Kramer Electronics, Ltd.

USER MANUAL

Model:

VP-728

Presentation Switcher / Scaler

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1 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! Our 1,000-plus different models now appear in 11 groups[1] that are clearly defined by function.

Congratulations on purchasing your Kramer **VP-728** *Presentation Switcher / Scaler*, which is ideal for the following typical applications:

- Projection systems in conference rooms, boardrooms, auditoriums, hotels and churches
- Production studios, rental and staging
- Any application where high quality conversion and switching of multiple and different video signals to graphical data signals is required for projection purposes

The package includes the following items:

- **VP-728** *Presentation Switcher / Scaler*
- Infrared remote control transmitter
- Power cord[2] and null-modem adapter
- This user manual[3]

2 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
- Use Kramer high performance high resolution cables[4]

2.1 Quick Start

The quick start charts summarize the basic setup and operation steps of the **VP-728**.

1 GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Matrix Switchers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters; GROUP 11: Sierra Products

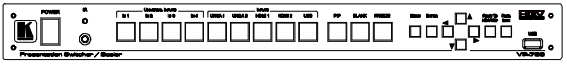
2 We recommend that you use only the power cord that is supplied with this machine

3 Download up-to-date Kramer user manuals from our Web site at http://www.kramerelectronics.com

4 The complete list of Kramer cables is on our Web site at http://www.kramerelectronics.com

Step 1: Mount the machine - see section 5

Mount the machine in a rack or stick the 4 rubber feet to the underside

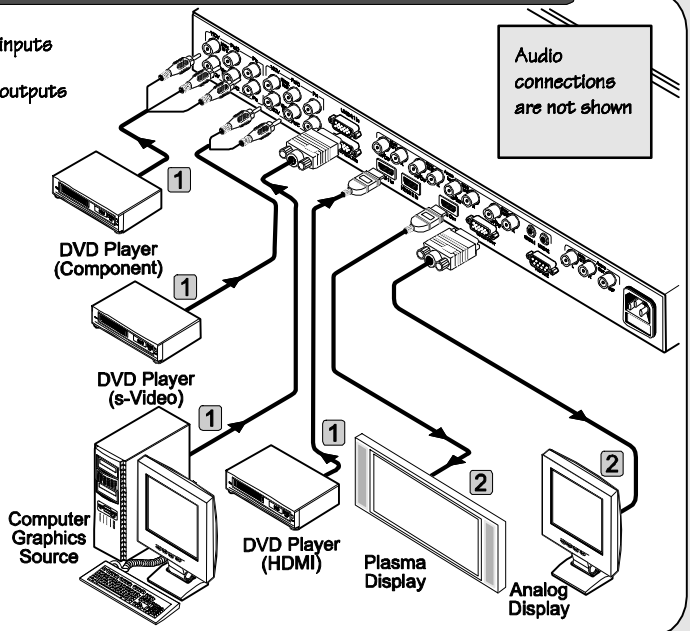


Step 2: Connect the inputs/outputs - see section 6

1 Connect the inputs

2 Connect the outputs

Audio connections are not shown



Step 3: Connect the control ports - see section 7

Connect an RS-232 optional control port

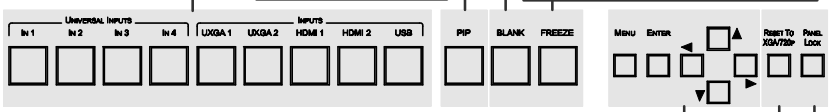
Step 4: Turn the power ON

Step 5: Set and operate the machine - see sections 7 and 8

Select an input

Select the PIP function on the scaled outputs

Set a BLANK display
FREEZE the video image on the outputs



Operate via the OSD menu

Use the OSD Menu buttons

RESET the resolution
LOCK the PANEL

3 Overview

The Kramer **VP-728** is a 9-input Proscale™ *Presentation Switcher / Scaler* with unbalanced stereo and digital S/PDIF audio.

The **VP-728** scales any composite, s-Video (Y/C), component video (YUV), HDMI or computer graphics video signal, as well as jpeg files (via USB) up or down to a selectable graphics or HDTV output resolution and provides glitch-free switching between sources through FTB™ (fade-thru-black) switching technology. The output signal is available simultaneously on a 15-pin HD computer graphics video (UXGA) connector and on an HDMI connector.

The **VP-728** features include:

- Silicon Optix HQV® Video Processing - HQV (Hollywood Quality Video) processing represents the state-of-the-art in video processing technology, with the highest quality de-interlacing, noise reduction, and scaling performance for both standard-definition and high-definition signals
- Fade-Thru-Black (FTB™) Switching - the video fades to black and then the new input fades from black for glitch-free and smooth switching. The output signal provides constant sync so the display never glitches
- K-IIT XL™ Picture-in-Picture Image Insertion Technology - ultra stable picture-in-picture, picture-and-picture, and split screen capability. Any video source can be inserted into or positioned next to a computer graphics video source or vice versa with window positioning and sizing controls
- Four user definable (universal) video inputs (each can be set as composite video, s-Video (Y/C) or component video), two computer graphics video inputs, two HDMI inputs and 1 USB input (for reading JPEG picture files[1])
- HDTV compatible component input
- HDTV output resolutions - 480p, 576p, 720p 1080i, and 1080p
- Scaled video outputs - HDMI and computer graphics video
- HDMI supports up to 2.25Gbps bandwidth per graphic channel[2]
- Multiple computer graphics output resolutions - including a user-defined output resolution with selectable refresh rates
- Multiple aspect ratio selections
- Companion AFV (audio-follow-video) for every analog video input - supports embedded audio on the two HDMI inputs and output
- Built-in noise reduction and picture enhancement features

1 JPEG files in EXIF format are recognized, up to 1920x1200

2 Suitable for resolutions up to UXGA at 60Hz, and for all HD resolutions

- Audio inputs - four (stereo audio or S/PDIF on two RCA connectors) for each of the four universal video inputs; two stereo audio (on 3.5mm connectors) for the two computer graphics video inputs; and embedded audio on the HDMI inputs
- Audio outputs - S/PDIF and stereo audio (RCA connectors). Transcodes stereo or S/PDIF audio to both stereo and S/PDIF audio and embeds audio onto the HDMI output
- Built-in Time Base Corrector - stabilizes video sources with unstable sync
- Built-in video Proc-Amp - color, hue, sharpness, contrast, and brightness are set individually for each input
- A BLANK button, a FREEZE button, a RESET TO XGA/720P button (to hardware-reset the output resolution); and a PANEL LOCK button1
- Built-in audio Proc-Amp - with bass, treble, balance and loudness control, as well as audio delay
- Supports firmware upgrade2 via the USB port
- An OSD (On-Screen Display) – for making adjustments – that can be located anywhere on the screen[3]

In addition, the **VP-728**:

- Includes non-volatile memory that retains the last settings, after switching the power off and then on again
- Digitally reprocesses the signal to correct mastering errors, and regenerates the video at a higher line and pixel rate format, providing native-resolution video for LCD, DLP and plasma displays
- Is specifically designed to improve video quality by reducing chroma noise
- Scales and zooms (to up to 400% of the original size)
- Can provide non-linear scaling for 4:3, 16:9 transformation

Control your **VP-728** directly via the front panel push buttons, or:

- By RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller
- Remotely, from the infrared remote control transmitter (with on-screen menus)

The **VP-728** is housed in a 19" 1U rack mountable enclosure, with rack "ears" included, and is fed from a 100-240 VAC universal switching power supply.

1 The front panel blank, freeze and lock buttons can be programmed via the OSD menu (see Table 15)

2 To check if firmware upgrades are available, go to our Web site at http://www.kramerelectronics.com

3 Centered on the screen, or in one of the four corners

3.1 About HDMI

High-Definition Multimedia Interface (HDMI) is an uncompressed all-digital[1] audio/video interface, widely supported in the entertainment and home cinema industry. It delivers the maximum high-definition image and sound quality in use today. Note that Kramer Electronics Limited is an HDMI Adopter[2] and an HDCP Licensee[3].

In particular, HDMI[4]:

- Provides a simple[5] interface between any audio/video source, such as a set-top box, DVD player, or A/V receiver and video monitor, such as a digital flat LCD / plasma television (DTV), over a single lengthy[6] cable
- Supports standard, enhanced, high-definition video, and multi-channel digital audio[7] on a single cable
- Transmits all ATSC HDTV standards and supports 8-channel digital audio, with bandwidth to spare to accommodate future enhancements and requirements
- Benefits consumers by providing superior, uncompressed digital video quality via a single cable[8], and user-friendly connector
- Is backward-compatible with DVI (Digital Visual Interface)
- Supports two-way communication between the video source (such as a DVD player) and the digital television, enabling new functionality such as automatic configuration and one-button play
- Has the capacity to support existing high-definition video formats (720p, 1080i, and 1080p/60), standard definition formats such as NTSC or PAL, as well as 480p and 576p

1 Ensuring an all-digital rendering of video without the losses associated with analog interfaces and their unnecessary digital-to-analog conversions

2 See http://www.hdmi.org/about/adopters_founders.asp

3 See http://www.digital-cp.com/list/

4 HDMI, the HDMI logo and High-Definition Multimedia Interface are trademarks or registered trademarks of HDMI licensing LLC

5 With video and multi-channel audio combined into a single cable, the cost, complexity, and confusion of multiple cables currently used in A/V systems is reduced

6 HDMI technology has been designed to use standard copper cable construction at up to 15m

7 HDMI supports multiple audio formats, from standard stereo to multi-channel surround-sound. HDMI has the capacity to support Dolby 5.1 audio and high-resolution audio formats

8 HDMI provides the quality and functionality of a digital interface while also supporting uncompressed video formats in a simple, cost-effective manner

3.2 Recommendations for Best Performance

To achieve the best performance:

- Connect only good quality connection cables, thus avoiding interference, deterioration in signal quality due to poor matching, and elevated noise-levels (often associated with low quality cables)
- Avoid interference from neighboring electrical appliances and position your Kramer **VP-728** away from moisture, excessive sunlight and dust

4 Your Presentation Switcher / Scaler

Figure 1, and Table 1 define the front panel of the **VP-728**; Figure 2 and Table 2 define the rear panel.

