PAIR 5*         | -       |
|                  |              |                 |                           |            | PAIR 6*         | -       |
|                  |              |                 |                           |            | PAIR 7*         | -       |
|                  |              |                 |                           |            | PAIR 8*         | -       |
|                  |              |                 | 4 CHANNELS                | METER 1    | SUM(M)/DIFF (S) | OFF/ON  |
|                  |              |                 |                           |            | INPUT PAIR      | PAIR 1  |
|                  |              |                 |                           |            |                 | PAIR 2  |
|                  |              |                 |                           |            |                 | PAIR 3  |
|                  |              |                 |                           |            |                 | PAIR 4  |
|                  |              |                 |                           |            |                 | PAIR 5* |
|                  |              |                 |                           |            |                 | PAIR 6* |
| 4 CHANNELS       | METER 2      | SUM(M)/DIFF (S) | -                         |            |                 |         |
|                  |              | INPUT PAIR      | PAIR 1                    |            |                 |         |
|                  |              |                 | PAIR 2                    |            |                 |         |
|                  |              |                 | PAIR 3                    |            |                 |         |
|                  |              | PAIR 4          |                           |            |                 |         |

NOTE: Not available when Audio Type ANALOG is selected.

(Table continues on next page)

Table 3-10. AUDIO SETUP Menu (Option 7, 7A, or 8) (continued)

| CONFIGURE INPUTS (CONT) | INPUT A TO B (CONT) | AUDIO DISPLAY (CONT) | 4 CHANNELS (CONT) | METER 2 (CONT) | INPUT PAIR (CONT) | PAIR 5* |
|-------------------------|---------------------|----------------------|-------------------|----------------|-------------------|---------|
|                         |                     |                      |                   |                |                   | PAIR 6* |
|                         |                     |                      |                   |                |                   | PAIR 7* |
|                         |                     |                      |                   |                |                   | PAIR 8* |
|                         |                     |                      | 6 CHANNELS        | DISPLAY TYPE   | VERTICAL          | -       |
|                         | CINESOUND           | -                    |                   |                |                   |         |
|                         | METER 1             | PAIR 1               | -                 |                |                   |         |
|                         |                     | PAIR 2               | -                 |                |                   |         |
|                         |                     | PAIR 3               | -                 |                |                   |         |
|                         |                     | PAIR 4               | -                 |                |                   |         |
|                         |                     | PAIR 5*              | -                 |                |                   |         |
|                         |                     | PAIR 6*              | -                 |                |                   |         |
|                         |                     | PAIR 7*              | -                 |                |                   |         |
|                         |                     | PAIR 8*              | -                 |                |                   |         |
|                         | METER 2             | PAIR 1               | -                 |                |                   |         |
|                         |                     | PAIR 2               | -                 |                |                   |         |
|                         |                     | PAIR 3               | -                 |                |                   |         |
|                         |                     | PAIR 4               | -                 |                |                   |         |
|                         |                     | PAIR 5*              | -                 |                |                   |         |
|                         |                     | PAIR 6*              | -                 |                |                   |         |
|                         |                     | PAIR 7*              | -                 |                |                   |         |
|                         |                     | PAIR 8*              | -                 |                |                   |         |
|                         | METER 3             | PAIR 1               | -                 |                |                   |         |
|                         |                     | PAIR 2               | -                 |                |                   |         |
|                         |                     | PAIR 3               | -                 |                |                   |         |
|                         |                     | PAIR 4               | -                 |                |                   |         |
|                         |                     | PAIR 5*              | -                 |                |                   |         |
|                         |                     | PAIR 6*              | -                 |                |                   |         |
|                         |                     | PAIR 7*              | -                 |                |                   |         |
|                         |                     | PAIR 8*              | -                 |                |                   |         |
| 8 CHANNELS              | DISPLAY TYPE        | VERTICAL             | -                 |                |                   |         |
|                         | CINESOUND           | -                    |                   |                |                   |         |
|                         | METER 1             | PAIR 1               | -                 |                |                   |         |
|                         |                     | PAIR 2               | -                 |                |                   |         |
|                         |                     | PAIR 3               | -                 |                |                   |         |

NOTE: Not available when Audio Type ANALOG is selected.

(Table continues on next page)

Table 3-10. AUDIO SETUP Menu (Option 7, 7A, or 8) (continued)

|                         |                     |                          |                   |                |         |   |
|-------------------------|---------------------|--------------------------|-------------------|----------------|---------|---|
| CONFIGURE INPUTS (CONT) | INPUT A TO B (CONT) | AUDIO DISPLAY (CONT)     | 8 CHANNELS (CONT) | METER 1 (CONT) | PAIR 3  | - |
|                         |                     |                          |                   |                | PAIR 4  | - |
|                         |                     |                          |                   |                | PAIR 5* | - |
|                         |                     |                          |                   |                | PAIR 6* | - |
|                         |                     |                          |                   |                | PAIR 7* | - |
|                         |                     |                          |                   |                | PAIR 8* | - |
|                         |                     |                          |                   | METER 2        | PAIR 1  | - |
|                         |                     |                          |                   |                | PAIR 2  | - |
|                         |                     |                          |                   |                | PAIR 3  | - |
|                         |                     |                          |                   |                | PAIR 4  | - |
|                         |                     |                          |                   |                | PAIR 5* | - |
|                         |                     |                          |                   |                | PAIR 6* | - |
|                         |                     |                          |                   |                | PAIR 7* | - |
|                         |                     |                          |                   |                | PAIR 8* | - |
|                         |                     |                          |                   | METER 3        | PAIR 1  | - |
|                         |                     |                          |                   |                | PAIR 2  | - |
|                         |                     |                          |                   |                | PAIR 3  | - |
|                         |                     |                          |                   |                | PAIR 4  | - |
|                         |                     |                          |                   |                | PAIR 5* | - |
|                         |                     |                          |                   |                | PAIR 6* | - |
|                         |                     |                          |                   |                | PAIR 7* | - |
|                         |                     |                          |                   |                | PAIR 8* | - |
|                         |                     |                          |                   | METER 4        | PAIR 1  | - |
|                         |                     |                          |                   |                | PAIR 2  | - |
|                         |                     |                          |                   |                | PAIR 3  | - |
|                         |                     |                          |                   |                | PAIR 4  | - |
|                         |                     |                          |                   |                | PAIR 5* | - |
|                         |                     |                          |                   |                | PAIR 6* | - |
|                         |                     | PAIR 7*                  | -                 |                |         |   |
|                         |                     | PAIR 8*                  | -                 |                |         |   |
|                         |                     | DOLBY DISPLAY (OPTION 8) | INPUT             | INPUT 1        | -       | - |
|                         |                     |                          |                   | INPUT 2        | -       | - |
| INPUT 3                 | -                   |                          |                   | -              |         |   |
| INPUT 4                 | -                   |                          |                   | -              |         |   |
| INPUT 5                 | -                   |                          |                   | -              |         |   |

NOTE: Not available when Audio Type ANALOG is selected.

(Table continues on next page)

Table 3-10. AUDIO SETUP Menu (Option 7, 7A, or 8) (continued)

| CONFIGURE INPUTS (CONT) | INPUT A TO B (CONT) | DOLBY DISPLAY (OPTION 8) (CONT) | INPUT (CONT)       |                   |         |   |   |
|-------------------------|---------------------|---------------------------------|--------------------|-------------------|---------|---|---|
|                         |                     |                                 |                    |                   |         |   |   |
|                         |                     |                                 |                    | INPUT 6           | -       | - |   |
|                         |                     |                                 |                    | INPUT 7           | -       | - |   |
|                         |                     |                                 |                    | INPUT 8           | -       | - |   |
|                         |                     |                                 | DOLBY INPUT FORMAT | AUTODETECT        | -       | - |   |
|                         |                     |                                 |                    | 8 CHANNEL DOLBY E | 5.1 + 2 | - | - |
|                         |                     |                                 |                    |                   | 5.1+2x1 | - | - |
|                         |                     |                                 |                    |                   | 2x4     | - | - |
|                         |                     |                                 |                    |                   | 4+2x2   | - | - |
|                         |                     |                                 |                    |                   | 4+2+2x1 | - | - |
|                         |                     |                                 |                    |                   | 4+4x1   | - | - |
|                         |                     |                                 |                    |                   | 4x2     | - | - |
|                         |                     |                                 |                    |                   | 3x2+2x1 | - | - |
|                         |                     |                                 |                    |                   | 2x2+4x1 | - | - |
|                         |                     |                                 |                    |                   | 2+6x1   | - | - |
|                         |                     |                                 |                    | 8x1               | -       | - |   |
|                         |                     |                                 |                    | 6 CHANNEL DOLBY E | 5.1     | - | - |
|                         |                     |                                 |                    |                   | 4+2     | - | - |
|                         |                     |                                 |                    |                   | 4+2x1   | - | - |
|                         |                     |                                 |                    |                   | 3x2     | - | - |
|                         |                     |                                 |                    |                   | 2x2+2x1 | - | - |
|                         |                     |                                 |                    |                   | 2+4x1   | - | - |
|                         |                     |                                 |                    | 4 CHANNEL DOLBY E | 6x1     | - | - |
|                         |                     |                                 |                    |                   | 4       | - | - |
|                         |                     |                                 |                    |                   | 2x2     | - | - |
|                         |                     |                                 |                    |                   | 2+4x1   | - | - |
|                         |                     |                                 |                    | DOLBY DIGITAL     | 4x1     | - | - |
|                         |                     |                                 | 3/2L               |                   | -       | - |   |
|                         |                     |                                 | 3/2                |                   | -       | - |   |
|                         |                     |                                 | 2/2L               |                   | -       | - |   |
|                         |                     |                                 | 2/2                |                   | -       | - |   |
|                         |                     |                                 | 3/1L               |                   | -       | - |   |
|                         |                     |                                 | 3/1                |                   | -       | - |   |
|                         |                     |                                 | 2/1L               |                   | -       | - |   |
|                         |                     |                                 | 2/1                | -                 | -       |   |   |
|                         |                     |                                 | 3/0L               | -                 | -       |   |   |

(Table continues on next page)

Table 3-10. AUDIO SETUP Menu (Option 7, 7A, or 8) (continued)

|                         |                     |                                 |                           |                      |     |   |
|-------------------------|---------------------|---------------------------------|---------------------------|----------------------|-----|---|
| CONFIGURE INPUTS (CONT) | INPUT A TO B (CONT) | DOLBY DISPLAY (OPTION 8) (CONT) | DOLBY INPUT FORMAT (CONT) | DIGITAL DOLBY (CONT) | 3/0 | - |
|                         |                     |                                 |                           |                      | 2/0 | - |
|                         |                     |                                 |                           |                      | 1/0 | - |
|                         |                     |                                 |                           |                      | 1/1 | - |
|                         |                     |                                 | PULLDOWN MODE             | DISABLED             | -   | - |
|                         |                     |                                 |                           | ENABLED              | -   | - |
|                         |                     |                                 | AES CHANNEL SELECT        | CHANNEL 1            | -   | - |
|                         |                     |                                 |                           | CHANNEL 2            | -   | - |
| REFERENCE LEVEL         | ANALOG (dBm)        | +0                              | -                         | -                    | -   | - |
|                         |                     | +4                              | -                         | -                    | -   | - |
|                         |                     | +6                              | -                         | -                    | -   | - |
|                         |                     | +8                              | -                         | -                    | -   | - |
|                         |                     | +12                             | -                         | -                    | -   | - |
|                         | DIGITAL (dBFS)      | -22                             | -                         | -                    | -   | - |
|                         |                     | -20                             | -                         | -                    | -   | - |
|                         |                     | -18                             | -                         | -                    | -   | - |
|                         |                     | -15                             | -                         | -                    | -   | - |
|                         |                     | -12                             | -                         | -                    | -   | - |
|                         |                     | -9                              | -                         | -                    | -   | - |
|                         |                     | METER SETUP                     | ANALOG SCALE              | TYPE I               | -   | - |
| TYPE IIa                | -                   |                                 |                           | -                    | -   | - |
| TYPE IIb                | -                   |                                 |                           | -                    | -   | - |
| TYPE I +8               | -                   |                                 |                           | -                    | -   | - |
| NORDIC                  | -                   |                                 |                           | -                    | -   | - |
| DIN 45406               | -                   |                                 |                           | -                    | -   | - |
| DIGITAL SCALE           | TYPE I              |                                 | -                         | -                    | -   | - |
|                         | TYPE IIa            |                                 | -                         | -                    | -   | - |
|                         | TYPE IIb            |                                 | -                         | -                    | -   | - |
|                         | TYPE I +8           |                                 | -                         | -                    | -   | - |
|                         | NORDIC              |                                 | -                         | -                    | -   | - |
|                         | DIN 45406           |                                 | -                         | -                    | -   | - |
|                         | dBFS                |                                 | -                         | -                    | -   | - |
| ZERO REF dBFS           | -                   |                                 | -                         | -                    | -   |   |
| METER RESPONSE          | VU                  |                                 | -                         | -                    | -   | - |

(Table continues on next page)



Table 3-10. AUDIO SETUP Menu (Option 7, 7A, or 8) (continued)

|                           |                               |                           |                                |                                    |   |   |   |
|---------------------------|-------------------------------|---------------------------|--------------------------------|------------------------------------|---|---|---|
| <b>METER SETUP (CONT)</b> | <b>METER RESPONSE (CONT)</b>  | PEAK                      | -                              | -                                  | - | - |   |
|                           |                               | TRUE PEAK                 | -                              | -                                  | - | - |   |
|                           |                               | VU + PEAK                 | -                              | -                                  | - | - |   |
|                           |                               | VU + TRUE PEAK            | -                              | -                                  | - | - |   |
|                           |                               | <b>CUSTOM</b>             | <b>ATTACK</b>                  | 0 ms TO 20 ms                      | - | - | - |
|                           |                               |                           | <b>DECAY</b>                   | 0.5 SEC TO 5.0 SEC (0.1 INCREMENT) | - | - | - |
|                           | <b>PEAK HOLD TIME</b>         | <b>PEAK HOLD TIME</b>     | OFF, 1 TO 10 SECONDS, INFINITE | -                                  | - | - |   |
|                           |                               | RESET PEAK HOLD           | -                              | -                                  | - | - |   |
|                           | <b>METER LABELS</b>           | STEREO PAIRS              | -                              | -                                  | - | - |   |
|                           |                               | SMPTE 320M                | -                              | -                                  | - | - |   |
|                           | <b>CONFIGURE PHASE BAR(S)</b> | <b>POLARITY</b>           | NORMAL                         | -                                  | - | - |   |
|                           |                               |                           | REVERSE                        | -                                  | - | - |   |
|                           | <b>LFE OFFSET</b>             | 0 (NONE)                  | -                              | -                                  | - | - |   |
|                           |                               | -10 dB                    | -                              | -                                  | - | - |   |
|                           | <b>CINESOUND DIRECTION</b>    | OUTWARD                   | -                              | -                                  | - | - |   |
|                           |                               | INWARD                    | -                              | -                                  | - | - |   |
|                           | <b>AUDIO MARKERS</b>          | OFF                       | -                              | -                                  | - | - |   |
|                           |                               | ON                        | -                              | -                                  | - | - |   |
|                           |                               | <b>POSITION</b>           | -50 dB TO +12 dB               | -                                  | - | - |   |
|                           | <b>DOLBY SETUP (OPTION 8)</b> | <b>AUX OUTPUT MAPPING</b> | <b>DOLBY PROGRAM SELECT</b>    | PROGRAM 1                          | - | - | - |
| PROGRAM 2                 |                               |                           |                                | -                                  | - | - |   |
| PROGRAM 3                 |                               |                           |                                | -                                  | - | - |   |
| PROGRAM 4                 |                               |                           |                                | -                                  | - | - |   |
| PROGRAM 5                 |                               |                           |                                | -                                  | - | - |   |
| PROGRAM 6                 |                               |                           |                                | -                                  | - | - |   |

