

**Kramer Electronics, Ltd.**



# **USER MANUAL**

**Model:**

**VP-16x18AK**

*16 x 18 PC UXGA/Audio Router*

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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 video, audio, presentation, and broadcasting professionals on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 1,000-plus different models now appear in 11 groups<sup>1</sup> that are clearly defined by function.

Congratulations on purchasing your **VP-16x18AK**, *16 x 18 PC UXGA/Audio Router* which is ideal for the following typical applications:

- Professional display systems requiring a true 16x18 computer graphics and audio matrix operation
- Multimedia and presentation source and acceptor selection

The package includes the following items:

- **VP-16x18AK**, *16 x 18 PC UXGA/Audio Router*
- Kramer **RC-IR3** Infrared Remote Control transmitter (including the required battery and a separate user manual<sup>2</sup>)
- Power cord<sup>3</sup>, rack “ears” and this user manual<sup>2</sup>

## 2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use Kramer high-performance high-resolution cables<sup>4</sup>
- Use only the power cord that is supplied with this machine

### 2.1 Recycling Kramer Products

The Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC aims to reduce the amount of WEEE sent for disposal to landfill or incineration by requiring it to be collected and recycled. To comply with the WEEE Directive, Kramer Electronics has made

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

2 Available from <http://www.kramerelectronics.com>

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

4 The complete list of Kramer cables is available from <http://www.kramerelectronics.com>



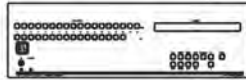
arrangements with the European Advanced Recycling Network (EARN) and will cover any costs of treatment, recycling and recovery of waste Kramer Electronics branded equipment on arrival at the EARN facility. For details of Kramer's recycling arrangements in your particular country go to our recycling pages at <http://www.kramerelectronics.com/support/recycling/>.

## **2.2 Quick Start**

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

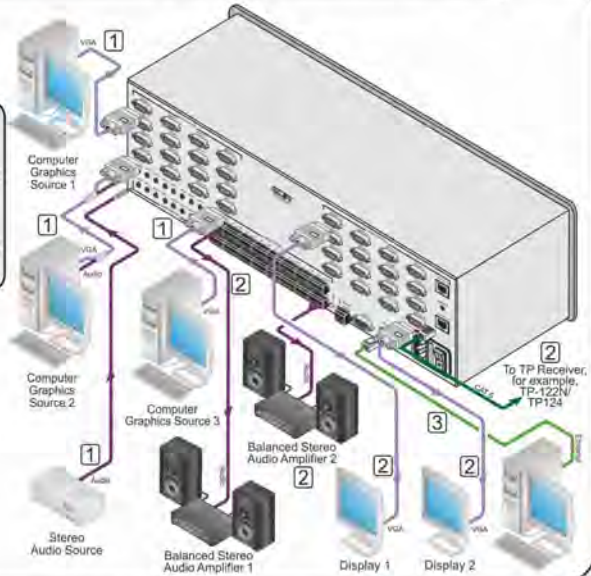
**Step 1: Mount the machine - see Section 5**

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



**Step 2: Connect and configure the unit - see Section 6**

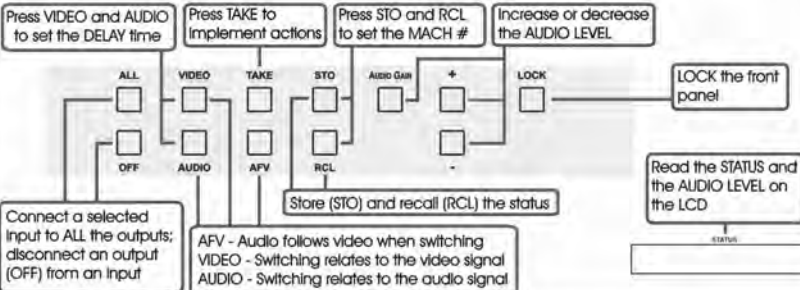
- 1 Connect the inputs
- 2 Connect the outputs
- 3 Optional—Connect a PC via Ethernet for remote operation
- 4 If required, set the RS-485 DIP-switches (not shown)



**Step 3: Turn the power ON**

**Step 4: Operate the machine - see Sections 7, 8 and 9**

Use the front panel SELECTOR buttons to switch the inputs to the outputs



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



### 3 Overview

The **VP-16x18AK** is a high performance, 16x18 computer graphics video matrix router for high resolution video and stereo audio signals. The **VP-16x18AK** is HDTV compatible and lets you simultaneously route any or all of the 16 inputs to any or all of the 18 outputs.

In particular, the **VP-16x18AK**, *16 x 18 PC UXGA/Audio Router* features:

- Kramer's innovative integrated sync processing; Kr-isp<sup>®</sup> technology provides a sharp, stable image by restoring the signal waveform even when the sync level is too low
- A video bandwidth of over 300MHz that ensures transparent performance even for the most critical applications
- 12 preset memory locations for quick access to common routing configurations and audio gain status for each output
- Automatic detection of inputs with live connections (the respective input button lights green)
- A delayed switching mode (ranging from 0 to 3.5sec<sup>1</sup>) for clean transitions when switching between non-genlocked sources
- DC-coupled video inputs and outputs
- Audio-follow-video and breakaway options
- 16 VGA (up to UXGA) video inputs on 15-pin HD connectors
- 16 unbalanced, stereo audio inputs on 3.5mm mini jacks
- 16 VGA (up to UXGA) video outputs on 15-pin HD connectors
- 16 balanced stereo audio outputs on 5-pin, removable terminal block connectors
- Two Twisted Pair outputs on RJ-45 connectors
- Audio level control buttons for adjusting the volume of each input and output
- Bass and treble control for each output
- The ability to place multiple switching actions in a queue and then to activate them simultaneously with a one touch button
- The ability to lock the front panel buttons to prevent tampering with settings
- Support for DDC (Display Data Channel) communication between input 1 and output 1 high-density 15-pin HD connectors on pins 12 and 15
- Default EDID values programmed on each input
- Customizable bass and treble for each output

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<sup>1</sup> In ½ second increments



You can operate the **VP-16x18AK** using the front panel buttons, or remotely via:

- RS-485, RS-232 serial or Ethernet TCP/UDP commands (using Kramer 2000 and 3000 protocols) transmitted by a touch screen system, PC or other serial/Ethernet controller
- The Kramer Infrared Remote Control transmitter or Infrared remote extension cable transmitter (optional)
- Your Web browser using Ethernet communication over a LAN

The **VP-16x18AK** is dependable, rugged and fits into three vertical spaces (3U) of a standard 19" professional rack.

### 3.1 Recommendations for Best Performance

To achieve the best performance:

- Use only high quality connection cables<sup>1</sup> to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Do not secure the cables in tight bundles or roll the slack into tight coils
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality
- Position your Kramer **VP-16x18AK** away from moisture, excessive sunlight and dust

### 3.2 Shielded Twisted Pair and Unshielded Twisted Pair

We recommend that you use Shielded Twisted Pair (STP) cable, and stress that the compliance to electromagnetic interference was tested using STP cable. There are different levels of STP cable available, and we advise you to use the best quality STP cable that you can afford. Our non-skew-free cable, Kramer **BC-STP** is intended for analog signals where skewing is not an issue.

In cases where there is skewing, our Unshielded Twisted Pair (UTP) skew-free cable, Kramer **BC-XTP**, may be advantageous, and UTP cable might also be preferable for long range applications. In any event when using UTP cable, it is advisable to ensure that the cable is installed far away from electric cables, motors and so on, which are prone to create electrical interference.

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<sup>1</sup> Available from Kramer Electronics and listed on our Web site at <http://www.kramerelectronics.com>

## 4 Defining the VP-16x18AK 16 x 18 PC UXGA/Audio Router

Figure 1 and Table 1 define the front panel of the VP-16x18AK 16 x 18 PC UXGA/Audio Router.

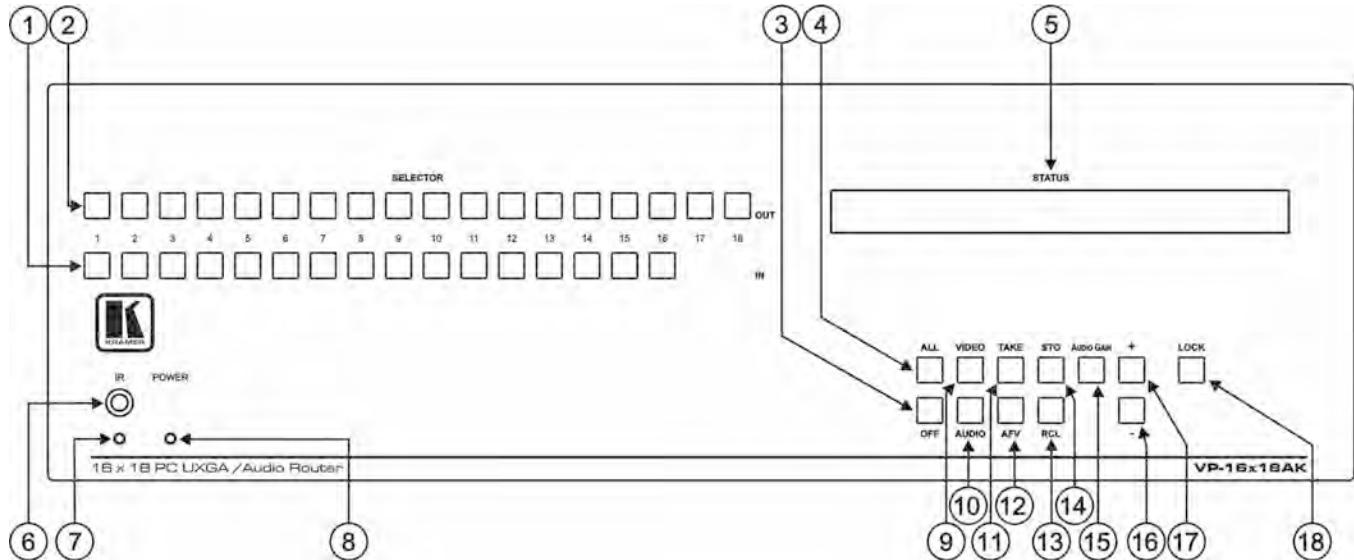


Figure 1: VP-16x18AK 16 x 18 PC UXGA/Audio Router Front Panel

Table 1: VP-16x18AK 16 x 18 PC UXGA/Audio Router Front Panel Features

#	Feature	Function
1	SELECTOR IN Buttons	Press to select an input (from 1 to 16) following the selection of an output (see <a href="#">Section 7.2</a> ). When an input signal is detected, the corresponding input button lights
2	SELECTOR OUT Buttons	Press to select an output (from 1 to 18) followed by an input selection (see <a href="#">Section 7.2</a> )

