Kramer Electronics, Ltd.

USER MANUAL

Model:

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

1. **Introduction** 1
2. **Getting Started** 1
   2.1 Achieving the Best Performance 2
   2.2 Safety Instructions 2
   2.3 Recycling Kramer Products 3
   2.4 Quick Start 3
3. **Overview** 5
   3.1 Shielded Twisted Pair and Unshielded Twisted Pair 6
4. **Defining the VP-16x18AK 16 x 18 PC UXGA/Audio Router** 7
   4.1 Using the IR Transmitter 11
5. **Installing the VP-16x18AK in a Rack** 12
6. **Connecting and Configuring the VP-16x18AK** 13
   6.1 Connecting the VP-16x18AK 13
   6.2 Connecting the Audio Outputs to Balanced/Unbalanced Acceptors 14
   6.3 Connecting to the VP-16x18AK via RS-232 15
   6.4 Connecting to the VP-16x18AK via RS-485 15
   6.5 Connecting to the VP-16x18AK via the Ethernet Port 16
   6.5.1 Connecting Directly to the Ethernet Port 16
   6.5.2 Connecting via a Network Hub, Switch, or Router 18
   6.5.3 Configuring the Ethernet Port on the VP-16x18AK Using K-Upload 18
   6.6 Setting the RS-485 Termination and Machine Number DIP-switches 18
7. **Operating the VP-16x18AK Locally via the Front Panel Buttons** 20
   7.1 The Status Display 20
   7.2 Switching Inputs to Outputs 20
   7.3 The At Once and Confirm Modes 21
   7.3.1 Toggling between At Once and Confirm Modes 21
   7.3.2 Confirming a Switching Action 21
   7.4 Setting the Audio Gain for Inputs and Outputs 22
   7.5 Audio Output Bass and Treble Level Setting 22
   7.6 Setting the Audio-Follow-Video or Breakaway Option 23
   7.6.1 Setting the Audio-Follow-Video Option 23
   7.6.2 Setting the Breakaway Option 23
   7.7 Storing and Recalling Setup Configurations 23
   7.7.1 Storing a Setup Configuration 24
   7.7.2 Recalling a Setup Configuration 24
   7.8 Locking and Unlocking the Front Panel Buttons 24
8. **Operating the VP-16x18AK Remotely** 25
   8.1 Operating the VP-16x18AK via RS-232 25
9. **Operating the VP-16x18AK Remotely Using a Web Browser** 27
Contents

9.1 Connecting to the VP-16x18AK via your Browser 27
9.2 The Main Switching Matrix Page 29
9.2.1 Switching an Input to an Output 30
9.2.2 Setting the AFV Mode 30
9.2.3 Operating in the Offline Mode 31
9.2.4 Storing and Recalling Setups 32
9.2.5 Locking the Front Panel Buttons 34
9.3 Audio Input Gain Control Page 34
9.4 The Configuration Page 35

10 Firmware Upgrade Using K-Upload 36

11 Technical Specifications 37

12 Default Communication Parameters 38

13 Factory Default EDID 38

14 Table of ASCII Codes for Serial Communication (Protocol 3000) 40

15 Table of Hex Codes for Serial Communication (Protocol 2000) 41

16 Kramer Protocol 43
16.1 Switching Protocols 43
16.1.1 Switching Protocols via the Front Panel Buttons 43
16.1.2 Switching Protocols via Protocol Commands 43
16.2 Kramer Protocol 3000 43
16.2.1 Protocol 3000 Syntax 44
16.2.2 Command Parts Details 44
16.3 Kramer Protocol 2000 51

Figures

Figure 1: VP-16x18AK 16 x 18 PC UXGA/Audio Router Front Panel 7
Figure 2: VP-16x18AK 16 x 18 PC UXGA/Audio Router Rear Panel 9
Figure 3: Connecting the VP-16x18AK 16 x 18 PC UXGA/Audio Router 14
Figure 4: Connecting to a Balanced Acceptor 14
Figure 5: Connecting to an Unbalanced Acceptor 15
Figure 6: Local Area Connection Properties Window 17
Figure 7: Internet Protocol (TCP/IP) Properties Window 17
Figure 8: VP-16x18AK DIP-switches 18
Figure 9: Control Configuration via RS-232 26
Figure 10: Java Test Page Success Message 27
Figure 11: Entering the IP Address in the Address Bar 27
Figure 12: The Loading Page 28
Figure 13: First Time Security Warning 28
Figure 14: Main Switching Matrix Page 29
Figure 15: Selecting a Switching Point on the Matrix 30
Figure 16: Switching an Input to an Output 30
Figure 17: AFV Mode Warning 31
Figure 18: AFV Mode Audio Channels Switched 31
Contents

Figure 19: Switching Audio in the Offline Mode 32
Figure 20: Exiting Offline Warning 32
Figure 21: Selecting Preset 07 33
Figure 22: Selecting Preset 03 33
Figure 23: Recalling a Preset in Offline Mode 34
Figure 24: Audio Gain Control Page 34
Figure 25: Selecting Audio Input Gain for Channel 2 35
Figure 26: Configuration Page 35

Tables

Table 1: VP-16x18AK 16 x 18 PC UXGA/Audio Router Front Panel Features 8
Table 2: VP-16x18AK 16 x 18 PC UXGA/Audio Router Rear Panel Features 10
Table 3: DIP-switch Settings 18
Table 4: Machine Number DIP-switch Settings 19
Table 5: Technical Specifications of the VP-16x18AK 37
Table 6: Communication Parameters 38
Table 7: VP-16x18AK Video Signal Codes for Protocol 3000 40
Table 8: VP-16x18AK Audio Signal Codes for Protocol 3000 40
Table 9: VP-16x18AK Audio Input Gain Codes 40
Table 10: VP-16x18AK Audio Output Gain Codes 41
Table 11: VP-16x18AK Hex Codes for Switching Video Channels via RS-232/RS-485 41
Table 12: VP-16x18AK Hex Codes for Switching Audio Channels via RS-232/RS-485 41
Table 13: VP-16x18AK Hex Codes for Increasing/Decreasing the Audio Input Gain 41
Table 14: VP-16x18AK Hex Codes for Setting the Audio Input Gain 42
Table 15: VP-16x18AK Hex Codes for Increasing/Decreasing the Output Gain 42
Table 16: VP-16x18AK Hex Codes for Setting the Audio Output Gain 42
Table 17: Instruction Codes for Protocol 3000 45
Table 18: Protocol Definitions 51
Table 19: Instruction Codes for Protocol 2000 52
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 14 groups that are clearly defined by function: 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 Video Products; GROUP 12: Digital Signage; GROUP 13: Audio; and GROUP 14: Collaboration.

