

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, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 1,000-plus different models now appear in 11 groups¹ that are clearly defined by function.

Thank you for purchasing your Kramer **VP-1608** *16x8 RGBHV/Balanced Audio Matrix* that 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, null-modem adapter and IR remote control
- 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

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

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

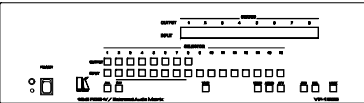
3 The complete list of Kramer cables is on our Web site at <http://www.kramerelectronics.com>

2.1 Quick Start

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

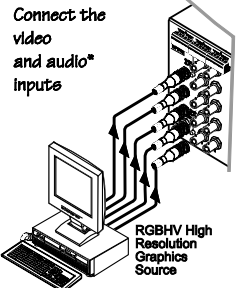
Step 1: Mount the machine - see section 5

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



Step 2: Connect the inputs and outputs - see section 6

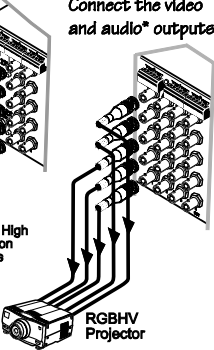
Connect the video and audio* inputs



RGBHV High Resolution Graphics Source

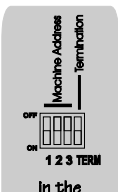
(* audio connections are not shown)

Connect the video and audio* outputs




RGBHV Projector

Set the Machine Address



In the default, all DIPs are set to ON

Set the Delay DIP-switches



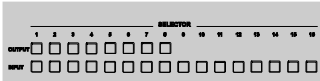
DELAY

Step 3: Connect the control port - see section 6

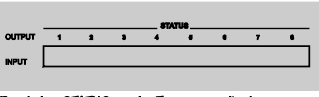
Connect an RS-232 optional Control Port, an RS-485 port

Step 4: Turn the power ON


Step 5: Operate the machine - see section 8




Use the SELECTOR buttons to switch the inputs to the outputs




Read the STATUS on the 7-segment display




Connect a selected input to ALL the outputs




Disconnect an output



Press TAKE to confirm actions



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



Stores (STO) and recall (RCL) actions
Lock and unlock the panel

Operate via the front panel buttons, IR remote control, RS-485, RS-232

3 Overview

The **VP-1608** *16x8 RGBHV/Balanced Audio Matrix* is a true matrix switcher, routing any input to any or all outputs. The **VP-1608** includes 16 input and 8 output selector buttons.

The unit features:

- 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 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-IR2** Infrared 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 Your VP-1608 16x8 RGBHV/Balanced Audio Matrix

[Figure 1](#) illustrates the front and rear panels of the **VP-1608**. [Table 1](#) and [Table 2](#) define the front and rear panels of the **VP-1608**, respectively.

¹ In increments of 0.5sec

Your VP-1608 16x8 RGBHV/Balanced Audio Matrix

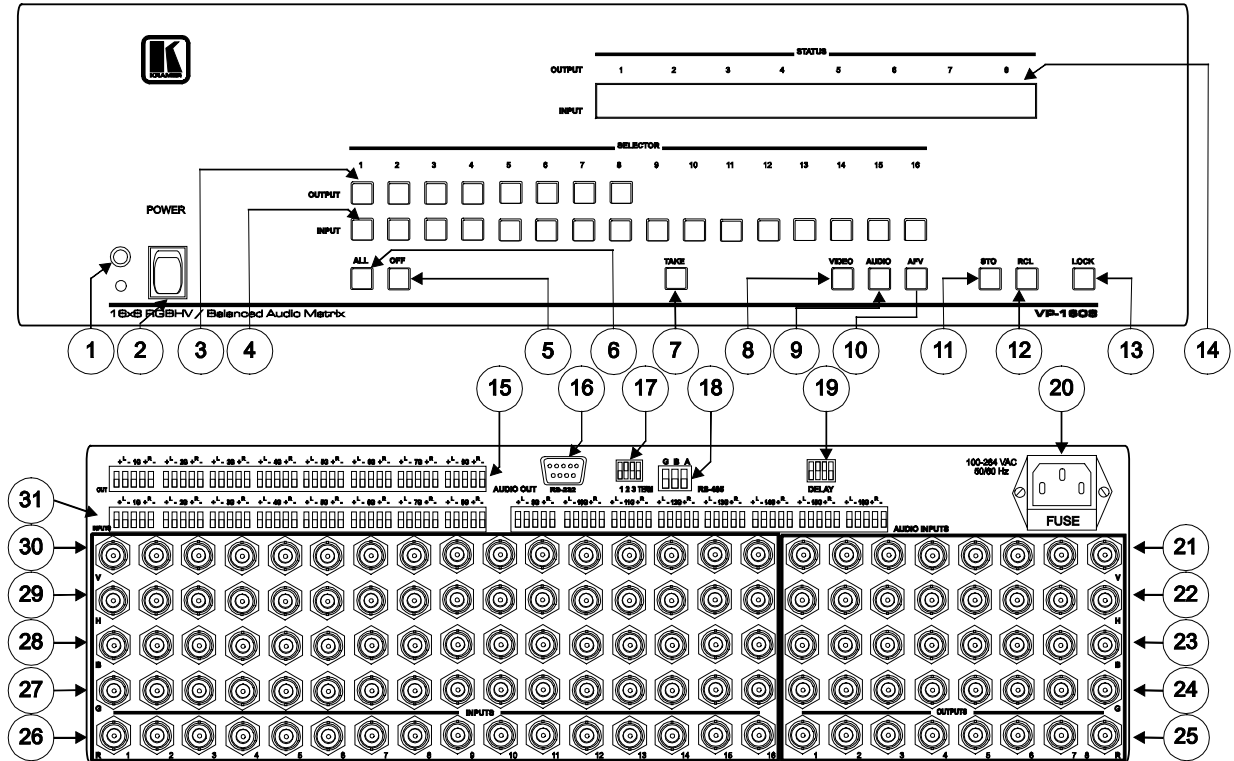


Figure 1: VP-1608 16x8 RGBHV/Balanced Audio Matrix

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

#	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	OUTPUT SELECTOR Buttons	Select the output to which the input is switched (from 1 to 8)
4	INPUT SELECTOR Buttons ¹	Select the input to switch to the output (from 1 to 16)
5	OFF Button	Pressing OFF after pressing an OUTPUT button disconnects that output from the inputs. To disconnect all the outputs, press the ALL button and then the OFF button
6	ALL Button	Pressing ALL followed by an INPUT button, connects that input to all outputs ²
7	TAKE Button	Pressing TAKE toggles the mode between the CONFIRM mode ³ and the AT ONCE 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 AFV 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 flashes. Pressing a different input button lets you view ⁴ another setup. After making your choice, pressing the RCL button again implements the new status
13	LOCK Button	Pressing the LOCK 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) ⁵

