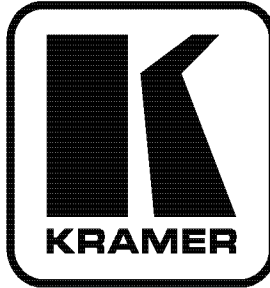


Kramer Electronics, Ltd.



USER MANUAL

Model:

VP-81K

8x1 UXGA / Audio 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-81K 8x1 UXGA / Audio Switcher**.

The **VP-81K** is ideal for:

- Display systems requiring simple input selection
- Remote monitoring of computer activity in schools and businesses
- Rental/staging applications
- Multimedia and presentation source selection

The package includes the following items:

- **VP-81K 8x1 UXGA / Audio Matrix Switcher**
- Null-modem adapter, a power cord and an infrared remote control transmitter (including the required battery and a separate user manual²)
- This user manual²

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 cables³

2.1 Quick Start

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

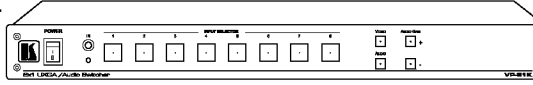
1 GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Matrix Switchers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Sealers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity;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

2 Download up-to-date Kramer user manuals from the Internet at this URL: <http://www.kramerelectronics.com>

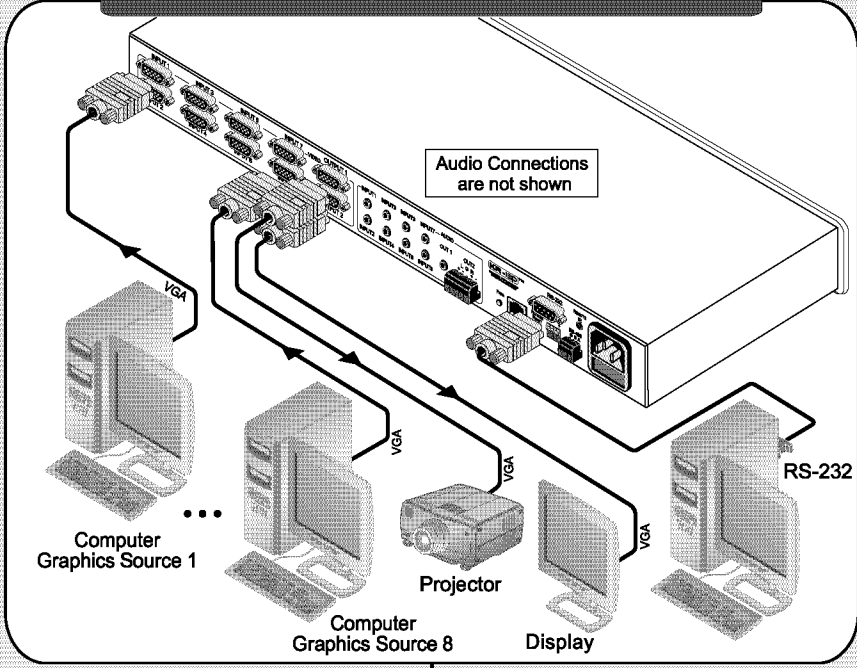
3 The complete list of Kramer cables is on our Web site at <http://www.kramerelectronics.com>

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

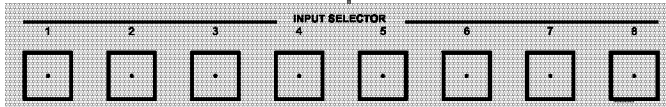


Step 3: Turn the power ON

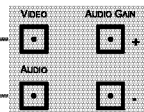
Step 4: Operate the machine - see section 7

Use the SELECTOR buttons to switch the inputs to one or both identical outputs

Lock the front panel via RS-232



AUDIO and VIDEO - Audio follows video when switching
 VIDEO - Switching relates to the video signal
 AUDIO - Switching relates to the audio signal



Increase or decrease the AUDIO GAIN (while the AUDIO button illuminates)

Operate via the front panel buttons, IR remote controller, RS-232, RS-485 and the Ethernet

3 Overview

The **VP-81K** routes any input to both outputs, using 15-pin HD female connectors for the computer graphics video signals, a mini plug connector for the unbalanced stereo audio output 1 signal, and a detachable terminal block connector for the balanced stereo audio output 2 signal.

In particular, the **VP-81K**:

- Has a very high video bandwidth, ensuring transparent UXGA performance
- Features audio-follow-video (AFV) in which all operations relate to both the video and the audio channels, or audio breakaway option, in which video and audio channels switch independently
- Features volume control
- Supports DDC (Display Data Channel) communication between the selected input and output 1 high-density 15-pin HD connectors on pins 12 and 15
- Includes the Kramer innovative integrated sync processing; KR-ISP™ technology, which lets you achieve a sharp, stable image even when the sync level is too low, by restoring the sync signal waveform
- Can cascade up to eight units with control from a PC or serial controller
- Operates in an automatic switching mode (as well as the regular switching mode), automatically switching to the lowest number input when that input is connected and active¹

Control the **VP-81K** using the front panel buttons, or remotely via:

- RS-485 or RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller
- ETHERNET
- The Kramer **RC-IR2** Infrared Remote Control Transmitter or infrared remote extension cable transmitter (optional)

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 **VP-81K** away from moisture, excessive sunlight and dust

¹ For example, if INPUT 6 is currently selected and connected and then INPUT 4 receives an active signal, the VP-81K automatically switches to INPUT 4

3.1 Terminology Used in this User Manual

Table 1 defines some terms that are used in this user manual:

Table 1: Terminology Used in this User Manual

Term	Definition
802.3	The standard specification for ETHERNET that is maintained by the Institute of Electrical and Electronics Engineers (IEEE).
Dynamic Host Configuration Protocol (DHCP)	Allows the network administrator to distribute IP addresses from a central point and automatically send a new IP address when an Ethernet point is plugged into a different network location.
Gateway	A network position serving as an entry to another network. On the Internet, a node or stopping point can be either a gateway node or a host (end-point) node.
IP Address	A 32-binary digit number that identifies each sender or receiver (within a network via a particular server or workstation) of data (HTML pages or e-mails) that is sent in packets across the Internet. Every device connected to an IP network must have a unique IP address. This address is used to reference the specific unit.
Local Area Network (LAN)	Computers sharing a common communications line or wireless link, which often share a server within a defined geographic area.
Media Access Control (MAC) Address	A computer's unique hardware number (or address) in a LAN or other network. On an Ethernet LAN, the (MAC) address is identical to the Ethernet address.
Transmission Control Protocol/Internet Protocol (TCP/IP)	The basic communication language or protocol of the Internet that breaks the message into appropriately sized packets for the network, and can be used as a communications protocol in an intranet or an extranet.

3.2 DDC Support

When establishing a VGA connection between a PC or laptop and a display device, a set of parameters known as EDID is exchanged between them, which is carried over the DDC channel. In some PC graphic cards and laptops, this information exchange is essential for proper VGA OUT operation.