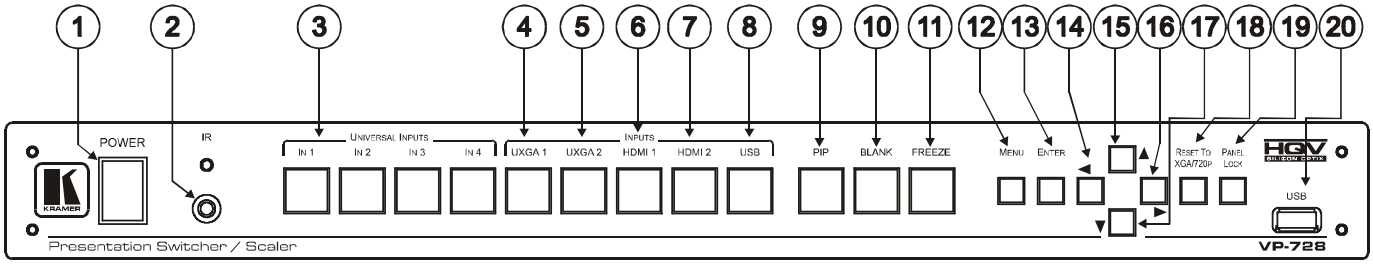


Figure 1: VP-728 Presentation Switcher / Scaler Front Panel

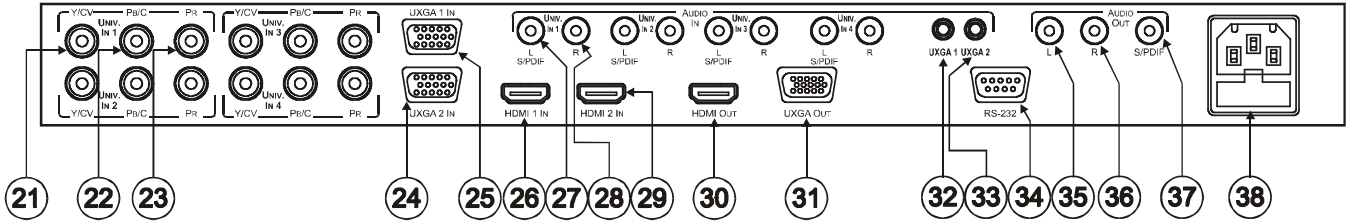


Figure 2: VP-728 Presentation Switcher / Scaler Rear Panel

Table 1: Front Panel Presentation Switcher / Scaler Features

#	Feature		Function
1	*POWER* Switch		Illuminated switch for turning the machine ON or OFF
2	*IR* Receiver / LED		Red when the unit accepts IR remote commands
3	*UNIVERSAL INPUT* Selector Buttons		Press to select the composite video / s-Video / component video source[1] (from 1 to 4)
4	*INPUT* Selector Buttons[2]	*UXGA 1*	Press to select the UXGA[1] source 1
5		*UXGA 2*	Press to select the UXGA[1] source 2
6		*HDMI 1*	Press to select the HDMI source 1
7		*HDMI 2*	Press to select the HDMI source 2
8		*USB*	Press to select the USB[3] source
9	*PIP* Button		Toggles the picture-in-picture function (see section 7.2)
10	*BLANK* Button		Press to toggle between a blank screen (blue or black screen)[4] and the display
11	*FREEZE* Button		Press to freeze/unfreeze the output video image[4]
12	*MENU* Button		Displays the OSD menu screen (toggle)
13	*ENTER* Button		Moves to the next level in the OSD screen, or accepts a new parameter
14	◄ Button		Decreases the range by one step in the OSD screen or moves to the previous level in the OSD screen
15	▲ Button		Moves up one step (in the same level) in the OSD screen
16	► Button		Increases the range by one step in the OSD screen
17	▼ Button		Moves down one step (in the same level) in the OSD screen
18	*RESET TO XGA/720p* Button		Press and hold to reset to the default resolution[5]
19	*PANEL LOCK* Button		Press to lock/unlock the front panel to prevent unintentional operation
20	*USB* Connector		Connect to a USB drive to read JPEG files[6]

1 And the appropriate audio source

2 When selected, button illuminates. See section 7.1 for details of how to program the INPUT SELECTOR buttons

3 JPEG files in EXIF format on a USB memory stick

4 Can be programmed to mute the audio signal at the same time (see Table 15)

5 Toggles between reset to XGA and reset to 720p

6 Files must be in EXIF format

Table 2: Rear Panel Presentation Switcher / Scaler Features

#	Feature		Function
21	*UNIV. IN* RCA Connectors (from 1 to 4)	*Y/CV*	Connect to the video acceptor which can be either composite video (*Y/CV*), s-Video (*Y/CV, PB/C*) or component video (*Y/CV, PB/C, PR*)
22		*PB/C*	
23		*PR*	
24	*UXGA 2 IN* 15-pin HD Connector		Connects to the UXGA (analog interface) graphics source 2
25	*UXGA 1 IN* 15-pin HD Connector		Connects to the UXGA (analog interface) graphics source 1
26	*HDMI 1 IN* Connector		Connect to the HDMI 1 source
27	*AUDIO IN UNIV. IN* RCA Connectors (from 1 to 4)	*L, S/PDIF*	Connect to the left unbalanced stereo analog audio source; Alternatively, connect to a digital audio source
28		*R*	Connect to the right unbalanced stereo analog audio source
29	*HDMI 2 IN* Connector		Connect to the HDMI 2 source
30	*HDMI OUT* Connector		Connect to the HDMI acceptor
31	*UXGA OUT* 15-pin HD Connector		Connects to the video acceptor that displays the scaled output In the default HDTV mode, the signal goes out via 3 PINS: PIN 1 is P_r, PIN 2 is Y, PIN 3 P_b
32	*AUDIO IN* 3.5 Mini Jack	UXGA 1	Connects to the unbalanced stereo analog audio source 1
33		*UXGA 2*	Connects to the unbalanced stereo analog audio source 2
34	*RS-232* 9-pin D-sub Connector		Connects to PC or Serial Controller
35	*AUDIO OUT* RCA Connectors	*L*	Connect to the left unbalanced stereo analog audio acceptor
36		*R*	Connect to the right unbalanced stereo analog audio acceptor
37		*S/PDIF*	Connect to a digital audio acceptor
38	Power Connector with *Fuse*		AC connector enabling power supply to the unit

5 Installing in a Rack

This section describes what to do before installing in a rack and how to rack mount.

Before Installing in a Rack

Before installing in a rack, be sure that the environment is within the recommended range:	
Operating temperature range	+5º to +45º C (41º to 113º F)
Operating humidity range	10 to 90% RHL, non-condensing
Storage temperature range	-20º to +70º C (-4º to 158º F)
Storage humidity range	5 to 95% RHL, non-condensing

CAUTION!!

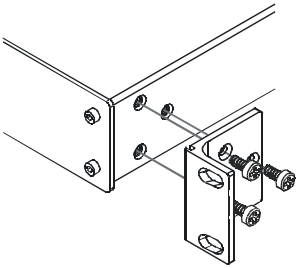
When installing on a 19" rack, avoid hazards by taking care that:

1. It is located within the recommended environmental conditions, as the operating ambient temperature of a closed or multi unit rack assembly may exceed the room ambient temperature.
2. Once rack mounted, enough air will still flow around the machine.
3. The machine is placed straight in the correct horizontal position.
4. You do not overload the circuit(s). When connecting the machine to the supply circuit, overloading the circuits might have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.
5. The machine is earthed (grounded) in a reliable way and is connected only to an electricity socket with grounding. Pay particular attention to situations where electricity is supplied indirectly (when the power cord is not plugged directly into the socket in the wall), for example, when using an extension cable or a power strip, and that you use only the power cord that is supplied with the machine.

How to Rack Mount

To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.



2. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

Note that:

- **In some models, the front panel may feature built-in rack ears**
- Detachable rack ears can be removed for desktop use
- Always mount the machine in the rack before you attach any cables or connect the machine to the power
- If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions (you can download it at: http://www.kramerelectronics.com)

6 Connecting your Presentation Switcher / Scaler

To connect[1] the **VP-728** as illustrated in the example in Figure 3, do the following[2]:

1. Connect the following video sources[3]:
   - A component video[4] source (for example, a DVD player) to the UNIV. IN 1 RCA connectors, Y/CV, PB/C and PR
   - An s-Video source (for example, a DVD player) to the UNIV. IN 4 RCA connectors, Y/CV and PB/C
   - A computer graphics source to the UXGA 1 IN 15-pin HD computer graphics video connector
   - An HDMI source (for example, a DVD player) to the HDMI 1 IN connector
   - A graphics data source (for example, JPEG files from a PC or a USB flash drive) to the USB connector on the front panel of the machine (not illustrated in Figure 3)
2. Connect the unbalanced stereo or digital audio sources[5] (not illustrated in Figure 3):
   - The audio of the component video source 1 to the AUDIO UNIV IN 1 S/PDIF RCA connector
   - The audio of the s-Video source 4 to the AUDIO UNIV IN 4 L and R RCA connector
   - The audio of computer graphics source to the AUDIO UXGA 1 3.5mm mini jack
3. Connect the video outputs:
   - The HDMI OUT connector to an HDMI acceptor (for example, a plasma display)
   - The UXGA OUT 15-pin HD computer graphics video connector[6] to a video acceptor (for example, an analog display)
4. Connect the AUDIO OUT L and R unbalanced stereo audio output and/or the S/PDIF digital audio output to audio acceptors, for example, speakers (not illustrated in Figure 3).

1 Although this example shows only several inputs that are connected, you can connect all the inputs simultaneously

2 Switch OFF the power on each device before connecting it to your VP-728. After connecting your VP-728, switch on its power and then switch on the power on each device

3 You do not have to connect all the inputs

4 Sometimes called YUV, or Y, B-Y, R-Y, or Y, Pb, Pr

5 As required. Not all devices need to be connected

6 In the HDTV mode, the signal goes out via three PINS: PIN 1 is Red or Pr, PIN 2 is Green or Y, PIN 3 is Blue or Pb

5. Connect the power cord[1] (the power connector is not illustrated in Figure 3).
6. If required, connect a PC via RS-232, see section 6.1.