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 8.8 describes

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

#	Feature	Function
15	AUDIO OUT Terminal Block Connectors	Connect to the audio acceptors (from 1 to 8)
16	RS-232 9-pin D-sub (F) Connector	Connects to the PC or other Serial Controller
17	Setup DIP-switches	DIPS 1, 2, and 3 for setup of the Machine #; DIP 4 for RS-485 termination
18	RS-485 Connector	RS-485 port on detachable terminal block
19	DELAY DIP-switches	DIP-switches for setup of the delay time ¹
20	Power Connector with Fuse	AC connector enabling power supply to the unit
21	V (Vertical Sync) OUTPUT BNC Connectors ²	Connect to the RGBHV video acceptors (1 to 8)
22	H (Horizontal Sync) OUTPUT BNC Connectors ²	
23	B OUTPUT BNC Connectors	
24	G OUTPUT BNC Connectors	
25	R OUTPUT BNC Connectors	
26	R INPUT BNC Connectors	Connect to the RGBHV video sources (1 to 16)
27	G INPUT BNC Connectors	
28	B INPUT BNC Connectors	
29	H (Horizontal Sync) INPUT BNC Connectors ²	
30	V (Vertical Sync) INPUT BNC Connectors ²	
31	AUDIO INPUTS Terminal Block Connectors	Connect to the audio sources (from 1 to 16)

Figure 2 and Table 3 define the two flash program switches³ on the underside of the VP-1608 unit:

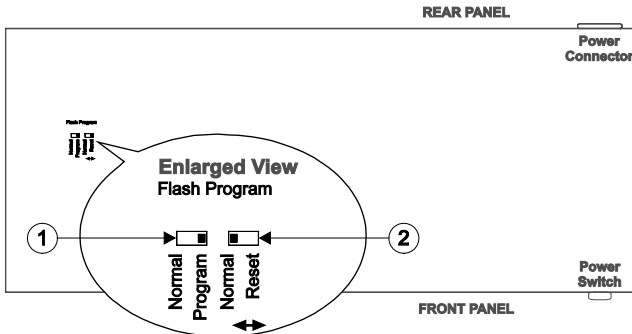


Figure 2: VP-1608 Underside Flash Program Switches

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)

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 8.8)

4 The factory default

5 Installing the VP-1608 in a Rack

This section describes how to install the **VP-1608** in a rack.

Before Installing in a rack

Before installing in a rack, be sure that the environment is within the recommended range:	
Operating temperature range	+5° to +45° C (41° to 113° F)
Operating humidity range	10 to 90% RHL, non-condensing
Storage temperature range	-20° to +70° C (-4° to 158° F)
Storage humidity range	5 to 95% RHL, non-condensing



CAUTION!!

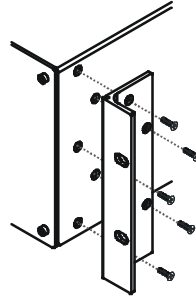
When installing on a 19" rack, avoid hazards by taking care that:

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.

How to Rack Mount

To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (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 that:

- **In some models, the front panel may feature built-in rack ears**
- Detachable rack ears can be removed for desktop use
- Always mount the machine in the rack before you attach any cables or connect the machine to the power
- If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions (you can download it at: <http://www.kramerelectronics.com>)

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

To connect a single¹ **VP-1608 16x8 RGBHV/Balanced Audio Matrix** as illustrated in *Figure 3*, do the following²:

1. Connect up to 16 RGBHV sources³ (such as RGBHV graphics sources) to the RGBHV INPUT BNC connectors.
2. Connect up to 8 RGBHV acceptors³ (such as RGBHV projectors) to the RGBHV OUTPUT BNC connectors.
3. Connect up to 16 stereo audio sources³ to the AUDIO INPUT terminal block connectors (see section [6.1](#)).
4. Connect up to 8 stereo audio acceptors³ to the AUDIO OUTPUT terminal block connectors (see section [6.1](#)).
5. Set the MACHINE # DIP-switches to MACHINE # 1, according to *Table 4*, that is, set all switches OFF (see section [6.4](#)).
6. Set the DELAY DIP-switches, if required (see section [6.5](#)).
7. Connect a PC or other controller, if required, via the RS-232 (see section [6.2](#)) or RS-485 ports (see section [6.3](#)).
8. Connect the power cord.