## Defining the VP-16x18AK 16 x 18 PC UXGA/Audio Router

#	Feature	Function
3	OFF Button	Press a SELECTOR OUT button followed by OFF to disconnect the selected output from the input (see <a href="#">Section 7.2</a> ). Press ALL followed by OFF to disconnect all outputs
4	ALL Button	Press ALL followed by an INPUT button to switch the selected input to all outputs <sup>1</sup> (see <a href="#">Section 7.2</a> )
5	STATUSLCD Readout	Displays the current Input-Output switching configuration <sup>2</sup> on a 2 line LCD readout
6	IR Sensor	IR receiver for the Remote Control IR transmitter
7	IR LED	Lights yellow when a signal is received from the IR transmitter
8	POWER LED	Lights green when the unit receives power and is switched on
9	VIDEO Button	Press for subsequent actions to relate to video. The button lights when the video mode is active. Press in conjunction with AUDIO to set the delay time
10	AUDIO Button	Press for subsequent actions to relate to audio. The button lights when the audio mode is active. Press in conjunction with VIDEO to set the delay time
11	TAKE Button	Press to set the Confirm mode <sup>3</sup> (where user confirmation is required for switching actions); press again to set the At Once mode (where user confirmation per action is not required). When in Confirm mode, press the TAKE button to execute pending actions (see <a href="#">Section 7.3.2</a> )
12	AFV Button	Press to make the audio channels follow the video channel switching. The button lights when the AFV mode is active (see <a href="#">Section 7.6</a> )
13	RCL (Recall) Button	Press in conjunction with an Output button to recall a switching preset (see <a href="#">Section 7.7.2</a> ). Press again to execute the preset. Press in conjunction with STO to set the machine number
14	STO (Store) Button	Press followed by an Output button to store the current switching configuration (see <a href="#">Section 7.7.1</a> ). Press in conjunction with RCL to set the machine number
15	AUDIO GAIN Button	Press (following selection of an output or input) to set the audio input or output gain (see <a href="#">Section 7.4</a> )
16	AUDIO – Button	Press (following the Audio Gain button) to decrease the audio signal level (input, output, bass or treble)
17	LEVEL + Button	Press (following the Audio Gain button) to increase the audio input signal level (input, output, bass or treble)
18	LOCK Button	Press and hold to lock the front panel buttons, press and hold again to unlock the buttons. The button lights when the front panel is locked (see <a href="#">Section 9.2.5</a> )

<sup>1</sup> For example, press ALL and then IN button 2 to connect input 2 to all the outputs

<sup>2</sup> Also displays the number of input and output ports, the firmware version number and the machine number (see [Section 6.6](#))

<sup>3</sup> When in the Confirm mode, the TAKE button lights



Defining the VP-16x18AK 16 x 18 PC UXGA/Audio Router

Figure 2 and Table 2 define the rear panel of the **VP-16x18AK 16 x 18 PC UXGA/Audio Router**.

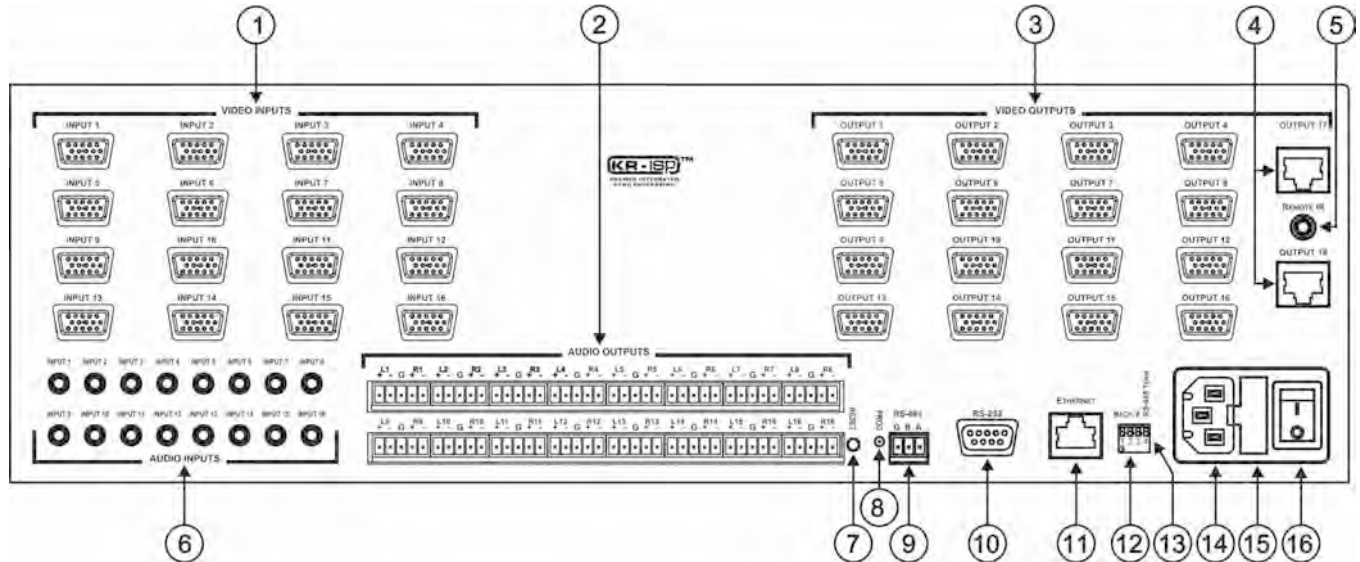


Figure 2: VP-16x18AK 16 x 18 PC UXGA/Audio Router Rear Panel

## Defining the VP-16x18AK 16 x 18 PC UXGA/Audio Router

*Table 2: VP-16x18AK 16 x 18 PC UXGA/Audio Router Rear Panel Features*

#	Feature	Function	
1	<b>VIDEO INPUTS</b> 15-pin HD (F) Connectors	Connect to the VGA <sup>1</sup> sources (from 1 to 16)	
2	<b>AUDIO OUTPUTS</b> Removable Terminal Block Connectors	Connect to balanced stereo audio acceptors (from 1 to 16)	
3	<b>VIDEO OUTPUTS</b>	VGA 15-pin HD (F) Connectors	Connect to the VGA <sup>1</sup> acceptors (from 1 to 16)
4		<b>OUTPUT 17, OUTPUT 18</b> RJ-45 TP Connectors	Connect to compatible TP receivers (for example, TP-122N/TP-142)
5	<b>REMOTE IR</b> Opening <sup>2</sup>	Mount the optional internal IR connection cable that connects to an external IR receiver unit for controlling the machine via an IR remote controller instead of using the front panel IR receiver	
6	<b>AUDIO INPUTS</b> 3.5mm Mini Jacks	Connect to the unbalanced stereo audio sources (from 1 to 16)	
7	<b>RESET</b> Button	Press and hold while powering up the unit to reset all audio, switching and Ethernet settings to their factory default values (see <a href="#">Section 12</a> )	
8	<b>PROG</b> Button	For the use of Kramer service personnel only	
9	<b>RS-485</b> 3-pin Terminal Block	Connect to the corresponding pins A(+), B(-) and G on another device for RS-485 communication (see <a href="#">Section 6.4</a> )	
10	<b>RS-232</b> 9-pin D-sub Serial Port	Connect to a PC or remote controller (see <a href="#">Section 6.3</a> )	
11	<b>ETHERNET</b> RJ-45 Connector	Connect to a PC or other controller over a LAN (see <a href="#">Section 6.5</a> )	
12	<b>MACH #</b> DIP-switches (1, 2 and 3)	Use to set the RS-485 machine number (see <a href="#">Section 6.6</a> )	
13	<b>RS-485 TERM</b> DIP-switch (4)	Use to set the RS-485 termination <sup>3</sup> ; ON (down) for RS-485 line termination with 120Ω; OFF (up) for no RS-485 line termination (see <a href="#">Section 6.6</a> )	
14	Mains Power Connector	Connect to the AC mains power supply	
15	Fuse Holder	Mains fuse holder	
16	Power Switch	Switch for turning the unit on and off	

<sup>1</sup> Up to UXGA resolution

<sup>2</sup> Covered by a removable cap The 3.5mm mini jack at the end of the internal IR connection cable fits into this opening

<sup>3</sup> Terminate the first and the last physical units on the RS-485 bus (on) Leave all other units unterminated (off)



## 4.1 Using the IR Transmitter

You can use the **RC-IR3** IR transmitter to control the machine via the built-in IR receiver on the front panel or, instead, via an optional external IR receiver<sup>1</sup>. The external IR receiver can be located up to 15m (50ft) away from the machine. This distance can be extended to up to 60m (200ft) when used with three extension cables<sup>2</sup>

Before using the external IR receiver, be sure to arrange for your Kramer dealer to insert the internal IR connection cable<sup>3</sup> with the 3.5mm jack that fits into the REMOTE IR opening on the rear panel. Connect the external IR receiver to the REMOTE IR 3.5mm jack.

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1 Model: C-A35M/IRR-50

2 Model: C-A35M/A35F-50

3 P/N: 505-70434010-S

## 5 Installing the VP-16x18AK in a Rack

This section describes what to do before installing in a rack and how to rack mount the **VP-16x18AK**.

**Before installing in a rack**, be sure that the environment is within the recommended range:

OPERATING TEMPERATURE:	0° to +40°C (32° to 104°F)
STORAGE TEMPERATURE:	-40° to +70°C (-40° to 158°F)
HUMIDITY:	10% to 90%, RHL non-condensing



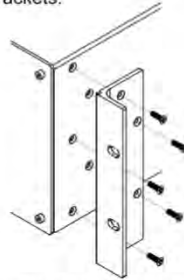
### CAUTION!

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

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

**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 (5 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:

- 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 available from our Web site

## 6 Connecting and Configuring the VP-16x18AK

This section describes how to:

- Connect the **VP-16x18AK** (see [Section 6.1](#))
- Connect a balanced stereo audio output (see [Section 6.2](#))
- Connect the **VP-16x18AK** to a remote control device via:
  - RS-232 (see [Section 6.3](#))
  - RS-485 (see [Section 6.4](#))
  - Ethernet (see [Section 6.5](#))
- Set the RS-485 termination and machine number (see [Section 6.6](#))

### 6.1 Connecting the VP-16x18AK



Always switch off the power on each device before connecting it to your **VP-16x18AK**. After connecting your **VP-16x18AK**, connect its power and then switch on the power on each device.