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 manual¹)
- Power cord², rack “ears” and this user manual

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

Go to [www.kramerav.com/downloads/VP-16x18AK](http://www.kramerav.com/downloads/VP-16x18AK) to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

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¹ Available from [www.kramerav.com](http://www.kramerav.com)
² We recommend that you use only the power cord that is supplied with this machine
2.1 Achieving the Best Performance

To achieve the best performance:

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

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

2.2 Safety Instructions

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

**Warning:** Use only the power cord that is supplied with the unit

**Warning:** Do not open the unit. High voltages can cause electrical shock! Servicing by qualified personnel only

**Warning:** Disconnect the power and unplug the unit from the wall before installing

**Warning:** In case of static electricity discharge, the device may freeze and require restarting. The product then returns to normal operation in its pre-freeze state
2.3 Recycling Kramer Products

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

2.4 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.

Press VIDEO and AUDIO to set the DELAY time.
Press TAKE to implement actions.
Press STO and RCL to set the MACH #.
Increase or decrease the AUDIO LEVEL.

LOCK the front panel.
Read the STATUS and the AUDIO LEVEL on the LCD.

Connect a selected input to ALL the outputs; disconnect an output (OFF) from an input.
AFV - Audio follows video when switching
VIDEO - Switching relates to the video signal
AUDIO - Switching relates to the audio signal.

Operate via the front panel buttons, RS-232, RS-485 and the Ethernet.
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® 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\(^1\)) 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

---

1 In \(\frac{1}{2}\) 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 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.
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

<table>
<thead>
<tr>
<th>#</th>
<th>Feature</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SELECTOR IN Buttons</td>
<td>Press to select an input (from 1 to 16) following the selection of an output (see Section 7.2). When an input signal is detected, the corresponding input button lights.</td>
</tr>
<tr>
<td>2</td>
<td>SELECTOR OUT Buttons</td>
<td>Press to select an output (from 1 to 18) followed by an input selection (see Section 7.2).</td>
</tr>
<tr>
<td>3</td>
<td>OFF Button</td>
<td>Press a SELECTOR OUT button followed by OFF to disconnect the selected output from the input (see Section 7.2). Press ALL followed by OFF to disconnect all outputs.</td>
</tr>
<tr>
<td>4</td>
<td>ALL Button</td>
<td>Press ALL followed by an INPUT button to switch the selected input to all outputs¹ (see Section 7.2).</td>
</tr>
<tr>
<td>5</td>
<td>STATUS LCD Readout</td>
<td>Displays the current Input-Output switching configuration² on a 2 line LCD readout.</td>
</tr>
<tr>
<td>6</td>
<td>IR Sensor</td>
<td>IR receiver for the Remote Control IR transmitter.</td>
</tr>
<tr>
<td>7</td>
<td>IR LED</td>
<td>Lights yellow when a signal is received from the IR receiver. When the front panel is locked, press and hold again to unlock the buttons.</td>
</tr>
<tr>
<td>8</td>
<td>POWER LED</td>
<td>Lights green when the unit receives power and is switched on.</td>
</tr>
<tr>
<td>9</td>
<td>VIDEO Button</td>
<td>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.</td>
</tr>
<tr>
<td>10</td>
<td>AUDIO Button</td>
<td>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.</td>
</tr>
<tr>
<td>11</td>
<td>TAKE Button</td>
<td>Press to set the Confirm mode³ (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 Section 7.3.2).</td>
</tr>
<tr>
<td>12</td>
<td>AFV Button</td>
<td>Press to make the audio channels follow the video channel switching. The button lights when the AFV mode is active (see Section 7.6).</td>
</tr>
<tr>
<td>13</td>
<td>RCL (Recall) Button</td>
<td>Press in conjunction with an Output button to recall a switching preset (see Section 7.7.2). Press again to execute the preset. Press in conjunction with STO to set the machine number.</td>
</tr>
<tr>
<td>14</td>
<td>STO (Store) Button</td>
<td>Press followed by an Output button to store the current switching configuration (see Section 7.7.1). Press in conjunction with RCL to set the machine number.</td>
</tr>
<tr>
<td>15</td>
<td>AUDIO GAIN Button</td>
<td>Press (following selection of an output or input) to set the audio input or output gain (see Section 7.4).</td>
</tr>
<tr>
<td>16</td>
<td>AUDIO LEVEL - Button</td>
<td>Press (following the Audio Gain button) to decrease the audio signal level (input, output, bass or treble).</td>
</tr>
<tr>
<td>17</td>
<td>AUDIO LEVEL + Button</td>
<td>Press (following the Audio Gain button) to increase the audio signal level (input, output, bass or treble).</td>
</tr>
<tr>
<td>18</td>
<td>LOCK Button</td>
<td>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 Section 9.2.5).</td>
</tr>
</tbody>
</table>

1 For example, press ALL and then IN button 2 to connect input 2 to all the outputs.

2 Also displays the number of input and output ports, the firmware version number and the machine number (see Section 6.6).