(Table continues on next page)

Table 3-10. AUDIO SETUP Menu (Option 7, 7A, or 8) (continued)

|                               |                           |                              |             |   |   |   |
|-------------------------------|---------------------------|------------------------------|-------------|---|---|---|
| <b>DOLBY SETUP (OPTION 8)</b> | <b>AUX OUTPUT MAPPING</b> | <b>DOLBY PROGRAM SELECT</b>  | PROGRAM 7   | - | - | - |
|                               |                           |                              | PROGRAM 8   | - | - | - |
|                               |                           | <b>DOLBY E 5.1 CH (CONT)</b> | Lo/Ro       | - | - | - |
|                               |                           |                              | Lo+Ro/Lo+Ro | - | - | - |
|                               |                           |                              | L/R         | - | - | - |
|                               |                           |                              | C/C         | - | - | - |
|                               |                           |                              | Ls/Rs       | - | - | - |
|                               |                           |                              | LFE/LFE     | - | - | - |
|                               |                           |                              | Lt/Rt       | - | - | - |
|                               |                           |                              | L+C/R+C     | - | - | - |
|                               |                           | <b>DOLBY E 4 CH</b>          | Lo/Ro       | - | - | - |
|                               |                           |                              | Lo+Ro/Lo+Ro | - | - | - |
|                               |                           |                              | L/R         | - | - | - |
|                               |                           |                              | C/C         | - | - | - |
|                               |                           |                              | S/S         | - | - | - |
|                               |                           |                              | MUTE        | - | - | - |
|                               |                           |                              | Lt/Rt       | - | - | - |
|                               |                           |                              | L+C/R+C     | - | - | - |
|                               |                           | <b>DOLBY E 2 CH</b>          | L/R         | - | - | - |
|                               |                           |                              | L+R/L+R     | - | - | - |
|                               |                           |                              | MUTE        | - | - | - |
|                               |                           | <b>DOLBY E 1 CH</b>          | C/C         | - | - | - |
|                               |                           |                              | MUTE        | - | - | - |
|                               |                           | <b>DOLBY D 3/2</b>           | Lo/Ro       | - | - | - |
|                               |                           |                              | Lo+Ro/Lo+Ro | - | - | - |
|                               |                           |                              | L/R         | - | - | - |
|                               |                           |                              | C/C         | - | - | - |
|                               |                           |                              | Ls/Rs       | - | - | - |
|                               |                           |                              | LFE/LFE     | - | - | - |
|                               |                           |                              | Lt/Rt       | - | - | - |
|                               |                           |                              | L+C/R+C     | - | - | - |
|                               |                           | <b>DOLBY D 2/2</b>           | Lo/Ro       | - | - | - |
|                               |                           |                              | Lo+Ro/Lo+Ro | - | - | - |
| L/R                           | -                         |                              | -           | - |   |   |
| MUTE                          | -                         |                              | -           | - |   |   |
| Ls/Rs                         | -                         |                              | -           | - |   |   |

(Table continues on next page)

Table 3-10. AUDIO SETUP Menu (Option 7, 7A, or 8) (continued)

|                                      |                                  |                           |             |   |   |   |
|--------------------------------------|----------------------------------|---------------------------|-------------|---|---|---|
| <b>DOLBY SETUP (OPTION 8) (CONT)</b> | <b>AUX OUTPUT MAPPING (CONT)</b> | <b>DOLBY D 2/2 (CONT)</b> | LFE/LFE     | - | - | - |
|                                      |                                  |                           | Lt/Rt       | - | - | - |
|                                      |                                  | <b>DOLBY D 3/1</b>        | Lo/Ro       | - | - | - |
|                                      |                                  |                           | Lo+Ro/Lo+Ro | - | - | - |
|                                      |                                  |                           | L/R         | - | - | - |
|                                      |                                  |                           | C/C         | - | - | - |
|                                      |                                  |                           | S/S         | - | - | - |
|                                      |                                  |                           | LFE/LFE     | - | - | - |
|                                      |                                  |                           | Lt/Rt       | - | - | - |
|                                      |                                  |                           | L+C/R+C     | - | - | - |
|                                      |                                  | <b>DOLBY D 2/1</b>        | Lo/Ro       | - | - | - |
|                                      |                                  |                           | Lo+Ro/Lo+Ro | - | - | - |
|                                      |                                  |                           | L/R         | - | - | - |
|                                      |                                  |                           | MUTE        | - | - | - |
|                                      |                                  |                           | S/S         | - | - | - |
|                                      |                                  |                           | LFE/LFE     | - | - | - |
|                                      |                                  |                           | Lt/Rt       | - | - | - |
|                                      |                                  | <b>DOLBY D 3/0</b>        | Lo/Ro       | - | - | - |
|                                      |                                  |                           | Lo+Ro/Lo+Ro | - | - | - |
|                                      |                                  |                           | L/R         | - | - | - |
|                                      |                                  |                           | C/C         | - | - | - |
|                                      |                                  |                           | MUTE        | - | - | - |
|                                      |                                  |                           | LFE         | - | - | - |
|                                      |                                  |                           | Lt/Rt       | - | - | - |
|                                      |                                  | <b>DOLBY D 2/0</b>        | L/R         | - | - | - |
|                                      |                                  |                           | L+R/L+R     | - | - | - |
|                                      |                                  |                           | MUTE        | - | - | - |
|                                      |                                  |                           | MUTE        | - | - | - |
|                                      |                                  | <b>DOLBY D 1/0</b>        | C/C         | - | - | - |
|                                      |                                  |                           | MUTE        | - | - | - |
|                                      |                                  | <b>DOLBY D 1/1</b>        | L/R         | - | - | - |
|                                      |                                  |                           | L+R/L+R     | - | - | - |
|                                      |                                  |                           | MUTE        | - | - | - |

(Table continues on next page)

Table 3-10. AUDIO SETUP Menu (Option 7, 7A, or 8) (continued)

|  |                                     |                |                    |   |   |   |
|--|-------------------------------------|----------------|--------------------|---|---|---|
| <b>DOLBY SETUP<br/>(OPTION 8)<br/>(CONT)</b> | <b>AUDIO<br/>EMULATION<br/>MODE</b> | <b>DOLBY E</b> | NONE               | - | - | - |
|  |                                     |                | CUSTOM             | - | - | - |
|  |                                     |                | RF                 | - | - | - |
|  |                                     |                | LINE               | - | - | - |
|  |                                     | <b>DOLBY D</b> | RF                 | - | - | - |
|  |                                     |                | LINE               | - | - | - |
| CUSTOM                                       | -                                   |                | -                  | - |   |   |
| <b>AES VALIDITY<br/>BIT</b>                  | ENABLE                              | -              | -                  | - | - |   |
|  | DISABLE                             | -              | -                  | - | - |   |
| <b>OUTPUT<br/>PREFERENCES</b>                | <b>OUTPUT<br/>LEVEL</b>             | <b>ANALOG</b>  | -40 dB TO +6<br>dB | - | - | - |

Table 3-11. WAVEFORM ALARMS Menu

|                             |                         |  |
|-----------------------------|-------------------------|--|
| <b>EDH - SD</b>             | OFF/ON                  | -  |
|                             | <b>DURATION</b>         | 0 - 60 SECONDS   |
| <b>CRC DISPLAY - SD</b>     | OFF/ON                  | -  |
| <b>CRC - HD</b>             | OFF/ON                  | -  |
|                             | <b>DURATION</b>         | 0 - 60 SECONDS   |
| <b>CARRIER DETECT</b>       | OFF/ON                  | -  |
|                             | <b>DURATION</b>         | 0 - 60 SECONDS   |
| <b>RGB GAMUT</b>            | OFF/ON                  | -  |
|                             | UPPER                   | 650 TO 750 mV  |
|                             | LOWER                   | -50 TO +50 mV  |
|                             | SENSITIVITY             | 2 TO 20 CES  |
|                             | <b>DURATION</b>         | 0 - 60 SECONDS   |
| <b>ENCODED GAMUT - SD</b>   | OFF/ON                  | -  |
|                             | <b>LUMA UPPER</b>       | NTSC: +90 TO +110 IRE<br>PAL: +92 TO +112 UNITS<br>PAL V: 643 TO 786 mV    |
|                             | <b>LUMA LOWER</b>       | NTSC: 0 TO +20 IRE<br>PAL: -10 TO 20 UNITS<br>PAL V: -70 TO 143 mV         |
|                             | <b>PEAK UPPER</b>       | NTSC: +50 TO +140 IRE<br>PAL: +51 TO +143 UNITS<br>PAL V: +357 TO +1000 mV |
|                             | <b>PEAK LOWER</b>       | NTSC: -40 TO 20 IRE<br>PAL: -41 TO 0 UNITS<br>PAL V: -285 TO +143 mV       |
|                             | <b>LUMA SENSITIVITY</b> | 1 - 20 CES   |
|                             | <b>PEAK SENSITIVITY</b> | 1 - 20 CES   |
|                             | <b>DURATION</b>         | 0 - 60 SECONDS   |
| <b>LOSS OF ACTIVE VIDEO</b> | OFF/ON                  | -  |
|                             | <b>THRESHOLD</b>        | 0 TO +350 mV   |
|                             | <b>SENSITIVITY</b>      | 1 TO 20 CES  |
|                             | <b>DURATION</b>         | 0 - 60 SECONDS   |

Operation

Table 3-12. AUDIO ALARMS Menu (Option 7, 7A, or 8)

|                        |                        |                |               |
|------------------------|------------------------|----------------|---------------|
| <b>PEAK AUDIO</b>      | OFF/ON                 | -              | -             |
|                        | <b>LEVEL</b>           | <b>ANALOG</b>  | -6 TO +24 dB  |
|                        |                        | <b>DIGITAL</b> | -30 TO +20 dB |
|                        | <b>DURATION</b>        | 0 - 60 SECONDS | -             |
| <b>PHASE</b>           | OFF/ON                 | -              | -             |
|                        | <b>VALUE</b>           | 0 TO 178°      | -             |
|                        | <b>DURATION</b>        | 0 - 60 SECONDS | -             |
| <b>LOSS OF SOUND</b>   | <b>CHANNEL 1-8</b>     | OFF/ON         | -             |
|                        | <b>LEVEL</b>           | <b>ANALOG</b>  | -50 TO 0 dB   |
|                        |                        | <b>DIGITAL</b> | -50 to 0 dB   |
|                        | <b>DURATION</b>        | 1 - 60 SECONDS | -             |
| <b>LOSS OF DATA</b>    | <b>CHANNEL 1-8</b>     | OFF/ON         | -             |
|                        | <b>DURATION</b>        | 0 - 60 SECONDS | -             |
| <b>AES / EBU PHASE</b> | OFF/ON                 | -              | -             |
|                        | <b>REFERENCE INPUT</b> | INPUT 1-8      | -             |
|                        | <b>THRESHOLD</b>       | 5 PERCENT      | -             |
|                        |                        | 25 PERCENT     | -             |
|                        | <b>DURATION</b>        | 0 - 60 SECONDS | -             |

Table 3-13. TIME CODE ALARMS Menu

|                               |                           |                 |                   |
|-------------------------------|---------------------------|-----------------|-------------------|
| <b>LTC TIME CODE ALARMS</b>   | <b>LOSS OF TIME CODE</b>  | OFF/ON          | -                 |
|                               |                           | <b>DURATION</b> | 0 - 20 SECONDS    |
|                               | <b>TIME CODE FRAMING</b>  | OFF/ON          | -                 |
|                               |                           | <b>RANGE</b>    | 1.5 TO 10.5 LINES |
|                               |                           | <b>DURATION</b> | 0 - 60 SECONDS    |
|                               | <b>CONTINUITY</b>         | OFF/ON          | -                 |
|                               |                           | <b>DURATION</b> | 0 - 20 SECONDS    |
|                               | <b>DISPLAY WITH ALARM</b> | TIME CODE       | -                 |
|                               |                           | CLOCK           | -                 |
|                               |                           | BOTH            | -                 |
| <b>DVITC TIME CODE ALARMS</b> | <b>CONTINUITY</b>         | OFF/ON          | -                 |
|                               |                           | <b>DURATION</b> | 0 - 20 SECONDS    |
|                               | <b>CRC</b>                | OFF/ON          | -                 |
|                               |                           | <b>DURATION</b> | 0 - 20 SECONDS    |

Table 3-14. I/O AND COMMUNICATIONS Menu

|                           |                      |  |                    |                    |
|---------------------------|----------------------|--|--------------------|--------------------|
| <b>TIME CODE INPUT</b>    | <b>SD</b>            | (D) VITC                                 | -                  |                    |
|                           |                      | <b>LTC</b>                               | TIME CODE<br>CLOCK |                    |
|                           | <b>HD</b>            | <b>ANCILLARY</b>                         | LTC                | VITC               |
|                           |                      |  | <b>LTC</b>         | TIME CODE<br>CLOCK |
|                           |                      | <b>YEAR</b>                              | 1980 TO 2079       | -                  |
|                           |                      | <b>MONTH</b>                             | JAN TO DEC         | -                  |
| <b>CLOCK SET</b>          | <b>DAY</b>           | 1 TO 31 <sup>1</sup>                     | -                  |                    |
|                           | <b>HOUR</b>          | 0 TO 23                                  | -                  |                    |
|                           | <b>MINUTE</b>        | 0 TO 59                                  | -                  |                    |
|                           | <b>SECOND</b>        | 0 TO 59                                  | -                  |                    |
|                           | <b>BAUD RATE</b>     | 19200                                    | -                  | -                  |
|                           |                      | 38400                                    | -                  | -                  |
| 57600                     |                      | -  | -                  |                    |
| 115200                    |                      | -  | -                  |                    |
| <b>SERIAL PORT</b>        | RS-232               | -  | -                  |                    |
|                           | RS-422 UNTERMINATED  | -  | -                  |                    |
|                           | RS-422 TERMINATED    | -  | -                  |                    |
| <b>GPI INPUT FUNCTION</b> | <b>INPUT 1</b>       | <b>SELECT INPUT A<br/>USER GPI 1</b>     | RENAME             |                    |
|                           | <b>INPUT 2</b>       | <b>SELECT INPUT B<br/>USER GPI 2</b>     | RENAME             |                    |
|                           | <b>INPUT 3</b>       | <b>CLEAR ALARMS<br/>USER GPI 3</b>       | RENAME             |                    |
|                           | <b>INPUT 4</b>       | <b>CRC – RESET ERRORS<br/>USER GPI 4</b> | RENAME             |                    |
|                           | <b>INPUT 5</b>       | <b>CAPTURE FRAME<br/>USER GPI 5</b>      | RENAME             |                    |
|                           | <b>INPUT 6</b>       | <b>TRANSFER<br/>USER GPI 6</b>           | RENAME             |                    |
|                           | <b>INPUT 7</b>       | <b>ON AIR<br/>USER GPI 7</b>             | RENAME             |                    |
|                           | <b>INPUT 8</b>       | <b>MEMORY SEQUENCE<br/>USER GPI 8</b>    | RENAME             |                    |
|                           | <b>INPUT 9</b>       | <b>BYPASS<br/>USER GPI 9</b>             | RENAME             |                    |
| <b>GPI OUTPUT #1</b>      | <b>AUDIO PEAK</b>    | OFF/ON                                   | -                  |                    |
|                           | <b>AUDIO PHASE</b>   | OFF/ON                                   | -                  |                    |
|                           | <b>AUDIO QUIET</b>   | OFF/ON                                   | -                  |                    |
|                           | <b>AUDIO DATA</b>    | OFF/ON                                   | -                  |                    |
|                           | <b>AES/EBU PHASE</b> | OFF/ON                                   | -                  |                    |

(Table continues on next page)

<sup>1</sup> The last day of the month changes depending upon the number of days in the month.

