

Kramer Electronics, Ltd.



USER MANUAL

Model:

VP-27

Presentation Switcher

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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 groups¹ that are clearly defined by function.

Congratulations on purchasing your Kramer **VP-27 Presentation Switcher**. This product is ideal for the following typical applications:

- Presentation and conference room systems
- Production studios, as well as rental and staging

The package includes the following items:

- **VP-27 Presentation Switcher**
- Windows®-based Kramer control software²
- Power cord³ and Rack “ears”
- Infrared remote control transmitter (including the required batteries and a separate user manual⁴) and this user manual⁴

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 cables⁵

2.1 Quick Start

This quick start chart summarizes the basic setup and operation steps.

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 Sealers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters; GROUP 11: Sierra Products

2 Download the latest software from our Web site at <http://www.kramerelectronics.com>

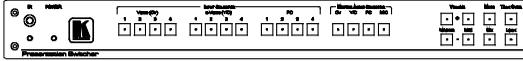
3 We recommend that you use only the power cord that is supplied with this machine

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

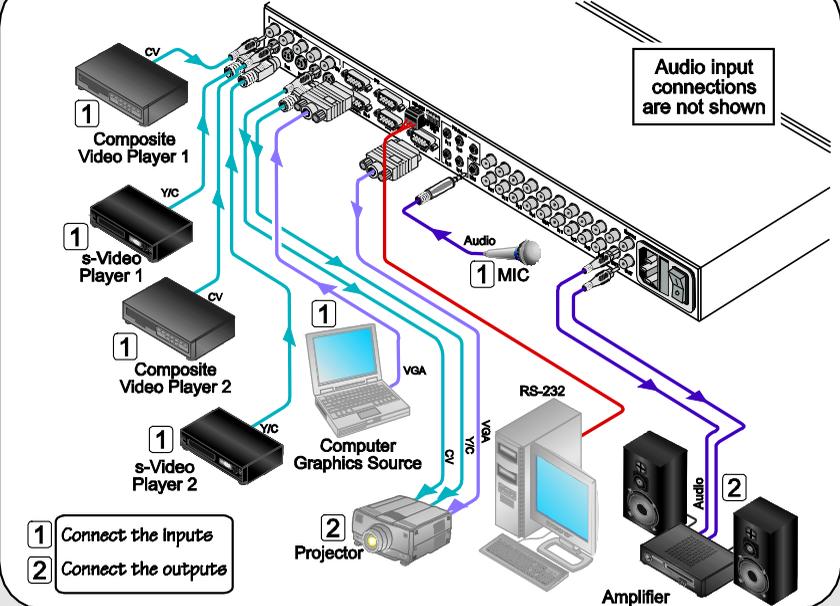
5 The complete list of Kramer cables is on our Web site at <http://www.kramerelectronics.com>

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 and outputs - see section 6

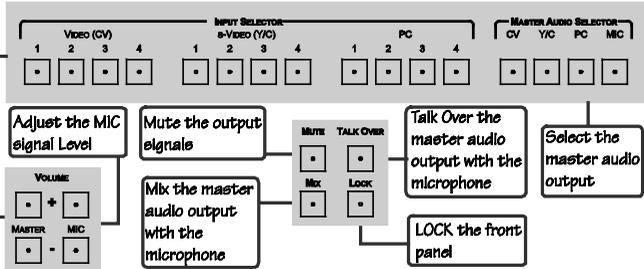


Step 3: Turn the power ON

Step 4: Operate the machine - see section 7

Select an input on each switcher group (CV, e-Video, and/or PC) to route to the appropriate output. The selected input buttons illuminate

Adjust the audio signal Level



Operate via the front panel buttons, RS-232 or the remote control transmitter

3 Overview

The **VP-27** is a high quality presentation switcher designed for a wide variety of presentation and multimedia applications. The **VP-27** combines the functions of a 4x1 switcher for composite video and audio, a 4x1 switcher for s-Video and audio, and a 4x1 switcher for computer graphics video (PC/VGA) type signals with audio.

The **VP-27** is a one-box high-performance solution for installations that would otherwise require several separate products, and is designed so that each section is controllable independently from the other sections.

The **VP-27** features:

- An additional audio switching section that routes one of the pre-selected audio inputs from the other switching sections to a separate output
- 24 selector switches and front panel control adjustment for master audio output level and microphone level, mix, mute, and talk over
- The ability to insert a microphone channel by switching, mixing, or talk-over
- A LOCK button to prevent tampering with the front panel

Control the **VP-27** via the front panel buttons or IR remote control using the Kramer infrared remote control transmitter (provided) or by RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller.

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 that may adversely influence signal quality and position your Kramer **VP-27** away from moisture, excessive sunlight and dust

4 Your VP-27 Presentation Switcher

[Figure 1](#), [Table 1](#) and [Table 2](#) define the **VP-27**.

