KRAMER

USER MANUAL
MODEL:

861
4K HDMI Generator, Analyzer and Cable Tester

Contents

Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better!

Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment.

- Review the contents of this user manual.

Go to www.kramerav.com/downloads/861 to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

Achieving the Best Performance

- Use only good quality connection cables (we recommend Kramer high-performance, high-resolution cables) to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables).

- Do not secure the cables in tight bundles or roll the slack into tight coils.

- Avoid interference from neighboring electrical appliances that may adversely influence signal quality.

- Position your Kramer **861** away from moisture, excessive sunlight and dust.

This equipment is to be used only inside a building. It may only be connected to other equipment that is installed inside a building.

Safety Instructions

Caution: There are no operator serviceable parts inside the unit.

Recycling Kramer Products

The Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC aims to reduce the amount of WEEE sent for disposal to landfill or incineration by requiring it to be collected and recycled. To comply with the WEEE Directive, Kramer Electronics has made arrangements with the European Advanced Recycling Network (EARN) and will cover any costs of treatment, recycling and recovery of waste Kramer Electronics branded equipment on arrival at the EARN facility. For details of Kramer's recycling arrangements in your particular country go to our recycling pages at www.kramerav.com/support/recycling.

Overview

Congratulations on purchasing your Kramer **861 4K HDMI Generator, Analyzer and Cable Tester**.

The **861** HDMI 18Gbps (6Gbps per graphic channel) 4K HDR Pocket Signal Generator, Analyzer and Cable Tester is an advanced handy tool for generating, testing and verifying the signal path within your (up to) 4K@60Hz (4:4:4) HDMI 2.0/HDCP 2.2 ecosystem. The **861** is a 3-in-1 tool that is great for:

- Analyzing an HDMI stream by capturing the data transmitted by an HDMI source.

- Testing a display device by transmitting a customizable audio and video HDMI stream to the display.

- Testing an HDMI cable.

With 23 built-in resolutions, 11 test patterns and over a dozen types of AV analysis functions, this unit provides an enormous range of testing options. HDMI data packet, EDID and HDCP analysis are supported along with EDID upload and emulation. Additionally, the Status and Control Data Channel (SCDC) can be monitored, enabling HDMI 18Gbps signal detection and analysis.

Up to 8 channels of LPCM audio test tones can be generated with a wide range of frequencies and audio levels. **861** is portable, durable, and includes a Li-Ion battery that typically operates for over 5 hours before requiring recharging.

861 provides exceptional quality and user-friendly operation.

Exceptional Quality

- Max. resolution – 4K@60Hz (4:4:4).

- Standards compliance – HDR10, HDMI 2.0, DVI 1.0 and HDCP 1.4/2.2.

- Data path analysis – source and sink up to 18Gbps HDMI signals (6Gbps per graphic channel).

- HDMI data packet analysis.

- HDCP v1.4 and v2.2 Analysis & Control.

- EDID data analysis & emulation – including SCDC.

- HDR bypass & analysis support.

- HDMI timing generation – up to 4096×2160 @60Hz (4:4:4), 8-bit.

- Supported output resolutions – 480p, 576p, 720p@25/30/50/60, 1080i@50/60, 1080p@24/25/30/50/60, 4K(3840×2160p)@24/25/30/50/60, 4K(4096×2160p)@24/25/30/50/60.

- LPCM sinewave audio generation – up to 8 channels.

- Cable Tester – suitable for 4K HDMI cables. Includes tests for 5V, CEC and hotplug detection support.

Advanced and User-friendly Operation

- OLED display – with rapid updates of current status information.

- Detailed OSD – for settings and informational displays.

- USB firmware update.

- Portable and durable.

- Includes a ≥5 hour (typical) operating life Li-ion battery.

- Power saving features.

- High−quality belt pouch.

Typical Applications

861 is ideal for the following typical applications:

- Installer/Integrator multi-function testing.

- HDMI source and sink testing.

- UHD system/SCDC error identification.

- Third-party equipment setup.

- Source and sink EDID reading, writing and saving.

- HDCP compliance verification.

- Production testing.

- R&D design and testing.

Defining 861 4K HDMI Generator, Analyzer and Cable Tester

This section defines **861**.
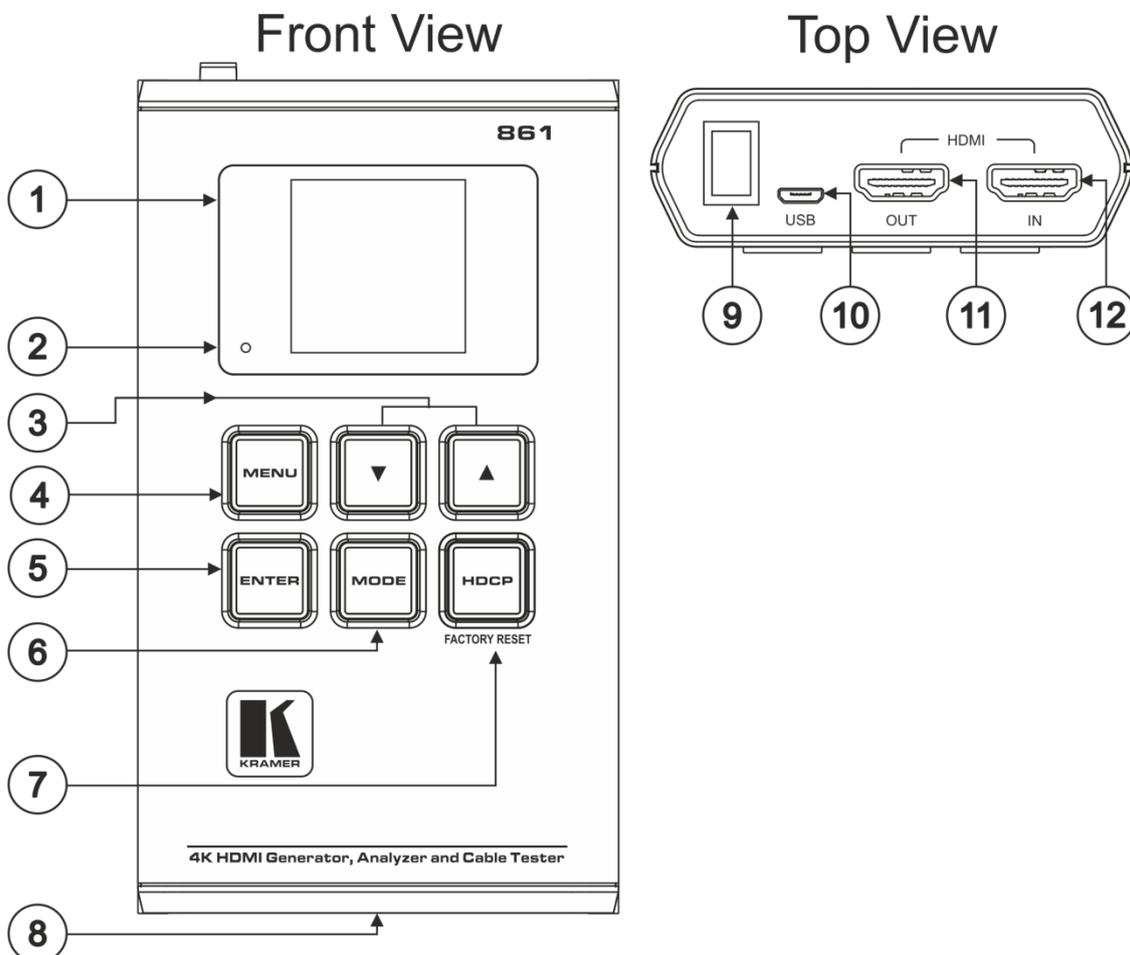

Figure 1: 861 4K HDMI Generator, Analyzer and Cable Tester

#	Feature	Function
1	OLED Display	Displays the selected function of the current operation mode. The status lines at the top show the current operational mode (Analyzer, Pattern, or Cable Test), USB port mode (power or control), power status, and mode-specific detection details. The menu or signal analysis data appears below.
2	Battery Charging LED	LED lights red when a USB power source is connected and is charging the battery. When the device is not in use for a while, the LED slowly flashes red to indicate that the device entered the power saving mode (when not receiving power via USB). Press any button to turn the OLED display back on.
3	Up and Down Arrow Buttons	Press up and down arrow buttons to move up and down or adjust selections within a menu.
4	MENU Button	Press the **MENU** Button to exit to a previous menu and return to the main menu screen.
5	ENTER Button	Press **ENTER** to confirm a selection or go to the next menu level. In the Analyzer and Pattern modes, press and hold **ENTER** for about 2 seconds to turn the audio on or off.