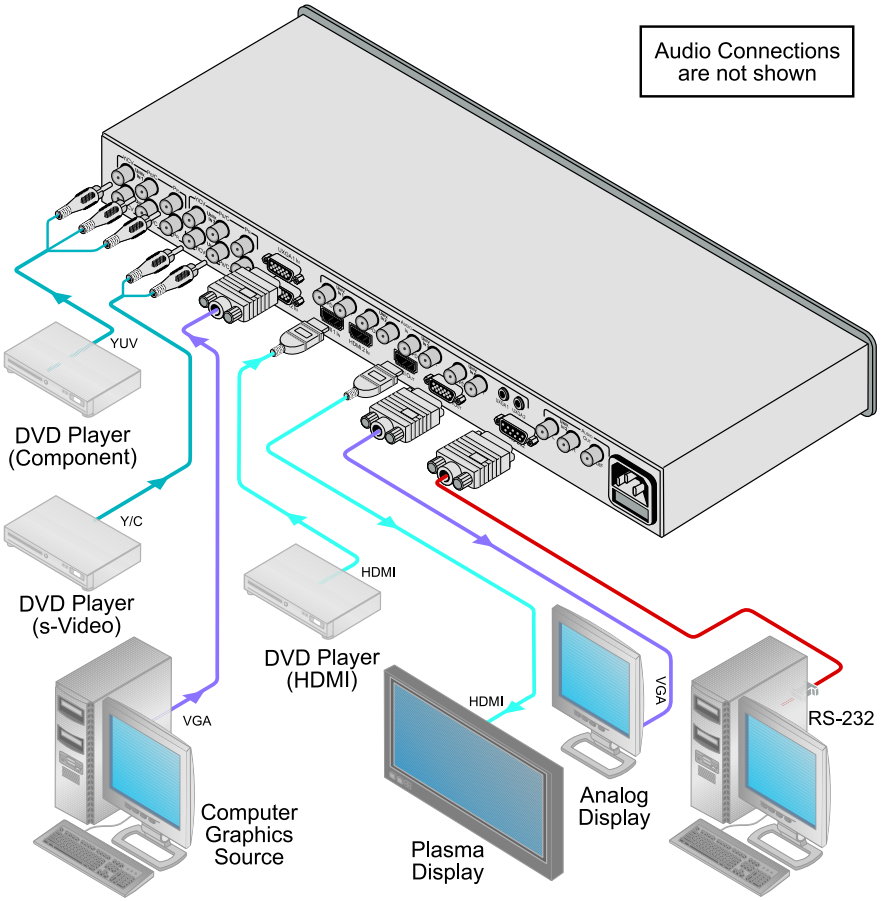


Figure 3: Connecting the VP-728 Rear Panel

1 We recommend that you use only the power cord that is supplied with this machine

6.1 Connecting a PC

You can connect a PC (or other controller) to the **VP-728** via the RS-232 port for remote control, and for upgrading the firmware.

To connect a PC to a **VP-728** unit, using the Null-modem adapter provided with the machine (recommended):

- Connect the RS-232 9-pin D-sub rear panel port on the **VP-728** unit to the Null-modem adapter and connect the Null-modem adapter with a 9-wire flat cable to the RS-232 9-pin D-sub port on your PC

To connect a PC to a **VP-728** unit, without using a Null-modem adapter:

- Connect the RS-232 9-pin D-sub port on your PC to the RS-232 9-pin D-sub rear panel port on the **VP-728** unit, forming a cross-connection[1], as Figure 4 illustrates

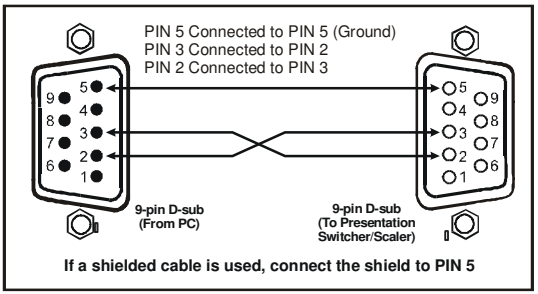


Figure 4: Connecting the PC

1 Also known as a Null-modem connection

7 Presentation Switcher / Scaler Buttons

The **VP-728** includes the following front panel buttons:

- Nine INPUT selector buttons, see section 7.1
- A PIP button, see section 7.2
- BLANK and FREEZE buttons
- Six OSD buttons
- A RESET TO XGA/720p button
- A PANEL LOCK button, see section 7.3

7.1 Switching an Input

Each INPUT SELECTOR button can be used to select the source.

You can switch seamlessly[1] between each input that is connected to a source, by pressing the appropriate INPUT SELECTOR button.

7.2 The PIP Button Feature

The Picture-in-Picture inserter (PIP) uses K-IIT XL™ image insertion technology to present video and graphic sources simultaneously[2]. You can display:

- An inserted video source[3] PIP over a graphic source[4]
- An inserted graphic source[4] PIP over a video source[3]

Three types of PIP insertions are available:

- Picture-in-Picture – the PIP image appears over the background image
- Picture + Picture – both the video source and the graphic source are placed side by side and have the same height (the PIP image is stretched lengthwise)
- Split – both the video source and the graphic source are placed side by side (the PIP image appears smaller than the defined size and the source size is reduced)

1 FTB™ switching for glitchless transitions between inputs

2 If the HDMI signal is HDCP protected, it cannot appear on a display that is not HDCP compliant, and the machine will not output a picture on the VGA output

3 That is, composite, s-Video

4 That is, HDMI or UXGA or component

7.2.1 Activating the PIP Feature

You can activate the PIP by:

- Pressing the PIP button
- Pressing the PIP key on the infrared remote control transmitter (see section 7.4, Figure 7)
- Switching on the PIP functionality via the OSD Menu (see Figure 12 and Table 8)

7.2.2 Selecting the PIP Source

To use the PIP feature, set the PIP source via the OSD menu (see Figure 12 and Table 8) or the remote-transmitter keys.

To set the PIP source via the OSD menu, do the following:

1. Press the MENU button to enter the OSD menu.
2. Press the ► button to move to the PIP icon.
3. Scroll down to select Source and press ENTER.
4. Use the ▲ or ▼ buttons to select the PIP Source from the drop-down list box, and press ENTER (see Figure 12).
5. To exit the OSD menu, press the MENU button.

Figure 5: PIP Source Over Background

7.2.3 Toggling between the PIP and the Screen Source (Swap)

To toggle back and forth between the PIP source and the main display, as Figure 6 illustrates, press the Swap key on the infrared remote control transmitter (see Figure 7).

Figure 6: OSD SWAP Status

7.2.4 Quick Selection of the PIP Source via the Front Panel Buttons

For quick selection of the PIP source, press and hold the PIP front panel button while pressing the input button of the required PIP source. For example, to select UXGA 2 as the graphic PIP source over a video background, press the PIP front panel button while pressing the UXGA 2 front panel button.

When attempting to select a PIP source of the same category as the background source (for example, video on video, which is not compliant to Table 3), a message is prompted: “unavailable operation”

To replace a PIP in the same category (for example, changing the PIP source from UXGA 1 to HDMI 2), press the required PIP Source on the remote control transmitter and the PIP display will change accordingly.

You can swap the PIP source category with the main source category via the:

- Remote control keys, by selecting a new main source and then a new PIP source
- OSD menu, by selecting a new Input source through the Input menu and a new PIP source through the PIP menu

When selecting one PIP source, the Presentation Switcher / Scaler automatically recognizes and displays the selected graphic PIP source on all the video displays[1] and the selected video source on all the graphic[1] displays, compliant to Table 3.

1 Even if the input signal is not connected. In this case the PIP appears over a blank screen

Table 3: PIP Source Appearance Availability

Main Source		PIP Source												
		Input 1			Input 2			VGA 1	VGA 2	VGA 3	VGA 4	HDMI 1	HDMI 2	USB
		Video	YC	Comp.	Video	YC	Comp.							
Input 1	Video	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
	YC	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
	Comp.	No	No	No	Yes	Yes	No	No	No	No	No	No	No	No
Input 2	Video	No	No	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No
	YC	No	No	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No
	Comp.	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No
VGA 1		Yes	Yes	No	Yes	Yes	No	No	No	No	No	No	No	No
VGA 2		Yes	Yes	No	Yes	Yes	No	No	No	No	No	No	No	No
VGA 3		Yes	Yes	No	Yes	Yes	No	No	No	No	No	No	No	No
VGA 4		Yes	Yes	No	Yes	Yes	No	No	No	No	No	No	No	No
HDMI 1		Yes	Yes	No	Yes	Yes	No	No	No	No	No	No	No	No
HDMI 2		Yes	Yes	No	Yes	Yes	No	No	No	No	No	No	No	No
USB		Yes	Yes	No	Yes	Yes	No	No	No	No	No	No	No	No

7.3 Locking and Unlocking the Front Panel

To prevent changing the settings accidentally or tampering with the unit via the front panel buttons, lock your **VP-728**. Unlocking releases the protection mechanism. When the front panel is locked, control is still available via RS-232.

To lock the **VP-728**:

- Press the PANEL LOCK button on the front panel.
  The front panel is locked and the PANEL LOCK button is illuminated. Pressing a button will have no effect

To unlock the **VP-728**:

- Press the illuminated PANEL LOCK button on the front panel
  The front panel unlocks and the PANEL LOCK button is no longer illuminated

For a description of the Save Lock and Input Lock OSD functions, see Table 15.