Your VP-27 Presentation Switcher

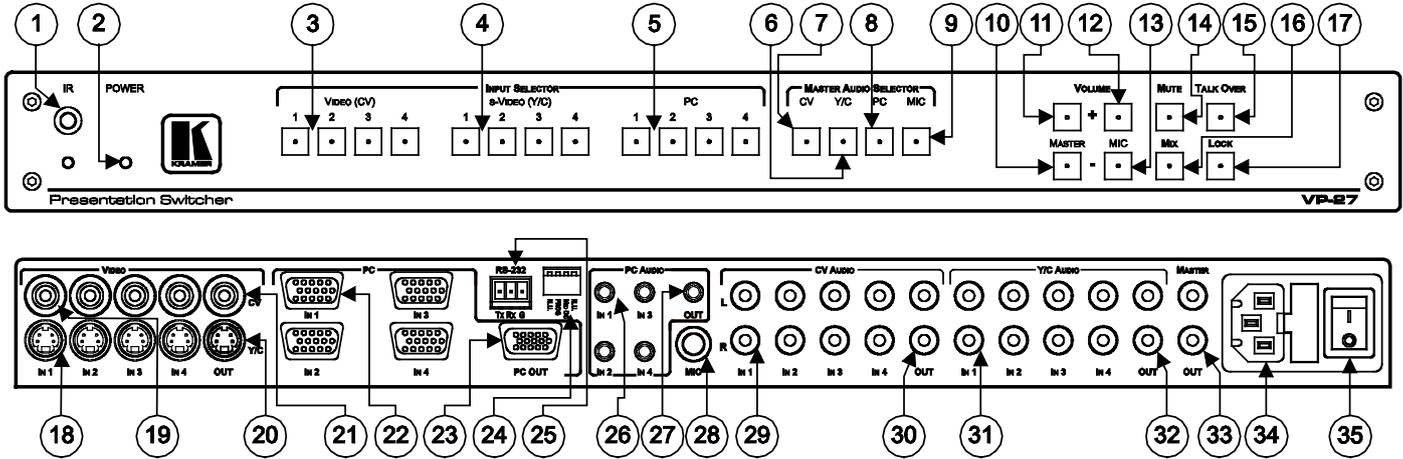


Figure 1: VP-27 Presentation Switcher

Your VP-27 Presentation Switcher

Table 1: Front Panel VP-27 Presentation Switcher Features

#	Feature		Function	
1	IR Receiver		Signals from the remote control transmitter illuminate the LED	
2	POWER LED		Lights when the unit is turned ON	
3	INPUT SELECTOR Buttons	VIDEO (CV)	Select the composite video / audio input (from 1 to 4)	
4		s-VIDEO (Y/C)	Select the s-Video / audio input (from 1 to 4)	
5		PC	Select the computer graphics video / audio input (from 1 to 4)	
6	MASTER AUDIO SELECTOR Buttons	Y/C	Press to route the selected audio signal from the s-Video section to the master audio outputs	
7		CV	Press to route the selected audio signal from the composite video section to the master audio outputs	
8		PC	Press to route the selected audio signal from the computer graphics video section to the master audio outputs	
9		MIC	Press to route the microphone input to the master audio outputs	
10	VOLUME Buttons	MASTER	-	Decrease the master audio signal level
11			+	Increase the master audio signal level
12		MIC	+	Increase the microphone audio signal level
13			-	Decrease the microphone audio signal level
14	MUTE Button		Press to disable/enable the Master Audio output	
15	TALK OVER Button		Press to toggle. When on will activate talk over function ¹	
16	MIX Button		Press to toggle. When on, will mix the microphone signal with the Master Audio output	
17	LOCK Button		Press and hold to lock/unlock the front panel buttons	

¹ With the TALK OVER button pressed in, speaking into the microphone amplifies the voice of the speaker, overriding and fading out all other audio channels. However, pressing the MIC button in the Master Audio Selector renders the Talk Over function inactive

Your VP-27 Presentation Switcher

Table 2: Rear Panel VP-27 Presentation Switcher Features

#	Feature		Function
18	Video Connectors	Y/C IN 4-pin	Connect to the s-Video sources ²
19		CV IN RCA	Connect to the composite video sources ²
20		Y/C OUT 4-pin	Connect to the s-Video acceptor
21		CV OUT RCA	Connect to the composite video acceptor
22	PC IN 15-pin HD Connectors		Connect to the VGA/UXGA video sources ²
23	PC OUT 15-pin HD Connector		Connect to the VGA/UXGA video acceptor
24	DIP-switches		DIP-switches for setup of the unit (DIP 1 and 4 are not used; DIP 2 PROG ¹ , DIP 3 MIC DC; see Section 6.2)
25	RS-232 (Tx, Rx, G) Terminal Block Connector		Connects to the PC or the Remote Controller
26	PC AUDIO IN 3.5mm Mini Plugs		Connect to the s-Video unbalanced audio sources ²
27	PC AUDIO OUT 3.5mm Mini Plug		Connect to the PC unbalanced stereo audio acceptor (for the PC video)
28	MIC 6.3mm Phone Jack Connector		Connect to the microphone
29	CV AUDIO IN RCA Connectors		Connect to the unbalanced audio sources ² of the composite video
30	CV AUDIO OUT RCA Connectors (L and R)		Connect to the composite video unbalanced audio acceptor (for the composite video)
31	Y/C AUDIO IN RCA Connectors		Connect to the s-Video unbalanced audio sources ²
32	Y/C AUDIO RCA Connectors (L and R)		Connects to the s-Video unbalanced audio acceptor (for the s-Video)
33	MASTER OUT RCA Connectors (L and R)		Connect the master unbalanced audio channel acceptor
34	Power Connector with Fuse		AC connector enabling power supply to the unit
35	POWER Switch		Illuminated switch for turning the unit ON or OFF

¹ Always set to OFF (for factory use)

² From 1 to 4

5 Installing the VP-27 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	+5° to +45° C (41° to 113° F)
Operating humidity range	10 to 90% RHL, non-condensing
Storage temperature range	-20° to +70° C (-4° to 158° F)
Storage humidity range	5 to 95% RHL, non-condensing



CAUTION!!

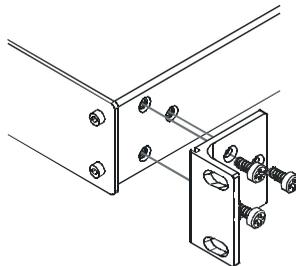
When installing in a 19" rack, avoid hazards by taking care that:

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 the VP-27 Presentation Switcher

To connect¹ the **VP-27**, as illustrated in the example in [Figure 2](#), do the following²:

1. Connect the following video sources:
 - One composite video source (for example, composite video player 1) to the CV IN 1 RCA connector
 - One composite video source (for example, a composite video player 2) to the CV IN 2 RCA connector
 - One s-Video source (for example, s-Video player 1) to the YC IN 1 4-pin connector
 - One s-Video source (for example, s-Video player 2) to the YC IN 2 4-pin connector
 - One PC source (for example, a computer graphics video source) to the PC IN 1 15-pin HD connector
2. Connect the acceptors to a projector³ as follows, the:
 - Composite video CV OUT RCA connector to the composite video input of the projector
 - s-Video YC OUT 4-pin connector to the s-Video input of the projector
 - PC OUT 15-pin HD connector to the VGA/UXGA input of the projector
3. Connect⁴ the appropriate unbalanced stereo audio sources.
4. Connect the MASTER AUDIO OUT RCA connectors to an amplifier with speakers.
5. If required, connect a microphone to the MIC 6.3mm phone jack connector and set the Mic DC switch as appropriate⁵.
6. As an option, you can connect a PC and/or controller to the RS-232 port (see [Section 6.2](#)).
7. Connect⁴ the power cord⁶.

