Kramer Electronics, Ltd.



USER MANUAL

Model:

VP-1608 16x8 RGBHV / Balanced Audio Matrix

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1 Introduction

Welcome to Kramer Electronics (since 1981): a world of unique, creative and affordable solutions to the infinite range of problems that confront the video, audio and presentation professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 350-plus different models now appear in 8 Groups¹, which are clearly defined by function.

Congratulations on purchasing your Kramer **VP-1608** *16x8 RGBHV / Balanced Audio Matrix*, which is ideal for the following typical applications:

- Any professional system requiring outstanding value in a 16x8 matrix
- Production and duplications facilities

The package includes the following items:

- VP-1608 16x8 RGBHV / Balanced Audio Matrix
- Power cord and Null-modem adapter
- Windows®-based Kramer control software
- This user manual²

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use Kramer high performance high resolution cables³

3 Overview

The high performance **VP-1608** *16x8 RGBHV* / *Balanced Audio Matrix* is a true matrix switcher, routing any input to any or all outputs simultaneously. The **VP-1608** includes 16 input and eight output selector buttons, as well as:

- A bandwidth of 400MHz (Fully Loaded) for RGB signals
- A unique vertical and horizontal sync-pulse solution
- Audio-follow-video or audio breakaway option (to switch audio

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



¹ GROUP 1: Distribution Amplifiers; GROUP 2: Video and Audio Switchers, Matrix Switchers and Controllers; GROUP 3: Video, Audio, VGA/XGA Processors; GROUP 4: Interfaces and Sync Processors; GROUP 5: Twisted Pair Interfaces;

GROUP 6: Accessories and Rack Adapters; GROUP 7: Scan Converters and Scalers; and GROUP 8: Cables and Connectors

² Download up-to-date Kramer user manuals from our Web site: http://www.kramerelectronics.com

independently from video)

- 15 preset memory locations for quick access to common configurations
- A "TAKE" button for precise switch control, letting you place multiple switches in a queue, and then activate them, with one touch of this button or a single serial command
- A delayed switching mode (ranging from 0 to 3.5sec¹), for clean transitions when switching between non-genlocked sources

Control the VP-1608 using the front panel buttons, or remotely via:

- RS-485 or RS-232 serial commands—that also support audio gain adjustments for each input and output—transmitted by a touch screen system, PC, or other serial controller
- The Kramer **RC-IR1**² Infra-Red Remote Control Transmitter

The **VP-1608** is dependable, rugged and fits into three vertical spaces (3U) of a standard 19" rack. To achieve the best performance:

- Connect only good quality connection cables, thus avoiding interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Avoid interference from neighboring electrical appliances and position your Kramer **VP-1608** away from moisture, excessive sunlight and dust

4 Summary of how to Operate a Single Machine

By default, the **VP-1608** is setup for use as a single machine. This means that it is a 16x8 RGBHV / Balanced Audio Matrix (in audio-follow-video mode), with all setups empty and each input connected to its corresponding output (for example, input 1 to output 1). The dipswitches are set up for a typical application using a single machine (see Figure 1):



Figure 1: Dipswitch Setup on a Single Machine

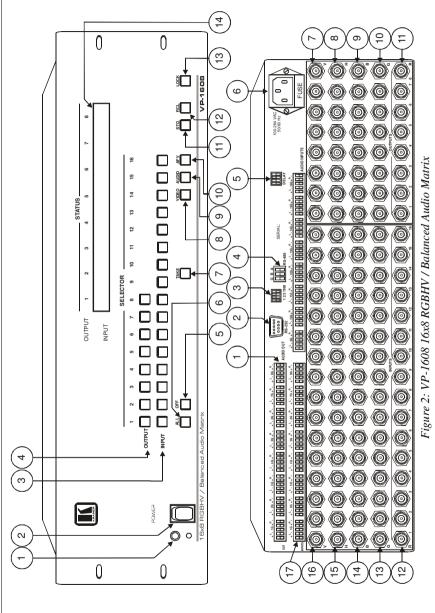
5 Your VP-1608 16x8 RGBHV / Balanced Audio Matrix

Figure 2 illustrates the front and rear panels of the **VP-1608**. Tables 1 and 2 define the front and rear panels of the **VP-1608**, respectively.

¹ In increments of 0.5sec

² Previously known as IR-1 / IR-1-01

Your VP-1608 16x8 RGBHV / Balanced Audio Matrix



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KRAMER

Ħ	Feature	Function
1	IR Receiver	The red LED is illuminated when receiving signals from the Kramer Infra-red remote control transmitter
2	POWER Switch	Illuminated switch supplying power to the unit
3	INPUT SELECTOR Buttons ¹	Select the input to switch to the output (from 1 to 16)
4	OUTPUT SELECTOR Buttons	Select the output to which the input is switched (from 1 to 8)
5	OFF Button	Pressing <i>OFF</i> after pressing an <i>OUTPUT</i> button disconnects that output from the inputs. To disconnect all the outputs, press the <i>ALL</i> button and then the <i>OFF</i> button
6	ALL Button	Pressing ALL followed by an <i>INPUT</i> button, connects that input to all outputs ²
7	TAKE Button	Pressing <i>TAKE</i> toggles the mode between the <i>CONFIRM</i> mode ³ and the <i>AT ONCE</i> mode (user confirmation per action is unnecessary)
8	VIDEO Button	When pressed actions relate to video
9	AUDIO Button	When pressed actions relate to audio
10	AFV Button	When pressed audio channels follow the video channels. The button is illuminated when the <i>AFV</i> mode is selected
11	STO Button	Pressing STO (STORE) followed by an input button stores the current setup
12	RCL Button	Pressing the RCL (RECALL) button and the corresponding input button recalls a setup
		After pressing the button, the stored status blinks. Pressing a different input button lets you view ⁴ another setup. After making your choice, pressing the <i>RCL</i> button again implements the new status
13	LOCK Button	Pressing the <i>LOCK</i> button for more than 2 seconds, engages/disengages the front panel switches
14	INPUT STATUS 7-segment Display	Displays the selected input switched to the output (marked above each input) $^{\rm 5}$

Table 1: Front Panel VP-1608 16x8 RGBHV / Balanced Audio Matrix Features

¹ The INPUT SELECTOR buttons are also used to store/recall the input/output configurations (refer to section 8.4)

² For example, press ALL and then INPUT button # 2 to connect input # 2 to all the outputs

³ When in Confirm mode, the TAKE button illuminates

⁴ Only view, nothing is implemented at this stage

⁵ Also displays the number included in the product name and the firmware version number, as section 5.1 describes

Ħ	Feature	Function
1	AUDIO OUT Terminal Block Connectors	Connect to the audio acceptors (from 1 to 8)
2	RS-232 DB 9F Connector	Connects to the PC or other Serial Controller
3	Setup Dipswitches	DIPS 1, 2, and 3 for setup of the Machine #; DIP 4 for RS-485 termination
4	RS-485 Connector	RS-485 port on detachable terminal block
5	DELAY Dipswitches	Dipswitches for setup of the delay time ¹
6	Power Connector with Fuse	AC connector enabling power supply to the unit
7	V (Vertical Sync) OUTPUT BNC Connectors ²	
8	H (Horizontal Sync) OUTPUT BNC Connectors ²	
9	B OUTPUT BNC Connectors	Connect to the RGBHV video acceptors (1 to 8)
10	G OUTPUT BNC Connectors	
11	R OUTPUT BNC Connectors	
12	R INPUT BNC Connectors	
13	G INPUT BNC Connectors	
14	B INPUT BNC Connectors	Connect to the RGBHV video sources (1 to 16)
15	H (Horizontal Sync) INPUT BNC Connectors ²	
16	V (Vertical Sync) INPUT BNC Connectors ²	
17	AUDIO INPUTS Terminal Block Connectors	Connect to the audio sources (from 1 to 16)

Table 2: Rear Panel VP-1608 16x8 RGBHV / Balanced Audio Matrix Features

Figure 3 and Table 3 define the two Flash Program switches³ on the underside of the **VP-1608** unit:

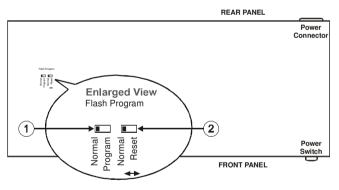


Figure 3: VP-1608 Underside Flash Program Switches

Table 3: VP-1608 Underside (Flash Program Switches) Features

#	Feature	Function
1	Flash Program Switch 1	Move to the right for Program ³ , or move to the left for Normal ⁴
2	Flash Program Switch 2	Move to the right for Reset ³ , or move to the left for Normal ⁴

1 Ranging from 0sec to 3.5sec (in increments of 0.5sec)

4 The factory default

² For RGBS applications, one of the sync channels (H or V) may be used for the S channel

³ Used to upgrade to the latest Kramer firmware (see section 9)

5.1 Displaying Unit Characteristics

Switching on and/or resetting¹ the **VP-1608** unit, momentarily displays the following characteristics on the front panel (as Figure 4 illustrates):

- The number included in the product name (for example, 1608)
- The Firmware Version Number

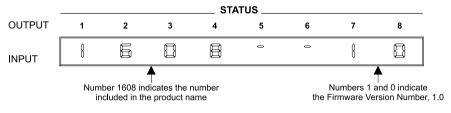


Figure 4: VP-1608 Unit Characteristics

¹ To the Current Status (see section 8.7.1) or to the Factory Default State (see section 8.7.2)

6 Connecting a VP-1608 16x8 RGBHV / Balanced Audio Matrix

To connect a single¹ **VP-1608** *16x8 RGBHV / Balanced Audio Matrix*, do the following²:

- 1. Connect to the rear panel, the:
 - Video sources and acceptors (see the illustration³ in Figure 5)
 - Appropriate audio sources and acceptors (see section 6.1)
 - Power cord
- 2. Set the dipswitches, as follows:
 - The MACHINE # dipswitches to MACHINE # 1, according to Table 4, that is, set all OFF. See the example illustrated in Figure 1
 - The DELAY dipswitches, if required (see section 6.4)
- 3. Connect to a PC or other controller, if required, via RS-232 (see section 6.1) or RS-485 (see section 6.3).