Table 3-14. I/O AND COMMUNICATION Menu (*continued*)

|                                 |                              |                    |        |   |
|---------------------------------|------------------------------|--------------------|--------|---|
| <b>GPI OUTPUT #1<br/>(CONT)</b> | <b>EDH (SD)</b>              | OFF/ON             |        |   |
|                                 | <b>LOSS OF CARRIER</b>       | OFF/ON             | -      |   |
|                                 | <b>LOSS OF VIDEO</b>         | OFF/ON             | -      |   |
|                                 | <b>LTC LOSS OF TIME CODE</b> | OFF/ON             | -      |   |
|                                 | <b>TIME CODE FRAMING</b>     | OFF/ON             | -      |   |
|                                 | <b>CRC ERROR (HD)</b>        | OFF/ON             | -      |   |
|                                 | <b>LTC CONTINUITY</b>        | OFF/ON             | -      |   |
|                                 | <b>DVITC CONTINUITY</b>      | OFF/ON             | -      |   |
|                                 | <b>DVITC CRC</b>             | OFF/ON             | -      |   |
|                                 | <b>GPI ALARM 1-9</b>         | OFF/ON             | -      |   |
|                                 | <b>SAV (SD)</b>              | OFF/ON             | -      |   |
|                                 | <b>LINE LENGTH (SD)</b>      | OFF/ON             | -      |   |
|                                 | <b>FIELD LENGTH (SD)</b>     | OFF/ON             | -      |   |
|                                 | <b>RESV'D VALUES (SD)</b>    | OFF/ON             | -      |   |
|                                 | <b>ANC CHECKSUM (SD)</b>     | OFF/ON             | -      |   |
|                                 | <b>ANC PARITY (SD)</b>       | OFF/ON             | -      |   |
|                                 | <b>ANC PLACEMENT (SD)</b>    | OFF/ON             | -      |   |
|                                 | <b>NO VIDEO (SD)</b>         | OFF/ON             | -      |   |
|                                 | <b>RGB GAMUT UPPER</b>       | OFF/ON             | -      |   |
|                                 | <b>RGB GAMUT LOWER</b>       | OFF/ON             | -      |   |
|                                 | <b>LUM GAMUT UPPER (SD)</b>  | OFF/ON             | -      |   |
|                                 | <b>LUM GAMUT LOWER (SD)</b>  | OFF/ON             | -      |   |
|                                 | <b>PK GAMUT UPPER (SD)</b>   | OFF/ON             | -      |   |
|                                 | <b>PK GAMUT LOWER (SD)</b>   | OFF/ON             | -      |   |
|                                 | <b>GPI OUTPUT #2</b>         | <b>AUDIO PEAK</b>  | OFF/ON | - |
|                                 |                              | <b>AUDIO PHASE</b> | OFF/ON | - |
| <b>AUDIO QUIET</b>              |                              | OFF/ON             | -      |   |
| <b>AUDIO DATA</b>               |                              | OFF/ON             | -      |   |
| <b>AES/EBU PHASE</b>            |                              | OFF/ON             | -      |   |
| <b>EDH (SD)</b>                 |                              | OFF/ON             |        |   |
| <b>LOSS OF CARRIER</b>          |                              | OFF/ON             | -      |   |
| <b>LOSS OF VIDEO</b>            |                              | OFF/ON             | -      |   |
| <b>LOSS OF TIME CODE</b>        |                              | OFF/ON             | -      |   |
| <b>TIME CODE FRAMING</b>        |                              | OFF/ON             | -      |   |
| <b>CRC ERROR (HD)</b>           |                              | OFF/ON             | -      |   |
| <b>LTC CONTINUITY</b>           |                              | OFF/ON             | -      |   |
| <b>DVITC CONTINUITY</b>         |                              | OFF/ON             | -      |   |
| <b>DVITC CRC</b>                |                              | OFF/ON             | -      |   |
| <b>GPI ALARM 1-9</b>            |                              | OFF/ON             | -      |   |
| <b>SAV (SD)</b>                 |                              | OFF/ON             | -      |   |

(Table continues on next page)



Table 3-14. I/O AND COMMUNICATION Menu (*continued*)

|                                 |                                       |                                   |   |   |
|---------------------------------|---------------------------------------|-----------------------------------|---|---|
| <b>GPI OUTPUT #2<br/>(CONT)</b> | <b>LINE LENGTH (SD)</b>               | OFF/ON                            | - |   |
|                                 | <b>FIELD LENGTH (SD)</b>              | OFF/ON                            | - |   |
|                                 | <b>RESV'D VALUES (SD)</b>             | OFF/ON                            | - |   |
|                                 | <b>ANC CHECKSUM (SD)</b>              | OFF/ON                            | - |   |
|                                 | <b>ANC PARITY (SD)</b>                | OFF/ON                            | - |   |
|                                 | <b>ANC PLACEMENT (SD)</b>             | OFF/ON                            | - |   |
|                                 | <b>NO VIDEO (SD)</b>                  | OFF/ON                            | - |   |
|                                 | <b>RGB GAMUT UPPER</b>                | OFF/ON                            | - |   |
|                                 | <b>RGB GAMUT LOWER</b>                | OFF/ON                            | - |   |
|                                 | <b>LUM GAMUT UPPER (SD)</b>           | OFF/ON                            | - |   |
|                                 | <b>LUM GAMUT LOWER (SD)</b>           | OFF/ON                            | - |   |
|                                 | <b>PK GAMUT UPPER (SD)</b>            | OFF/ON                            | - |   |
|                                 | <b>PK GAMUT LOWER (SD)</b>            | OFF/ON                            | - |   |
|                                 | <b>GPO OUT #1<br/>POLARITY</b>        | NORMALLY OPEN                     | - | - |
| NORMALLY CLOSED                 |                                       | -                                 | - |   |
| <b>GPO OUT #2<br/>POLARITY</b>  | NORMALLY OPEN                         | -                                 | - |   |
|                                 | NORMALLY CLOSED                       | -                                 | - |   |
| <b>UNIT ID</b>                  | 1-32                                  | -                                 | - |   |
| <b>BYPASS KEY</b>               | CTRL+A TO CTRL+Z,<br>CTRL+0 TO CTRL+9 | -                                 | - |   |
| <b>PANEL LOCKOUT</b>            | <b>PRESET<br/>LOCKOUT</b>             | 00-09 (first password<br>number)  | - |   |
|                                 |                                       | 00-09 (second password<br>number) | - |   |
|                                 |                                       | 00-09 (third password<br>number)  | - |   |
|                                 | <b>UNLOCK</b>                         | PRESET 1<br>(LOCK/UNLOCK)         |   |   |
|                                 |                                       | PRESET 2<br>(LOCK/UNLOCK)         |   |   |
|                                 |                                       | PRESET 3<br>(LOCK/UNLOCK)         |   |   |
|                                 |                                       | PRESET 4<br>(LOCK/UNLOCK)         |   |   |
|                                 |                                       | PRESET 5<br>(LOCK/UNLOCK)         |   |   |
|                                 |                                       | PRESET 6<br>(LOCK/UNLOCK)         |   |   |
|                                 |                                       | PRESET 7<br>(LOCK/UNLOCK)         |   |   |

(Table continues on next page)

Operation

Table 3-14. I/O AND COMMUNICATIONS Menu (*continued*)

| PANEL LOCKOUT<br>(CONT) | PRESET LOCKOUT<br>(CONT)         | UNLOCK (CONT)                            | PRESET 8<br>(LOCK/UNLOCK) |
|-------------------------|----------------------------------|--|---------------------------|
|                         | LOCK PANEL                       | -  | -                         |
|                         | <b>CHANGE<br/>PASSWORD</b>       | 00-09 (first number of<br>new password)  | -                         |
|                         | -                                | 00-09 (second number<br>of new password) | -                         |
|                         | -                                | 00-09 (third number of<br>new password)  | -                         |
|                         | -                                | ACCEPT                                   | -                         |
|                         | <b>ALT<br/>PAUSE/CAPTURE GPI</b> | FRAME<br>CAPTURE/TRANSFER                | -                         |
| ALARM<br>PAUSE/RESUME   |                                  | -  | -                         |
| <b>ETHERNET SETUP</b>   | <b>IP ADDRESS</b>                | ENTER VALUE                              | -                         |
|                         | <b>SUBNET MASK</b>               | ENTER VALUE                              | -                         |
|                         | <b>GATEWAY</b>                   | ENTER VALUE                              | -                         |
|                         | <b>DHCP ENABLE</b>               | OFF/ON                                   | -                         |

Table 3-15. DISPLAY SETUP Menu

|                             |                 |
|-----------------------------|-----------------|
| <b>WAVEFORM INTENSITY</b>   | -32 TO +32      |
| <b>WAVEFORM CONTRAST</b>    | 0 TO +15        |
| <b>WAVEFORM COLOR</b>       | (16 COLORS)*    |
| <b>VECTOR INTENSITY</b>     | -32 TO +32      |
| <b>VECTOR COLOR</b>         | (16 COLORS)*    |
| <b>ATTACK</b>               | NORMAL          |
|                             | MAXIMUM         |
| <b>PERSISTENCE</b>          | NORMAL          |
|                             | HIGH            |
|                             | INFINITE        |
| <b>GAMMA</b>                | FLAT            |
|                             | 2.0             |
|                             | 3.0             |
| <b>PICTURE BRIGHTNESS</b>   | -128 TO +128    |
| <b>PICTURE CONTRAST</b>     | -128 TO +128    |
| <b>PICTURE SATURATION</b>   | -128 TO +128    |
| <b>PICTURE HUE</b>          | -128 TO +127    |
| <b>BACKGROUND COLOR</b>     | (16 COLORS)*    |
| <b>GRATICULE COLOR</b>      | (16 COLORS)*    |
| <b>GRATICULE INTENSITY</b>  | 25% TO 200%     |
| <b>CURSOR COLOR</b>         | (16 COLORS)*    |
| <b>PICTURE ENABLE</b>       | OFF             |
|                             | ON              |
| <b>PICTURE COLOR</b>        | COLOR           |
|                             | MONO            |
| <b>SCREEN SAVER</b>         | OFF/1 TO 60 MIN |
| <b>VGA FRAME RATE</b>       | VESA 60 Hz      |
|                             | OPTIMIZE        |
| <b>BLUE GUN</b>             | OFF             |
|                             | ON              |
| <b>ASPECT RATIO PICTURE</b> | 4:3             |
|                             | 14:9            |
|                             | 16:9            |
|                             | 16:10           |
|                             | FOLLOW MONITOR  |

\*See Display Colors Menu on page 3-40

(Table continues on next page)

**Table 3-15. DISPLAY SETUP Menu (continued)**

|                                 |       |
|---------------------------------|-------|
| <b>ASPECT RATIO<br/>MONITOR</b> | 4:3   |
|                                 | 14:9  |
|                                 | 16:9  |
|                                 | 16:10 |

**Display Colors Menu**

Black\*

Blue

Green

Cyan

Red

Purple

Brown

LT Gray

DK Gray

LT Blue

LT Green

LT Cyan

LT Red

LT Purple

Yellow

White

\* Not available on the GRATICULE COLOR menu.

**NOTE:** LT=Light and DK=Dark

## CLOSED CAPTION DISPLAY

The closed caption display monitors both Standard Definition and High Definition formats. Standard Definition formats, primary caption service (CC1) or secondary caption service (CC3), which are defined by the EIA-608-B NTSC Line 21 Closed Caption standard, can be selected. For High Definition formats, only NTSC Line 21 captions EIA-608B, CC1 or CC3 captions can be selected. Other Digital Television Closed Caption services, as defined in EIA-708-B, are not decoded. These settings are found in the VIDEO SETUP menu. The H knob scrolls through the Closed Caption selections. The default caption service for both High and Standard Definition is CC1. The CLOSED CAPTION SIZE field selection determines if the text in the closed caption display is large (covers more of the displayed video signal) or small (covers less of the displayed video signal).

## SAFE AREA

When the Safe Area feature is activated in the VIDEO SETUP menu, it displays the limits a picture will display on all television screens. Brackets appear on the corners of the display or a box surrounds the display to show these minimum limits. To activate the Safe Area:

1. Press SETUP/LEARN to display the SETUP MENU.
2. Rotate the WAVEFORM POSITION-H knob (H knob) to move the cursor to VIDEO SETUP menu.
3. Press the H knob.
4. Rotate the H knob to move the cursor to VIDEO GENERAL.
5. Press the H knob.
6. Rotate the H knob to move the cursor to SAFE AREA.
7. Press the H knob.
8. Rotate the H knob to select CORNERS ONLY to have the brackets appear on the corners of the display or BOX to have a box appear on the display.
9. Press the H knob.
10. Press the WAVEFORM POSITION-V knob four times to exit.

## PANEL AND PRESET LOCKOUT

When the VTM-420HD/SD activates the Panel Lockout, the front panel cannot alter any internal information until the password is entered. Within the Panel Lockout menu is a Preset Lockout feature. The Preset Lockout will disallow a user to store information into a certain number of presets. The Preset Lockout can affect one or all of the presets. Similar to the Panel Lockout feature, the Preset Lockout is also password protected. When a user locks a preset configuration into the VTM-420HD/SD, the preset cannot be altered until the password is entered. To use the Preset Lockout feature:

**NOTE:** The default password is 00-00-00.

1. Press SETUP/LEARN to display the SETUP MENU.
2. Rotate the WAVEFORM POSITION-H Knob (H Knob) to move the cursor to the I/O AND COMMUNICATION MENU.
3. Press the H Knob.
4. Rotate the H knob to move the cursor to PANEL LOCKOUT.
5. Press the H Knob.
6. Rotate the H knob to move the cursor to PRESET LOCKOUT.
7. Press the H knob.
8. Rotate the V knob to move the cursor to select 00-09 (first digit in password).
9. Rotate the H knob to select the second password number.
10. Rotate the V knob to move the cursor to select 00-09 (second digit in password).
11. Rotate the H knob to select the third password number.
12. Rotate the V knob to move the cursor to select 00-09 (third digit in password).  
When all the digits are correct, UNLOCK will appear.
13. Rotate the H knob to move the cursor to select UNLOCK.
14. Press the H knob.
15. Rotate the H knob to move the cursor to select PRESET.
16. Press the H knob to toggle between Lock and Unlock on the highlighted PRESET.
17. After the settings are complete press the V knob five times to exit.

## Configuring the Optional Audio Display

The VTM-420HD/SD is capable of displaying many audio standards. To take advantage of this flexibility, use the SETUP MENU to select specifications unique to a studio environment.

The following discussion is useful for determining specific setup requirements.

The AUDIO SETUP menu is detailed in **Table 3-10**.

There are eight analog audio input channels (four stereo pairs), 16 AES/EBU digital input channels (eight stereo pairs), and 16 embedded audio channels (serial-digital video input only) available for selection in the menu. Up to eight channels display simultaneously and show a vertical display or a CineSound display. Analog, AES/EBU, and embedded audio inputs can be assigned to track video input A or B. The displayed audio can be monitored as analog signals on the 37-pin, ANALOG AUDIO IN/OUT connector. If the display is AES/EBU or embedded audio, the monitoring output is analog audio. The output audio level can be adjusted  $\pm 6$  dB. This adjustment is on the AUDIO SETUP menu. Audio input pairs can be assigned to any meter pair on the display.

Adjustable markers can be placed in the audio meters to show a specific critical level. In addition, alarms can be activated to monitor peak levels, phase differences, loss of

sound, and loss of data. The adjustable markers are selected in the AUDIO SETUP\AUDIO MARKERS menu.

The unique CineSound display monitors 5.1 or 7.1 channels of surround sound. The CineSound input mapping follows a SMPTE 320M standard.

The phase bars monitor the instantaneous phase relationship between two audio channels. The “+” marking indicates a phase difference of 0 degrees, and the “-” marking indicates a phase difference of 180 degrees. A properly phased stereo pair produces a phase pointer (yellow mark) that moves within the green zone, whereas a reversed channel produces a pointer that moves within the red zone.