#	Feature	Function
⑥	MODE Button	Press the **MODE** button to switch between Analyzer mode, Pattern mode, and Cable Test mode. In Analyzer mode, press and hold the **MODE** button for about 2 seconds to toggle the input's hot plug trigger. In Pattern mode, press and hold the **MODE** button for about 2 seconds to enable or disable the output's AV Mute function.
⑦	HDCP (FACTORY RESET) Button	Press the **HDCP** button to toggle between supported HDCP versions (1.4, 2.2) or to disable HDCP. In Analyzer mode, this changes the HDCP versions that are supported by the input port. In the Pattern mode, this changes the HDCP that is encrypted on the output port. The **HDCP** button's outline lights according to the HDCP state and the current versions that are supported: • Red (HDCP 1.4) • Blue (HDCP 2.2) • Off (HDCP disabled) • Flashing (HDCP authentication failed). Press and hold the **HDCP** button while powering the device to reset the **861** to its factory default settings.
⑧	Battery Compartment	Stores the rechargeable battery (supplied with the unit).
⑨	Power Switch	Switch **861** power on or off.
⑩	Micro-B USB Connector	Use to power the unit and charge the battery, upgrade the firmware, or control the device (via RS-232).
⑪	HDMI OUT Connector	Connect to an HDMI acceptor (for example, a display).
⑫	HDMI IN Connector	Connect to an HDMI source (for example, a laptop).

Connecting the 861

ⓘ
- Always switch off the power to each device before connecting it to your **861**. After connecting your **861**, connect its power and then switch on the power to each device.
- Please remove the clear plastic sticker(s) covering the OLED window and (for some models) covering the keys on the keypad.

To connect the 861:

1. Connect an HDMI source (for example, a Blu-ray player) to the HDMI IN Connector ⑫.

2. Connect the HDMI OUT Connector ⑪ to an HDMI acceptor (e.g., projector).

3. If required, connect a laptop to the Micro-B USB Port ⑩ to control the device.
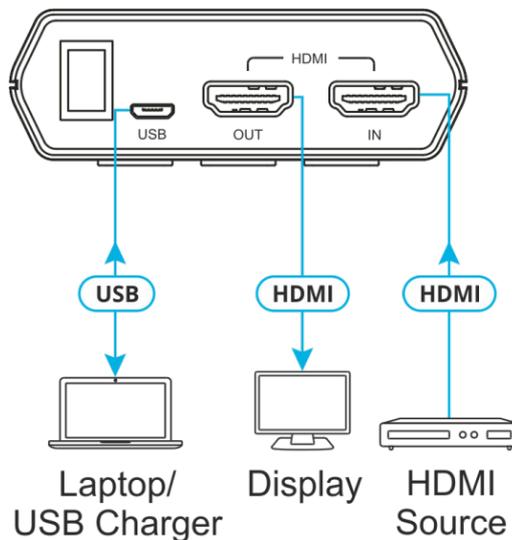
Figure 2: Connecting 861

Battery

The **861** is powered by a rechargeable Lithium-ion battery which is concealed within the bottom of the unit. It can also be powered directly via the USB port.

Power Saving Mode

The OLED display automatically switches off after the set number of minutes. All other functions of the unit continue normally while the display is turned off. The HDCP button slowly flashes red to indicate it is in power saving mode.

Press any button to turn the OLED display back on.

ⓘ The power saving feature is only available while the unit is not receiving power via USB.

Charging the Battery

To charge the battery, connect a USB charger (5V/2.1A minimum) to the USB port to charge the unit's battery until it is full. Before using with a battery for the first time, it is recommended to charge it for at least 5 hours (with the unit powered down).

ⓘ Many USB hubs do not provide proper 5V power to connected devices. When using a USB hub to connect the unit to a PC, it is strongly recommended to power the unit with a fully charged battery.

Replacing the Battery

To replace Lithium-ion rechargeable battery:

1. Using a small flathead screwdriver, gently, but firmly, press down into the slot behind the base panel.
   The bottom cover pops out.

2. If a battery is already installed, pull on the tab to pop the battery out of its holding brackets.

3. Turn the unit so that it is face down and align the new battery so that the positive terminal of the battery (marked with a +) is aligned with the positive (+) marking in the battery compartment. Slide the battery into the unit until it snaps into the holding bracket.

4. After the battery has been properly inserted, place the battery compartment cover back into the bottom of the unit by first fitting the 2 small tabs on the cover into the 2 slots in the case and then gently snapping the cover into place.
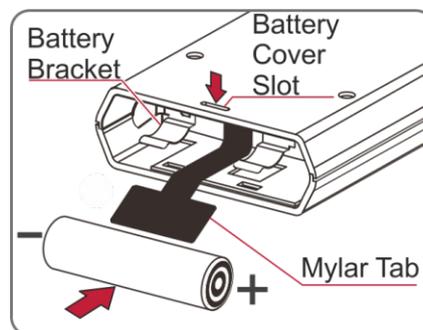
Figure 3: [Figure Caption]

ⓘ The recommended Lithium-Ion battery is INR18650 F1L (3.6V/3350mAh) from LG.

Operating the 861

The **861** is controlled by 6 front panel buttons (see Defining 861 4K HDMI Generator, Analyzer and Cable Tester on page 4):

- ▲ and ▼arrow buttons ③
- **MENU** button ④
- **ENTER** button ⑤
- **MODE** button ⑥
- **HDCP** (FACTORY RESET) button ⑦

The screen layout changes depending on the unit's operational mode and selected function. The status lines at the top displays the unit's current operational mode:

Analyzer Mode: The status line displays the 5v, TMDS clock, and sync detection state of the connected source (1 = detected, 0 = not detected). For details, see Analyzer Mode on page 10.
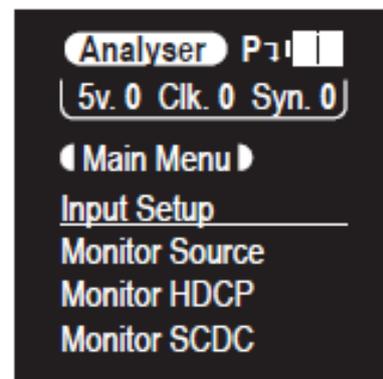
Pattern Mode: The status line displays the RxSense and Hot-plug detection state of the connected display (1 = detected, 0 = not detected). For details, see Pattern Mode on page 14.
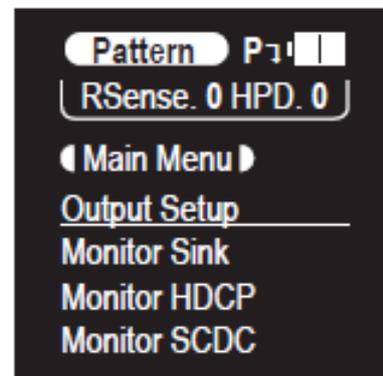
Cable Test Mode: The status line displays a cable connection graphic. For details, see Cable Test Mode on page 21.
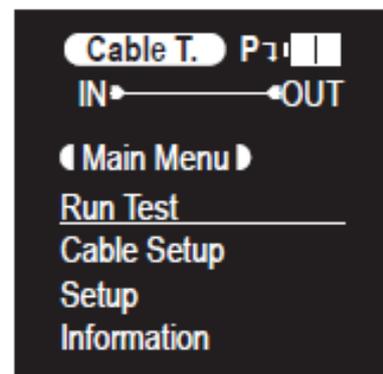
To the right of the status line, the unit displays:

- **USB port mode** (indicating battery charging or control)

    Battery charge mode.