**To connect<sup>1</sup> the VP-16x18AK, as illustrated in the example<sup>2</sup> in [Figure 3](#):**

1. Connect the VGA (up to UXGA) sources (for example, computer graphics sources) to the 15-pin HD VIDEO INPUT connectors.
2. Connect the unbalanced stereo audio sources (for example, the audio source of the computer) to the 3.5mm mini AUDIO INPUT jacks.
3. Connect the 15-pin HD VGA VIDEO OUTPUT connectors to the video acceptors (for example, video displays).
4. Connect the AUDIO OUTPUT terminal block connectors to the balanced stereo audio acceptors (for example, balanced stereo audio amplifiers with speakers).
5. If required, you can connect a PC and/or controller to the:
  - RS-232 port (see [Section 6.3](#))
  - RS-485 port (see [Section 6.4](#))
  - Ethernet port via a LAN (see [Section 6.5](#))
6. Connect the power cord<sup>3</sup> (not shown in [Figure 3](#)).

---

<sup>1</sup> You do not need to connect all inputs and outputs

<sup>2</sup> Switch off the power on each device before connecting it to your VP-16x18AK. After connecting your VP-16x18AK, switch on its power and then switch on the power on each device. Do NOT push in the rear panel PROG button, it is reserved for service use.

<sup>3</sup> We recommend that you use only the power cord that is supplied with this machine.



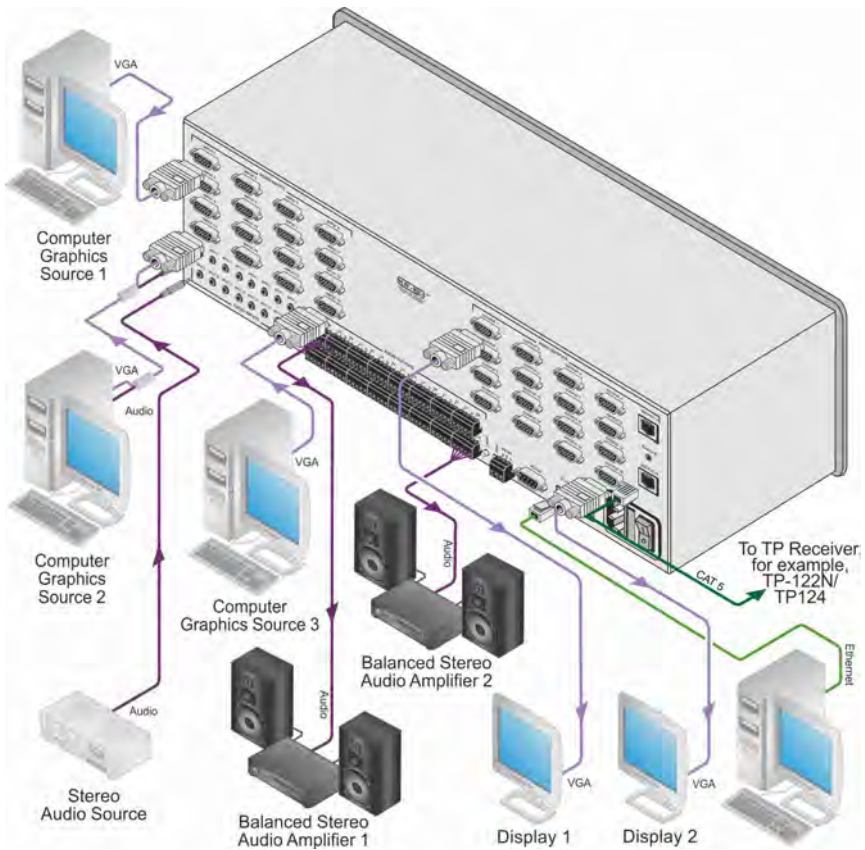


Figure 3: Connecting the VP-16x18AK 16 x 18 PC UXGA/Audio Router

## 6.2 Connecting the Audio Outputs to Balanced/Unbalanced Acceptors

Figure 4 illustrates how to connect the VP-16x18AK to a balanced acceptor.

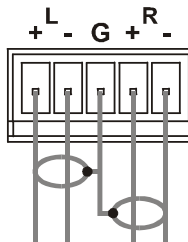
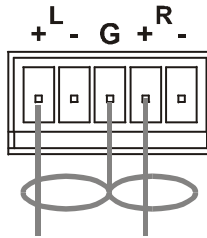


Figure 4: Connecting to a Balanced Acceptor

[Figure 5](#) illustrates how to connect the **VP-16x18AK** to an unbalanced acceptor.



*Figure 5: Connecting to an Unbalanced Acceptor*

### 6.3 Connecting to the VP-16x18AK via RS-232

You can connect to the **VP-16x18AK** via an RS-232 connection using, for example, a PC. Note that a null-modem adapter/connection is not required.

To connect to the **VP-16x18AK** via RS-232:

- Connect the RS-232 9-pin D-sub rear panel port on the **VP-16x18AK** unit via a 9-wire straight cable (only pin 2 to pin 2, pin 3 to pin 3, and pin 5 to pin 5 need be connected) to the RS-232 9-pin D-sub port on your PC

### 6.4 Connecting to the VP-16x18AK via RS-485

You can operate the **VP-16x18AK** via the RS-485 port from a distance of up to 1200m (3900ft) using a PC equipped with a card that provides an RS-485 port<sup>1</sup>.

**To connect a PC or controller to the RS-485 port on the VP-16x18AK:**

1. Wire the RS-485 port on the device to the RS-485 port on the controller as follows:
  - Connect the A(+) pin on the RS-485 port of the PC to the A(+) pin on the RS-485 port on the rear panel of the **VP-16x18AK**
  - Connect the B(-) pin on the RS-485 port of the PC to the B(-) pin on the RS-485 port on the rear panel of the **VP-16x18AK**
  - Connect the G pin on the RS-485 port of the PC to the G pin on the RS-485 port on the rear panel of the **VP-16x18AK**
2. Set the DIP-switches (see [Section 6.6](#)) so that the machine number on the **VP-16x18AK** is any number between 2 and 8.
3. Terminate the RS-485 line on both the **VP-16x18AK** (set DIP-switch 1 to ON) and on the PC (see [Section 6.6](#)).

---

<sup>1</sup> RS-485 can be used for control even for distances exceeding 1km

## 6.5 Connecting to the VP-16x18AK via the Ethernet Port

You can connect the **VP-16x18AK** via Ethernet using either of the following methods:

- Direct connection to the PC using a crossover cable (see [Section 6.5.1](#))
- Connection via a network hub, switch or router using a straight-through cable (see [Section 6.5.2](#))

**Note:** The following instructions are valid only if your PC uses a fixed IP address. If your PC receives an IP address from a DHCP server, consult your IT department regarding a suitable IP address.

### 6.5.1 Connecting Directly to the Ethernet Port

You can connect the Ethernet port of the **VP-16x18AK** to the Ethernet port on your PC via a crossover cable with RJ-45 connectors.

This type of connection is recommended for identification of the factory default IP Address of the <b>VP-16x18AK</b> during the initial configuration
---

**To connect the VP-16x18AK directly to a PC using a crossover cable:**

1. Using a crossover cable, connect the **VP-16x18AK** to the PC via the Ethernet port on both units.
2. On the PC, click **Start > Control Panel**.
3. Double-click **Network Connections**.
4. Right-click, and from the menu select **Properties**.  
The **Local Area Connection Properties** window appears.
5. Select **Internet Protocol (TCP/IP)** (see [Figure 6](#)).

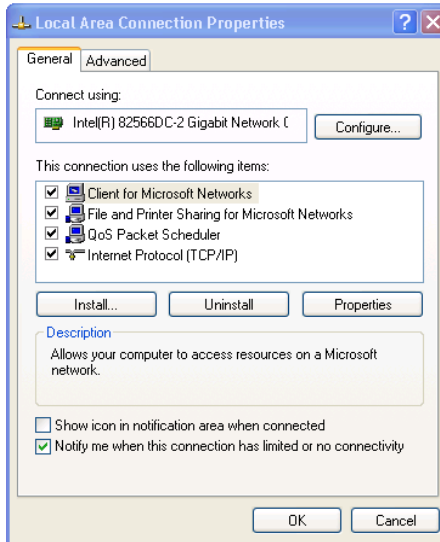


Figure 6: Local Area Connection Properties Window

6. Click the **Properties** button.
7. Select **Use the following IP address**, and fill in the details as shown in [Figure 7](#). You can use any IP address in the range 192.168.1.1 to 192.168.1.255 (excluding 192.168.1.39) that is provided by your IT department.

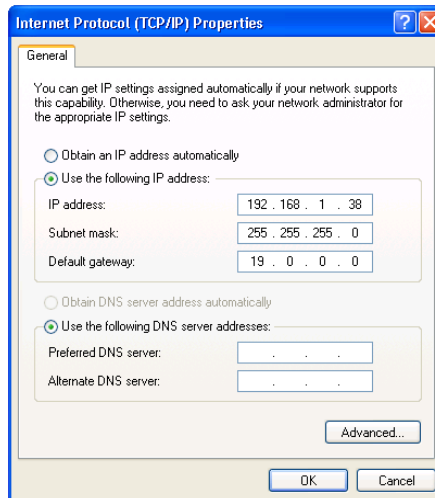


Figure 7: Internet Protocol (TCP/IP) Properties Window

8. Click **OK**.

### 6.5.2 Connecting via a Network Hub, Switch, or Router

You can connect the Ethernet port of the **VP-16x18AK** to the Ethernet port on a network hub, switch, or router, via a straight-through cable with RJ-45 connectors. The **VP-16x18AK** Ethernet port has to be configured to be compatible with your network (see [Section 6.5.3](#)).

### 6.5.3 Configuring the Ethernet Port on the VP-16x18AK Using K-Upload

To configure the Ethernet port on the **VP-16x18AK**, see the *K-Upload Guide*<sup>1</sup>.

### 6.6 Setting the RS-485 Termination and Machine Number DIP-switches

This section describes the **VP-16x18AK** DIP-switch settings that determine the machine number and RS-485 bus termination.

[Figure 8](#) illustrates the factory default DIP-switch positions. A switch in the up position is off. To turn a switch on, push it down.

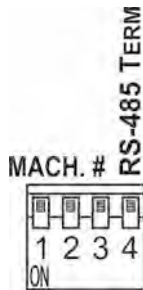


Figure 8: VP-16x18AK DIP-switches

Table 3: DIP-switch Settings

DIP-switch Number	Function
1, 2, 3	RS-485 Machine number (see <a href="#">Table 4</a> ) Default—All off, machine number 1
4	RS-485 Termination Default—Off

DIP-switches 1, 2 and 3 determine the RS-485 machine number for the **VP-16x18AK**. When several **VP-16x18AK** units are connected, the machine number determines the unique identity of the **VP-16x18AK** in the sequence (see [Table 4](#)).