For example, to set four channels of analog audio to follow input A:

1. Press SETUP/LEARN.
2. Rotate the WAVEFORM POSITION-H knob (H knob) to highlight the AUDIO SETUP menu
3. Press the H knob.
4. Rotate the H knob to highlight CONFIGURE INPUTS.
5. Press the H knob.
6. Rotate the H knob to highlight INPUT A.
7. Press the H knob.
8. Rotate the H knob to highlight AUDIO TYPE.
9. Press the H knob.
10. Rotate the H knob to highlight ANALOG.
11. Press the WAVEFORM POSITION-V knob (V knob) to exit one level.
12. Rotate the H knob to highlight AUDIO DISPLAY.
13. Press the H knob.
14. Rotate the H knob to highlight 4 CHANNELS.
15. Press the H knob.
16. Rotate the H knob to highlight METER 1.
17. Press the H knob to select it.
18. Rotate the H knob to select INPUT PAIR and press the knob to select it.
19. Rotate the H knob to highlight PAIR 1.
20. Press the V knob two times to exit two levels.
21. Rotate the H knob to highlight METER 2.
22. Press the H knob.
23. Rotate the H knob to select INPUT PAIR.
24. Press the H knob.
25. Rotate the H knob to highlight PAIR 2.

26. To exit the SETUP MENU, press the V knob six times, or press SETUP/LEARN once.

## Dolby Selections

Option 8 includes Dolby Digital and Dolby E technology selections. These selections are found in the Audio Setup menu on page 3-24.

Six or Eight channels of Dolby E can be selected from the Audio Setup menu. Within each channel is a list of encoded selections. The encoded channel selections can be broken down into:

- 5.1: The “5” consists of three front channels (left, center, and right), and two surround sound channels (right surround, left surround). The “.1” provides the bass.
- 4: Four speaker configuration consisting of two front speakers and two surround sound speakers. Usually used to simulate sound coming from a phantom center speaker.
- 2: Stereo channels
- 1: Mono channel

With the channels defined, an example of an 8-channel configuration shown in the Audio Setup menu is “8x1.” This example signifies that eight channels will receive a mono signal.

Some of the other Option 8 terminology found in the Audio Setup menu are:

- Low Frequency Effects (LFE): provides a deep base effect.
- Dolby AC-3: Audio coding for multiple or single channel transmission.
- Dolby Digital: Digital audio format using Dolby AC-3.
- 5.1: Surround Sound Configuration. The “5” consists of three front channels (left, center, and right), and two surround sound channels (right surround, left surround). The “.1” provides the bass.
- Lt and Rt: Left total and right total channels for surround sound setup.
- Lo and Ro: Left only and right only sound channels for stereo use.
- L: Left channel
- C: Center channel
- R: Right channel
- Ls: Left surround channel
- Rs: Right surround channel
- L+C: Left and center channels
- L+R: Left and right channels
- #/#: The number of front speakers to the number of surround sound speakers



## Using the Cursors

Cursors are available for precise measurement of waveform amplitude, waveform time, and vector phase. To access them:

1. Press SETUP/LEARN to display the SETUP MENU.
2. Rotate the WAVEFORM POSITION-H knob (H knob) to highlight VIDEO SETUP.
3. Press the H knob.
4. Rotate the H knob to select CURSOR SETUP.
5. Press the H knob.
6. Rotate the H knob to select AMPLITUDE, TIME, or PHASE. Each selection displays three options: OFF/ON, REF, and DELTA.
7. To toggle the cursor ON or OFF, rotate the H knob to position the menu cursor on OFF/ON and then press the H knob.
8. To move the solid cursor line, rotate the H knob to position the menu cursor on REF.
9. Rotate the WAVEFORM POSITION-V knob (V knob).
10. To move the dashed line, rotate the H knob to position the menu cursor on DELTA.
11. Rotate the V knob.

In all cases, a numeric readout at the bottom of the associated display indicates the difference between the REF and DELTA lines.

## Recalling and Storing Front Panel and SETUP MENU Configurations

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

Press PRESET to recall stored front panel presets and SETUP MENU configurations. Press PRESET to advance through the presets.

To store a new preset:

1. Make all changes to the front panel controls and/or the SETUP MENU.
2. Press PRESET and SETUP/LEARN simultaneously and then release them.
3. Press PRESET to advance to the desired preset number (the selected LED blinks, indicating that it is ready to store the new settings).

**NOTE:** Press PRESET one more time after position 8 to exit the Preset mode without storing information.

4. Press SETUP/LEARN. The LED is illuminated and steady. Any previous setup conditions at the preset number are erased and the new settings are stored.

## Placing the Waveform and Vector Display in Line Select Mode

1. Press the LINE SELECT button to place the waveform and vector display in Line Select mode and illuminate the ODD or EVEN field LED.
2. Press the LINE SELECT knob to alternate between the ODD and EVEN fields.
3. Rotate the LINE SELECT knob to locate the line to be displayed.

A marker on the edge of the picture indicates the displayed line approximate position (+/- 1 line). The line count number is 100% accurate to the video line being displayed on the waveform monitor.

## Moving the Waveform

When in normal operating mode (not in the SETUP MENU), use the WAVEFORM POSITION-H (horizontal) and WAVEFORM POSITION-V (vertical) knobs to move the waveform display relative to the graticule. Press the respective knob to cycle H MAG (horizontal magnification) or V MAG (vertical magnification) through the available magnifications and OFF. In 1H sweep mode, the horizontal magnification is x5 or x10 and the vertical magnification is x2.5 or x5. Vertical magnification of Composite waveforms is x2.5 or x5.

These two knobs can also be used to navigate through the SETUP MENU. (See “Navigating the SETUP MENU” page 3-19)

## Rotating the Vector Display in Composite Mode

Use the VECTOR PHASE knob to rotate the vector display when the FORMAT button is in Composite mode.

## Capturing and Transferring the Entire X VGA Display

The VTM-420HD/SD is capable of holding one frame-captured display in memory. Once captured, the display can be transferred to a connected PC for file storage and placed in the display button cycle.

1. Press CAPTURE to freeze the entire X VGA display.
2. Press DISPLAY to return to normal operation. If CAPTURE is pressed again, a new frozen display overwrites the previous display.
3. Press TRANSFER to begin the transfer to a PC running *SpyderWeb*, which cannot be interrupted. The transfer begins and the display returns to live video.

To place a captured display in the display button cycle:

1. Press SETUP/LEARN to enter the SETUP MENU.
2. Rotate the WAVEFORM POSITION-H knob (H knob) to VIDEO SETUP.
3. Press the H knob.
4. Rotate the H knob to select CAPTURE SETUP.

5. Press the H knob.
6. Rotate the H knob to select CAPTURE DISPLAY.
7. Press the H knob.
8. Rotate the H knob to select HOLD IN DISPLAY CYCLE.
9. Press the WAVEFORM POSITION-V knob four times to exit.

To recall the most recently captured display, press DISPLAY five times to cycle through the normal full-screen display modes. The captured display follows the full-screen audio display.

## CAPTURE ON ALARM

The VTM-420HD/SD provides a feature that creates a frame capture when one or more user-selectable VTM-420HD/SD alarms are triggered. When used with *SpyderWeb*, this feature automatically transfers and stores the frame capture to a PC. After the frame capture is sent to a PC, *SpyderWeb* manages the frame capture by indicating that the triggered alarm has a frame capture. *SpyderWeb* then links the alarm to the frame capture file that is saved on the PC. When the alarm is selected in *SpyderWeb*, the frame capture can be viewed or deleted. See the *SpyderWeb* online help for more information.

From the VTM-420HD/SD, the frame capture is immediately displayed if the RETURN TO ACTIVE PIC menu item in the CAPTURE SETUP submenu is set to MANUAL.

If RETURN TO ACTIVE PIC is set to AUTO, the active picture replaces the frame capture. In this case, the captured frame can only be viewed if CAPTURE DISPLAY is set to HOLD IN DISPLAY CYCLE, as described in Capturing and Transferring the Entire XVGA Display, on page 3-46. If HOLD IN DISPLAY CYCLE is set, press the DISPLAY button on the front panel to view the frame capture.

To enable or disable the VTM-420HD/SD alarm capture feature:

1. Press the SETUP/LEARN button to enter the SETUP menu.
2. Turn the WAVEFORM POSITION H knob (H knob) to select VIDEO SETUP, and press the knob to enter the menu.
3. Turn the H knob to select CAPTURE SETUP, and press the H knob to enter the menu.
4. Turn the H knob to select CAPTURE TRIGGER, and press the H knob to enter the menu.
5. Turn the H knob to select FROM ALARM, and press the H knob to select ON (to enable the frame capture) or OFF (to disable the frame capture).
6. Press the SETUP/LEARN button to exit the Setup menu.

Once the alarm capture is enabled, select how the alarm capture will operate. To select how the alarm capture operates:

1. Press the SETUP/LEARN button to enter the Setup menu.

2. Turn the H knob to select the VIDEO SETUP menu, and press the H knob to enter the menu.
3. Turn the H knob to select CAPTURE SETUP, and press the H knob to enter the menu.
4. Turn the H knob to select CAPTURE ON ALARM, and press the H knob to enter the menu.
5. Turn the H knob to select between FIRST ALARM and LAST ALARM.
  - FIRST ALARM creates a frame capture when the first alarm is triggered. The captured alarm is held in the VTM until *SpyderWeb* transfers it. With FIRST ALARM set, subsequent alarms will disable further alarm frame captures until the existing capture is either transferred or a manual frame capture is performed.
  - LAST ALARM creates a frame capture when a new alarm is triggered. The new alarm frame capture replaces the previous alarm frame capture.

**NOTE:** To ensure that a frame capture transfer is not disrupted, the VTM will not allow any captures to occur.

6. Press the SETUP/LEARN button to exit the menu system.

Before alarms can trigger a frame capture, the alarms must be selected for capturing. To select or deselect the alarms that will trigger an alarm frame capture:

1. Press the SETUP/LEARN button to enter the Setup menu.
2. Turn the H knob to select the VIDEO SETUP menu, and press the H knob to enter the menu.
3. Turn the H knob to select the CAPTURE SETUP, and press the H knob to enter the menu.
4. Turn the H knob to select ALARM TO CAPTURE, and press the H knob to enter the menu.
5. Turn the H knob to select an alarm and press the knob to change the alarm from OFF to ON.

**NOTE:** If all the alarms are OFF, no alarm capture will be triggered. Also, alarms must be enabled in order to create a frame capture.

6. Press the SETUP/LEARN button to exit the menu system.

## Setting Alarms

Most alarms monitor all lines of the video signal instead of just a single line. For example, the GAMUT alarm monitors the entire active picture for errors over the preset limits chosen on the menu.

Limits are selected by choosing a value using the WAVEFORM POSITION-H or WAVEFORM POSITION-V knobs, while additionally causing a limit cursor line to appear in the waveform or vector display. Do not confuse these limit cursor lines with the cursor lines selected on the VIDEO SETUP menu. The limit cursor lines disappear when exiting the alarm menu.

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

- Sensitivity

Sensitivity is set in 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 an approximate pixel rate. 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

This value, from 0–60 seconds, determines how long an error must persist before it is reported. Set the duration to 0 to display an error as soon as the CES value is met.

## Alarm Message Contents and Limitations

Figure 3-13. Sample Alarm Message

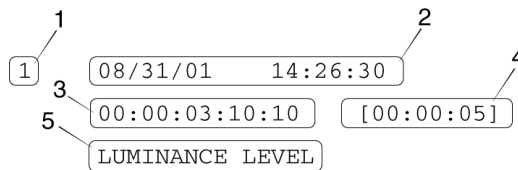


Table 3-16. Description of Sample Alarm Message

| Key | Description  |
|-----|--|
| 1   | Index number, from 1-100   |
| 2   | Date and time (the internal clock setting in month/day/year and hour:minute:second)                                  |
| 3   | Time code, which is from the LTC/CLOCK back panel connector, VITC, or D-VITC (shown in day:hour:minute:second:frame) |
| 4   | Duration, which is the length of time that an error occurred (shown in hour:minute:second)                           |
| 5   | Alarm or error name  |

When an error is first registered, it appears at the bottom of the error display and is highlighted in yellow. If the error is short term (i.e., two seconds or less), the error text reverts to the original graticule color after approximately two seconds. If the error continues longer than two seconds, the text remains highlighted in yellow and the error duration is incremented. When the next error occurs, the previous error moves up one position.

When 100 different error events occur, error number 01 is dropped and the most recent error is tagged as 100. There is a maximum of 100 error events that can be stored. To overcome the 100-event limit, connect a PC to the RS-232 COMM or Ethernet port and use the *SpyderWeb* software included; all errors are passed to the PC and saved.

Press ALARM SCROLL/CLEAR to scroll, or press and hold the ALARM SCROLL/CLEAR button to erase the current group of 100 errors. A GPI output dry-contact closure can be used to alert other devices when an error occurs. Use the I/O AND COMMUNICATIONS menu to setup GPI.

An alarm can also trigger a screen capture. The CAPTURE SETUP menu is in the VIDEO SETUP menu. To capture and store a complete screen when an alarm occurs, set the Capture Trigger mode to Alarm. If the screen capture is saved to a PC, the transfer can take up to a few minutes depending on if the transfer is being run over an RS-232 or Ethernet connection. While other alarms can occur during this transfer, the feature is helpful when unattended monitoring is required.

## Alarm Descriptions

The following subsections describe the alarms associated with each alarm menu. Refer to the menu selections starting on page 3-33 for the alarm limits.

### Digital Waveform Alarm Error Types

Table 3-17. Waveform Alarm Error Types

| Error Type                  | Description  |
|-----------------------------|--|
| <b>EDH - SD</b>             | Per SMPTE RP 165-1994; the alarm occurs when one or more errors are detected for a period in excess of the duration setting (Standard definition only).  |
| <b>CRC DISPLAY – SD</b>     | These groups of alarms are triggered when an active picture in a particular field drops below its adjustable value for a period in excess of the duration setting. The alarm also detects how many groups of audio are available and any other supplementary information (Standard definition only). |
| <b>CRC - HD</b>             | The alarm occurs when one or more CRC errors are detected for a period in excess of the duration setting (High definition only).   |
| <b>CARRIER DETECT</b>       | This alarm occurs when there is no signal detected.  |
| <b>RGB GAMUT</b>            | This 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 CES can be increased to provide immunity to fast transcoding spikes.   |
| <b>ENCODED GAMUT - SD</b>   | This alarm scans the composite encoded signal derived from the selected digital input. The alarm occurs when the luminance or peak video falls outside the adjustable limits for a period in excess of the duration setting. The CES can be increased to provide immunity to fast noise spikes.      |
| <b>LOSS OF ACTIVE VIDEO</b> | This alarm occurs when active video falls below the adjustable threshold for a period in excess of the duration setting.   |

To monitor for RGB GAMUT errors in a HD or SD video signal:

1. Press SETUP/LEARN to display the SETUP MENU.
2. Rotate the WAVEFORM POSITION-H knob (H knob) to select WAVEFORM ALARMS.
3. Press the H knob.
4. Rotate the H knob to select RGB GAMUT.
5. Press the H knob.

## Operation

6. Rotate the H knob to select OFF.
7. Press the H knob to toggle to ON.
8. Rotate the H knob to select UPPER.
9. Press the H knob.
10. Rotate the H knob and use the waveform cursor to set the upper limit to 703 mV.
11. Press the WAVEFORM POSITION-V knob (V knob) to exit one level.
12. Rotate the H knob to select LOWER.
13. Press the H knob.
14. Rotate the H knob and use the waveform cursor to set the lower limit to -3 mV.
15. Press the V knob to exit one level.
16. Rotate the H knob to select SENSITIVITY.
17. Press the H knob.
18. Rotate the H knob to set the CES to 3.
19. Press the V knob to exit one level.
20. Rotate the H knob to select DURATION.
21. Press the H knob.
22. Rotate the H knob to set the DURATION to 0 seconds.
23. Press the V knob four times or press SETUP/LEARN once to exit the SETUP MENU.