    RS-232 control mode.

    Firmware update mode.

- **Power status**

    External power only. No battery present.

    External power. Battery at max charge.

    External power. Battery charging.

    Battery power with ~100% charge.

    Battery power with ~75% charge.

    Battery power with ~50% charge.

    Battery power with under 25% charge. Icon flashes to indicate recharge needed.

    Battery power is critically low. Auto shutdown.

Below the status lines are the mode-specific detection details consisting of either the unit's menu or signal analysis data.

The battery charging LED illuminates red when a USB power source is connected and actively charging the battery.

You can change the **861** basic settings in any operational mode through the menu item **Setup**. The following are customizable:

- USB Port (Power, RS-232).

- OLED Contrast (0-8).

- Firmware Update (Yes/No).

- Power Saving (2min~10min, Off).

- EDID Reset (Yes/No).

- Factory Restore (Yes/No).

- Firmware Version.

Analyzer Mode

Use **Analyzer** mode to analyze an HDMI stream.

To use 861 in Analyzer Mode:

1. Switch off the power of the HDMI source before connecting it to your **861.**

2. Connect an HDMI cable from a device transmitting an HDMI signal to **HDMI IN**.

3. Switch the source device's power on.

4. Press **MODE** until the display displays **Analyzer**.

5. Use the **Input Setup** on the menu for any of the following:

   ▪ Set the **Hotplug Time** (default 150ms).

   ▪ Set the **Hotplug Toggle.**

   ▪ Set the **RxSense** (default On).

   ▪ Set the **DDC Bus** (default On).

   ▪ Set the **HDCP Port** (default v1.4+v2.2).

   ▪ Set the **4K to 1080p** (default Off).

This unit provides 3 options for how to handle a 4K video signal entering the **861** when in Analyzer mode. These choices are selectable from the "Input Setup" menu using the "4K to 1080p" item.

- To pass the 4K source without modification set "4K to 1080p" to "Off".
- To scale the 4K source down to 1080p and output as YCbCr, set it to "On YCbCr Out".
- To scale the 4K source down to 1080p and output as RGB, set it to "On RGB Out".

All other (non-4K) resolutions are passed without modification regardless of this setting.

When 4K sources are scaled down to 1080p they maintain the same refresh rate. For example, if the source is 4K@24Hz, the scaled timing will be 1080p@24Hz.

   ▪ Set the **SCDC Port** (Default On).

   ▪ Set the **PC Tolerance** (Default 6).

6. Use the menu item in the table below to analyze the HDMI stream.

Items in **Bold** are the factory default settings.

Items marked with **POR (Power-On Reset)** return to their factory default settings whenever the power is turned off and back on.

To turn audio On or Off, press and hold **ENTER** for 2 seconds.

To toggle the input's hot plug trigger, press and hold **MODE** for 2 seconds.

Analyzer Menu

Level 1	Level 2	Level 3
Input Setup	Hotplug Time	50ms~500ms **(150ms)**
	Hotplug Toggle	
	RxSense	**On (POR)**
		Off
	DDC Bus	**On (POR)**
		Off
	HDCP Port	v1.4
		v1.4+v2.2 (POR)
		Off
	HDCP REAUTH-REQ	
	4K to 1080p	On YCbCr Out
		On RGB Out
		Off
	SCDC Port	**On (POR)**
		Off
	PC Tolerance	1~10 **(6)** (Each step is ±1/1000)
Monitor Source	Timing	[Analytic Data]
	HDCP	
	Format	
	Colorspace	
	Audio	
	Deep Color	
	AVI, AIF, HDR, VSI, AVMute, SPD, 3D	
Monitor HDCP (HDCP v1.4)	Source HDCP	[Analytic Data]
	Rx HDCP Port	
	Aksv	
	Bksv	
	Ri Source	
	Ri' Rx	
	Count	
	Day 0 00 : 00 : 00	
Monitor HDCP (HDCP v2.2)	Source HDCP	[Analytic Data]
	Rx HDCP Port	
	TxCaps	
	RxCaps	
	Receiver ID	
	rn	
	riv	
Monitor SCDC	Rx SCDC Port	[Analytic Data]
	Sink Version	
	Source Version	
	Scramble Enabled	
	Scramble Status	
	Clock Detect	
	Ch2/1/0 Locked	
	CED Ch0	

Level 1	Level 2	Level 3
	CED Ch1	
	CED Ch2	
	ENTER Reset/Start	
	HF VSDB	
	SCDC Exist	
Video Timing	Timing	[Analytic Data]
	TMDS Clock	
	Pixel Clock	
	Data Rate	
	Bit Depth, 3D, Y4:2:0, Scramble	
	Total (H/V Total Pixel/Line)	[Analytic Data]
	Act (H/V Active Pixel/Line)	
	Polarity (H/V Sync. Polarity)	
	Scan	
	HFreq (H Sync. Frequency)	
	VFreq (V Sync. Frequency)	
	Offset1 (H/V Sync. Offset1)	
	Offset2 (H/V Sync. Offset2)	
Audio Timing	ACR, AIF, ASP, HBR	[Analytic Data]
	N	
	CTS	
	ASP PLL Lock	
	ASP audio FIFO	
	ASP Layout	
	ASP Ch No.	
	CHS App. Type	
	CHS Audio Coding	
	CHS Ch No.	
	CHS Source No.	
	CHS Sampling Rate	
	CHS Sampling Size	
Packet	GCP 0x03	[Analytic Data]
	AVI 0x82	
	AIF 0x84	
	SPD 0x83	
	VSIF H14b 0x81	
	DRMI (HDR) 0x87	
EDID Analyzer	Sink	[Analytic Data]
	Rx EDID	[Analytic Data]
	[D1] [DVI	[Default EDID Details]
	[D2] VGA	
	[D3] 8B LPCM PC	
	[D4] 8B LPCM H[D	
	[D5] 12 BS 720p	
	[D6] 12 BS H[D 3[D	
	[D7] 12 BS 4K6G	
	[D8] 12 HBR 4K3G	
	[D9] 12 HBR 4K420	
	[D10] 12 HBR 4K6G	
	[C1~10] Copy 01~10	[Copied EDID Details]

Level 1	Level 2	Level 3
EDID Emulator	Copy Sink	
	[D1] [DVI	
	[D2] VGA	
	[D3] 8B LPCM PC	
	[D4] 8B LPCM H[D	
	[D5] 12 BS 720p	
	[D6] 12 BS H[D 3[D	
	[D7] 12 BS 4K6G	
	[D8] 12 HBR 4K3G	
	[D9] 12 HBR 4K420	
	[D10] 12 HBR 4K6G	
	[C1~10] Copy 01~10	
EDID Copy Sink	[C1~10] Copy 01~10	
EDID Burn Sink	[D1] [DVI	
	[D2] VGA	
	[D3] 8B LPCM PC	
	[D4] 8B LPCM H[D	
	[D5] 12 BS 720p	
	[D6] 12 BS H[D 3[D	
	[D7] 12 BS 4K6G	
	[D8] 12 HBR 4K3G	
	[D9] 12 HBR 4K420	
	[D10] 12 HBR 4K6G	
	[C1~10] Copy 01~10	
Setup	USB Port	**Power**
		RS-232
	OLED Contrast	0~8 **(6)**
	Firmware Update	Yes/**No**
	Power Saving	2min~10min
		Off
	EDID Reset	Yes/**No**
	Factory Restore	Yes/**No**
Information	[Unit Version Details]	

Pattern Mode

Use **Pattern** mode to send an HDMI stream to test a monitoring device.