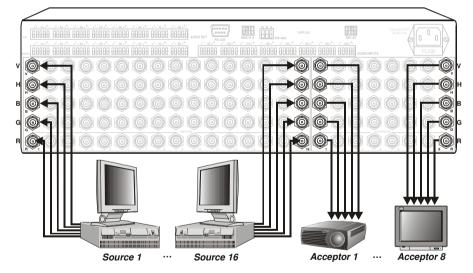


Figure 5: Connecting the Video Sources and Acceptors to the Rear Panel

³ Which shows a grayed-out rear panel except for how to connect the sources, one to 16, and the acceptors, one to eight



¹ Note that you can connect up to 8 VP-1608 units to a PC or other RS-232 or RS-485 controller (see section 7)

² Switch OFF the power on each device before connecting it to your VP-1608. After connecting your VP-1608, switch on its power and then switch on the power on each device

6.1 Connecting the Balanced/Unbalanced Stereo Audio Input/Output

This section illustrates how to wire:

- A balanced input/output connection, see Figure 6
- An unbalanced audio input, see Figure 7
- An unbalanced audio output, see Figure 8

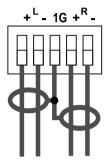


Figure 6: Connecting the Balanced Stereo Audio Input/Output

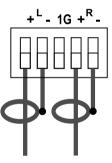


Figure 7: Connecting the Unbalanced Stereo Audio Input

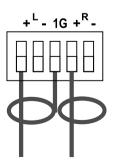


Figure 8: Connecting an Unbalanced Output

6.2 Controlling via RS-232 (for example, using a PC)

To connect a PC to the **VP-1608** unit¹, using the Null-modem adapter provided with the machine (recommended):

• Connect the RS-232 DB9 rear panel port on the **VP-1608** unit to the Null-modem adapter and connect the Null-modem adapter with a 9 wire flat cable² to the RS-232 DB9 port on your PC

To connect a PC to the **VP-1608** unit¹, without using a Null-modem adapter:

• Connect the RS-232 DB9 port on your PC to the RS-232 DB9 rear panel port on the **VP-1608** unit, as Figure 9 illustrates² (depending on whether the PC has a 9-pin or 25-pin connector)

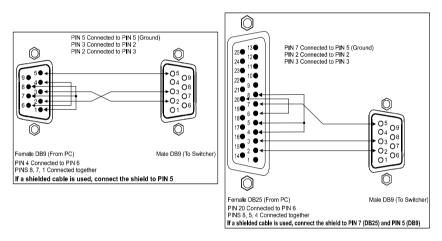


Figure 9: Connecting a PC without using a Null-modem Adapter

² Up to 50 feet of cabling may be used for the RS-232 connection



¹ When connecting a single VP-1608 unit via RS-232, set the MACH. # dipswitches to Machine # 1, according to Table 4

6.3 Controlling via RS-485

You can control a **VP-1608** unit via an RS-485 controller¹, for example, a PC (equipped with an RS-485 interface) or a Master Programmable Remote Control system, such as the Kramer **RC-3000**².

To connect an **RC-3000** to a single **VP-1608** unit (see Figure 10):

- 1. Connect the RS-485 terminal block port on the **RC-3000** to the RS-485 port on the **VP-1608** unit, as follows:
 - Connect the "A" (+) PIN on the RS-485 rear panel port of the RC-3000 to the "A" (+) PIN on the RS-485 rear panel port of the VP-1608 unit
 - Connect the "B" (-) PIN on the RS-485 rear panel port of the RC-3000 to the "B" (-) PIN on the RS-485 rear panel port of the VP-1608 unit
 - If shielded twisted pair cable is used, the shield may be connected to the "G" (Ground) PIN on one of the units (for example, on the RC-3000)
- Set the MACH. # dipswitches on the VP-1608 unit to a Machine # between 2 and 16, according to Table 4. Do not set as Machine # 1 (the Master). Terminate the RS-485 line on both the VP-1608 unit (set DIP 4 to ON) and on the RC-3000³.

¹ RS-485 can be used for control even for distances exceeding 1km

² Previously known as the VS-3000

³ Refer to the RC-3000 user manual for details of how to terminate the RS-485 line

		RS-485 PINOUT
		G
		– B —
	REMOTE CONTACT	+ A —
RC-3000		
	_	
		-
		=71
	00000000000	
6000000000000000	000000000000	Ô
	000000000000	Ø
	000000000000000000000000000000000000000	ı 🎯
000000000000000000000000000000000000000	00000000000	

Figure 10: Controlling via RS-485 (for example, using an RC-3000)

6.4 Setting the MACHINE # Dipswitches

The MACHINE # determines the position of a **VP-1608** unit in the sequence, specifying which **VP-1608** unit is being controlled when several **VP-1608** units are controlled by a PC or serial controller. Set the MACHINE # on a **VP-1608** unit via DIPS 1, 2, and 3 (DIP 4 is for RS-485 termination), according to Table 4.

When using a stand-alone VP-1608 unit, set the MACHINE # to 1 (see Figure 1).

When connecting more than one **VP-1608** unit, set the first machine (the Master) connected via RS-232, as MACHINE # 1. The Master connects to the PC via the RS-232 port. The other **VP-1608** slave units (each set to a MACHINE # between 2 and 8) interconnect via their RS-485 ports to the RS-485 port on the Master.

MACHINE #	DIPS		
WACHINE #	1	2	3
1 Master	OFF	OFF	OFF
2	OFF	OFF	ON
3	OFF	ON	OFF
4	OFF	ON	ON
5	ON	OFF	OFF
6	ON	OFF	ON
7	ON	ON	OFF
8	ON	ON	ON

Table 4: MACHINE # Dipswitch Settings



6.5 Setting the DELAY Dipswitches

You can achieve clean transitions when switching between non-genlocked sources by setting the delay time—ranging from 0sec to 3.5sec¹—via the DELAY dipswitches, as Table 5 defines. The **VP-1608** unit is shipped (its factory default state) with no delay, that is, the DELAY dipswitches set up for a 0sec delay.

sec	DIP 1	DIP 2	DIP 3	DIP 4
0	OFF	OFF	OFF	OFF
0.5	OFF	OFF	OFF	ON
1.0	OFF	OFF	ON	OFF
1.5	OFF	OFF	ON	ON
2.0	OFF	ON	OFF	OFF
2.5	OFF	ON	OFF	ON
3.0	OFF	ON	ON	OFF
3.5	OFF	ON	ON	ON

Table 5: DELAY Dipswitch Settings

7 Controlling 16x8 RGBHV / Balanced Audio Matrix Units

You can connect up to eight single² **VP-1608** units with control from a PC or serial controller via RS-232 and RS-485 (see section 7.1), or up to seven single³ **VP-1608** units via RS-485 (see section 7.2).

7.1 Control Configuration via RS-232 and RS-485

To control up to eight single **VP-1608** units—with control from a PC or serial controller—via RS-232 and RS-485, as Figure 11 illustrates, do the following⁴:

- 1. Connect the video sources and acceptors, the appropriate audio sources and acceptors, and the power cord to each **VP-1608** unit.
- 2. On each **VP-1608** unit, set the MACHINE # dipswitches, as required⁵ (see section 6.4).

¹ In increments of 0.5sec

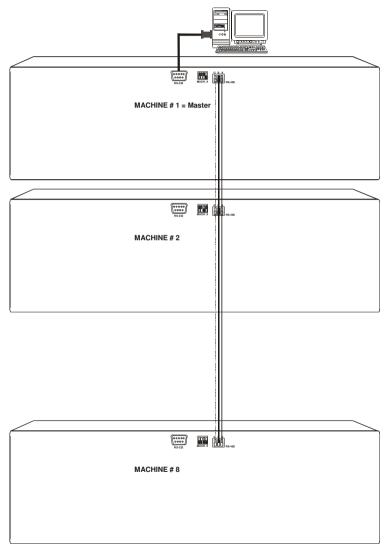
² To connect a single VP-1608 unit to a PC or other RS-232 controller, see section 6.1

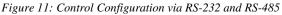
³ To connect a single VP-1608 unit to a PC or other RS-485 controller, see section 6.3

⁴ Switch OFF the power on each device before connecting it to your VP-1608. After connecting your VP-1608, switch on its power and then switch on the power on each device

⁵ Set the first unit to MACHINE # 1 (Master), the second unit to MACHINE # 2, and so on - up to MACHINE # 16 for the sixteenth unit

- 3. Connect the RS-232 port on the first **VP-1608** unit to the PC using the Null-modem adapter provided with the machine (see section 6.1).
- Interconnect the RS-485 ports on all the VP-1608 units: from the RS-485 port on the first VP-1608 unit, to the RS-485 port on the second VP-1608 unit, and so on – up to the RS-485 port on the eighth VP-1608 unit.







7.2 Control Configuration via RS-485

To control up to seven single **VP-1608** units via an RS-485 controller, for example, a Master Programmable Remote Control system, such as the Kramer **RC-3000**¹, or a PC (equipped with an RS-485 interface), as Figure 12 illustrates, do the following²:

- 1. Connect the video sources and acceptors, the appropriate audio sources and acceptors, and the power cord to each **VP-1608** unit.
- On each VP-1608 unit, set the MACHINE # dipswitches, as required. For example, set the first VP-1608 unit to MACHINE # 2, the second VP-1608 unit to MACHINE # 3, and so on - up to MACHINE # 8 for the seventh VP-1608 unit (see section 6.4).
- 3. Terminate the RS-485 line on both the **RC-3000**³ and on the last **VP-1608** unit (set DIP 4 to ON).
- 4. Connect the RS-485 ports on the **RC-3000** to the RS-485 ports on each of the **VP-1608** units, as follows:
 - Connect the "A" (+) PIN on the RS-485 rear panel port of the RC-3000 to the "A" (+) PIN on the RS-485 rear panel ports of the VP-1608 units
 - Connect the "B" (-) PIN on the RS-485 rear panel port of the RC-3000 to the "B" (-) PIN on the RS-485 rear panel ports of the VP-1608 units
 - If shielded twisted pair cable is used, the shield may be connected to the "G" (Ground) PIN on one of the units (for example, on the **RC-3000**)

¹ Previously known as VS-3000

² Switch OFF the power on each device before connecting it to your VP-1608. After connecting your VP-1608, switch on its power and then switch on the power on each device

³ Refer to the RC-3000 user manual for details of how to terminate the RS-485 line

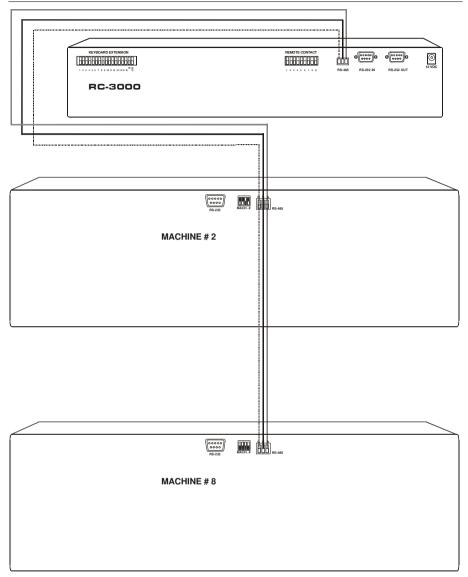


Figure 12: Control Configuration via RS-485



8 Operating Your VP-1608 16x8 RGBHV / Balanced Audio Matrix

Operate your VP-1608 via:

- The front panel buttons
- RS-232 / RS-485 serial commands transmitted by a touch screen system, PC, or other serial controller
- The Kramer **RC-IR1**¹ Infra-Red Remote Control Transmitter

8.1 Choosing the Audio-Follow-Video or Breakaway Option

You can switch stereo audio signals in one of two ways, either:

- Audio-follow-video (AFV), in which all operations relate to both the video and the audio channels; or
- Breakaway, in which video and audio channels switch independently

8.1.1 Setting the Audio-Follow-Video Option

To set the Audio-follow-video (AFV) option press the AFV button:

- If the AUDIO and VIDEO configurations are the same, then the AFV button illuminates. The audio will follow the video
- If the AUDIO differs from the VIDEO, then the TAKE and the AUDIO buttons will flash. Also, the audio outputs in the INPUT STATUS 7-segment display, which will be changed, will flash². Press the TAKE button to confirm the modification. The audio will follow the video

8.1.2 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:

- If the AUDIO button illuminates, switching operations relate to Audio
- If the VIDEO button illuminates, switching operations relate to Video

¹ Previously known as IR-1 / IR-1-01

² Warning that you are about to modify the audio configuration for AFV operation

8.2 Switching OUT-IN Combinations

To switch a video/audio input to a video/audio output, do the following:

- Press an OUTPUT SELECTOR button. The corresponding input number that is displayed in the *INPUT STATUS* 7-segment Display blinks.
- 2. Press an INPUT SELECTOR button. The selected input switches to the selected output.