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

³ Not all sources or acceptors need to be connected

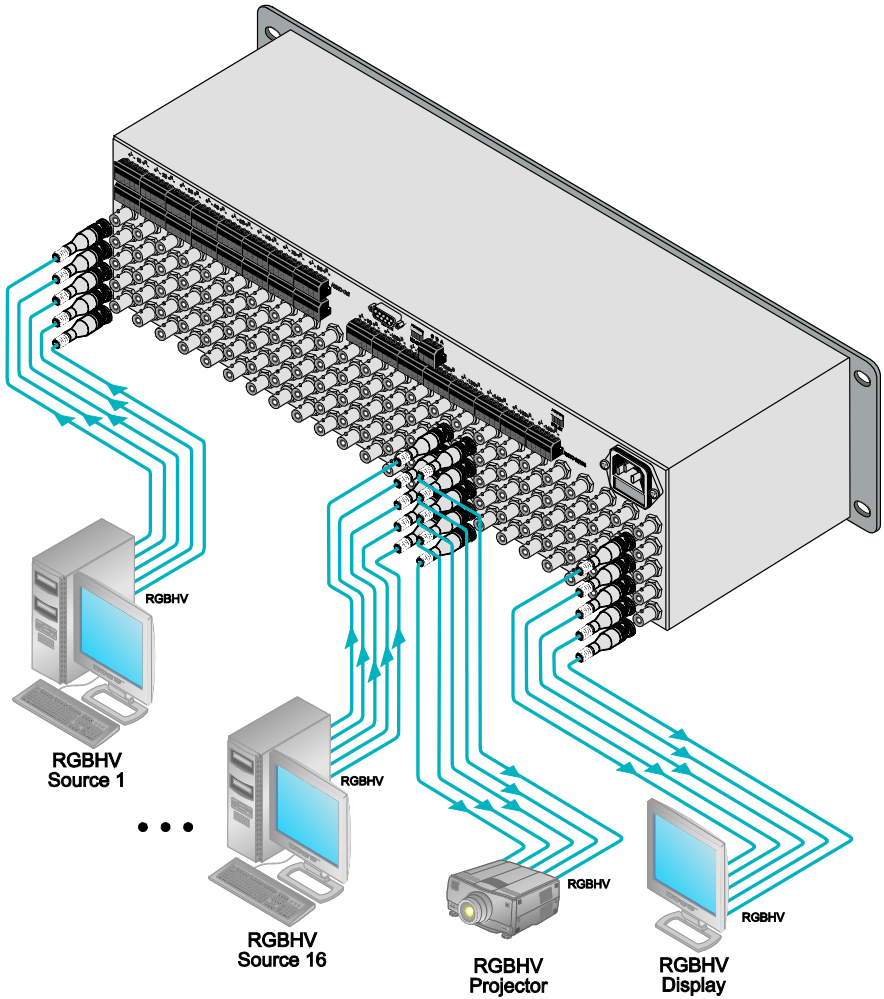


Figure 3: Connecting the VP-1608

6.1 Connecting the Balanced/Unbalanced Stereo Audio Input/Output

This section illustrates how to connect:

- A balanced stereo audio input/output connection, see [Figure 4](#)
- An unbalanced stereo audio input connection, see [Figure 5](#)
- An unbalanced stereo audio output connection, see [Figure 6](#)

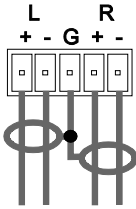


Figure 4: Connecting the Balanced Stereo Audio Input/Output

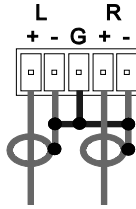


Figure 5: Connecting the Unbalanced Stereo Audio Input

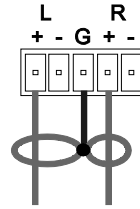


Figure 6: Connecting an Unbalanced Stereo Audio Output

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 9-pin D-sub (F) 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 9-pin D-sub (F) port on your PC

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

- Connect the RS-232 9-pin D-sub (F) port on your PC to the RS-232 9-pin D-sub (F) rear panel port on the **VP-1608** unit², as illustrated in [Figure 7](#) (depending on whether the PC has a 9-pin or 25-pin connector)

¹ When connecting a single **VP-1608** unit via RS-232, set the MACH. # DIP-switches to Machine # 1, according to [Table 4](#)

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

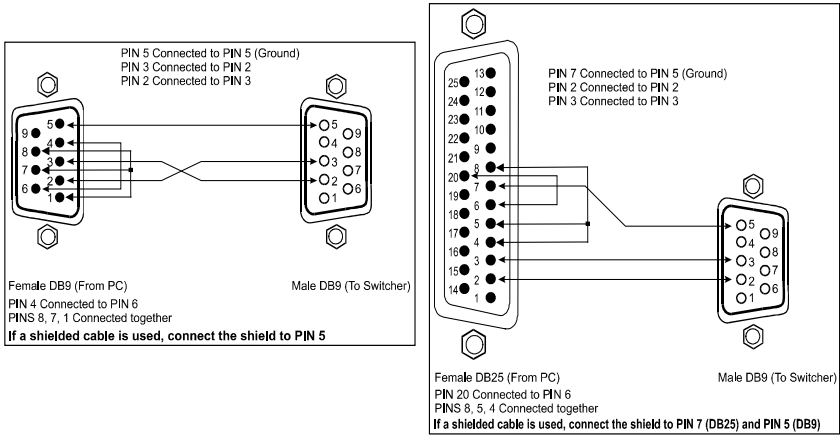


Figure 7: Connecting a PC Without Using a Null-Modem Adapter

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**.

To connect an **RC-3000** to a single **VP-1608** unit (see [Figure 8](#)):

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**)
2. Set the MACH. # DIP-switches 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-3000**².

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

² Refer to the RC-3000 user manual for details of how to terminate the RS-485 line

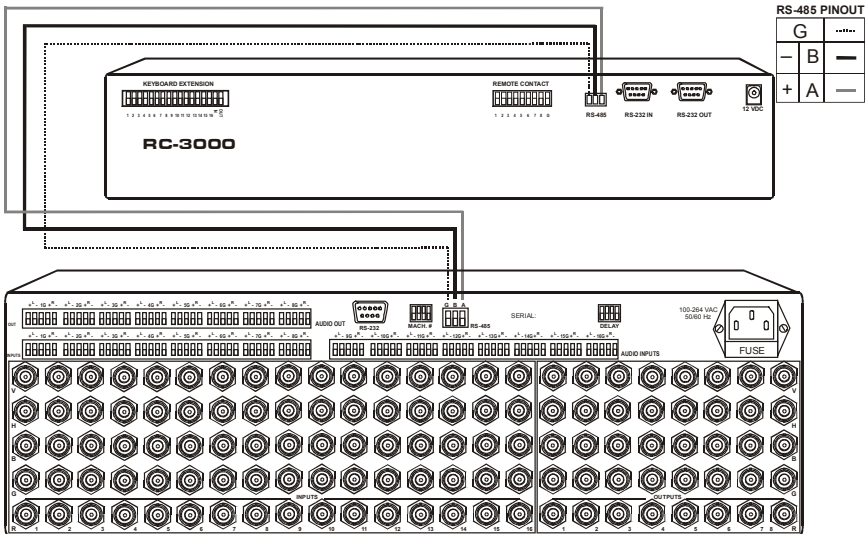


Figure 8: Controlling via RS-485 (for example, using an RC-3000)

6.4 Setting the MACHINE # DIP-Switches

The MACHINE # determines the address of a **VP-1608** unit 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.

When connecting more than one **VP-1608** unit, set the first machine (the Master) connected via RS-232, as MACHINE # 1. 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.