Test Patterns

There are a total of 11 test patterns available for output when in Pattern Mode.

Patterns P01 – P08 are full screen purity tests offering eight different full field patterns: **Black**, **Blue**, **Cyan**, **Green**, **Magenta**, **Red**, **White**, and **Yellow**. The color patterns should display an even distribution of brightness and consistent color tone across the screen.

Pattern Name	ID	Display	Description
Black	P01		The **black** pattern exposes the display's true minimum brightness capability and is helpful for setting the viewing room lighting levels.
Blue	P02		The **blue** pattern should display an even distribution of brightness and consistent color tone across the screen.
Cyan	P03		The **cyan** pattern should display an even distribution of brightness and consistent color tone across the screen.
Green	P04		The **green** pattern should display an even distribution of brightness and consistent color tone across the screen.
Magenta	P05		The **magenta** pattern should display an even distribution of brightness and consistent color tone across the screen.
Red	P06		The **red** pattern should display an even distribution of brightness and consistent color tone across the screen.
White	P07		The 100% **white** pattern should display evenly across the screen and not cause the display's overall brightness to lower, or for the image to become instable.
Yellow	P08		The **yellow** pattern should display an even distribution of brightness and consistent color tone across the screen.

Pattern Name	ID	Display	Description
Color Bar	**P09**		The **Color Bar** pattern is a series of repeating vertical colored bars (white, yellow, cyan, green, magenta, red, blue, and black).
Grayscale 256	**P10**		The **Grayscale 256** pattern provides a way to fine tune the contrast, brightness and grayscale tracking of your display with a full 265 step gradient progressing from 0% to 100% brightness. When testing a display, no color should be visible at any point across the gradient, and the transition from black to white should appear even and consistent.
Line On/Off-V	**P11**		The **Line On/Off-V** pattern generates an alternating pattern of single-pixel vertical lines. This pattern can be used to analyze the horizontal pixel resolution of your display. If the output appears to have mosaic patterns, or appears to be a solid field (grey, white or black), then it is possible that your display does not fully support the resolution you are currently sending to it ⓘ When outputting 4K@50/60Hz the pattern consists of double, rather than single, pixel lines.

Test Timings

This unit supports a total of 23 output resolution timings when in Pattern Mode.

Test Timing List	Hz	ID
720×480p	59	**T01**
720×576p	50	**T02**
1280×720p	25	**T03**
	30	**T04**
	50	**T05**
	60	**T06**
1920×1080i	50	**T07**
	60	**T08**
1920×1080p	24	**T09**
	25	**T10**
	30	**T11**
	50	**T12**
	60	**T13**
3840×2160p	24	**T14**
	25	**T15**
	30	**T16**
	50	**T17**
	60	**T18**
4096×2160p	24	**T19**
	25	**T20**
	30	**T21**
	50	**T22**
	60	**T23**

Input/Output PC Resolutions

PC Resolution	Vertical Frequency (Hz)	HDMI Input	HDMI Output
640×350p	85	✓	
640×480p	59, 72, 75, 85	✓	
720×400p	70, 85	✓	
800×600p	56, 60, 72, 75, 85	✓	
848×480p	60	✓	
1024×768p	60, 70, 75, 85	✓	
1152×864p	70, 75, 85	✓	
1280×768p	60 (RB), 60, 75, 85	✓	
1280×800p	60 (RB), 60, 75, 85	✓	
1280×960p	60, 85	✓	
1280×1024p	60, 75, 85	✓	
1360×768p	60	✓	
1366×768p	60 (RB), 60	✓	
1400×1050p	60 (RB), 60	✓	
1440×900p	60 (RB), 60	✓	
1600×900p	60 (RB)	✓	
1600×1200p	60	✓	
1680×1050p	60 (RB), 60	✓	
1920×1200p	60 (RB)	✓	
RB = Reduced Blanking.			

(i) If a source resolution or timing is not natively supported, the resolution is displayed on the unit as "Timing?"

Input/Output TV Resolutions

TV Resolution	Vertical Frequency (Hz)	HDMI Input	HDMI Output
480i	59, 60	✓	59
480p	59, 60	✓	
576i	50	✓	
576p	50	✓	50
720p	25, 29, 30, 50, 59, 60	✓	25, 30, 50, 60
1080i	50, 59, 60	✓	50, 60
1080p	23, 24, 25, 29, 30, 50, 59, 60	✓	24, 25, 30, 50, 60
2048×1080p	23, 24, 25, 29, 30, 50, 59, 60	✓	
3840×2160p	23, 24, 25, 29, 30, 50, 59, 60	✓	24, 25, 30, 50, 60
4096×2160p	23, 24, 25, 29, 30, 50, 59, 60	✓	24, 25, 30, 50, 60

Pattern Menu

To use 861 in Pattern Mode:

1. Switch off the monitoring device's power before connecting it to your **861**.

2. Connect an HDMI cable from **HDMI OUT** to the monitoring device.

3. Switch the monitoring device's power on.

4. Press **MODE** until the display displays **Pattern**.

5. Use the menu item in the table below to send a pattern HDMI stream.

Items in **Bold** are the factory default settings.

Items marked with **POR (Power-On Reset)** return to their factory default settings whenever the power is turned back on.

To enable or disable the output's AV Mute function, press and hold **MODE** for 2 seconds.

Level 1	Level 2	Level 3
Output Setup	Timing	[T1] 720×480p59
		[T2] 720×576p50
		[T3] 1280×720p25
		[T4] 1280×720p30
		[T5] 1280×720p50
		[T6] 1280×720p60
		[T7] 1920×1080i50
		[T8] 1920×1080i60
		[T9] 1920×1080p24
		[T10] 1920×1080p25
		[T11] 1920×1080p30
		[T12] 1920×1080p50
		[T13] 1920×1080p60
		[T14] 3840×2160p24
		[T15] 3840×2160p25
		[T16] 3840×2160p30
		[T17] 3840×2160p50
		[T18] 3840×2160p60
		[T19] 4096×2160p24
		[T20] 4096×2160p25
		[T21] 4096×2160p30
		[T22] 4096×2160p50
		[T23] 4096×2160p60
	Pattern	[P1] Black
		[P2] Blue
		[P3] Cyan
		[P4] Green
		[P5] Magenta
		[P6] Red
	Pattern	[P7] White
		[P8] Yellow
		[P9] Color Bar
		[P10] Grayscale 256
		[P11] V Line OnOff
	Format	**HDMI**
		DVI

Level 1	Level 2	Level 3
	Colorspace	**RGB**
		YUV444
	ColorRange	**Full**
		Limited
	Audio LPCM	2CH
		5.1CH
		7.1CH (POR)
	HDCP Out	v1.4
		v2.2
		Off
	HDCP V2.2 (AKE-Stored-KMC)	On
		Off
	AVMute	On
		Off (POR)
	Output	**On (POR)**
		Off
	+5V Out	**Follow**
		On
Monitor Sink	HDCP Port/Auth	[Analytic Data]
	EDID	
	SCDC Port	
Monitor HDCP (Output HDCP 1.4)	Tx HDCP	[Analytic Data]
	Sink HDCP Port	
	Aksv	
	Bksv	
	Ri Tx	
	Ri' Sink	
	Count	
	Day 0 00:00:00	
Monitor HDCP (Output HDCP 2.2)	Tx HDCP	[Analytic Data]
	Sink HDCP Port	
	TxCaps	
	RxCaps	
	Receiver ID	
	rn	
	riv	
	Stored km	
	Sink REAUTH	
	Count	
	Day 0 00:00:00	
Monitor SCDC	Sink SCDC Port	[Analytic Data]
	Sink Version	
	Source Version	
	Scramble Enable	
	Scramble Status	