For example, press the ALL button and then INPUT SELECTOR button # 2 to connect input # 2 to all the outputs.

8.3 Confirming Settings

Choose to work in the AT ONCE or the CONFIRM mode, as section 8.3.1 describes. When the **VP-1608** operates in the AT ONCE mode, pressing an OUT-IN combination implements the switch immediately. In the CONFIRM mode, the TAKE button must be pressed to authorize the switch.

In the AT ONCE mode, you save time as execution is immediate and actions require no user confirmation. However, no protection is offered against changing an action in error.

In the CONFIRM mode:

- You can key-in several actions and then confirm them by pressing the TAKE button, to simultaneously activate the multiple switches
- Every action requires user confirmation, to protect against erroneous switching
- Execution is delayed¹ until the user confirms the action

8.3.1 Toggling between the AT ONCE and CONFIRM Modes

To toggle between the AT ONCE and CONFIRM modes, do the following:

- Press the TAKE button to toggle from the AT ONCE mode² to the CONFIRM mode³. Actions now require user confirmation and the TAKE button illuminates.
- Press the illuminated TAKE button to toggle from the CONFIRM mode back to the AT ONCE mode. Actions no longer require user confirmation and the TAKE button no longer illuminates.

³ The TAKE button illuminates



¹ Failure to press the TAKE button within one minute (the Timeout) will abort the action

² The TAKE button does not illuminate

8.3.2 Confirming a Switching Action

To confirm a switching action (in CONFIRM mode), do the following:

- Press an OUT-IN combination. The corresponding input number that is displayed in the *INPUT STATUS* 7-segment Display blinks. The TAKE button also blinks.
- Press the blinking TAKE button to confirm the action. The corresponding input number that is displayed in the *INPUT STATUS* 7-segment Display no longer blinks. The TAKE button illuminates.

To confirm several actions (in CONFIRM mode), do the following:

- 1. Press each OUT-IN combination in sequence. The corresponding input numbers that are displayed in the *INPUT STATUS* 7-segment Display blink. The TAKE button also blinks.
- 2. Press the blinking TAKE button to confirm all the actions. The corresponding input numbers that are displayed in the *INPUT STATUS* 7-segment Display no longer blink. The TAKE button illuminates.

8.4 Storing/Recalling Input/Output Configurations

You can store and recall up to 15 input/output configurations (or setups) in non-volatile memory, using the INPUT SELECTOR buttons 1 to 15. The 15 input/output configurations also include the relevant audio-follow-video / breakaway option definition, the video configurations, the audio configurations, the audio gain level for each of the 16 inputs, and the audio gain level for each of the eight outputs.

8.4.1 Storing an Input/Output Configuration

To store the current status in memory, do the following:

- 1. Press the STO button. The STO button blinks.
- 2. Press one of the INPUT SELECTOR buttons from 1 to 15 (this will be the setup # in which the current status is stored). If in the CONFIRM mode, press the blinking TAKE button to confirm the action. The memory stores the data at that reference.

8.4.2 Recalling an Input/Output Configuration

To recall an input/output configuration, do the following:

- 1. Press the RCL button. The RCL button blinks.
- Press the appropriate INPUT SELECTOR button (the INPUT SELECTOR button # corresponding to the setup #). If in the CONFIRM mode, the setup will blink on the display and will only be implemented after pressing the TAKE button. The memory recalls the stored data from that reference.

To view the saved input/output configurations, set the **VP-1608** to the CONFIRM mode and manually scan all the input/output configurations¹.

8.4.3 Deleting an Input/Output Configuration

To delete an input/output configuration, do the following:

- 1. Press the STO and RCL buttons simultaneously. Both the STO and RCL buttons blink.
- Press the appropriate INPUT SELECTOR button. This erases that specific input/output configuration from the memory, leaving it empty and available².

8.5 Adjusting the Audio Gain Control

You can adjust the gain control for each input and output signal using the latest³ K-Router Windows®-based control software (provided). See the Tables of Hex Codes for Audio Input/Output Gain Control in section 12.

³ Version 3.9 or higher



¹ Press RCL followed by an INPUT SELECTOR button to display a configuration. To recall this configuration, press TAKE to select it. If not, repeat the above to display another configuration

² Storing a new configuration over a previous configuration (without deleting it first) replaces the previous configuration

8.6 Locking and Unlocking the Front Panel

To prevent changing the settings accidentally or tampering with the unit via the front panel buttons, lock¹ your **VP-1608**. Unlocking releases the protection mechanism.

To lock the VP-1608:

• Press the LOCK button for more than two seconds The front panel is locked and the LOCK button blinks

To unlock the VP-1608:

• Press the LOCK button for more than two seconds The front panel unlocks and the LOCK button no longer blinks

8.7 Resetting the VP-1608 16x8 RGBHV / Balanced Audio Matrix

You can reset the VP-1608 unit to the:

- Current status² (reloads the current setup³)
- Factory default (resets to the pre-installed factory default state⁴)

8.7.1 Resetting to the Current Status

You can reset the **VP-1608** unit to the current status (reloads the current setup)

To reset a VP-1608 unit to the current status, do the following:

• Press INPUT buttons 1 and 5 simultaneously for 3 seconds The **VP-1608** unit resets to the current status, momentarily displaying⁵ the unit characteristics, as section 5.1 describes

8.7.2 Resetting to the Factory Default State

You can reset the VP-1608 unit to the factory default state.

To reset a VP-1608 unit to the factory default state, do the following:

• Press OUTPUT buttons 1 and 5 simultaneously for 3 seconds The **VP-1608** unit resets to its factory default state, momentarily displaying⁵ the unit characteristics, as section 5.1 describes

¹ Nevertheless, even though the front panel is locked you can still operate via RS-232 or RS-485 serial (remote controller or PC), as well as via the Kramer RC-IR1 Infra-Red Remote Control Transmitter

² Sometimes called a "soft reset"

³ Without having to switch the power off and on

⁴ Each VP-1608 unit ships in its factory default state that is a 16x8 RGBHV / Balanced Audio Matrix (in audio-follow-video mode), with all setups empty and each input connected to its corresponding output (for example, 1-to-1)

⁵ In addition, the unit characteristics also appear immediately (and automatically) after switching on the power

9 Flash Memory Upgrade

The **VP-1608** firmware is located in FLASH memory, which lets you upgrade to the latest Kramer firmware version in minutes! The process involves:

- Downloading from the Internet (see section 9.1)
- Connecting the PC to the RS-232 port (see section 9.2)
- Upgrading Firmware (see section 9.3)

9.1 Downloading from the Internet

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

- 1. Go to our Web site at <u>http://www.kramerelectronics.com</u> and download the file: "*FLIP_VP1608.zip*" from the Technical Support section.
- 2. Extract the file: *"FLIP_VP1608.zip"* to a folder (for example, C:\Program Files\Kramer Flash).
- 3. Create a shortcut on your desktop to the file: "FLIP.EXE".

9.2 Connecting the PC to the RS-232 Port

Before installing the latest Kramer firmware version on a **VP-1608** unit, do the following:

- 1. Connect the *RS-232* DB9 rear panel port on the **VP-1608** unit to the Null-modem adapter and connect the Null-modem adapter with a 9 wire flat cable to the RS-232 DB9 COM port on your PC (see section 6.2).
- 2. Connect the power on the VP-1608 unit and switch it ON.
- 3. Set the underside Flash Program switches (see Figure 13), as follows:
 - Set Flash Program switch 1 to Program
 - Set Flash Program switch 2 to Reset
 - Set Flash Program switch 2 to Normal

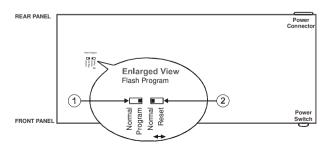


Figure 13: VP-1608 Underside Flash Program Switches Set for Upgrade



9.3 Upgrading Firmware

Follow these steps to upgrade the firmware:

1. Double click the desktop icon: "*Shortcut to FLIP.EXE*". The Splash screen appears as follows:



Figure 14: Splash Screen

2. After a few seconds, the Splash screen is replaced by the "*Atmel – Flip*" window:



Figure 15: Atmel – Flip Window

3. Press the keyboard shortcut key *F2* (or select the "*Select*" command from the *Device* menu, or press the integrated circuit icon in the upper right corner of the window).

The "Device Selection" window appears:

ion	
AT89C5115	
Cancel	1
	AT89C5115

Figure 16 Device Selection Window

4. Click the button next to the name of the device and select from the list: AT89C51RD2.

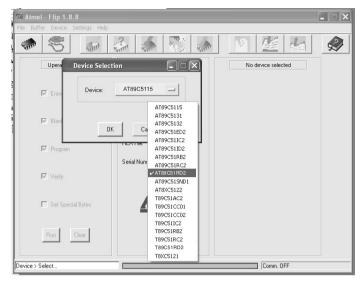


Figure 17: Device Selection Window

5. Click OK and select "Load Hex" from the File menu.

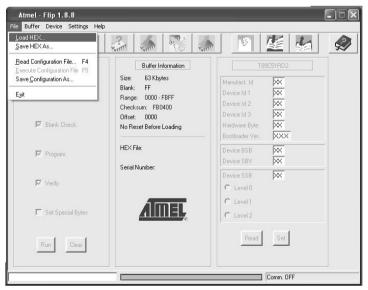


Figure 18: Loading the Hex

- The Open File window opens. Select the correct HEX file that contains the updated version of the firmware for VP-1608 (for example 1608M_V1p2.hex) and click Open.
- 7. Press the keyboard shortcut key F3 (or select the "Communication / RS232" command from the Settings menu, or press the keys: Alt SCR). The "RS232" window appears. Change the COM port according to the configuration of your computer and select the 9600 baud rate:



Figure 19: RS-232 Window

8. Click Connect.

In the "Atmel – Flip" window, in the Operations Flow column, the Run button is active, and the name of the chip appears as the name of the third column: AT89C51RD2.

