Kramer Electronics, Ltd.

USER MANUAL

Model:

VP-12x8

12x8 UXGA Matrix Switcher

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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 500-plus different models now appear in 8 Groups[1], which are clearly defined by function.

Congratulations on purchasing your **VP-12x8** *12x8 UXGA Matrix Switcher*, which is ideal for the following typical applications:

- Any professional display system requiring a true 12x8 computer graphics matrix operation
- Multimedia and presentation source and acceptor selection

The package includes the following items:

- **VP-12x8** *12x8 UXGA Matrix Switcher*
- Power cord and Null-modem adapter
- Windows®-based Kramer control software[2]
- Windows®-based Ethernet Configuration Manager and Virtual Serial Port Manager
- Infra-red remote control transmitter (including the required batteries and a separate user manual[3]) and this user manual[3]

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use Kramer high performance high resolution cables[4]

2.1 Quick Start

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

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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 Downloadable from our Web site at http://www.kramerelectronics.com

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

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

Step 1: Mount the machine - see section 5

Mount the machine in a rack or stick the 4 rubber feet to the underside
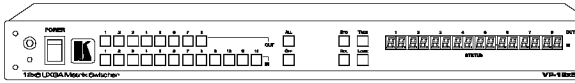
Step 2: Connect the inputs and outputs - see section 6

Connect up to 12 inputs

Connect up to 8 outputs

Computer Graphics Source

Display
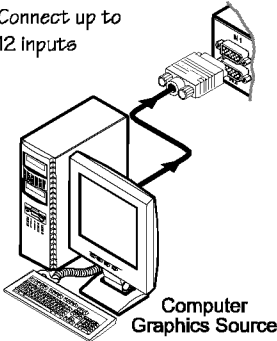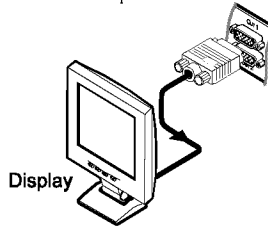
Step 3: Connect the control port - see section 6

If required, connect an RS-232 Control Port and/or the ETHERNET Port

Step 4: Turn the power ON

Step 5: Set the machine - see section 7
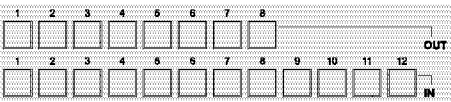
Use the OUT IN buttons to switch the inputs to the outputs

Store (STO) and recall (RCL) actions

Confirm actions

LOCK front panel buttons
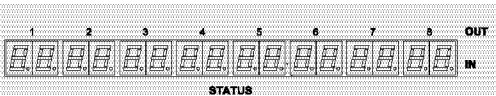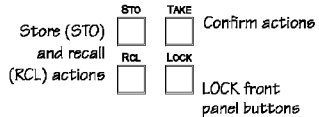
Read the STATUS on the 7-segment display

Connect a selected input to ALL the outputs

Disconnect an output
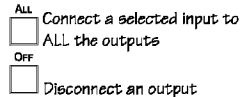
Step 6: Control the machine - see section 6

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

3 Overview

The Kramer **VP-12x8** is a high performance matrix switcher for computer graphics video signals, with resolutions ranging from VGA through UXGA and higher on HD15 connectors. The **VP-12x8** can route any or all the inputs to any or all the outputs simultaneously.

The **VP-12x8** features:

- A computer graphics video bandwidth of 380MHz that ensures transparent performance even in the most critical applications, and is HDTV compatible
- Buttons for the storing and recalling of up to 12 preset memory locations[1] for quick access to common configurations
- A Take button that allows you to place multiple switches in a queue and then activate them simultaneously with one touch of the button
- A 7-segment display
- A LOCK button to prevent tampering with the front panel and a switch for firmware upgrade.

Control the **VP-12x8** via the front panel buttons, and remotely, via:

- RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller
- The Kramer **RC-IR1/2** Infra-Red remote control transmitter
- The ETHERNET

The **VP-12x8** is dependable, rugged, and fits into one vertical space (1U) of a standard 19" professional rack[2].

To achieve the best performance:

- Connect only good quality connection cables, thus avoiding interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality and position your Kramer **VP-12x8** away from moisture, excessive sunlight and dust

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1 You can store/recall eight additional configurations via RS-232

2 The RGBHV signals are connected on HD15 pin connectors to reduce enclosure size

3.1 Terminology Used in this User Manual

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

Table 1: Terminology Used in this User Manual

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

4 Your VP-12x8 12x8 UXGA Matrix Switcher

Figure 1, Table 2 and Table 3 define the **VP-12x8** *12x8 UXGA Matrix Switcher*.
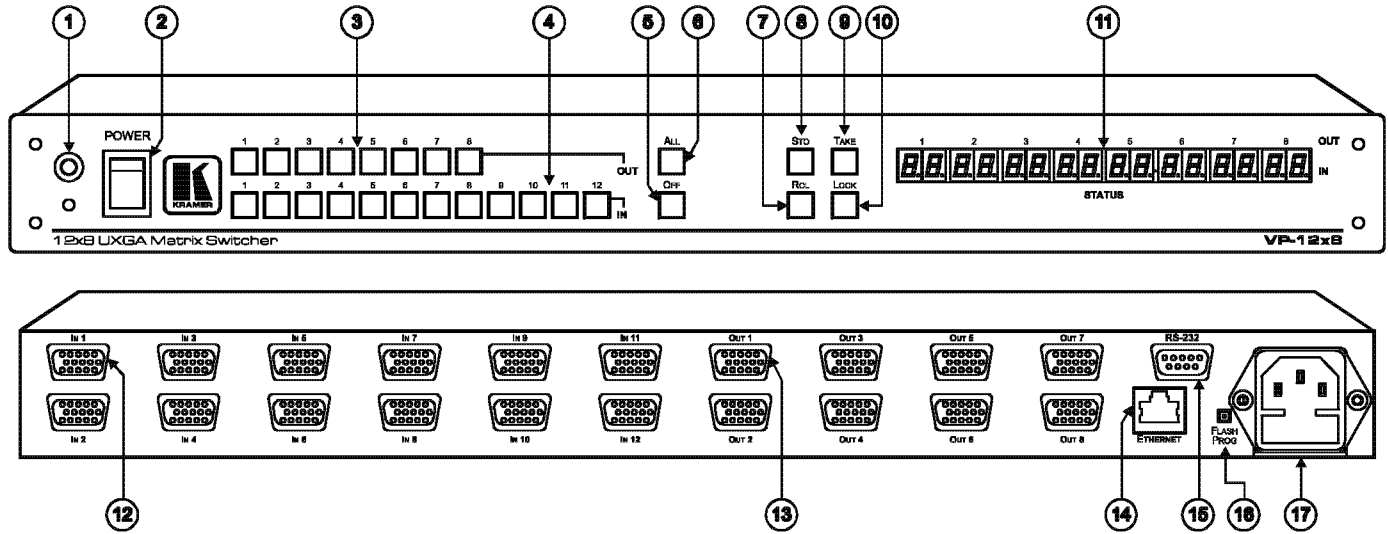
Figure 1: VP-12x8 12x8 UXGA Matrix Switcher – Front and Rear View