Level 1	Level 2	Level 3
	Clock Detect	
	Ch2/1/0 Locked	
	CED Ch0	
	CED Ch1	
	CED Ch2	
	ENTER Reset/Start	
	HF VSDB	
	SCDC Exist	
Audio Output	Volume	0~80 **(70)**
	Sample Rate	**48KHz**
		96KHz
		192KHz
	Word Length	16 Bits
		20 Bits
		24 Bits
	Channels	2
		5.1
		7.1 (POR)
	SD0-L~SD03-L Freq.	Mute
		200Hz~1600Hz **(1000Hz)**
	SD0-R~SD3-R Freq.	Mute
		200Hz~1600Hz **(1000Hz)**
EDID Analyzer	Same as Analyzer Mode	[Analytic Data]
EDID Emulator	Same as Analyzer Mode	[Analytic Data]
EDID Copy Sink	Same as Analyzer Mode	[Analytic Data]
EDID Burn Sink	Same as Analyzer Mode	[Analytic Data]
HDR Emulator	HDR Out	On
		Off
	AVI Colorimetry	BT.2020(1)
		BT.2020(2)
		No Data
		ITU601
		ITU709
		xvYCC601
		xvYCC709
		sYCC601
		AdobeY601
		Adobe RGB
	EOTF	**0:SDR Lumi Range**
		1:HDR Lumi Range
		2:SMPTE ST2084.2
		3:Future EOTF
	Metadata Descr.	**S. Metadata Type 1**
		Reserved
	Max. Content L-L	0~65500 **(0)**

Level 1	Level 2	Level 3
	Max. FrameAve L-L	0~65500 **(0)**
	AVI Color Space	[Analytic Data]
	Sink EDID HDR	[Analytic Data]
Setup	USB Port	**Power**
		RS-232
	OLED Contrast	0~8 **(6)**
	Firmware Update	Yes/**No**
	Power Saving	2min~10min
		Off
	EDID Reset	Yes/**No**
	Factory Restore	Yes/**No**
Information	[Unit Version Details]	

Cable Test Mode

Use **Cable Test** mode to test an HDMI cable according to the HDMI 2.0 specification.

To use 861 in Cable Test Mode:

1. Connect an HDMI cable from **HDMI IN** to **HDMI OUT**.

2. Press **MODE** until the display displays **Cable T**.

3. Use the menu item in the table below to test the cable.

Items in **Bold** are the factory default settings.

Cable Test Menu

Level 1	Level 2	Level 3
Run Test (Enter–Start/Stop)	Normal/Strict	[Analytic Data] (PASS or FAIL result)
	Elapsed Time (Min:Sec)	
	+5V	
	Hotplug	
	DDC Bus	
	CEC	
	4K6G A/V	
Cable Setup	Level	**Normal**
		Strict
	Length	5 meters
		4 meters
		3 meters
		2 meters
	Time	**2 min.**
		5 min.
		10 min.
		15 min.
		30 min.
		1 hour
		Infinite
Setup	USB Port	**Power**
		RS-232
	OLED Contrast	0~8 **(8)**
	Firmware Update	Yes/**No**
	Power Saving	2min~10min
		Off
	EDID Reset	Yes/**No**
	Factory Restore	Yes/**No**
Information	[Unit Version Details]	

Firmware Update

To update the firmware:

1. From the main menu select **Setup**>**Firmware update**>**Yes**.
   The unit enters the Firmware Update mode.

2. Connect a USB cable between the unit and a PC.
   After connection, the PC detects the unit as a USB storage device named "USB UPDATE" and the OLED display reads "Paste FW File...".

3. Copy and paste a valid firmware *.BIN file into the USB UPDATE drive.
   After successfully copying the file, the unit starts the update process.
   The OLED display reads "Programming..." followed by the HDCP button flashing rapidly.

Do not turn off the power during the programming phase.

Once the update is complete the unit automatically reboots.

Technical Specifications

Technical Specifications

Inputs	1 HDMI	On a female HDMI connector
Outputs	1 HDMI	On a female HDMI connector
Ports	1 USB	On a female Micro-B connector
Video	Max Data Rate	18Gbps (6Gbps per graphic channel)
	Max Resolution	4K @60Hz (4:4:4, 8-bit)
	Supported Output Resolutions	480p@59Hz 576p@50 720p@25/30/50/60 1080i@50/60 1080p@24/25/30/50/60 4K(3840×2160p)@24/25/30/50/60 4K(4096×2160p)@24/25/30/50/60
	Standards Compliance	HDMI 2.0 and HDCP 1.4, 2.2
Audio (embedded)	Output Support	LPCM 2.0, 5.1, and 7.1
Power	Source	5V, 2.1A USB power
	Consumption	4.7W
Environmental conditions	Operating Temperature	0° to +40°C (32° to 104°F)
	Storage Temperature	-20° to +50°C (-40° to 158°F)
	Humidity	20% to 90%, RH non-condensing
Regulatory	Safety	CE, FCC
	Environmental	RoHs, WEEE
	ESD Protection	Human body model ±12kV (air discharge) ±8kV (contact discharge)
Enclosure	Type	Metal
	Cooling	Convection ventilation
Accessories	Included	Micro-B USB cable 1 C-HM/HM/PICO/BK-3 cable 1 lithium-ion 3.6V/3350mAh rechargeable battery Belt pouch
Specifications are subject to change without notice at www.kramerav.com		

Default Communication Parameters

RS-232	
Baud Rate:	115,200
Data Bits:	8
Stop Bits:	1
Parity:	None
Command Format:	ASCII
Full Factory Reset	
OSD:	Go to: Menu-> Setup -> Factory Reset -> press Enter to confirm.
Front Panel Buttons:	Press the Reset to XGA/720p Button while plugging the power to reset the machine.

Operating Using the PC

This unit may also be controlled via a Windows PC software application. For more details, please refer to the separate Control Software for Signal Generator & Analyzer manual.

The **861 4K HDMI Generator, Analyzer and Cable Tester** can be operated using <u>RS-232 Commands</u>. The command framing varies according to how you interface with the **861**.

To set 861 to RS-232 mode:

1. Connect Laptop or PC to Micro-B USB Port ⑩.

2. Connect HDMI OUT connector ⑪ to the display.

3. Connect HDMI device to HDMI IN Connector ⑫.
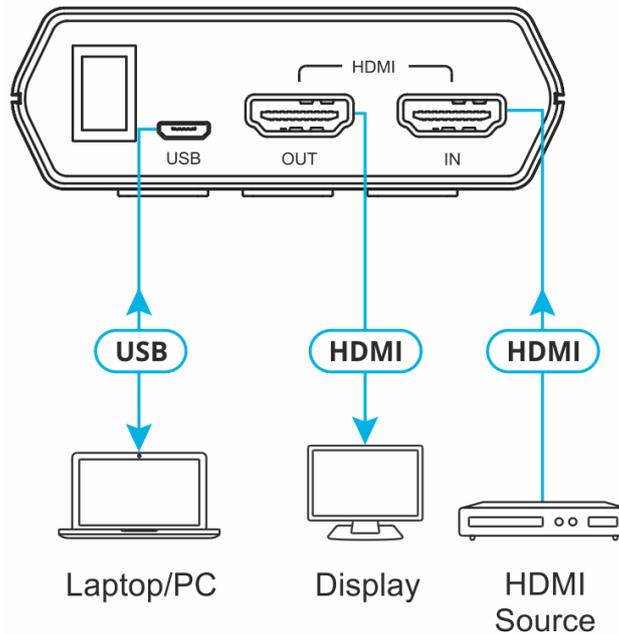
Figure 4: Connection Diagram for Using 232 Commands

4. Select **Setup**>**USB Port**>**RS-232** on the Menu.
   RS-232 control mode icon 🔧 appears.

RS-232 Commands

When the USB port is set to RS-232 mode, a properly charged battery is required to power the unit.

