HDM Series

- HDM-170-3G
- HDM-215-3G

Dual Input, LCD, Multi-Viewer Audio/ Video Monitors

User Guide

Part Number 821098, Revision A

Wohler CONFIDENCE.

VIDEO AUDIO CAPTIONING LOUDNESS

31055 Huntwood Avenue
Hayward, California
94544 USA

1 800 5 WOHLER
+1 (510) 870-0810
Fax +1 (510) 870-0811

www.wohler.com
info@wohler.com

Reproduction

Licensed users and authorized distributors of Wohler Technologies, Inc. products may copy this document for use with Wohler Technologies., Inc. products provided that the copyright notice above is included in all reproductions.

Customer Support

Wohler Technologies, Inc.
31055 Huntwood Avenue
Hayward, CA 94544
www.wohler.com

Phone: 510-870-0810
FAX: 510-870-0811
US Toll Free: 1-888-596-4537
(1-888-5-WOHLER)
Web: www.wohler.com
Sales: sales@wohler.com
Support: support@wohler.com

Disclaimers

Even though Wohler Technologies, Inc. has tested its equipment and software, and reviewed the documentation, Wohler Technologies, Inc. makes no warranty or representation, either express or implied, with respect to software, documentation, their quality, performance, merchantability, or fitness for a particular purpose.

Wohler Technologies, Inc. reserves the right to change or improve our products at any time and without notice.

In no event will Wohler Technologies, Inc. be liable for direct, indirect, special, incidental, or consequential damages resulting from any defect in the hardware, software, or its documentation, even if advised of the possibility of such damages.

Some states do not allow the exclusion or limitation for incidental or consequential damages, so the above exclusion or limitation may not apply to you.

Printing

This document is intended to be printed on a duplex printer, such that the copy appears on both sides of each page. This ensures that all new chapters start on a right-facing page.

This document looks best when printed on a color printer since some images may be indistinct when printed on a black and white printer.

Last Update

June 27, 2013

HDM Series

Introduction

Overview

The HDM Series dual input, LCD video monitors are high-performance, professional LCD monitors that support advanced 10-bit digital processing technology with 3D comb filter and de-interlace, accurate scaling engine, GAMMA correction and color temperature adjustments to achieve the best possible image display.

The HDM Series supports 2-channel 3G/HD/SD-SDI, Y/C, component, and CVBS signal inputs as well as a single HDMI signal input. Each model can simultaneously display two signal inputs, with three display modes including one full screen display, Picture-In-Picture (PIP) displays and two Picture-By-Picture (PBP) uniform size screen displays.

Topics

Safety

Important Safety Instructions

1. Read, keep, and follow all of these instructions; heed all warnings.
2. Do not use this equipment near water, rain or moisture.
3. Use only a dry cloth to clean the equipment.
4. Do not install near any heat source such as a radiator, heat register, amplifier, or stove.
5. Do not attempt to plug the unit into a two-blade outlet (with only two prongs of equal width).

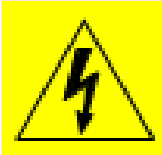
IMPORTANT: By design, these monitors will only plug into a three-prong outlet for your safety. If the plug does not fit into your outlet, contact an electrician to replace the obsolete outlet.

6. Protect the power cord from being walked on or pinched, particularly at plug's source on the equipment and at the socket.
7. Use only the attachments/accessories specified by the manufacturer.
8. Unplug the equipment during lightning storms or when unused for long periods of time.
9. Use of a cart is neither recommended nor approved by Wohler.
10. Refer all servicing to qualified service personnel. Servicing will be required under all of the following conditions:

    - The equipment has been damaged in any way, such as when the power-supply cord or plug is damaged.
    - Objects have fallen onto the equipment; or the equipment has been exposed to rain or moisture, or liquid has been spilled onto the equipment.
    - The equipment does not operate normally.
    - The equipment has been dropped.

Safety Symbols

WARNING:



The symbol to the left warns of electric shock hazard inside the unit. Disconnect the power cord before removing access panels when installing upgrades. Only qualified service personnel are to operate the equipment with covers removed, and are to exercise caution to avoid personal injury.

Installation Recommendations

Heat Dissipation

The ambient temperature around the unit should not exceed 40° Celsius (104° Fahrenheit). Allow plenty of space around the unit for air circulation.

Mounting/Bracing

A table top (-TT) stand or rack mount (-RM) kit may be provided. A standard VESA 100 mounting hole pattern is provided on the back of the unit for use with other mounts (not supplied).

Refer to Mounting on page 5 for instructions on attaching the desktop stand.

Connections and Cable Recommendations

We recommend that you limit the length of the cables that you use for feeding HD-SDI signals sources to the HD-SDI inputs of the HDM Series units and that you use a Belden 1694A cable (or equivalent). The HD-SDI inputs (**IN1** and **IN2**) can be up to 150 meters (492 feet) in length for 1.5 Gbps (HD), more for 270 Mbps (SD) and less for 3Gbps.