Table 2: Front Panel VP-12x8 12x8 UXGA Matrix Switcher Features

#	Feature	Function
1	IR Receiver	The red LED is illuminated when receiving signals from the Infra-red remote control transmitter
2	*POWER* Switch	Illuminated switch for turning the unit ON or OFF
3	*OUT* Selector Buttons	Select the output to which the input is switched
4	*IN* Selector Buttons	Select the input to switch to the output. When a signal is detected, the input button illuminates in green
5	*OFF* Button	Press an OUT selector button and then an OFF button to disconnect that output from the inputs. Press the ALL button and then the OFF button to disconnect all the outputs
6	*ALL* Button	Pressing ALL followed by an IN button, connects that input to all outputs[1]
7	*RCL* (Recall) Button	Pressing the RCL button and the corresponding IN/OUT button recalls a setup from the non-volatile memory
8	*STO* (Store) Button	Pressing STO followed by an input/output button stores the current setting[2]
9	*TAKE* Button	Pressing TAKE toggles the mode between the Confirm mode[3] and the At Once mode (user confirmation per action is unnecessary)
10	*LOCK* Button	Disengages the front panel switches
11	*STATUS* 7-segment Display	Displays the selected input switched to the output (marked above each input)[4]

Table 3: Rear Panel VP-12x8 12x8 UXGA Matrix Switcher Features

#	Feature	Function
12	*IN* HD15F Connectors	Connect to the video sources (from 1 to 8)
13	*OUT* HD15F Connectors	Connect to the output acceptor (from 1 to 8)
14	*ETHERNET* Connector	Connects to the PC or other Serial Controller through computer networking
15	*RS-232* DB 9F Port	Connects to the PC or the Remote Controller
16	*FLASH PROG* Button	Push in for "Program" to upgrade to the latest Kramer firmware (see section 8), or release for Normal (the factory default)[5]
17	Power Connector with Fuse	AC connector enabling power supply to the unit

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

2 For example, press STO and then the OUT button # 3 to store in Setup # 3

3 When in the Confirm mode, the TAKE button illuminates

4 Also displays the number of IN and OUT ports, the firmware version number, and the MACHINE #. Refer to section 7.1

5 The FLASH PROG "Reset" button is located on the underside of the unit

Figure 2 illustrates the underside of the **VP-12x8** unit, and Table 4 defines the underside features.
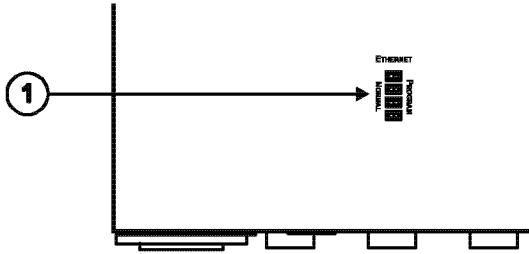
Figure 2: VP-12x8 12x8 UXGA Matrix Switcher – Underside View

Table 4: VP-12x8 Underside Panel Features

#	Feature	Function
1	*ETHERNET* *NORMAL/ PROGRAM* Switches	Set switches to PROGRAM to reset the unit prior to Ethernet flash memory firmware upgrade (see section 8.2)

5 Installing the VP-12x8 on a Rack

This section describes what to do before installing on a rack and how to rack mount.

Before Installing on a Rack

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

Operating temperature range	+5 to +45 Deg. Centigrade
Operating humidity range	5 to 65% RHL, non-condensing
Storage temperature range	-20 to +70 Deg. Centigrade
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 (3 on each side), and replace those screws through the ear brackets.
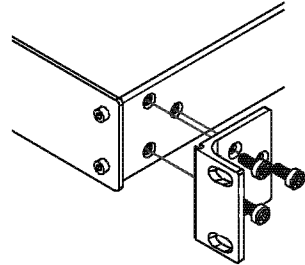
2 Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

Note that:

- **In some models, the front panel may feature built-in rack ears**

- Detachable rack ears can be removed for desktop use

- Always mount the machine in the rack before you attach any cables or connect the machine to the power

- If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions (you can download it at: http://www.kramerelectronics.com)

6 Connecting the VP-12x8

This section describes how to connect the **VP-12x8**:
- Rear panel (see section 6.1)
- To a controlling device via RS-232 (see section 6.2)
- To the ETHERNET (see section 6.3)

6.1 Connecting the VP-12x8 Rear Panel

To connect the **VP-12x8** as illustrated in the example in Figure 3, do the following[1]:

1. Connect up to 12 VGA/UXGA computer graphics sources to the input connectors.

2. Connect[2] the eight output connectors to up to eight VGA/UXGA video acceptors (for example, displays[3]).

3. If required, connect a PC and/or controller to the RS-232 port (see section 6.2) and/or the ETHERNET port (see section 6.3).