Verify that in the Buffer Information column, the "HEX File: VP1608.hex" appears.

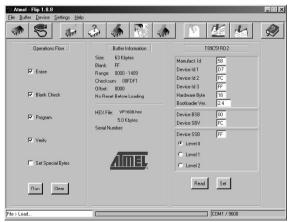


Figure 20: Atmel – Flip Window (Connected)

Click Run. After each stage of the operation is completed, the check-box for that stage becomes colored green¹.
 When the operation is completed, all 4 check-boxes will be colored

green and the status bar message: Memory Verify Pass appears²:

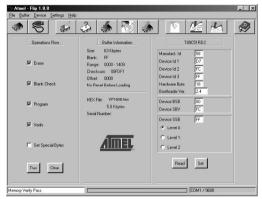


Figure 21: Atmel – Flip Window (Operation Completed)

- 10. Close the "Atmel Flip" window.
- 11. Disconnect the power on the VP-1608.
- 12. Disconnect the RS-232 rear panel port on the VP-1608 unit from the Null-modem adapter.
- 13. Set both the underside switches: Flash Program switch 1 and Flash Program switch 2 (see Figure 3) to Normal.
- Connect the power on the VP-1608. Upon initialization, the new VP-1608 software version shows in the INPUT STATUS 7-segment Display.

² If an error message: "Not Finished" shows, click Run again



¹ See also the blue progress indicator on the status bar

10 Technical Specifications

Table 6 includes the technical specifications:

Table 6: Technical Specifications	¹ of the VP-1608
-----------------------------------	-----------------------------

	(0.0.) (D.0.) 0								
INPUTS:	. ,	16x3 video (RGB) 0.7Vpp/75Ω on BNC connectors							
	· · · · · · · · · · · · · · · · · · ·	6x2 H&V, TTL level on BNC connectors							
	16 balanced audio stereo u	p to $14dBm/33k\Omega$ on detachable terminal blocks							
OUTPUTS:	8x3 video (RGB) 0.7Vpp/75	5Ω on BNC connectors							
	8x2 H&V, TTL level/75Ω on	BNC connectors							
	8 balanced audio stereo 19	dBm/50Ω on detachable terminal blocks							
MAX. OUTPUT LEVEL:	VIDEO: 2Vpp	AUDIO: ±10Vpp (gain=1); ±20Vpp (total gain>2)							
BANDWIDTH (-3dB):	VIDEO: 400MHz	AUDIO: 30kHz							
	Fully Loaded	ully Loaded							
DIFF. GAIN:	0.06%	0.06%							
DIFF. PHASE:	0.04%	0.04%							
K-FACTOR:	0.01								
S/N RATIO:	VIDEO: 71.7dB	/IDEO: 71.7dB AUDIO: 74.5 dB unweighted (1Vpp)							
CROSSTALK (all hostile):	VIDEO: < -62.5dB @ 5MHz	AUDIO: –71.4dB@1kHz							
CONTROLS:		32, RS-485, IR remote control, Audio gain Inputs: Mute, –46dB to +10dB via RS-232, RS 485, IR							
COUPLING:	VIDEO: DC	AUDIO: AC							
AUDIO THD + NOISE:	0.028% (1kHz)								
AUDIO 2nd HARMONIC:	0.012%								
POWER SOURCE:	230 VAC, 50/60 Hz (115 VAC, USA)								
DIMENSIONS:	19 inch (W), 7 inch (D), 3U (H) rack mountable								
WEIGHT:	5.5 kg. (12.2 lbs.) approx.								
ACCESSORIES:	Power cord, Null modem ac	dapter, Windows®-based control software							

11 Table of Hex Codes for Serial Communication

Table 7 lists the Hex values for a single machine (MACHINE # 1):

¹ Specifications are subject to change without notice

		<u> </u>		oue.				115 1	Switching Audio Channels							
OUT	_					Chan						Ĕ.		1		
OUT	1 01	2 01	3 01	4 01	5	6 01	7 01	8 01	1 02	2 02	3 02	4 02	5 02	6 02	7 02	8 02
IN 1	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
	81	82	83	84	85	86	87	88	81	82	83	84	85	86	87	88
	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
IN 2	01 82	01 82	01 82	01 82	01 82	01 82	01 82	01 82	02 82	02 82	02 82	02 82	02 82	02 82	02 82	02 82
	81	82	83	84	85	86	87	88	81	82	83	84	85	86	87	88
	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
IN 3	01	01	01	01	01	01	01	01	02	02	02	02	02	02	02	02
	83 81	83 82	83 83	83 84	83 85	83 86	83 87	83 88	83 81	83 82	83 83	83 84	83 85	83 86	83 87	83 88
	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
IN 4	01	01	01	01	01	01	01	01	02	02	02	02	02	02	02	02
	84 81	84 82	84 83	84	84 85	84 86	84 87	84 88	84 81	84 82	84 83	84 84	84 85	84 86	84 87	84 88
	81	82 81	81	84 81	81	81	81	81	81	o∠ 81	81	81	81	81	81	81
IN 5	01	01	01	01	01	01	01	01	02	02	02	02	02	02	02	02
	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
	81 81	82 81	83 81	84 81	85 81	86 81	87 81	88 81	81 81	82 81	83 81	84 81	85 81	86 81	87 81	88 81
IN 6	01	01	01	01	01	01	01	01	02	02	02	02	02	02	02	02
INO	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86
	81	82	83	84	81	82	83	84	81	82	83	84	81	82	83	84
INL 7	81 01	81 01	81 01	81 01	81 01	81 01	81 01	81 01	81 02	81 02	81 02	81 02	81 02	81 02	81 02	81 02
IN 7	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87
	81	82	83	84	85	86	87	88	81	82	83	84	85	86	87	88
	81 01	81 01	81 01	81 01	81 01	81 01	81 01	81 01	81 02	81 02	81 02	81 02	81 02	81 02	81 02	81 02
IN 8	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88
	81	82	83	84	85	86	87	88	81	82	83	84	85	86	87	88
	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
IN 9	01 89	01 89	01 89	01 89	01 89	01 89	01 89	01 89	02 89	02 89	02 89	02 89	02 89	02 89	02 89	02 89
	81	82	83	84	85	86	87	88	81	82	83	84	85	86	87	88
	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
IN 10	01 8A	01 8A	01 8A	01 8A	01 8A	01 8A	01 8A	01 8A	02 8A	02 8A	02 8A	02 8A	02 8A	02 8A	02 8A	02 8A
	81	82	83	84	85	86	87	88	81	82	83	84	85	86	87	88
	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
IN 11	01 8B	01 8B	01 8B	01 8B	01 8B	01 8B	01 8B	01 8B	02 8B	02 8B	02 8B	02 8B	02 8B	02 8B	02 8B	02 8B
	81	82	83	од 84	85	86	од 87	88	81	82	83	84	85	86	87	88
	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
IN 12	01	01	01	01	01	01	01	01	02	02	02	02	02	02	02	02
	8C 81	8C 82	8C 83	8C 84	8C 85	8C 86	8C 87	8C 88	8C 81	8C 82	8C 83	8C 84	8C 85	8C 86	8C 87	8C 88
	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
IN 13	01	01	01	01	01	01	01	01	02	02	02	02	02	02	02	02
	8D 81	8D 82	8D 83	8D 84	8D 85	8D 86	8D 87	8D 88	8D 81	8D 82	8D 83	8D 84	8D 85	8D 86	8D 87	8D 88
	81	82 81	83 81	84 81	85 81	80	87 81	88 81	81	82 81	83 81	84 81	85 81	80	87 81	88
IN 14	01	01	01	01	01	01	01	01	02	02	02	02	02	02	02	02
	8E	8E	8E	8E	8E	8E	8E	8E	8E	8E	8E	8E	8E	8E	8E	8E
	81 81	82 81	83 81	84 81	85 81	86 81	87 81	88 81	81 81	82 81	83 81	84 81	85 81	86 81	87 81	88 81
IN 15	01	01	01	01	01	01	01	01	02	02	02	02	02	02	02	02
	8F	8F	8F	8F	8F	8F	8F	8F	8F	8F	8F	8F	8F	8F	8F	8F
	81 81	82 81	83 81	84 81	85 81	86 81	87 81	88 81	81 81	82 81	83 81	84 81	85 81	86 81	87 81	88 81
IN 16	01	01	01	01	01	01	01	01	02	02	02	02	02	02	02	02
114 10	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
	81	82	83	84	85	86	87	88	81	82	83	84	85	86	87	88
	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81

Table 7: VP-1608 Hex Codes for Switching via RS-232/RS-485 in Breakaway Mode

12 Tables of Hex Codes for Audio Input/Output Gain Control

Sections 12.1 and 12.2 contain the tables of hex codes for input and output signal gain control adjustment, respectively.

12.1 Tables of Hex Codes for Audio Input Gain Control

Before adjusting the audio inputs gain, instruction 42, the AUDIO PARAMETER SETTINGS FOR INSTRUCTIONS 22, 24, 25 is sent. This command is sent once, and the "audio inputs gain adjustment" mode continues until instruction 42 changes to the "audio outputs gain adjustment" mode:

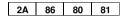


Table 8 lists the Hex values for the audio gain control of the 16 inputs:

										INPL	ITS							
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	ALL
u	ivel	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Instruction # 22	Audio Level = 0	81 80	82	83	84	85	86	87	88	89 80	8A	8B	8C 80	8D	8E	8F	90	80
tlnstr	Vndi	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81
		16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Instruction #22	Audio Level = 1	Q1	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F	90	80
structi # 22	dio L	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
Ë	Au	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
5	le l	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
tructic # 22	lio Le	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F	90	80
Instruction # 22	Audio Level = 10	8A 81	8A 81	8A 81	8A 81	8A 81	8A 81	8A 81	8A 81	8A 81	8A 81	8A 81	8A 81	8A 81	8A 81	8A 81	8A 81	8A 81
-	< <	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	
		1																
uo	ivel	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Instruction # 22	dio Lev = 127	81 FF	82 FF	83 FF	84 FF	85 FF	86 FF	87 FF	88 FF	89 FF	8A FF	8B FF	8C FF	8D FF	8E FF	8F FF	90 FF	80 FF
# Insti	Audio Level = 127	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
T	-	¦ 															1	
Instruction # 63		3F 80	3F	3F	3F	3F	3F 80	3F	3F 80	3F 80	3F	3F	3F	3F 80	3F 80	3F 80	3F	3F 80
tructi # 63	<u> </u>	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81
sul	Audio Level = 128	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
on	oibr 1	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Instruction # 22	Ā	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F	90	80
i Inst		80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81
-		3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F
Instruction # 63		80	80	80	3F 80	80	80	3F 80	3F 80	80	80	80	80	80	80	80	3F 80	3F 80
structi # 63	e e		81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
	Audio Level = 216 (1:1)	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
Instruction # 22	udi =21	16 81	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
tructi # 22	٩	D8	82 D8	83 D8	84 D8	85 D8	86 D8	87 D8	88 D8	89 D8	8A D8	8B D8	8C D8	8D D8	8E D8	8F D8	90 D8	80 D8
sul		81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
																	1	
-		3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F
3 ctio		80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Instruction # 63	⊐ e	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
Ĕ	Audio Level = 255 (3:1)	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
u	udic = 25	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Instruction # 22	۹	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F	90	80
# till	1	FF 81	FF 81	FF 81	FF 81	FF 81	FF 81	FF 81	FF 81	FF 81	FF 81	FF 81	FF 81	FF 81	FF 81	FF 81	FF 81	FF 81
		51															, vi	