<sup>1</sup> Available from <http://www.kramerelectronics.com>

**Note:**

- When using a stand-alone **VP-16x18AK** unit set the machine number to 1 (factory default)
- When connecting more than one **VP-16x18AK** set the first machine (connected via RS-232) to be machine number 1. The other **VP-16x18AK** units must each be set to a unique machine number between 2 and 8.

*Table 4: Machine Number DIP-switch Settings*

Machine Number	DIP-switch Number		
	1	2	3
1 (Default)	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

DIP-switch 4 sets the RS-485 termination of the **VP-16x18AK**. Only the first and last physical units on the RS-485 bus should be terminated, all others must be unterminated. Moving the DIP-switch up turns the termination off (default), moving the switch down turns the termination on.

## 7 Operating the VP-16x18AK Locally via the Front Panel Buttons

### 7.1 The Status Display

For a few seconds after being powered on, the unit's model, machine number and firmware version are displayed on the Status display.

KRAMER VP-1618AK

MACH.NUM.01 FW.VERS.5645

After a few seconds, the display shows which audio<sup>1</sup> or video<sup>2</sup> input is switched to which output, for example, output 1 is switched to input 1, output 4 is switched to input 11 and output 15 is switched to input 3, as shown below.

01	02	03	11	05	06	07	08	09
10	11	12	13	14	03	16	17	18

### 7.2 Switching Inputs to Outputs

#### To switch a video/audio input to an output:

1. Press the VIDEO button to select video channels or AUDIO to select audio channels.

The VIDEO/AUDIO button lights red.

2. Press the required OUTPUT button.  
The selected output on the Status display flashes.

3. Press the required INPUT button.  
After a few seconds the output on the Status display stops flashing and the switch is implemented.

#### To connect a video/audio input to all outputs:

- Press the ALL button followed by the INPUT button corresponding to the input that is to be routed to all the outputs

#### To disconnect a video/audio input from a specific output:

- Press the required OUTPUT button followed by the OFF button.

#### To disconnect all outputs:

- Press the ALL button, followed by the OFF button

---

<sup>1</sup> When the Audio button is lit the audio switching is selected

<sup>2</sup> When the Video button is lit the video switching is selected

### 7.3 The At Once and Confirm Modes

You can choose to work in the At Once or the Confirm mode. When the **VP-16x18AK** is set to the At Once mode, pressing an output-input combination implements the action immediately. In the Confirm mode (the TAKE button is lit), the TAKE button must be pressed to execute the switch.

#### The At Once Mode

In the At Once mode, execution is immediate and actions require no user confirmation, however, no protection is provided against changing a switching action in error.

#### The Confirm Mode

In the Confirm mode:

- You can enter several actions and then confirm execution by pressing the TAKE button to simultaneously activate multiple switches
- Every action requires user confirmation which protects against erroneous switching
- Execution is delayed<sup>1</sup> until the user confirms the execution

#### 7.3.1 Toggling between At Once and Confirm Modes

**To toggle between the At Once and Confirm modes:**

1. Press the TAKE button to toggle from the At Once mode<sup>2</sup> to the Confirm mode<sup>3</sup>.  
The TAKE button lights and actions now require user confirmation.
2. Press the TAKE button to toggle from the Confirm mode back to the At Once mode.  
The TAKE button no longer lights and actions no longer require user confirmation.

#### 7.3.2 Confirming a Switching Action

**To confirm a switching action (in the Confirm mode):**

1. Press an output-input combination.  
The corresponding input number that is displayed in the LCD readout flashes. The TAKE button also flashes.
2. Press the flashing TAKE button to confirm the action.  
The corresponding input number that is displayed in the LCD readout no longer flashes. The TAKE button lights.

---

<sup>1</sup> If the TAKE button is not pressed within one minute, the action is aborted

<sup>2</sup> The TAKE button does not light

<sup>3</sup> The TAKE button lights



**To confirm several actions (in the Confirm mode):**

1. Press each OUTPUT-INPUT combination in sequence.  
The corresponding input numbers that are displayed in the LCD readout flash. The TAKE button also flashes.
2. Press the flashing TAKE button to confirm all the actions.  
The corresponding input numbers that are displayed in the LCD readout no longer flash. The TAKE button lights.

## 7.4 Setting the Audio Gain for Inputs and Outputs

During audio gain level setting, the Status display indicates individual input/output volume settings as shown in the example below.

INP: 01

VOL: 06

**To set the audio gain to 6 for output 14:**

1. Press the AUDIO GAIN button.  
The button lights red and the current output/volume setting is displayed.
2. Press OUTPUT 14.  
Output 14 flashes on the Status display.
3. Press the + button to increase the volume or the – button to decrease the volume.  
After a few seconds the setting is saved.

## 7.5 Audio Output Bass and Treble Level Setting

During audio bass/treble level setting, the Status display indicates individual output settings as shown in the example below.

OUT: 08

BAS: 06

**To set the bass level to 6 for output 14:**

1. Press and hold the AUDIO GAIN button.  
The button lights red and the current output/bass setting is displayed.
2. Press OUTPUT 14.  
Output 14 flashes on the Status display.
3. Press the + button to increase the bass level or the – button to decrease the bass level.  
After a few seconds the setting is saved.

**To set the treble level to 6 for output 14:**

1. Press and hold the AUDIO GAIN button.  
The button lights red and the current output/bass setting is displayed.

2. Press the AUDIO GAIN button a second time.  
The current treble setting is displayed.  
OUT: 08  
TRE: 06
3. Press OUTPUT 14.  
Output 14 flashes on the Status display.
4. Press the + button to increase the treble gain or the – button to decrease the treble level.  
After a few seconds the setting is saved

## 7.6 Setting the Audio-Follow-Video or Breakaway Option

You can configure stereo audio signal switching in one of two ways:

- Audio-follow-video (AFV), in which all operations relate to both the video and the audio channels (see [Section 7.6.1](#))
- Breakaway, in which video and audio channels switch independently (see [Section 7.6.2](#))

### 7.6.1 Setting the Audio-Follow-Video Option

**To set the Audio-follow-video (AFV) option, press AFV. One of the following occurs:**

- If the AUDIO and VIDEO configurations are the same, then the AFV button lights. The audio follows the video
- If the AUDIO differs from the VIDEO, then the TAKE and the AUDIO buttons flash. Also, the audio outputs of the STATUS 7-segment display which change, flash. Press TAKE to confirm the modification. The audio follows the video switching

### 7.6.2 Setting the Breakaway Option

**To set the Breakaway option:**

- Press either the AUDIO (for audio control only) or the VIDEO (for video control only) button. One of the following occurs:
  - If the AUDIO button lights, switching operations relate to Audio
  - If the VIDEO button lights, switching operations relate to Video

The STATUS window displays audio or video settings according to your selection.

## 7.7 Storing and Recalling Setup Configurations

You can store and recall up to 18 configurations (or setups) in non-volatile memory, using the OUTPUT (1-18) buttons.

### 7.7.1 Storing a Setup Configuration

**To store the current status in memory:**

1. Press the STO button<sup>1</sup>.  
The STO button flashes.
2. Press one of the OUTPUT SELECTOR buttons from 1 to 18. This is the preset number in which the current status is stored.  
The configuration is stored in the selected preset number.

### 7.7.2 Recalling a Setup Configuration

**To recall an input-output configuration:**

1. Press the RCL button.  
The RCL button flashes.
2. Press the required OUTPUT SELECTOR button (the OUTPUT SELECTOR button number corresponding to the setup number).  
The memory recalls the switching configuration from the selected preset.

## 7.8 Locking and Unlocking the Front Panel Buttons

**To lock the front panel buttons:**

- Press and hold the Lock button until the button LED lights.  
The buttons are locked

**To unlock the front panel buttons:**

- Press and hold the Lock button until the button LED is no longer lit.  
The buttons are unlocked

## 7.9 Reading and Writing the EDID

The **VP-16x18AK** is delivered with default EDID data programmed in each input. This can be modified by using the EDID Designer software<sup>2</sup> to read and write EDID data via RS-232 or Ethernet.

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<sup>1</sup> Storing a new configuration over a previous configuration (without deleting it first) replaces the previous configuration

<sup>2</sup> The software can be downloaded from <http://www.kramerelectronics.com>

## 8 Operating the VP-16x18AK Remotely

The **VP-16x18AK** can be operated remotely via the following methods:

- The Kramer **RC-IR3** Infra-Red Remote Control Transmitter
- RS-485 (see [Section 6.4](#))
- RS-232 (see [Section 8.1](#))
- Ethernet over a LAN (see [Section 9](#))

### 8.1 Operating the VP-16x18AK via RS-232

To operate up to eight **VP-16x18AK** units from a PC or serial controller via RS-232, as illustrated in [Figure 9](#):

1. Connect the video sources and acceptors, the appropriate audio sources and acceptors, and the power cord to each **VP-16x18AK**.
2. Connect the RS-232 port on the first **VP-16x18AK** to the PC (see [Section 6.3](#)).
3. Set the machine number to 1 of the unit connected to the PC.
4. Set RS-485 termination of machine number 1 to ON (see [Section 6.6](#)).
5. Set the machine number on all **VP-16x18AK** units other than machine number 1 to a unique number between 2 and 8 (see [Section 6.6](#)).
6. Set the termination on all **VP-16x18AK** units other than the first and last devices in the chain.
7. Interconnect the RS-485 bus on all **VP-16x18AK** units as follows:
  - From the RS-485 connector on the first **VP-16x18AK** unit, to the RS-485 port on the second **VP-16x18AK** unit, and so on. Up to eight **VP-16x18AK** units can be connected.