The VTM-420HD/SD will now monitor active video for any peaks that exceed 703 mV and -3 mV for three consecutive clock samples.

## CRC Alarms

Under WAVEFORM ALARMS, a submenu called CRC DISPLAY is used for CRC evaluation for SD formats. When the CRC DISPLAY is set to OFF, this display is not active; but, when it is set to ON, the CRC errors are detected and the information is displayed in the alarm window.

The following information is displayed when the CRC display is ON:

| DISPLAY          |     |          |         | DESCRIPTION   |
|------------------|-----|----------|---------|---|
| Time since Reset |     | 00:00:00 |         | Hr:min:sec, elapsed time since last reset           |
| FF               | CRC | Seconds  | value   | Full field CRC error in seconds                     |
| AP               | CRC | Seconds  |         | Active Picture CRC error in seconds                 |
|                  | F1  | AP       | CRC     | CRC value (Check Sum) for active picture, field one |
|                  | F2  | AP       | CRC     | CRC value (Check Sum) for active picture, field two |
| Embedded Audio   |     |          | value   | Detects how many groups of audio are available      |
| Ancillary Data   |     |          | Present | Detects other ancillary information                 |
| Format Errors    |     |          |         | Detects a format error                              |

**NOTE:** When activated, the CRC display replaces the alarm display when an SD format is detected.

The following are CRC Window Format Error types:

- SAV PLACED INCORRECTLY (sav)
- LINE LENGTH ERROR (line length)
- FIELD LENGTH ERROR (field length)
- RESERVED VALUES USED IMPROPERLY (reserved values)
- ANC DATA CHECKSUM ERROR (anc checksum)
- ANC DATA PARITY ERROR (anc parity)
- ANC DATA PLACEMENT ERROR (anc placement)
- ABSENCE OF SERIAL VIDEO INPUT (no video)

Press and hold the ALARMS SCROLL/CLEAR button on the front panel for five seconds to reset the CRC elapsed time to zero and clear the EDH errors.



## Audio Alarm Error Types

Table 3-18. Audio Alarm Error Types

| Error Type                                     | Description   |
|--|---|
| <b>PEAK AUDIO</b>                              | The Peak Audio alarm occurs when the peak audio level exceeds the adjustable limit for a period in excess of the duration setting. This alarm is not tied to the format selection. Instead, it monitors analog, AES/EBU, or embedded input.   |
| <b>PHASE</b>                                   | 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. If two channels (two pairs) are displayed, the setting is valid for both pairs.   |
| <b>LOSS OF SOUND (reported as Audio Quiet)</b> | 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 (analog, AES/EBU, or embedded). The range point is global and independent of the scale type or input format. |
| <b>LOSS OF DATA</b>                            | The Loss of Data alarm monitors the AES/EBU data stream. The alarm occurs when a loss of data is detected in the displayed audio for a period in excess of the duration setting.  |
| <b>AES/EBU PHASE</b>                           | The AES/EBU Phase alarm compares the X preamble data from the displayed AES/EBU inputs to a selected reference input X preamble. The alarm occurs when the alignment exceeds the selected range for a period in excess of the duration setting.   |

## Time Code Alarm Error Types

Table 3-19. Time Code Alarm Error Types

| Error Type                  | Description   |
|-----------------------------|---|
| <b>LOSS OF TIME CODE</b>    | 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. This alarm is valid for the displayed input. |
| <b>TIME CODE FRAMING</b>    | This alarm occurs when the alignment of the start of LTC (ANSI/SMPTE 12M-1999) exceeds the limit for a period in excess of the duration setting.  |
| <b>TIME CODE CONTINUITY</b> | This alarm occurs when a break or interruption in the time-code count occurs.   |
| <b>DVITC CONTINUITY</b>     | This 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.   |
| <b>DVITC CRC</b>            | This alarm occurs when the cyclic redundancy check (CRC) within the digital vertical interval time code field does not correlate with the embedded CRC for a period in excess of the duration setting.              |

## Using the Keyboard Commands

**Table 3-20** lists the keyboard commands used for remote operation of a single VTM-420HD/SD or multiple VTM-420HD/SD units. This table continues on the next page.

**Table 3-20. Keyboard Commands**

| Function                  | Keystroke         | Description   |
|---------------------------|-------------------|---|
| <b>Bypass</b>             | Ctrl+(A–Z & 0–9)* | Toggles BYPASS on and off                             |
| <b>Capture</b>            | P p               | Captures the current display                          |
| <b>Transfer</b>           | D d               | Selects Transfer                                      |
| <b>Display</b>            | F1                | Provides full-screen display                          |
| <b>Display</b>            | F2                | Displays full-screen WAVEFORM display                 |
| <b>Display</b>            | F3                | Displays full-screen VECTOR display                   |
| <b>Display</b>            | F4                | Displays full-screen AUDIO display                    |
| <b>Display</b>            | F5                | Multiscreen (simultaneous) display                    |
| <b>External Reference</b> | X x               | Toggles Internal/External Reference                   |
| <b>Input</b>              | 1                 | Selects INPUT A                                       |
| <b>Input</b>              | 2                 | Selects INPUT B                                       |
| <b>Input</b>              | 3                 | Selects INPUT A+B                                     |
| <b>Filter</b>             | F f               | Cycles through Flat, LP, and Bowtie                   |
| <b>Sweep</b>              | S s               | Cycles through 1H, 2H, 1V, 2V                         |
| <b>Format</b>             | T t               | Cycles through RGB, YC <sub>B</sub> CR, and COMPOSITE |
| <b>Edit/Clear</b>         | E e               | Selects Edit/Clear                                    |
| <b>Waveform Zoom</b>      | W w               | Cycles through WAVEFORM ZOOM modes                    |
| <b>Vector Zoom</b>        | V v               | Cycles through VECTOR ZOOM modes                      |
| <b>Audio Zoom</b>         | A a               | Cycles through AUDIO ZOOM mode                        |
| <b>Alarm Scroll</b>       | O o               | Selects/deselects Alarm Scroll                        |
| <b>Alarm Clear</b>        | Alt+O o           | Clears the displayed alarm list                       |
| <b>Setup</b>              | U u               | Selects/deselects SETUP                               |
| <b>Preset 1</b>           | Alt+1             | Selects Preset 1                                      |
| <b>Preset 2</b>           | Alt+2             | Selects Preset 2                                      |
| <b>Preset 3</b>           | Alt+3             | Selects Preset 3                                      |
| <b>Preset 4</b>           | Alt+4             | Selects Preset 4                                      |
| <b>Preset 5</b>           | Alt+5             | Selects Preset 5                                      |

\*To ensure that a fixed keystroke does not interfere with any programs on the remote control PC, use the BYPASS CONFIGURE option on the I/O AND COMMUNICATIONS menu. This option allows selection of a letter (A–Z) or a number (0–9) as the second keyboard key along with the Ctrl key. The default is Ctrl+B b.

*(Table continues on next page)*

## Operation

**Table 3-20. Keyboard Commands (continued)**

| Function                                  | Keystroke           | Description  |
|---|---------------------|--|
| <b>Preset 6</b>                           | Alt+6               | Selects Preset 6   |
| <b>Preset 7</b>                           | Alt+7               | Selects Preset 7   |
| <b>Preset 8</b>                           | Alt+8               | Selects Preset 8   |
| <b>Learn</b>                              | Alt+U u             | Turns on the “Preset Learn” function   |
| <b>Line Select</b>                        | L l                 | Toggles Line Select on and off   |
| <b>Line Select</b>                        | Alt+L l             | Toggles odd/even fields  |
| <b>Line Select</b>                        | [ {                 | Decrements the line number   |
| <b>Line Select</b>                        | ] }                 | Increments the line number   |
| <b>Menu Item Select or Waveform H Mag</b> | Home                | Toggles H Mag on and off (selects items in setup mode)                                       |
| <b>Menu Item Select or Waveform V Mag</b> | End                 | Toggles V Mag on and off (exits Setup mode)  |
| <b>Waveform Position-H</b>                | up arrow            | Moves waveform up  |
| <b>Waveform Position-V</b>                | down arrow          | Moves waveform down  |
| <b>Waveform Position-H</b>                | left arrow          | Moves waveform left (moves cursor down in SETUP mode)  |
| <b>Waveform Position-H</b>                | right arrow         | Moves waveform right (moves cursor up in SETUP mode)   |
| <b>Vector Phase</b>                       | , <                 | Rotates vector counterclockwise  |
| <b>Vector Phase</b>                       | . >                 | Rotates vector clockwise   |
| <b>Vector Level</b>                       | C c                 | Toggles 75%/100% vector level  |
| <b>Source ID</b>                          | F10                 | Toggles source ID edit mode  |
| <b>Source ID</b>                          | Arrows              | Moves cursor   |
| <b>Source ID</b>                          | Backspace           | Deletes character at cursor and backspace  |
| <b>Router</b>                             | Shift + (F1 to F12) | Router selection 1 through 12 (F1 being Router selection 1 to F12 being Router selection 12) |

\*To ensure that a fixed keystroke does not interfere with any programs on the remote control PC, use the BYPASS CONFIGURE option on the I/O AND COMMUNICATIONS menu. This option allows selection of a letter (A–Z) or a number (0–9) as the second keyboard key along with the Ctrl key. The default is Ctrl+B b.

## Calibration Interval

Calibration is recommended under any of the following conditions:

- Every 12 months
- When critical components are replaced
- After exposure to temperatures outside the specified operating or storage temperatures

**NOTE:** If calibration is needed, refer to **Appendix B** for service and support.

## Section 4 ♦ 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.

**NOTE:** When power is applied to the unit, the display remains blank for about 30 seconds.

If the VTM-420HD/SD is not functioning properly, first verify that:

1. The VTM-420HD/SD is connected to a power source (90–264 VAC, 50/60 Hz nominal).
2. All cables are correctly connected (see Section 2, “Installation”).

Initial difficulties with operation or display can be due to improper setup. Review the SETUP MENU (see Section 3, “Operation”) to ensure that the proper adjustments have been made for the signal requirements.

For information on troubleshooting the RCU-420HD/SD, see Appendix D, “Remote Control Unit (RCU-420HD/SD).”

### Cold Starting the VTM-420HD/SD

**NOTE:** A cold start resets all front panel and SETUP MENU selections to the factory-default settings. All user settings are lost. See Section 3, “Operation,” for the factory-default settings.

If a problem persists after the cables are correctly connected and the unit is set up, perform a Cold Start. Two procedures can cold start the VTM-420HD/SD. Only one procedure needs to be performed to cold start the unit. The first type of cold start procedure is a Power-up Cold Start, as described below. The second type of cold start procedure is a Front Panel Cold Start that is described on page 4-2.

**NOTE:** A cold start will reset the Ethernet values to their default settings.

*The Ethernet default settings for the VTM-420HD/SD are:*

- Gateway: 0.0.0.0
- IP: 192.0.0.100
- Subnet Mask: 255.0.0.0

### Power-up Cold Start

To perform a Power-up Cold Start:

1. Disconnect the AC power cord.
2. Wait 30 seconds.
3. Press and hold the SETUP button.
4. Re-apply power while holding SETUP.
5. Release the SETUP button after the graticules appear on the X VGA monitor.

## Front Panel Cold Start

The Front Panel Cold Start procedure is a cold starting procedure that does not require the power to be disconnected from the unit. To perform a Front Panel Cold Start:

1. Push and hold the SETUP/LEARN, H-MAG, and V-MAG buttons for a minimum of five seconds until the clock on the display stops.
2. Once the clock has stopped, the cold start has begun. The unit will restart, and the cold start will be complete.

## Updating the VTM-420HD/SD Using VFlash

**NOTE:** To obtain the most recent .flu files, visit [www.videotek.com](http://www.videotek.com)

VFlash is a utility program required to download firmware updates into the VTM-420HD/SD. Located on the *SpyderWeb* CD-ROM is a folder named VFlash. There are two types of connections that can perform a VFlash update. The update can be performed by using a standard RS-232 connection or an Ethernet connection. Follow the RS-232 or Ethernet instructions below to perform an update.

To install VFlash:

1. Locate and open the VFlash folder on the CD-ROM.
2. Double-click the SETUP.EXE file and follow the instructions to install VFlash.

To perform a VFlash update using a standard **RS-232** serial connection:

1. Select VFlash in the Videotek, Inc folder located on the windows task bar menu (START/PROGRAMS/VIDEOTEK INC./VFLASH is the default location)
2. Connect a standard RS-232 serial cable from the PC to the RS-232 port on the VTM-420HD/SD.
3. Using the SETUP menu on the VTM-420HD/SD, go to BAUD RATE in the I/O COMMUNICATIONS menu and verify the baud rate is 115200.
4. Exit SETUP mode.
5. (For VFlash version 1.42 or earlier) Click on BROWSE on the VFLASH window and select the VTM420V.xxx.FLU .flu file from the provided software. To obtain the most recent .flu files, visit [www.videotek.com](http://www.videotek.com).
6. (For VFlash version 2.00 or later) Select the SERIAL radio button. Leave the “Auto Spin” field unchecked.
7. Click on UPDATE. The UNIT ID box in the middle of the VTM-420HD/SD display should change from red to green, indicating that VFlash is communicating with the unit. Do not disturb the flash update once it has begun. Do not disturb the flash update once it has begun. A status bar indicates the progress of the update. The update may take 10 minutes to complete.

**NOTE:** A green status bar indicates that the flash transfer was completed. Wait two to three minutes for the VTM to reboot.

8. Remove power from the VTM-420HD/SD.

9. Press and hold the SETUP button on the front panel while reapplying power.
10. Hold in the SETUP button until you see the standard waveform, vector picture display on the screen. This could take approximately 30 seconds.
11. Release the SETUP button.
12. Verify that the version number of the .flu file is at the bottom of the SETUP window.

The update is complete.

To perform a VFlash update using an **Ethernet** connection:

1. Connect a standard Ethernet cable from the PC to the Ethernet RJ-45 port on the VTM-420HD/SD.
2. Select VFlash in the Videotek, Inc folder located on the windows task bar menu (START/PROGRAMS/VIDEOTEK INC./VFLASH is the default location).
3. Click BROWSE and select the .flu file from the VTM-420HD/SD folder on the *SpyderWeb* CD-ROM. Select the ETHERNET radio button and type in the IP address of the VTM-420HD/SD. Leave the “Auto Spin” field unchecked.
4. Click on UPDATE. The UNIT ID box in the middle of the VTM-420HD/SD display should change from red to green, indicating that VFlash has connected to the unit.

Do not disturb the flash update once it has begun.

A status bar indicates the progress of the update.

The update may take five minutes to complete.

**NOTE:** A green status bar indicates that the flash transfer was completed. Wait two to three minutes for the VTM to reboot.

5. Remove power from the VTM-420HD/SD.
6. Press and hold the SETUP button on the front panel while reapplying power.
7. Hold in the SETUP button until you see the standard waveform, vector picture display on the screen. This could take approximately 30 seconds.
8. Release the SETUP button.
9. Verify that the version number of the .flu file is at the bottom of the SETUP window.

The update is complete.