4. Connect the power cord[4] (not shown in this illustration).

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1 Switch OFF the power on each device before connecting it to your VP-12x8. After connecting your VP-12x8, switch on its power and then switch on the power on each device. DO NOT push in the rear panel FLASH PROG button and DO NOT move the underside ETHERNET PROGRAM switches. These are only used for upgrading to the latest Kramer firmware (see section 8)

2 When less than eight outputs are required, connect only those outputs of the VP-12x8 that are required, and leave the other outputs unconnected

3 Alternatively, you can connect projectors

4 We recommend that you use only the power cord that is supplied with this machine
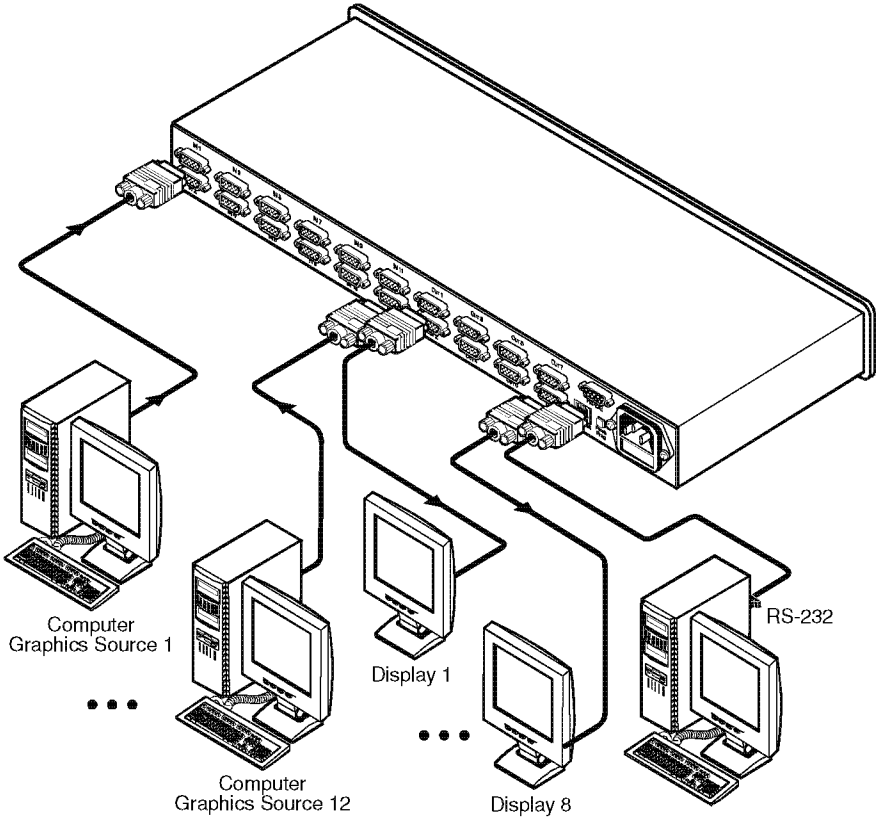
Figure 3: Connecting the VP-12x8 12x8 VGA / UXGA Matrix Switcher

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

To connect a PC to the **VP-12x8** unit, using the Null-modem adapter provided with the machine (recommended):

- Connect the RS-232 DB9 rear panel port on the **VP-12x8** unit to the Null-modem adapter and connect the Null-modem adapter with a 9-wire flat cable to the RS-232 DB9 port on your PC

To connect a PC to the **VP-12x8** unit, 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 Master **VP-12x8** unit, as Figure 4 illustrates
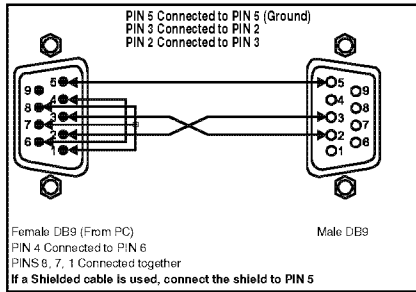
Figure 4: Connecting a PC without using a Null-modem Adapter

6.3 Control Configuration via the Ethernet Port

You can connect the **VP-12x8** via the ETHERNET in the following ways:

- For direct connection to the PC, use a crossover cable (see section 6.3.1)
- For connection via a network hub or network router, use a straight-through cable (see section 6.3.2)

6.3.1 Connecting the ETHERNET Port directly to a PC (Crossover Cable)

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

This type of connection is recommended for identification of the factory default IP Address¹ of the **VP-12x8** during the initial configuration

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

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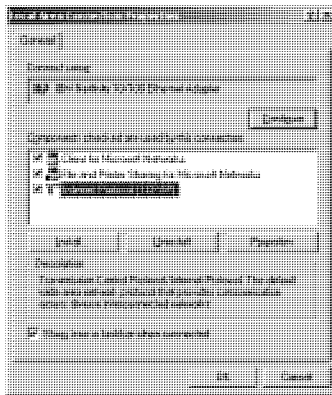
Figure 5: Local Area Connection Properties Window

1 The default IP address is 192.168.1.39

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

7. Click **OK**.
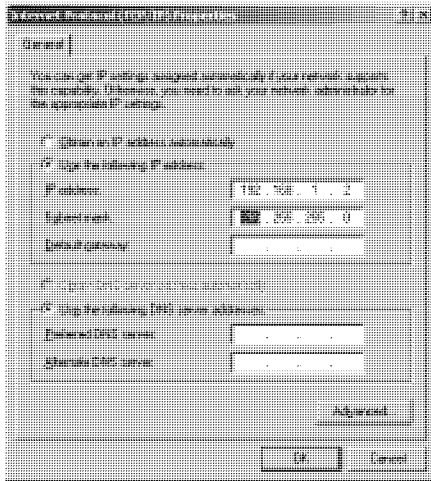
Figure 6: Internet Protocol (TCP/IP) Properties Window

6.3.2 Connecting the ETHERNET Port via a Network Hub (Straight-Through Cable)

You can connect the Ethernet port of the **VP-12x8** to the Ethernet port on a network hub or network router, via a straight-through cable with RJ-45 connectors.