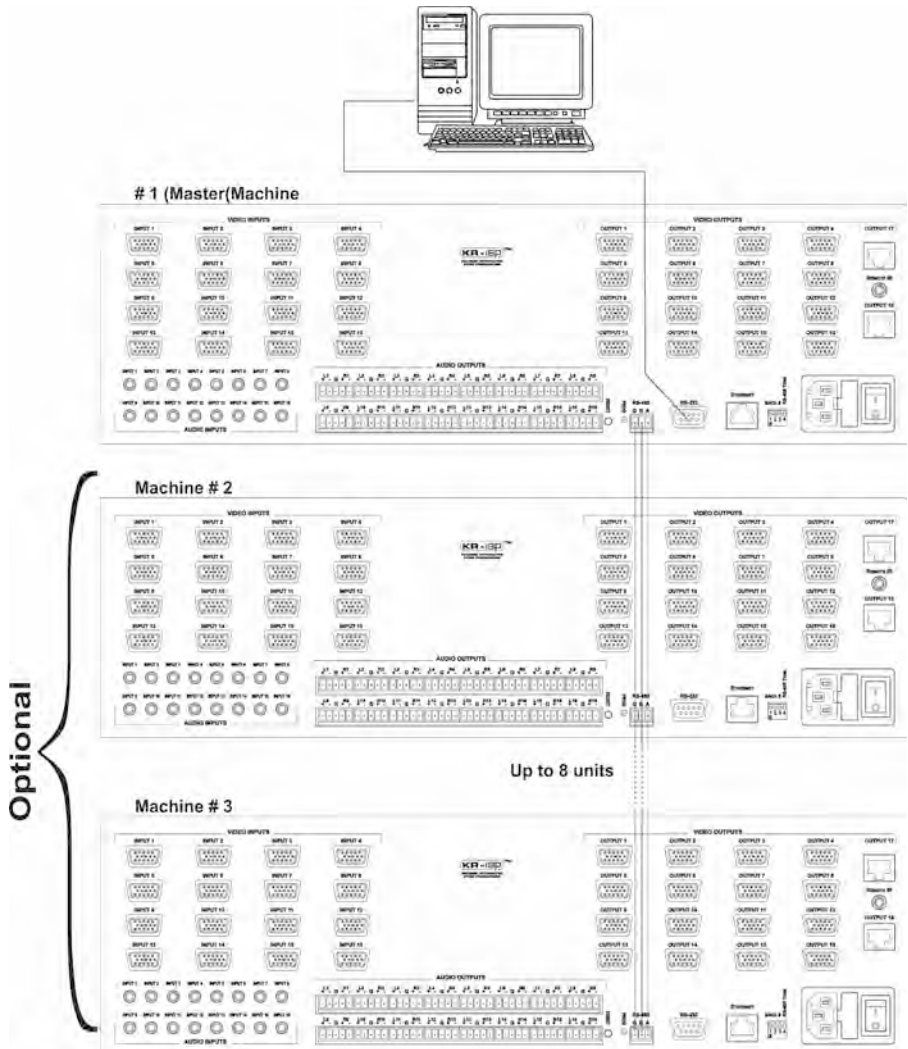


Figure 9: Control Configuration via RS-232

## 9 Operating the VP-16x18AK Remotely Using a Web Browser

You can remotely operate the **VP-16x18AK** using a Web browser via the Ethernet port (see [Section 9.1](#)). To be able to do so, you must use a supported Web browser; Microsoft (V6.0 and higher), Chrome, Firefox (V3.0 and higher).

To check that Java is installed and running, browse to:  
<http://www.java.com/en/download/help/testvm.xml>

This page runs a test and displays a Java success (see [Figure 10](#)) or failure message.



Figure 10: Java Test Page Success Message

If you do not see the success message, follow the instructions on the page to:

- Load and enable Java
- Enable Javascript in your browser

### 9.1 Connecting to the VP-16x18AK via your Browser

Make sure that your PC is connected via a network to the **VP-16x18AK** and do the following:

1. Open your Internet browser.
2. Enter the unit's IP number (for the default IP address, see [Table 2](#)) or name in the Address bar of your browser.  
If you are using DHCP, you have to enter the name.



Figure 11: Entering the IP Address in the Address Bar

The *Loading* page appears.

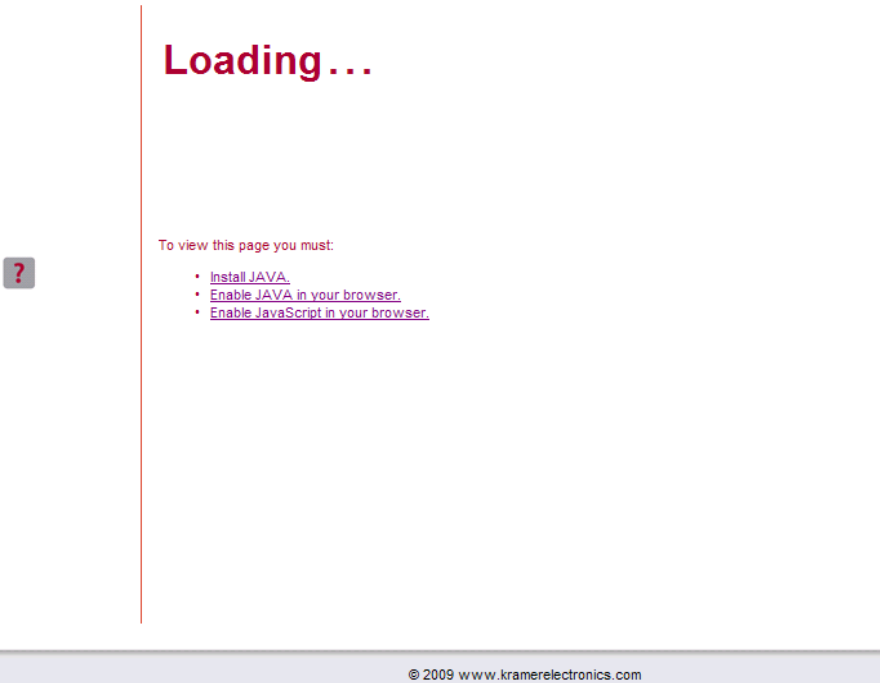


Figure 12: The Loading Page

The first time that you run the Kramer applet a security warning appears.



Figure 13: First Time Security Warning

3. Click **Run**.

The main switching control page is displayed which shows a graphical interpretation of the front panel (see [Figure 14](#)).

There are three remote operation Web pages:

- Main switching matrix (see [Section 9.2](#))
- Audio gain control (see [Section 9.3](#))
- Configuration (see [Section 9.4](#))

Select a page by clicking on the relevant link on the left hand side of the window.

## 9.2 The Main Switching Matrix Page



Figure 14: Main Switching Matrix Page

The main switching matrix page allows you to:

- Switch any audio/video input to any/all outputs independently (see [Section 9.2.1](#))
- Set the audio to operate in AFV (Audio Follow Video) mode (see [Section 9.2.2](#))
- Operate the unit in the Offline mode (see [Section 9.2.3](#))
- Use presets to store and recall switching configurations (see [Section 9.2.4](#))
- Lock or unlock the unit's front panel buttons (see [Section 9.2.5](#))




### 9.2.1 Switching an Input to an Output

**To switch an input to an output, for example, video input 1 to video output 4:**

1. Click the blue **Video** button.  
The button outline becomes dark. Actions now relate to video channels.
2. Click the required square within the switching matrix grid (In 1, Out 4).



Figure 15: Selecting a Switching Point on the Matrix

A blue video icon  appears indicating that the video channel is switched to In 1 and Out 4.

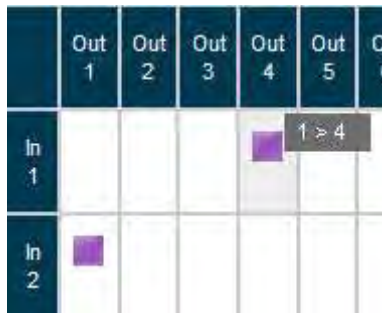


Figure 16: Switching an Input to an Output

3. Repeat the above steps for each video and audio (clicking the purple **Audio** button for audio mode) channel that you want to switch.

### 9.2.2 Setting the AFV Mode

Audio channel In 1 is currently switched to Out 4.

**To set the AFV mode:**

1. Click the **AFV** button.  
The following warning appears.



Figure 17: AFV Mode Warning

2. Click **OK**.  
 The **AFV** button outline becomes dark.  
 All audio channels are switched according to the corresponding video channels. In this example, audio channel In 2 is now switched to Out 4.

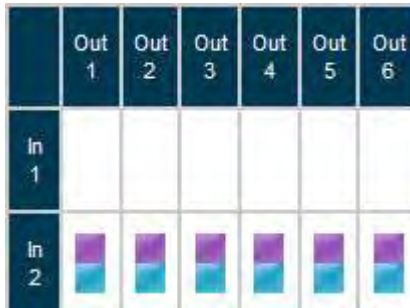


Figure 18: AFV Mode Audio Channels Switched

All configuration changes now switch audio and video simultaneously.

### 9.2.3 Operating in the Offline Mode

By default, the unit operates in the At-Once mode, meaning that any switching changes take effect immediately. In the Offline mode, changes only take effect when you press the **Take** button.

#### To operate in the Offline mode:

1. Click the red **Offline** button.  
 The button outline becomes dark.
2. Click the required square in the switching matrix grid (In 1, Out 5).  
 The audio/video indicator icon outline (in this example, audio) appears, and the **Take** and **Cancel** buttons change from gray to dark blue.

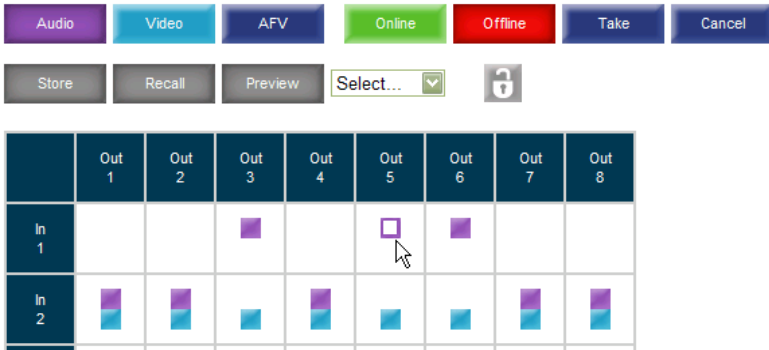


Figure 19: Switching Audio in the Offline Mode

3. If required, repeat Step 2 for several audio/video channels.
4. Click either **Take** to accept the change or **Cancel** to discard the changes.
5. Click the **Online** button to exit the Offline mode.  
If you have made any changes since clicking the **Take** button, the exiting Offline warning appears.

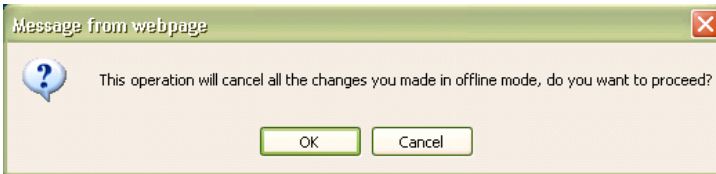


Figure 20: Exiting Offline Warning

### 9.2.4 Storing and Recalling Setups

You can store switching configurations in presets and recall them at any time.

#### To store a switching configuration:

1. From the Preset drop-down list, select a preset (in this example, Preset 07).  
Presets that currently contain configurations are displayed with a blue background; presets with no configuration have a white background.  
When you select a preset, the **Store** button changes from gray to dark blue.