3.3 Defining EDID

The Extended Display Identification Data (EDID¹) is a data-structure, provided by a display, to describe its capabilities to a graphics card (that is connected to the display's source). The EDID enables the PC or laptop to "know" what kind of monitor is connected to the output. The EDID includes the manufacturer's name, the product type, the timing data supported by the display, the display size, luminance data and (for digital displays only) the pixel mapping data.

4 Your VP-81K 8x1 UXGA / Audio Switcher

Figure 1 and Table 2 define the **VP-81K 8x1 UXGA / Audio Switcher**:

¹ Defined by a standard published by the Video Electronics Standards Association (VESA)

Your VP-81K 8x1 UXGA / Audio Switcher

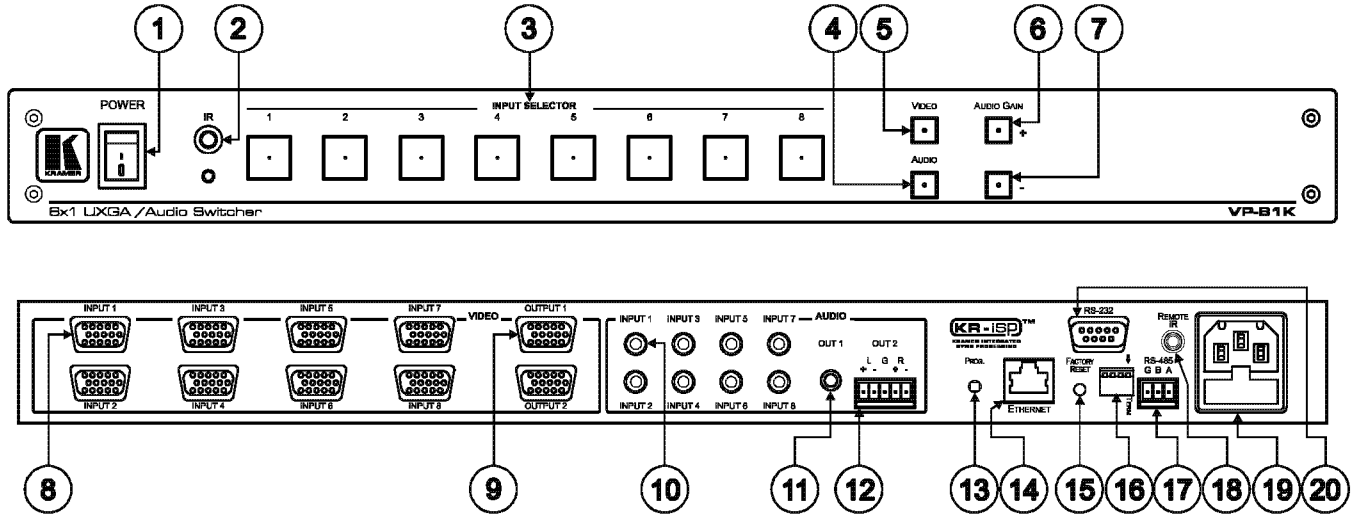


Figure 1: VP-81K 8x1 UXGA / Audio Switcher

Table 2: Front Panel VP-81K 8x1 UXGA / Audio Switcher Features

#	Feature	Function
1	POWER Switch	Illuminated switch supplying power to the unit
2	IR Receiver	The red LED is illuminated when receiving signals from the Kramer Infrared remote control transmitter
3	INPUT SELECTOR Buttons	Select the input (from 1 to 8) to switch to the outputs The button illuminates in red if it is selected and there is no input signal The button illuminates in green if it is not selected but there is an input signal at that input The button illuminates in violet if it is selected and there is an input signal connected
4	AUDIO Button	When illuminated ¹ , actions relate to audio
5	VIDEO Button	When illuminated ¹ , actions relate to video
6	AUDIO GAIN Buttons	+
7		-
6		Press to increase the audio output level of the selected input ²
7		Press to decrease the audio output level of the selected input ²
8	INPUT 15-pin HD Connectors	Connect to the UXGA sources (from 1 to 8)
9	OUTPUT 15-pin HD Connectors	Connect to the UXGA acceptors (from 1 to 2)
10	AUDIO INPUT Mini Plug Connectors	Connect to the unbalanced stereo audio sources (from 1 to 8)
11	OUT 1 Mini Plug Connector	Connect to the unbalanced stereo audio acceptor
12	OUT 2 Terminal Block Connector	Connect to the balanced stereo audio acceptor
13	PROG. Button	Not used (for technical staff use only)
14	ETHERNET Connector	Connects to the PC or other Serial Controller through computer networking
15	FACTORY RESET Button	Press to reset to factory default definitions ³ : IP number – 192.168.1.39 Mask – 255.255.255.0 Gateway – 192.168.1.1 The audio gain of all the inputs is reset to 0dB
16	SETUP Dipswitches	Dipswitches for setup of the unit, see section 6.5
17	RS-485 Detachable Terminal Block Port	Pin # 1 is for Ground connection, and Pins # 2 and # 3 are for RS-485
18	REMOTE IR 3.5mm Mini Jack	Connect to an external IR receiver unit for controlling the machine via an IR remote controller (instead of using the front panel IR receiver) ⁴
19	Power Connector with FUSE	AC connector enabling power supply to the unit
20	RS-232 9-pin D-sub Port	Connects to the RS-232 9-pin D-sub port of the next unit in the daisy-chain

1 If the AUDIO and VIDEO buttons both illuminate, the unit operates in the audio-follow-video mode

2 While the AUDIO button illuminates

3 Turn the machine OFF, then turn the machine ON while pressing the FACTORY RESET button. The unit powers up and loads its memory with the factory default definitions

4 Can be used instead of the front panel (built-in) IR receiver to remotely control the machine, see section 4.1

4.1 Using the IR Transmitter for the VP-81K

You can use the **RC-IR2** IR transmitter to control the machine via the built-in IR receiver on the front panel or, instead, via an optional external IR receiver¹. The external IR receiver can be located 15 meters away from the machine. This distance can be extended to up to 60 meters when used with three extension cables².

Before using the external IR receiver, be sure to arrange for your Kramer dealer to insert the internal IR connection cable³ with the 3.5mm connector that fits into the REMOTE IR opening on the rear panel.

Connect the external IR receiver to the REMOTE IR 3.5mm connector.

1 Model: C-A35M/IRR-50

2 Model: C-A35M/A35F-50

3 P/N: 505-70434010-S

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	+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!!

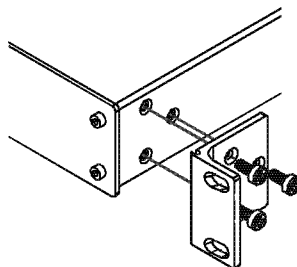
When installing in a 19" rack, avoid hazards by taking care that:

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-81K 8x1 UXGA / Audio Switcher

To connect the **VP-81K**, as illustrated in the example in Figure 2, do the following¹:

1. Connect up to eight² UXGA computer graphics sources to the INPUT 15-pin HD connectors (from 1 to 8).
2. Connect the unbalanced audio sources to up to eight INPUT mini plug connectors³.
3. Connect⁴ the 15-pin HD OUTPUT connectors (from 1 to 2) to up to two UXGA acceptors (for example, a projector to OUTPUT 1 and a display to OUTPUT 2).
4. Connect the OUT 1 unbalanced audio mini plug connector to an audio acceptor³.
5. Connect the OUT 2 balanced audio terminal block connector (see section 6.1) to an audio acceptor³.
6. Set the dipswitches (see section 6.5).
7. As an option you can connect a PC and/or controller to the:
 - RS-232 port (see section 6.2)
 - RS-485 port (see section 6.3)
 - The ETHERNET connector (see section 6.4)
8. Connect the power cord^{3,5}.