Table 8: VP-1608 Hex Codes for Audio Input Gain Control

12.2 Tables of Hex Codes for Audio Output Gain Control

Before adjusting the audio outputs gain, instruction 42, the AUDIO PARAMETER SETTINGS FOR INSTRUCTIONS 22, 24, 25 is sent. The command sends once, and the "audio outputs gain adjustment" mode continues until instruction 42 changes to the "audio inputs gain adjustment" mode:

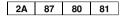


Table 9 lists the Hex values for the audio gain control of the eight outputs:

					(OUTP	UTS				
		1	2	3	4	5	6	7	8	ALL	
tion	evel te*)	16 81	16 82	16 83	16 84	16 85	16 86	16 87	16 88	16 80	
Instruction # 22	Audio Leve = 0 (Mute*	80	82 80	80	80	80	80	80	80	80 80	
lns	Audio Level Audio Level = 1 = 0 (Mute*)	81	81	81	81	81	81	81	81	81	*In the Mute state, the
ion	evel	16	16	16	16	16	16	16	16	16	audio output is physically disconnected
Instruction # 22	io L = 1	81 81	82 81	83 81	84 81	85 81	86 81	87 81	88 81	80 81	from the input
Inst	Aud	81	81	81	81	81	81	81	81	81	
		1									,
۲.	vel	16	16	16	16	16	16	16	16	16	
tructi # 22	lio Le = 10	81	82	83	84	85	86	87	88	80	
Instruction # 22	Audio Level = 10	8A 81	8A 81	8A 81	8A 81	8A 81	8A 81	8A 81	8A 81	8A 81	
	1										
	-	16	16	16	16	16	16	16	16	16	
Instruction # 22	Audio Level = 127	81	82	83	84	85	86	87	88	80	
structi # 22	ela 1.1	FF	FF	FF	FF	FF	FF	FF	FF	FF	
Ë	Au	81	81	81	81	81	81	81	81	81	
											, , , ,
ion		3F	3F	3F	3F	3F	3F	3F	3F	3F	*
Instruction # 63	-	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	80 81	
Inst	Audio Level = 128	81	81	81	81	81	81	81	81	81	
ion	olbu 1 =	16	16	16	16	16	16	16	16	16	
nstruction # 22	A	81 80	82 80	83 80	84 80	85 80	86 80	87 80	88 80	80 80	
Inst		81	80 81	81	81	81	80 81	81	81	81	
		, , ,									L
no		3F	3F	3F	3F	3F	3F	3F	3F	3F	
Instruction # 63	_	80	80	80	80	80	80	80	80	80	
hnstr #	eve 1:1)	81 81	81 81	81 81	81 81	81 81	81 81	81 81	81 81	81 81	
	Audio Level = 216 (1:1)	16	16	16	16	16	16	16	16	16	
Instruction # 22	Au L	81	82	83	84	85	86	87	88	80	
nstn #		D8 81	D8 81	D8 81	D8 81	D8 81	D8 81	D8 81	D8 81	D8 81	
		01	01	01	01	01	01	01	01	01	
		3F	3F	3F	3F	3F	3F	3F	3F	3F	• •
3 a		80	80	80	80	80	80	80	80	80	
Instruction # 63	-1 ce	81	81	81	81	81	81	81	81	81	
Ë	Audio Level = 255 (3:1)	81	81	81	81	81	81	81	81	81	
tion	Audi = 25	16	16	16	16	16	16	16	16	16	
Instruction # 22		81 FF	82 FF	83 FF	84 FF	85 FF	86 FF	87 FF	88 FF	80 FF	
Inst		81	81	81	81	81	81	81	81	81	
L		I	I		I	I		I	·		1

Table 9: VP-1608 Hex Codes for Audio Output Gain Control



K

13 Kramer Protocol 2000

The **VP-1608** is compatible with Kramer's Protocol 2000 (version 0.42) (below). This RS-232 / RS-485 communication protocol uses four bytes of information as defined below.

For RS-232, a null-modem connection between the machine and controller is used. The default data rate is 9600 baud, with no parity, 8 data bits and 1 stop bit.

MSB							LSB			
	DESTIN ATION		INSTRUCTION							
0	D	N5	N4	N3	N2	N1	N0			
7	6	5	4	3	2	1	0			
1st byte										
				INPUT	•					
1	16	15	14	13	12	11	10			
7	6	5	4	3	2	1	0			
2nd byte										
				OUTPU	т					
1	O6	O5	O4	O3	O2	01	O0			
7	6	5	4	3	2	1	0			
3rd byte										
					MACHINE N	IUMBER				
1	OVR	Х	M4	M3	M2	M1	M0			
7	6	5	4	3	2	1	0			

Table 10: Protocol Definitions

4th byte

1st BYTE: Bit 7 – Defined as 0.

D - "DESTINATION": 0 - for sending information to the switchers (from the PC); 1 - for sending to the PC (from the switcher).

N5...N0 - "INSTRUCTION"

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

2nd BYTE: Bit 7 - Defined as 1.

I6...I0 – "INPUT".

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

3rd BYTE: Bit 7 – Defined as 1.

O6...O0 - "OUTPUT".

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

4th BYTE: Bit 7 - Defined as 1.

Bit 5 – Don't care.

OVR - Machine number override.

M4...M0 - MACHINE NUMBER.