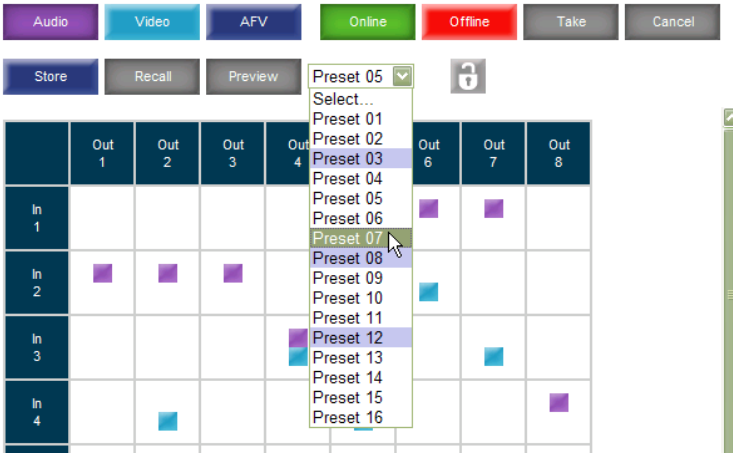


Figure 21: Selecting Preset 07

2. Click **Store**.  
A confirmation message appears.
3. Click **OK**.  
The configuration is stored in Preset 07.

**To recall a setup:**

1. From the Preset drop-down list, select a preset (in this example, Preset 03).  
Presets that contain a configuration are displayed with a blue background; presets with no configuration have a white background. When you select a preset that contains a configuration, the **Recall** button changes from gray to dark blue.

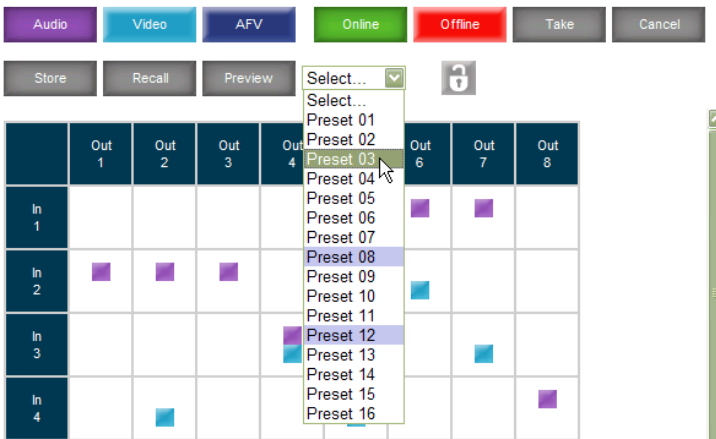


Figure 22: Selecting Preset 03

2. Click **Recall**.  
A confirmation message appears.
3. Click **OK**.  
The configuration from Preset 03 is loaded.

**Note:** You can also recall a preset in the Offline mode (see [Figure 24](#)) and make it active when you press the **Take** button (see [Section 9.2.3](#)).


	Out 1	Out 2	Out 3	Out 4	Out 5	Out 6	Out 7	Out 8
In 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In 2		<input type="checkbox"/>		<input type="checkbox"/>			<input type="checkbox"/>	
In 3					<input type="checkbox"/>			<input type="checkbox"/>
In 4								

Figure 23: Recalling a Preset in Offline Mode

### 9.2.5 Locking the Front Panel Buttons

You can lock the front panel buttons to prevent tampering.

**To lock the front panel buttons:**

- Click the padlock icon 

**Note:** Locking the front panel buttons does not disable remote operation of the unit via Ethernet, RS-232 or RS-485.

### 9.3 Audio Input Gain Control Page

The Audio Gain page lets you set the gain for each of the input channels independently.



Figure 24: Audio Gain Control Page

**To change the audio gain (in this example, input gain for channel 2):**

1. From the Input Gain drop-down list, click 02.

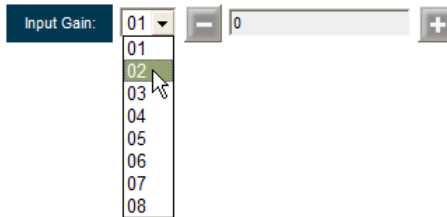


Figure 25: Selecting Audio Input Gain for Channel 2

2. Click the – or + button to decrease or increase the gain. Hold the – or + button down to step quickly through the values.

**Note:** Each click increments/decrements the value by 0.5. To change the gain by a whole number, you must click the +/- button twice.

## 9.4 The Configuration Page

The Configuration page lets you view the IP-related settings. Fields with a white background are editable; fields with a blue background are read-only.



Figure 26: Configuration Page

The following IP-related settings can be edited:

- Unit name
- Fixed IP Address/DHCP
- Gateway
- Subnet Mask

The following fields are read-only:

- Model
- Serial Number
- Firmware Version
- MAC Address

**To edit the IP-related settings:**

1. Edit the required field.
2. Click **Submit**.  
The Network Settings confirmation message appears.
3. Click **OK**.  
A message appears showing that the settings have been successfully changed.

If the IP address was changed or you selected DHCP, reload the Web page using the new name or IP address.

## 10 Firmware Upgrade Using K-Upload

For instructions on upgrading the firmware, see the *K-Upload Software Guide*.

The latest firmware and installation instructions can be downloaded from the Kramer Web site at [www.kramerelectronics.com](http://www.kramerelectronics.com).

## 11 Technical Specifications

[Table 5](#) lists the technical specifications for the **VP-16x18AK 16 x 18 PC UXGA/Audio Router**.

*Table 5: Technical Specifications<sup>1</sup> of the VP-16x18AK*

**Note:** All are measured on the local output unless specified otherwise

INPUTS:	16 XGA on 15-pin HD connectors (VGA through UXGA) 16 unbalanced stereo audio on 3.5mm mini jacks	
OUTPUTS:	16 XGA on 15-pin HD connectors (VGA through UXGA) 16 balanced stereo audio on 5-pin terminal block connectors 2 TP on RJ-45 connectors	
MAX. OUTPUT LEVEL:	VIDEO: 1.6Vpp	AUDIO: 9.6Vpp diff (12.8dBu)
BANDWIDTH (-3dB):	VIDEO: 400MHz	AUDIO: 20kHz
DIFF. GAIN:	0.1% maximum	
DIFF. PHASE:	0.05 deg maximum	
K-FACTOR:	Local output: 0.1%	
S/N RATIO:	VIDEO: 62dB to 5MHz	AUDIO: 83dB
CROSSTALK (all hostile):	VIDEO: -35dB @ 100MHz	AUDIO: -68dB @ 1kHz
CONTROLS:		Volume: -105 to +30dB Bass: -15 to 15dB Treble: -20 to +20dB
COUPLING:	VIDEO— Local output: DC CAT 5 output: AC	AUDIO— Local output: input=AC, output=DC CAT 5 output: input=AC, output=AC
AUDIO THD + NOISE:	Local output: 0.031% @ 1kHz	
AUDIO 2nd HARMONIC:	Local output: 0.003% @ 1kHz	
POWER CONSUMPTION:	100-240V AC, 44VA	
OPERATING TEMPERATURE:	0° to +40°C (32° to 104°F)	
STORAGE TEMPERATURE:	-40° to +70°C (-40° to 158°F)	
HUMIDITY:	10% to 90%, RHL non-condensing	
DIMENSIONS:	19" x 9.5" x 3U (W, D, H) rack mountable	
WEIGHT:	4.4kg (9.7lbs) approx	
ACCESSORIES:	Power cord, rack "ears", RC-IR3 Infrared Remote Control	
OPTIONS:	External remote IR receiver cable <sup>2</sup>	

<sup>1</sup> Specifications are subject to change without notice

<sup>2</sup> P/N: C-A35M/IRR-50



## 12 Default Communication Parameters

[Table 6](#) lists the default communication parameters as used in Kramer Electronics products.

*Table 6: Communication Parameters*

EDID			
EDID data is passed between Input 1 and Output 1			
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 Output 1 and Output 3 simultaneously	Front Panel:	Press and hold Output 1 and Output 2 simultaneously
Ethernet			
To reset the IP settings to the factory reset values, power cycle the device while holding in the Factory Reset button, located on the rear panel of the unit			
IP Address:	192.168.1.39		
Subnet mask:	255.255.255.0		
Default gateway:	192.168.1.1		
TCP Port #:	5000		
UDP Port #:	50000		
Maximum UDP Ports:	10		
Maximum TCP Ports:	4		

## 13 Factory Default EDID

### Monitor

Model name VP-16X18AK  
 Manufacturer KRM  
 Plug and Play, ID KRM0808  
 Serial number 2  
 Manufacture date 2009, ISO week 10

EDID revision 1.3  
 Input signal type Analog 0.700, 0.000 (0.7 Vp-p)  
 Sync input support Separate, Composite, Sync-on-green  
 Display type RGB color  
 Screen size 360 x 290 mm (18.2 in)  
 Power management Standby, Suspend, Active off/Sleep  
 Extension blocks None  
 DDC/CI Not supported

Color characteristics  
 Default color space sRGB  
 Display gamma 2.0  
 Red chromaticity Rx 0.611 - Ry 0.329



## Factory Default EDID

---

Green chromaticity Gx 0.312 - Gy 0.559  
Blue chromaticity Bx 0.148 - By 0.131  
White point (default) Wx 0.320 - Wy 0.336  
Additional descriptors None

### Timing characteristics

Range limits Not available

GTF standard Not supported

Additional descriptors None

Preferred timing Yes

Native/preferred timing 1024x768p at 60Hz (4 3)

Modeline "1024x768" 65.000 1024 1048 1184 1344 768 771 777 806 -hsync -vsync

Detailed timing #1 1280x800p at 60Hz (1:1)

Modeline "1280x800" 71.000 1280 1328 1360 1440 800 803 809 823 +hsync -vsync

### Standard timings supported

640 x 480p at 60Hz  
640 x 480p at 67Hz  
640 x 480p at 72Hz  
640 x 480p at 75Hz  
800 x 600p at 56Hz  
800 x 600p at 60Hz  
800 x 600p at 72Hz  
800 x 600p at 75Hz  
1024 x 768p at 60Hz  
1024 x 768p at 70Hz  
1024 x 768p at 75Hz  
1280 x 1024p at 75Hz  
1280 x 1024p at 60Hz  
1280 x 960p at 60Hz  
1400 x 1050p at 60Hz  
1440 x 900p at 60Hz  
1600 x 1200p at 60Hz

### Report information

Date generated 11/15/2010

Software revision 2.43.0.822

Operating system 5.1 2600 2.Service Pack 3

### Raw data

00,FF,FF,FF,FF,FF,FF,00,2E,4D,08,08,02,00,00,00,0A,13,01,03,6E,24,1D,64,EE,9C,20,9C,54,4F,8F,26,  
21,52,56,3F,CF,00,81,80,81,40,90,40,95,00,A9,40,D1,00,D1,C0,01,01,64,19,00,40,41,00,26,30,18,88,  
36,00,30,E4,10,00,00,18,BC,1B,00,A0,50,20,17,30,30,20,36,00,20,20,00,00,00,1A,00,00,00,FC,00,56,  
50,2D,38,58,38,54,50,0A,20,20,20,20,00,00,00,10,00,56,50,2D,38,58,38,54,50,20,0A,20,20,20,00,4A

## 14 Table of ASCII Codes for Serial Communication (Protocol 3000)

[Table 7](#) and [Table 8](#) list the ASCII values to switch an input to an output for a single **VP-16x18AK** machine. For more detailed information, see Protocol 3000 ([Section 16.2](#)).