7.4 The Infrared Remote Control Transmitter

You can control the **VP-728** remotely, from the infrared remote control transmitter, which:

- Is a hand held instrument with a convenient keypad that receives its power from 2 AAA size 1.5V DC batteries
- Has a range of up to 15 meters
- Delivers instantaneous results

Figure 7 and Table 4 define the infrared Remote Control Transmitter:

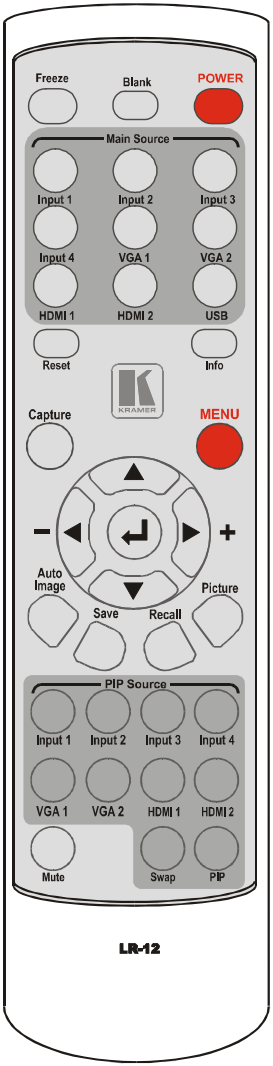


Figure 7: Infrared Remote Control Transmitter

Table 4: Infrared Remote Control Transmitter Functions

key	Function
Freeze	Pauses the output video[1]
Blank	Toggles between a blank screen (blue or black screen) and the display
POWER	Cycles power
Main Source	9 separate keys for selecting each of the following sources: Input 1, Input 2, Input 3, Input 4, VGA 1, VGA2, HDMI 1, HDMI 2 and USB
Reset	Press and hold to reset to the default resolution[2]
Info	Press to toggle the Info OSD menu
Capture	Capture an image to place as a logo or background (see Table 15)
MENU	Shows the main OSD Menu
Navigation arrows	Allows maneuvering within an OSD screen (left, right, up and down, as well as the ENTER arrow at the center)
Auto Image	Assesses the image and improves the quality accordingly, by automatically adjusting the phase, frequency and position
Save	Saves a profile
Recall	Recalls a profile
Picture	Shows the Picture OSD menu
PIP source	Nine separate keys for selecting each of the following PIP sources: Input 1, Input 2, Input 3, Input 4, VGA 1, VGA2, HDMI 1 and HDMI 2
Mute	Mutes the audio signal
Swap	Toggles between the PIP content and the parent screen content
PIP	Selects the picture-in-picture function and illuminates the PIP button[3]

1 Can be programmed to mute the audio signal at the same time (see Table 15)

2 Toggles between reset to XGA and reset to 720p

3 See section 7.2

8 Configuring the VP-728 via the OSD MENU Screens

The OSD superimposes a menu on the screen from which you can configure and control each input signal on your **VP-728**, using the MENU, ENTER, ◄, ►, ▲ and ▼ OSD buttons on the front panel and the remote transmitter.

To use the OSD menus:

1. Select the desired input signal.
2. Use the menu buttons as follows:
   - Press the MENU front panel OSD button or the MENU key on the infrared remote control transmitter (see Figure 7) to display the main MENU screen[1], which displays eight interactive icons (see Figure 8)
   - Press the MENU front panel OSD button or the MENU key on the infrared remote control transmitter to move to the previous level in the OSD screen (Esc)
   - Press the UP or DOWN buttons to select menu icons and then press ENTER
   - Use + and – buttons to increase and decrease the (numerical) rate respectively

Figure 8: MENU Items

1 Each icon represents a Level 1 function. In addition to Level 1, the OSD structure includes Level 2 (a subset of level 1), Level 3 (a subset of level 2), Level 4 (a subset of level 3) and a numerical range

8.1 The Input Screen

Figure 9 and Table 5 define the Input screen.

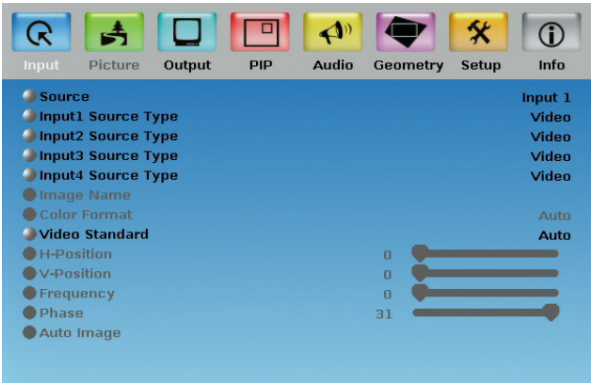


Figure 9: Input Screen

Table 5: Input Screen Functions[1]

Setting	Function	Selection	Default
Source[2]	Select the source[3]	Input 1, Input 2, Input 3, Input 4, VGA 1, VGA 2, HDMI 1, HDMI 2 or USB	
Input (1 to 4) Source Type	Select the source type	Component, YC or video (CV)	Video
Image Name	Shows the file name[4] that is displayed when the USB port is connected		
Color Format	Select the color format	Auto, RGB or YUV	Auto
Video Standard	Select the video standard	Auto, NTSC, PAL, PAL-M, PAL-N, NTSC 4.43, SECAM or PAL-60	Auto
H-Position	Set the horizontal position[5]	Set according to the input resolution	
V-Position	Set the vertical position	Set according to the input resolution	
Frequency	Adjust the frequency[6]	0 to 50	0
Phase	Adjust the phase	0 to 31	0
Auto image	Assesses the image and improves the quality accordingly, by automatically adjusting the phase, frequency and position		

1 Values may change according to the firmware version (you can download the up-to-date firmware version from our Web site at http://www.kramerelectronics.com)

2 When switching sources, the image fades through black

3 Automatically updated when pressing an input front panel button on the machine

4 Supports JPEG format only, including EXIF data (Exchangeable Image File Format). The JPEG file should not exceed a resolution of 1920x1200. If the image file is not within the definition, the machine displays the message: "Non EXIF File" or "Size Too Big"

5 For UXGA and component video inputs

6 For UXGA inputs

8.2 The Picture Screen

The Brightness, Contrast, Color and Hue picture settings are saved individually for each input (except USB). Figure 10 and Table 6 define the Picture screen.

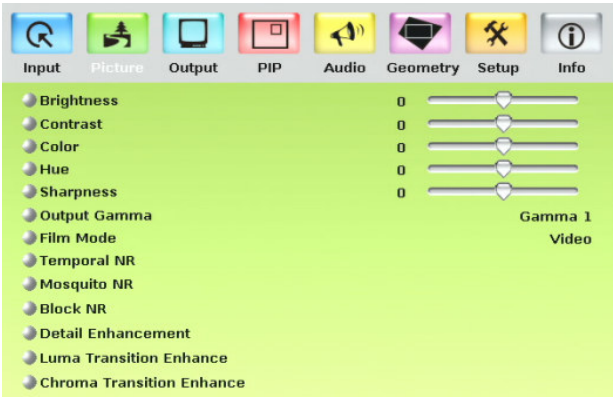


Figure 10: Picture Screen

Table 6: Picture Screen Functions[1]

Setting	Function	Selection/Range	Default
Brightness	Adjust the brightness	0 to 100	50
Contrast	Adjust the contrast	0 to 100	50
Color	Adjust the color	0 to 100	55
Hue	Adjust the hue	0 to 360	180
Sharpness	Adjust the sharpness	0 to 100	50
Output Gamma	Adjust the gamma	Gamma 1 to Gamma 5	Gamma 1
Film Mode	Set the film mode	Auto, Video, Film	Auto
Temporal NR	Set the temporal noise reduction level	Off, Low, Medium, High	High
Mosquito NR	Set the Mosquito noise reduction level	Off, Low, Medium, High	Low
Block NR	Set the block noise reduction level	Off, On	Off
Detail Enhancement	Set the detail enhancement	Off, Low, Medium, High	Medium[2]
Luma Transition Enhance	Set the luminance transition enhance level	Off, Low, High	Low
Chroma Transition Enhance	Set the chrominance transition enhance level	Off, Low, High	Low

1 Values may change according to the firmware version (you can download the up-to-date firmware version from our Web site at http://www.kramerelectronics.com)

2 If the USB input is selected, Detail Enhancement is set to Off

8.3 The Output Screen

Figure 11 and Table 7 define the Output screen.

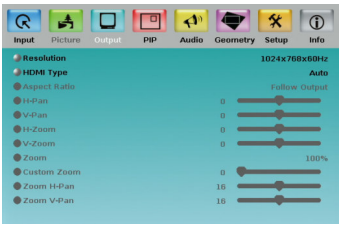


Figure 11: Output Screen

Table 7: Output Screen Functions[1]

Setting	Function	Selection/Range	Default
Resolution[2]	Set the resolution[3]	Native HDMI, 640x480x60Hz, 640x480x75Hz, 800x600x50Hz, 800x600x60Hz, 800x600x75Hz, 1024x768x50Hz, 1024x768x60Hz, 1024x768x75Hz, 1280x768x50Hz, 1280x768x60Hz, 1280x720x60Hz, 1280x800x60Hz, 1280x1024x50Hz, 1280x1024x60Hz, 1280x1024x75Hz, 1366x768x50Hz, 1366x768x60Hz, 1400x1050x50Hz, 1400x1050x60Hz, 1600x1200x50Hz, 1600x1200x60Hz, 1680x1050x60Hz, 1920x1080x60Hz, 1920x1200x60Hz, 480px60Hz, 576px60Hz, 720px50Hz, 720px60Hz, 1080ix50Hz, 1080ix60Hz, 1080px50Hz, 1080px60Hz, or Custom[4]	1024x768@60Hz
HDMI Type	Set the HDMI type	Auto, HDMI, DVI	auto
Aspect Ratio	Set the aspect ratio	Best Fit[5], Letterbox, Follow Output[6], Virtual Wide, Follow Input[7], or Custom	Best Fit
H-Pan[8]	Horizontal pan	-16 to 16	0
V-Pan[8]	Vertical pan	-16 to 16	0
H-Zoom[8]	Horizontal zoom	-8 to 8	0
V-Zoom[8]	Vertical zoom	-8 to 8	0
Zoom	Set the Zoom	100%, 150%, 200%, 225%, 250%, 275%, 300%, 325%, 350%, 375%, 400%, Custom	100%
Custom Zoom	Set the Zoom	From 100% to 400%	
Zoom H-Pan		0 to 31	16
Zoom V-Pan		0 to 31	16

1 Values may change according to the firmware version (you can download the up-to-date firmware version from our Web site at http://www.kramerelectronics.com)

2 For the most updated resolution list, go to our Web site at http://www.kramerelectronics.com

3 Any change in the resolution must be confirmed via the count-down message that appears on the screen

4 From Custom 1 to Custom 4

5 The best possible compromise between the input and the output aspect ratios

6 If the input ≤ output, scale up the picture. If the input ≥ output, scale down the picture

7 If the input ≤ output, display with a blank border. If the input ≥ output, crop the image

8 Available when selecting Custom aspect ratio

8.4 The PIP Screen

Figure 12 and Table 8 define the PIP screen.