Note: HDMI 1.3 or 1.4 cable lengths of 2m (6 feet) are guaranteed to work well. Four meters (12 feet) lengths of high quality cable should work well enough, but is not guaranteed for all situations. Longer HDMI cables often degrade signal quality. Active extender transmitter/receiver pairs can be used to cover long distances.

Electrical Interference

Be careful to properly terminate/ground signals and avoid mismatched cable types and other similar causes of undesired reflections in digital signal systems. If severe enough, such reflections can result in corruption of the digital data stream. As with any audio equipment, maximum immunity from electrical interference requires the use of shielded cable. The internal circuitry ground is connected to the chassis.

Power

The unit comes with a standard 12 VDC/5 A external power adapter and connects an A/C mains power source (65W, 100 to 240 VAC, 50/60Hz) through the IEC connector provided on the power adapter.

When the mains plug or appliance coupler is used as the disconnect device, the disconnect device connection should remain accessible to be operable.

Unpacking and Installation

Contents

While unpacking the components, verify that none of the components are damaged. The selected stand or mounting kit comes in a separate box.

Also verify that the box contains all of the following:

- Monitor

- Adapter (12 VDC)
- Power cord
- User guide CDROM
- Warranty card

Mounting

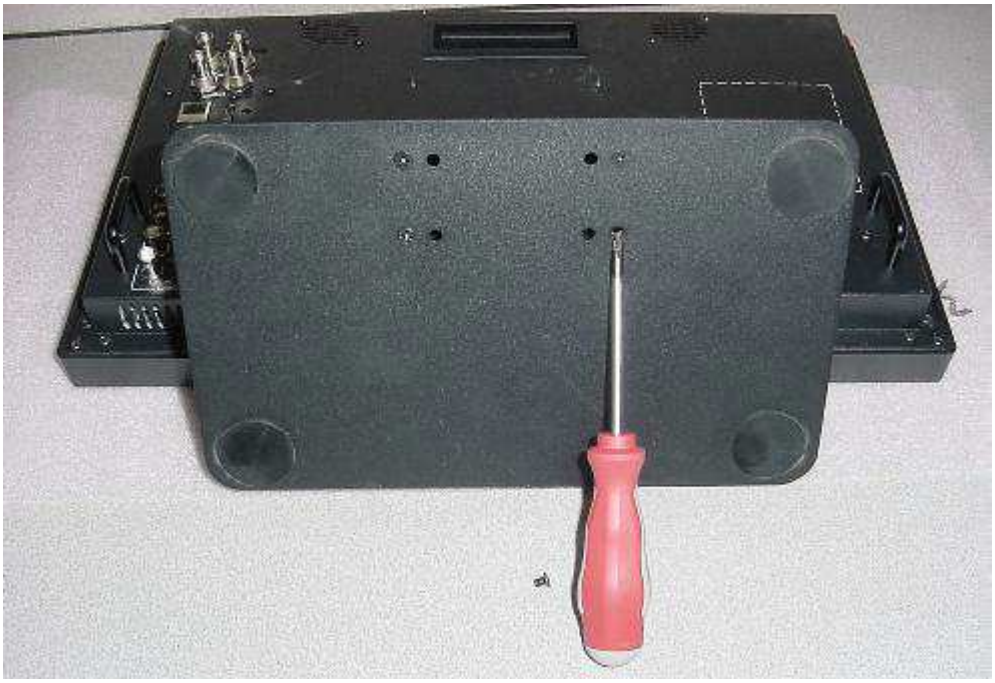
The HDM Series monitors come standard with either a table top base (HDM-170-3G-TT and HDM-215-3G-TT) or rack ears (HDM-170-3G-RM). A standard VESA 100 pattern accomodates other user-supplied mountings, such as for walls.

To install the table-top base, refer to Figure 1–1 and the instructions that follow. Refer to the instructions included with other mounts when used.

Figure 1–1 HDM Bracket Installation

1. Place the monitor face down on a smooth surface and, as shown in Figure 1–1 on page 5, use a screwdriver and the supplied **round head** screws to fasten the bracket to the back of the monitor.

Figure 1–2 HDM Base Installation



2. Next, again using a screwdriver, attach the base to the bracket, with the supplied **flat head** screws, as shown in Figure 1–2.