1 Be sure that the power is switched OFF on each device before connecting it to your VP-81K. After connecting all the devices to your VP-81K, switch on the power of the VP-81K, and then switch on the power of each device

2 You do not have to connect all the inputs

3 Not shown in Figure 2

4 You do not have to connect both outputs

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

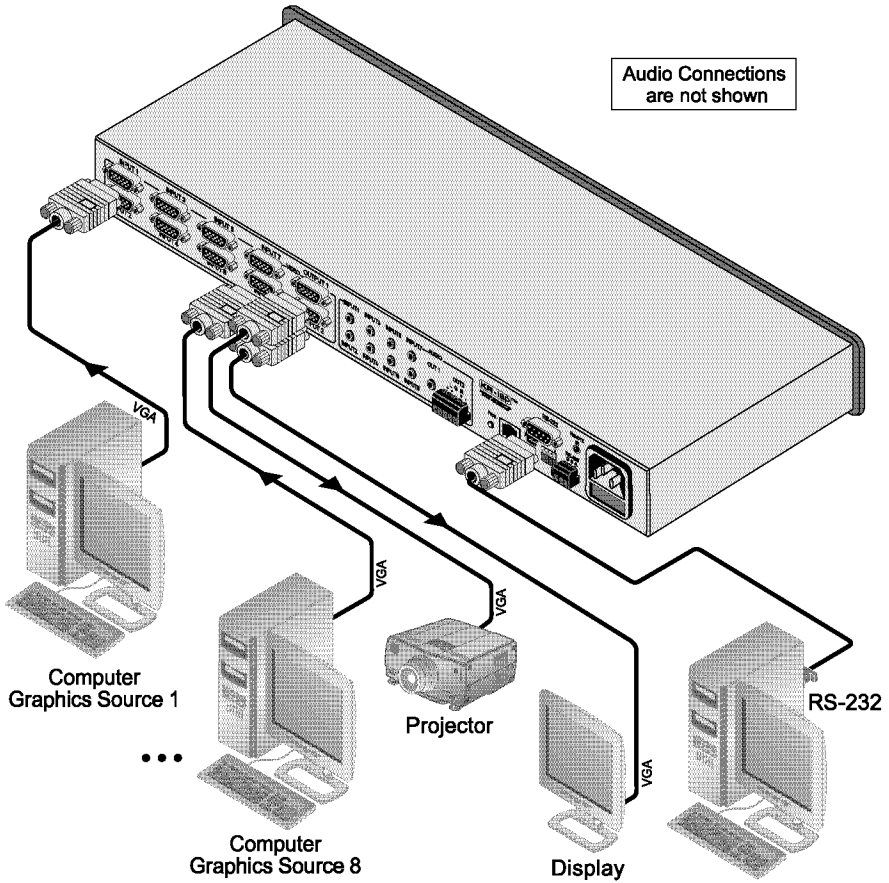


Figure 2: Connecting the VP-81K

6.1 Connecting the Balanced/Unbalanced Stereo Audio Output

This section illustrates how to wire:

- A balanced output connection, see Figure 3
- An unbalanced audio output, see Figure 4

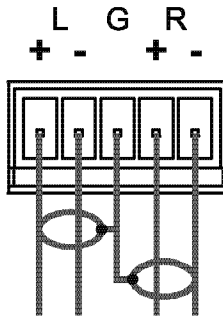


Figure 3: Connecting the Balanced Stereo Audio Output

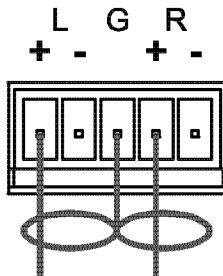


Figure 4: Connecting an Unbalanced Output

6.2 Controlling via RS-232

You can connect a PC (or other controller) to the **VP-81K** via the RS-232 port for remote control, and for upgrading the firmware.

To connect a PC to a **VP-81K** 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-81K** 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-81K** 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-81K** unit, forming a cross-connection¹, as Figure 5 Illustrates

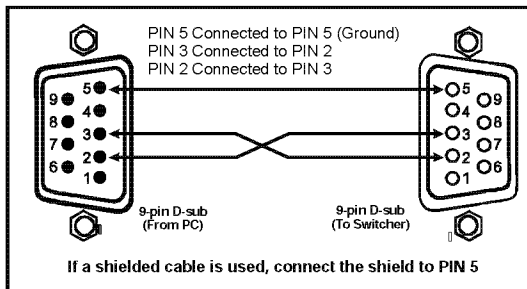


Figure 5: Connecting a PC without using a Null-modem Adapter

¹ Also known as a Null-modem connection

6.3 Controlling via RS-485

You can control a **VP-81K** unit via an RS-485 controller, for example, a PC (equipped with an RS-485 interface) or a Master Programmable Remote Control system such as the Kramer **RC-3000**.

To connect an **RC-3000** to a **VP-81K** unit (see Figure 6):

1. Connect the RS-485 terminal block port on the **RC-3000** to the RS-485 port on the **VP-81K** unit, as follows:
 - Connect the “A” (+) PIN on the RS-485 rear panel port of the **RC-3000** to the “A” (+) PIN on the RS-485 rear panel port of the **VP-81K** unit
 - Connect the “B” (-) PIN on the RS-485 rear panel port of the **RC-3000** to the “B” (-) PIN on the RS-485 rear panel port of the **VP-81K** unit
 - If shielded twisted pair cable is used, the shield may be connected to the “G” (Ground) PIN on one of the units (for example, on the **RC-3000**)
2. Set the **VP-81K** unit as Machine # 2, according to Table 4 (that is, DIP 1 and DIP 2 OFF, and DIP 3 ON), and set RS-485 Line Termination ON

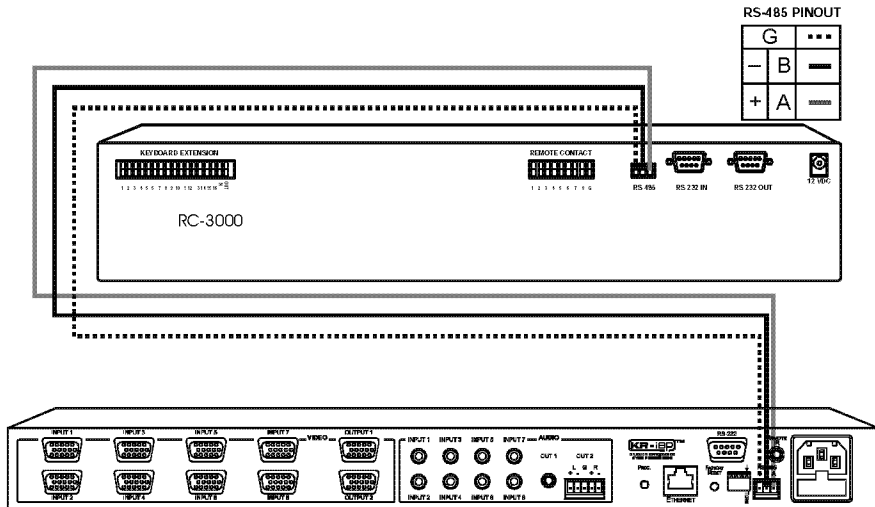


Figure 6: Controlling via RS-485 (for example, using an RC-3000)