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

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

Table 11: Instruction Codes for Protocol 2000

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

Image: Provide and the set of th		INSTRUCTION	DEFINITION FOR	SPECIFIC INSTRUCTION	NOTE
0 RESET VIDEO 0 1 SWITCH VIDEO Set equal to video input which is to be switched (0 - disconnect) 0 2 SWITCH AUDIO Set equal to audio input which is to be switched (0 - disconnect) Set equal to audio output which is to be switched (0 - to all the outputs) 3 STORE VIDEO STATUS Set as SETUP # 0 4 RECALL VIDEO STATUS Set as SETUP # 0 5 RECOURST STATUS OF AN AUDIO OUTPUT Set as SETUP # Equal to output number whose status is regd 6 RECOURST STATUS OF AN AUDIO OUTPUT Set as SETUP # Equal to output number whose status is regd 7 VIS SOURCE Set as input # (for OUTPUT byte = 7), or set = 0 No NO IS (immediate) 1 - Input # (INPUT byte) 2 - External analog sync 4 - Dynamic sync 5 - Inter-machine sync 6 - Secret delayed switch 65 - Exerct delayed switch 65 - Exerct delayed switch 66 - Cancel delayed switch 66 - Cancel delayed switch 66 - Cancel delayed switch 66 - Cancel delayed switch 67 - Input # (INPUT byte) 7 - Output # (INPUT byte) 7 - Output # (INPUT byte) 7 - Normal mode 8 BREAKAWAY SETTING 0 - for video 0 - CV 2 - VIDU 7 - Secure delayed switch 66 - Cancel delayed switch 67 - Output # O avolut 7 - VIDEO / AUDIO TYPE SETTING 0 - for video 0 - CV 2 - VIDU 7 - Secure VICA 9					_
1 SWTCH VIDEO Set equal to video input which is to be switched (0 - disconnect) (0 - to all the outputs) 2 SWITCH AUDIO Set equal to addo input which is to be switched (0 - to all the outputs) 3 STORE VIDEO STATUS Set as SETUP # 0 4 RECALL VIDEO STATUS Set as SETUP # 0 5 REQUEST STATUS OF A Set as SETUP # 0 6 REQUEST STATUS OF A Set as SETUP # 0 7 VIS SOURCE Set as SETUP # 0 8 Store VIDEO OUTPUT Set as SETUP # 0 6 REQUEST STATUS OF AN AUDIO OUTPUT byte = 6) or as output # (for OUTPUT byte = 6) or as output # (for OUTPUT 0 7 VIS SOURCE Set as input # (for OUTPUT byte = 6) or as output # (for OUTPUT 0 7 VIS SOURCE Set as input # (for OUTPUT 0 8 BREAKAWAY SETTING 0 9 VIDEO / AUDIO TYPE 0 - for video 1 - output # (INPUT byte) 8 - Set for delayed switch 65 - Execute delayed switch 66 - Cancel delayeed switch 66 - Cancel delayeed switch 66 - Cancel delayeed switch 66 - Canc	F		_		1
to be switched (0 = disconnect) switched (0 = disconnect) switched (0 = to all the outputs) 2 SWITCH AUDIO Set equal to audio input which is to be switched (0 = disconnect) Set equal to audio output which is to be to be switched (0 = to all the outputs) 3 STORE VIDEO STATUS Set as SETUP # 0 4 RECULEST STATUS OF A VIDEO OUTPUT Set as SETUP # Equal to output number whose status is reqd 7 VIS SOURCE Set as SETUP # Equal to output number whose status is reqd 7 VIS SOURCE Set as SETUP # Equal to output number whose status is reqd 8 REQUEST STATUS OF A N AUDIO OUTPUT Set as output # (for OUTPUT byte = 6) or as output # (for OUTPUT byte = 6) or as output # (for OUTPUT byte = 7), or set = 0 - No NIS (immediate) 1 - Input # 1 7 VIS SOURCE Set as SETUP # . - Setternal digital sync 3 - External digital sync 3 - External digital sync 3 - External digital sync 3 - External analog sync 4 - Set tor delayed switch 66 - Cancel delayed switch 67 - OUTPUT byte 7 - CUEDUT # (NPUT byte) 7 - VUW 5 - CV+YC 2 - YUW 6 - VGA - Sal 7 - FOLLOW mode 1 - Normal mode 0 - CV - 4 - SD1 1 - YU 5 - CV+YC 2 - YUW 6 - VGA - Sal 7					2, 15
2 SWITCH AUDIO Set equal to audio input which is to be switched (0 = disconnect) Set equal to audio output which is to be (0 = load) the outputs) 3 STORE VIDEO STATUS Set as SETUP # 0 - to store 1 - to delete 4 RECALL VIDEO STATUS OF A VIDEO OUTPUT Set as SETUP # 0 equal to output number whose status is reqd 7 VIS SOURCE Set as SETUP # Equal to output number whose status is reqd 7 VIS SOURCE Set as set up # (for OUTPUT byte = 6) or as output # (for OUTPUT byte = 6) or as output # (for OUTPUT byte = 6) or as output # (for OUTPUT byte) - No VIS (immediate) 7 VIS SOURCE Set as input # (for OUTPUT byte) = 6) or as output # (for OUTPUT byte) - No VIS (immediate) 8 BREAKAWAY SETTING 0 - audio follow wideo - audio-follow wideo 1 - audio follow wideo 1 - audio follow wideo - audio follow wideo 1 - Corr video 0 - for wideo - for wideo - VUV 9 VIDEO / AUDIO TYPE SETTING 0 - for wideo 0 - for wideo - VUV - VUV 1 - for audio - for audio - VIDEO - AUDIO TYPE - for audio					, -
to be switched (0 = disconnect) switched (0 = locall the outputs) 3 STORE VIDEO STATUS Set as SETUP # 0 4 RECALL VIDEO STATUS Set as SETUP # 0 5 REQUEST STATUS OF A AN AUDIO OUTPUT Set as SETUP # Equal to output number whose status is red 6 REQUEST STATUS OF AN AUDIO OUTPUT Set as SETUP # Equal to output number whose status is red 7 VIS SOURCE Set as input # (for OUTPUT by byte = 7), or set = 0 0 - No VIS (immediate) 2 - External anglog sync 4 - Dynamic sync 5 - Inter-machine sync 6 - Input # (INPUT byte) - Norup 4 (INPUT byte) 8 BREAKAWAY SETTING 0				(0 = to all the outputs)	
Image: construct of the second seco	3	SWITCH AUDIO	Set equal to audio input which is	Set equal to audio output which is to be	2
3 STORE VIDEO STATUS Set as SETUP # 0 10 delete 4 RECALL VIDEO STATUS Set as SETUP # 0 5 REQUEST STATUS OF A VIDEO OUTPUT Set as SETUP # Equal to output number whose status is read 6 REQUEST STATUS OF A A Set as SETUP # Equal to output number whose status is read Equal to output number whose status is read 7 VIS SOURCE Set as SETUP # 0 0 NO VIS (immediate) 1 - Input # 1 - Input # 1 6 REQUEST STATUS OF A No SUB (immediate) 1 - Input # 1 7 VIS SOURCE Set as setupt # (for OUTPUT byte equation of the status is read 0 No VIS (immediate) 1 7 VIS SOURCE Set as soutput # (for OUTPUT byte equation of the status is read 0 No VIS (immediate) 1 8 BREAKAWAY SETTING 0 - Concol delayed switch esting 0 - audio follow-video 7 VIDEO / AUDIO TYPE 0 - for video 0 - CV 4 - SDI - FOLLOW mode 8 BREAKAWAY SETTING 0 - for audio 0 - do: Augu audio 0 - audio follow-video - VUV C - VGA Scale					
Image: Section of the sectin of the section of the section					
4 RECALL VIDEO STATUS Set as SETUP # 0 5 REQUEST STATUS OF VIDEO OUTPUT Set as SETUP # Equal to output number whose status is read 6 REQUEST STATUS OF AN AUDIO OUTPUT Set as SETUP # Equal to output number whose status is read 7 VIS SOURCE Set as input # (for OUTPUT byte = 6) or as output # (for OUTPUT byte byte = 7), or set = 0 0 No VIS (immediate) 1 Input # 1 2 External analog sync 3 External analog sync 5 Inter-machine sync 6 Input # (INPUT byte) 7 Output # (INPUT byte) 7 VIDEO / AUDIO TYPE 0 - for video 1 - satiof-rollow-video 8 BREAKAWAY SETTING 0 0 - audio-follow-video - satiof rollow-video 1 - for video 0 - for video 0 - CV 4 - SDI 9 VIDEO / AUDIO TYPE SETTING 0 - for video 0 - CV 4 - SDI 1 - for audio 0 - Go - CV 4 - SDI - VIDEO / AUDIO TYPE 9 VIDEO / AUDIO TYPE SETTING 0 - for video 0 - CV 4/C	3	STORE VIDEO STATUS	Set as SETUP #		2, 3, 15
5 REQUEST STATUS OF A VIDEO OUTPUT Set as SETUP # Equal to output number whose status is reqd 7 VIS SOURCE Set as SETUP # Equal to output number whose status is reqd 7 VIS SOURCE Set as input # (for OUTPUT byte = 6) or as output # (for OUTPUT byte = 7), or set = 0 0 No VIS (immediate) 1 Input # 1 2 External digital sync 3 REAKAWAY SETTING 0 2 External digital sync 8 BREAKAWAY SETTING 0 0 - audio-follow-video 8 BREAKAWAY SETTING 0 0 - audio-follow-video 1 - for video 0 - CVC 4 - SDI 2 - for video 0 - CV 4 - SDI 1 - for audio 0 - Output # 0					
VIDEO OUTPUT Index Set as SETUP # read 6 REQUEST STATUS OF AN AUDIO OUTPUT Set as SETUP # Equal to output number whose status is read 7 VIS SOURCE Set as input # (for OUTPUT byte = 6) or so output # (for OUTPUT byte byte = 7), or set = 0 0 - No VIS (immediate) 1 Input # 1 1 - External digital sync 3 - External analog sync 4 - Dynamic sync 5 - Inter-machine sync 6 - Input # (INPUT byte) 7 - Output # (INPUT byte) 7 - Output # (INPUT byte) 8 - User-defined sync 6 - Execute delayed switch 66 - Execute delayed switch 66 - Execute delayed switch 66 - Cancel delayed switch 67 - FOLLOW mode 1 - Normal mode 9 VIDEO / AUDIO TYPE 9 SETTING 0 - for video 1 - for video 1 - for audio 0 - CV 4 - SDI 1 - VC 5 - CV+YC 2 - YUV 6 - VGA scaler 3 - RGBS 7 - for VGA 1 - for audio 0 - for video 1 - for audio 0 - Outpalanced audio OI = - Digital audio OI = - Audio breakaway setting 127 to request if machine has this 1 - Input # or output # of source 2 - Vertical sync freq (Hz) 11 REQUEST VIS SETTING Set as SETUP #, or set to 126 or 127 to request if machine has this 1 - for audio 0 - for video 1 - for audio 1 - for audio 1 - for audio 12 REQUEST VIDEO / AUDIO TYPE SETTING Set as SETUP #, or set to 126 o					2, 3, 15
6 REQUEST STATUS OF AN AUDIO OUTPUT Set as SETUP # Equal to output number whose status is reqd 7 VIS SOURCE Set as input # (for OUTPUT byte = 7), or set = 0 0 No VIS (immediate) 1 - Input # 1 7 VIS SOURCE Set as input # (for OUTPUT byte = 7), or set = 0 1 - Input # 1 8 External digital sync 3 - External digital sync 3 - External digital sync 3 - External digital sync 3 - External digital sync 6 - Input # (INPUT byte) 7 - Output # (INPUT byte) 8 - User-defined sync 6 - Execute delayed switch 65 - Execute delayed switch 65 - Execute delayed switch 66 - Cancel delayed switch 67 - Output # (INPUT byte) 7 - for video 9 VIDEO / AUDIO TYPE SETTING 0 - for video 0 - CV 4 - SDI 1 - audio breakaway 0 - FOLLOW mode 1 - Normal mode 9 VIDEO / AUDIO TYPE SETTING 0 - for video 0 - OZ - Usplatal audio 00-1 - Digital audio 00 - Witsource 1 - input # or output # of source 1 - input # or o			Set as SETUP #		4, 3
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# BREAKAWAY SETTING 0 1 - Input # 1 2 - External analog sync 8 BREAKAWAY SETTING 0 - External analog sync - Dynamic sync - Input # (INPUT byte) 7 - Uput # (INPUT byte) - Input # (INPUT byte) - Input # (INPUT byte) - Set for delayed switch 8 BREAKAWAY SETTING 0 - audio foreakaway - audio foreakaway 1 - Otiput # (INPUT byte) - Set for delayed switch - Set for delayed switch 9 VIDEO / AUDIO TYPE 0 - for video 0 - CV 4 - SDI 1 - Normal mode - VUV 5 - CV+YC 2 - VVV 2 - for audio - FOLLOW mode - VID - VAGA 1 - for audio - External audio - CV + VC 2 - for video - CV 2 - VVV 6 - VGA scaler 3< - RGBS					
byte = 7), or set = 0 2 - External analog sync 3 - External analog sync 4 - Dynamic sync 6 - Input # (INPUT byte) 5 - Inter-machine sync 7 - Output # (INPUT byte) 7 - Output # (INPUT byte) 8 BREAKAWAY SETTING 0 9 VIDEO / AUDIO TYPE 0 - for video 9 VIDEO / AUDIO TYPE 0 - for video 9 VIDEO / AUDIO TYPE 0 - for video 1 - for audio 0 - for video 1 - for audio 0 - for video 1 - for audio 0 - for video 0 - 10 - Digital audio 0 - VIDEA # (INPUT byte) 1 - for audio 0 - for video 0 - for video 0 - CV 4 - SDI 1 - YC 5 - CV+YC 2 - YUV 6 - VGA scalar 3 - RGBS 1 - for audio 0 - for VGA 1 - for audio 0 - 10 - Digital audio 0 - OI-0D-0D-0D-0D-0D-0D-0D-0D-0D-0D-0D-0D-0D-	۱	VIS SOURCE			2, 5, 17
3 - External analog sync 4 - Dynamic sync 5 - Inter-machine sync 6 - Input # (INPUT byte) 7 - Output # (INPUT byte) 8 BREAKAWAY SETTING 0 9 VIDEO / AUDIO TYPE 9 VIDEO / AUDIO TYPE 0 - for video 1 - for audio 0 - for video 1 - for audio 0 - for video 1 - for audio 0 - for video 0 - for video 0 - for video 1 - for audio 0 - for video 1 - for audio			= 6) or as output # (for OUTPUT		
4 - Dynamic sync 5 - Inter-machine sync 6 - Input # (INPUT byte) 7 - Output # (INPUT byte) 8 BREAKAWAY SETTING 0 0 -audio-follow-video 1 0 -audio-follow-video 1 0 -momentation 9 VIDEO / AUDIO TYPE 0 -for video 0 -for video 1 -word of the synch 1 -word of the synch 9 VIDEO / AUDIO TYPE 0 -for video 1 -fad0X480 2			byte = 7 , or set = 0		
S - Infer-machine sync 6 - Input # (INPUT byte) 7 - Output # (INPUT byte) 8 BREAKAWAY SETTING 0 0 - audio-follow-video 1 - audio breakaway 1 - Or video 1 - audio breakaway 1 - for audio 0 - for video 1 - for audio 0 - for video 1 - for audio 0 - for video 1 - for audio 0 - logial audio 1 - for audio <td< td=""><td></td><td></td><td></td><td></td><td></td></td<>					