3. Place the monitor upright on a solid static-free surface.

4. Connect the signal inputs to the rear panel.

5. Connect the power cord to the rear panel of the monitor and to mains power.

6. Set the **Power** switch on the rear panel of the monitor to **On** (1).

Features

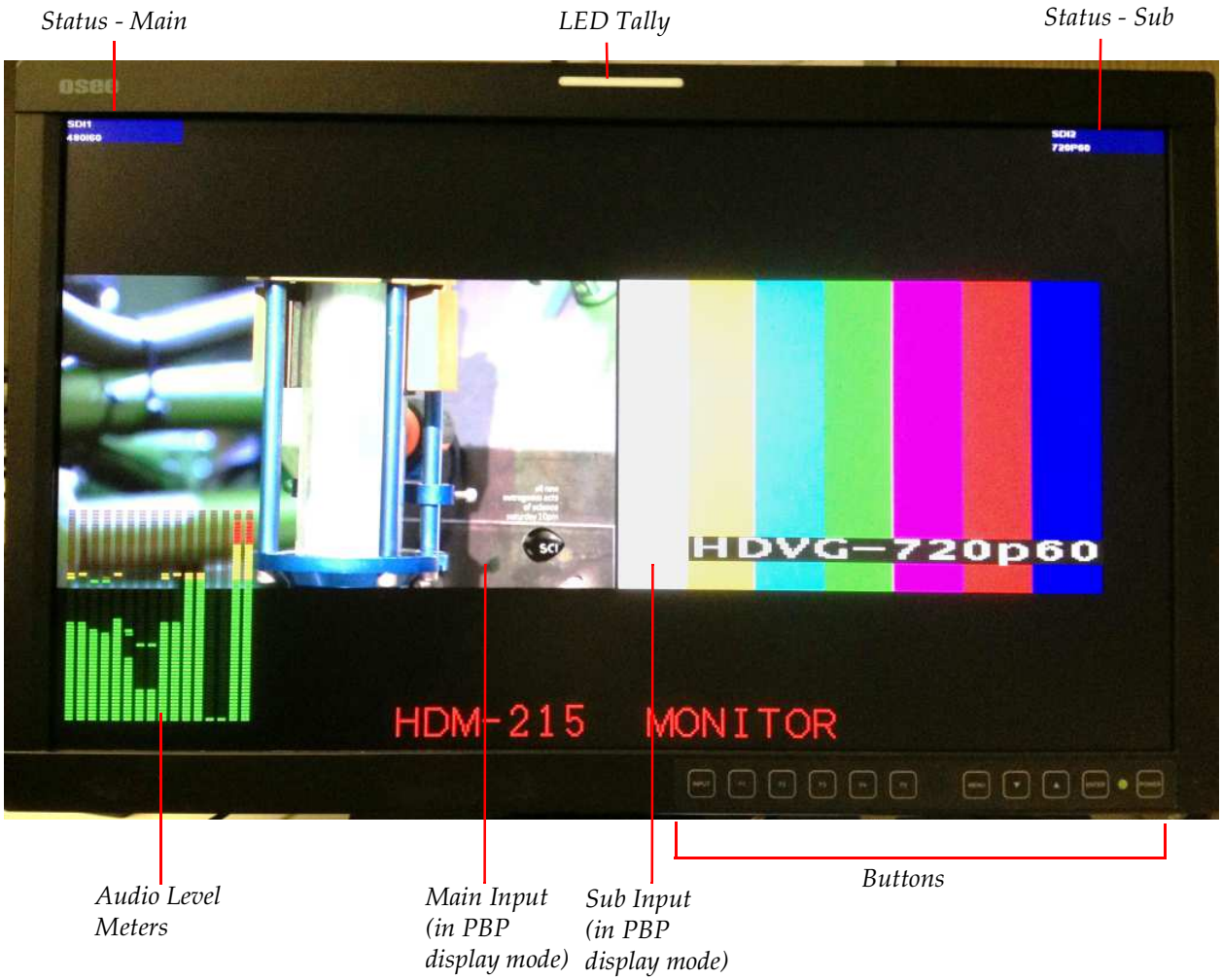
The HDM Series monitors provide the following features:

- 178° viewing angle
- Multi-format analog and digital audio signals
- Adjustment of the parameters for each channel
- High-quality waveform or vector monitoring (as SUB input)
- Embedded SDI or stereo analog audio through speakers or headphones
- Audio bar graph meters, up to sixteen
- Stereo analog audio line output of selected channel
- Area, safety, and center markers
- Closed captions for CVBS
- Pre-set or user-adjustable color temperature per channel
- Time code for SD/HD-SDI in ANC-packet form
- Dynamic OSD/IMD tally

Front Panel Features

The following feature descriptions refer to Figure 1–3 below.

Figure 1–3 HDM Front Panel



- **Status**: The status is displayed in the upper left corner for the main window and in the upper right corner for the sub-window. It includes the input channel number and signal format. Operation is defined in the DISPLAY menu.

- **Level Meters**: Displays up to 16 channels, in horizontal or vertical orientation. Define the meters setup in the AUDIO SOURCE and METER DISPLAY menu options.

- **IMD**: The 16 characters of the in-monitor display (IMD) can be displayed in red, green, yellow, or white. OSD CONFIG IMD DISPLAY, IMD COLOR, and IMD CHAR define the static operation. The IMD menu defines the dynamic IMD and OSD tally operations.

- **Timecode**: The display format for the timecode is HH: MM: SS: FF. In the event no timecode is available, the monitor will display **--:--:--:--**. Time code is currently available for SD/HD-SDI ANC-packetized only.

- **Input**: Pressing this button displays the Source menu. Further presses cycle through available main video inputs. Alternately the Up/Dn keys can be used.

- **F1 through F5**: These buttons serve as programmable hot keys. Pressing a Function key displays the Function menu. Pressing the key again toggles the state of that function. Refer to the Function Key Menu on page 24 for details.

- **Menu**: Pressing this button displays the on-screen display (OSD) Menu. Press MENU again to revert one menu level or exit out of MENU mode.