6.4 Controlling the VP-81K via the Ethernet Port

You can connect the **VP-81K** via the ETHERNET in the following ways:

- For direct connection to the PC, use a crossover cable (see section 6.4.1)
- For connection via a network hub or network router, use a straight-through cable (see section 6.4.2)

6.4.1 Connecting the ETHERNET Port Directly to a PC (Crossover Cable)

You can connect the Ethernet port of the **VP-81K** to the Ethernet port on your PC, via a crossover cable with RJ-45 connectors.

This type of connection is recommended for identifying the **VP-81K** with the factory configured default IP address

After connecting the Ethernet port, configure your PC as follows:

1. Right-click the My Network Places icon on your desktop.
2. Select **Properties**.
3. Right-click Local Area Connection Properties.
4. Select **Properties**.
The Local Area Connection Properties window appears.
5. Select the Internet Protocol (TCP/IP) and click the **Properties** Button (see Figure 7).

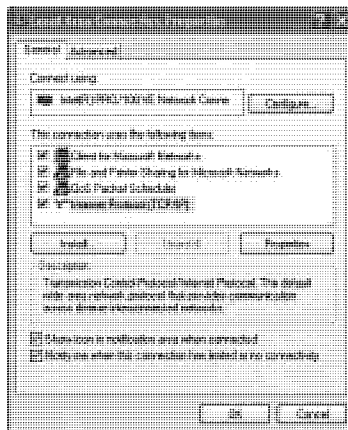


Figure 7: Local Area Connection Properties Window

6. Select Use the following IP address, and fill in the details as shown in Figure 8.

7. Click **OK**.

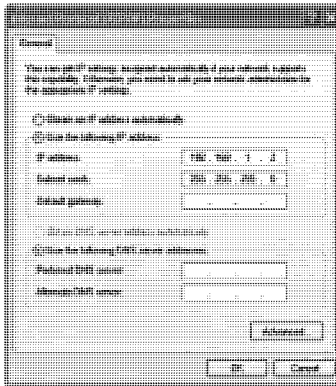


Figure 8: Internet Protocol (TCP/IP) Properties Window

6.4.2 Connecting via a Straight-Through Cable

You can connect the ETHERNET of the **VP-81K** to the Ethernet port on a network hub or network router, via a straight-through cable with RJ-45 connectors.

6.4.3 Configuring the Ethernet Port

To configure the Ethernet port, download the *P3K Wizard* Ethernet configuration software. Extract the file to a folder and create a shortcut on your desktop to the file.

Follow these steps to configure the port:

1. Double click the desktop icon
The Connect screen appears as follows:

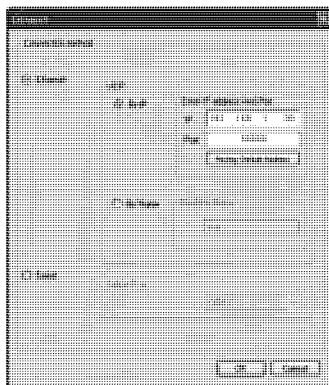


Figure 9: Connect Screen

2. Select the method to connect to the Ethernet port of the **VP-81K**.
Select:
 - Ethernet, if you know the IP address number or the machine name.
The default name for the machine is KRAMER_XXXX¹.
 - Serial, if you are connected via a serial port
3. Click OK.
The P3K Wizard screen appears².

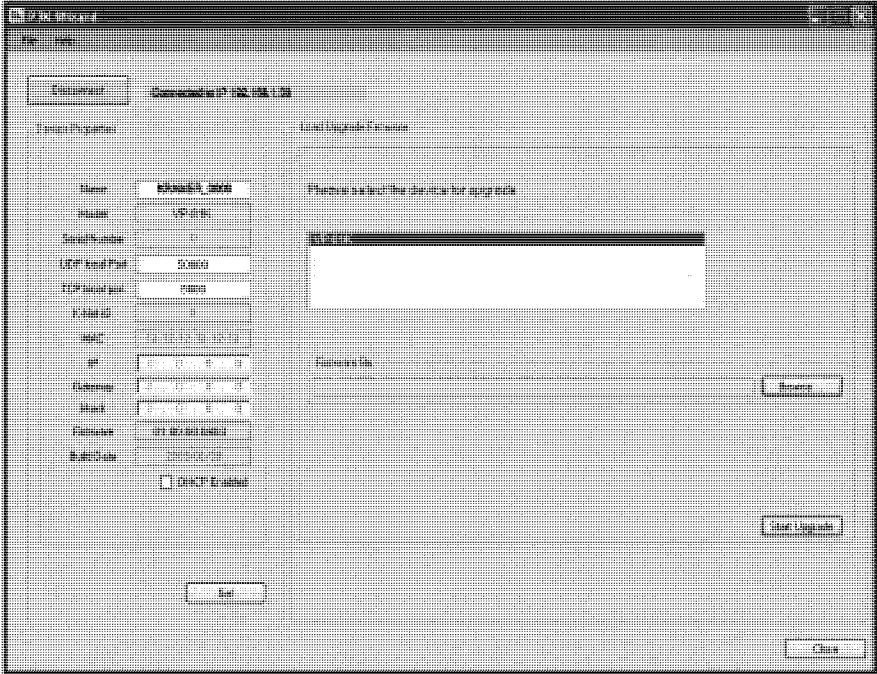


Figure 10: Device Properties Screen

4. If required, make changes and click Set. If not, click Close.

¹ The four digits are the last four digits of the machine's serial number.

² Do not use P3K Wizard to upgrade the firmware. To upgrade the firmware, see section 8

6.4.4 Controlling via the Embedded Web Pages

The embedded Web page can be used to remotely operate the **VP-81K** via the Ethernet.

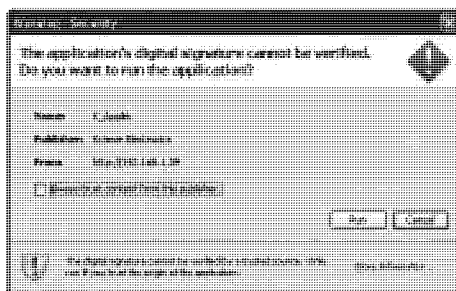
Before you use the embedded Web pages to control the **VP-81K** via the Ethernet, check that the Java™ software is installed on your computer. If not, download it from: www.java.com.