Table 4: MACHINE # DIP-switch Settings

MACHINE #	DIPS		
	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

6.5 Setting the DELAY DIP-switches

To achieve clean transitions when switching between non-genlocked sources, set the delay time—ranging from 0sec to 3.5sec¹—via the DELAY DIP-switches, as shown in [Table 5](#). The **VP-1608** unit is shipped from the factory set with no delay (0sec).

Table 5: DELAY DIP-switch Settings

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

7 Controlling 16x8 RGBHV/Balanced Audio Matrix Units

You can control up to eight single² **VP-1608** units 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 Controlling from a PC or Serial Controller

To control up to eight single **VP-1608** units from a PC or serial controller via RS-232 and RS-485, as shown in [Figure 9](#), 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 # DIP-switches, as required⁵ (see section [6.4](#)).
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 [6.2](#)).
4. 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

¹ In increments of 0.5sec

² To connect a single **VP-1608** unit to a PC or other RS-232 controller, see section [5](#)

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 # 8 for the eighth unit

VP-1608 unit, and so on – up to the RS-485 port on the eighth VP-1608 unit.

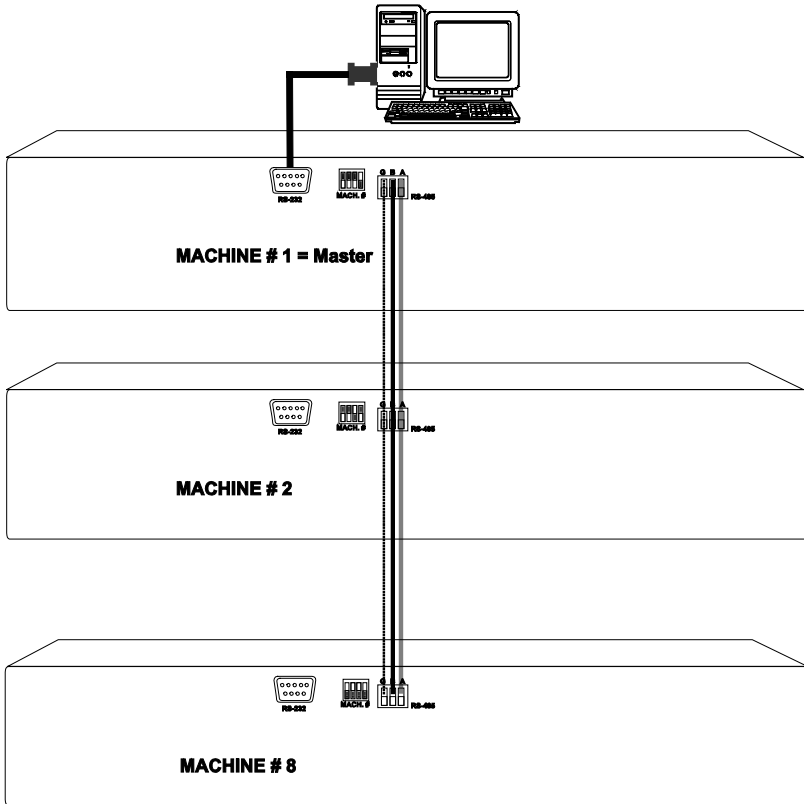


Figure 9: Control Configuration via RS-232 and RS-485

7.2 Controlling via an RS-485 Controller

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, or a PC (equipped with an RS-485 interface), as shown in [Figure 10](#), do the following¹:

¹ 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

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 # DIP-switches, 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**¹ 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 Refer to the RC-3000 user manual for details of how to terminate the RS-485 line

Controlling 16x8 RGBHV/Balanced Audio Matrix Units

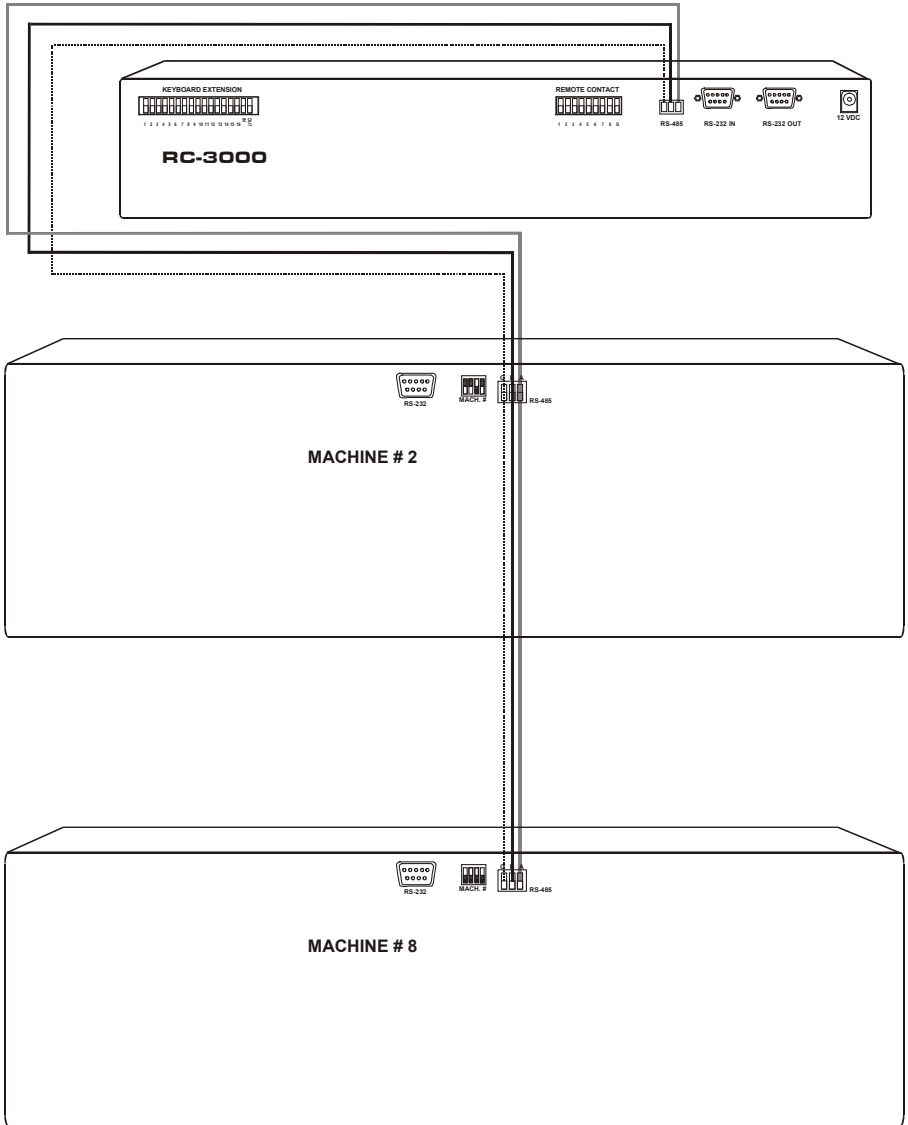


Figure 10: Controlling via an RS-485 Controller

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

This section describes how to operate the **VP-1608**. The section includes:

- Choosing the Audio-Follow-Video or Breakaway option (see section [8.1](#))
- Switching OUT-IN combinations (see section [8.2](#))
- Confirming settings (see section [8.3](#))
- Storing/recalling input/output configurations (see section [8.4](#))
- Adjusting the audio gain control (see section [8.5](#))
- Locking and unlocking the front panel (see section [8.6](#))
- Resetting the **VP-1608** (see section [8.7](#))
- Displaying unit characteristics (see section [8.8](#))

8.1 Choosing the Audio-Follow-Video or Breakaway Option

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 DIP-switches are set up for a typical application using a single machine (see [Figure 11](#)):

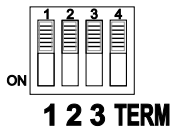


Figure 11: DIP-Switch Setup on a Single Machine

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, the AFV button illuminates. The audio follows the video
- If the AUDIO differs from the VIDEO, the TAKE and the AUDIO buttons flash. Also, the audio outputs in the INPUT

STATUS 7-segment display that are changed, flash¹. Press the TAKE button to confirm the modification. The audio follows 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

8.2 Switching OUT-IN Combinations

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

1. Press an OUTPUT SELECTOR button.
The corresponding input number in the *INPUT STATUS* 7-segment display flashes.
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

¹ Warning that you are about to modify the audio configuration for AFV operation

- 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:

1. Press the TAKE button to toggle from the AT ONCE mode² to the CONFIRM mode³.
The TAKE button illuminates and actions now require user confirmation.
2. Press the illuminated TAKE button to toggle from the CONFIRM mode back to the AT ONCE mode.
The TAKE button turns off and actions no longer require user confirmation.

8.3.2 Confirming a Switching Action

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

1. Press an OUT-IN combination.
The corresponding input number that is displayed in the *INPUT STATUS* 7-segment display 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 *INPUT STATUS* 7-segment display no longer flashes. 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 flashes.
2. Press the flashing 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 presets) 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.

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

² The TAKE button does not illuminate

³ The TAKE button illuminates

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 flashes.
2. Press one of the INPUT SELECTOR buttons from 1 to 15 (this becomes the setup # in which the current status is stored). If in the CONFIRM mode, press the flashing 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 flashes.
2. Press the appropriate INPUT SELECTOR button (the INPUT SELECTOR button # corresponding to the setup #). If in the CONFIRM mode, the setup flashes on the display and is only 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.
2. 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 Hex Tables for Audio Input/Output Gain Control in section [12](#).

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

³ Version 3.9 or higher

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 flashes

To unlock the **VP-1608**:

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

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 described in section [8.8](#)

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 described in section [8.8](#)

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-IR2 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

8.8 Displaying Unit Characteristics

Switching on and/or resetting¹ the **VP-1608** unit, momentarily displays the following characteristics on the front panel (as [Figure 12](#) illustrates):

- The number included in the product name (for example, **1608**)
- The firmware version number

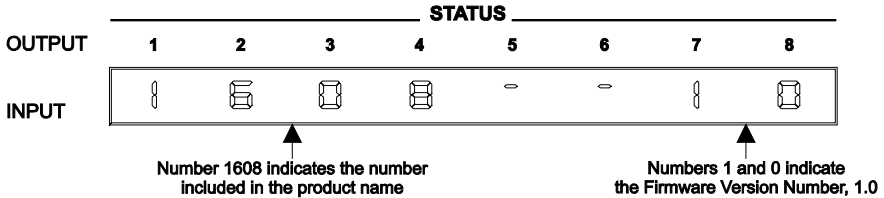


Figure 12: VP-1608 Unit Characteristics

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 the firmware (see section [9.3](#))

9.1 Downloading from the Internet

To download the up-to-date file from the Internet:

1. Go to our Web site at <http://www.kramerelectronics.com> 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*”.

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

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* 9-pin D-sub (F) 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* 9-pin D-sub (F) 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**

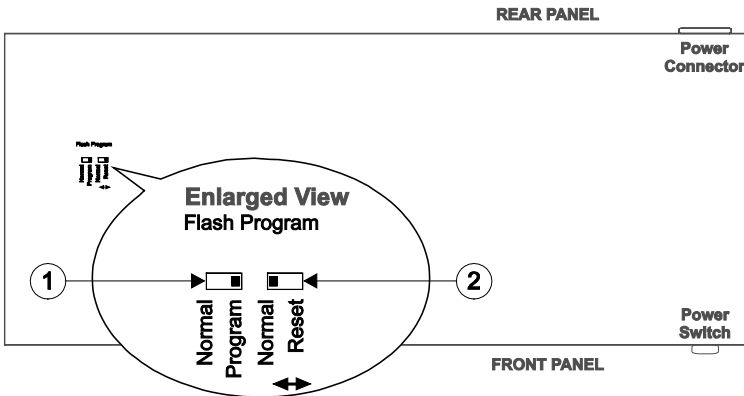


Figure 13: VP-1608 Underside Flash Program Switches Set for Upgrade

9.3 Upgrading the Firmware

To upgrade the firmware, follow these steps:

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

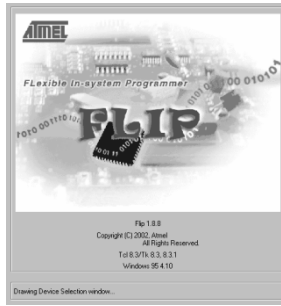


Figure 14: Splash Screen

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

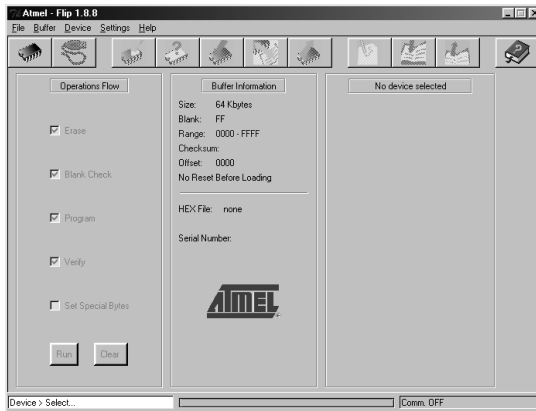


Figure 15: Atmel – Flip Window

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:

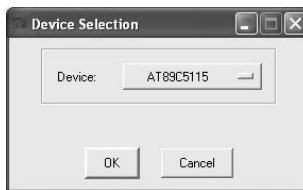


Figure 16: Device Selection Window

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

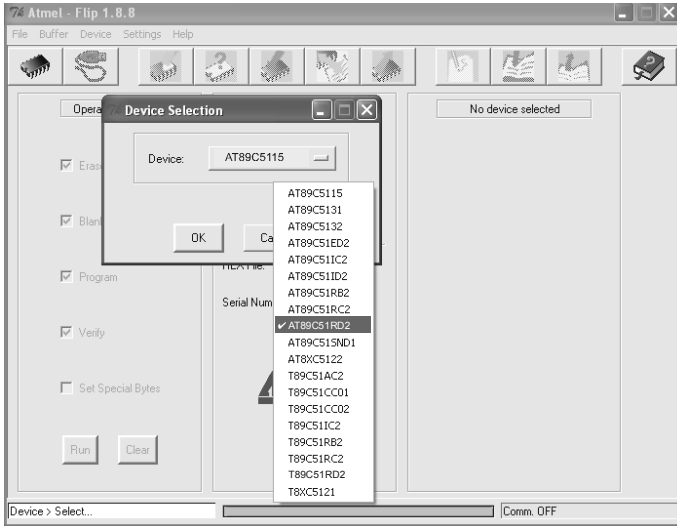


Figure 17: Device Selection Window

- Click OK and select “Load Hex” from the File menu.

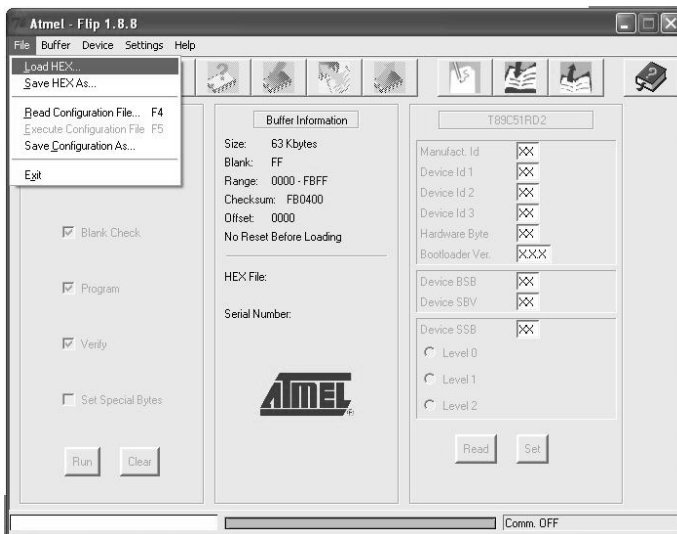


Figure 18: Loading the Hex

6. The Open File window opens. Select the correct HEX file that contains the updated version of the firmware for the **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:

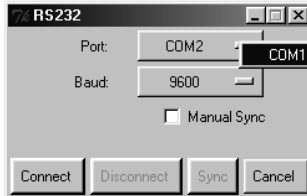


Figure 19: RS-232 Window

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.

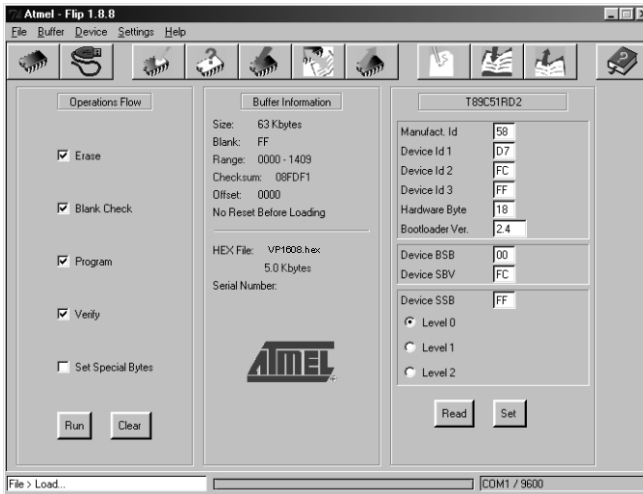


Figure 20: Atmel – Flip Window (Connected)

9. 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 are colored green and the status bar message: Memory Verify Pass appears²:

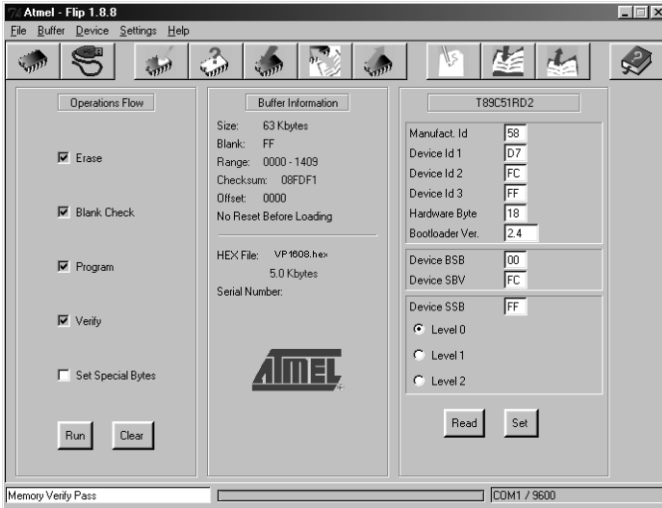


Figure 21: Atmel – Flip Window (Operation Completed)

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 2](#)) to Normal.
14. Connect the power on the **VP-1608**.
Upon initialization, the new **VP-1608** software version shows in the INPUT STATUS 7-segment Display.