6.3.3 Control Configuration via the Ethernet Port

To control several units via the Ethernet, connect the Master unit (MACH NO. 1) via the Ethernet port to the LAN port of your PC. Use your PC initially to configure the settings (see section 6.3).

For detailed instructions on how to install and configure your Ethernet port, see the "Ethernet Configuration (FC-11) guide.pdf" file on our Web site: http://www.kramerelectronics.com

7 Operating the VP-12x8
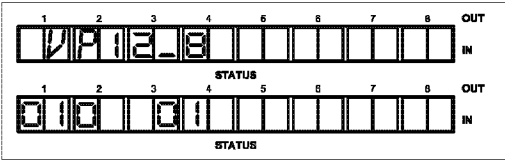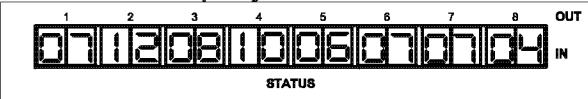
This section describes:
- The 7-segment display (see section 7.1)
- How to confirm settings (see section 7.2)
- How to store and recall IN/OUT combinations (see section 7.3)
- How to lock the front panel buttons (see section 7.4)

7.1 Displaying Unit Characteristics

The STATUS 7-segment display shows two sets of information, as defined in Table 5:

Table 5: STATUS 7-segment Display

The STATUS Display	Shows:
Initial Displays	The machine name appears after powering the unit, followed by the firmware version and the machine number[1]
Normal Display	Normal display (during normal operation): Inputs switched to the outputs[2]

7.2 Confirming Settings

You can choose to work in the At Once or the Confirm mode.

In the At Once mode (the TAKE button is not illuminated):
- Pressing an OUT-IN combination implements the switch immediately
- You save time as execution is immediate and actions require no user confirmation
- No protection is offered against changing an action in error

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1 The example shown here is for firmware version 1.0 and for machine number 1

2 The example shown here is for: input 7 connected to output 1; input 12 connected to output 2; input 8 connected to output 3 and so on

In the Confirm mode (TAKE button is illuminated):

- 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, protecting against erroneous switching
- Execution is delayed[1] until the user confirms the action

7.2.1 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 mode (in which the TAKE button is not illuminated) to the Confirm mode (in which the TAKE button illuminates).
   Actions now require user confirmation and the TAKE button illuminates.

2. 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.

7.2.2 Confirming a Switching Action

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

1. Press an OUT-IN combination.
   The corresponding 7-segment display blinks. The TAKE button also blinks.

2. Press the blinking TAKE button to confirm the action.
   The corresponding 7-segment display no longer blinks. The TAKE button illuminates.

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

1. Press each OUT-IN combination in sequence.
   The corresponding 7-segment display blinks. The TAKE button also blinks.

2. Press the blinking TAKE button to confirm all the actions.
   The corresponding 7-segment display no longer blinks. The TAKE button illuminates.

---

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

7.3 Storing/Recalling IN/OUT Configurations

You can store and recall up to 12 input/output configurations using the 12 input buttons[1], as Figure 7 illustrates:
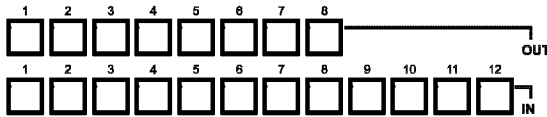
Figure 7: Storing and Recalling using the Input/Output Buttons

7.3.1 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 12 IN buttons (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.

7.3.2 Recalling an Input/Output Configuration

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

1. Press the RCL button.
   The RCL button blinks.

2. Press the appropriate IN button (the button # corresponding to the setup #). If in the Confirm mode, that setup configuration will blink in the 7-segment Display, together with the RCL button and the TAKE button, and will only be implemented after pressing the TAKE button.
   The memory recalls the stored data from that reference.

Tip: If you cannot remember which of the 12 input/output configurations is the one that you want, set the **VP-12x8** to the Confirm mode and manually scan all the input/output configurations until you locate it.

---

1 You can store/recall eight additional configurations via RS-232

7.3.3   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 IN button.
    This erases that specific input/output configuration from the memory,
    leaving it empty and available[1].

7.4 Locking the Front Panel

To prevent changing the settings accidentally or tampering with the unit via
the front panel buttons, lock[2] your **VP-12x8**. Unlocking releases the
protection mechanism.

To lock the **VP-12x8**:

*   Press the LOCK button for more than two seconds, until the LOCK
    button is illuminated
    The front panel is locked. Pressing a button will have no effect other than
    causing the LOCK button to blink[3]

To unlock the **VP-12x8**:

*   Press the illuminated LOCK button for more than two seconds, until the
    LOCK button is no longer illuminated
    The front panel unlocks

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

2 Nevertheless, even though the front panel is locked you can still operate via RS-232 or RS-485, as well as via the Kramer
RC-IR1 / RC-IR2 Infra-Red Remote Control Transmitter

3 Warning that you need to unlock to regain control via the front panel

8 Flash Memory Upgrade

The **VP-12x8** lets you upgrade both microcontrollers:
- The Switcher Microcontroller (see section 8.1)
- The Ethernet Microcontroller (see section 8.2)

8.1 Switcher Flash Memory Upgrade

The **VP-12x8** firmware is located in FLASH memory, which lets you upgrade[1] to the latest Kramer firmware version in minutes! The process involves:
- Downloading from the Internet (see section 8.1.1)
- Connecting the PC to the RS-232 port (see section 8.1.2)
- Upgrading Firmware (see section 8.1.3)

8.1.1 Downloading from the Internet

You can download the up-to-date file[2] from the Internet. To do so:

1. Go to our Web site at www.kramerelectronics.com and download the file: *"FLIP_VP12x8.zip"* from the Technical Support section.