1 Although in this example not all the sources are connected, you can connect all of the inputs, that is, twelve in total. However, you do not need to connect all the inputs and outputs

2 Switch OFF the power on each device before connecting it to your VP-27. After connecting your VP-27, switch on its power and then switch on the power on each device

3 In this example a projector is used, but you can also connect separate outputs such as displays, video recorders and so on

4 Not shown in [Figure 2](#)

5 Set to Mic DC when using a condenser microphone, see [Section 6.2](#)

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

Connecting the VP-27 Presentation Switcher

Audio input connections and mains power connection are not shown

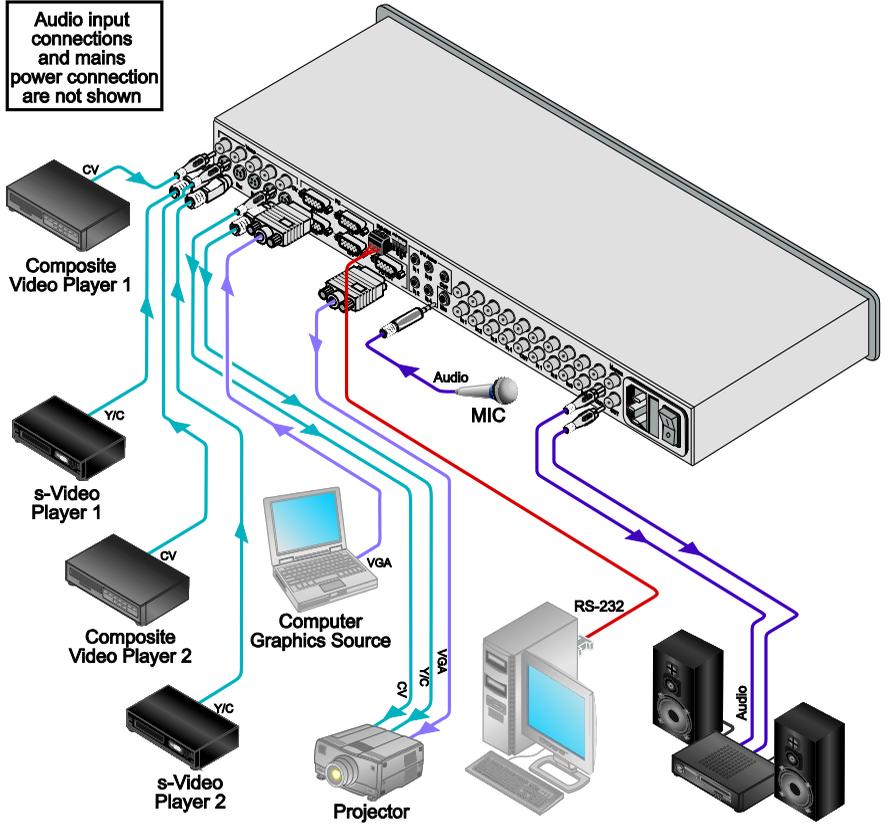


Figure 2: Connecting the VP-27

6.1 Connecting a PC

You can connect a PC (or other controller) to the **VP-27** via the RS-232 terminal block connector.

To connect a PC to a **VP-27** unit, connect the RS-232 terminal block connector on the **VP-27** unit to the RS-232 9-pin D-sub port on your PC, see [Figure 3](#):

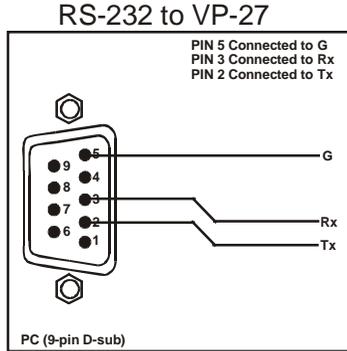


Figure 3: Connecting to a PC

6.2 DIP-switch Settings

The **VP-27** includes four DIP-switches, as [Figure 4](#) and [Table 3](#) define. Only two of the dipswitches are used:

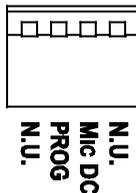


Figure 4: VP-27 Dipswitches

Table 3: Dipswitch Settings (Default Setting)

#	Function	Description
1	N.U.	Not used
2	PROG	Set to OFF (for factory use only)
3	Mic DC	Set to Mic DC when using a condenser microphone
4	N.U.	Not used

7 Operating the VP-27 Presentation Switcher

The **VP-27** operates in the audio-follow-video¹ (AFV) mode so that the audio signal follows the selected input signal.

You can select the video signals within each switcher group by pressing the relevant **INPUT SELECTOR**² buttons. You can switch:

- One³ of the four composite video **VIDEO (CV)** inputs to the composite video output
- One of the four s-Video (**Y/C**) inputs to the s-Video output
- One of the four **PC** inputs to the **PC** output of the **VP-27**

The selected button in each group is illuminated in red⁴.

An audio input can be switched to the master audio output either by pressing any **INPUT SELECTOR** (in any group) button or by selecting a **MASTER AUDIO SELECTOR** button (**CV**, **Y/C**, **PC** or **MIC**), which will route the input signal of the selected group to the master audio output.

For example:

- Press **INPUT SELECTOR** button 2 in the **PC** group to switch that input button to the master audio output
- Press **IN 1** in the **VIDEO (CV)** group to route that input to the master audio output
- If the **s-VIDEO (Y/C) IN 2** button is selected, press the **MASTER AUDIO SELECTOR Y/C** button to route that input to the master audio output

The **MUTE** and **MIX** functions can be toggled and their respective buttons on the front panel illuminate.

1 In which all operations relate to both the video and the audio channels

2 You can overlook a switcher group and choose not to select a button from it

3 You cannot select more than one button in a section

4 Pressing an illuminated button for more than 2 seconds will disconnect the output and the button will no longer illuminate

7.1 Locking the Front Panel

To prevent changing the settings accidentally or tampering with the front panel, lock your **VP-27**. Unlocking releases the protection mechanism.

To lock the **VP-27**:

- Press the LOCK button for more than 2 seconds
The LOCK button illuminates, freezing the front panel controls. Pressing a button will have no effect, except to cause the LOCK button to blink¹. Nevertheless, even though the front panel is locked you can still operate your PC control software

To unlock the **VP-27**:

- Press the illuminating LOCK button for more than 2 seconds
The **VP-27** unlocks and the LOCK button no longer illuminates

7.2 Resetting the VP-27 Presentation Switcher

Press the VIDEO (PC) INPUT 1 and INPUT 2 selector buttons to reset the **VP-27** to its factory default state.

8 Firmware Upgrade

The **VP-27** firmware is located in FLASH memory, which lets you upgrade to the latest Kramer firmware version in minutes! The process involves:

- Downloading from the Internet (see [Section 8.1](#))
- Connecting the PC to the RS-232 port (see [Section 8.2](#))
- Upgrading Firmware (see [Section 8.3](#))

8.1 Downloading from the Internet

You can download the up-to-date file from the Internet. To do so:

1. Go to our Web site and download the file: “*FlashLoader.zip*” from the Technical Support section.
2. Extract the file: “*FlashLoader.zip*” to a folder (for example, C:\Program Files\Kramer Flash).
3. Create a shortcut on your desktop to the file: “*FlashLoader*”.
4. Go to our Web site and download the latest **VP-27** firmware version.

¹ Warning that you need to unlock to regain control via the front panel

8.2 Connecting the PC to the RS-232 Port

Before installing the latest Kramer firmware version on a **VP-27** unit, connect the RS-232 9-pin D-sub rear panel port on the **VP-27** unit to your PC.