- **Up and Down**: After pressing the **MENU** button, press **Up** or **Down** to move within submenus.

- **ENTER**: After pressing the **MENU** button, pressing this button selects the current menu or menu option. Changes are previewed, but not saved, until you press the **ENTER** button again.

  When the OSD Menu is not displayed, you can press the **ENTER** button to quickly adjust the following parameters.

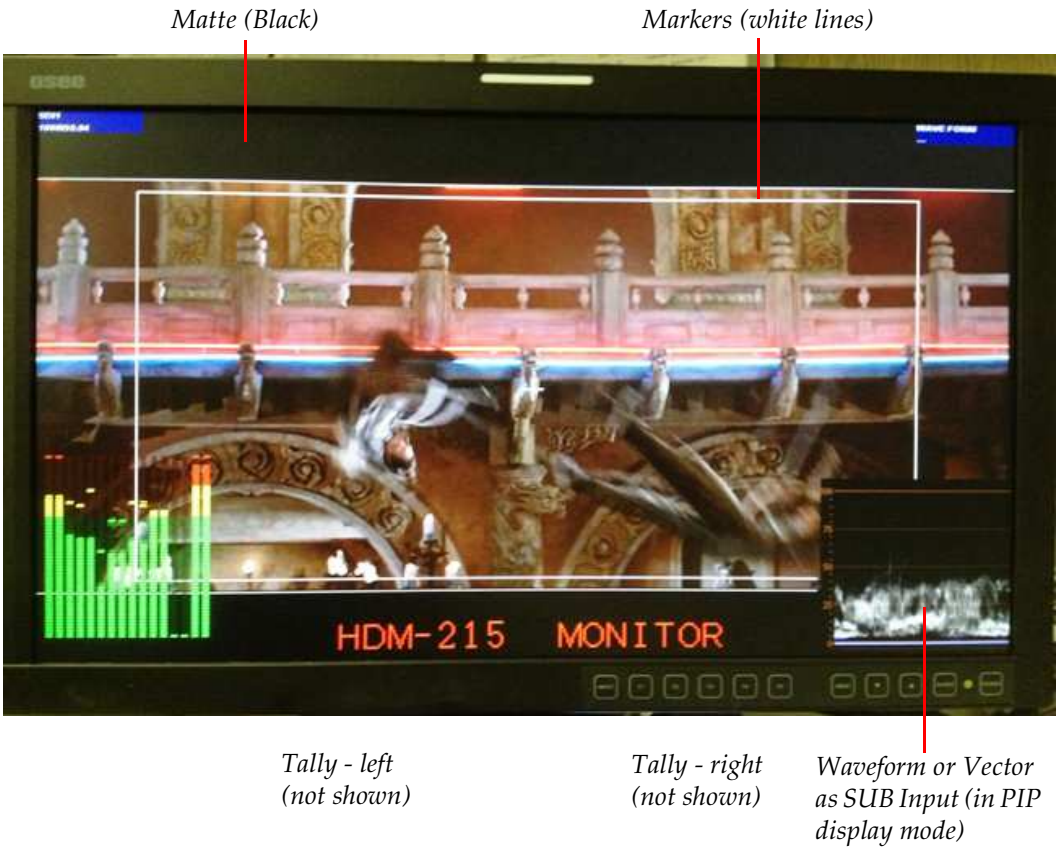
  - VOLUME: Adjusts the volume from 0 to 30.
  - BRIGHTNESS: Adjusts the video brightness from 0 to 100, where 50 is the typical value.
  - CONTRAST: Adjusts the image contrast from 0 to 100, where 50 is the typical value.
  - CHROMA: Adjusts the color saturation from 0 to 100, where 50 is the typical value.

- **Power LED**: Lights red in standby mode and green when on. When no main input signal is present, it blinks green.

- **POWER (front)**: Toggles the monitor to on or standby mode.

- **Waveform/Vector**: In PIP or PBP screen modes, the SUB window displays the waveform or vector, as defined in the Display Menu on page 20 and Config Menu on page 21.

Figure 1–4 HDM Waveform Display



Rear Panel Features

Figure 1–5 HDM Complete Rear Panel

Figure 1–6 HDM Rear Panel - Lower Right

- **DC IN** (jack): Accepts power plug from the included 12 VDC power adapter.
- **Power** (Rocker Switch): Turns power to the monitor on (1) or off (0).