Table 7: VP-16x18AK Video Signal Codes for Protocol 3000

	OUT 1	...	OUT 5	...	OUT Y
IN 1	#V 1>1 <b>CR</b>	...	#V 1>5 <b>CR</b>	...	#V 1>Y <b>CR</b>
	:		:		:
IN 5	#V 5>1 <b>CR</b>	...	#V 5>5 <b>CR</b>	...	#V 5>Y <b>CR</b>
	:		:		:
IN X	#V X>1 <b>CR</b>	...	#V X>5 <b>CR</b>	...	#V X>Y <b>CR</b>

Table 8: VP-16x18AK Audio Signal Codes for Protocol 3000

	OUT 1	...	OUT 5	...	OUT Y
IN 1	#A 1>1 <b>CR</b>	...	#A 1>5 <b>CR</b>	...	#A 1>Y <b>CR</b>
	:		:		:
IN 3	#A 5>1 <b>CR</b>	...	#A 5>5 <b>CR</b>	...	#A 5>Y <b>CR</b>
	:		:		:
IN X	#A X>1 <b>CR</b>	...	#A X>5 <b>CR</b>	...	#A X>Y <b>CR</b>

[Table 9](#) lists the codes that set the audio input gain. For more detailed information, see [Section 16.2](#).

Table 9: VP-16x18AK Audio Input Gain Codes

INPUT 1	...	INPUT 5	...	INPUT X*	Level [Rel]
#AUD-LVL 1,1, -100 <b>CR</b>		#AUD-LVL 1,5, -100 <b>CR</b>		#AUD-LVL 1,X, -100 <b>CR</b>	-100dB Mute
#AUD-LVL 1,1, -50 <b>CR</b>		#AUD-LVL 1,5, -50 <b>CR</b>		#AUD-LVL 1,X, -50 <b>CR</b>	-50dB
#AUD-LVL 1,1, 0 <b>CR</b>		#AUD-LVL 1,5, 0 <b>CR</b>		#AUD-LVL 1,X, 0 <b>CR</b>	0dB
#AUD-LVL 1,1, 20 <b>CR</b>		#AUD-LVL 1,5, 20 <b>CR</b>		#AUD-LVL 1,X, 20 <b>CR</b>	+20dB (Max)

\* Where X is the input number from 1 - 8. For example, for channel 7 and relative level -50dB, **#AUD-LVL 1,7, -50**CR****

[Table 10](#) lists the codes that set the audio output gain. For more detailed information, see [Section 16.2](#).

Table 10: VP-16x18AK Audio Output Gain Codes

OUTPUT 1	...	OUTPUT 5	...	OUTPUT Y*	Level [Rel]
#AUD-LVL 2,1, -100 $\overline{\text{CR}}$		#AUD-LVL 2,5, -100 $\overline{\text{CR}}$		#AUD-LVL 2,Y, -100 $\overline{\text{CR}}$	-100dB Mute
#AUD-LVL 2,1, -50 $\overline{\text{CR}}$		#AUD-LVL 2,5, -50 $\overline{\text{CR}}$		#AUD-LVL 2,Y, -50 $\overline{\text{CR}}$	-50dB
#AUD-LVL 2,1, 0 $\overline{\text{CR}}$		#AUD-LVL 2,5, 0 $\overline{\text{CR}}$		#AUD-LVL 2,Y, 0 $\overline{\text{CR}}$	0dB
#AUD-LVL 2,1, 10 $\overline{\text{CR}}$		#AUD-LVL 2,5, 10 $\overline{\text{CR}}$		#AUD-LVL 2,Y, 10 $\overline{\text{CR}}$	+10dB (Max)

\* Where X is the output number from 1 - 8. For example, for channel 7 and relative level -50dB, #AUD-LVL 2,7, -50 $\overline{\text{CR}}$

## 15 Table of Hex Codes for Serial Communication (Protocol 2000)

The Hex codes listed in this section are used to set video channels for a single machine (set as machine number 1) connected via either RS-232 or Ethernet. Similar hex codes are used when the **VP-16x18AK** is connected via RS-485 and the **VP-16x18AK** is set to machine number 2.

[Table 11](#) lists the Hex codes that switch video channels:

Table 11: VP-16x18AK Hex Codes for Switching Video Channels via RS-232/RS-485

Switching Video Channels					
	OUT 1	...	OUT 5	...	OUT Y
IN 1	01 81 81 81		01 81 85 81		01 81 8Y 81
:					
IN 5	01 85 81 81		01 85 85 81		01 85 8Y 81
:					
IN X	01 8X 81 81		01 8X 85 81		01 8X 8Y 81

[Table 12](#) lists the Hex codes that switch audio channels:

Table 12: VP-16x18AK Hex Codes for Switching Audio Channels via RS-232/RS-485

Switching Audio Channels					
	OUT 1	...	OUT 5	...	OUT Y
IN 1	02 81 81 81		02 81 85 81		02 81 8Y 81
...					
IN 5	02 85 81 81		02 85 85 81		02 85 8Y 81
...					
IN X	02 8X 81 81		02 8X 85 81		02 8X 8Y 81

[Table 13](#) lists the Hex codes that increase or decrease the audio input gain:

Table 13: VP-16x18AK Hex Codes for Increasing/Decreasing the Audio Input Gain

	IN 1	...	IN 5	...	IN X
Increase	18 81 86 81		18 85 86 81		18 8X 86 81
Decrease	18 81 87 81		18 85 87 81		18 8X 87 81

[Table 14](#) lists the Hex values that set the audio input gain:

*Table 14: VP-16x18AK Hex Codes for Setting the Audio Input Gain*

IN 1	...	IN 5	...	IN X	Level [Rel]
16 81 80 81		16 85 80 81		16 8X 80 81	Mute
16 81 87 81		16 85 87 81		16 8X 87 81	-100dB Mute
16 81 B9 81		16 85 B9 81		16 8X B9 81	-50dB
16 81 EB 81		16 85 EB 81		16 8X EB 81	0dB
16 81 FF 81		16 85 FF 81		16 8X FF 81	+20dB (Max)

\* BYTE 3 = 0x80 + Gain Value (0x00-0x7F)

[Table 15](#) lists the Hex codes that increase or decrease the audio output gain:

*Table 15: VP-16x18AK Hex Codes for Increasing/Decreasing the Output Gain*

	OUT 1	...	OUT 5	...	OUT Y
Increase	18 81 80 81		18 85 80 81		18 8Y 80 81
Decrease	18 81 81 81		18 85 81 81		18 8Y 81 81

[Table 16](#) lists the Hex codes that set the audio output gain.

Before sending the any of the codes in [Table 16](#), the command **2A 87 80 81** must be sent.

*Table 16: VP-16x18AK Hex Codes for Setting the Audio Output Gain*

OUT 1	...	OUT 5	...	OUT Y	Level [Rel]
16 81 80 81		16 85 80 81		16 8Y 80 81	Mute
16 81 94 81		16 85 94 81		16 8Y 94 81	-100dB Mute
16 81 C6 81		16 85 C6 81		16 8Y C6 81	-50dB
16 81 F8 81		16 85 F8 81		16 8Y F8 81	0dB
16 81 FF 81		16 85 FF 81		16 8Y FF 81	+10dB (Max)

\*BYTE 3 = 0x80 + Gain Value (0x00-0x7F)

## 16 Kramer Protocol

By default, the **VP-16x18AK** is set to protocol 3000 (see [Section 16.2](#)) but is also compatible with Kramer's Protocol 2000<sup>1</sup> (see [Section 16.3](#)). [Section 16.1](#) describes how to switch between protocol 3000 and protocol 2000.

### 16.1 Switching Protocols

You can switch protocols either via the front panel buttons (see [Section 16.1.1](#)) or the protocol commands (see [Section 16.1.2](#)).

#### 16.1.1 Switching Protocols via the Front Panel Buttons

To switch from protocol 3000 to protocol 2000, press and hold<sup>2</sup> the OUT 1 and OUT 2 buttons for a few seconds.

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

#### 16.1.2 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<sup>®</sup>-based Kramer control software<sup>3</sup> operates with protocol 2000. If the **VP-16x18AK** is set to protocol 3000, it is automatically switched to protocol 2000.

## 16.2 Kramer Protocol 3000

This RS-232/RS-485 communication protocol lets you control the machine from any standard terminal software (for example, Windows<sup>®</sup> HyperTerminal Application) and uses a data rate of 115200 baud, with no parity, 8 data bits, and 1 stop bit.