To control the **VP-81K** via the embedded Web page, make sure that it is connected to the Ethernet port of your computer and do the following:

1. Open your Internet browser.
2. Type the unit's IP number¹ in the Address bar of your browser:



A Warning-Security screen appears:



3. Click Run.
The **VP-81K** front panel is displayed on your screen (see Figure 11).

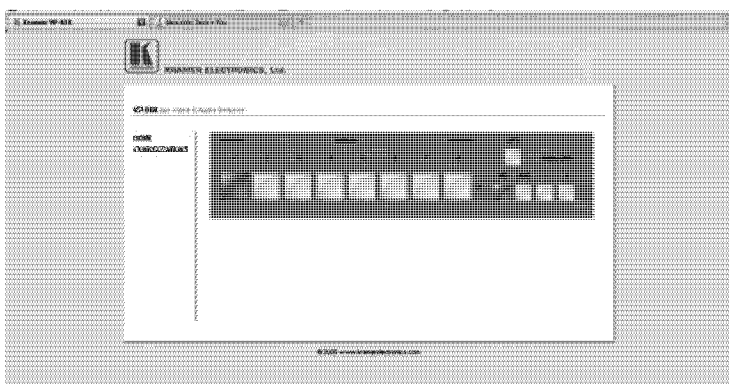


Figure 11: HOME Embedded Web Page

¹ The default IP number is 192.168.1.39, and may be changed by the system integrator

4. Click the on-screen buttons to control the unit.

The CONFIGURATIONS page lets you view some Ethernet settings¹ and change others (see Figure 12).

To change CONFIGURATION definitions:

1. Click the CONFIGURATIONS button.
The CONFIGURATIONS Web page appears.
2. Change the definitions as required.
3. Click the Submit button to apply changes².
A window appears asking if you are sure you want to change the network settings.
4. Click Yes.
A window appears announcing that the configuration has been successfully changed.
5. Click OK
6. If the IP number had been changed, close the browser and reload the Web page.

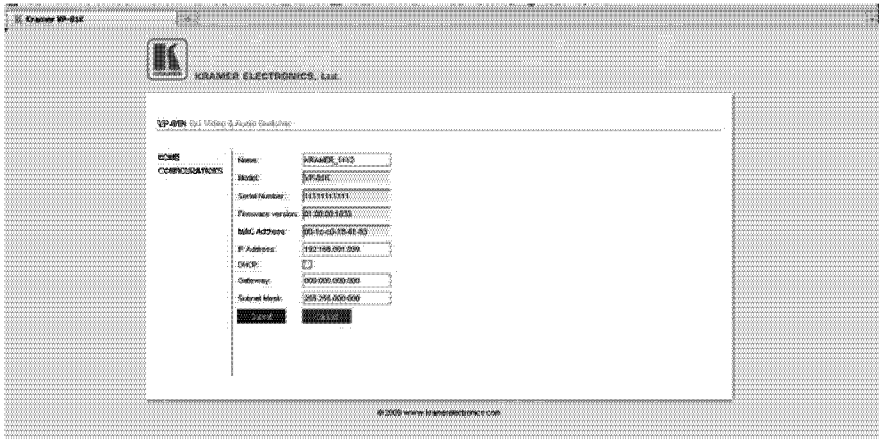


Figure 12: CONFIGURATIONS Embedded Web Page

1 The model name, serial number, firmware version and MAC address

2 Or Cancel to cancel changes

6.5 Dipswitch Settings

Figure 13 and Table 3 define the dipswitches:

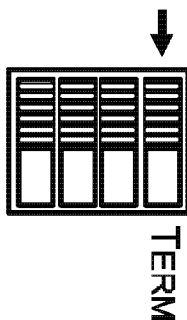


Figure 13: SETUP Dipswitches

Table 3: Dipswitch Definitions

DIP	Function:
1-3	Machine #: determines the number of the machine in the sequence
4	ON for RS-485 Line Termination with 120Ω; OFF for no RS-485 Line Termination (see section 6.3)

6.5.1 Setting the MACHINE

Table 4 defines the machine number dipswitch settings. The Machine # determines the position of a **VP-81K** unit, when controlling several units via RS-232 or RS-485.

Table 4: MACHINE # Dipswitch Settings

MACHINE #	DIP 1	DIP 2	DIP 3
1	OFF	OFF	OFF
2	OFF	OFF	ON
3	OFF	ON	OFF
4	OFF	ON	ON
5	ON	OFF	OFF
6	ON	OFF	ON
7	ON	ON	OFF
8	ON	ON	ON

6.6 Cascading Machines

You can cascade up to eight **VP-81K** units with control from a PC or serial controller (see Figure 14).

To cascade up to eight individual **VP-81K** units via RS-485, do the following:

1. Connect the computer graphics sources and acceptors, as section 6 describes.
2. Connect the RS-232 port¹ to the first **VP-81K** unit to the PC using the Null-modem adapter provided with the machine (recommended), as section 6.2 describes.
3. Connect the RS-485 terminal block port on the first unit to the RS-485 port on the second **VP-81K** unit and so on, connecting all the RS-485 ports.
4. Set the dipswitches, as section 6.2 describes:
 - Set the first **VP-81K** unit as Machine # 1 and the following seven **VP-81K** units as Machine # 2 to Machine # 8, according to Table 4
 - Set DIP 4 ON on the first and last **VP-81K** units (terminating the RS-485 line at 120Ω). Set DIP 4 OFF on the other **VP-81K** units

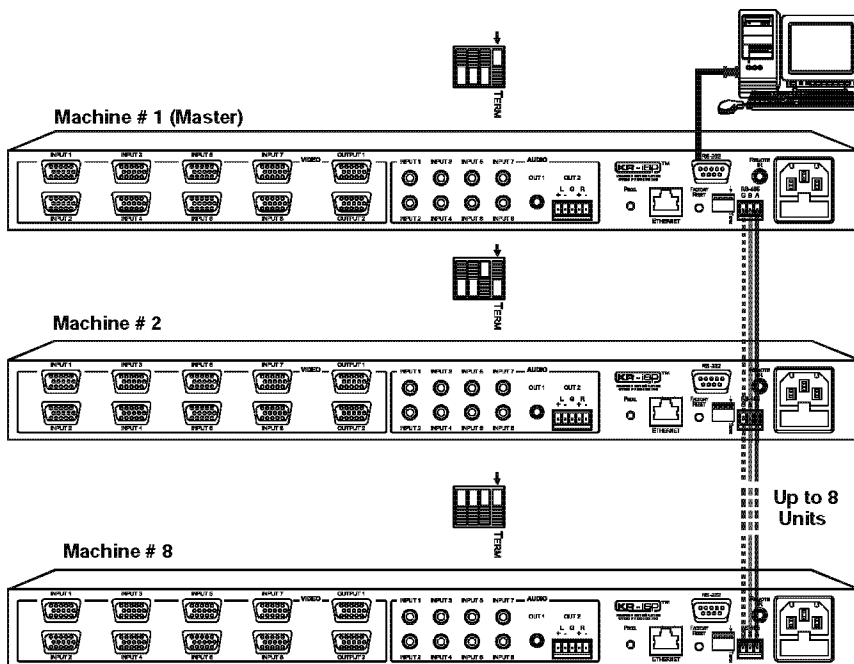


Figure 14: Control Configuration via RS-232 and RS-485

¹ Alternatively, the RS-485 port could be used for PC control (instead of RS-232)

7 Operating Your VP-81K 8x1 UXGA / Audio Switcher

You can operate your **VP-81K** via:

- The front panel INPUT SELECTOR buttons, as section 7.1 describes
- Remotely, by RS-485 or RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller
- The Ethernet
- Remotely, from the Kramer **RC-IR2** Infrared Remote Control Transmitter¹ (refer to the **RC-IR2** user manual) or the infrared remote extension cable transmitter

Powering up **VP-81K** unit, recalls the previous settings (that is, the state of the unit when it was powered down) from the non-volatile memory.