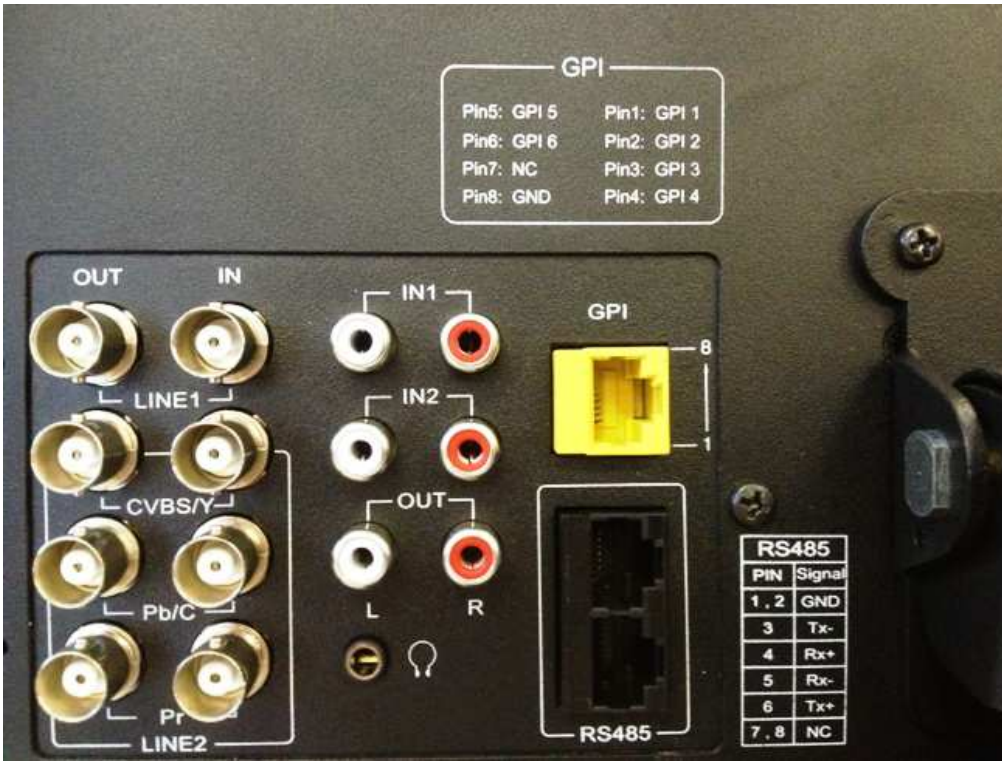
Figure 1–7 HDM Rear Panel - Upper Left

SDI Video Inputs (2 BNC) and **SDI Outputs** (2 BNC): These inputs and outputs receive and regenerate the 3G/HD/SD-SDI signals.

HDMI IN: Type A HDMI jack accepts non-DHCP HDMI signals in standard broadcast video formats, It can also accept similar DVI-D resolutions with an adaptor (not supplied).

Ethernet (RJ-45): Network interface for upgrades and dynamic tally/UMD.

Figure 1–8 HDM Rear Panel - Lower Left

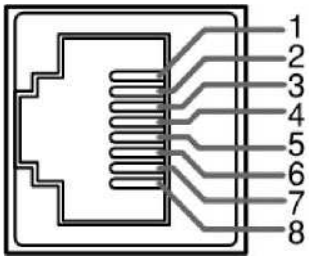


- **Line 1 Input** and **Output** (2 BNC): CVBS composite analog video.
- **Line 2 Inputs** and **Outputs: CVBS/Y** (2 BNC)**, Pb/C** (2 BNC)**, Pr** (2 BNC), analog composite, S-video, and component video.
- **Audio Inputs** (4 RCA) and **Outputs** (2 RCA): Each input pair (one for each channel) accepts standard analog audio. Output is from last (video) channel selected as heard from the speakers/ headphones.
- **Headphones**: This 1/8" jack receives a standard mini-headphone plug and provides stereo audio. Inserting a plug here, wired or not, will mute the speakers.
- **GPI** (RJ-45): Tally input. Refer to Figure 1–9 on page 14 and Table 1–1 on page 14 for connection details. Refer to the GPI Menu on page 25 for selectable functions.
- **RS485 Ports** (2 RJ-45): Input and output connectors for external control. Refer to Figure 1–9 on page 14 and Table 1–2 on page 14 for connection details.

Table 1–1 GPI Pin Out

Pin	Function
1	GPI 1
2	GPI 2
3	GPI 3
4	GPI 4
5	GPI 5
6	GPI 6
7	NC
8	GND

Figure 1–9 RJ45 Connector Pin Map



.

Table 1–2 RS485 Pin Out

Pin	RS485 In Terminal Signal	RS485 Out Terminal Signal
1, 2	GND	GND
3	Tx-	Tx-
4	Rx+	Rx+
5	Rx-	Rx-
6	Tx+	Tx+
7, 8	NC	NC

Using the Menu System

Configuring the HDM Series monitors is accomplished in the **Menu system**. Each of the menus is explained on this and the following pages.

1. Press the **MENU** button to display the menu.

2. Use the **Up** and **Down** buttons to navigate through the sub-menus. The submenus are:
   - STATUS MENU (Read-only)
   - INPUT SELECT MENU
   - MARKER MENU
   - AUDIO MENU
   - DISPLAY MENU
   - CLOSED CAPTION MENU
   - CONFIG MENU
   - COLOR TEMP MENU
   - FUNCTION KEY MENU
   - GPI MENU
   - IMD MENU
   - KEY INHIBIT MENU

3. Press the **ENTER** button to move into the parameter selections in the chosen sub-menu.

4. Use the **Up** or **Down** buttons to cycle through the sub-menus and sub-menu selections.

5. When the desired option is highlighted, press the **ENTER** button to select it.

6. Use the **Up** or **Down** buttons to adjust the parameter value up or down, make a selection, or turn a function on or off.