8.3 Upgrading Firmware

Follow these steps to upgrade the firmware:

1. Double click the desktop icon: “*FlashLoader*”.
2. Connect the power on the **VP-27** unit and switch it ON.
3. Set the appropriate COM port.

The following window appears:

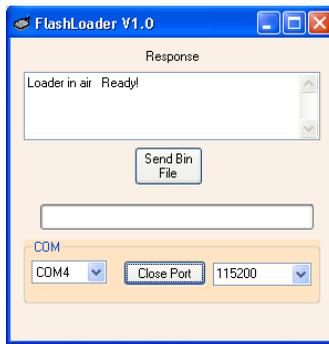
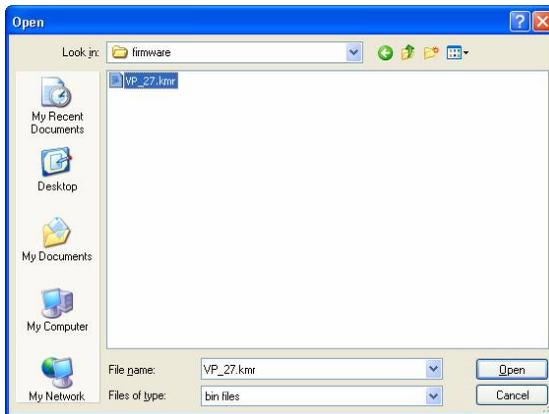


Figure 5: FlashLoader Window

4. Click the Send Bin File button.
The following window appears:



Loading the Latest Firmware

5. Select the latest **VP-27** firmware version, and click Open. Wait for completion of the upgrade procedure. The new firmware version appears in the INPUT STATUS 7-segment Display.

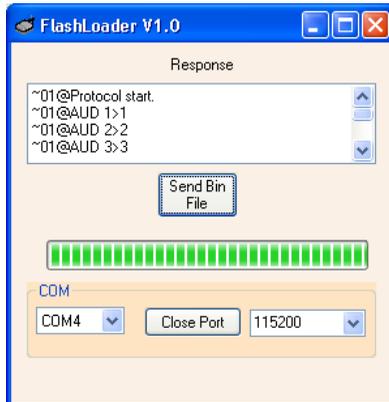


Figure 6: Flash Upgrade Process

6. If required, disconnect the RS-232 rear panel port on the **VP-27** unit from the PC.

9 Technical Specifications

[Table 4](#) includes the technical specifications:

Table 4: Technical Specifications¹ of the VP-27 Presentation Switcher

INPUTS:	4 composite video on RCA connectors 4 s-Video on 4-pin connectors 4 PC on 15-pin HD connectors 4 unbalanced stereo audio on RCA connectors, L+R (for CV) 4 unbalanced stereo audio on RCA connectors, L+R (for Y/C) 4 unbalanced stereo audio on 3.5mm jack connectors (for PC) Mic: 3mV / 10k Ω condenser / dynamic on a 6.3mm Phone Jack connector	
OUTPUTS:	1 composite video on an RCA connector 1 s-Video on a 4-pin connector 1 PC on a 15-pin HD connector 1 master audio on an RCA connector, L+R 1 unbalanced stereo audio on an RCA connector, L+R (for CV) 1 unbalanced stereo audio on an RCA connector, L+R (for Y/C) 1 unbalanced stereo audio on a 3.5mm jack connector (for PC)	
MAX. OUTPUT LEVEL:	VIDEO: CV and Y/C: 1.8Vpp PC: 2Vpp	AUDIO: CV and Y/C: 1.8Vpp; mic: 6.2Vpp, PC: 6.2Vpp; master: 6Vpp
BANDWIDTH (-3dB):	CV: 683MHz; Y/C: 725MHz; PC: 415MHz	AUDIO: CV and Y/C: >40kHz; mic: 22.6kHz; PC: >40kHz; master: 22.5kHz
DIFF. GAIN:	CV and Y/C: 0.03%; XGA: 0.05%	
DIFF. PHASE:	CV and PC: 0.03 Deg.; Y/C: 0.02Deg.	
K-FACTOR:	<0.05%	
S/N RATIO:	VIDEO (@5MHz): CV: 75.1dB; Y/C: 78.7dB; PC: 74.4dB	AUDIO (@1MHz): CV and Y/C: 78.5dB; PC: 78dB; mic: 52dB
CROSSTALK (all hostile):	VIDEO(@5MHz): CV: -50.5dB; Y/C: -33dB; PC: -51.5dB	AUDIO: -68.9dB @1MHz, -43.3dB @20kHz (YC)
CONTROLS:	MUTE, TALK OVER, MIX, LOCK, switching front panel buttons, RS-232, rear panel dipperswitches, volume for line: -62dB to +14.1dB; mic volume: -17dB to +69.5dB	
COUPLING:	VIDEO: DC	AUDIO: AC
AUDIO THD + NOISE (@1kHz):	YC: 0.092%; PC: 0.024%	
AUDIO 2nd HARMONIC (@1kHz):	YC and PC: 0.03%	
POWER SOURCE:	100-240V AC, 6VA max.	
DIMENSIONS:	19-inch (W), 7-inch(D) 1U (H) rack mountable	
WEIGHT:	2.7kg (6 bs) approx	
ACCESSORIES:	Power cord, Windows®-based control software	

¹ Specifications are subject to change without notice

10 Communication Parameters

[Table 5](#) lists the communication parameters as used in Kramer Electronics products.

Table 5: Communication Parameters

RS-232			
Protocol 2000		Protocol 3000 (Default)	
Baud Rate:	9600	Baud Rate:	115,200
Data Bits:	8	Data Bits:	8
Stop Bits:	1	Stop Bits:	1
Parity:	None	Parity:	None
Command Format:	HEX	Command Format:	ASCII
Example (Output 1 to Input 1):	0x01, 0x81, 0x81, 0x81	Example (Output 1 to Input 1):	#AV 1>1<CR>
Switching Protocol			
P2000 -> P3000		P3000 -> P2000	
Command:	0x38, 0x80, 0x83, 0x81	Command:	#P2000<CR>
Front Panel:	Press and hold CV Input 1 and CV Input 3 simultaneously	Front Panel:	Press and hold CV Input 1 and CV Input 2 simultaneously

11 Hex Table (Protocol 2000)

The following sections describe the Hex values (which the protocol in [Section 13.4](#) describes in more detail) for the **VP-27 Presentation Switcher**. RS-232 communication is at 9600 baud, no parity, 8 data bits and 1 stop bit.