7.1 Using the Front Panel INPUT SELECTOR Buttons

Table 5 describes the INPUT SELECTOR button illumination definitions.

Table 5: Button Illumination Definitions

Button Color	Selected	Input Signal
Red	Yes	No
Green	No	Yes
Violet	Yes	Yes

To switch an input to the outputs, press one of the eight front panel INPUT SELECTOR buttons on the front panel of the **VP-81K**. The INPUT SELECTOR button illuminates (see Table 5) and routes that input simultaneously to both outputs.

7.2 Using the Regular or Automatic Switching Mode

You can set the machine to either the regular switching mode (see section 7.2.1) or the automatic switching mode (see section 7.2.2). By default, the machine is set to the regular switching mode.

7.2.1 The Regular Switching Mode

You can set the machine to the regular switching mode by simultaneously pressing and holding the VIDEO and INPUT 7 buttons for 2 seconds.

In the regular switching mode, all switching operations are performed manually.

¹ Previously known as the IR-1/IR-1-01

7.2.2 The Automatic Switching Mode

You can set the machine to the automatic switching mode by simultaneously pressing and holding the VIDEO and INPUT 8 buttons for 2 seconds.

In the automatic switching mode, the machine automatically switches to the lowest active INPUT video channel which is connected.

The following examples clarify the automatic switching mode:

- If input 6 is connected and active and input 4 is then connected (and active), the machine automatically switches to input 4
- If input 6 is connected but not active and input 7 is then connected and active, the machine automatically switches to input 7 which is the active input with the lowest number
- If input 2 is active and connected and input 7 is then connected and active, the machine remains switched to input 2 since it has the highest switching priority (the lowest active and connected input number)

Other switching operations are performed manually.

7.3 Using the Audio-Follow-Video / Breakaway Modes

By default, the **VP-81K** switches in true audio-follow-video mode in which all operations relate to both the video and audio. Both the VIDEO and the AUDIO buttons illuminate in this mode.

7.3.1 Operating in Breakaway Mode

To operate in breakaway mode, in which video and audio channels switch independently:

- Press either the VIDEO button or the AUDIO button (only one button, the VIDEO button or the AUDIO button illuminate at this time)
If the VIDEO button illuminates, the switching relates just to video (and the audio remains unchanged)
If the AUDIO button illuminates, the switching relates only to audio (and the video remains unchanged)

7.3.2 Toggling between Video and Audio Control in Breakaway Mode

To toggle between video and audio control, press the corresponding button:

- For audio, press the AUDIO button
This selects audio, illuminating the AUDIO button (the VIDEO button will not illuminate), or
- For video, press the VIDEO button
This selects video, illuminating the VIDEO button (the AUDIO button will not illuminate)

7.3.3 Operating in the Audio-Follow-Video Mode

To operate in audio-follow-video (AFV) mode¹, press both the VIDEO and the AUDIO buttons simultaneously.

7.4 Setting the Audio Gain

You can set the audio gain for each input individually (from 5dB to mute) using the AUDIO GAIN + and - buttons. To set the audio gain, press an input button to select an input (the selected input button illuminates) and then set the audio gain.

8 Flash Memory Upgrade

The **VP-81K** 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: “*FlashLoaderSetup.exe*” from the Technical Support section.
2. Extract the file: “*FlashLoaderSetup.exe*” 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-81K** firmware version.

8.2 Connecting the PC to the RS-232 Port

Before installing the latest Kramer firmware version on a **VP-81K** unit, connect the RS-232 9-pin D-sub rear panel port on the **VP-81K** 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 COM port on your PC (see section 6.2).

¹ In which the AUDIO and VIDEO buttons both illuminate. If only one button illuminates (AUDIO or VIDEO), the unit operates in the breakaway mode

8.3 Upgrading Firmware

To upgrade the firmware, do the following:

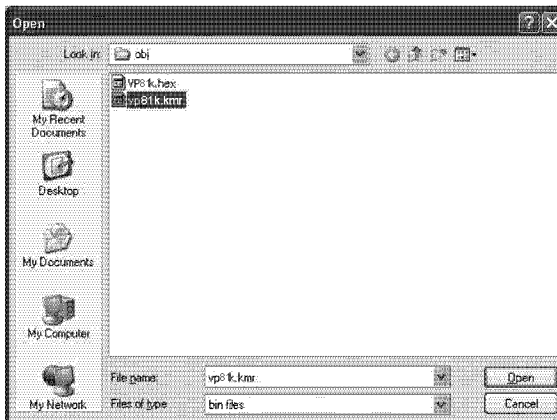
1. Double click the desktop icon: “*FlashLoader*”.
2. Connect the power on the **VP-81K** unit and switch it ON.
3. Set the appropriate COM port.

The following screen appears:



Figure 15: FlashLoader Window

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



Loading the Latest Firmware

5. Select the latest **VP-81K** firmware version, and click Open
Wait for completion of the upgrade procedure. The new firmware version appears in the INPUT STATUS 7-segment Display.

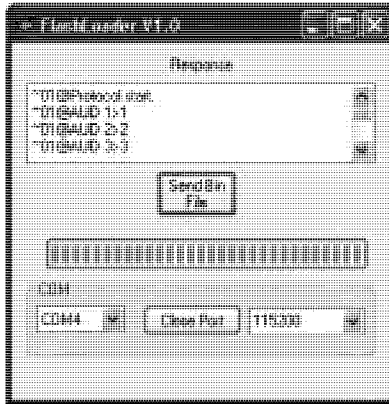


Figure 16: Flash Upgrade Process

6. If required, disconnect the RS-232 rear panel port on the **VP-81K** unit from the Null-modem adapter.

9 Technical Specifications

Table 6 includes the technical specifications:

Table 6: Technical Specifications¹ of the VP-81K

INPUTS:	8 UXGA on 15-pin HD connectors (VGA through UXGA) 8 unbalanced audio stereo signals on 3.5mm mini plug connectors	
OUTPUTS:	2 UXGA on 15-pin HD connectors (VGA through UXGA) 1 unbalanced audio stereo signal on a 3.5mm mini plug connector 1 balanced audio stereo signal on a detachable terminal block	
MAX. OUTPUT LEVEL:	VIDEO: 1.9Vpp	AUDIO: 19.5Vpp, maximum gain
BANDWIDTH (-3dB):	VIDEO: >325MHz	AUDIO: 30kHz
DIFF. GAIN	0.05%	
DIFF PHASE	0.05 Deg.	
S/N RATIO:	VIDEO: 73dB @5MHz	AUDIO: >70dB
CROSSTALK (all hostile):	VIDEO: -50dB @5MHz	AUDIO: -82dB @1kHz
CONTROLS:	Audio level buttons: -80dB to 5dB, audio and video select buttons, front panel selector switches; RS-232, RS-485; IR remote control;	
COUPLING:	VIDEO: DC	AUDIO: AC
AUDIO THD + NOISE:	<0.2%	
AUDIO 2nd HARMONIC:	<0.04%	
POWER SOURCE:	110-230V AC 50/60Hz 8VA max	
DIMENSIONS:	19-inch (W), 7-inch (D) 1U (H) rack-mountable	
WEIGHT:	2.7kg (6lbs) approx.	
ACCESSORIES:	Power cord, Null modem adapter, Windows®-based Kramer control software, Infrared remote control transmitter	
OPTIONS:	External remote IR receiver cable ² ; 15 meter extension cable ³	

¹ Specifications are subject to change without notice

² P/N: C-A35M/IRR-50

³ P/N: C-A35M/A35F-50

10 Table of ASCII Codes for Serial Communication (Protocol 3000)

Table 7 lists the ASCII values to switch an input to an output for a single **VP-81K** machine. For more detailed information, see Protocol 3000 (section 12.2).

Table 7: VP-81K Codes for Protocol 3000

	Video	Audio
IN 1	#V 1>1 <u>CR</u>	#A 1>1 <u>CR</u>
IN 2	#V 1>2 <u>CR</u>	#A 1>2 <u>CR</u>
IN 3	#V 1>3 <u>CR</u>	#A 1>3 <u>CR</u>
IN 4	#V 1>4 <u>CR</u>	#A 1>4 <u>CR</u>
IN 5	#V 1>5 <u>CR</u>	#A 1>5 <u>CR</u>
IN 6	#V 1>6 <u>CR</u>	#A 1>6 <u>CR</u>
IN 7	#V 1>7 <u>CR</u>	#A 1>7 <u>CR</u>
IN 8	#V 1>8 <u>CR</u>	#A 1>8 <u>CR</u>

11 Table of Hex Codes for Serial Communication (Protocol 2000)

Table 8 lists the Hex values to switch an input to an output for a single **VP-81K** machine. For more detailed information, see Protocol 2000¹ (see section 12.3).

Table 8: VP-81K Hex Codes for Protocol 2000

	Video	Audio
IN 1	01, 81, 81, 81	02, 81, 81, 81
IN 2	01, 82, 81, 81	02, 82, 81, 81
IN 3	01, 83, 81, 81	02, 83, 81, 81
IN 4	01, 84, 81, 81	02, 84, 81, 81
IN 5	01, 85, 81, 81	02, 85, 81, 81
IN 6	01, 86, 81, 81	02, 86, 81, 81
IN 7	01, 87, 81, 81	02, 87, 81, 81
IN 8	01, 88, 81, 81	02, 88, 81, 81

¹ Go to the Technical Support section of our Web site at <http://www.kramerelectronics.com>

12 Kramer Protocol¹

By default, the **VP-81K** is set to protocol 3000 (see section 12.2) but is also compatible with Kramer's Protocol 2000 (see section 12.3). Section 12.1 describes how to switch between protocol 3000 and protocol 2000.

12.1 Switching Protocols

You can switch protocols either via the front panel buttons (see section 12.1.1) or the protocol commands (see section 12.1.2).

12.1.1 Switching Protocols via the Front Panel Buttons

To switch from protocol 3000 to protocol 2000 via the:

- Front panel buttons, press the IN 1 and IN 2 button simultaneously
- Infrared remote control transmitter, press the TAKE button and then 13

To switch from protocol 2000 to protocol 3000 via the:

- Front panel buttons, press the IN 1 and IN 3 button simultaneously
- Infrared remote control transmitter, press the TAKE button and then 16

12.1.2 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-81K** is set to Protocol 3000, it is automatically switched to Protocol 2000.

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>

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

12.2 Kramer Protocol 3000

This RS-232/RS-485 communication protocol¹ lets you control the machine from any standard terminal software (for example, Windows® HyperTerminal Application).

12.2.1 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):

*# 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
~	<i>Sender_id@</i>	message	CR LF

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

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

CR = Carriage return (ASCII 13 = 0x0D)

LF = Line feed (ASCII 10 = 0x0A)

SP = Space (ASCII 32 = 0x20)

¹ Not available at the time of printing. Refer to our Web site at <http://www.kramerelectronics.com> for details

12.2.2 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).

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 9: Instruction Codes for Protocol 3000

Help commands		
Command	Syntax	Response
Protocol Handshaking	# CR	~OK CR LF
Device initiated messages		
Command	Syntax	
Start message	Kramer Electronics LTD. , Device Mode 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] , ...
Read audio connection	AUD? [OUT] Short form: A? [OUT] AUD? *	AUD [IN->OUT] AUD [IN>1] , [IN>2] , ...
Parameters Description: [N] = Input number or '0' to disconnect output. '>' = Connection character between in and out parameters. [OUT] = Output number or '*' for all outputs.		

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Examples:		
Switch Video and Audio input 3 to output 7	#AV 3>7 $\overline{\text{CR}}$	~AV 3>7 OK $\overline{\text{CRLF}}$
Switch Video input 2 to output 4	#V 2>4 $\overline{\text{CR}}$	~VID 2>4 OK $\overline{\text{CRLF}}$
Switch Video input 4 to output 2 in machine number 6	#6@VID 4>2 $\overline{\text{CR}}$	~6@VID 4>2 OK $\overline{\text{CRLF}}$
Disconnect Video and Audio Output 4	#AV 0>4 $\overline{\text{CR}}$	~AV 0>4 OK $\overline{\text{CRLF}}$
Switch Video Input 3 to All Outputs	#V 3>* $\overline{\text{CR}}$	~VID 3>* OK $\overline{\text{CRLF}}$
Chaining Multiple commands*	<p>#AV 1>* V 3>4, 2>2, 82>1, 0>2 V 82>3 A 0>1 V? *$\overline{\text{CR}}$</p> <p>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.</p> <p>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 $\overline{\text{CR}}$, response will sent for each command after processing it.</p>	<p>~AV 1>* OK$\overline{\text{CRLF}}$</p> <p>~VID 1>2, 3>4 OK$\overline{\text{CRLF}}$</p> <p>~VID 82>3 $\overline{\text{ERR###}}$ $\overline{\text{CRLF}}$</p> <p>~AUD 0>1 OK$\overline{\text{CRLF}}$</p> <p>~V 1>1, 0>2, 1>3, 3>4 $\overline{\text{CRLF}}$</p>

Signal Status commands		
Command	Syntax	Response
Change signal status	-----	SIGNAL $\overline{\text{INPUT}}$ $\overline{\text{STATUS}}$
Get signal status	SIGNAL? $\overline{\text{INPUT}}$	SIGNAL $\overline{\text{INPUT}}$ $\overline{\text{STATUS}}$

Parameters Description:

$\overline{\text{INPUT}}$ = Input number, '*' for all.