## Problems, Causes, and Solutions

Table 4-1. VTM-420HD/SD: Problems, Causes, and Solutions

| Problem/Symptom  | Possible Cause   | Solution or Explanation  |
|--|--|--|
| <b>No display on XVGA monitor</b>  | The VTM-420HD/SD is set to BYPASS mode.  | Press BYPASS to toggle it off.   |
|  | The monitor is not powered up.   | Check to see that the monitor is plugged in and powered up.  |
|  | The full-screen picture display is selected but no signal is present on the input selected.        | Press DISPLAY to de-select the full-screen picture display.  |
| <b>Display on XVGA monitor is not centered</b>   | The XVGA monitor is not correctly adjusted.  | Use the monitor controls to center the display.  |
| <b>Waveform not locked when External Reference (EXT REF) is selected</b>                       | 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.     |
| <b>Audio level reading too low</b>   | The input reference level is not correctly set.  | Use the SETUP MENU to check the input reference level setting.   |
| <b>When displaying an A+B parade, the second display is not locked or is offset</b>            | The two signals are not genlocked or are not timed.  | Genlock or time the signals.   |
| <b>Picture width or vector circle not correct</b>  | The aspect ratio is not set correctly.   | Change aspect ratio in the setup menu.   |
| <b>Input switches by itself</b>  | The router control is on.  | Turn off router control in the setup menu.   |
| <b>No communications on serial port</b>  | The baud rate is not correct.<br>The serial standard is incorrect.                                 | Select the proper baud rate and either RS-232 or RS-422 in the setup menu.                               |
| <b>No communications on Ethernet port</b>  | 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. |
| <b>Periodic clicks and/or dropouts are heard while inputting Dolby E at an NTSC frame rate</b> | The Dolby pull-down mode is disabled   | Enable the Dolby pull-down mode  |

If the problem still exists after troubleshooting the VTM-420HD/SD, see Appendix B, “Service Support,” for further instructions.



# Appendix A ♦ Specifications

---

## Video

### Inputs A and B

- Standard definition serial digital video (270 Mb/s)
- High definition serial digital video (1.485 or 1.485 /1.001 Gb/s)

### Connector

BNC

### Input impedance

75  $\Omega$  nominal

### Input Return Loss

- $\leq -18$  dB 5 MHz to 270 MHz
- $\leq -15$  dB 270 MHz to 1.485 GHz

### Input Signal Amplitude

800 mV  $\pm$  10% nominal

### Standard Definition Serial Digital Input Formats

Compatibility: ITU-R BT.601, SMPTE 259M-C

### High Definition Serial Digital Input Formats

#### FORMATS SUPPORTED:

- SMPTE 274M-1998
  - 1920 x 1080/60/2:1
  - 1920 x 1080/59.94/2:1
  - 1920 x 1080/50/2:1
  - 1920 x 1080/30/1:1
  - 1920 x 1080/29.97/1:1
  - 1920 x 1080/25/1:1
  - 1920 x 1080/24/1:1
  - 1920 x 1080/23.98/1:1
- Segmented Frames (sF) additions to SMPTE 274M SMPTE RP 211
  - 1920 x 1080/30 (sF)
  - 1920 x 1080/29.97 (sF)
  - 1920 x 1080/25 (sF)
  - 1920 x 1080/24 (sF)
  - 1920 x 1080/23.98 (sF)
- SMPTE 296M-2001: (note: all 296M formats are progressive, i.e. 1:1)
  - 1280 x 720/60
  - 1280 x 720/59.94
  - 1280 x 720/50
  - 1280 x 720/30
  - 1280 x 720/29.97
- 480P Transport Specification Rev. 3.1
  - 720 x 480/59.94/1:1 from 1920 x 1080/59.94/2:1

## Specifications

### Reference

#### Input

- Blackburst (for standard or high definition reference)
- Tri-level sync (for high definition reference)

#### Input Signal Level

- Blackburst
  - 286 mV peak-to-peak sync amplitude (NTSC)
  - 300 mV peak-to-peak sync amplitude (PAL)
  - ±6 dB
- Tri-level Sync
  - 600 mV peak-to-peak
  - ±3 dB

#### Input impedance

Hi-Z (looping BNC)

#### Return loss

≤ -45 dB

### XVGA Output

#### Resolution

1024 x 768, progressive scan, 60 Hz refresh rate

#### R, G, B output levels

1 V peak-to-peak ±1%

#### R, G, B output impedance

75 Ω nominal

#### Horizontal sync

Negative TTL pulse @ 48,363 Hz ±1%

#### Vertical sync

Negative TTL pulse @ 60.004 Hz ±1%

### XVGA Monitor Requirements

#### Display

Must be capable of displaying 1024 x 768 progressive @ 60 Hz (VESA standard #901101A)

#### Connector

15-pin, XVGA, mini D-sub connector

## Audio (Option 7, 7A, or 8)

|   |   |
|---|---|
| <b>Analog inputs</b>                        | Eight monophonic or four stereo channels, balanced or unbalanced  |
| <b>Analog audio maximum input level</b>     | +24 dBu (600 $\Omega$ )   |
| <b>Analog Input impedance</b>               | $\geq 20$ k $\Omega$ , balanced   |
| <b>Digital Input impedance</b>              | 75 $\Omega$   |
| <b>Digital inputs</b>                       | <ul style="list-style-type: none"> <li>▪ AES/EBU, Embedded</li> <li>▪ Dolby<sup>®</sup> Digital, AC-3, or Dolby<sup>®</sup> E (Option 8)</li> </ul> |
| <b>Digital Input level</b>                  | 1V $\pm$ 200 mV   |
| <b>Output signal format (Option 7 or 8)</b> | Eight monophonic or four stereo channels, balanced or unbalanced  |
| <b>Output signal format (Option 7A)</b>     | Eight monophonic or four stereo channels, balanced or unbalanced with enhanced SNR  |
| <b>Output signal level</b>                  | 0.0 $\pm$ 0.6 dB relative to the audio input  |
| <b>Output Impedance</b>                     | 10 $\Omega$ unbalanced, 20 $\Omega$ balanced (nominal)  |

## Time Code

|                |  |
|----------------|--|
| <b>Input</b>   | <ul style="list-style-type: none"> <li>▪ LTC via back panel connector</li> <li>▪ DVITC extracted from SD inputs</li> </ul> |
| <b>Display</b> | <ul style="list-style-type: none"> <li>▪ Displayed directly</li> <li>▪ Used to set internal clock</li> </ul>               |

## Controls

### GPI input

Includes:

- A and B input selection
- On-air tally
- Memory sequence
- XVGA bypass
- Capture frame
- Transfer captured frame
- Clear Alarms
- Reset CRC errors

### GPI output

Alarm(s) see pages 3-35 to 3-37

### GPI input impedance

4.75 K $\Omega$  returned to +5 VDC

### GPI alarm output

Relay closure

### GPI output maximum relay current

0.35A @ 30 VDC, resettable fuse protected

### Remote control keyboard interface

PC/PS2-compatible for remote control

### RS-232/RS-422 communication parameters

No parity, eight data bits, one stop bit; supported baud rates are 19200, 38400, 57600, and 115200 (default setting).

### Displays

- Picture, waveform, vector, and audio are shown simultaneously in a four-quadrant display, or in a separate full-screen display for each one
- Full-screen display of any of the above displays
- Alarms (with date and time stamp) or set-up window
- Picture display shows all active lines
- Others include: Input selected (A or B), unit ID#, CRC status, input signal rate (example 525/60), and signal format (example YC<sub>B</sub>C<sub>R</sub>)
- Closed captioning text can be displayed over the picture

## Controls (cont)

|                             |   |
|-----------------------------|---|
| <b>Waveform</b>             | Waveforms can be displayed as native $YC_B C_R$ ; as RGB, or for SD inputs as encoded composite (NTSC or PAL, dependent on input field rate).   |
| <b>Vector</b>               | HD: $C_R$ vs. $C_B$<br>SD: $C_R$ vs. $C_B$ or Composite R-Y/B-Y   |
| <b>Time Base for Sweeps</b> | <ul style="list-style-type: none"> <li>▪ One or two lines, one or two fields</li> <li>▪ Each sweep can be magnified x5 or x10</li> <li>▪ Component displays are paraded or overlaid (1H for overlay, 3H for parade).</li> </ul> |
| <b>Waveform Gain</b>        | x1, x2.5, and x5  |
| <b>Waveform Accuracy</b>    | <1%   |
| <b>Vector Accuracy</b>      | $\pm 1^\circ$   |

## Communications

|                                 |   |
|---------------------------------|---|
| <b>Communication Interfaces</b> | <ul style="list-style-type: none"> <li>▪ One RS-232/RS-422 port</li> <li>▪ One Ethernet port (optional)</li> </ul>                      |
| <b>Serial Communication</b>     | <ul style="list-style-type: none"> <li>▪ RS-232: No parity, eight data bits, one stop bit.</li> <li>▪ RS-422: Per SMPTE 207M</li> </ul> |
| <b>Supported baud rates</b>     | <ul style="list-style-type: none"> <li>▪ 19200</li> <li>▪ 38400</li> <li>▪ 57600</li> <li>▪ 115200</li> </ul>                           |
| <b>Keyboard</b>                 | 6-pin, mini DIN connector   |

## CRC Error Display

### Display position

Replaces alarm Window for SD only

### Parameters displayed

- FF CRC Sec (full-field CRC errored seconds)
- AP CRC Sec (active picture CRC errored seconds)
- Line CRC sec (line CRC errored seconds)
- F1 AP CRC Value- displays the most recent active picture CRC for field 1
- F2 AP CRC Value- displays the most recent active picture CRC for field 2
- Format Errors
- Embedded audio presence
- Other ancillary data presence

### Format errors monitored

- SAV placed incorrectly
- Line-length error
- Field-length error
- Reserved values used improperly
- ANC data checksum error
- ANC data parity error
- ANC data placement error
- Absence of serial video input

### CRC error-specific controls

Errored second counter rest

## Closed Captioning Displays

### Standards

- SD: EIA-608B
- HD: EIA-708B

### Data types supported

- CC1: primary
- CC3: secondary

## Magnification

### HMAG selection

x1, x5, and x10. Pressing the H POS knob will cycle through x1, x5, and x10 horizontal magnification.

### VMAG selection

x1, x2.5, and x5. Pressing the V POS knob will cycle through x1, x2.5, and x5 vertical magnification.

## Output Aspect Ratio

### Aspect ratios supported

4:3, 14:9, 16:9, 16:10

## Signal Strength Display

|                      |  |
|----------------------|--|
| <b>Display type</b>  | Four element bar graph; first two indicators are green, representing the highest received signal strength; the next indicator is yellow; and the last indicator is red.  |
| <b>Display range</b> | <ul style="list-style-type: none"><li>▪ HD: Third (yellow) indicator should first illuminate at 60 meters <math>\pm</math> 10 meters of Belden 8281 when driven with an 800 mV <math>\pm</math> 10 mV signal source.</li><li>▪ SD: Third (yellow) indicator should first illuminate at 75 meters <math>\pm</math> 10 meters of Belden 8281, when driven with an 800 mV <math>\pm</math> 10 mV signal source.</li></ul> |

## External Routing Control

|  |        |
|--|--------|
| <b>Switcher protocol</b>                 | RS-12X |
| <b>Number of RS-12X</b>                  | Two    |
| <b>Physical interconnection standard</b> | RS-485 |

## Power Requirements

|                          |                                   |
|--------------------------|-----------------------------------|
| <b>AC power source</b>   | 90 – 264 VAC, 50 - 60 Hz, nominal |
| <b>Power consumption</b> | 115 VA maximum                    |

## Mechanical

|                   |   |
|-------------------|---|
| <b>Dimensions</b> | <ul style="list-style-type: none"><li>▪ Height: 1.75" (4.45 cm)</li><li>▪ Width: 19.00" (48.26 cm)</li><li>▪ Depth: 20.00" (50.80 cm)</li></ul> |
| <b>Weight</b>     | 10.74 lb (4.87 kg)  |

## Environmental

|                              |  |
|------------------------------|--|
| <b>Operating temperature</b> | 0° to +50°C  |
| <b>Storage temperature</b>   | -40° to +65°C  |
| <b>Humidity</b>              | 0 to 90% (non-condensing)  |
| <b>Altitude</b>              | <ul style="list-style-type: none"><li>▪ Operating: to 10,000 feet (3,050 meters)</li><li>▪ Non-operating: to 50,000 feet (15,240 meters)</li></ul> |
| <b>Transportation</b>        | 24" (9.5 cm) impact-drop survivable in original factory packaging  |

## Standard Accessories

|                             |  |
|-----------------------------|--|
| <b>Standard accessories</b> | <ul style="list-style-type: none"><li>▪ <i>VTM-420HD/SD Installation and Operation Handbook</i></li><li>▪ Breakout connector for GPI/TALLY/LTC/CLOCK</li></ul> |
|-----------------------------|--|

## Options

### Ethernet

|                                      |  |
|--------------------------------------|--|
| ▪ Standard                           | 10/100BaseT conforms to IEEE802.3                                      |
| ▪ Minimum throughput                 | 1 Mb/s   |
| ▪ Connector                          | RJ45   |
| ▪ Performance metric                 | Transfer a captured frame to a PC in 30 seconds or less, dedicated LAN |
| ▪ Number of simultaneous connections | Five   |

### VTM-OPT 7

- Eight AES/EBU audio inputs
- Simultaneous monitoring of eight AES or EBU
- Eight embedded or eight analog audio inputs

### VTM-OPT 7A

- Eight analog, AES/EBU, and embedded audio inputs
- Displays up to eight inputs at once including the CineSound display
- Outputs up to eight channels on screen with enhanced SNR



## OPTIONS (Continued)

- VTM-OPT 7B**
- Eight analog and eight AES audio inputs
  - Two embedded sources HD or SD audio inputs (only utilizes one input at a time)
  - AES inputs (1-4) can be configured as AES outputs for a total of 4 AES outputs
  - On-screen Lip Sync indication
  - Channel mapping
  - Two, four, six, or eight simultaneous channels displayed on the screen
  - All outputs corresponding to meters that are not displayed can be muted
  - Lissajous pattern displayed with two or four channels
  - CineSound™ multi-channel audio display
- VTM-OPT 8**
- Four analog stereo inputs
  - Eight AES/EBU inputs
  - 16 channels of embedded audio
  - Dolby® E and Dolby® D inputs for HD and SD video inputs.
  - Dolby® inputs produce a two channel mix down analog output.
- VTM-OPT 8A**
- Eight analog and eight AES audio inputs
  - Two embedded sources HD or SD audio inputs (only utilizes one input at a time)
  - Dolby® D and Dolby® E support through AES or embedded inputs
  - AES inputs (1-4) can be configured as AES outputs for a total of 4 AES outputs
  - AES output 4 can be configured as an encoded Dolby output
  - On-screen Lip Sync indication
  - Channel mapping
  - Two, four, six, or eight simultaneous channels displayed on the screen
  - All outputs corresponding to meters that are not displayed can be muted
  - Lissajous pattern displayed with two or four channels
  - CineSound™ multi-channel audio display
  - Dolby® D and Dolby E® metering and decoding
  - Dolby inputs produce a two-channel mix down analog output

## OPTIONS (Continued)

### VTM-OPT 9

- Eight analog and eight AES audio inputs
- Two embedded sources HD or SD audio inputs (uses only one input at a time)
- Dolby® D and Dolby® E support through AES or embedded inputs
- AES inputs (1-4) can be configured as AES outputs for a total of 4 AES outputs
- AES output 4 can be configured as an encoded Dolby output
- On-screen Lip Sync indication
- Channel mapping
- Two, four, six, or eight simultaneous channels displayed on the screen
- All outputs corresponding to meters that are not displayed can be muted
- Lissajous pattern displayed with two or four channels
- CineSound™ multi-channel audio display
- Dolby® D and Dolby E® metering and decoding
- Dolby inputs produce an 8-channel fully decoded analog output

### RCU-420HD/SD

Remote control panel

*Specifications are subject to change without notice.*

For RCU-420HD/SD specifications, see Appendix D, “Remote Control Unit (RCU-420HD/SD).”

## Appendix B ♦ Service Support

---

For service support, telephone the Customer Service Department at **610-327-2292**. If the problem cannot be resolved over the telephone and the instrument must be shipped to Videotek for service or repair:

- Obtain a Return Authorization (RA) number from the Videotek Customer Service Department.
- Attach a tag to the unit with:
  - 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 Videotek had packed it. If possible, use the original packing materials in the original shipping container.
- Ship the unit to:

Videotek  
243 Shoemaker Road  
Pottstown, PA 19464-6433  
Attn: Service Dept.