11.1 The Switching Control Hex Table

[Table 6](#) lists the Hex values for the Video and Audio In-group Selector:

Table 6: VP-27 Hex Table Video and Audio In-group Selector

Inputs		CV OUT	Y/C OUT	PC OUT	Master Audio
Group	#				
CV	In 1	01 81 81 81			
	In 2	01 82 81 81			
	In 3	01 83 81 81			
	In 4	01 84 81 81			
Y/C	In 1		01 81 82 81		
	In 2		01 82 82 81		
	In 3		01 83 82 81		
	In 4		01 84 82 81		
PC	In 1			01 81 83 81	
	In 2			01 82 83 81	
	In 3			01 83 83 81	
	In 4			01 84 83 81	
Master Audio	Group input	CV			02 81 80 81
		Y/C			02 82 80 81
	PC	02 83 80 81			
	Mic	02 84 80 81			

11.2 Audio Gain Control Hex Tables

The following tables describe the audio gain controls.

Table 7: Set the Audio Gain Control for the Groups

VGA 1	Y/C	PC	Notes
16 81 80 81	16 82 80 81	16 83 80 81	Mute
⋮	⋮	⋮	
16 81 F1 81	16 82 F1 81	16 83 F1 81	0dB (1:1)
⋮	⋮	⋮	
16 81 FF 81	16 82 FF 81	16 83 FF 81	Maximum

Table 8: Set the Audio Output Gain Control for the Microphone

Audio Gain Control for Microphone	
16 84 80 81	Mute
⋮	
16 84 EB 81	0dB (1:1)
⋮	
16 84 FF 81	Maximum

Table 9: Set the Audio Output Gain Control for the Master Audio

Audio Gain Control for Master Out	
16 80 80 81	Mute
⋮	
16 80 F1 81	0dB (1:1)
⋮	
16 80 FF 81	Maximum

Table 10: Increase or Decrease the Audio Output Gain by One Step

	CV OUT	Y/C OUT	PC OUT	Master Out	Microphone
Increase	18 81 80 81	18 82 80 81	18 83 80 81	18 80 80 81	18 84 80 81
Decrease	18 81 81 81	18 82 81 81	18 83 81 81	18 80 81 81	18 84 81 81

12 ASCII Table (Protocol 3000)

The following sections describe the ASCII values (which the protocol in [Section 13.3](#) describes in more detail). RS-232 communication is at 115200 baud, no parity, 8 data bits and 1 stop bit.

12.1 The Switching Control ASCII Table

Table 11 lists the Protocol 3000 ASCII Audio/Video Switching for the **VP-27**:

Table 11: VP-27 ASCII Table Video and Audio In-group Selector

Inputs		CV OUT	Y/C OUT	PC OUT	Master Audio
Group	#				
CV	In 1	#AV 1>1<CR>			
	In 2	#AV 2>1<CR>			
	In 3	#AV 3>1<CR>			
	In 4	#AV 4>1<CR>			
Y/C	In 1		#AV 1>2<CR>		
	In 2		#AV 2>2<CR>		
	In 3		#AV 3>2<CR>		
	In 4		#AV 4>2<CR>		
PC	In 1			#AV 1>3<CR>	
	In 2			#AV 2>3<CR>	
	In 3			#AV 3>3<CR>	
	In 4			#AV 4>3<CR>	
Master Audio	Group input	CV			#AUD 1>0<CR>
		Y/C			#AUD 2>0<CR>
	PC	#AUD 3>0<CR>			
	Mic	#AUD 4>0<CR>			

12.2 The Audio Gain Control ASCII Tables

The following tables describe the audio gain controls.

Table 12: Set the Audio Gain Control for the Groups

CV Group Input	Y/C Group Input	PC Group Input	Notes
# AUD-LVL 1,1,0<CR>	# AUD-LVL 1,2,0<CR>	# AUD-LVL 1,3,0<CR>	Mute
⋮	⋮	⋮	
# AUD-LVL 1,1,227<CR>	# AUD-LVL 1,2,227<CR>	# AUD-LVL 1,3,227<CR>	0dB (1:1)
⋮	⋮	⋮	
# AUD-LVL 1,1,255<CR>	# AUD-LVL 1,2,255<CR>	# AUD-LVL 1,3,255<CR>	Maximum

Table 13: Set the Audio Output Gain Control for the Microphone

Audio Gain Control for Microphone	
# AUD-LVL 2,4,0<CR>	Mute
⋮	
# AUD-LVL 2,4,215<CR>	0dB (1:1)
⋮	
# AUD-LVL 2,4,255<CR>	Maximum

Table 14: Set the Audio Output Gain Control for the Master Audio

Audio Gain Control for Master Out	
# AUD-LVL 2,0,0<CR>	Mute
⋮	
# AUD-LVL 2,0,227<CR>	0dB (1:1)
⋮	
# AUD-LVL 2,0,255<CR>	Maximum

13 Kramer Protocol

By default, the **VP-27** is set to protocol¹ 3000 (see [Section 13.3](#)) but is also compatible with Kramer's Protocol 2000 (see [Section 13.4](#)). [Section 13.2](#) describes how to switch between protocol 3000 and protocol 2000.

13.1 Protocol Output Definitions

The protocol output definitions are: Video (CV) group defined as output 1, Video (YC) group defined as output 2, Video (PC) group defined as output 3, and Master Audio Selector defined as output 0.

13.2 Switching Protocols

You can switch protocols either via the front panel buttons (see [Section 13.2.1](#)) or the protocol commands (see [Section 13.2.2](#)).

¹ You can download our user-friendly "Software for Calculating Hex Codes for Protocol 2000" from the technical support section on our Web site at: <http://www.kramerelectronics.com>

13.2.1 Switching Protocols via the Front Panel Buttons

To switch from protocol 3000 to protocol 2000, press and hold¹ the CV group INPUT 1 and INPUT 2 buttons for a few seconds.

To switch from protocol 2000 to protocol 3000, press and hold the CV group INPUT 1 and INPUT 3 buttons for a few seconds.

13.2.2 Switching Protocols via Protocol Commands

To switch from protocol 3000 to protocol 2000, send the following command:

```
#P2000<CR>
```

To switch from protocol 2000 to protocol 3000, send the following command:

```
0x38, 0x80, 0x83, 0x81
```

The Windows®-based Kramer control software² operates with protocol 2000. If the **VP-27** is set to protocol 3000, it is automatically switched to protocol 2000.

13.3 Kramer Protocol 3000

This RS-232 communication protocol lets you control the machine from any standard terminal software (for example, Windows® HyperTerminal Application) and uses a data rate of 115200 baud, with no parity, 8 data bits, and 1 stop bit.