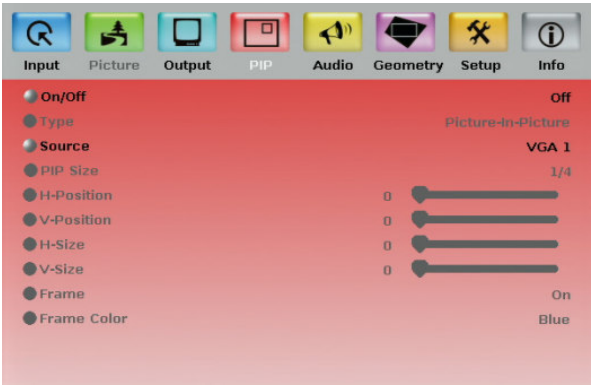


Figure 12: PIP Screen

Table 8: PIP Screen Functions[1]

Setting	Function	Selection/Range	Default
On/Off	Activate/deactivate the PIP feature	On/Off	Off
Type	Select the PIP type	Picture-In-Picture, Picture + Picture[2] or Split	Picture-In-Picture
Source	Select the PIP source[3]	See Table 3	
PIP Size	Select the PIP size	1/25, 1/16, 1/9, 1/4, or Custom	1/4
H-Position	Set the horizontal position of the PIP on the display	0 – 128	3
V-Position	Set the vertical position of the PIP on the display	0 – 128	0
H-Size	Set custom size	0 – 32	
V-Size	Set custom size	0 – 32	
Frame	Turn the PIP frame on or off	On/Off	On
Frame Color	Select the color of the PIP frame	Red, Green or Blue	Blue

1 Values may change according to the firmware version (you can download the up-to-date firmware version from our Web site at http://www.kramerelectronics.com)

2 Maintains the aspect ratio

3 When changing the PIP source, the display fades through black

8.5 The Audio Screen

Figure 13 and Table 9 define the Audio screen.

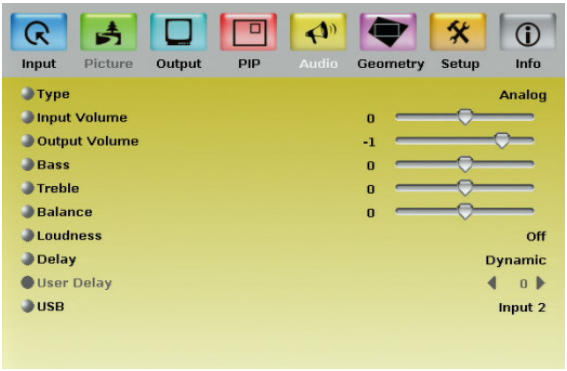


Figure 13: Audio Screen

Table 9: Audio Screen Functions[1]

Setting	Function	Selection/Range	Default
Type	Select the audio input type[2]	Analog or S/PDIF	Analog
Input Volume	Adjust the input volume	-22 to 22	0
Output Volume	Adjust the output volume	-100 to 24	0
Bass	Adjust the bass	-36 to 36	0
Treble	Adjust the treble	-36 to 36	0
Balance	Adjust the balance	-10 to 10	0
Loudness	Set the loudness	On/Off	Off
Delay	Define the delay type	Dynamic or User Define	Dynamic[3]
User Delay	Available when selecting the User Defined delay	0 to 340[4] (msec)	0
USB	Select the audio signal to follow the USB signal	No Audio, Input 1, Input 2, Input 3, Input 4, VGA 1, VGA 2, HDMI 1 or HDMI 2	No Audio

1 Values may change according to the firmware version (you can download the up-to-date firmware version from our Web site at http://www.kramerelectronics.com)

2 Available for IN 1 to IN 4

3 Dynamic means that the audio delay is equal to the pipeline video delay

4 In 2msec steps

8.6 The Geometry Screen

Figure 14 and Table 10 define the Geometry screen, allowing the user flexibility in positioning his projector relative to the screening surface.

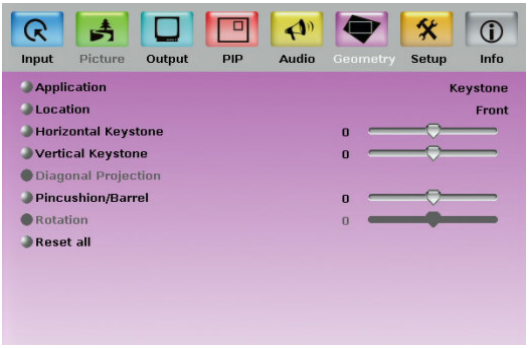


Figure 14: Geometry Screen

Table 10: Geometry Screen Functions[1]

Setting	Function	Selection/Range	Default
Application	Select the output application	Keystone, Anyplace or Rotation	Keystone
Location	Select the location of the display	Front, Rear, Ceiling or Rear ceiling	Front
Horizontal Keystone	Adjust the horizontal keystone[2]	-40 to 40	0
Vertical Keystone	Adjust the vertical keystone[3]	-30 to 30	0
Diagonal Projection	Move the location of each corner of the display separately	Top Left, Top Right, Bottom Left, Bottom Right or Reset (to reset diagonal projections settings)	Top Left
Pincushion/Barrel	Adjust the pincushion or barrel appearance of the screen	-20 to 20	0
Rotation	Rotate the display by 180 degrees clockwise or counterclockwise	-180 to 180	0
Reset all	Resets the geometry values to their default value		

Table 11 defines the settings available for each application:

Table 11: Available Settings for Each Application

Application	Available Settings
Keystone	Location, horizontal keystone, vertical keystone, pincushion/barrel and Reset all
Anyplace	Location, Diagonal Projection and Reset all
Rotation	Location, pincushion/barrel, Rotation and Reset all

1 Values may change according to the firmware version (you can download the up-to-date firmware version from our Web site at http://www.kramerelectronics.com)

2 If the projector is located at an angle to the left or right of the screen

3 If the projector is located at an angle above or below the screen

8.7 The Setup Screen

Figure 15 and Table 10 define the Setup screen.

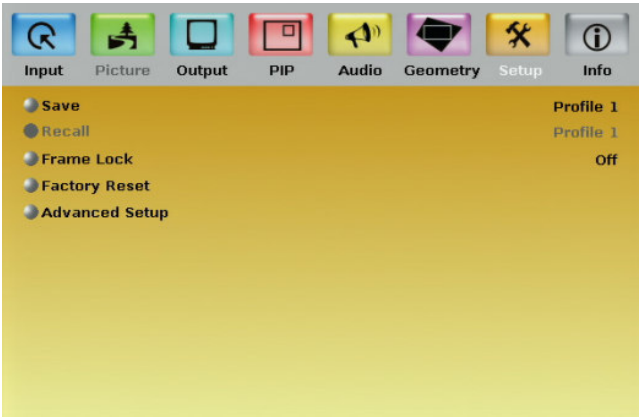


Figure 15: Setup Screen

Table 12: Setup Screen Functions

Setting	Function	Selection/Range	Default
Save	Save a profile	From Profile 1 to Profile 8	
Recall	Recall a profile	From Profile 1 to Profile 8	
Frame Lock	Locks the vertical refresh rate of the output to that of the input[1]	On/Off	Off
Factory Reset	Reset your **VP-728** to its preset default settings	Yes/No	
Advanced Setup:	Open the advanced setups (see Figure 16)	Mode Set (see Table 13) OSD (see Table 14) Misc (see Table 15.) Input (see Table 16) Output (see Table 17)	

1 Note that seamless switching is not possible when working in the Frame Lock mode unless all sources are frame synchronized

8.7.1 The Advanced Setup Screen

Figure 16 and Table 14 to Table 17 (inclusive) define the Advanced Setup screen.

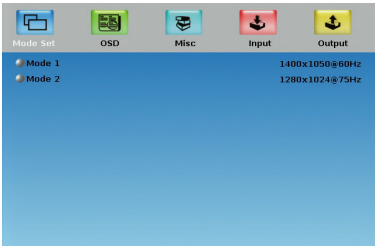


Figure 16: Advanced Setup Screen

The Mode Set functions define the desired working resolution and refresh rate when the system cannot distinguish between similar resolutions and refresh rate values (see Table 13).

Table 13: Mode Set Functions

Setting	Function	Selection/Range	Default
Mode 1[1]	Set mode 1	1400x1050x60Hz 1680x1050x60Hz	1400x1050x60Hz
Mode 2[1]	Set mode 2	1280x1024x75Hz 1280x1024x76Hz	1280x1024x75Hz

Table 14: OSD Functions

Setting	Function	Selection/Range	Default
Menu Position	Set the location of the OSD menu	Center, Top Left, Top Right, Bottom Left, Bottom Right	Center
Time Out (sec)	Set the OSD menu timeout	5, 10, 20, 30, 60, 90 or Off	30

Figure 17 and Table 15 define the Misc Setup screen.

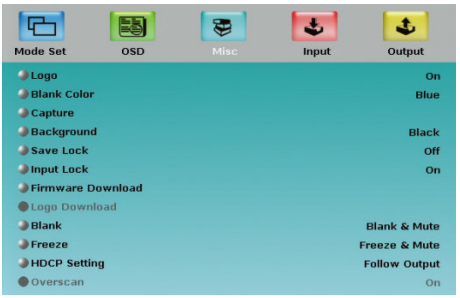


Figure 17: Misc Setup Screen

1 Since both resolutions have the same number of lines, we can define for the unit to identify the above resolutions as 1400x1050 or as 1680x1050

Table 15: Misc Functions

Setting	Function	Selection/Range	Default
Logo	Choose ON for the start up logo to appear on the screen OFF for it not to appear Set to Custom to download a custom Logo[1] (Flash ROM)	On, Off or Custom	Kramer Logo
Blank Color	Set the blank color (the color that appears on the screen when the blank button is pressed)	Black or Blue	Blue
Capture	Press to capture the desired image input[2] to Flash ROM for using as a logo or as the background if the Background setting is set to Custom	Prompts "Capture" If the image size is not within the definition, prompts "Size Too Big"	
Background	Set the background screen color if an input without a signal is selected	Blue, Black, Custom[1] or Disable Analog Sync[3]	Default
Save Lock	Set the Save Lock option to ON to save the lock status when the machine is powered down	On/Off	Off
Input Lock	Set the Input Lock to OFF so you can still use the SOURCE buttons on the front panel even when the lock button is on	On/Off	On
Firmware Download	Download the firmware via the USB connection	Confirmation	
Logo Download	Download a new logo via the USB connection		
Blank	Define the function of the BLANK front panel button	Blank & Mute, Blank, Mute	Blank & Mute
Freeze	Define the function of the FREEZE front panel button	Freeze & Mute, Freeze, Mute	Freeze & Mute
HDCP Setting	Define whether the HDCP will follow the input or the output	Follow Input[4], Follow Output[5]	Monitor
Overscan	Allows stretching of the outputted	On, Off	Off