3 When in the Confirm mode, the TAKE button lights.

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Figure 2 and Table 2 define the rear panel of the VP-16x18AK 16 x 18 PC UXGA/Audio Router.
### Table 2: VP-16x18AK 16 x 18 PC UXGA/Audio Router Rear Panel Features

<table>
<thead>
<tr>
<th>#</th>
<th>Feature</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VIDEO INPUTS 15-pin HD (F) Connectors</td>
<td>Connect to the VGA¹ sources (from 1 to 16)</td>
</tr>
<tr>
<td>2</td>
<td>AUDIO OUTPUTS Removable Terminal Block Connectors</td>
<td>Connect to balanced stereo audio acceptors (from 1 to 16)</td>
</tr>
<tr>
<td>3</td>
<td>VIDEO OUTPUTS VGA 15-pin HD (F) Connectors</td>
<td>Connect to the VGA1 acceptors (from 1 to 16)</td>
</tr>
<tr>
<td>4</td>
<td>OUTPUT 17, OUTPUT 18 RJ-45 TP Connectors</td>
<td>Connect to compatible TP receivers (for example, TP-122N/TP-142)</td>
</tr>
<tr>
<td>5</td>
<td>REMOTE IR Opening²</td>
<td>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</td>
</tr>
<tr>
<td>6</td>
<td>AUDIO INPUTS 3.5mm Mini Jacks</td>
<td>Connect to the unbalanced stereo audio sources (from 1 to 16)</td>
</tr>
<tr>
<td>7</td>
<td>RESET Button</td>
<td>Press and hold while powering up the unit to reset all audio, switching and Ethernet settings to their factory default values (see Section 12)</td>
</tr>
<tr>
<td>8</td>
<td>PROG Button</td>
<td>For the use of Kramer service personnel only</td>
</tr>
<tr>
<td>9</td>
<td>RS-485 3-pin Terminal Block</td>
<td>Connect to the corresponding pins A(+), B(–) and G on another device for RS-485 communication (see Section 6.4)</td>
</tr>
<tr>
<td>10</td>
<td>RS-232 9-pin D-sub Serial Port</td>
<td>Connect to a PC or remote controller (see Section 6.3)</td>
</tr>
<tr>
<td>11</td>
<td>ETHERNET RJ-45 Connector</td>
<td>Connect to a PC or other controller over a LAN (see Section 6.5)</td>
</tr>
<tr>
<td>12</td>
<td>MACH # DIP-switches (1, 2 and 3)</td>
<td>Use to set the RS-485 machine number (see Section 6.6)</td>
</tr>
<tr>
<td>13</td>
<td>RS-485 TERM DIP-switch (4)</td>
<td>Use to set the RS-485 termination³: ON (down) for RS-485 line termination with 120Ω; OFF (up) for no RS-485 line termination (see Section 6.6)</td>
</tr>
<tr>
<td>14</td>
<td>Mains Power Connector</td>
<td>Connect to the AC mains power supply</td>
</tr>
<tr>
<td>15</td>
<td>Fuse Holder</td>
<td>Mains fuse holder</td>
</tr>
<tr>
<td>16</td>
<td>Power Switch</td>
<td>Switch for turning the unit on and off</td>
</tr>
</tbody>
</table>

---

1 Up to UXGA resolution

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

3 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\(^1\). 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\(^2\).

Before using the external IR receiver, be sure to arrange for your Kramer dealer to insert the internal IR connection cable\(^3\) 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:

<table>
<thead>
<tr>
<th>OPERATING TEMPERATURE:</th>
<th>0° to +40°C (32° to 104°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STORAGE TEMPERATURE:</td>
<td>-40° to +70°C (-40° to 158°F)</td>
</tr>
<tr>
<td>HUMIDITY:</td>
<td>10% to 90%, RHL non-condensing</td>
</tr>
</tbody>
</table>

**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 the VP-16x18AK, as illustrated in the example 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 (not shown in Figure 3).

---

1 You do not need to connect all inputs and outputs.
2 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.
3 We recommend that you use only the power cord that is supplied with this machine.
6.2 Connecting the Audio Outputs to Balanced/Unbalanced Acceptors

Figure 4 illustrates how to connect the **VP-16x18AK** to a balanced acceptor.
Connecting and Configuring the VP-16x18AK

Figure 5 illustrates how to connect the **VP-16x18AK** to an unbalanced acceptor.

![Diagram](image.png)

*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\(^1\).

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**).

---

\(^1\) RS-485 can be used for control even for distances exceeding 1km.
Connecting and Configuring the VP-16x18AK

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 VP-16x18AK 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).
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.

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.

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.

![DIP-switches](image)

Figure 8: VP-16x18AK DIP-switches

<table>
<thead>
<tr>
<th>DIP-switch Number</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3</td>
<td>RS-485 Machine number (see Table 4)</td>
</tr>
<tr>
<td></td>
<td>Default—All off, machine number 1</td>
</tr>
<tr>
<td>4</td>
<td>RS-485 Termination</td>
</tr>
<tr>
<td></td>
<td>Default—Off</td>
</tr>
</tbody>
</table>

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).

---

1 Available from [www.kramerav.com](http://www.kramerav.com)
Connecting and Configuring the VP-16x18AK

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

<table>
<thead>
<tr>
<th>Machine Number</th>
<th>DIP-switch Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1 (Default)</td>
<td>OFF</td>
</tr>
<tr>
<td>2</td>
<td>OFF</td>
</tr>
<tr>
<td>3</td>
<td>OFF</td>
</tr>
<tr>
<td>4</td>
<td>OFF</td>
</tr>
<tr>
<td>5</td>
<td>ON</td>
</tr>
<tr>
<td>6</td>
<td>ON</td>
</tr>
<tr>
<td>7</td>
<td>ON</td>
</tr>
<tr>
<td>8</td>
<td>ON</td>
</tr>
</tbody>
</table>

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.
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 audio⁰ or video² 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.

<table>
<thead>
<tr>
<th>01</th>
<th>02</th>
<th>03</th>
<th>11</th>
<th>05</th>
<th>06</th>
<th>07</th>
<th>08</th>
<th>09</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>03</td>
<td>16</td>
<td>17</td>
<td>18</td>
</tr>
</tbody>
</table>

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

¹ When the Audio button is lit the audio switching is selected
² 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\(^1\) 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\(^2\) to the Confirm mode\(^3\).
   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.

---

\(^1\) If the TAKE button is not pressed within one minute, the action is aborted

\(^2\) The TAKE button does not light

\(^3\) 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.
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.
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
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\(^1\).
   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

---

\(^1\) Storing a new configuration over a previous configuration (without deleting it first) replaces the previous configuration.
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.
Operating the VP-16x18AK Remotely

**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: www.java.com/en/download/help/testvm.xml

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

![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.