2. Extract the file: *"FLIP_VP12x8.zip"* to a folder (for example, C:\Program Files\Kramer Flash).

3. Create a shortcut on your desktop to the file: *"FLIP.EXE"*.

8.1.2 Connecting the PC to the RS-232 Port

Before installing the latest Kramer firmware version on a **VP-12x8** unit, do the following:

1. Connect the RS-232 DB9 rear panel port according to section 6.2.

2. Push the rear panel FLASH PROG button to program using a small screwdriver.

3. Switch the unit ON.

Note: this sequence is critical – first push the FLASH PROG button and then turn on the unit

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1 Upgrade should be carried out by skilled technical personnel. Failure to upgrade correctly will result in the malfunction of the machine

2 The files indicated in this section are given as an example only. File names are liable to change from time to time

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8.1.3 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:
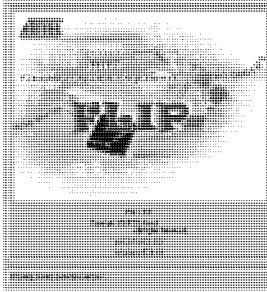
Figure 8: Splash Screen

2. After a few seconds, the Splash screen is replaced by the "*Atmel – Flip*" window:
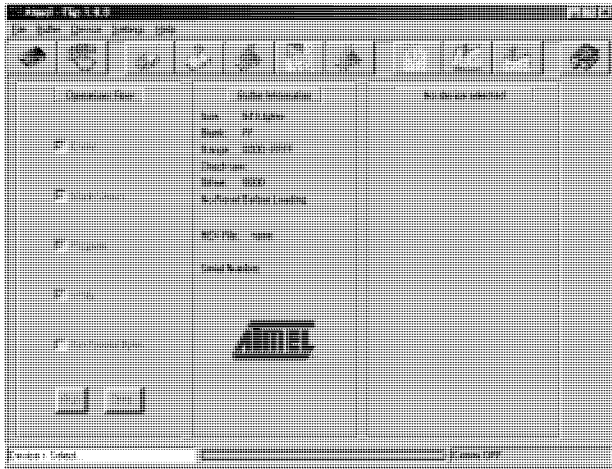
Figure 9: Atmel – Flip Window

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:
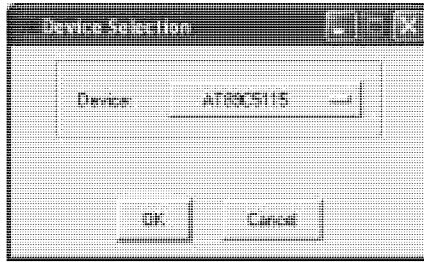
Figure 10: Device Selection Window

4. Click the button next to the name of the device and select from the list: AT89C51RD2:
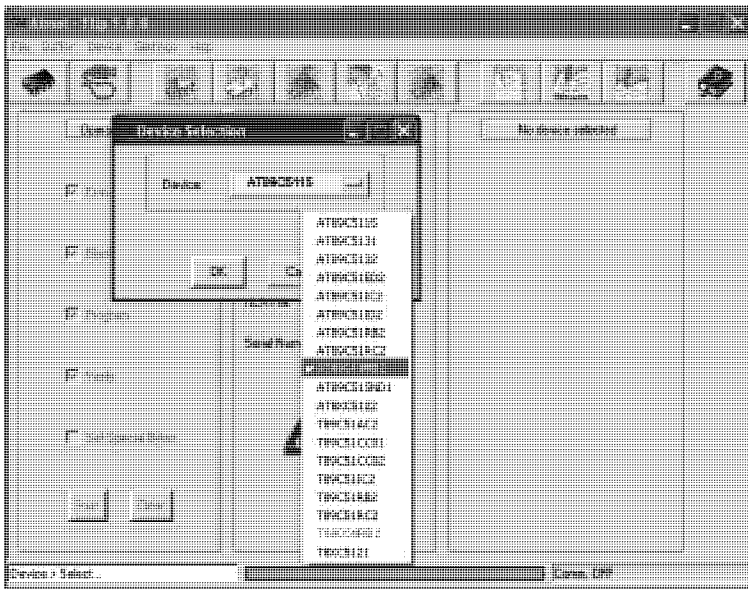
Figure 11: Device Selection window

5. Click OK and select "*Load Hex*" from the *File* menu.
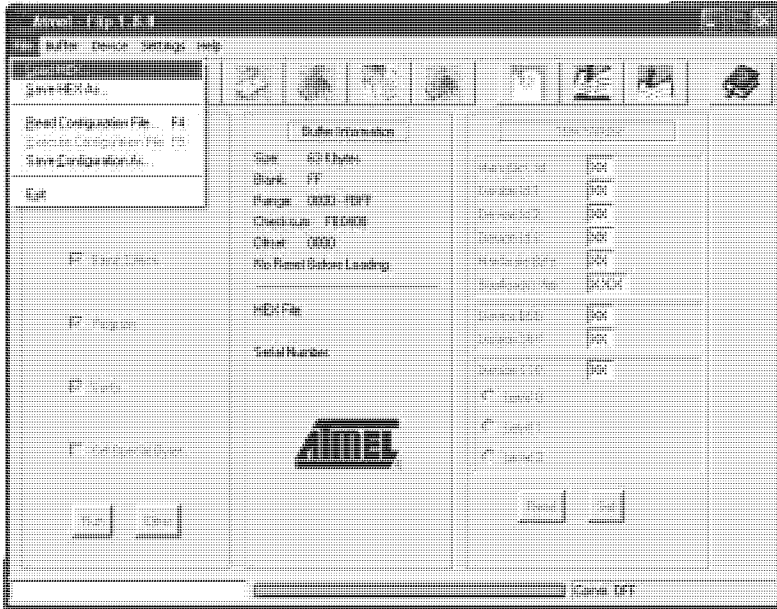
Figure 12: Loading the Hex