1 Obtained via the Capture function or downloaded via USB

2 The capture image size should not exceed 1280x1024

3 When selected, if an input is not connected for over 2 minutes, will cause the output SYNC to turn Off

4 When Follow Input is selected, the Scaler changes its HDCP output setting (for the HDMI output) according to the HDCP of the input. This option is recommended when the HDMI Scaler output is connected to a splitter/switcher (in this mode, switching may not be glitch-free)

5 When Follow Output is selected, the Scaler matches its HDCP output to the HDCP setting of the HDMI acceptor to which it is connected. This ensures smooth switching, regardless of the input

Table 16: Input Functions

Setting	Function	Range	Default
Custom Input	Custom Input	Custom 1 to custom 4	Custom 1
HT	Horizontal Total		1344
HW	Horizontal sync pulse width		136
HS	Horizontal active start point		296
HA	Horizontal active region		1024
HP	Horizontal polarity		
VT	Vertical Total		806
VW	Vertical sync pulse width		6
VS	Vertical active start point		35
VA	Vertical active region		768
VP	Vertical polarity		
OCLK	Output clock		65
Enable	Set to On to enable parameter change		Off
Save	Apply settings		N/A

Table 17: Output Functions

Setting	Function	Range	Default
Custom Output	Custom 1 to Custom 4	Custom 1	
HT	Horizontal total		1344
HW	Horizontal sync pulse width		136
HS	Horizontal active start point		296
HA	Horizontal active region		1024
HP	Horizontal polarity		
VT	Vertical total		806
VW	Vertical sync pulse width		6
VS	Vertical active start point		35
VA	Vertical active region		768
VP	Vertical polarity		
OCLK	Output clock		65
Apply	Press to apply the settings		
Save	Save setup		
Set Current	Import the values of the currently selected output resolution into the User Mode Setting		N/A

8.8 Verifying Configuration Details via the Info Screen

From the Information screen (see Figure 18), you can verify the main source, PIP source, the output resolution, the SYNC mode, as well as the firmware revision and the audio board firmware version (for example, 2.2 in Figure 18):

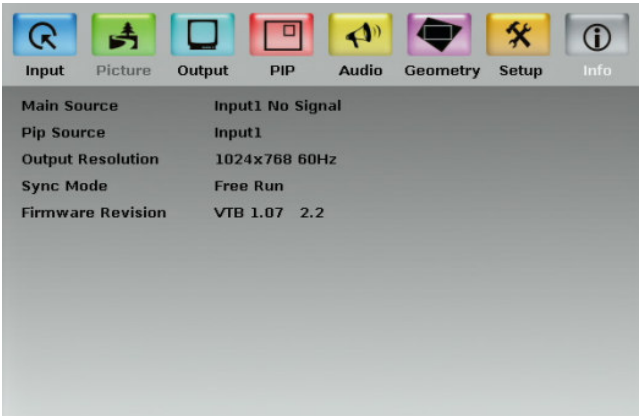


Figure 18: Information Screen

9 Using Text Overlay

The text overlay feature is accessed via the Application Program (AP)[1].

Running this AP with the PC connected to the **VP-728** lets you display text over the screen, with features including text color and speed, transparency, text position and repetition. Current text overlay settings can be saved and loaded to the AP.

Figure 19 and Table 18 define the Text Overlay Application Screen:

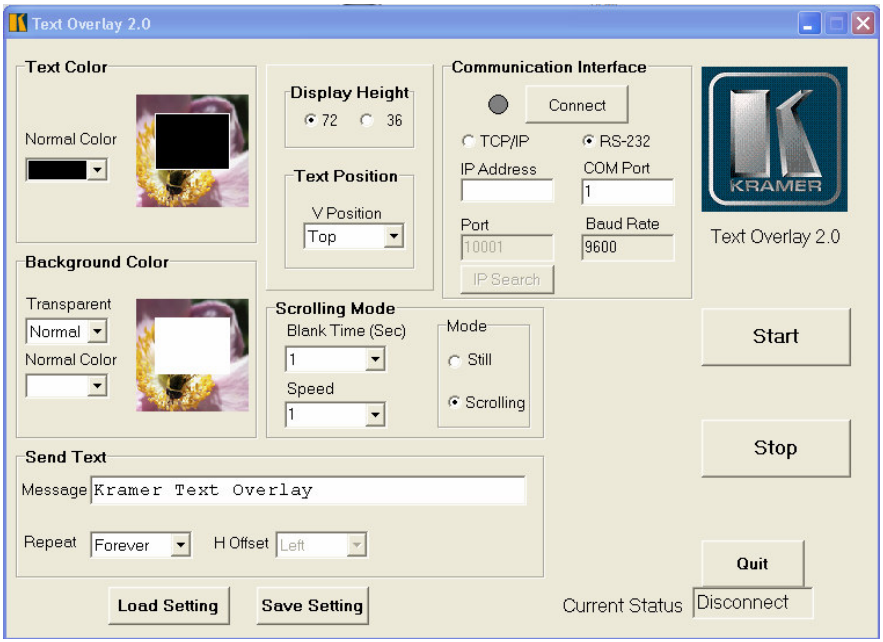


Figure 19: TextOverlay Application Screen

1 You can download it from our Web site: http://www.kramerelectronics.com

Table 18: Features and Functions of the TextOverlay Application

Feature		Function
Text Color Area		Select the Text color from the Normal Color
Background Color Area		Set the text background to be normal or transparent and select the background color
Display Height Check Box		Set the thickness of the background stripe (72 or 36)
Text Position – V-Position		Set the vertical position of the text background on the display screen (Top, Center or Bottom)
Communication Interface	*Connect/ Disconnect*	Connect the machine or disconnect
	TCP/IP Check box	N/A
	RS-232 Check box	When selected, set the *COM port* and *Baud Rate* (9600) to connect via the RS-232 connector
Scrolling Mode	*Blank Time*	Set the blank delay time (from 1 to 5)
	Speed	Set the speed at which the text moves on the display (from 1 to 5)
	Mode	Set to *Still* (fixed text) or *Scrolling* (text moves across the display)
Send Text	*Message*	Type the desired text in the *Message* box
	Repeat	Set the number of times that the text message will scroll across the screen[1] (1 to 20), or set to *Forever* to repeat the text message continuously
	H-Offset	After selecting the *Static* mode, use the *H-Offset* box to select the horizontal position of the text (Left Center or Right)
Load Setting		Click to load a previously saved setting
Save Setting		Click to save the current setting
Quit		Closes the program
Current Status		Shows the current status
Start		Click to display the text on screen
Stop		Click to stop scrolling on screen
Quit		Click to quit the program

1 For example, set to 2 to repeat the text twice

10 Technical Specifications

Table 19 includes the technical specifications:

Table 19: Technical Specifications[1] of the VP-728 Presentation Switchers / Scaler

INPUTS:	4 x universal Y/CV, Pb/C, Pr (composite, s-Video and component) 1 Vpp/75Ω on RCA connectors; 2 x UXGA on an 15-pin HD connector (VGA through UXGA) 2 x HDMI connectors 1 x USB connector For each universal input there is a corresponding (unbalanced) audio stereo input and digital S/PDIF input on RCA connectors For each UXGA input there is a corresponding (unbalanced) audio stereo input on a 3.5mm mini jack connector
OUTPUTS:	1 HDMI connector 1 UXGA format on an 15-pin HD connector 1 unbalanced audio stereo output on RCA connectors 1 digital S/PDIF output on an RCA connector
COMPLIANCE WITH HDMI STANDARD:	Supports HDMI 1.3 and HDCP
OUTPUT RESOLUTIONS[2]:	Native HDMI, 640x480x60Hz, 640x480x75Hz, 800x600x50Hz, 800x600x60Hz, 800x600x75Hz, 1024x768x50Hz, 1024x768x60Hz, 1024x768x75Hz, 1280x768x50Hz, 1280x768x60Hz, 1280x720x60Hz, 1280x800x60Hz, 1280x1024x50Hz, 1280x1024x60Hz, 1280x1024x75Hz, 1366x768x50Hz, 1366x768x60Hz, 1400x1050x50Hz, 1400x1050x60Hz, 1600x1200x50Hz, 1600x1200x60Hz, 1680x1050x60Hz, 1920x1080x60Hz, 1920x1200x60Hz, 480px60Hz, 576px60Hz, 720px50Hz, 720px60Hz, 1080ix50Hz, 1080ix60Hz, 1080px50Hz, 1080px60Hz, or Custom[3]
CONTROL:	Front panel buttons / OSD, IR remote control, RS-232 on a 9-pin D-sub connector, Picture-In-Picture: Video in Graphics (or vice versa) in any size and at any location, PIP or Split Screen (2 images side-by-side)
ADDITIONAL CONTROLS:	Freeze, zoom, different selectable vertical refresh rates, Video and Audio ProcAmp control, output image scaling and aspect ratio change
POWER SOURCE:	100-240 VAC, 50/60 Hz, 30VA automatic power supply
DIMENSIONS:	19" (W), 9.3" (D) 1U (H) rack mountable
WEIGHT:	3kg (6.6lbs.) approx.
ACCESSORIES:	Null modem adapter, IR remote control, power cord

1 Specifications are subject to change without notice

2 For the most updated resolution list, go to our Web site at http://www.kramerelectronics.com

3 From Custom 1 to Custom 4

Table 20: Technical Specifications of the RGBHV / RGBS (PC) / RGsB (PC) Signal[1]

Resolution	Vertical Frequency (Hz)	Notes	Resolution	Vertical Frequency (Hz)	Notes
640x480	60		1152x864	75	
640x480	67	Mac13	1152x870	75	Mac21
640x480	72		1152x900	66	Sun
640x480	75		1152x900	76	Sun
640x480	85		1280x720	60	
720x400	70		1280x800	60	
720x400	85		1280x960	60	
800x600	56		1280x960	85	
800x600	60		1280x768	60	
800x600	72		1280x1024	60	
800x600	75		1280x1024	75	
800x600	85		1280x1024	76	Sun
832x624	75	Mac16	1280x1024	85	
1024x768	60		1400x1050	60	
1024x768	70		1400x1050	75	
1024x768	75		1600x1200	60	
1024x768	75	Mac19	1680x1050	60	
1024x768	85		1920x1080	60	
1024x800	84	Sun	1920x1200	60	

Table 21: Technical Specifications of the DVI Signal (for RGB Colorspace)