![http://192.168.1.39]

The Loading page appears.
Operating the VP-16x18AK Remotely Using a Web Browser

KRAMER: SIMPLE CREATIVE TECHNOLOGY

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

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

![Main Switching Matrix Page](image)

*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](image)

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

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.
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 17: AFV Mode Warning](image)

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.
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 19: Switching Audio in the Offline Mode](image)

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).

![Figure 23: Recalling a Preset in Offline Mode](image)

### 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](image)
To change the audio gain (in this example, input gain for channel 2):
1. From the Input Gain drop-down list, click 02.

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.

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 http://www.kramerav.com.
11 Technical Specifications

Table 5 lists the technical specifications for the VP-16x18AK 16 x 18 PC UXGA/Audio Router.

Table 5: Technical Specifications1 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 |
| CROSSSTALK (all hostile): | VIDEO: –35dB @ 100MHz | AUDIO: –68dB @1kHz |
| 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 cable2 |

1 Specifications are subject to change without notice
2 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

<table>
<thead>
<tr>
<th>EDID</th>
<th>EDID data is passed between Input 1 and Output 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol 2000</td>
<td>Protocol 3000 (Default)</td>
</tr>
<tr>
<td>Baud Rate:</td>
<td>9600</td>
</tr>
<tr>
<td>Data Bits:</td>
<td>8</td>
</tr>
<tr>
<td>Stop Bits:</td>
<td>1</td>
</tr>
<tr>
<td>Parity:</td>
<td>None</td>
</tr>
<tr>
<td>Command Format:</td>
<td>HEX</td>
</tr>
</tbody>
</table>
| Example (Output 1 to Input 1): | 0x01, 0x81, 0x81, 0x81 | Example (Output 1 to Input 1): | #AV 1>1<CR>

Switching Protocol

<table>
<thead>
<tr>
<th>P2000 -&gt; P3000</th>
<th>P3000 -&gt; P2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Command:</td>
<td>0x38, 0x80, 0x83, 0x81</td>
</tr>
<tr>
<td>Front Panel:</td>
<td>Press and hold Output 1 and Output 3 simultaneously</td>
</tr>
</tbody>
</table>

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
GTG standard  Not supported
Additional descriptors  None
Preferred timing  Yes
Native/preferred timing  1024x768p at 60Hz (4:3)

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,FF,FF,00,2E,4D,08,0B,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,00,81,81,80,40,90,40,95,00,1A,9A,4D,D1,00,0D,1C,01,1C,64,19,00,40,41,00,26,30,18,88,
36,00,30,20,18,1C,1B,00,A0,50,20,17,30,30,20,36,00,20,00,00,01,1A,00,00,00,FC,00,56,50,2D,38,58,38,
54,50,0A,2D,20,20,20,00,00,00,10,00,56,50,2D,38,58,38,54,50,20,0A,2D,20,20,00,4A
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

<table>
<thead>
<tr>
<th>OUT 1</th>
<th>...</th>
<th>OUT 5</th>
<th>...</th>
<th>OUT Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN 1</td>
<td>#V 1&gt;1 CR</td>
<td>...</td>
<td>#V 1&gt;5 CR</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td></td>
<td>...</td>
<td></td>
</tr>
<tr>
<td>IN 5</td>
<td>#V 5&gt;1 CR</td>
<td>...</td>
<td>#V 5&gt;5 CR</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td></td>
<td>...</td>
<td></td>
</tr>
<tr>
<td>IN X</td>
<td>#V X&gt;1 CR</td>
<td>...</td>
<td>#V X&gt;5 CR</td>
<td>...</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>OUT 1</th>
<th>...</th>
<th>OUT 5</th>
<th>...</th>
<th>OUT Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN 1</td>
<td>#A 1&gt;1 CR</td>
<td>...</td>
<td>#A 1&gt;5 CR</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td></td>
<td>...</td>
<td></td>
</tr>
<tr>
<td>IN 3</td>
<td>#A 5&gt;1 CR</td>
<td>...</td>
<td>#A 5&gt;5 CR</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td></td>
<td>...</td>
<td></td>
</tr>
<tr>
<td>IN X</td>
<td>#A X&gt;1 CR</td>
<td>...</td>
<td>#A X&gt;5 CR</td>
<td>...</td>
</tr>
</tbody>
</table>

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

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

* 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 of Hex Codes for Serial Communication (Protocol 2000)

Table 10: VP-16x18AK Audio Output Gain Codes

<table>
<thead>
<tr>
<th>OUTPUT 1</th>
<th>...</th>
<th>OUTPUT 5</th>
<th>...</th>
<th>OUTPUT Y*</th>
<th>Level [Rel]</th>
</tr>
</thead>
<tbody>
<tr>
<td>#AUD-LVL 2.1, -100CR</td>
<td>...</td>
<td>#AUD-LVL 2.5, -100CR</td>
<td>...</td>
<td>#AUD-LVL 2,Y, -100CR</td>
<td>-100dB Mute</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>#AUD-LVL 2.1, -50CR</td>
<td>...</td>
<td>#AUD-LVL 2.5, -50CR</td>
<td>...</td>
<td>#AUD-LVL 2,Y, -50CR</td>
<td>-50dB</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>#AUD-LVL 2.1, 0CR</td>
<td>...</td>
<td>#AUD-LVL 2.5, 0CR</td>
<td>...</td>
<td>#AUD-LVL 2,Y, 0CR</td>
<td>0dB</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>#AUD-LVL 2.1, 10CR</td>
<td>...</td>
<td>#AUD-LVL 2.5, 10CR</td>
<td>...</td>
<td>#AUD-LVL 2,Y, 10CR</td>
<td>+10dB (Max)</td>
</tr>
</tbody>
</table>
* Where X is the output number from 1 - 8. For example, for channel 7 and relative level -50dB, #AUD-LVL 2.7, -50CR

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

<table>
<thead>
<tr>
<th>Switching Video Channels</th>
<th>OUT 1</th>
<th>OUT 5</th>
<th>OUT Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN 1</td>
<td>01 81 81 81</td>
<td>...</td>
<td>01 81 85 81</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>IN 5</td>
<td>01 85 81 81</td>
<td>...</td>
<td>01 85 85 81</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>IN X</td>
<td>01 8X 81 81</td>
<td>...</td>
<td>01 8X 85 81</td>
</tr>
</tbody>
</table>