Syntax

All commands MUST start with the "$" character or the command will not be recognized by the unit. Commands must end with a carriage return (0x0D). Use of a line feed (0x0A) is optional. Commands are not case-sensitive.

Responses

The unit responds to most commands with a repeat of the original command followed by the specified parameters or requested information except where otherwise noted. If an invalid command is entered, the unit responds with "$err". All unit responses end with a carriage return (0x0D) + line feed (0x0A).

Only one command may be processed at a time. Additional commands should not be sent until the response from the previous command has been received.

Command	Description and Parameters
$?	Show full command list.
$HELP	Show full command list.
$4K_TO_1080P N1	Set the 4K downscaling mode. Available values for **N1**: OFF [No downscaling] ON_RGB [1080p, RGB color] ON_YUV [1080p, YUV color]
$4K_TO_1080P?	Display the current 4K downscaling mode.
$AUDIO_CH N1	Set the number of internally sourced audio output channels. Available values for **N1**: 2 [2 Channels (2.0)] 6 [6 Channels (5.1)] 8 [8 Channels (7.1)]
$AUDIO_CH?	Display the current number of audio output channels.
$AUDIO_FREQ N1,N2	Set the internal audio output frequency of the selected channel (in Hz). Available Values for **N1**: SD0_L [SD0 Left Channel] SD0_R [SD0 Right Channel] SD1_L [SD1 Left Channel] SD1_R [SD1 Right Channel] SD2_L [SD2 Left Channel] SD2_R [SD2 Right Channel] SD3_L [SD3 Left Channel] SD3_R [SD3 Right Channel] **N2** = MUTE, 200, 400, 600, 800, 1000, 1200, 1400, 1600

Command	Description and Parameters
$AUDIO_FREQ? N1	Display the internal audio output frequency of the selected channel (in Hz).
	Available Values for **N1**:
	SD0_L [SD0 Left Channel]
	SD0_R [SD0 Right Channel]
	SD1_L [SD1 Left Channel]
	SD1_R [SD1 Right Channel]
	SD2_L [SD2 Left Channel]
	SD2_R [SD2 Right Channel]
	SD3_L [SD3 Left Channel]
	SD3_R [SD3 Right Channel]
$AUDIO_MUTE N1	Turn the audio output mute on or off.
	N1 = ON, OFF
$AUDIO_MUTE?	Display the audio output mute state.
$AUDIO_SR N1	Set the internal audio output sampling rate (in kHz).
	N1 = 48, 96, 192
$AUDIO_SR?	Display internal audio output sampling rate.
$AUDIO_VOL N1	Set the audio output volume.
	N1 = 0 ~ 80
$AUDIO_VOL?	Display the current audio output volume.
$BOOT GO	Reboot the unit.
	(i) The unit won't respond to any commands during the boot process.
$BOOT?	Display the current boot state.
$CABLE_LEVEL N1	Set the cable test level.
	N1 = NORMAL, STRICT
$CABLE_LEVEL?	Display the cable test level.
$CABLE_RESULT?	Display the cable test result.
$CABLE_RUN N1	Start or stop the cable testing process.
	N1 = START, STOP
$CABLE_RUN?	Display the cable test status.
$CABLE_TIME N1	Set the testing time for the cable test.
	Available values for **N1**:
	1 [2 Minutes]
	2 [5 Minutes]
	3 [10 Minutes]
	4 [15 Minutes]
	5 [30 Minutes]
	6 [1 Hour]
	7 [Infinite]
$CABLE_TIME?	Display the currently set testing time.
$COLOR_SPACE N1	Set the output color space.
	Available values for **N1**:
	RGB [RGB 4:4:4]
	Y444 [YCbCr 4:4:4]
$COLOR_SPACE?	Display the current output color space.

Command	Description and Parameters
$EDID_COPY_SINK N1	Copy the current HDMI sink's EDID to the designated copy slot. **N1** = C1 ~ C10 ⓘ If the copy fails "$err" is displayed.
$EDID_MANUF? N1	Display the manufacturer name stored in the EDID of the selected location. Available values for **N1**: RX [HDMI Input (Rx) Port] SINK_H [HDMI Sink] ⓘ If the EDID fails to be read, "$err_ddc" is displayed. If the EDID has invalid content, "$err_bad" is displayed.
$EDID_MODEL? N1	Display the model/monitor name stored in the EDID of the selected location. Available values for **N1**: RX [HDMI Input (Rx) Port] SINK_H [HDMI Sink] ⓘ If the EDID fails to be read, "$err_ddc" is displayed. If the EDID has invalid content, "$err_bad" is displayed.
$EDID_NAME N1,N2	Set the EDID name of the selected copy slot. **N1** = C1 ~ C10 **N2** = {Name} [20 characters max]
$EDID_NAME? N1	Display the name of the selected EDID slot. **N1** = D1 ~ D10, C1 ~ C10

$EDID_NATIVE? N1	Display the native resolution value stored in the EDID of the selected location.
	Available values for **N1**:
	RX [HDMI Input (Rx) Port]
	SINK_H [HDMI Sink]
	ⓘ First detailed timing from Block 0.
	    If the EDID fails to be read, "$err_ddc" is displayed.
	    If the EDID has invalid content, "$err_bad" is displayed.

$EDID_READ N1,N2	Displays the selected data block stored in the EDID of the selected location.
	Available values for **N1**:
	D1~D10 [Default EDID 1~10]
	C1~C10 [Copy EDID 1~10]
	SINK_H [HDMI Sink]
	Available values for **N2**:
	BLOCK0 [EDID Block 0]
	BLOCK1 [EDID Block 1]
	BLOCK2 [EDID Block 2]
	BLOCK3 [EDID Block 3]
	ⓘ This data is output as a bit stream of 128 bytes following the <CR><LF> of the command acknowledgement.
	    Each hex data unit is composed of 3 digits. The first 2 digits are the hex value. The 3rd digit is a space (0x20).
	    Blocks 2 & 3 are only supported from the HDMI sink.
	    If the EDID fails to be read, "$err_ddc" is displayed.
	    If block 2 or block 3 doesn't exist, "$err_block" is displayed.