7. Press the **ENTER** button to save the parameter change and return to the sub-menu level.

Press the **MENU** button to back out of a parameter or sub-menu. Press the **MENU** button again to remove the menu from the screen.

Status Menu

Note that none of the options displayed on the STATUS menu are editable.

Table 1–3 Status Menu

Parameters	Default Value	Domain Range
INPUT (Main)	Display only; Non-selectable. The values vary depending on input signal type and configuration settings.	
FORMAT		
COLOR TEMP		
SCAN MODE		
I/P MODE		
MODEL		
SERIAL NUMBER		
IP ADDRESS		
COLOR VERSION		

Input Select Menu

Table 1–4 Input Select Menu

Parameters	Default Value	Domain Range	
SDI1	ON	ON/OFF	Setting an input to OFF disables it in the source popup menu, so that **INPUT** button presses will bypass it.
SDI2	ON	ON/OFF	
LINE1	ON	ON/OFF	
LINE2	LINE2(YPBPR)	• CVBS • LINE2(Y/C) • LINE2(YPBR) • OFF	
HDMI	ON	ON/OFF	
NTSC SETUP	7.5	• 0 • 7.5	•
NTSC PHASE	0	-50 to +50	

Marker Menu

Important: MARKER is disabled when SCAN mode is NATIVE, or when the input signal is DVI or VGA.

Table 1–5 Marker Menu

Parameters	Default Value	Domain Range
MARKER	OFF	All markers ON (enabled) or OFF (disabled)
AREA MARKER	OFF	Select the area marker aspect ratio to be displayed. Note: the aspect ratio of the current image will not appear in this list. • OFF: turns area marker off • 4:3 • 16:9 • 15:9 • 14:9 • 13:9 • 16:9 • 1.85:1 • 2.35:1
CENTER MARKER	OFF	ON (enabled) or OFF (disabled)
SAFETY MARKER	OFF	Setting the picture safe area size marker proportional to the aspect ratio (determined by the Area Marker setting): • OFF • 80% • 85% • 88% • 90% • 93% • 95%

Table 1–5 Marker Menu (Continued)

Parameters	Default Value	Domain Range
MARKER LEVEL	1	Sets the luminance (white level or brightness) to display safety, center, and area marker line, where: • 1 = 100% • 2 = 75% • 3 = 50%
MARKER MAT	OFF	Sets the area marker matte transparency, where: • OFF = Normal background, use line for area marker edge only • HALF = 50% Background brightness • BLACK = Black

Audio Menu

The menu sets up the audio sources for each channel according to the last video input selected. Speakers and the analog Audio Output follow the selection accordingly.

Table 1–6 Audio Menu

Parameters	Default Value	Domain Range
AUDIO SOURCE	EBD	Used to select the audio source type, where: • UNDEF = Disables audio source • AUDIO1 / AUDIO2 = Analog audio Inputs IN1 to IN2 selected • EBD = Embedded audio (only for HDMI and SDI inputs)
SPEAK OUT L	EBD CH1	Select embedded audio for the left speaker/headphone/line output: • OFF • CH1 thru CH16

Table 1–6 Audio Menu (Continued)

Parameters	Default Value	Domain Range
SPEAK OUT R	EBD CH1	Select embedded audio for the right speaker/headphone/line output: • OFF • CH1 thru CH16
AUDIO METER	ON	ON / OFF
METER SELECT	G1-4	Select the audio meters to display: • OFF • CH1-2 • G1 (Group 1: 4 channels: 1-4) • G2 (Group 2: 4 channels: 5-8) • G3 (Group 3: 4 channels: 9-12) • G4 (Group 4: 4 channels: 13-16) • G1+G2 (Groups 1 & 2: 8 channels: 1-8) • G1+G3 (Groups 1 & 3: 8 channels: 1-4, 9-12) • G1+G4 (Groups 1 & 4: 8 channels: 1-8, 13-16) • G2+G3 (Groups 2 & 3: 8 channels: 5-12) • G2+G4 (Groups 3 & 4: 8 channels: 5-8, 13-16) • G3+G4 (Groups 3 & 4: 8 channels: 9-16) • G1-4 (Groups 1 - 4: 16 channels: 1-16)
METER DIRECTION	VERTICAL	HORIZ: divided evenly between the left and right sides of the monitor VERT: displayed in a single bank

Table 1–6 Audio Menu (Continued)

Parameters	Default Value	Domain Range
METER POSITION	BOT LEFT	TOP (HORIZ) BOT (HORIZ) TOP LEFT (VERT) BOT LEFT (VERT) BOT RIGHT (VERT) TOP RIGHT (VERT)
METER DIS MODE	MODE 1	MODE 1: BARS ONLY MODE 2: # & BOX MODE 3: #, BOX, & VALUE TEXT
REF LEVEL	-20dB	Select the reference level: -20dB or -18dB
OVER LEVEL	-10dB	Select the overload level: • -10dB • -8dB • -6dB • -4dB • -2dB