Table 12 lists the Hex codes that switch video channels:

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

<table>
<thead>
<tr>
<th>Switching Audio Channels</th>
<th>OUT 1</th>
<th>OUT 5</th>
<th>OUT Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN 1</td>
<td>02 81 81 81</td>
<td>...</td>
<td>02 81 85 81</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>IN 5</td>
<td>02 85 81 81</td>
<td>...</td>
<td>02 85 85 81</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>IN X</td>
<td>02 8X 81 81</td>
<td>...</td>
<td>02 8X 85 81</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>IN 1</th>
<th>IN 5</th>
<th>IN X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase</td>
<td>18 81 86 81</td>
<td>18 85 86 81</td>
</tr>
<tr>
<td>Decrease</td>
<td>18 81 87 81</td>
<td>18 85 87 81</td>
</tr>
</tbody>
</table>
Table 14 lists the Hex values that set the audio input gain:

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

<table>
<thead>
<tr>
<th>IN 1</th>
<th>...</th>
<th>IN 5</th>
<th>...</th>
<th>IN X</th>
<th>Level [Rel]</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 81 80 81</td>
<td>...</td>
<td>16 85 80 81</td>
<td>...</td>
<td>16 8X 80 81</td>
<td>Mute</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>16 81 87 81</td>
<td>...</td>
<td>16 85 87 81</td>
<td>...</td>
<td>16 8X 87 81</td>
<td>-100dB Mute</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>16 81 B9 81</td>
<td>...</td>
<td>16 85 B9 81</td>
<td>...</td>
<td>16 8X B9 81</td>
<td>-50dB</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>16 81 EB 81</td>
<td>...</td>
<td>16 85 EB 81</td>
<td>...</td>
<td>16 8X EB 81</td>
<td>0dB</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>16 81 FF 81</td>
<td>...</td>
<td>16 85 FF 81</td>
<td>...</td>
<td>16 8X FF 81</td>
<td>+20dB (Max)</td>
</tr>
</tbody>
</table>

* 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**

<table>
<thead>
<tr>
<th>OUT 1</th>
<th>...</th>
<th>OUT 5</th>
<th>...</th>
<th>OUT Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase</td>
<td>18 81 80 81</td>
<td>...</td>
<td>18 85 80 81</td>
<td>...</td>
</tr>
<tr>
<td>Decrease</td>
<td>18 81 81 81</td>
<td>...</td>
<td>18 85 81 81</td>
<td>...</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>OUT 1</th>
<th>...</th>
<th>OUT 5</th>
<th>...</th>
<th>OUT Y</th>
<th>Level [Rel]</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 81 80 81</td>
<td>...</td>
<td>16 85 80 81</td>
<td>...</td>
<td>16 8Y 80 81</td>
<td>Mute</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>16 81 94 81</td>
<td>...</td>
<td>16 85 94 81</td>
<td>...</td>
<td>16 8Y 94 81</td>
<td>-100dB Mute</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>16 81 C6 81</td>
<td>...</td>
<td>16 85 C6 81</td>
<td>...</td>
<td>16 8Y C6 81</td>
<td>-50dB</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>16 81 F8 81</td>
<td>...</td>
<td>16 85 F8 81</td>
<td>...</td>
<td>16 8Y F8 81</td>
<td>0dB</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>16 81 FF 81</td>
<td>...</td>
<td>16 85 FF 81</td>
<td>...</td>
<td>16 8Y FF 81</td>
<td>+10dB (Max)</td>
</tr>
</tbody>
</table>

*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 20001 (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 hold2 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®-based Kramer control software3 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® HyperTerminal Application) and uses a data rate of 115200 baud, with no parity, 8 data bits, and 1 stop bit.

---

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: www.kramerav.com

2 Not as part of a switching operation

3 Download the latest software from our Web site at www.kramerav.com
16.2.1 Protocol 3000 Syntax

Host message format:

<table>
<thead>
<tr>
<th>Start</th>
<th>Address (optional)</th>
<th>Body</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>device_id@</td>
<td>message</td>
<td>CR</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>start</th>
<th>body</th>
<th>delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>Command SP Parameter_1,Parameter_2,…</td>
<td>CR</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Start</th>
<th>Address (optional)</th>
<th>Body</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>~</td>
<td>device_id@</td>
<td>message</td>
<td>CR LF</td>
</tr>
</tbody>
</table>

Device long response (Echoing command):

<table>
<thead>
<tr>
<th>Start</th>
<th>Address (optional)</th>
<th>Body</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>~</td>
<td>device_id@</td>
<td>command</td>
<td>SP [param1,param2,…] result</td>
</tr>
</tbody>
</table>

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.
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