---

<sup>1</sup> 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>

<sup>2</sup> Not as part of a switching operation

<sup>3</sup> Download the latest software from our Web site at <http://www.kramerelectronics.com>

### 16.2.1 Protocol 3000 Syntax

Host message format:

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

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

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

**CR** = Carriage return (ASCII 13 = 0x0D)

**LF** = Line feed (ASCII 10 = 0x0A)

**SP** = Space (ASCII 32 = 0x20)

### 16.2.2 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 than one command separated by pipe ("|") char.

Message starting char:

'#' for host command/query

'~' for machine response

**Device ID** (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



# Kramer Protocol

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 17: Instruction Codes for Protocol 3000*

Help commands	
Command	Syntax
Protocol Handshaking	# <b>CR</b>
	~OK <b>CRLF</b>
Device initiated messages	
Command	Syntax
Start message	Kramer Electronics LTD. , <b>Device Model</b> Version <b>Software Version</b>
Switcher actions	
Audio-video channel has switched (AFV mode)	AV <b>IN&gt;OUT</b>
Video channel has switched (Breakaway mode)	VID <b>IN&gt;OUT</b>
Audio channel has switched (Breakaway mode)	AUD <b>IN&gt;OUT</b>
Result codes (errors)	
	Syntax
No error. Command running succeeded	<b>COMMAND</b> <b>PARAMETERS</b> 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 <b>[IN]&gt;[OUT]</b> , <b>[IN]&gt;[OUT]</b> , ...	AV <b>[IN]&gt;[OUT]</b> , <b>[IN]&gt;[OUT]</b> ... <b>[RESULT]</b>
Switch video only	<b>VID</b> <b>[IN]&gt;[OUT]</b> , <b>[IN]&gt;[OUT]</b> , ... <b>Short form: V</b> <b>[IN]&gt;[OUT]</b> , <b>[IN]&gt;[OUT]</b> , ...	<b>VID</b> <b>[IN]&gt;[OUT]</b> , <b>[IN]&gt;[OUT]</b> ... <b>[RESULT]</b>
Note: When AFV mode is active, his command will switch also audio. If audio is breakaway – device display mode will change to show audio connec ions status.		
Switch audio only	<b>AUD</b> <b>[IN]&gt;[OUT]</b> , <b>[IN]&gt;[OUT]</b> , ... <b>Short form: A</b> <b>[IN]&gt;[OUT]</b> , <b>[IN]&gt;[OUT]</b> , ...	<b>AUD</b> <b>[IN]&gt;[OUT]</b> , <b>[IN]&gt;[OUT]</b> ... <b>[RESULT]</b>
Note: When AFV mode is active, this command will switch also video.		
Read video connection	<b>VID?</b> <b>[OUT]</b> <b>Short form: V?</b> <b>[OUT]</b> <b>VID?</b> *	<b>VID</b> <b>[IN]&gt;[OUT]</b>  <b>VID</b> <b>[IN&gt;1]</b> <b>[IN&gt;2]</b> , ...
Read audio connection	<b>AUD?</b> <b>[OUT]</b> <b>Short form: A?</b> <b>[OUT]</b> <b>AUD?</b> *	<b>AUD</b> <b>[IN]&gt;[OUT]</b>  <b>AUD</b> <b>[IN&gt;1]</b> , <b>[IN&gt;2]</b> , ...
Parameters Description: <b>[IN]</b> = Input number or '0' to disconnect output. '>' = Connection character between in and out parameters. <b>[OUT]</b> = Output number or '*' for all outputs.		
Examples:		
Switch Video and Audio input 3 to output 7	#AV 3>7 <b>[CR]</b>	~AV 3>7 OK <b>[CRLF]</b>
Switch Video input 2 to output 4	#V 2>4 <b>[CR]</b>	~VID 2>4 OK <b>[CRLF]</b>
Switch Video input 4 to output 2 in machine number 6	#6@VID 4>2 <b>[CR]</b>	~6@VID 4>2 OK <b>[CRLF]</b>
Disconnect Video and Audio Output 4	#AV 0>4 <b>[CR]</b>	~AV 0>4 OK <b>[CRLF]</b>
Switch Video Input 3 to All Outputs	#V 3>* <b>[CR]</b>	~VID 3>* OK <b>[CRLF]</b>
Chaining Multiple commands*	#AV 1>*   V 3>4, 2>2, 82>1, 0>2   V 82>3   A 0>1   V? * <b>[CR]</b> First switch all Audio and video outputs from input 1, <b>Then switch video input 3 to output 4, video input 2 to output 2, video input and disconnect video output 2.</b> 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 <b>[CR]</b> , response will sent for each command after processing it.	~AV 1>* OK <b>[CRLF]</b> ~VID 1>2, 3>4 OK <b>[CRLF]</b> ~VID 82>3 <b>[ERR###]</b> <b>[CRLF]</b> ~AUD 0>1 OK <b>[CRLF]</b> ~V 1>1, 0>2, 1>3, 3>4 <b>[CRLF]</b>

Signal Status commands		
Command	Syntax	Response
Change signal status	-----	SIGNAL <u>INPUT</u> , <u>STATUS</u>
Get signal status	SIGNAL? <u>INPUT</u>	SIGNAL <u>INPUT</u> , <u>STATUS</u>

**Parameters Description:**

INPUT = Input number, "\*" for all.

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 <u>PRESET</u> Short form: PSTO <u>PRESET</u>	PRST-STO <u>PRESET</u> <u>RESULT</u>
Recall saved preset	PRST-RCL <u>PRESET</u> Short form: PRCL <u>PRESET</u>	PRST-RCL <u>PRESET</u> <u>RESULT</u>
Delete saved preset	PRST-DEL <u>PRESET</u> Short form: PDEL <u>PRESET</u>	PRST-DEL <u>PRESET</u> <u>RESULT</u>
Read video connections from saved preset	PRST-VID? <u>PRESET</u> <u>OUT</u> Short form: PVID? <u>PRESET</u> <u>OUT</u> PRST-VID? <u>PRESET</u> , *	PRST-VID <u>PRESET</u> , <u>IN</u> > <u>OUT</u> PRST-VID <u>PRESET</u> , <u>IN</u> >1, <u>IN</u> >2,...
Read audio connections from saved preset	PRST-AUD? <u>PRESET</u> <u>OUT</u> Short form: PAUD? <u>PRESET</u> <u>OUT</u> PRST-AUD? <u>PRESET</u> , *	PRST-AUD <u>PRESET</u> , <u>IN</u> > <u>OUT</u> PRST-AUD <u>PRESET</u> , <u>IN</u> >1, <u>IN</u> >2,...
Read saved presets list	PRST-LST? Short form: PLST?	PRST-LST <u>PRESET</u> , <u>PRESET</u> , ...

**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 <u>CR</u>	~PRST-STR 5 <u>OK</u> <u>CRLF</u>
Recall Audio & Video connections from preset 3	#PRCL 3 <u>CR</u>	~PRST-RCL 3 <u>OK</u> <u>CRLF</u>
Show source of video output 2 from preset 3	#PRST-VID? 3,2 <u>CR</u>	~PRST-VID 3: 4>2 <u>CRLF</u>

## Kramer Protocol

Operation commands		
Command	Syntax	Response
Lock front panel	LOCK-FP <u>LOCK-MODE</u> Short form: LCK <u>LOCK-MODE</u>	LOCK-FP <u>LOCK-MODE</u> <u>RESULT</u>
Get front panel locking state	LOCK-FP?	LOCK-FP <u>LOCK-MODE</u>
<b>Parameters Description:</b> <u>LOCK-MODE</u> = 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 <u>STAGE</u> <u>CHANNEL</u> <u>VOLUME</u> Short form: ADL <u>STAGE</u> <u>CHANNEL</u> <u>VOLUME</u>	AUD-LVL <u>STAGE</u> <u>CHANNEL</u> <u>VOLUME</u> <u>RESULT</u>
Read audio volume level	AUD-LVL? <u>STAGE</u> <u>CHANNEL</u> Short form: ADL? <u>STAGE</u>	AUD-LVL <u>STAGE</u> <u>CHANNEL</u> <u>VOLUME</u>
Set audio bass level	BASS <u>BASS</u> Short form: ADB, <u>BASS</u>	BASS <u>BASS</u> <u>RESULT</u>
Read audio bass level	BASS? Short form: ADB?	BASS <u>BASS</u>
Set audio treble level	TREBLE <u>TREBLE</u> Short form: ADT <u>TREBLE</u>	TREBLE <u>TREBLE</u> <u>RESULT</u>
Read audio treble	TREBLE? Short form: ADT?	TREBLE <u>TREBLE</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

**MUTE MODE** = 1 – Mute

0 – Unmute

Machine info commands		
Command	Syntax	Response
* Time settings commands require admin authorization		



Machine info commands		
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>
Mute Audio	MUTE <u>MUTE MODE</u>	MUTE <u>MUTE MODE</u> <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>
<p>*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 Alpha-Numeric chars.                      * <b>Machine factory name</b> = Model name + last 4 digits from serial number.</p>		
Set machine id number	<u>MACH-NUM</u> <u>MACHINE_NUMBER</u>	<u>MACH-NUM</u> <u>OLD_MACHINE_NUMBER</u> <u>NEW_MACHINE_NUMBER</u> <u>RESULT</u>
<p>* Response will send after machine number has been changed. So the replay with header will be:  <u>NEW_MACHINE_NUMBER</u> @<u>MACH-NUM</u> <u>OLD_MACHINE_NUMBER</u> <u>NEW_MACHINE_NUMBER</u> OK</p>		

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>

Network settings commands		
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>
<b><u>DHCP_MODE</u></b> = 0 – Don't use DHCP (Use IP set by factory or IP set command). 1 – Try to use DHCP, if unavailable use IP as above.		
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>
<b><u>PROTOCOL</u></b> = TCP / UDP (transport layer protocol) <b><u>PORT</u></b> = Ethernet port to enter protocol 3000 commands. 1-65535 = User defined port 0 - reset port to factory default (50000 for UDP, 5000 for TCP)		

Advanced switching commands		
Command	Syntax	Response
Set audio follow video mode	AFV <u>AFV-MODE</u>	AFV <u>AFV-MODE</u> <u>RESULT</u>
Note: This command effect device front-panel mode and AUD\VID command.		
Read audio follow video mode	AFV?	AFV <u>AFV-MODE</u>

**AFV-MODE** = Front panel AFV mode  
 "0" or "afv" to set front panel switching buttons in audio-follow-video state.  
 "1" or "brk" to set front panel switching buttons in their previous state when audio.

## 16.3 Kramer Protocol 2000

This RS-232/RS-485 communication protocol uses four bytes of information as defined below. The default data rate is 115200 baud, with no parity, 8 data bits and 1 stop bit.

Table 18: Protocol Definitions

MSB		INSTRUCTION						LSB
	DESTINATION	N5	N4	N3	N2	N1	N0	
0	D							
7	6	5	4	3	2	1	0	

1st byte

		INPUT					
		I5	I4	I3	I2	I1	I0
1	6						
7	6	5	4	3	2	1	0

2nd byte

		OUTPUT					
		O5	O4	O3	O2	O1	O0
1	O6						
7	6	5	4	3	2	1	0

3rd byte

		MACHINE NUMBER					
		M4	M3	M2	M1	M0	
1	OVR	X					
7	6	5	4	3	2	1	0

4th byte

1<sup>st</sup> 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).

2<sup>nd</sup> 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.

3<sup>rd</sup> 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.

4<sup>th</sup> 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 19: Instruction Codes for Protocol 2000

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

## Kramer Protocol

INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	DESCRIPTION	INPUT	OUTPUT	
0	RESET VIDEO	0	0	1
1	SWITCH V DEO	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 V DEO 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 V DEO 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 / VAL D 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 - 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 NSTRUCTIONS 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

## Kramer Protocol

INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	DESCRIPTION	INPUT	OUTPUT	
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 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")



## Kramer Protocol

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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

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**Caution**

**Safety Warning:**

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



P/N: 2900-000652



Rev: 2

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Web site: [www.kramerelectronics.com](http://www.kramerelectronics.com)

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