Command	Description and Parameters
$EDID_RX N1	Select the EDID to use with the unit's HDMI input (Rx).
	Available values for **N1**:
	D1~D10 [Default EDID 1~10]
	C1~C10 [Copy EDID 1~10]
	SINK [Current HDMI sink]
$EDID_RX?	Display the current EDID selection for the unit's HDMI input (Rx).
$EDID_TYPE? N1	Display the EDID type of the selected location.
	Available values for **N1**:
	RX [HDMI Input(Rx) Port]
	SINK_H [HDMI Sink]
	ⓘ If the EDID fails to be read, "$err_ddc" is displayed.
	If the EDID has invalid content, "$err_bad" is displayed.
$EDID_WRITE N1,N2 N3	Directly write an EDID block to the selected EDID location.
	Available values for **N1**:
	RX [HDMI Input(Rx) Port]
	SINK_H [HDMI Sink]
	Available values for **N2**:
	BLOCK0 [EDID Block 0]
	BLOCK1 [EDID Block 1]
	N3 = <CR><LF>{128 byte hex data}
	ⓘ The data must be sent as a 128 byte hex data bit stream following the <CR><LF> in the **N3** part of the command.
	Each hex data unit is composed of 3 digits. The first 2 digits are the hex value. The 3rd digit is a space (0x20).
	If the sum of the 128 byte data isn't 0, "$err_checksum" is displayed.
$FACTORY	Execute a factory reset and reboot the unit.
	ⓘ Stored Copy EDIDs and Ethernet settings are not reset.
$FWVER?	Display the current firmware version.
$HDCP_IN_SW N1	Enable or disable HDCP support for the unit's HDMI input.
	N1 = ON, OFF
	ⓘ Affects Analyzer mode only.
$HDCP_IN_SW?	Display the current HDCP support setting for the unit's HDMI input.
$HDCP_IN_VER N1	Set the HDCP version to use on the unit's HDMI input.
	Available values for **N1**:
	V1.4 [HDCP v1.4 only]
	V1.4+V2.2 [HDCP v1.4 & v2.2]
	ⓘ Affects Analyzer mode only.
$HDCP_IN_VER?	Display the current HDCP version used on the unit's HDMI input.
$HDCP_OUT_SW N1	Enable or disable HDCP support on the unit's HDMI output.
	N1 = ON, OFF
	ⓘ Affects Pattern mode only.
$HDCP_OUT_SW?	Display the HDMI output's HDCP status.
	ⓘ A status of "Talk" means HDCP is currently performing handshaking.

Command	Description and Parameters
$HDCP_OUT_VER N1	Set the HDCP version to use on the unit's HDMI output. Available values for **N1**: V1.4 [HDCP v1.4] V2.2 [HDCP v2.2] ⓘ Affects Pattern mode only.
$HDCP_OUT_VER?	Display the current HDCP version for the output port.
$HDR_EOTF N1	Set the HDR EOTF (Electro-Optical Transfer Function) mode. Available values for **N1**: SDR [Traditional Gamma, SDR Luminance Range] HDR [Traditional Gamma, HDR Luminance Range] 2084 [SMPTE ST 2084] RSVD [Reserved for future use]
$HDR_EOTF?	Display the current HDR EOTF mode.
$HDR_MCLL N1	Set the maximum HDR content light level. **N1** = 0 ~ 65500 [100-unit increments]
$HDR_MCLL?	Display the current maximum HDR content light level.
$HDR_MFALL N1	Set the maximum HDR frame-average light level. **N1** = 0 ~ 65500 [100-unit increments]
$HDR_MFALL?	Display the current maximum HDR frame-average light level.
$HDR_SW N1	Enable or disable HDR support on the unit's HDMI output. **N1** = ON, OFF
$HDR_SW?	Display the current HDR support status for the unit's HDMI output.
$HDR_TX_COL N1	Set the HDMI output (Tx) AVI Colorimetry mode. Available values for **N1**: 1 [No Data] 2 [ITU 601] 3 [ITU 709] 4 [xvYCC 601] 5 [xvYCC 709] 6 [sYCC 601] 7 [Adobe Y601] 8 [Adobe RGB] 9 [BT.2020 (1) Y'CC'BCC'RC] 10 [BT.2020 (2) R'G'B'/Y'C'BC'R]
$HDR_TX_COL?	Display the current HDMI output (Tx) AVI Colorimetry mode.
$MODEL?	Display the unit's model number.
$PATTERN N1	Select the test pattern to output. Available values for **N1**: 1 [Black] 2 [Blue] 3 [Cyan] 4 [Green] 5 [Magenta] 6 [Red] 7 [White] 8 [Yellow] 9 [Color Bar] 10 [Grayscale 256] 11 [V Line On/Off]
$PATTERN?	Display the current test pattern selection.

Command	Description and Parameters
$RX_DDC N1	Enable or disable the DDC bus for the HDMI input (Rx). **N1** = ON, OFF
$RX_DDC?	Display the DDC bus state for the HDMI input (Rx).
$RX_HOTPLUG N1	Set the hot plug value for the HDMI input (Rx). Available values for **N1**: OFF　　　　　[Set hot plug low] ON　　　　　[Set hot plug high] TOGGLE　　[Toggle low→high]
$RX_HOTPLUG?	Display the current hot plug state for the HDMI input (Rx).
$RX_HOTPLUG_T N1	Set the hot plug time (in milliseconds) for the HDMI input (Rx). **N1** = 50 ~ 500　[50ms increments]
$RX_HOTPLUG_T?	Display the current hot plug time (in milliseconds) for the HDMI input (Rx).
$RX_PC_TOL N1	Set PC source clock detection tolerance for the HDMI input (Rx). **N1** = 1 ~ 10　　[1/1000 ~ 10/1000]
$RX_PC_TOL?	Display the PC source clock detection tolerance for the HDMI input (Rx).
$RX_SCDC N1	Enable or disable the SCDC port function on the HDMI input (Rx). **N1** = ON, OFF
$RX_SCDC?	Display the current SCDC port state for the HDMI input (Rx).
$RX_SENSE N1	Enable or disable the RxSense function for the HDMI input (Rx). **N1** = ON, OFF
$RX_SENSE?	Display the current RxSense state for the HDMI input (Rx).
$SINK_DETECT? N1	Displays a variety of sink detection status and informational values. Available values for **N1**: HOTPLUG　　　　　　　[Sink's hot plug status] RSENSE　　　　　　　　[Sink's RxSense status] HDCP　　　　　　　　　[Sink HDCP status detection] HDCP_AKSV　　　　　[Sink AKSV in 2-digit hex (HDCP v1.4)] HDCP_BKSV　　　　　[Rx BKSV in 2-digit hex (HDCP v1.4)] HDCP_RXID　　　　　[HDCP Rx ID in 2-digit hex (HDCP v2.2)] SCDC_SCR_ENABLE　[Rx SCDC source enable scrambling state] SCDC_SCR_STATUS　[SCDC sink scrambling status] SCDC_SINK_VER　　　[SCDC sink version] SCDC_SOURCE_VER　[SCDC source version]

Command	Description and Parameters
$SOURCE_DETECT? N1	Displays a variety of source detection status and informational values.
	Available values for **N1**:
	5V [5V detection state] HDCP [Source HDCP status detection] HDCP_AKSV [Source AKSV in 2-digit hex (HDCP v1.4)] HDCP_BKSV [Rx BKSV in 2-digit hex (HDCP v1.4)] HDCP_RXID [HDCP Receiver ID in 2-digit hex (HDCP v2.2)] SCDC_SCR_ENABLE [Rx SCDC source enable scrambling state] SCDC_SCR_STATUS [SCDC sink scrambling status] SCDC_SINK_VER [SCDC sink version] SCDC_SOURCE_VER [SCDC source version] CKDT [TMDS clock detection] DATA_RATE [Video data rate in Mbps] TMDS_FORMAT [Detected TMDS format (DVI or HDMI)] SCDT [TMDS sync detection] HA [Horizontal active pixels] HBP [Horizontal back porch pixels] HFP [Horizontal front porch pixels] HSW [Horizontal sync width pixels] HT [Total horizontal pixels] HSP [Horizontal sync polarity] HVS_OFFSET1 [Horizontal/vertical sync offset1 in dot] HVS_OFFSET2 [Horizontal/vertical sync offset2 in dot] PIXEL_CLOCK [Pixel clock in kHz] SCAN [Video scan mode (P = Progressive, I = Interlaced)] TIMING [Video timing (Ref. "Source Video Timing List")] TMDS_CLOCK [TMDS clock in kHz] VA [Vertical active lines] VBP [Vertical back porch lines] VFP [Vertical front porch lines] VSW [Vertical sync width lines] VT [Total vertical lines] VSP [Vertical sync polarity] ACR [Audio-Clock-Recovery packet status] ACR_CTS [Audio-Clock-Recovery CTS value] ACR_N [Audio-Clock-Recovery N value] ASP [Audio-Sample packet status] ASP_CH [Audio-Sample packet channel number] ASP_FIFO [Audio-Sample packet audio FIFO (error or normal)] ASP_LAYOUT [Audio-Sample packet layout] ASP_PLL [Audio-Sample packet PLL (locked or unlocked)] CHS_CODE [Channel-status audio coding] CHS_SR [Channel-status sampling rate in kHz] CHS_SS [Channel-status sampling size] CHS_TYPE [Channel-status app type (consumer/professional)] HBR [High-Bit-Rate packet status] AIF [Display packet-AIF data in 2-digit hex] AVI [Display packet-AVI data] DRMI [Display packet-DMI data] GCP [Display packet-GCP data] SPD [Display packet-SPD data] VSI [Display packet-VSI data] SCDC_SCR_ENABLE [Rx SCDC source enable scrambling state] SCDC_SCR_STATUS [SCDC sink scrambling status] SCDC_SINK_VER [SCDC sink version] SCDC_SOURCE_VER [SCDC source version]