<table>
<thead>
<tr>
<th>Help commands</th>
<th>Command</th>
<th>Syntax</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol Handshaking</td>
<td>#CR</td>
<td>~OKCRLF</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Device initiated messages</th>
<th>Command</th>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start message</td>
<td>Kramer Electronics LTD., Device Model Version Software Version</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Switcher actions</th>
<th>Command</th>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audio-video channel has switched (AFV mode)</td>
<td>AV [IN&gt;OUT]</td>
<td></td>
</tr>
<tr>
<td>Video channel has switched (Breakaway mode)</td>
<td>VID [IN&gt;OUT]</td>
<td></td>
</tr>
<tr>
<td>Audio channel has switched (Breakaway mode)</td>
<td>AUD [IN&gt;OUT]</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Result codes (errors)</th>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>No error. Command running succeeded</td>
<td>COMMAND PARAMETERS OK</td>
</tr>
<tr>
<td>Protocol Errors</td>
<td>ERR001</td>
</tr>
<tr>
<td>Syntax Error</td>
<td>ERR002</td>
</tr>
<tr>
<td>Command not available for this device</td>
<td>ERR003</td>
</tr>
<tr>
<td>Parameter is out of range</td>
<td>ERR004</td>
</tr>
<tr>
<td>Unauthorized access (running command without the match login).</td>
<td>ERR004</td>
</tr>
</tbody>
</table>
### Basic routing commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Syntax</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch audio &amp; video</td>
<td>AV [IN-&gt;OUT], [IN-&gt;OUT], …</td>
<td>AV [IN-&gt;OUT], [IN-&gt;OUT], … RESULT</td>
</tr>
<tr>
<td>Switch video only</td>
<td>VID [IN-&gt;OUT], [IN-&gt;OUT], …</td>
<td>VID [IN-&gt;OUT], [IN-&gt;OUT], … RESULT</td>
</tr>
<tr>
<td>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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switch audio only</td>
<td>AUD [IN-&gt;OUT], [IN-&gt;OUT], …</td>
<td>AUD [IN-&gt;OUT], [IN-&gt;OUT], … RESULT</td>
</tr>
<tr>
<td>Note: When AFV mode is active, this command will switch also video.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Read video connection</td>
<td>VID? [OUT]</td>
<td>VID [IN-&gt;OUT]</td>
</tr>
<tr>
<td>Short form: V? [OUT]</td>
<td>VID? *</td>
<td>VID [IN-&gt;OUT], [IN-&gt;OUT], …</td>
</tr>
<tr>
<td>Read audio connection</td>
<td>AUD? [OUT]</td>
<td>AUD [IN-&gt;OUT]</td>
</tr>
<tr>
<td>Short form: A? [OUT]</td>
<td>AUD? *</td>
<td>AUD [IN-&gt;OUT], [IN-&gt;OUT], …</td>
</tr>
</tbody>
</table>

Parameters Description:

- **IN** = Input number or '0' to disconnect output.
- '>' = Connection character between in and out parameters.
- **OUT** = Output number or '*' for all outputs.

Examples:

- **Switch Video and Audio input 3 to output 7**  
  #AV 3->[CR]  
  ~AV 3>7 OK[CRLF]

- **Switch Video input 2 to output 4**  
  #V 2->[CR]  
  ~VID 2>4 OK[CRLF]

- **Switch Video input 4 to output 2 in machine number 6**  
  #6@VID 4->[CR]  
  ~6@VID 4>2 OK[CRLF]

- **Disconnect Video and Audio Output 4**  
  #AV 0->[CR]  
  ~AV 0>4 OK[CRLF]

- **Switch Video Input 3 to All Outputs**  
  #V 3->[CR]  
  ~V 3>* OK[CRLF]

Chaining Multiple commands*  

#AV 1>* | V 3>4, 2>2, 82>1, 0>2 | V 82>3 | A 0>1 | V? * [CR]  
First switch all Audio and video outputs from input 1,  
Then switch video input 3 to output 4, video input 2 to output 2, video input and disconnect video output 2.  
Then switch audio input 3 to output 2,  
Then disconnect audio output 1.  
Then get status of all links (assume this is 4x4 matrix).  
Commands processing start after entering [CR], response will sent for each command after processing it.  
~AV 1>* OK[CRLF]  
~VID 1>2, 3>4 OK[CRLF]  
~VID 82>3 ERR### CRLF  
~AUD 0>1 OK[CRLF]  
~V 1>1, 0>2, 1>3, 3>4 CRLF
### Signal Status commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Syntax</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change signal status</td>
<td>SIGNAL INPUT, STATUS</td>
<td>SIGNAL INPUT, STATUS</td>
</tr>
<tr>
<td>Get signal status</td>
<td>SIGNAL? INPUT</td>
<td>SIGNAL INPUT, STATUS</td>
</tr>
</tbody>
</table>

#### 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

<table>
<thead>
<tr>
<th>Command</th>
<th>Syntax</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Store current connections to preset</td>
<td>PRST-STO [PRESET]</td>
<td>PRST-STO [PRESET] RESULT</td>
</tr>
<tr>
<td></td>
<td>Short form: PSTO [PRESET]</td>
<td></td>
</tr>
<tr>
<td>Recall saved preset</td>
<td>PRST-RCL [PRESET]</td>
<td>PRST-RCL [PRESET] RESULT</td>
</tr>
<tr>
<td></td>
<td>Short form: PRCL [PRESET]</td>
<td></td>
</tr>
<tr>
<td>Delete saved preset</td>
<td>PRST-DEL [PRESET]</td>
<td>PRST-DEL [PRESET] RESULT</td>
</tr>
<tr>
<td></td>
<td>Short form: PDEL [PRESET]</td>
<td></td>
</tr>
<tr>
<td>Read video connections from saved preset</td>
<td>PRST-VID? [PRESET] [OUT]</td>
<td>PRST-VID [PRESET] [N-&gt;OUT]</td>
</tr>
<tr>
<td></td>
<td>Short form: PVID? [PRESET] [OUT]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRST-VID? [PRESET] *</td>
<td>PRST-VID [PRESET] [N-&gt;1, N-&gt;2,...]</td>
</tr>
<tr>
<td>Read audio connections from saved preset</td>
<td>PRST-AUD? [PRESET] [OUT]</td>
<td>PRST-AUD [PRESET] [IN-&gt;OUT]</td>
</tr>
<tr>
<td></td>
<td>Short form: PAUD? [PRESET] [OUT]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRST-AUD? [PRESET] *</td>
<td>PRST-AUD [PRESET] [IN-&gt;1, IN-&gt;2,...]</td>
</tr>
</tbody>
</table>
| Read saved presets list  | PRST-LST? [PRESET]  | PRST-LST [PRESET] [PRESET] ...

#### 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

<table>
<thead>
<tr>
<th>Command</th>
<th>Syntax</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lock front panel</td>
<td>LOCK-FP [LOCK-MODE]</td>
<td>LOCK-FP [LOCK-MODE] RESULT</td>
</tr>
<tr>
<td></td>
<td>Short form: LCK [LOCK-MODE]</td>
<td>LOCK-FP [LOCK-MODE]</td>
</tr>
</tbody>
</table>

**Get front panel locking state**

<table>
<thead>
<tr>
<th>Command</th>
<th>Syntax</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCK-FP?</td>
<td>LOCK-FP [LOCK-MODE]</td>
<td></td>
</tr>
</tbody>
</table>

**Parameters Description:**

- [LOCK-MODE] = Front panel locking state:
  - "0" or "off" to unlock front panel buttons.
  - "1" or "on" to lock front panel buttons.