Resolution	Vertical Frequency (Hz)	Notes	Resolution	Vertical Frequency (Hz)	Notes
640x480	60		1152x864	75	
640x480	67	Mac13	1152x870	75	Mac21
640x480	72		1152x900	66	Sun
640x480	75		1152x900	76	Sun
640x480	85		1280x720	60	
720x400	70		1280x800	60	
720x400	85		1280x960	60	
800x600	56		1280x960	85	
800x600	60		1280x768	60	
800x600	72		1280x1024	60	
800x600	75		1280x1024	75	
800x600	85		1280x1024	76	Sun
832x624	75	Mac16	1280x1024	85	
1024x768	60		1400x1050	60	
1024x768	70		1400x1050	75	
1024x768	75		1600x1200	60	
1024x768	75	Mac19	1680x1050	60	
1024x768	85		1920x1200	60	
1024x800	84	Sun			

1 For the most updated resolution list, go to our Web site at http://www.kramerelectronics.com

Table 22: Technical Specifications of the Y/C, Video Signal

Standard	NTSC, NTSC4.43, PAL, PAL-M, PAL-N, SECAM, PAL-60

Table 23: Technical Specifications of the HDMI Signal (for RGB or YUV Colorspace)

Resolution	Vertical Frequency (Hz)	Remark
1080i	60	YPbPr
1080i	50	YPbPr
1080p	60	YPbPr
1080p	50	YPbPr
1080P	24fps	YPbPr
720p	60	YPbPr
720p	50	YPbPr
480i	60	YPbPr
480p	60	YPbPr
576i	50	YPbPr
576p	50	YPbPr

Table 24: Technical Specifications of the Component Input Signal

Resolution	Vertical Frequency (Hz)	Remark
1080i	60	YPbPr
1080i	50	YPbPr
1080p	60	YPbPr
1080p	50	YPbPr
720p	60	YPbPr
720p	50	YPbPr
480i	60	YPbPr
480p	60	YPbPr
576i	50	YPbPr
576p	50	YPbPr

Table 25: Technical Specifications of the RGBHV/Comp/YPbPr Output Signal

Resolution	Vertical Frequency (Hz)
640x480	60
640x480	75
800x600	50
800x600	60
800x600	75
1024x768	50
1024x768	60
1024x768	75
1280x720	60
1280x768	50
1280x768	60
1280x800	60
1280x1024	50
1280x1024	60
1280x1024	75
1366x768	50
1366x768	60
1400x1050	50
1400x1050	60
1600x1200	50
1600x1200	60
1920x1080	60
1920x1200	60
1680x1050	60
1080i	60
1080i	50
720p	60
720p	50
480p	60
576p	50
1080p	50
1080p	60

Table 26: Technical Specifications of the HDMI/DVI/RGB Output Signal

Resolution	Vertical Frequency (Hz)
640x480	60
640x480	75
800x600	50
800x600	60
800x600	75
1024x768	50
1024x768	60
1024x768	75
1280x720	60
1280x768	50
1280x768	60
1280x800	60
1280x1024	50
1280x1024	60
1280x1024	75
1366x768	50
1366x768	60
1400x1050	50
1400x1050	60
1600x1200	50
1600x1200	60
1920x1080	60
1920x1200	60
1680x1050	60
1080i	60
1080i	50
720p	60
720p	50
480p	60
576p	50
1080p	50
1080p	60

11 VP-728 Communication Protocol

Serial Configuration:

Baud rate: 9600 (Bits per second)

Data bits: 8bits

Parity: None

Stop bits: 1bit

Communication confirmation:

Send: CR

Reply: CR>

Set Command:

Send: Y■Control_Type■Function■Param■CR

Reply: Z■Control_Type■Function■Param■CR>

Get Command:

Send: Y■Control_Type■Function■CR

Reply: Z■Control_Type■Function■Param■CR>

Example: set Input 1 Source Type to Component

Send: Y■0■0■0■CR

Reply: Z■0■0■0■CR>

Example: get current Input 1 Source Type

Send: Y■1■0■CR

Reply: Z■1■0■0■CR >

Definition:

■: ASCII Code 0x20

CR: Ascii Code 0x0D

Go to our Web site at http://www.kramerelectronics.com to check for the latest **VP-728** communication protocol

Control Type		Function	Parameter	Description
Set	Get			
0	1	0	0: Input 1 1: Input 2 2: Input 3 3: Input 4 4: VGA 1 5: VGA 2 6: HDMI 1 7: HDMI 2 8: USB	Input Source
0	1	1	0: Component 1: YC 2: Video	Input 1 Source Type
0	1	2	0: Component 1: YC 2: Video	Input 2 Source Type
0	1	3	0: Component 1: YC 2: Video	Input 3 Source Type
0	1	4	0: Component 1: YC 2: Video	Input 4 Source Type
0	1	5	0: Auto 1: RGB 2: YUV	Input Color Format
0	1	6	0: Auto 1: NTSC 2: PAL 3: PAL-M 4: PAL-N 5: NTSC 4.43 6: SECAM 7: PAL-60	Input Video Standard
0	1	7	1 ~ 50	Input H-Position
0	1	8	2 ~ 50	Input V-Position
0	1	9	0 ~ 50	Input Frequency
0	1	10	0 ~ 31	Input Phase
0	-	11	N/A	Input Auto Image
0	1	12	0~100	Picture Brightness
0	1	13	0~100	Picture Contrast
0	1	14	0~100	Picture Color
0	1	15	0~360	Picture Hue
0	1	16	0~100	Picture Sharpness
0	1	17	0: Gamma 1 1: Gamma 2 2: Gamma 3 3: Gamma 4 4: Gamma 5	Picture Output Gamma
0	1	18	0: Auto 1: Video 2: Film	Picture Film Mode

Control Type		Function	Parameter	Description
Set	Get			
0	1	19	0: Off 1: Low 2: Medium 3: High	Picture Temporal NR
0	1	20	0: Off 1: Low 2: Medium 3: High	Picture Mosquito NR
0	1	21	0: Off 1: On	Picture Block NR
0	1	22	0: Off 1: Low 2: Medium 3: High	Picture Detail Enhancement
0	1	23	0: Off 1: Low 2: High	Picture Luma Transition Enhance
0	1	24	0: Off 1: Low 2: High	Picture Chroma Transition Enhance
0	1	25	0 : Native HDMI 1 : 640x480@60Hz 2 : 640x480@75Hz 3 : 800x600@50Hz 4 : 800x600@60Hz 5 : 800x600@75Hz 6 : 1024x768@50Hz 7 : 1024x768@60Hz 8 : 1024x768@75Hz 9 : 1280x768@50Hz 10: 1280x768@60Hz 11: 1280x720@60Hz 12: 1280x800@60Hz 13: 1280x1024@50Hz 14: 1280x1024@60Hz 15: 1280x1024@75Hz 16: 1366x768@50Hz 17: 1366x768@60Hz 18: 1400x1050@50Hz 19: 1400x1050@60Hz 20: 1600x1200@50Hz 21: 1600x1200@60Hz 22: 1680x1050@60Hz 23: 1920x1080@60Hz 24: 1920x1200@60Hz 25: 480p@60Hz 26: 576p@60Hz 27: 720p@50Hz 28: 720p@60Hz 29: 1080i@50Hz 30: 1080i@60Hz 31: 1080p@50Hz	Output Resolution

Control Type		Function	Parameter	Description
Set	Get			
			32: 1080p@60Hz 96: Custom1 97: Custom2 98: Custom3 99: Custom4	
0	1	26	0: Auto 1: HDMI 2: DVI	Output HDMI Type
0	1	27	0: Best Fit 1: Letterbox 2: Follow Output 3: Virtual Wide 4: Follow Input 5: Custom	Aspect Ratio
0	1	28	-16 ~ 16	H-Pan
0	1	29	-16 ~ 16	V-Pan
0	1	30	-8 ~ 8	H-Zoom
0	1	31	-8 ~ 8	V-Zoom
0	1	32	0: 100% 1: 150% 2: 200% 3: 225% 4: 250% 5: 275% 6: 300% 7: 325% 8: 350% 9: 375% 10: 400% 11: Custom	Zoom
0	1	33	0 ~ 32	Custom Zoom
0	1	34	0 ~ 31	Zoom H-Pan
0	1	35	0 ~ 31	Zoom V-Pan
0	1	36	0: Off 1: On	PIP On/Off
0	1	37	0: Picture-In-Picture 1: Picture + Picture 2: Split	PIP Type
0	1	38	0: Input 1 1: Input 2 2: Input 3 3: Input 4 4: VGA 1 5: VGA 2 6: HDMI 1 7: HDMI 2	PIP Source
0	1	39	0: 1/25 1: 1/16 2: 1/9 3: 1/4 4: Custom	PIP Size
0	1	40	0 ~ 128	PIP H-Position
0	1	41	0 ~ 128	PIP V-Position

Control Type		Function	Parameter	Description
Set	Get			
0	1	42	0 ~ 32	PIP H-Size
0	1	43	0 ~ 32	PIP V-Size
0	1	44	0: Off 1: On	PIP Frame
0	1	45	0: Red 1: Green 2: Blue	PIP Frame Color
0	1	46	0: Analog 1: S/PDIF	Audio Input Type
0	1	47	-22~0~+22	Audio Input Volume
0	1	48	-100~24	Audio Output Volume
0	-		111	Volume Up
0	-		-111	Volume Down
0	1	49	-36~0~+36	Audio Bass
0	1	50	-36~0~+36	Audio Treble
0	1	51	-10~10	Audio Balance
0	1	52	0: Off 1: On	Audio Loudness
0	1	53	0: Dynamic 1: User Define	Audio Delay
	1	54	0~340 (2msec steps)	User Delay
0	1	55	0: No audio 1: Input 1 2: Input 2 3: Input 3 4: Input 4 5: VGA1 6: VGA2 7: HDMI1 8: HDMI2	Audio Input For USB
0	1	56	0: Keystone 1: Anyplace 2: Rotation	Geometry Application
0	1	57	0: Front 1: Ceiling 2: Rear 3: Rear ceiling	Geometry Location
0	1	58	-40 ~ 40	Geometry Horizontal Keystone
0	1	59	-30~30	Geometry Vertical Keystone
0	1	60	-2000~2000	Geometry Diagonal Projection – Top Left H
0	1	61	-2000~2000	Geometry Diagonal Projection – Top Left V
0	1	62	-2000~2000	Geometry Diagonal Projection – Top Right H
0	1	63	-2000~2000	Geometry Diagonal Projection – Top Right V
0	1	64	-2000~2000	Geometry Diagonal Projection – Bottom Left H
0	1	65	-2000~2000	Geometry Diagonal Projection – Bottom Left V
0	1	66	-2000~2000	Geometry Diagonal Projection – Bottom Right H
0	1	67	-2000~2000	Geometry Diagonal Projection – Bottom Right V
0	-	68	N/A	Geometry Diagonal Projection – Reset
0	1	69	-20 ~ 20	Geometry Pincushion/Barrel
0	1	70	-180 ~ 180	Geometry Rotation