6 - Input # (INPUT byte) 7 - Output # (INPUT byte) 8 BREAKAWAY SETTING 0 0 9 VIDEO / AUDIO TYPE 9 VIDEO / AUDIO TYPE 9 VIDEO / AUDIO TYPE 0 - for video 1 0 1 0 2 VIDEO / AUDIO TYPE 9 VIDEO / AUDIO TYPE 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 - for video 1 - for audio 00=1 - Balanced audio 00=1 - Analog audio 01=1 - Analog audio 02=1 - Set as SETUP #, or set to 126 or 1 - for VGA 1 - for VGA 1 - Request audio breakaway setting 1 - ror VGA <					
8 BREAKAWAY SETTING 0 7 - Output # (INPUT byte) 8 BREAKAWAY SETTING 0 62 - Cancel delayed switch 65 Execute delayed switch 66 - Cancel delayed switch 7 - Output # of operative delayed switch 66 - Cancel delayed switch 7 - Output # of operative delayed switch 67 - Cancel delayed switch 68 BREAKAWAY SETTING 9 VIDEO / AUDIO TYPE 9 VIDEO / AUDIO TYPE 0 - for video 1 - for video 1 - YC 5 - CV+YC 2 - YUV 6 - GOLDQUE 1 - for video 0 - FOLLOW mode 1 - YC 9 SETTING 1 - for video 1 - for audio 00=0 - Unbalanced audio 01=1 - Analog audio 02=1 - Set as SETUP #, or set to 126 or 127 to request if machine has this - Input # or output # of source 127 to request if machine					
8 - User-defined sync 64 - Set for delayed switch 65 - Execute delayed switch 66 - Cancel delayed switch 66 - Cancel delayed switch 66 - Cancel delayed switch 67 - Cancel delayed switch 68 BREAKAWAY SETTING 0 - audio breakaway 1 - audio breakaway 0 - FOLLOW mode 1 - Normal mode 9 VIDEO / AUDIO TYPE SETTING 0 - for video 1 - for audio 00-0 - Unbalanced audio 00-0 - Unbalanced audio 00-0 - Hohalanced audio 01-1 - Analog audio 04-0 03=0, 02=0-Mono 04-0 03=0, 02=0-Nono 04-0 0 - VI				6 - Input # (INPUT byte)	
64 - Set for delayed switch 65 - Execute delayed switch 66 - Cancel delayed switch setting 8 BREAKAWAY SETTING 0 0 - audio-follow-video 1 - audio breakaway 1 0 - for video 9 VIDEO / AUDIO TYPE SETTING 0 0 - for video 1 0 - for video 1 - FOLLOW mode 1 - Normal mode 9 VIDEO / AUDIO TYPE SETTING 0 - for video 1 - for audio 00-0 - Ubalanced audio O0-0 00-1 - Balanced audio O1-1 00-1 - Analog audio O1-1 00-1 - Analog audio O4-0, O3=0, O2=0-Mono O4-0, O3=0, O2=0-					
8 BREAKAWAY SETTING 0 0 - audio-follow-video 8 BREAKAWAY SETTING 0 0 - audio-follow-video 9 VIDEO / AUDIO TYPE 0 - for video 0 - FOLLOW mode 9 VIDEO / AUDIO TYPE 0 - for video 0 - CV 4 - SDI 1 Normal mode 0 - CV + 4 - SDI 1 - YC 5 - CV+YC 2 - YUV 6 - VGA scaler 3 - RGBS 0 - 0 - Unbalanced audio 00-1 - Balanced audio 00-1 - Balanced audio 00-1 - Dalanced audio 01-0 - Digital audio 01-1 - Analog audio 04-0, 03=0, 02=1-Stereo 2 - for VGA 1 - for audio 0 - VIS source 10 REQUEST VIS SETTING Set as SETUP #, or set to 126 or 1 - Not vical source 11 REQUEST VIS SETTING Set as SETUP #, or set to 126 or 1 - Not vical sync freq (Hz) 11 REQUEST VIDEO / AUDIO TYPE SETTING Set as SETUP #, or set to 126 or 1 - Not vical source 127 to request if machine has this function 1 - Not vical source 2 - for Video 12 REQUEST VIDEO / AUDIO TYPE SETTING Set as SETUP #, or set to 126 or 1 - Request #FOLLOW" setting 13 SET HIGHEST MACHINE					
66 - Cancel delayed switch setting 8 BREAKAWAY SETTING 0 0 - audio breakaway 9 VIDEO / AUDIO TYPE 0 - for video 1 - Normal mode 9 VIDEO / AUDIO TYPE 0 - for video 0 - CV 4 - SDI 1 - YC 5 - CV+YC 2 - YUV 6 - VGA scaler 3 - REGBS Digital audio OO=0 - Unbalanced audio 01=0 - Digital audio O1=1 - Analog audio O4=0, O3=0, O2=1-Stereo 10 REQUEST VIS SETTING Set as SETUP #, or set to 126 or 1 - 640X480 2 - 800X600 2 - for video 1 - Vertical sync freq (Hz) 11 REQUEST VIS SETTING Set as SETUP #, or set to 126 or 0 - VIs source 11 REQUEST BREAKAWAY SETTING Set as SETUP #, or set to 126 or 0 - Request audio breakaway setting 12 REQUEST VIDEO / AUDIO TYPE SETTING Set as SETUP #, or set to 126 or 0 - for video 12 REQUEST MICEO / AUDIO TYPE SETTING Set as SETUP #, or set to 126 or 0 - for video 12 REQUEST MIGHEST 0 - for video 0 - for video <tr< td=""><td></td><td></td><td></td><td></td><td></td></tr<>					
8 BREAKAWAY SETTING 0 0 0 0 0 0 0 0 FOLLOW mode 1 - audio breakaway 9 VIDEO / AUDIO TYPE SETTING 0 - for video 0 - CV 4 - SDI 1 - YC 5 - CV+YC 2 YUV 6 - VGA scaler 3 - RGBS -					
1 -audio breakaway 1 -audio breakaway 1 - FOLLOW mode 1 - Normal mode 9 VIDEO / AUDIO TYPE SETTING 0 - for video 1 - YUV 2 - YUV 6 - VGA scaler 3 - RGBS 1 - for audio 00=0 - Unbalanced audio 00=0 - Unbalanced audio 01=0 - Digital audio 01=0 - Digital audio 01=0 - Digital audio 01=0 - O2=0-Mono 04=0, O3=0, O2=0-Mono 03=0, O2=0-Mono 04=0, O3=0, O2=0-Mono 03=0, O2=0-Mono 04=0, O3=0, O2=0-Mono 03=	F	BREAKAWAY SETTING	0		2
1 0 - FOLLÓW mode 1 - Normal mode 9 VIDEO / AUDIO TYPE SETTING 0 - for video 0 - CV 4 - SDI 1 - YC 3 RGBS - for audio 00=0 - Unbalanced audio O0=0 - Unbalanced audio O1=0 - Digital audio O1=0 - Digital audio O1=1 - Analog audio O4=0, O3=0, O2=0-Mono O4=0, O3=0, O2=1-Stereo 10 REQUEST VIS SETTING Set as SETUP #, or set to 126 or 127 to request if machine has this function 0 - Ior video O - Inplate audio O1=1 - Analog audio O4=0, O3=0, O2=1-Stereo 11 REQUEST VIS SETTING SETTING Set as SETUP #, or set to 126 or 127 to request if machine has this function 0 - VIS source 1 - Input # or output # of source 2 - Vertical sync freq (Hz) 11 REQUEST VIDEO / AUDIO TYPE SETTING Set as SETUP #, or set to 126 or 127 to request if machine has this function 0 - for video 1 - Request audio breakaway setting 1 - Request YOLLOW" setting 12 REQUEST VIDEO / AUDIO TYPE SETTING Set as SETUP #, or set to 126 or AUDIO TYPE SETTING 0 - for video 1 - for audio 2 - for VGA 13 SET HIGHEST MACHINE ADDRESS 1 - for audio 1 - for audio 0 14 REQUEST HIGHEST MACHINE ADDRESS 0 - for video 1 - for video 0 - error 1 - invalid instruction 2 - out of range	1	BREAKAWAT BETTING	0		2
9 VIDEO / AUDIO TYPE SETTING 0 - for video 0 - CV 4 - SDI 1 - YC 5 - CV+YC 2 - YUV 6 - VGA scaler 3 - RGBS 1 - for audio O0=0 - Unbalanced audio O0=0 - Digital audio O1=0 - Digital audio O1=0 - Digital audio O4=0, O3=0, O2=0-Mono O4=0, O3=0, O2=1-Stereo 10 REQUEST VIS SETTING Set as SETUP #, or set to 126 or function 1 - Input # or output # of source 11 REQUEST VIS SETTING Set as SETUP #, or set to 126 or function 0 - VIS source 11 REQUEST VIS SETTING Set as SETUP #, or set to 126 or function 0 - VIS source 12 REQUEST VIDEO / AUDIO TYPE SETTING Set as SETUP #, or set to 126 or function 0 - for video 12 REQUEST VIDEO / AUDIO TYPE SETTING Set as SETUP #, or set to 126 or function 0 - for video 13 SET HIGHEST MACHINE ADDRESS 0 - for video 0 - for video 14 REQUEST HIGHEST MACHINE ADDRESS 0 - for video 0 14 REQUEST HIGHEST MACHINE ADDRESS 0 - for video 0 15 REQUEST HIGHEST MACHINE 0 - for video 0 16 ERROR / BUSY 0 0 - error 1 - invalid instruction			1	0 - FOLLOW mode	15
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3 - decrease right output 4 - increase right output 5 - decrease right output 6 - increase right output 7 - decrease right output 8 - increase right input 9 - decrease right input 10 - increase right input 11 - decrease right input 12 - increase right input 13 - decrease left input 14 - decrease right input 15 - increase right input 16 - increase right input 17 - decrease right input 18 - decrease right input 19 - increase right input 10 - increase right input 11 - decrease right input 10 - increase right input 11 - decrease right input 12 - market is input / output number 13 - decrease right input 14 - Panel locked 15 - RESERVED 16 - increase right input 17 - Bast 18 RESERVED 10 - Geain		AUDIO PARAMETER			
4 - increase right output 5 - decrease right output 6 - increase right output 7 - decrease right output 8 - increase right output 9 - decrease right output 10 - increase right input 11 - decrease right input 12 - REQUEST AUDIO Equal to input / output number 9 - decrease right input 11 - decrease right input 12 - REQUEST VIDEO PARAMETER whose parameter is requested 30 LOCK FRONT PANEL 0 - Panel unlocked 11 - Panel locked 12 RESERVED 13 REQUEST WHETHER 9 ANALL IS LOCKED 14 - ESERVED 15 RESERVED 16 17 RESERVED 18 RESERVED 10 JIRECT MEMORY SAVE Memory address 10 JIRECT MEMORY SAVE Memory address 10 SETTINGS FOR 11 - Left 12 - Right 3 - Output 13 NIDEO PARAMETER 14 - Input 2 - Output 1 - Centrast 12 - Right			increased / decreased (0 = all)		
5 - decrease input 5 - increase input 6 - increase input 6 - increase input 7 - decrease input 8 - increase input 8 - increase input 9 - decrease input 9 - decrease input 11 - decrease input 10 - increase right input 11 - decrease right input 11 - decrease inght input 6, 23 26 REQUEST VIDEO Equal to input / output number 0 9 - ARAMETER whose video parameter is requested 0 9 - ARAMETER equal to input / output number 0 9 - REQUEST VIDEO Equal to input / output number 0 9 - REQUEST WHEEN 0 - Deanel unlocked 0 11 - Panel locked 0 1 12 RESERVED 10 J3 RESERVED 10 31 RESERVED 10 32 RESERVED 10 33 RESERVED 10 34 RESERVED 10 35 RESERVED 10 36 RESERVED 10 37 VIDEO PARAMETER INPUT Bit: 0 - Gain 38 RESERVED 2- 20 42 AUDIO PARAMETER INPUT Bit: 0 - Gain 37 SETTINGS FOR					
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7 - decrease input 7 - decrease input 9 - decrease input 9 - decrease input 25 REQUEST AUDIO Equal to input / output number 0 26 REQUEST VIDEO Equal to input / output number 0 26 REQUEST VIDEO Equal to input / output number 0 27 PARAMETER whose video parameter is requested 0 30 LOCK FRONT PANEL 0 - Panel unlocked 0 31 REQUEST WHETHER 0 0 32 RESERVED 10 33 RESERVED 10 34 RESERVED 10 35 RESERVED 10 36 RESERVED 10 37 RESERVED 10 38 RESERVED 10 39 IDRCT MEMORY SAVE Memory address Data 41 Left 2 - Treble 1 12<- Right					
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31 REQUEST WHETHER PANEL IS LOCKED 0 16 32 RESERVED 10 33 RESERVED 10 33 RESERVED 10 34 RESERVED 10 35 RESERVED 10 36 RESERVED 10 37 RESERVED 10 36 RESERVED 10 37 RESERVED 10 40 DIRECT MEMORY SAVE Memory address Data 20 42 AUDIO PARAMETER INPUT Bit: 0 - Gain 23 23 11 - Left 2 - Treble 11 - Left 2 - Treble 2 3 23 43 VIDEO PARAMETER 1 - Input 0 - video gain 23 23 SETTINGS FOR 1 - Input 0 - video gain 2 3 - color 4 - hue 4 - Huphase 5 - Output 1 - contrast	30	LOCK FRONT PANEL		0	2
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32 RESERVED 10 33 RESERVED 10 34 RESERVED 10 34 RESERVED 10 35 RESERVED 10 40 DIRECT MEMORY SAVE Memory address Data 20 42 AUDIO PARAMETER INPUT Bit: 0 - Gain 23 SETTINGS FOR I0 - 0-input; 1=output 1 - Bass 2 1 INSTRUCTIONS 22, 24, 25 I1 - Left 2 - Treble 2 1 43 VIDEO PARAMETER 1 - Input 0 - video gain 23 SETTINGS FOR 1 - Input 0 - video gain 23 SETTINGS FOR 2 - Output 1 - contrast 2 INSTRUCTIONS 21, 23, 26 2 - Output 1 - contrast 2 56 CHANGE TO ASCII 0 0 18 57 SET AUTO-SAVE 13 - no save 0 12, 2 44 -uto-save 0 12, 2 </td <td>31</td> <td></td> <td>0</td> <td>0</td> <td>16</td>	31		0	0	16
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34 RESERVED 10 35 RESERVED 10 40 DIRECT MEMORY SAVE Memory address Data 20 42 AUDIO PARAMETER INPUT Bit: 0 - Gain 23 INSTRUCTIONS 22, 24, 25 11 - Left 2 - Treble 12 - Right 3 - Midrange 43 VIDEO PARAMETER 1 - Input 0 - video gain 23 SETTINGS FOR 1 - Input 0 - video gain 23 SETTINGS FOR 2 - Output 1 - contrast 2 10 SETTINGS FOR 2 - Output 1 - contrast 2 10 SETTINGS FOR 2 - Output 1 - contrast 2 10 SETTINGS FOR 2 - Dutput 1 - contrast 2 10 SETTINGS FOR 2 - Dutput 1 - contrast 2 10 Set action 13 - no save 0 18 15 CHANGE TO ASCII 0 0 12, 2 14 - auto-save 0 12, 2 13, 3 158 EXECUTE LOADED DATA Set as 0, or as SETUP # 1-Take 21, 32 159 LOAD VIDEO DATA Set equal to video input Set equal to video output 21, 22 159					
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57 SET AUTO-SAVE I3 - no save 0 12, 2 58 EXECUTE LOADED DATA Set as 0, or as SETUP # 1-Take 21, 3 59 LOAD VIDEO DATA Set equal to video input (0 = disconnect) Set equal to video output (0 = to all the outputs) 21, 22					
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58 EXECUTE LOADED DATA Set as 0, or as SETUP # 1-Take 21, 3 59 LOAD VIDEO DATA Set equal to video input (0 = disconnect) Set equal to video output (0 = to all the outputs) 21, 22	57	SET AUTO-SAVE		0	12, 2
2-Cancel 59 LOAD VIDEO DATA Set equal to video input (0 = disconnect) Set equal to video output (0 = to all the outputs) 21, 22					
59 LOAD VIDEO DATA Set equal to video input (0 = disconnect) Set equal to video output (0 = to all the outputs) 21, 22	58	EXECUTE LOADED DATA	Set as 0, or as SETUP #		21, 3
(0 = disconnect) (0 = to all the outputs)	-				
	59	LOAD VIDEO DATA			21, 22
(127 = load SETUP #) or SETUP #					
			(127 = load SETUP #)	or SETUP #	