- [RESET OK] = Restart device

**Switch to protocol 2000**

<table>
<thead>
<tr>
<th>Command</th>
<th>Syntax</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2000</td>
<td>P2000 OK</td>
<td></td>
</tr>
</tbody>
</table>

* Protocol 2000 has command to switch back to ASCII protocol (like protocol 3000)

### Audio parameters commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Syntax</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set audio level in specific amplifier stage.</td>
<td>AUD-LVL [STAGE, CHANNEL, VOLUME]</td>
<td>AUD-LVL [STAGE, CHANNEL, VOLUME]</td>
</tr>
<tr>
<td></td>
<td>Short form: ADL [STAGE, CHANNEL, VOLUME]</td>
<td>AUD-LVL [STAGE, CHANNEL, VOLUME]</td>
</tr>
<tr>
<td>Read audio volume level</td>
<td>AUD-LVL? [STAGE, CHANNEL]</td>
<td>AUD-LVL [STAGE, CHANNEL, VOLUME]</td>
</tr>
<tr>
<td></td>
<td>Short form: ADL? [STAGE, CHANNEL]</td>
<td>AUD-LVL [STAGE, CHANNEL, VOLUME]</td>
</tr>
<tr>
<td>Set audio bass level</td>
<td>BASS [OUTPUT, BASS]</td>
<td>BASS [OUTPUT, BASS]</td>
</tr>
<tr>
<td></td>
<td>Short form: ADB [OUTPUT, BASS]</td>
<td>BASS [OUTPUT, BASS]</td>
</tr>
<tr>
<td>Read audio bass level</td>
<td>BASS? [OUTPUT]</td>
<td>BASS [OUTPUT, BASS]</td>
</tr>
<tr>
<td></td>
<td>Short form: ADB? [OUTPUT]</td>
<td>BASS [OUTPUT, BASS]</td>
</tr>
<tr>
<td>Set audio treble level</td>
<td>TREBLE [OUTPUT, TREBLE]</td>
<td>TREBLE [OUTPUT, TREBLE]</td>
</tr>
<tr>
<td></td>
<td>Short form: ADT [OUTPUT, TREBLE]</td>
<td>TREBLE [OUTPUT, TREBLE]</td>
</tr>
<tr>
<td>Read audio treble</td>
<td>TREBLE? [OUTPUT]</td>
<td>TREBLE [OUTPUT, TREBLE]</td>
</tr>
<tr>
<td></td>
<td>Short form: ADT? [OUTPUT]</td>
<td>TREBLE [OUTPUT, TREBLE]</td>
</tr>
</tbody>
</table>

**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.

- [OUTPUT] = Output #

- [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
## Kramer Protocol

### Machine info commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Syntax</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Time settings commands require admin authorization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Read in/outs count</td>
<td>INFO-IO?</td>
<td>INFO-IO: IN [INPUTS_COUNT], OUT [OUTPUTS_COUNT]</td>
</tr>
<tr>
<td>Read max presets count</td>
<td>INFO-PRST?</td>
<td>INFO-PRST: VID [PRESET_VIDEO_COUNT], AUD [PRESET_AUDIO_COUNT]</td>
</tr>
<tr>
<td>Reset configuration to factory default</td>
<td>FACTORY</td>
<td>FACTORY [RESULT]</td>
</tr>
<tr>
<td>Mute Audio</td>
<td>MUTE MUTE MODE</td>
<td>MUTE MUTE MODE [RESULT]</td>
</tr>
</tbody>
</table>

### Identification commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Syntax</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol Handshaking</td>
<td>#CR</td>
<td>-OK CRLF</td>
</tr>
<tr>
<td>Read device model</td>
<td>MODEL?</td>
<td>MODEL [MACHINE_MODEL]</td>
</tr>
<tr>
<td>Read device serial number</td>
<td>SN?</td>
<td>SN [SERIAL_NUMBER]</td>
</tr>
<tr>
<td>Read device firmware version</td>
<td>VERSION?</td>
<td>VERSION [MAJOR], [MINOR], [BUILD], [REVISION]</td>
</tr>
<tr>
<td>Set machine name</td>
<td>NAME [MACHINE_NAME]</td>
<td>NAME [MACHINE_NAME] [RESULT]</td>
</tr>
<tr>
<td>Read machine name</td>
<td>NAME?</td>
<td>NAME [MACHINE_NAME]</td>
</tr>
<tr>
<td>Reset machine name to factory default*</td>
<td>NAME-RST</td>
<td>NAME-RST [MACHINE_FACTORY_NAME] [RESULT]</td>
</tr>
</tbody>
</table>

*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). [MACHINE_NAME] = Up to 14 Alfa-Numeric chars.

** Machine factory name = Model name + last 4 digits from serial number.**

<table>
<thead>
<tr>
<th>Set machine id number</th>
<th>MACH-NUM MACHINE_NUMBER</th>
<th>MACH-NUM OLD_MACHINE_NUMBER, NEW_MACHINE_NUMBER [RESULT]</th>
</tr>
</thead>
</table>

* Response will send after machine number has been changed. So the replay with header will be:

**NEW_MACHINE_NUMBER** @MACH-NUM OLD_MACHINE_NUMBER, NEW_MACHINE_NUMBER OK

### Network settings commands

<table>
<thead>
<tr>
<th>Set IP Address</th>
<th>NET-IP IP_ADDRESS NTIP</th>
<th>NET-IP [IP_ADDRESS] [RESULT]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read IP Address</td>
<td>NET-IP? NTIP?</td>
<td>NET-IP [IP_ADDRESS]</td>
</tr>
<tr>
<td>Read MAC Address</td>
<td>NET-MAC? NTMC</td>
<td>NET-MAC [MAC_ADDRESS]</td>
</tr>
</tbody>
</table>
Kramer Protocol