$\overline{\text{STATUS}}$ = Signal state:

"0" or "off" for not existent signal.

"1" or "on" for existent signal.

Preset commands		
Command	Syntax	Response
Store current connections to preset	PRST-STO $\overline{\text{PRESET}}$ Short form: PSTO $\overline{\text{PRESET}}$	PRST-STO $\overline{\text{PRESET}}$ $\overline{\text{RESULT}}$
Recall saved preset	PRST-RCL $\overline{\text{PRESET}}$ Short form: PRCL $\overline{\text{PRESET}}$	PRST-RCL $\overline{\text{PRESET}}$ $\overline{\text{RESULT}}$
Delete saved preset	PRST-DEL $\overline{\text{PRESET}}$ Short form: PDEL $\overline{\text{PRESET}}$	PRST-DEL $\overline{\text{PRESET}}$ $\overline{\text{RESULT}}$
Read video connections from saved preset	PRST-VID? $\overline{\text{PRESET}}$ $\overline{\text{OUT}}$ Short form: PVID? $\overline{\text{PRESET}}$ $\overline{\text{OUT}}$ PRST-VID? $\overline{\text{PRESET}}$, *	PRST-VID $\overline{\text{PRESET}}$ $\overline{\text{IN}}$ - $\overline{\text{OUT}}$ PRST-VID $\overline{\text{PRESET}}$ $\overline{\text{IN}}$ >1, $\overline{\text{IN}}$ >2,...
Read audio connections from saved preset	PRST-AUD? $\overline{\text{PRESET}}$ $\overline{\text{OUT}}$ Short form: PAUD? $\overline{\text{PRESET}}$ $\overline{\text{OUT}}$ PRST-AUD? $\overline{\text{PRESET}}$, *	PRST-AUD $\overline{\text{PRESET}}$: $\overline{\text{IN}}$ - $\overline{\text{OUT}}$ PRST-AUD $\overline{\text{PRESET}}$: $\overline{\text{IN}}$ >1, $\overline{\text{IN}}$ >2,...
Read saved presets list	PRST-LST? Short form: PLST?	PRST-LST $\overline{\text{PRESET}}$, $\overline{\text{PRESET}}$, ...

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Preset commands		
Command	Syntax	Response
Parameters Description: [PRESET] = Preset number. [OUT] = Output in preset to show for, "*" for all.		

Examples:		
Store current Audio & Video connections to preset 5	#PRST-STR 5 [CR]	~PRST-STR 5 OK [CRLF]
Recall Audio & Video connections from preset 3	#PRCL 3 [CR]	~PRST-RCL 3 OK [CRLF]
Show source of video output 2 from preset 3	#PRST-VID? 3,2 [CR]	~PRST-VID 3: 4>2 [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]

Mute audio	MUTE [MUTE-MODE]	MUTE [MUTE-MODE] [RESULT]
Read audio mute state	MUTE?	MUTE [MUTE-MODE]

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/out 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		

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Network settings commands		
Set IP Address	NET-IP <u>IP ADDRESS</u> NTIP	NET-IP <u>IP ADDRESS</u> <u>RESULT</u>
Read IP Address	NET-IP? NTIP?	NET-IP <u>IP ADDRESS</u>
Read MAC Address	NET-MAC? NTMC	NET-MAC <u>MAC ADDRESS</u>
Set subnet mask	NET-MASK <u>SUBNET MASK</u> NTMSK	NET-MASK <u>SUBNET MASK</u> <u>RESULT</u>
Read subnet mask	NET-MASK? NTMSK?	NET-MASK <u>SUBNET MASK</u>
Set gateway address	NET-GATE <u>GATEWAY ADDRESS</u> NTGT	NET-GATE <u>GATEWAY ADDRESS</u> <u>RESULT</u>
Read subnet mask	NET-GATE? NTGT?	NET-GATE <u>GATEWAY ADDRESS</u>
Set DHCP mode	NET-DHCP <u>DHCP MODE</u> NTDH	NET-DHCP <u>DHCP MODE</u> <u>RESULT</u>
Read subnet mask	NET-DHCP? NTDH?	NET-DHCP <u>DHCP MODE</u>
<p>DHCP MODE =</p> <p>0 – Don't use DHCP (Use IP set by factory or IP set command).</p> <p>1 – Try to use DHCP, if unavailable use IP as above.</p>		
Change protocol ethernet port	ETH-PORT <u>PROTOCOL</u> , <u>PORT</u> ETHP	ETH-PORT <u>PROTOCOL</u> <u>PORT</u> <u>RESULT</u>
Read protocol ethernet port	ETH-PORT? <u>PROTOCOL</u> ETHP?	ETH-PORT <u>PROTOCOL</u> , <u>PORT</u>
<p><u>PROTOCOL</u> = TCP / UDP (transport layer protocol)</p> <p><u>PORT</u> = ethernet port to enter protocol 3000 commands.</p> <p>1-65535 = User defined port</p> <p>0 - reset port to factory default (50000 for UDP, 5000 for TCP)</p>		
Advanced switching commands		
Command	Syntax	Response
Set audio follow video mode	AFV <u>AFV-MODE</u>	AFV <u>AFV-MODE</u> <u>RESULT</u>
<p>Note:</p> <p>This command effect device front-panel mode and AUD\VID command.</p>		
Read audio follow video mode	AFV?	AFV <u>AFV-MODE</u>
<p>AFV-MODE = Front panel AFV mode</p> <p>"0" or "afv" to set front panel switching buttons in audio-follow-video state.</p> <p>"1" or "brk" to set front panel switching buttons in their previous state when audio.</p>		

12.3 Kramer Protocol 2000

This RS-232/RS-485 communication protocol (version 0.5) uses four bytes of information as defined below. For RS-232, a null-modem connection between the machine and controller is used. The default data rate is 9600 baud, with no parity, 8 data bits and 1 stop bit.

Table 10: 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 11: Instruction Codes for Protocol 3000

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
3	STORE VIDEO STATUS	Set as SETUP #	0 - to store 1 - to delete	2, 3
4	RECALL VIDEO STATUS	Set as SETUP #	0	2, 3
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
8	BREAKAWAY SETTING	0	0 - audio-follow-video 1 - audio breakaway	2
11	REQUEST BREAKAWAY SETTING	Set as SETUP #	0 - Request audio breakaway setting	3, 4, 6
15	REQUEST WHETHER SETUP IS DEFINED / VALID INPUT IS DETECTED	SETUP # or Input #	0 - for checking if setup is defined 1 - for checking if input is valid	8
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
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: I0 - 0=input, 1=output I1 - Left I2 - Right	0 - Gain 1 - Bass 2 - Treble 3 - Midrange 4 - Mix On	24
56	CHANGE TO ASCII	0	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:

Kramer Protocol

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 8 - The reply is as in TYPE 3 above, except that here the OUTPUT is assigned with the value 0 if the setup is not defined / no valid input is detected; or 1 if it is defined / valid input is detected.

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

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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.



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