6. The Open File window opens. Select the correct HEX file that contains the updated version of the firmware for **VP-12x8** (for example *44M_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:
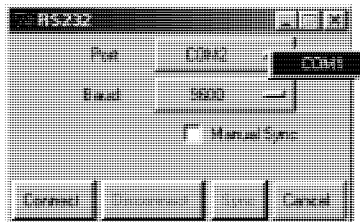
Figure 13: RS-232 Window

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: VP12x8.hex*" appears.
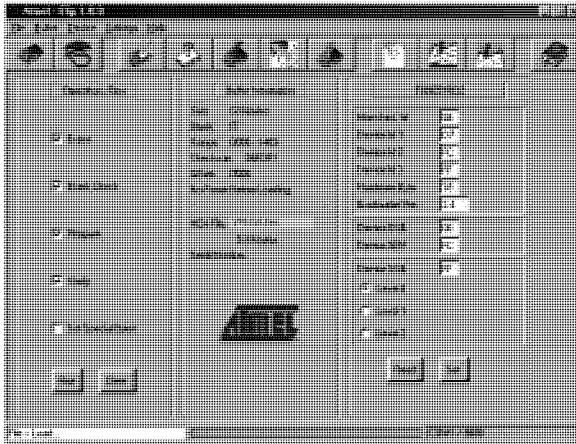
Figure 14: Atmel – Flip Window (Connected)

9. Click *Run*.
   After each stage of the operation is completed, the check-box for that stage becomes colored green[1].
   When the operation is completed, all 4 check-boxes will be colored green and the status bar message: *Memory Verify Pass* appears[2]:
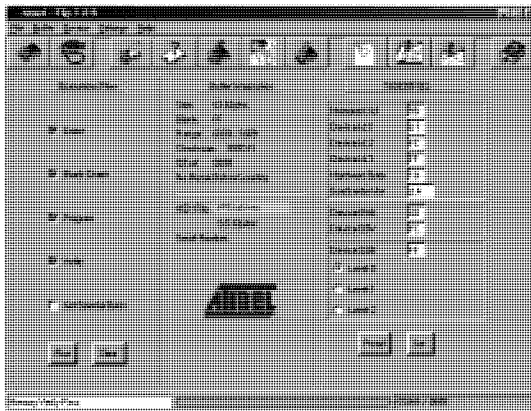
Figure 15: Atmel – Flip Window (Operation Completed)

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1 See also the blue progress indicator on the status bar

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

10. Close the "*Atmel – Flip*" window.

11. Disconnect the power on the **VP-12x8**.

12. If required, disconnect the *RS-232* rear panel port on the **VP-12x8** unit from the Null-modem adapter.

13. Release the FLASH PROG button on the rear panel (Table 3).

14. Connect the power to the **VP-12x8**.
    Upon initialization, the new **VP-12x8** software version shows in the STATUS 7-segment Display.

8.2 Ethernet Flash Memory Upgrade

The **VP-12x8** firmware is located in FLASH memory, which lets you upgrade to the latest Kramer firmware version in minutes!

The process involves:

- Downloading the upgrade package from the Internet
- Connecting the PC to the RS-232 port
- Upgrading the firmware

8.2.1 Downloading from the Internet

You can download the up-to-date file[1] from the Internet. To do so:

1. Go to our Web site at http://www.Kramerelectronics.com and download the file: "*SetKFRETH11-xx.zip*" from the technical support section.

2. Extract the file "*SetKFRETH11-xx.zip*" package, which includes the KFR-Programmer application setup and the *.s19* firmware file, to a folder (for example, C:\Program Files\KFR Upgrade).

3. Install the KFR-Programmer Application.

8.2.2 Connecting the PC to the RS-232 Port

Before installing the latest Kramer Ethernet firmware version on the **VP-12x8**, do the following:

1. Connect the RS-232 DB9 port (COM 1) on the **VP-12x8** to a 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.

2. Set the ETHERNET PROGRAM/NORMAL switches, located on the machine underside, to PROGRAM.

---

1 File names are liable to change from time to time

3. Connect the power on your machine.

8.2.3   Upgrading Firmware

Follow these steps to upgrade the firmware:

1. Double click the KFR-Programmer desktop icon.
   The KFR-Programmer window appears (see Figure 16).
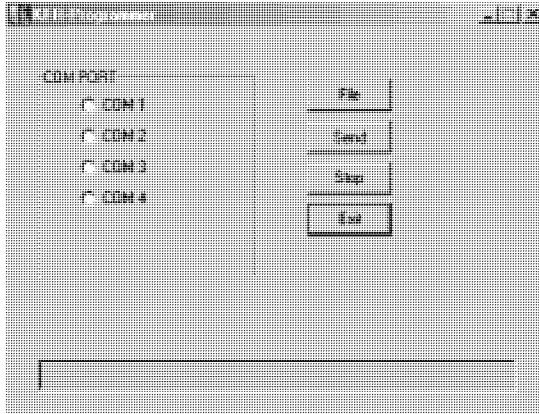
Figure 16: The KFR-Programmer Window

2. Select the required COM Port[1].

3. Press the File button to select the *.s19* firmware file included in the package.

4. Press the Send button to download the file. The Send button lights red.

5. Wait until downloading is completed and the red Send button turns off.

6. Disconnect the power on the **VP-12x8**.

7. Set the ETHERNET PROGRAM/NORMAL switch, located on the machine underside, to NORMAL.

8. Connect the power on your machine.

---

1 To which the VP-12x8 is connected on your PC

9 Technical Specifications

Table 6 includes the technical specifications:

Table 6: Technical Specifications[1] of the VP-12x8 12x8 UXGA Matrix Switcher

INPUTS:	12 XGA on HD15 connectors (VGA through UXGA)
OUTPUTS:	8 VGA on HD15 connectors (VGA through UXGA)
MAX. OUTPUT LEVEL:	2Vpp
BANDWIDTH (-3dB):	380MHz
DIFF. GAIN:	0.06%
DIFF. PHASE:	0.03 Deg.
K-FACTOR:	<0.05%
S/N RATIO:	71.5dB @5MHz
CROSSTALK (all hostile):	-49dB @5MHz
COUPLING:	DC
POWER SOURCE:	100-264 VAC, 50/60 Hz; 12VA
DIMENSIONS:	19-inch (W), 7-inch (D) 1U (H) rack-mountable
WEIGHT:	2.7kg (6lbs.) approx.
ACCESSORIES:	Power cord, Null modem adapter, Windows®-based Kramer control software, Infra-red remote control transmitter

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1 Specifications are subject to change without notice

10 Table of Hex Codes for Serial Communication

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

Table 7: VP-12x8 Hex Codes for Switching via RS-232/RS-485

	Switching Video Channels							
	OUT 1	OUT 2	OUT 3	OUT 4	OUT 5	OUT 6	OUT 7	OUT 8
IN 1	01 81 81 81	01 81 82 81	01 81 83 81	01 81 84 81	01 81 85 81	01 81 86 81	01 81 87 81	01 81 88 81
IN 2	01 82 81 81	01 82 82 81	01 82 83 81	01 82 84 81	01 82 85 81	01 82 86 81	01 82 87 81	01 82 88 81
IN 3	01 83 81 81	01 83 82 81	01 83 83 81	01 83 84 81	01 83 85 81	01 83 86 81	01 83 87 81	01 83 88 81
IN 4	01 84 81 81	01 84 82 81	01 84 83 81	01 84 84 81	01 84 85 81	01 84 86 81	01 84 87 81	01 84 88 81
IN 5	01 85 81 81	01 85 82 81	01 85 83 81	01 85 84 81	01 85 85 81	01 85 86 81	01 85 87 81	01 85 88 81
IN 6	01 86 81 81	01 86 82 81	01 86 83 81	01 86 84 81	01 86 81 81	01 86 82 81	01 86 83 81	01 86 84 81
IN 7	01 87 81 81	01 87 82 81	01 87 83 81	01 87 84 81	01 87 85 81	01 87 86 81	01 87 87 81	01 87 88 81
IN 8	01 88 81 81	01 88 82 81	01 88 83 81	01 88 84 81	01 88 85 81	01 88 86 81	01 88 87 81	01 88 88 81
IN 9	01 89 81 81	01 89 82 81	01 89 83 81	01 89 84 81	01 89 85 81	01 89 86 81	01 89 87 81	01 89 88 81
IN 10	01 8A 81 81	01 8A 82 81	01 8A 83 81	01 8A 84 81	01 8A 85 81	01 8A 86 81	01 8A 87 81	01 8A 88 81
IN 11	01 8B 81 81	01 8B 82 81	01 8B 83 81	01 8B 84 81	01 8B 85 81	01 8B 86 81	01 8B 87 81	01 8B 88 81
IN 12	01 8C 81 81	01 8C 82 81	01 8C 83 81	01 8C 84 81	01 8C 85 81	01 8C 86 81	01 8C 87 81	01 8C 88 81

11 Kramer Protocol 2000[1]

The **VP-12x8** is compatible with Kramer's Protocol 2000 (version 0.48) (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 8: Protocol Definitions

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

1st byte

			INPUT				
1	I6	I5	I4	I3	I2	I1	I0
7	6	5	4	3	2	1	0

2nd byte

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

3rd byte

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

4th byte

1st BYTE: Bit 7 – Defined as 0.
D – "DESTINATION":   0 - for sending information to the switchers (from the PC);
1 - for sending to the PC (from the switcher).
N5…N0 – "INSTRUCTION"
The function that is to be performed by the switcher(s) is defined by the INSTRUCTION (6 bits). Similarly, if a function is performed via the machine's keyboard, then these bits are set with the INSTRUCTION NO., which was performed. The instruction codes are defined according to the table below (INSTRUCTION NO. is the value to be set for N5…N0).

2nd BYTE: Bit 7 – Defined as 1.
                      I6…I0 – "INPUT".
When switching (ie. instruction codes 1 and 2), the INPUT (7 bits) is set as the input number which is to be switched. Similarly, if switching is done via the machine's front-panel, then these bits are set with the INPUT NUMBER which was switched. For other operations, these bits are defined according to the table.

3rd BYTE: Bit 7 – Defined as 1.
                      O6…O0 – "OUTPUT".
When switching (ie. instruction codes 1 and 2), the OUTPUT (7 bits) is set as the output number which is to be switched. Similarly, if switching is done via the machine's front-panel, then these bits are set with the OUTPUT NUMBER which was switched. For other operations, these bits are defined according to the table.

4th BYTE: Bit 7 – Defined as 1.
                      Bit 5 – Don't care.
                      OVR – Machine number override.
                      M4…M0 – MACHINE NUMBER.
Used to address machines in a system via their <u>machine numbers.</u> 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 to 1, then all machine numbers will accept (implement) the command, and only the addressed machine will reply.
For a single machine controlled via the serial port, always set M4…M0 = 00001, and make sure that the machine itself is configured as MACHINE NUMBER = 1.