### Network settings commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Syntax</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set subnet mask</td>
<td>NET-MASK SUBNET_MASK</td>
<td>NET-MASK SUBNET_MASK RESULT</td>
</tr>
<tr>
<td>Read subnet mask</td>
<td>NET-MASK? SUBNET_MASK?</td>
<td>NET-MASK SUBNET_MASK</td>
</tr>
<tr>
<td>Set gateway address</td>
<td>NET-GATE GATEWAY_ADDRESS</td>
<td>NET-GATE GATEWAY_ADDRESS RESULT</td>
</tr>
<tr>
<td>Read gateway address</td>
<td>NET-GATE? GATEWAY_ADDRESS ?</td>
<td>NET-GATE GATEWAY_ADDRESS</td>
</tr>
<tr>
<td>Set DHCP mode</td>
<td>NET-DHCP DHCP_MODE</td>
<td>NET-DHCP DHCP_MODE RESULT</td>
</tr>
<tr>
<td>Read DHCP mode</td>
<td>NET-DHCP DHCP_MODE?</td>
<td>NET-DHCP DHCP_MODE</td>
</tr>
</tbody>
</table>

**DHCP_MODE**

- **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

<table>
<thead>
<tr>
<th>Command</th>
<th>Syntax</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read protocol Ethernet port</td>
<td>ETH-PORT PROTOCOL . PORT</td>
<td>ETH-PORT PROTOCOL . PORT RESULT</td>
</tr>
</tbody>
</table>

**PROTOCOL** = TCP / UDP (transport layer protocol)

**PORT** = 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

<table>
<thead>
<tr>
<th>Command</th>
<th>Syntax</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set audio follow video mode</td>
<td>AFV AFV-MODE</td>
<td>AFV AFV-MODE RESULT</td>
</tr>
</tbody>
</table>

**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.

---

50
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

<table>
<thead>
<tr>
<th>MSB</th>
<th>DESTINATION</th>
<th>INSTRUCTION</th>
<th>LSB</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>D</td>
<td>N5</td>
<td>N4</td>
</tr>
<tr>
<td>1</td>
<td>I6</td>
<td>I5</td>
<td>I4</td>
</tr>
<tr>
<td>2</td>
<td>O6</td>
<td>O5</td>
<td>O4</td>
</tr>
<tr>
<td>3</td>
<td>M4</td>
<td>M3</td>
<td>M2</td>
</tr>
<tr>
<td>4</td>
<td>OVR</td>
<td>X</td>
<td>M1</td>
</tr>
<tr>
<td>5</td>
<td>OVR</td>
<td>X</td>
<td>M0</td>
</tr>
</tbody>
</table>

1st 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.
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.

<table>
<thead>
<tr>
<th>#</th>
<th>DESCRIPTION</th>
<th>DEFINITION FOR SPECIFIC INSTRUCTION</th>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>RESET VIDEO</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>SWITCH VIDEO</td>
<td>Set equal to video input which is to be switched (0 = disconnect)</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>SWITCH AUDIO</td>
<td>Set equal to audio input which is to be switched (0 = disconnect)</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>STORE VIDEO STATUS</td>
<td>Set as SETUP # 0 - to store 1 - to delete</td>
<td>2, 3</td>
</tr>
<tr>
<td>4</td>
<td>RECALL VIDEO STATUS</td>
<td>Set as SETUP # 0</td>
<td>2, 3</td>
</tr>
<tr>
<td>5</td>
<td>REQUEST STATUS OF A VIDEO OUTPUT</td>
<td>Set as SETUP # Equal to output number whose status is reqd</td>
<td>4, 3</td>
</tr>
<tr>
<td>6</td>
<td>REQUEST STATUS OF AN AUDIO OUTPUT</td>
<td>Set as SETUP # Equal to output number whose status is reqd</td>
<td>4, 3</td>
</tr>
<tr>
<td>8</td>
<td>BREAKAWAY SETTING</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>REQUEST BREAKAWAY SETTING</td>
<td>Set as SETUP # 0 - Request audio breakaway setting</td>
<td>3, 4, 6</td>
</tr>
<tr>
<td>15</td>
<td>REQUEST WHETHER SETUP IS DEFINED / VALID INPUT IS DETECTED</td>
<td>SETUP # or Input # 0 - for checking if setup is defined 1 - for checking if input is valid</td>
<td>8</td>
</tr>
<tr>
<td>16</td>
<td>ERROR / BUSY</td>
<td>For invalid / valid input (i.e. OUTPUT byte = 4 or OUTPUT byte = 5), this byte is set as the input #</td>
<td>9, 25</td>
</tr>
<tr>
<td>22</td>
<td>SET AUDIO PARAMETER</td>
<td>Equal to input / output number whose parameter is to be set (0 = all)</td>
<td>2, 24</td>
</tr>
<tr>
<td>24</td>
<td>INCREASE / DECREASE AUDIO PARAMETER</td>
<td>Equal to input / output number whose parameter is to be increased / decreased (0 = all)</td>
<td>2</td>
</tr>
<tr>
<td>25</td>
<td>REQUEST AUDIO PARAMETER</td>
<td>Equal to input / output number whose parameter is requested</td>
<td>6, 24</td>
</tr>
<tr>
<td>30</td>
<td>LOCK FRONT PANEL</td>
<td>0 - Panel unlocked 1 - Panel locked</td>
<td>2</td>
</tr>
<tr>
<td>31</td>
<td>REQUEST WHETHER PANEL IS LOCKED</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>42</td>
<td>AUDIO PARAMETER SETTINGS FOR INSTRUCTIONS 22, 24, 25</td>
<td>INPUT Bit: 10 - 0= Input; 1= Output 11 - Left 12 - Right</td>
<td>24</td>
</tr>
<tr>
<td>56</td>
<td>CHANGE TO ASCII</td>
<td>0</td>
<td>Kramer protocol 3000</td>
</tr>
</tbody>
</table>
### INSTRUCTION

**#** | **DESCRIPTION** | **DEFINITION FOR SPECIFIC INSTRUCTION** | **NOTE**
---|---|---|---
61 | IDENTIFY MACHINE | 1 - video machine name 2 - audio machine name 3 - video software version 4 - audio software version | 13
62 | DEFINE MACHINE | 1 - number of inputs 2 - number of outputs 3 - number of setups | 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”).

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 (i.e. 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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**Safety Warning:**
Disconnect the unit from the power supply before opening/servicing.

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