13.3.1 Protocol 3000 Syntax

Host message format:

Start	Address (optional)	Body	Delimiter
#	<i>Destination_id@</i>	message	CR

Simple command (commands string with only one command without addressing):

start	body	delimiter
#	Command SP Parameter_1,Parameter_2,...	CR

Commands string (formal syntax with commands concatenation and addressing):

¹ Not as part of a switching operation

² Download the latest software from our Web site at <http://www.kramerelectronics.com>

Address@ **Command_1** Parameter1_1,Parameter1_2,... |Command_2
 Parameter2_1,Parameter2_2,... |Command_3
 Parameter3_1,Parameter3_2,... |..**CR**

Device message format:

Start	Address (optional)	Body	Delimiter
~	Sender_id@	message	CR LF

Device long response (**Echoing command**):

Start	Address (optional)	Body	Delimiter
~	Sender_id@	command SP [param1 ,param2 ...] result	CR LF

CR = Carriage return (ASCII 13 = 0x0D)

LF = Line feed (ASCII 10 = 0x0A)

SP = Space (ASCII 32 = 0x20)

13.3.2 Command Parts Details

Command:

Sequence of ASCII letters ('A'-'Z', 'a'-'z' and '-').
 Command will separate from parameters with at least single space.

Parameters:

Sequence of Alfa-Numeric ASCII chars ('0'-'9','A'-'Z','a'-'z' and some special chars for specific commands), parameters will be separated by commas.

Message string:

Every command must to be entered as part of message string that begin with **message starting char** and end with **message closing char**, note that string can contain more then one command separated by pipe ("|") char.

Message starting char:

'#' for host command/query.
 '-' for machine response.

Device address (Optional, for Knet):

Knet Device ID follow by '@' char.

Query sign = '?', will follow after some commands to define query request.

Message closing char =

Host messages - Carriage Return (ASCII 13), will be referred to by **CR** in this document.

Machine messages - Carriage Return (ASCII 13) + Line-Feed (ASCII 10), will be referred to by **CRLF**.

Spaces between parameters or command parts will be ignored.

Commands chain separator char:

When **message string** contains more than one command, commands will be separated by pipe ("|").

Commands entering:

If terminal software used to connect over serial \ ethernet \ USB port, that possible to directly enter all commands characters (**CR** will be entered by Enter key, that key send also **LF**, but this char will be ignored by commands parser).

Sending commands from some controllers (like Crestron) require coding some characters in special form (like \X##).

Anyway, there is a way to enter all ASCII characters, so it is possible to send all commands also from controller.

(Similar way can use for URL \ Telnet support that maybe will be added in future).

Commands forms:

Some commands have short name syntax beside the full name to allow faster typing, response is always in long syntax.

Commands chaining:

It is possible to enter multiple commands in same string by '|' char (pipe).

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In this case the **message starting char** and the **message closing char** will be entered just one time, in the string beginning and at the end.

All the commands in string will not execute until the closing char will be entered.

Separate response will be sent for every command in the chain.

Input string max length:

64 characters.

Backward support:

Design note: transparent supporting for protocol 2000 will be implemented by switch protocol command from protocol 3000 to protocol 2000, in protocol 2000 there is already such a command to switch protocol to ASCII protocol (#56 : H38 H80 H83 H81).

Table 15: Instruction Codes for Protocol 3000

Help commands		
Command	Syntax	Response
Protocol Handshaking	# CR	~OK CRLF
Device initiated messages		
Command	Syntax	
Start message	Kramer Electronics LTD. , Device Model Version: Software Version	
Switcher actions		
Audio-video channel has switched (AFV mode)	AV IN>OUT	
Video channel has switched (Breakaway mode)	VID IN>OUT	
Audio channel has switched (Breakaway mode)	AUD IN>OUT	
Result codes (errors)		
	Syntax	
No error. Command running succeeded	COMMAND PARAMETERS OK	
Protocol Errors		
Syntax Error	ERR001	
Command not available for this device	ERR002	
Parameter is out of range	ERR003	
Unauthorized access (running command without the match login).	ERR004	
Basic routing commands		
Command	Syntax	Response
Switch audio & video	AV IN>OUT , IN>OUT , ...	AV IN>OUT , IN>OUT ,... RESULT
Switch video only	VID IN>OUT , IN>OUT , ... Short form: V IN>OUT , IN>OUT , ...	VID IN>OUT , IN>OUT , ... RESULT
Note: When AFV mode is active, this command will switch also audio. If audio is breakaway – device display mode will change to show audio connections status.		
Switch audio only	AUD IN>OUT , IN>OUT , ... Short form: A IN>OUT , IN>OUT , ...	AUD IN>OUT , IN>OUT , ... RESULT
Note: When AFV mode is active, this command will switch also video.		
Read video connection	VID? OUT Short form: V? OUT VID? *	VID IN>OUT VID IN>1 , IN>2 , ...

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Read audio connection	AUD? OUT Short form: A? OUT AUD? *	AUD IN - OUT AUD IN >1, IN >2, ...
Parameters Description: IN = Input number or '0' to disconnect output. '>' = Connection character between in and out parameters. OUT = Output number or '*' for all outputs.		

Examples:		
Switch Video and Audio input 3 to output 7	#AV 3>7 CR	~AV 3>7 OK CRLF
Switch Video input 2 to output 4	#V 2>4 CR	~VID 2>4 OK CRLF
Switch Video input 4 to output 2 in machine number 6	#6@VID 4>2 CR	~6@VID 4>2 OK CRLF
Disconnect Video and Audio Output 4	#AV 0>4 CR	~AV 0>4 OK CRLF
Switch Video Input 3 to All Outputs	#V 3>* CR	~VID 3>* OK CRLF
Chaining Multiple commands*	#AV 1>* V 3>4, 2>2, 82>1, 0>2 V 82>3 A 0>1 V? * CR First switch all Audio and video outputs from input 1, Then switch video input 3 to output 4, video input 2 to output 2, video input and disconnect video output 2. Then switch audio input 3 to output 2, Then disconnect audio output 1. Then get status of all links (assume this is 4x4 matrix). Commands processing start after entering CR , response will sent for each command after processing it.	~AV 1>* OK CRLF ~VID 1>2, 3>4 OK CRLF ~VID 82>3 ERR### CRLF ~AUD 0>1 OK CRLF ~V 1>1, 0>2, 1>3, 3>4 CRLF

Operation commands		
Command	Syntax	Response
Lock front panel	LOCK-FP LOCK-MODE Short form: LCK LOCK-MODE	LOCK-FP LOCK-MODE RESULT
Get front panel locking state	LOCK-FP?	LOCK-FP LOCK-MODE
Parameters Description: LOCK-MODE = Front panel locking state: "0" or "off" to unlock front panel buttons. "1" or "on" to lock front panel buttons.		
Restart device	RESET	RESET OK
Switch to protocol 2000*	P2000	P2000 OK
* Protocol 2000 has command to switch back to ASCII protocol (like protocol 3000)		

Audio parameters commands		
Command	Syntax	Response
Set audio level in specific amplifier stage.	AUD-LVL STAGE , CHANNEL , VOLUME Short form: ADL STAGE , CHANNEL , VOLUME	AUD-LVL STAGE , CHANNEL , VOLUME RESULT
Read audio volume level	AUD-LVL? STAGE , CHANNEL Short form: ADL? STAGE	AUD-LVL STAGE , CHANNEL , VOLUME

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Mute audio	MUTE <u>MUTE-MODE</u>	MUTE <u>MUTE-MODE</u> <u>RESULT</u>
Read audio mute state	MUTE?	MUTE <u>MUTE-MODE</u>

Parameters Description:

STAGE =

"In","Out"

or

Numeric value (present audio processing stage). For example: "0" for Input level, "1" for Pre-Amplifier, "2" for Amplifier (Out) etc.