Display Menu

Table 1–7 Display Menu

Parameters	Default Value	Domain Range
STATUS DISPLAY	OFF	OFF/AUTO/ON
AFD DISPLAY	OFF	OFF/ON
WAVEFORM TYPE	VECT100	• LINE WAVE • WAVEFORM • VECT75 • VECT100
LINE WAVE NUMBER	MID SCREEN	• 0 TO HIGHEST SCAN LINE NUMBER
WAVE OVER LIMIT	75	50 to 100

Table 1–7 Display Menu (Continued)

Parameters	Default Value	Domain Range
WAVE UNDER LIMIT	5	0 to 50
TIMECODE	OFF	• VITC • LTC • D-VITC • OFF

Closed Caption Menu

Table 1–8 Closed Caption Menu

Parameters	Default Value	Domain Range
CLOSED CAPTION	CC1	• CC1 • CC2 • CC3 • CC4 • TEXT1 • TEXT2 • TEXT3 • TEXT4 • OFF
SDI CC LOG	ON	ON/OFF

Config Menu

Table 1–9 Config Menu

Parameters	Default Value	Domain Range
IP MODE	NORMAL	• NORMAL, FILM (Pulldown) • FIELD (Interlace)
SUB IN TYPE	OFF	OFF/PBP/PIP
SUB IN SELECT	SDI1	INPUTS OR WAVEFORM / VECTORSCOPE

Table 1–9 Config Menu (Continued)

Parameters	Default Value	Domain Range
PIP SIZE	SMALL	• SMALL/LARGE
PIP POSITION	BOT RIGHT	• TOP RIGHT • TOP LEFT • BOT RIGHT • BOT LEFT
BACKLIGHT	15	0 to 30
AUTO STANDBY	OFF	ON/OFF
APERTURE	0	0 to 24
LOCK NUMBER	---	8 characters (factory setup)
LANGUAGE	ENGLISH	• ENGLISH • CHINESE

Color Temp Menu

Important: To make custom modifications to the RGB gains and bias, COLOR TEMP must be set to either USER 1. or USER 2.

Table 1–10 Color Temp Menu

Parameters	Default Value	Domain Range
COLOR TEMP	D65	Selects the color temperature (white balance) in degrees Kelvin X 100: • D93 = 9300K • D65 = 6500K • D56 = 5600K • D50 = 5000K • D32 = 3200K • USER1 (Set for HDMI and Component Inputs) • USER2 (Set by user)
RED GAIN	Presets Factory Calibrated	0 to 255
GREEN GAIN		
BLUE GAIN		

Table 1–10 Color Temp Menu (Continued)

Parameters	Default Value	Domain Range
RED BIAS	Presets Factory Calibrated	0 to 63
GREEN BIAS		
BLUE BIAS		
COPY FROM	---	When USER1 or USER 2 is selected, COPY FROM will copy one of the standard color temperatures to be custom modified.
RESET	Resets User gain and bias to their factory defaults.	
COLOR SPACE	OFF	• OFF • EBU • SMPTE-C • ITU-709

Function Key Menu

This menu lets you customize what you need each function key to do.

Table 1–11 Function Key Menu

Parameters	Default Value	Domain Range
F1 BUTTON	AUDIO METER	Select the function to assign to the function button: • SCAN: Enables or disables display. • NATIVE • ASPECT: Toggles between 4:3 and 16:9 scaling (SD only). • BLUE ONLY • MONO • MARKER • H/V DELAY • AUDIO METER • I/P MODE • TC • IMD • MUTE • PBP • CC • UNDEF (none)
F2 BUTTON	NATIVE	
F3 BUTTON	ASPECT	
F4 BUTTON	BLUE ONLY	
F5 BUTTON	PBP	

GPI Menu

Table 1–12 GPI Menu

Parameters	Default Value	Domain Range
GPI 1	TALLY GREEN	Select the function that each GPI will control. • AREA MARKER • CENTER MARKER • SAFETY MARKER • ASPECT • NATIVE • OVER SCAN • UNDER SCAN • BLUE ONLY • MONO • H DELAY • V DELAY • H/V • SDI 1 • SDI 2 • LINE 1 • LINE 2 • HDMI • LED TALLY GREEN • LED TALLY RED • UNDEF (NONE)
GPI 2	TALLY RED	
GPI 3	NATIVE	
GPI 4	BLUE ONLY	
GPI 5	MONO	
GPI 6	H/V DELAY	

IMD Menu

Table 1–13 IMD Menu

Parameters	Default Value	Domain Range
IMD DISPLAY	ON	ON = Displays OFF = Does not display
IMD COLOR	RED	Select the color in which to display the IMD text: • RED • GREEN • YELLOW • WHITE
IMD CHARACTER	HDM-170 MONITOR	The IMD text can contain up to 16 characters including all letters, numbers, and some symbols.
IMD PROTOCOL	TSL3.1	Select the IMD protocol you want to use: • LOCAL • NETWORK • TSL3.1 • TSL4.0 • TSL5.0 • IMAGE VIDEO
IMD ID	0	Select the IMD ID: 0 through 255
IMD NAME (S/N)	XXXXXXXX XXXXXXXX	The IMD serial number contains up to 16 characters.