¹ See also the blue progress indicator on the status bar

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

10 Technical Specifications

[Table 6](#) includes the technical specifications:

Table 6: Technical Specifications¹ of the VP-1608

INPUTS:	16 x 3 video (RGB) 0.7Vpp/75Ω on BNC connectors. 16 x 2 H&V, TTL level on BNC connectors. 16 balanced audio stereo on detachable terminal blocks.
OUTPUTS:	8 x 3 video (RGB) 0.7Vpp/75Ω on BNC connectors. 8 x 2 H&V, TTL level/75Ω on BNC connectors. 8 balanced audio stereo on detachable terminal blocks.
VIDEO BANDWIDTH (-3dB):	400MHz.
AUDIO BANDWIDTH (-3dB):	30kHz.
VIDEO S/N RATIO:	71.7dB.
AUDIO S/N RATIO:	74.5dB unweighted (1Vpp).
VIDEO CROSSTALK:	-62.5dB @5MHz.
CONTROL:	Front panel switches and IR. RS-232 and RS-485 may also control input and output audio levels.
AUDIO CONTROL:	Mute, -46dB to +10dB gain range, via RS-232, RS-485, IR.
AUDIO THD:	0.028% (1kHz).
POWER SOURCE:	230V AC, 50/60Hz (115V AC, USA), 28VA.
DIMENSIONS:	19" x 7" x 3U W, D, H, rack mountable.
WEIGHT:	5.5kg, (12.2lbs) approx.
ACCESSORIES:	Power cord, Windows®-based Kramer control software, null-modem adapter, IR remote control

¹ Specifications are subject to change without notice

11 3Table of Hex Codes for Serial Communication

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

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

OUT	Switching Video Channels								Switching Audio Channels							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
IN 1	01	01	01	01	01	01	01	01	02	02	02	02	02	02	02	02
	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	01	01	01	01	01	01	01	02	02	02	02	02	02	02	02
	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	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	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83
	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 4	01	01	01	01	01	01	01	01	02	02	02	02	02	02	02	02
	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
	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 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	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 6	01	01	01	01	01	01	01	01	02	02	02	02	02	02	02	02
	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
	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
IN 7	01	01	01	01	01	01	01	01	02	02	02	02	02	02	02	02
	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	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
IN 8	01	01	01	01	01	01	01	01	02	02	02	02	02	02	02	02
	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	01	01	01	01	01	01	01	02	02	02	02	02	02	02	02
	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	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	01	01	01	01	01	01	01	02	02	02	02	02	02	02	02
	8A	8A	8A	8A	8A	8A	8A	8A	8A	8A	8A	8A	8A	8A	8A	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	01	01	01	01	01	01	01	02	02	02	02	02	02	02	02
	8B	8B	8B	8B	8B	8B	8B	8B	8B	8B	8B	8B	8B	8B	8B	8B
	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 12	01	01	01	01	01	01	01	01	02	02	02	02	02	02	02	02
	8C	8C	8C	8C	8C	8C	8C	8C	8C	8C	8C	8C	8C	8C	8C	8C
	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 13	01	01	01	01	01	01	01	01	02	02	02	02	02	02	02	02
	8D	8D	8D	8D	8D	8D	8D	8D	8D	8D	8D	8D	8D	8D	8D	8D
	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 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	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 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	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 16	01	01	01	01	01	01	01	01	02	02	02	02	02	02	02	02
	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

12 Hex Tables 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 Hex Tables 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:

2A	86	80	81
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[Table 8](#) lists the Hex values for the audio gain control of the 16 inputs:

Hex Tables for Audio Input/Output Gain Control

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

		INPUTS																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	ALL	
Instruction # 22	Audio Level = 0	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	
		81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F	90	80	
		80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
		81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
Instruction # 22	Audio Level = 1	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	
		81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F	90	80	
		81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
		81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
Instruction # 22	Audio Level = 10	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	
		81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F	90	80	
		8A	8A	8A	8A	8A	8A	8A	8A	8A	8A	8A	8A	8A	8A	8A	8A	8A	8A
		81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
Instruction # 22	Audio Level = 127	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	
		81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F	90	80	
		FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	
		81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
Instruction # 63	Audio Level = 128	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	
		80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
		81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
		81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
Instruction # 22	Audio Level = 216 (1:1)	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	
		81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F	90	80	
		80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
		81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
Instruction # 63	Audio Level = 255 (3:1)	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	3F	
		80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
		81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
		81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
Instruction # 22	Audio Level = 255 (3:1)	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	
		81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F	90	80	
		FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
		81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81

12.2 Hex Tables 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:

2A	87	80	81
----	----	----	----

[Table 9](#) lists the Hex values for the audio gain control of the eight outputs:

Hex Tables for Audio Input/Output Gain Control

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

		OUTPUTS								
		1	2	3	4	5	6	7	8	ALL
Instruction # 22	Audio Level = 0 (Mute*)	16	16	16	16	16	16	16	16	16
		81	82	83	84	85	86	87	88	80
		80	80	80	80	80	80	80	80	80
		81	81	81	81	81	81	81	81	81
Instruction # 22	Audio Level = 1	16	16	16	16	16	16	16	16	16
		81	82	83	84	85	86	87	88	80
		81	81	81	81	81	81	81	81	81
		81	81	81	81	81	81	81	81	81
Instruction # 22	Audio Level = 10	16	16	16	16	16	16	16	16	16
		81	82	83	84	85	86	87	88	80
		8A	8A	8A	8A	8A	8A	8A	8A	8A
		81	81	81	81	81	81	81	81	81
Instruction # 22	Audio Level = 127	16	16	16	16	16	16	16	16	16
		81	82	83	84	85	86	87	88	80
		FF	FF	FF	FF	FF	FF	FF	FF	FF
		81	81	81	81	81	81	81	81	81
Instruction # 63	Audio Level = 128	3F	3F	3F	3F	3F	3F	3F	3F	3F
		80	80	80	80	80	80	80	80	80
		81	81	81	81	81	81	81	81	81
		81	81	81	81	81	81	81	81	81
Instruction # 22	Audio Level = 216 (1:1)	16	16	16	16	16	16	16	16	16
		81	82	83	84	85	86	87	88	80
		80	80	80	80	80	80	80	80	80
		81	81	81	81	81	81	81	81	81
Instruction # 63	Audio Level = 216 (1:1)	3F	3F	3F	3F	3F	3F	3F	3F	3F
		80	80	80	80	80	80	80	80	80
		81	81	81	81	81	81	81	81	81
		81	81	81	81	81	81	81	81	81
Instruction # 22	Audio Level = 255 (3:1)	16	16	16	16	16	16	16	16	16
		81	82	83	84	85	86	87	88	80
		D8	D8	D8	D8	D8	D8	D8	D8	D8
		81	81	81	81	81	81	81	81	81
Instruction # 63	Audio Level = 255 (3:1)	3F	3F	3F	3F	3F	3F	3F	3F	3F
		80	80	80	80	80	80	80	80	80
		81	81	81	81	81	81	81	81	81
		81	81	81	81	81	81	81	81	81
Instruction # 22	Audio Level = 255 (3:1)	16	16	16	16	16	16	16	16	16
		81	82	83	84	85	86	87	88	80
		FF	FF	FF	FF	FF	FF	FF	FF	FF
		81	81	81	81	81	81	81	81	81