Control Type		Function	Parameter	Description
Set	Get			
0	-	71	N/A	Geometry Reset all
0	-	72	0: Profile 1 1: Profile 2 2: Profile 3 3: Profile 4 4: Profile 5 5: Profile 6 6: Profile 7 7: Profile 8	Save Setting
0	-	73	0: Profile 1 1: Profile 2 2: Profile 3 3: Profile 4 4: Profile 5 5: Profile 6 6: Profile 7 7: Profile 8	Recall Setting
0	1	74	0: Off 1: On	Frame Lock
0	-	75	N/A	Factory Reset
-	1	76	N/A	Firmware Revision
0	1	77	0: 1400x1050x60 1: 1680x1050x60	Mode Set – Mode 1
0	1	78	0: 1280x1024x75 1: 1280x1024x76	Mode Set – Mode 2
0	1	79	0: Center 1: Top Left 2: Top Right 3: Bottom Left 4: Bottom Right	OSD Menu Position
0	1	80	0: 5 sec 1: 10 sec 2: 20 sec 3: 30 sec 4: 60 sec 5: 90 sec 6: Off	OSD Time Out
0	1	81	0: Off 1: On 2: Custom	Logo
0	1	82	0: Black 1: Blue	Blank Color
0	-	83	N/A	Capture
0	1	84	0: Black 1: Blue 2: Custom 3: Disable Analog Sync	Background
0	1	85	0: Off 1: On	Save Lock
0	1	86	0: Off 1: On	Input Lock

Control Type		Function	Parameter	Description
Set	Get			
0	1	87	0: Blank & Mute 1: Blank 2: Mute	Blank key function
0	1	88	0: Freeze & Mute 1: Freeze 2: Mute	Freeze key function
0	1	89	0: Off 1: On	Freeze
0	1	90	0: Off 1: On	Blank
0	1	91	0: Off 1: On	Power
0	-	92	N/A	Info
0	-	93	N/A	Menu
0	-	94	N/A	Top
0	-	95	N/A	Down
0	-	96	N/A	Left
0	-	97	N/A	Right
0	-	98	N/A	Enter
0	-	99	N/A	Picture
0	-	100	N/A	Swap
0	1	101	0: Off 1: On	Mute
0	1	102	0: Off 1: On	Lock
-	1	103	0: 640x480 60 1: 640x480 67 Mac13 2: 640x480 72 3: 640x480 75 4: 640x480 85 5: 720x400 70 6: 720x400 85 7: 800x600 56 8: 800x600 60 9: 800x600 72 10: 800x600 75 11: 800x600 85 12: 832x624 75 Mac16 13: 1024x768 60 14: 1024x768 70 15: 1024x768 75 16: 1024x768 75 Mac19 17: 1024x768 85 18: 1024x800 84 Sun 19: 1152x864 75 20: 1152x870 75 Mac21 21: 1152x900 66 Sun 22: 1152x900 76 Sun 23: 1280x960 60 24: 1280x960 85 25: 1280x768 60	Main Input status

Control Type		Function	Parameter	Description
Set	Get			
			26: 1280x1024 60 27: 1280x1024 75 28: 1280x1024 76 Sun 29: 1280x1024 85 30: 1400x1050 60 31: 1400x1050 75 32: 1600x1200 60 33: 1680x1050 60 34: 1080i 60 35: 1080i 50 36: 1080p 60 37: 1080p 50 38: 720p 60 39: 720p 50 40: 480i 41: 480p 42: 576i 43: 576p 44: 1280x800 60 (Reduce blank) 45: 1920x1200 60 46: 1920x1080 60 47: 1280x720 60 48: 1080p 24 49: 1280x800 60 97: Custom 98: other 99: No Input detected 101: NTSC 102: PAL 103: PAL-M 104: PAL-N 105: NTSC 4.43 106: SECAM 107: PAL-60	
-	1	104	0: 640x480 60 1: 640x480 67 Mac13 2: 640x480 72 3: 640x480 75 4: 640x480 85 5: 720x400 70 6: 720x400 85 7: 800x600 56 8: 800x600 60 9: 800x600 72 10: 800x600 75 11: 800x600 85 12: 832x624 75 Mac16 13: 1024x768 60 14: 1024x768 70 15: 1024x768 75 16: 1024x768 75 Mac19 17: 1024x768 85	PIP Input status

Control Type		Function	Parameter	Description
Set	Get			
			18: 1024x800 84 Sun 19: 1152x864 75 20: 1152x870 75 Mac21 21: 1152x900 66 Sun 22: 1152x900 76 Sun 23: 1280x960 60 24: 1280x960 85 25: 1280x768 60 26: 1280x1024 60 27: 1280x1024 75 28: 1280x1024 76 Sun 29: 1280x1024 85 30: 1400x1050 60 31: 1400x1050 75 32: 1600x1200 60 33: 1680x1050 60 34: 1080i 60 35: 1080i 50 36: 1080p 60 37: 1080p 50 38: 720p 60 39: 720p 50 40: 480i 41: 480p 42: 576i 43: 576p 44: 1280x800 60 (Reduce blank) 45: 1920x1200 60 46: 1920x1080 60 47: 1280x720 60 48: 1080p 24 49: 1280x800 60 97: Custom 98: other 99: No Input detected 101: NTSC 102: PAL 103: PAL-M 104: PAL-N 105: NTSC 4.43 106: SECAM 107: PAL-60	
0	1	105	512~3071	Advance Input Mode: HT
0	1	106	32~(HS-48)	Advance Input Mode: HW
0	1	107	80~(HT-HA-12)	Advance Input Mode: HS
0	1	108	640~1920 <= (HT-92)	Advance Input Mode: HA
0	1	109	0: Negative polarity 1: Positive polarity	Advance Input Mode: HP
0	1	110	384~2047	Advance Input Mode: VT
0	1	111	2~(HS-13)	Advance Input Mode: VW

Control Type		Function	Parameter	Description
Set	Get			
0	1	112	15~(VT-VA-1)	Advance Input Mode: VS
0	1	113	480~1200 <= (VT-16)	Advance Input Mode: VA
0	1	114	0: Negative polarity 1: Positive polarity	Advance Input Mode: VP
0	1	115	25 < OCLK < 165	Advance Input Mode: OCLK(Integer)
0	1	116	25 < OCLK < 165	Advance Input Mode: OCLK(Decimal)
0	1	117	0: Off 1: On	Advance Input Mode: Enable
0	-	118	N/A	Advance Input Mode: Save
0	1	119	512~3071	Advance Output Mode: HT
0	1	120	32~(HS-48)	Advance Output Mode: HW
0	1	121	80~(HT-HA-12)	Advance Output Mode: HS
0	1	122	640~1920 <= (HT-92)	Advance Output Mode: HA
0	1	123	0: Negative polarity 1: Positive polarity	Advance Output Mode: HP
0	1	124	384~2047	Advance Output Mode: VT
0	1	125	2~(HS-13)	Advance Output Mode: VW
0	1	126	15~(VT-VA-1)	Advance Output Mode: VS
0	1	127	480~1200 <= (VT-16)	Advance Output Mode: VA
0	1	128	0: Negative polarity 1: Positive polarity	Advance Output Mode: VP
0	1	129	25 < OCLK < 165	Advance Output Mode: OCLK(Integer)
0	1	130	25 < OCLK < 165	Advance Output Mode: OCLK(Decimal)
0	-	131	N/A	Advance Output Mode: Save
0	-	132	N/A	Advance Output Mode: Set Current
0	-	133	N/A	Volume Up
0	-	134	n/a	Volume Down
0	1	135	0: Follow Output 1: Follow Input	HDCP Setting
0	1	136	0:Custom1 1:Custom2 2:Custom3 3:Custom4	Advance Input Mode: Custom Input
0	1	137	0:Custom1 1:Custom2 2:Custom3 3:Custom4	Advance Output Mode: Custom Output

11.1 Error Codes Description

Error code	Description
ERR 1	Unknown command
ERR 2	Unknown function
ERR 3	Unavailable function
ERR 4	Unknown control type
ERR 5	Unavailable get function
ERR 6	Unavailable set function
ERR 7	Unavailable parameter
ERR 8	Too few arguments

LIMITED WARRANTY

Kramer Electronics (hereafter *Kramer*) warrants this product free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

Labor and parts are warranted for seven years from the date of the first customer purchase.

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the Web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed, or on which the WARRANTY VOID IF TAMPERED sticker has been torn, reattached, removed or otherwise interfered with.
3. Damage, deterioration or malfunction resulting from:
   i) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
   ii) Product modification, or failure to follow instructions supplied with the product
   iii) Repair or attempted repair by anyone not authorized by Kramer
   iv) Any shipment of the product (claims must be presented to the carrier)
   v) Removal or installation of the product
   vi) Any other cause, which does not relate to a product defect
   vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

This equipment has been tested to determine compliance with the requirements of:

EN-50081:	"Electromagnetic compatibility (EMC); generic emission standard. Part 1: Residential, commercial and light industry"
EN-50082:	"Electromagnetic compatibility (EMC) generic immunity standard. Part 1: Residential, commercial and light industry environment".
CFR-47:	FCC* Rules and Regulations: Part 15: "Radio frequency devices Subpart B Unintentional radiators"

CAUTION!

- Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- Use the supplied DC power supply to feed power to the machine.
- Please use recommended interconnection cables to connect the machine to other components.

* FCC and CE approved using STP cable (for twisted pair products)

For the latest information on our products and a list of Kramer distributors, visit our Web site: www.kramerelectronics.com, where updates to this user manual may be found.
We welcome your questions, comments and feedback.

Safety Warning:
Disconnect the unit from the power supply before opening/servicing.

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P/N: 2900–000363 REV 2