Table 1–13 IMD Menu

Parameters	Default Value	Domain Range
BAUD RATE	9600	Select the communications baud rate: • 2400 • 4800 • 9600 • 19200 • 38400 • 57600 • 115200
LED TALLY	ON	ON/OFF
OSD TALLY MODE	OFF	Select the OSD tally mode: • RG: Red/Green • GR: Green/Red • RGY: Red/Green/Yellow • OFF: No OSD Tally
IMD TALLY MODE	T1	Select the IMD tally mode: • T1 • T2 • T1T2 • T2T1 • T1- • T2- • T1T2- • T2T1-
TALLY SOURCE	STANDARD	Select the LED/OSD tally source. Refer to Table 1–2 and Figure 1–9 on page 14: • STANDARD • IMAGE VIDEO • TSL

Key Inhibit Menu

Key Inhibit Menu

Table 1–14 Key Inhibit Menu

Parameters	Default Value	Domain Range
KEY INHIBIT	OFF	• OFF = Does not inhibit keys • ON = Inhibits all keys except POWER and MENU (to make setup changes)

Specifications

The general specifications of the HDM Series monitors are listed in Table 1–15 below.

Table 1–15 HDM Specifications

Specification	HDM-170	HDM-215
Dimensions, including the table stand	12.5″ H x 16.5″ W x 6.3″ D 305 mm H x 420 mm W x 160 mm D	14.6″ x H x 20.4″ W x 6.3″ D 370 mm H x 518 m W x 160 mm D
Dimensions, with rack mount	10.3″ H (6U) x 19″ W x 2.7″ D 305 mm H x 483 mm W x 70 mm D	12.6″ H (7U) x 20.4″ W x 2.7″ D 320 mm H x 520 mm W x 70 mm D Rack mount special order - min. quantity.
Shipping Weight	15 lbs. (6.8 kg)	18 lbs. (8.2 kg)
LCD Dimension	17.3″	21.5″
Aspect Ratio	4:3/16:9 (native)	
Resolution	1920 H x 1080 V	
Color Depth	10-bit, 1.073 G colors	
Viewing Angle	178° (H/V)	
Brightness	300 cd/m^2	
Contrast Ratio	600:1	

**** DIMENSIONS INCLUDING RACK MOUNT.**

Table 1–16 below lists the I/O specifications.

Table 1–16 HDM Specifications

Specification	HDM Values
Video Inputs	• 6 BNCs: CVBS, S-Video, YPbPr, 3G/HD/SD-SDI (supports embedded audio) • HDMI
Video Outputs	6 BNCs: Loop out of BNC In
Audio Inputs	4 RCAs: Analog stereo for EXT sources
Audio Outputs	2 RCAs: Analog stereo (monitoring, same as speakers)

Table 1–17 below distinguishes each of the HDM models.

Table 1–17 HDM Distinctions Among Each Model

Category	Specification	3G	HD	SD	A
3G-A SDI SMPTE 424M	1080p: (60/59.94/50)	✓	✓	✓	✓
HD-SDI SMPTE 292M, 296M	1080p: (23.98, 24, 25, 29.97, 30) 1080i: (60/59.94/50) 1035i: (60/59.94)\ 720p: (60/59.94/50)		✓	✓	✓
SD-SDI SMPTE 259M	480i: (60/59.94) 576i: (50)			✓	✓
Analog	PAL NTSC				✓

Note: 1080psF may display as the equivalent 1080i rates listed above. Segmented-Frame (sF) scan is not supported.

Table 1–18 below lists the specifications for CVBS inputs.

Table 1–18 HDM CVBS I/O Specifications

Specification	HDM Values
Signal Type	NTSC, PAL
Signal Amplitude	1V peak-to-peak ±3 dB
Impedance	75 Ω
Return Loss	> 40 dB ±5 MHz
DC Offset	0V ±0.05 V
Frequency Response	±0.2 dB to 5 MHz

Table 1–18 HDM CVBS I/O Specifications

Specification	HDM Values
Differential Gain	< 1%
Differential Phase	< 1.5°

Table 1–19 below lists the specifications for SDI inputs.

Table 1–19 HDM SDI Specifications

Specification	HDM Values
Signal Compliance	SMPTE 424M, SMPTE 299M, SMPTE 296M, SMPTE 274M, SMPTE 259M, SMPTE 292M, SMPTE 291M
Connector	BNC per IEC 169-8
Impedance	75 Ω
Return Loss	>18 dB at 5 to 270 MHz >15 dB at 270 MHz to 1.5 GHz >10 dB up to 3 GHz
Maximum Signal Level	800 mV peak-to-peak, 10%
Signal Amplitude	800 mV peak-to-peak, 10%
DC Offset	0 V ±0.5 V
Overshoot	<10%
Total Jitter	<0.2 UI
Rise and Fall Time	3G (3Gb/s): <135 ps HD (1.5 Gb/s): <270 ps SD: <700 ps

Technical Function Overview

Figure 1–10 below illustrates the overall functionality of the HDM Series monitors.

Figure 1–10 HDM Block Diagram