Blank Page

# Appendix C ♦ Pinouts

Figure C-1. ANALOG AUDIO IN/OUT 37-pin, Male, D-sub Connector For Audio Options

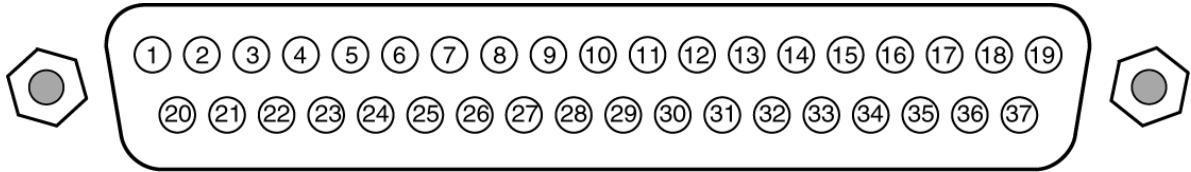


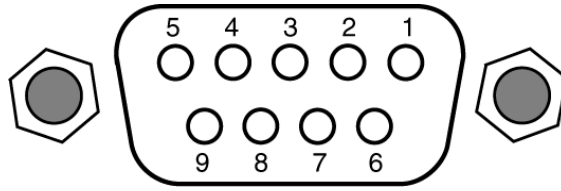
Table C-1. Pinouts for ANALOG AUDIO IN/OUT Connector and Audio Breakout Board

| Pinout | Signal            |
|--------|-------------------|
| 1      | Analog input 1 –  |
| 2      | Analog input 2 –  |
| 3      | Analog input 3 –  |
| 4      | GND               |
| 5      | Analog input 4 –  |
| 6      | Analog input 5 –  |
| 7      | Analog input 6 –  |
| 8      | Analog input 7 –  |
| 9      | Analog input 8 –  |
| 10     | GND               |
| 11     | Analog output 1 – |
| 12     | Analog output 2 – |
| 13     | Analog output 3 – |
| 14     | Analog output 4 – |
| 15     | Analog output 5 – |
| 16     | Analog output 6 – |
| 17     | Analog output 7 – |
| 18     | Analog output 8 – |
| 19     | GND               |

| Pinout | Signal            |
|--------|-------------------|
| 20     | Analog input 1 +  |
| 21     | Analog input 2 +  |
| 22     | Analog input 3 +  |
| 23     | Analog input 4 +  |
| 24     | Analog input 5 +  |
| 25     | Analog input 6 +  |
| 26     | GND               |
| 27     | Analog input 7 +  |
| 28     | Analog input 8 +  |
| 29     | Analog output 1 + |
| 30     | Analog output 2 + |
| 31     | Analog output 3 + |
| 32     | Analog output 4 + |
| 33     | Analog output 5 + |
| 34     | Analog output 6 + |
| 35     | Analog output 7 + |
| 36     | Analog output 8 + |
| 37     | GND               |

## Pinouts

**Figure C-2. RS-232/422 COMM 9-pin, Female, D-sub Connector**

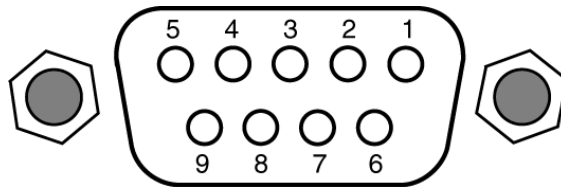


**Table C-2. RS-232 COMM Connector Pinouts (for RS-232 and RS-422)**

| RS-232 Pinout | Signal |
|---------------|--------|
| 1             | N.C.   |
| 2             | TX     |
| 3             | RX     |
| 4             | N.C.   |
| 5             | GND    |
| 6             | N.C.   |
| 7             | N.C.   |
| 8             | N.C.   |
| 9             | N.C.   |

| RS-422 Pinout | Signal |
|---------------|--------|
| 1             | N.C.   |
| 2             | TX -   |
| 3             | RX -   |
| 4             | N.C.   |
| 5             | GND    |
| 6             | N.C.   |
| 7             | TX +   |
| 8             | RX +   |
| 9             | N.C.   |

**Figure C-3. REMOTE 9-pin, Male, D-sub Connector**



**Table C-3. REMOTE Connector Pinouts**

| Pinout | Signal |
|--------|--------|
| 1      | N.C.   |
| 2      | TX -   |
| 3      | RX -   |
| 4      | N.C.   |
| 5      | GND    |

| Pinout | Signal |
|--------|--------|
| 6      | N.C.   |
| 7      | TX +   |
| 8      | RX +   |
| 9      | N.C.   |

## Pinouts

Figure C-4. GPI/TALLY, LTC/CLOCK 26-pin, Female, D-sub Connector

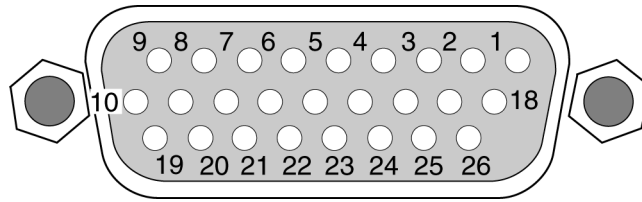
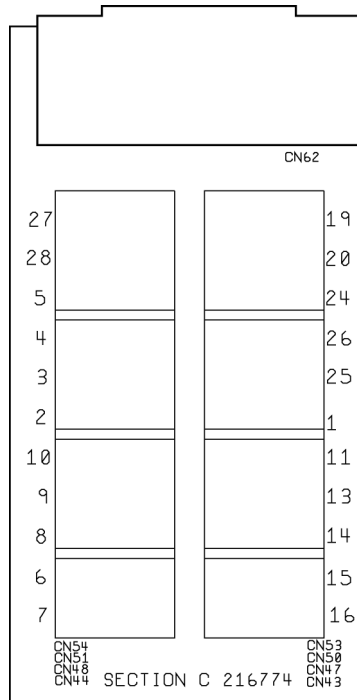


Figure C-5. GPI/TALLY, LTC/CLOCK Breakout Board



Pinouts

**Table C-4. Pinouts for GPI/TALLY/LTC/CLOCK Connector and GPI/TALLY/LTC/CLOCK Breakout Board**

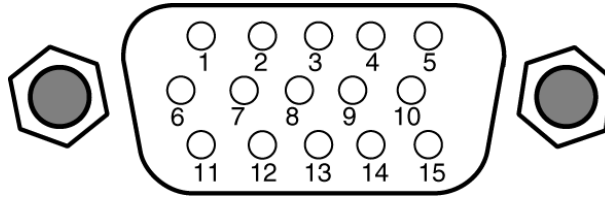
| Pinout | Signal   |
|--------|--|
| 1      | GND  |
| 2      | GPI input #4 (CRC - reset alarms in standard GPI set)      |
| 3      | GPI input #3 (Clear Alarms in standard GPI set)            |
| 4      | GPI input #2 (Select input B in standard GPI set)          |
| 5      | GPI input #1 (Select input A in standard GPI set)          |
| 6      | GPI input #8 (On Air in standard GPI set)                  |
| 7      | GPI input #9 (Memory in standard GPI set)                  |
| 8      | GPI input #7 (Bypass in standard GPI set)                  |
| 9      | GPI input #6 (Transfer captured frame in standard GPI set) |
| 10     | GPI input #5 (Capture frame in standard GPI set)           |
| 11     | GND  |
| 12     | Reserved   |
| 13     | GPI output #1  |

| Pinout | Signal            |
|--------|-------------------|
| 14     | Return for GPI #1 |
| 15     | GPI output #2     |
| 16     | Return for GPI #2 |
| 17     | Reserved          |
| 18     | Reserved          |
| 19     | Clock high in     |
| 20     | Clock low in      |
| 21     | Reserved          |
| 22     | Reserved          |
| 23     | Reserved          |
| 24     | LTC high in       |
| 25     | LTC ground        |
| 26     | LTC low in        |



## Pinouts

**Figure C-6. XVGA IN 15-pin, Male, D-sub Connector**

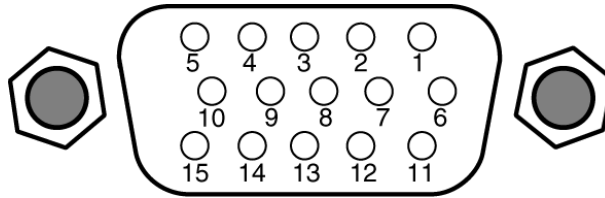


**Table C-5. XVGA IN Connector Pinouts**

| Pinout | Signal           |
|--------|------------------|
| 1      | XVGA red input   |
| 2      | XVGA green input |
| 3      | XVGA blue input  |
| 4      | N.C.             |
| 5      | GND              |
| 6      | GND              |
| 7      | GND              |
| 8      | GND              |

| Pinout | Signal                     |
|--------|----------------------------|
| 9      | N.C.                       |
| 10     | GND                        |
| 11     | N.C.                       |
| 12     | SDA                        |
| 13     | XVGA horizontal sync input |
| 14     | XVGA vertical sync input   |
| 15     | SCL                        |

**Figure C-7. XVGA OUT 15-pin, Female, D-sub Connector**



**Table C-6. XVGA OUT Connector Pinouts**

| Pinout | Signal            |
|--------|-------------------|
| 1      | XVGA red output   |
| 2      | XVGA green output |
| 3      | XVGA blue output  |
| 4      | N.C.              |
| 5      | GND               |
| 6      | GND               |
| 7      | GND               |
| 8      | GND               |

| Pinout | Signal                      |
|--------|-----------------------------|
| 9      | N.C.                        |
| 10     | GND                         |
| 11     | N.C.                        |
| 12     | N.C./SDA                    |
| 13     | XVGA horizontal sync output |
| 14     | XVGA vertical sync output   |
| 15     | N.C./SCL                    |

Pinouts

Figure C-8. KEYBOARD 6-pin, Female, Connectors

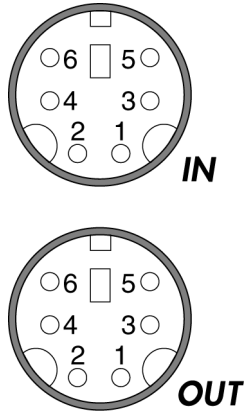


Table C-7. KEYBOARD Connector Pinouts

| Pinout | Signal                        |
|--------|-------------------------------|
| 1      | Keyboard data                 |
| 2      | N.C.                          |
| 3      | GND                           |
| 4      | +5 V power source to keyboard |
| 5      | Keyboard Clock                |
| 6      | N.C.                          |

| Pinout | Signal         |
|--------|----------------|
| 1      | Keyboard data  |
| 2      | N.C.           |
| 3      | GND            |
| 4      | N.C.           |
| 5      | Keyboard Clock |
| 6      | N.C.           |

Figure C-9. Ethernet Connector

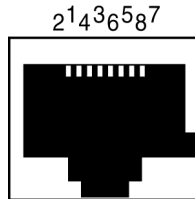


Table C-8. ETHERNET Connector Pinouts

| Pinout | Signal |
|--------|--------|
| 1      | TX+    |
| 2      | TX-    |
| 3      | RX+    |
| 4      | N.C.   |

| Pinout | Signal |
|--------|--------|
| 5      | N.C.   |
| 6      | RX-    |
| 7      | N.C.   |
| 8      | N.C.   |

## Pinouts

Figure C-10. Router Control Connector

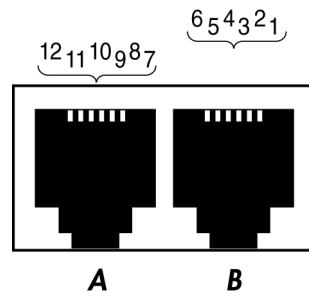


Table C-9. Router Control Connector Pinouts

| Pinout | Signal |
|--------|--------|
| 1      | OPEN   |
| 2      | OPEN   |
| 3      | RX     |
| 4      | TX     |
| 5      | OPEN   |
| 6      | OPEN   |
| 7      | OPEN   |
| 8      | OPEN   |
| 9      | RX     |
| 10     | TX     |
| 11     | OPEN   |
| 12     | OPEN   |

## Pinouts

Blank Page

# Appendix D ♦ Remote Control Unit (RCU-420HD/SD)

The RCU-420HD/SD remote control unit enables remote control of as many as 30 VTM-420HD/SD units.

## Installing the RCU-420HD/SD

Figure D-1. RCU-420HD/SD Front Panel



Figure D-2. RCU-420HD/SD Back Panel Connectors

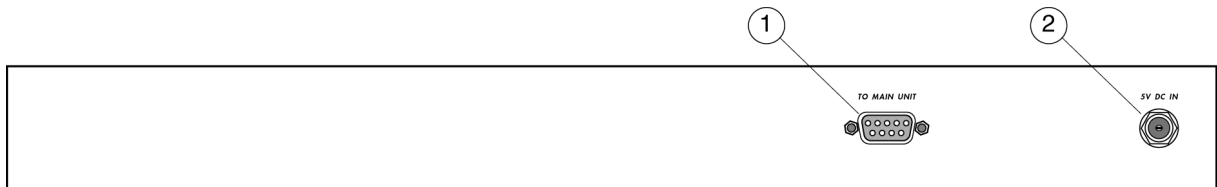


Table D-1. Description of RCU-420HD/SD Back Panel Connectors

| Key | Label        | Description  |
|-----|--------------|--|
| 1   | TO MAIN UNIT | 9-pin, male, D-sub connector connects to the REMOTE connector on the VTM-420HD/SD to provide RS-422 communication. The communication parameters are 8 data bits, no parity, with the baud rate fixed at 38,400 bps.            |
| 2   | 5V DC IN     | Connects to the DC power plug on the RCU-420HD/SD DC power supply. A knurled ring enables the power plug to be secured to the jack after the plug is fully inserted. This connection must be made before AC power is supplied. |

To install the RCU-420HD/SD:

1. Connect the DC power supply to the 5V DC IN connector.
2. Connect the power cord to a properly grounded AC outlet.
3. Verify that the INPUT and REF LEDs flash in alternate pairs (A+EXT and B+INT); if they do not, check steps 1 and 2.
4. If multiple VTM-420HD/SD units are being connected, ensure each has a unique unit ID (from 1-32) *before connecting them to the RS-422 bus*. If a VTM-420HD/SD has a unique ID other than 1.

**NOTE:** If a VTM-420HD/SD does not have a unique unit ID, change it on the I/O AND COMMUNICATIONS submenu.

- a) Physically connect the RCU-420HD/SD to a bus with multiple VTM-420HD/SD.

- b) To select the VTM-420HD/SD to be controlled by the RCU-420HD/SD, press SETUP/LEARN and LINE SELECT on the RCU-420HD/SD simultaneously (the VTM-420HD/SD selection mode is restricted to the RCU-420HD/SD). While in the selection mode, the LINE SELECT ODD and EVEN LEDs alternately flash.
  - c) Rotate the LINE SELECT knob until the Unit ID on the VTM-420HD/SD to be controlled turns green.
  - d) Simultaneously press SETUP/LEARN and LINE SELECT to end the selection process. When communication is established between RCU-420HD/SD and the VTM-420HD/SD, the RCU-420HD/SD LEDs will stop flashing in alternate pairs. The RCU-420HD/SD LEDs now reflect the settings of the VTM-420HD/SD and RCU-420HD/SD front panel operations affect the VTM-420HD/SD. To indicate connection to the RCU-420HD/SD, the selected VTM-420HD/SD changes the background for the UNIT ID on the XVGA display from red to green (see **Figure 3-1** and **Table 3-1**).
  - e) The RCU-420HD/SD polls the selected base unit every 100 ms. If the VTM-420HD/SD fails to receive the poll, it assumes that there is a communication break.  
A communication break is indicated by changing the background for the UNIT ID on the XVGA display from green to red and alternately flashing the A+EXT and B+INT LEDs on the RCU-420HD/SD. When communication is re-established, the INPUT LEDs stop flashing.
5. If multiple VTM-420HD/SDs are configured, the RCU-420HD/SD must be at one end of the RS-422 bus. The last VTM-420HD/SD must be terminated at the other end by using a jumper, as shown in Section 2 by **Figure 2-1** for the VTM-420HD/SD.