Kramer Protocol 2000

	INSTRUCTION	DEFINITION FOR SPECIFIC INSTRUCTION						
ħ	DESCRIPTION	INPUT	OUTPUT					
60	LOAD AUDIO DATA	Set equal to audio input (0 = disconnect) (127 = load SETUP #)	Set equal to audio output (0 = to all the outputs) or SETUP #	21, 22				
61	IDENTIFY MACHINE	 video machine name audio machine name video software version audio software version RS422 controller name RS422 controller version remote control name remote software version Protocol 2000 revision 	 0 - Request first 4 digits 1 - Request first suffix 2 - Request second suffix 3 - Request third suffix 10 - Request first prefix 11 - Request second prefix 12 - Request third prefix 	13				
62	DEFINE MACHINE	 number of inputs number of outputs number of setups 	1 - for video 2 - for audio 3 - for SDI 4 - for remote panel 5 - for RS-422 controller	14				
63	EXTENDED DATA	7 MSBs for INPUT data	7 MSBs for OUTPUT data	19				

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 5 – For the OUTPUT byte set as 6, the VIS source is the input selected using the OUTPUT byte. Similarly, for the OUTPUT byte set as 7, the VIS source is the output selected using the OUTPUT byte. Note also, that on some machines the sync source is not software selectable, but is selected using switches, jumpers, etc!

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

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

NOTE 7 – Setting OUTPUT to 0 will return the VIS source setting as defined in instruction #7. Setting to 1 will return the input # or output # of the sync source (for the case where the VIS source is set as 6 or as 7 in instruction #7). Setting to 2 returns the vertical sync frequency (0 for no input sync, 50 for PAL, 60 for NTSC, 127 for error).



NOTE 8 - The reply to the "REQUEST WHETHER SETUP IS DEFINED" is as in TYPE 3 above, except that here the OUTPUT is assigned with the value 0 if the setup is not defined; or 1 if it is defined.

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.

7D

NOTE 11 - For machines where the video and / or audio gain is programmable.

NOTE 12 - Under normal conditions, the machine's present status is saved each time a change is made. The "power-down" save (auto-save) may be disabled using this code. Note that whenever the machine is turned on, the auto-save function is set.

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):

81 (i.e. 128dec+ 22dec for 2nd byte, and 128dec+ 16dec for 3rd byte). 06 00

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

NOTE 14 - The number of inputs and outputs refers to the specific machine, which is being addressed, not to the system. For example, if six 16X16 matrices are configured to make a 48X32 system (48 inputs, 32 outputs), the reply to the HEX code 3E 82 81 82 (ie. request the number of outputs)

would be HEX codes			
7E	82	90	82
i.e. 16 outputs			

NOTE 15 - When the OVR bit (4th byte) is set, then the "video" commands have universal meaning. For example, instruction 1 (SWITCH VIDEO) will cause all units (including audio, data, etc.) to switch. Similarly, if a machine is in "FOLLOW" mode, it will perform any "video" instruction.

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 17 - Delayed execution allows switching after a delay dictated by RS-232. To do this, the user sends instruction 7 with the "Set for delayed switch" option (64dec) before sending the switch command (instruction 1) or pressing via front panel. The switch is not executed (unless timed-out) until the "Execute delayed switch" code is sent, or the ""Set for delayed switch" code is sent again. (The mode is automatically cancelled after implementation of the switch if the "execute" command is used).

For exar	nple, to conne	ect input 4 to c	output 3 after a	a delay, send	HEX codes
	07	80	C0	81	(set for delayed switch)
	01	84	83	81	(switch code)
then, aft	er the require	d delay, send I	HEX codes		
	07	80	C1	81	(execute delayed switch)
to imple	ment the swit	ch.			

NOTE 18 - After this instruction is sent, the unit will respond to the ASCII command set. The ASCII command to operate with the HEX command set must be sent in order to return to working with HEX codes.

NOTE 19 - When data (ie. the INPUT and/or OUTPUT bytes) of more than 7 bits is required, this instruction is sent before sending the instruction needing the additional bits. The data in this instruction then becomes the Most Significant Bits of that next instruction. For example, to set the audio gain (instruction 22) of output 3 to 681dec (2A9hex), you would first send HEX codes

3F 80 85 81 and then send HEX codes 83 A9 81 16 To set the audio gain of output 6 to 10013dec (271Dhex), first send HEX codes

3F	80	CE	81
followed by HEX codes 16	86	9D	81

NOTE 20 – To store data in the non-volatile memory of the unit, e.g. the EEPROM for saving SETUPS. The EEPROM address is sent using the INPUT byte, and the data to be stored is sent using the OUTPUT byte. To use this instruction, it is necessary to understand the memory map, and memory structure of the particular machine.

NOTE 21 – Instruction 59 and instruction 60 load data for sending to the crosspoint switcher (or for storing in a SETUP), i.e. the data is "lined-up" to be executed later. Instruction 58 executes the loaded data.

NOTE 22 - If the INPUT byte is set as 127dec, then the data stored in a SETUP is loaded. The SETUP # is in the OUTPUT byte.

NOTE 23 – 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



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

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

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- 1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
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- 3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

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

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

CAUTION!

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



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