CHANNEL = Input or Output #

VOLUME = Audio parameter in Kramer units, precede minus sign for negative values.

++ increase current value,

-- decrease current value.

Machine info commands		
Command	Syntax	Response
* Time settings commands require admin authorization		
Read in/outs count	INFO-IO?	INFO-IO: IN <u>INPUTS_COUNT</u> , OUT <u>OUTPUTS_COUNT</u>
Read max presets count	INFO-PRST?	INFO-PRST: VID <u>PRESET_VIDEO_COUNT</u> , AUD <u>PRESET_AUDIO_COUNT</u>
Reset configuration to factory default	FACTORY	FACTORY <u>RESULT</u>

Identification commands		
Command	Syntax	Response
Protocol Handshaking	# <u>CR</u>	~OK <u>CRLF</u>
Read device model	MODEL?	MODEL <u>MACHINE_MODEL</u>
Read device serial number	SN?	SN <u>SERIAL_NUMBER</u>
Read device firmware version	VERSION?	VERSION <u>MAJOR</u> <u>MINOR</u> <u>BUILD</u> <u>REVISION</u>
Set machine name	NAME <u>MACHINE_NAME</u>	NAME <u>MACHINE_NAME</u> <u>RESULT</u>
Read machine name	NAME?	NAME <u>MACHINE_NAME</u>
Reset machine name to factory default*	NAME-RST	NAME-RST <u>MACHINE_FACTORY_NAME</u> <u>RESULT</u>
*Note: machine name not equal to model name. This name relevance for site viewer identification of specific machine or for network using (with DNS feature on). <u>MACHINE_NAME</u> = Up to 14 Alfa-Numeric chars. * Machine factory name = Model name + last 4 digits from serial number.		
Set machine id number	MACH-NUM <u>MACHINE_NUMBER</u>	MACH-NUM <u>OLD_MACHINE_NUMBER</u> <u>NEW_MACHINE_NUMBER</u> <u>RESULT</u>
* Response will send after machine number has been changed. So the replay with header will be: <u>NEW_MACHINE_NUMBER</u> @ MACH-NUM <u>OLD_MACHINE_NUMBER</u> <u>NEW_MACHINE_NUMBER</u> OK		

13.4 Kramer Protocol 2000

This RS-232 communication protocol uses four bytes of information as defined below. The default data rate is 9600 baud, with no parity, 8 data bits and 1 stop bit.

Table 16: Protocol Definitions

	MSB						LSB
	DESTINATION	INSTRUCTION					
0	D	N5	N4	N3	N2	N1	N0
7	6	5	4	3	2	1	0
1st byte							
	INPUT						
1	I6	I5	I4	I3	I2	I1	I0
7	6	5	4	3	2	1	0
2nd byte							
	OUTPUT						
1	O6	O5	O4	O3	O2	O1	O0
7	6	5	4	3	2	1	0
3rd byte							
	MACHINE NUMBER						
1	OVR	X	M4	M3	M2	M1	M0
7	6	5	4	3	2	1	0
4th byte							

1st BYTE: Bit 7 – Defined as 0.

D – “DESTINATION”: 0 - for sending information to the switchers (from the PC);

1 - for sending to the PC (from the switcher).

N5...N0 – “INSTRUCTION”

The function that is to be performed by the switcher(s) is defined by the INSTRUCTION (6 bits). Similarly, if a function is performed via the machine’s keyboard, then these bits are set with the INSTRUCTION NO., which was performed. The instruction codes are defined according to the table below (INSTRUCTION NO. is the value to be set for N5...N0).

2nd BYTE: Bit 7 – Defined as 1.

I6...I0 – “INPUT”.

When switching (ie. instruction codes 1 and 2), the INPUT (7 bits) is set as the input number which is to be switched. Similarly, if switching is done via the machine’s front-panel, then these bits are set with the INPUT NUMBER which was switched. For other operations, these bits are defined according to the table.

3rd BYTE: Bit 7 – Defined as 1.

O6...O0 – “OUTPUT”.

When switching (ie. instruction codes 1 and 2), the OUTPUT (7 bits) is set as the output number which is to be switched. Similarly, if switching is done via the machine’s front-panel, then these bits are set with the OUTPUT NUMBER which was switched. For other operations, these bits are defined according to the table.

4th BYTE: Bit 7 – Defined as 1.

Bit 5 – Don’t care.

OVR – Machine number override.

M4...M0 – MACHINE NUMBER.

Used to address machines in a system via their machine numbers. When several machines are controlled from a single serial port, they are usually configured together with each machine having an individual machine number. If the OVR bit is set, then all machine numbers will accept (implement) the command, and the addressed machine will reply.

For a single machine controlled via the serial port, always set M4...M0 = 1, and make sure that the machine itself is configured as MACHINE NUMBER = 1.

Table 17: Instruction Codes for Protocol 2000

Note: All values in the table are decimal, unless otherwise stated.

INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	DESCRIPTION	INPUT	OUTPUT	
0	RESET VIDEO	0	0	1
1	SWITCH VIDEO	Set equal to video input which is to be switched (0 = disconnect)	Set equal to video output which is to be switched (0 = to all the outputs)	2
2	SWITCH AUDIO	Set equal to audio input which is to be switched (0 = disconnect)	Set equal to audio output which is to be switched (0 = to all the outputs)	2
5	REQUEST STATUS OF A VIDEO OUTPUT	Set as SETUP #	Equal to output number whose status is reqd	4, 3
6	REQUEST STATUS OF AN AUDIO OUTPUT	Set as SETUP #	Equal to output number whose status is reqd	4, 3
16	ERROR / BUSY	For invalid / valid input (i.e. OUTPUT byte = 4 or OUTPUT byte = 5), this byte is set as the input #	0 - error 1 - invalid instruction 2 - out of range 3 - machine busy 4 - invalid input 5 - valid input 6 - RX buffer overflow	9, 25
22	SET AUDIO PARAMETER	Equal to input / output number whose parameter is to be set (0 = all)	Set as parameter value	2, 24
24	INCREASE / DECREASE AUDIO PARAMETER	Equal to input / output number whose parameter is to be increased / decreased (0 = all)	0 - increase output 1 - decrease output 2 - increase left output 3 - decrease left output 4 - increase right output 5 - decrease right output 6 - increase input 7 - decrease input 8 - increase left input 9 - decrease left input 10 - increase right input 11 - decrease right input	2
25	REQUEST AUDIO PARAMETER	Equal to input / output number whose parameter is requested	0	6, 24
30	LOCK FRONT PANEL	0 - Panel unlocked 1 - Panel locked	0	2
31	REQUEST WHETHER PANEL IS LOCKED	0	0	16
42	AUDIO PARAMETER SETTINGS FOR INSTRUCTIONS 22, 24, 25	INPUT Bit: 10 - 0=input; 1=output 11 - Left 12 - Right	0 - Gain 4 - Mix On	24
56	CHANGE TO ASCII	0	3 - Kramer protocol 3000	19
61	IDENTIFY MACHINE	1 - video machine name 2 - audio machine name 3 - video software version 4 - audio software version	0 - Request first 4 digits 1 - Request first suffix 2 - Request second suffix 3 - Request third suffix 10 - Request first prefix 11 - Request second prefix 12 - Request third prefix	13
62	DEFINE MACHINE	1 - number of inputs 2 - number of outputs 3 - number of setups	1 - for video 2 - for audio	14

NOTES on the above table:

NOTE 1 - When the master switcher is reset, (e.g. when it is turned on), the reset code is sent to the PC. If this code is sent to the switchers, it will reset according to the present power-down settings.

NOTE 2 - These are bi-directional definitions. That is, if the switcher receives the code, it will perform the instruction; and if the instruction is performed (due to a keystroke operation on the front panel), then these codes are sent. For example, if the HEX code

01 85 88 83

was sent from the PC, then the switcher (machine 3) will switch input 5 to output 8. If the user switched input 1 to output 7 via the front panel keypad, then the switcher will send HEX codes:

41 81 87 83

to the PC.

When the PC sends one of the commands in this group to the switcher, then, if the instruction is valid, the switcher replies by sending to the PC the same four bytes that it was sent (except for the first byte, where the DESTINATION bit is set high).

NOTE 3 - SETUP # 0 is the present setting. SETUP # 1 and higher are the settings saved in the switcher's memory, (i.e. those used for Store and Recall).

NOTE 4 - The reply to a "REQUEST" instruction is as follows: the same instruction and INPUT codes as were sent are returned, and the OUTPUT is assigned the value of the requested parameter. The replies to instructions 10 and 11 are as per the definitions in instructions 7 and 8 respectively. For example, if the present status of machine number 5 is breakaway setting, then the reply to the HEX code

```
0B      80      80      85
would be HEX codes
4B      80      81      85
```

NOTE 6 - If INPUT is set to 127 for these instructions, then, if the function is defined on this machine, it replies with OUTPUT=1. If the function is not defined, then the machine replies with OUTPUT=0, or with an error (invalid instruction code).

If the INPUT is set to 126 for these instructions, then, if possible, the machine will return the current setting of this function, even for the case that the function is not defined. For example, for a video switcher which always switches during the VIS of input #1, (and its VIS setting cannot be programmed otherwise), the reply to the HEX code

```
0A      FE      80      81 (ie. request VIS setting, with INPUT set as 126dec)
would be HEX codes
4A      FE      81      81 (ie. VIS setting = 1, which is defined as VIS from input #1).
```

NOTE 9 - An error code is returned to the PC if an invalid instruction code was sent to the switcher, or if a parameter associated with the instruction is out of range (e.g. trying to save to a setup greater than the highest one, or trying to switch an input or output greater than the highest one defined). This code is also returned to the PC if an RS-232 instruction is sent while the machine is being programmed via the front panel. Reception of this code by the switcher is not valid.

NOTE 10 - This code is reserved for internal use.

NOTE 13 - This is a request to identify the switcher/s in the system. If the OUTPUT is set as 0, and the INPUT is set as 1, 2, 5 or 7, the machine will send its name. The reply is the decimal value of the INPUT and OUTPUT. For example, for a 2216, the reply to the request to send the audio machine name would be (HEX codes):

```
7D      96      90      81 (i.e. 128dec+ 22dec for 2nd byte, and 128dec+ 16dec for 3rd byte).
```

If the request for identification is sent with the INPUT set as 3 or 4, the appropriate machine will send its software version number. Again, the reply would be the decimal value of the INPUT and OUTPUT - the INPUT representing the number in front of the decimal point, and the OUTPUT representing the number after it. For example, for version 3.5, the reply to the request to send the version number would be (HEX codes):

```
7D      83      85      81 (i.e. 128dec+ 3dec for 2nd byte, 128dec+ 5dec for 3rd byte).
```

If the OUTPUT is set as 1, then the ASCII coding of the lettering following the machine's name is sent. For example, for the VS-7588YC, the reply to the request to send the first suffix would be (HEX codes):

```
7D      D9      C3      81 (i.e. 128dec+ ASCII for "Y"; 128dec+ ASCII for "C").
```

NOTE 14 - The number of inputs and outputs refers to the specific machine which is being addressed, not to the system. For example, if six 16X16 matrices are configured to make a 48X32 system (48 inputs, 32 outputs), the reply to the HEX code

```
3E      82      81      82 (ie. request the number of outputs)
would be HEX codes
```

```
7E      82      90      82
ie. 16 outputs
```

NOTE 16 - The reply to the "REQUEST WHETHER PANEL IS LOCKED" is as in NOTE 4 above, except that here the OUTPUT is assigned with the value 0 if the panel is unlocked, or 1 if it is locked.

NOTE 19 - After this instruction is sent, the unit will respond to the ASCII command set defined by the OUTPUT byte. The ASCII command to operate with the HEX command set must be sent in order to return to working with HEX codes.

NOTE 24 - Further information needed in instructions 21, 22, 25 and 26, is sent using instruction 42 - which is sent prior to the instruction. For example, to request the audio gain value of right input #9, send hex codes

```
2A      84      80      81
```

and then send HEX codes

```
19      89      81      81.
```

To set MIX mode, send hex codes

```
2A      81      84      81
```

and then send HEX codes

```
16
```

NOTE 25 - For units which detect the validity of the video inputs, Instruction 16 will be sent whenever the unit detects a change in the state of an input (in real-time).

For example, if input 3 is detected as invalid, the unit will send the HEX codes

```
10      83      84      81
```

If input 7 is detected as valid, then the unit will send HEX codes

```
10      87      85      81.
```

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.



Caution

Safety Warning:

Disconnect the unit from the power supply before opening/servicing.



Kramer Electronics, Ltd.

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