Command	Description and Parameters
$TASK_MODE N1	Set the unit's operation mode to Signal Analyzer or Pattern Generation.
	Available values for **N1**:
	CABLE [Cable Test Mode]
	ANALYZER [Analyzer Mode]
	PATTERN [Pattern Mode]
$TASK_MODE?	Display the unit's current operation mode.
$TIMER_DAY?	Display the unit's test timer day value.
$TIMER_HOUR?	Display the unit's test timer hour value.
$TIMER_MINUTE?	Display the unit's test timer minute value.
$TIMER_SECOND?	Display the unit's test timer second value.
$TIMING N1	Select the output resolution timing to use.
	Available values for **N1**:
	1 [720×480p@59]
	2 [720×576p@50]
	3 [1280×720p@25]
	4 [1280×720p@30]
	5 [1280×720p@50]
	6 [1280×720p@60]
	7 [1920×1080i@50]
	8 [1920×1080i@60]
	9 [1920×1080p@24]
	10 [1920×1080p@25]
	11 [1920×1080p@30]
	12 [1920×1080p@50]
	13 [1920×1080p@60]
	14 [3840×2160p@24]
	15 [3840×2160p@25]
	16 [3840×2160p@30]
	17 [3840×2160p@50]
	18 [3840×2160p@60]
	19 [4096×2160p@24]
	20 [4096×2160p@25]
	21 [4096×2160p@30]
	22 [4096×2160p@50]
	23 [4096×2160p@60]
$TIMING?	Display the unit's current output resolution timing by timing number.
$TIMINGX?	Display the unit's current output resolution timing by timing name.
$TMDS_FORMAT N1	Set the video output format.
	N1 = HDMI, DVI
$TMDS_FORMAT?	Display the current video output format.
$TMDS_SW N1	Enable or disable video output.
	N1 = ON, OFF [Off disables video output]
$TMDS_SW?	Display the current video output status.
$TX_5V N1	Set the unit's output +5V pin state to follow the TMDS output state or to always be on.
	Available values for **N1**:
	FOLLOW [Only output 5V if there is a live signal]
	ON [Always output 5V]
$TX_5V?	Display the current output +5V pin setting.
$UPDATE_FW	Update firmware from USB & reboot the unit.

The warranty obligations of Kramer Electronics Inc. ("Kramer Electronics") for this product are limited to the terms set forth below:

What is Covered

This limited warranty covers defects in materials and workmanship in this product.

What is Not Covered

This limited warranty does not cover any damage, deterioration or malfunction resulting from any alteration, modification, improper or unreasonable use or maintenance, misuse, abuse, accident, neglect, exposure to excess moisture, fire, improper packing and shipping (such claims must be presented to the carrier), lightning, power surges, or other acts of nature. This limited warranty does not cover any damage, deterioration or malfunction resulting from the installation or removal of this product from any installation, any unauthorized tampering with this product, any repairs attempted by anyone unauthorized by Kramer Electronics to make such repairs, or any other cause which does not relate directly to a defect in materials and/or workmanship of this product. This limited warranty does not cover cartons, equipment enclosures, cables or accessories used in conjunction with this product.

Without limiting any other exclusion herein, Kramer Electronics does not warrant that the product covered hereby, including, without limitation, the technology and/or integrated circuit(s) included in the product, will not become obsolete or that such items are or will remain compatible with any other product or technology with which the product may be used.

How Long this Coverage Lasts

The standard limited warranty for Kramer products is seven (7) years from the date of original purchase, with the following exceptions:

1. All Kramer VIA hardware products are covered by a standard three (3) year warranty for the VIA hardware and a standard three (3) year warranty for firmware and software updates.
2. All Kramer fiber optic cables and adapters, active cables, cable retractors, all Kramer speakers and Kramer touch panels are covered by a standard one (1) year warranty.
3. All Kramer Cobra products, all Kramer Calibre products, all Kramer Minicom digital signage products, all HighSecLabs products, all streaming, and all wireless products are covered by a standard three (3) year warranty.
4. All Sierra Video MultiViewers are covered by a standard five (5) year warranty.
5. Sierra switchers & control panels are covered by a standard seven (7) year warranty (excluding power supplies and fans that are covered for three (3) years).
6. K-Touch software is covered by a standard one (1) year warranty for software updates.
7. All Kramer passive cables are covered by a ten (10) year warranty.

Who is Covered

Only the original purchaser of this product is covered under this limited warranty. This limited warranty is not transferable to subsequent purchasers or owners of this product.

What Kramer Electronics Will Do

Kramer Electronics will, at its sole option, provide one of the following three remedies to whatever extent it shall deem necessary to satisfy a proper claim under this limited warranty:

1. Elect to repair or facilitate the repair of any defective parts within a reasonable period of time, free of any charge for the necessary parts and labor to complete the repair and restore this product to its proper operating condition. Kramer Electronics will also pay the shipping costs necessary to return this product once the repair is complete.
2. Replace this product with a direct replacement or with a similar product deemed by Kramer Electronics to perform substantially the same function as the original product.
3. Issue a refund of the original purchase price less depreciation to be determined based on the age of the product at the time remedy is sought under this limited warranty.

What Kramer Electronics Will Not Do Under This Limited Warranty

If this product is returned to Kramer Electronics or the authorized dealer from which it was purchased or any other party authorized to repair Kramer Electronics products, this product must be insured during shipment, with the insurance and shipping charges prepaid by you. If this product is returned uninsured, you assume all risks of loss or damage during shipment. Kramer Electronics will not be responsible for any costs related to the removal or re-installation of this product from or into any installation. Kramer Electronics will not be responsible for any costs related to any setting up this product, any adjustment of user controls or any programming required for a specific installation of this product.

How to Obtain a Remedy Under This Limited Warranty

To obtain a remedy under this limited warranty, you must contact either the authorized Kramer Electronics reseller from whom you purchased this product or the Kramer Electronics office nearest you. For a list of authorized Kramer Electronics resellers and/or Kramer Electronics authorized service providers, visit our web site at www.kramerav.com or contact the Kramer Electronics office nearest you.

In order to pursue any remedy under this limited warranty, you must possess an original, dated receipt as proof of purchase from an authorized Kramer Electronics reseller. If this product is returned under this limited warranty, a return authorization number, obtained from Kramer Electronics, will be required (RMA number). You may also be directed to an authorized reseller or a person authorized by Kramer Electronics to repair the product.

If it is decided that this product should be returned directly to Kramer Electronics, this product should be properly packed, preferably in the original carton, for shipping. Cartons not bearing a return authorization number will be refused.

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⚠ **SAFETY WARNING**
Disconnect the unit from the power supply before opening and servicing

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For the latest information on our products and a list of Kramer distributors, visit our Web site where updates to this user manual may be found.

We welcome your questions, comments, and feedback.

www.KramerAV.com
info@KramerAV.com