## Operating the RCU-420HD/SD

Operating the RCU-420HD/SD is the same as operating a VTM-420HD/SD with one exception: selecting a VTM-420HD/SD for communication.

To select a VTM-420HD/SD for communication:

1. Press SETUP/LEARN and LINE SELECT simultaneously to enable the selection mode.
2. Rotate the LINE SELECT knob to select the unit ID. Each subsequent rotation moves up (or down) to the next higher (or lower) VTM-420HD/SD connected to the communication line.
3. Press SETUP/LEARN and LINE SELECT simultaneously to end the selection process.

# Troubleshooting

Table D-2. RCU-420HD/SD: Problems, Causes, and Solutions

| Problem/Symptom  | Possible Cause  | Solution or Explanation               |
|--|---|---------------------------------------|
| <b>No LEDs are illuminated.</b>  | The DC power supply cable is not properly connected to the back panel 5V DC IN connector.   | Properly connect the DC power supply. |
|  | The DC power supply has no AC power applied.  | Apply the AC power.                   |
| <b>INPUT and REF LEDs flash in alternate pairs (e.g., A+EXT and B+INT); no other LEDs are illuminated.</b> | The cable from the VTM-420HD/SD to the RCU-420HD/SD is defective or not properly connected. | Check the cable and the connection.   |
|  | VTM-420HD/SD not powered up.  | Apply the power to the VTM-420HD/SD.  |
|  | A VTM-420HD/SD is not selected.   | Select a VTM-420HD/SD.                |

If the problem still exists after troubleshooting the RCU-420HD/SD, see Appendix B, “Service Support,” for further instructions.

## Specifications

### Power Requirements (External Power Supply)

AC power source 115–230 VAC, 50/60 Hz nominal

Power consumption 30 VA maximum

DC output 5 V

### Mechanical

Dimensions

- Height: 1.75" (4.45 cm)
- Width: 19.00" (48.26 cm)
- Depth: 2.30" (5.85 cm)

Weight 3.64 lb (1.65 kg)

### Environmental

Operating temperature 0° to +50°C

Storage temperature -40° to +65°C

Humidity 0 to 90% (non-condensing)

Altitude

- Operating: to 10,000 feet (3,050 meters)
- Non-operating: to 50,000 feet (15,240 meters)

Transportation 24" (9.5 cm) impact-drop survivable in original factory packaging

## Standard Accessories

- Standard accessories**
- DC power supply (115–230 VAC, 50–60 Hz capability) with detachable AC power cord
  - 25' RCU-420HD/SD/VTM-420HD/SD interface cable

*Specifications are subject to change without notice.*

## Pinouts

Figure D-3. RCU-420HD/SD TO MAIN UNIT 9-pin, Male, D-sub Connector

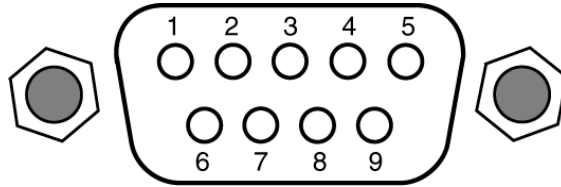


Table D-3. Pinouts for RCU-420HD/SD TO MAIN UNIT Connector

| Pinout | Signal |
|--------|--------|
| 1      | N.C.   |
| 2      | RX-    |
| 3      | TX-    |
| 4      | N.C.   |
| 5      | GND    |

| Pinout | Signal |
|--------|--------|
| 6      | N.C.   |
| 7      | RX+    |
| 8      | TX+    |
| 9      | N.C.   |



# Appendix E ♦ Option 7, 7A, and 8 Field Upgrade Instructions

---

## Introduction

Option 7 and 7A accepts up to 8 AES/EBU, analog and embedded inputs and provides up to 8 analog output channels. Also, Option 7 and 7A provides a CineSound™ feature that contains a unique audio display that provides an intuitive view of 5.1 and 7.1 channels of surround-sound audio.

In addition to the Option 7 functionality, the Option 8 board decode one Dolby® Digital or Dolby® E channel. This channel is selectable from any one of the AES/EBU inputs or from the audio that is embedded in the video stream.

Option 7, 7A, and 8 for the VTM-420HD/SD provides the following features:

- Provides the following input formats: 8 channel, 6 channel, 4 channel, and digital formats
- CineSound™ display for 5.1 and 7.1 surround sound channels
- One, two, six, or eight simultaneous channels displayed on the screen (Option 7 or Option 8)
- One, two, six, or eight simultaneous channels displayed on the screen with enhanced SNR (Option 7A)
- AES Channel Selection
- Unique Dolby® output mapping for all Dolby® formats (Option 8)
- Dolby® Digital and Dolby® E meters and output monitor. (Option 8)

## Upgrade Instructions



**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.

Follow the steps below to upgrade a VTM-420HD/SD series instrument to Option 8:

**NOTE:** If an Option 7 or 7A circuit card exists in the VTM-420HD/SD, it is necessary to remove an Option 7 audio circuit card before installing an Option 8 circuit card.

1. Inspect the Option 8 shipment:
  - One VTM Option 8 board
  - One Hardware Kit, VTM-404A, item number 045806
  - VTM Option 7 and 7A removal instructions
  - VTM Option 8 field upgrade instructions
  - One *SpyderWeb* CD-ROM

## Option 7 and 8 Field Upgrade Instructions

- One VTM420Vxxx.FLU file (floppy disk)
  - One *SpyderWeb Installation Guide*
  - One *VTM-420HD/SD Installation and Operation Handbook*
  - A warranty registration card
2. Flash-update the VTM-420HD/SD firmware using the provided .flu file on the VTM420Vxxx.FLU floppy disk. Refer to page 4-2 for VFlash instructions.
  3. Remove the power from the VTM-420HD/SD.
  4. Remove the cover to the VTM-420HD/SD.
  5. Remove the Option 7 and 7A board (if required). Refer to the VTM OPT 7 and 7A removal instructions provided with VTM Option 8 shipment.
  6. Install the Option 8 board. Refer to the VTM Option 8 field upgrade instructions provided with the VTM Option 8 shipment.
  7. Fasten the cover onto the VTM-420HD/SD.
  6. Press and hold the SETUP button.
  7. Re-apply power while holding SETUP.
  8. Release the SETUP button after the graticules appear on the XVGA monitor.

## Appendix F ♦ 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 ‘pixelation’ 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.

**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

**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 (C/L 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.

**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

**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.

**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 ( $3 \times 1.75 = 5.25$ ) 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.

**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  $YC_B C_R$  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 RGB 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.

**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.

**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.

**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.

**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.

**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.

**RGB Legalization** Limiting of luminance and color difference video signals such that, once transcoded into RGB 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.

**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  $C_B$  and  $C_R$  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 1024x768 non-interlaced (progressive) display monitor

**XVGA** Extended Video Graphics Adapter

**Y<sub>P</sub>B<sub>P</sub>R<sub>P</sub>**: CAV format composed of luminance (Y) and two color difference signals (P<sub>B</sub> and P<sub>R</sub>)

**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.

# Index

## A

- AES/EBU, 1-1, 3-42
- Alarm
  - Display, 3-3
- Alarms
  - AUDIO ALARMS menu, 3-34
  - Clearing the list, 3-16, 3-50
  - Contents and Limitations, 3-49
  - CRC, 3-52
  - Descriptions, 3-50
  - Digital Waveform Errors, 3-50
  - Duration, 3-49
  - Gamut, 3-48
  - GPI, 3-50
  - Phase, 3-42
  - RGB Gamut Error Monitoring, 3-50
  - Sample Message, 3-49
  - Sample Message Description, 3-49
  - Screen Capture, 3-50
  - Scrolling through the list, 3-16, 3-50
  - Sensitivity, 3-49
  - Setting, 3-48
  - Time Code Errors, 3-53
  - TIME CODE Menu, 3-34
  - WFM ALARMS, DIGITAL Menu, 3-33
- Audio
  - ANALOG AUDIO IN/OUT
    - Connector Pinouts, C-1
  - AUDIO ALARMS menu, 3-34
  - AUDIO SETUP Menu, 3-32
  - AUDIO ZOOM button, 3-15
  - Ballastics, 3-10
  - Configuring Display, 3-42
  - Display, 3-3
  - Display Configuration, 3-42
  - Expanding the display, 3-15
  - Graticule Scales, 3-10
  - Level, 3-42
  - Loss of, 3-42
  - Markers, 3-42
  - Peak, 3-42
  - Phase, 3-42
- Audio type
  - AES/EBU, 3-42

Embedded, 3-42

## B

- Back Panel
  - Connectors, 2-4
- Blanking, 3-13
- Breakout Board
  - GPI/Tally, LTC/CLOCK, C-3
- Bypass, 2-14, 3-13, 3-37

## C

- Capture, 3-13, 3-54
    - Status, 3-4
    - XVGA Display, 3-46
  - CES, 3-49, 3-50
  - CineSound, 3-43
  - CineSound<sup>™</sup>
    - Audio Display, 3-12
    - Audio Setup Menu, 3-12
    - Channels, 3-12, E-1
    - Input Mapping, 3-12
    - Left Surround, 3-12
    - LFE, 3-12
    - Right Surround, 3-12
  - Clock, 3-4, 3-35, 3-49
  - Closed Caption Display, 3-41
  - Color
    - Background, 3-39
  - Communication
    - I/O AND COMMUNICATIONS Menu, 3-4, 3-19, 3-35
  - Connectors
    - Back Panel, 2-4
    - GPI/TALLY, LTC/CLOCK, 2-1
  - Controls
    - Front Panel, 3-1
  - CRC Alarms, 3-52
  - Cursor, 3-45
    - Cursor Setup, 3-45
  - Customer Service, B-1
- ## D
- Default Settings, 3-13
  - Display
    - Selecting Display Format, 3-14

Dolby® Digital  
Field Upgrade Instructions, E-1

## E

EDH  
Status, 3-4  
EDIT/CLEAR button, 3-1  
EDIT/CLEAR Button, 3-13, 3-14  
Ethernet  
Addresses, 2-6  
CAT5 Crossover Cable, 2-7  
*Cold Started*, 4-1  
Configuration Testing, 2-8  
Conforming to Industry Standards,  
3-16  
Connection Information Screen, 2-10  
Connector Pinouts, C-6  
Dedicated Connection, 2-7  
*Default Settings*, 4-1  
Ethernet Setup, 2-6  
Interface, 3-16  
Network Connection, 2-7  
Preferences Screen, 2-9  
Recording Addresses, 2-6  
Setup Instructions, 2-8  
SpyderWeb, 2-6, 2-8, 3-16  
Eye Pattern, 3-4

## F

Filters  
Multiple, 3-14, 3-15  
Selecting, 3-14  
Formats  
Selecting, 3-14  
Front Panel  
Controls and Indicators, 3-1  
Controls and Indicators Description,  
3-1  
Recalling and Storing, 3-45

## G

Gamut  
Alarm, 3-48  
RGB Error Monitoring, 3-50  
Gateway, 2-6  
GPI, 3-19, 3-35, 3-36  
Alarms, 3-50

Connector, C-3  
External, 3-17  
Input, 3-17  
Input Setup, 3-17  
Output, 3-18  
Pinout, 3-17  
GPI/TALLY, LTC/CLOCK Connector,  
C-3, C-4

## K

KEYBOARD  
Commands, 3-54  
Connector Pinouts, C-6

## L

Line Select  
Button, 3-2  
Knob, 3-2  
Line Select Mode, 3-46  
Waveform and Vector Display, 3-46  
Lissajous, 3-3  
Lockout  
Preset and Panel, 3-41  
LTC/CLOCK, 3-18

## M

Menus  
AUDIO ALARMS, 3-34  
AUDIO SETUP, 3-32  
Display Colors Menu, 3-40  
DISPLAY SETUP Menu, 3-39  
SETUP MENU Groups, 3-19  
TIME CODE, 3-34  
VIDEO SETUP Menu, 3-20  
WFM ALARMS, DIGITAL menu,  
3-33  
Mode  
Overlay, 3-14  
Parade, 3-14

## N

NTSC-J Simulation, 3-1, 3-10

## O

Overlay mode, 3-14

**P**

- PAL, 3-10
- Parade mode, 3-14
- Phase, 3-42
- Pinouts
  - ANALOG AUDIO IN/OUT
    - Connector, C-1
  - Analog Audio IN/OUT Options, C-1
  - Ethernet Connector, C-6
  - GPI/TALLY, LTC/CLOCK
    - Connector, C-3, C-4
  - Keyboard Connectors, C-6
  - RCU-420HD/SD TO MAIN UNIT
    - Connector, D-4
  - Remote Connector, C-2
  - Router Control Connector, C-7
  - RS-232/422 COMM Connector, C-2
  - XVGA IN Connector, C-5
  - XVGA OUT Connector, C-5
- Preset and Panel Lockout, 3-41
- Presets, 3-45

**R**

- RA. *See* Return Authorization
- Rackmount, 2-1, 2-3
  - Parts, 2-3
  - Procedure, 2-4
- RCU-420HD/SD, D-1
  - Back Panel, D-1
  - Features, 1-1
  - Installing, D-1
  - Operating, D-2
  - Options, 1-1
  - Pinouts, D-4
  - Specifications, D-3
  - Troubleshooting, D-3
- Reference Level, 3-4
- REMOTE
  - Connector Pinouts, C-2
- Remote Control
  - Configuring, 2-11
  - Connector, 2-4
  - Ports, 2-1
  - RS-232, 2-1
  - Sample configurations, 2-11
  - Unit ID, 2-13
- Return Authorization, B-1

- Router Control, 3-17
  - Access, 3-17
  - Connector Pinouts, C-7
  - Videotek RS-12, 3-17
- RS-232, 4-2
  - Reconfigure Port, 2-2

**S**

- Safe Area, 3-41
- Screen Saver, 3-39
- Serial Port, 2-1
- Setup
  - AUDIO SETUP Menu, 3-32
- SETUP MENU, 3-4, 3-13. *See* Menus
  - Navigation, 3-19
  - Recalling and Storing, 3-45
- Shipment
  - Returning to Videotek, B-1
- Signal, loss of, 3-14
- SpyderWeb, 1-1, 2-8, 2-10, 2-12, 4-2
  - Ethernet, 2-6
  - Ethernet Interface, 3-16
- Standards, video, supported, 1-2

**T**

- Time Code
  - Alarm Error Types, 3-53
  - Sample Alarm Messages, 3-49
  - TIME CODE Menu, 3-34
- Troubleshooting
  - VTM-420HD/SD, 4-1

**U**

- Unit ID, 3-3, 3-4

**V**

- Vector
  - Composite Mode, 3-46
  - Display, 3-3, 3-4
  - Expanding the Display, 3-16
  - Graticule scales, 3-8
  - Line Select Mode, 3-46
  - Setup, 3-19
  - VECTOR ZOOM button, 3-16
- Vector Phase knob, 3-46
- VFlash, using to update
  - VTM-420HD/SD, 4-2

## Index

### Video

- Closed Caption Display, 3-41
- Display Colors Menu, 3-40
- DISPLAY SETUP Menu, 3-39
- Safe Area, 3-41
- Selecting Inputs, 3-14
- VIDEO SETUP Menu, 3-20
- Video standards supported, 1-2
- Videotek RS-12, 3-17

## W

### Waveform

- Display, 3-3, 3-4
- Expanding Display, 3-16
- Graticule Scales, 3-5
- Line Select Mode, 3-46
- Moving, 3-46

Position H, 3-2

Position V, 3-2, 3-43

Specifications, A-5

### WFM

WFM ALARMS, DIGITAL Menu,  
3-33

## X

XVGA Display, 3-3

Sample, 3-3

XVGA IN Connector, C-5

XVGA OUT

Connector Pinouts, C-5

## Z

ZOOM buttons, 3-1, 3-13