*In the Mute state, the audio output is physically disconnected from the input

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.

Table 10: Protocol Definitions

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

1st BYTE: Bit 7 – Defined as 0.

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

N5...N0 – “INSTRUCTION”

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

2nd BYTE: Bit 7 – Defined as 1.

I6...I0 – “INPUT”.

When switching (i.e. 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.

INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	DESCRIPTION	INPUT	OUTPUT	
0	RESET VIDEO	0	0	1
1	SWITCH VIDEO	Set equal to video input which is to be switched (0 = disconnect)	Set equal to video output which is to be switched (0 = to all the outputs)	2, 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 switched (0 = to all the outputs)	2
3	STORE VIDEO STATUS	Set as SETUP #	0 - to store 1 - to delete	2, 3, 15
4	RECALL VIDEO STATUS	Set as SETUP #	0	2, 3, 15
5	REQUEST STATUS OF A VIDEO OUTPUT	Set as SETUP #	Equal to output number whose status is reqd	4, 3
6	REQUEST STATUS OF AN AUDIO OUTPUT	Set as SETUP #	Equal to output number whose status is reqd	4, 3
8	BREAKAWAY SETTING	0	0 - audio-follow-video 1 - audio breakaway	2
		1	0 - FOLLOW mode 1 - Normal mode	15
11	REQUEST BREAKAWAY SETTING	Set as SETUP #, or set to 126 or 127 to request if machine has this function	0 - Request audio breakaway setting 1 - Request "FOLLOW" setting	3, 4, 6, 15
12	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 - for audio 2 - for VGA	3, 4, 6
15	REQUEST WHETHER SETUP IS DEFINED	Set as SETUP #	0	8
16	ERROR/BUSY	0	0 - error 1 - invalid instruction 2 - out of range 3 - machine busy	9
17	RESERVED	----	----	10
18	RESET AUDIO	0	0	1
19	STORE AUDIO STATUS	Set as SETUP #	0 - to store 1 - to delete	2, 3
20	RECALL AUDIO STATUS	Set as SETUP #	0	2, 3
22	SET AUDIO PARAMETER	Equal to input/output number whose gain is to be set (0 = all)	Set as parameter value	2, 11, 23
24	INCREASE/DECREASE AUDIO PARAMETER	Equal to input/output number whose parameter is to be increased/decreased (0 = all)	0 - increase output 1 - decrease output 2 - increase left output 3 - decrease left output 4 - increase right output 5 - decrease right output 6 - increase input 7 - decrease input 8 - increase left input 9 - decrease left input 10 - increase right input 11 - decrease right input	23
25	REQUEST AUDIO PARAMETER	Equal to input/output number whose parameter is requested	0	6, 23
30	LOCK FRONT PANEL	0 - Panel unlocked 1 - Panel locked	0	2
31	REQUEST WHETHER PANEL IS LOCKED	0	0	16
42	AUDIO PARAMETER SETTINGS FOR INSTRUCTIONS 22, 24, 25	INPUT Bit: I0 - 0=input, 1=output I1 - Left I2 - Right	0 - Gain 1 - Bass 2 - Treble 3 - Midrange	23
57	SET AUTO-SAVE	I3 - no save I4 - auto-save	0	12, 2

Kramer Protocol 2000

INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	DESCRIPTION	INPUT	OUTPUT	
59	LOAD VIDEO DATA	Set equal to video input (0 = disconnect) ----- (127 = load SETUP #)	Set equal to video output (0 = to all the outputs) ----- or SETUP #	21, 22
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	1 - video machine name 2 - audio machine name 3 - video software version 4 - audio software version 5 - RS422 controller name 6 - RS422 controller version 7 - remote control name 8 - remote software version 9 - 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	1 - number of inputs 2 - number of outputs 3 - 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 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 (i.e. request VIS setting, with INPUT set as 126dec)

would be HEX codes

4A FE 81 81 (i.e. VIS setting = 1, which is defined as VIS from input #1).

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 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):

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
----	----	----	----

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 19 - When data (i.e. 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

16	83	A9	81
----	----	----	----

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 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
----	----	----	----

LIMITED WARRANTY

Kramer Electronics (hereafter *Kramer*) warrants this product free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

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

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the Web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed, or on which the WARRANTY VOID IF TAMPERED sticker has been torn, reattached, removed or otherwise interfered with.
3. Damage, deterioration or malfunction resulting from:
 - i) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
 - ii) Product modification, or failure to follow instructions supplied with the product
 - iii) Repair or attempted repair by anyone not authorized by Kramer
 - iv) Any shipment of the product (claims must be presented to the carrier)
 - v) Removal or installation of the product
 - vi) Any other cause, which does not relate to a product defect
 - vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

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

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

CAUTION!

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

* FCC and CE approved using STP cable (for twisted pair products)



For the latest information on our products and a list of Kramer distributors, visit our Web site: www.kramerelectronics.com where updates to this user manual may be found. We welcome your questions, comments and feedback.



Caution

Safety Warning:

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



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