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1 You can download our user-friendly "Software for Calculating Hex Codes for Protocol 2000" from the technical support section on our Web site at: http://www.kramerelectronics.com

Table 9: 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
7	VIS SOURCE	Set as input # when OUTPUT byte = 6; OR set as output # when OUTPUT byte = 7; OR set as blank period (in steps of 25ms) when OUTPUT byte = 32; OR set = 0. *****	0 - No VIS (immediate) 1 - Input # 1 2 - External digital sync 3 - External analog sync 4 - Dynamic sync 5 - Inter-machine sync 6 - Input # (INPUT byte) 7 - Output #(INPUT byte) 8 - User-defined sync 32 - RGBHV seamless switching 64 - Set for delayed switch 65 - Execute delayed switch 66 - Cancel delayed switch setting	2, 5, 17, 18
8	BREAKAWAY SETTING	0	0 - audio-follow-video 1 - audio breakaway	2
		1	0 - FOLLOW mode 1 - Normal mode	15
9	VIDEO / AUDIO TYPE SETTING	0 - for video	0 - CV 4 - SDI 1 - YC 5 - CV+YC 2 - YUV 6 - VGA scaler 3 - RGBS 7 - DVI	2
		1 - for audio	O0=0 – Unbalanced audio O0=1 – Balanced audio O1=0 – Digital audio O1=1 – Analog audio O4=0, O3=0, O2=0-Mono O4=0, O3=0,O2=1-Stereo	
		2 - for VGA and DVI	1 - 640X480 2 - 800X600 3 - 1024X768	
10	REQUEST VIS 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)	3, 4, 6, 7
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
13	SET HIGHEST MACHINE ADDRESS	0 - for video 1 - for audio	Set equal to highest machine address	2
14	REQUEST HIGHEST MACHINE ADDRESS	0 - for video 1 - for audio	0	4
15	REQUEST WHETHER SETUP IS DEFINED / VALID INPUT IS DETECTED	SETUP # or Input #	0 - for checking if setup is defined 1 - for checking if input is valid	8

INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	DESCRIPTION	INPUT	OUTPUT	
16	ERROR / BUSY	For invalid / valid input (i.e. OUTPUT byte = 4 or OUTPUT byte = 5), this byte is set as the input #	0 - error 1 - invalid instruction 2 - out of range 3 - machine busy 4 - invalid input 5 - valid input	9, 25
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
21	SET VIDEO PARAMETER	Equal to input / output number whose video parameter is to be set (0 = all)	Set as parameter value	2, 11, 24
22	SET AUDIO PARAMETER	Equal to input / output number whose parameter is to be set (0 = all)	Set as parameter value	2, 11, 24
23	INCREASE / DECREASE VIDEO PARAMETER	Equal to input / output number whose video parameter is to be increased / decreased (0 = all)	0 - increase video gain 1 - decrease video gain 2 - increase contrast 3 - decrease contrast 4 - increase brightness 5 - decrease brightness 6 - increase colour 7 - decrease colour 8 - increase hue 9 - decrease hue 16 - increase H-phase 17 - decrease H-phase 18 - increase V-position 19 - decrease V-position	24
24	INCREASE / DECREASE AUDIO PARAMETER	Equal to input / output number whose parameter is to be increased / decreased (0 = all)	0 - increase output 1 - decrease output 2 - increase left output 3 - decrease left output 4 - increase right output 5 - decrease right output 6 - increase input 7 - decrease input 8 - increase left input 9 - decrease left input 10 -increase right input 11 - decrease right input	24
25	REQUEST AUDIO PARAMETER	Equal to input / output number whose parameter is requested	0	6, 24
26	REQUEST VIDEO PARAMETER	Equal to input / output number whose video parameter is requested	0	6, 24
30	LOCK FRONT PANEL	0 - Panel unlocked 1 - Panel locked	0	2
31	REQUEST WHETHER PANEL IS LOCKED	0	0	16
32 to 35	RESERVED	-	-	10
40	DIRECT MEMORY SAVE	Memory address	Data	20
42	AUDIO PARAMETER SETTINGS FOR INSTRUCTIONS 22, 24, 25	INPUT Bit: I0=input; 1=output I1 - Left I2 - Right	0 - Gain 1 - Bass 2 - Treble 3 - Midrange 4 - Mix On	24

INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	DESCRIPTION	INPUT	OUTPUT	
43	VIDEO PARAMETER SETTINGS FOR INSTRUCTIONS 21, 23, 26	1 – Input 2 – Output	0 - video gain 1 - contrast 2 - brightness 3 - colour 4 - hue 5 - H-phase 6 - V-position	24
44	MEDIA CONTROL	Set equal to switch number	Switch data	
45	REQUEST MEDIA CONTROL SETTINGS	Set equal to switch number	0	
56	CHANGE TO ASCII	0	1 - SVS protocol 2 - Generic protocol	19
57	SET AUTO-SAVE	I3 - no save I4 - auto-save	0	12, 2
58	EXECUTE LOADED DATA	Set as 0, or as SETUP #.	1-Take 2-Cancel	22, 3
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 #	22, 23
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 #	22, 23
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	20

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

| 0A | FE | 80 | 81 (ie. request VIS setting, with INPUT set as 126dec) |

would be HEX codes

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

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

NOTE 9 - An error code is returned to the PC if an invalid instruction code was sent to the switcher, or if a parameter associated with the instruction is out of range (e.g. trying to save to a setup greater than the highest one, or trying to switch an input or output greater than the highest one defined). This code is also returned to the PC if an RS-232 instruction is sent while the machine is being programmed via the front panel. Reception of this code by the switcher is not valid.

NOTE 10 – This code is reserved for internal use.

NOTE 11 – For machines where the video and / or audio parameter 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 (ie. request the number of outputs) |

would be HEX codes

| 7E | 82 | 90 | 82 |

ie. 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 – For clean switching of RGBHV video, the "seamless switching" option may be used. The blanking period for the transition of the RGB sources may be set in this case, in steps of 25 milliseconds.
For example, to set for 350ms blanking time (14 steps), send HEX codes

| 07 | 8E | A0 | 81 |

NOTE 18 – 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 example, to connect input 4 to output 3 after a delay, send HEX codes

07	80	C0	81	(set for delayed switch)
01	84	83	81	(switch code)

then, after the required delay, send HEX codes

07	80	C1	81	(execute delayed switch)

to implement the switch.

NOTE 19 – After this instruction is sent, the unit will respond to the ASCII command set defined by the OUTPUT byte. The ASCII command to operate with the HEX command set must be sent in order to return to working with HEX codes.

NOTE 20 – 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 intruction 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 – To store data in the non-volatile memory of the unit, eg. 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 22 – Instruction 59 and instruction 60 load data for sending to the crosspoint switcher (or for storing in a SETUP), ie. the data is "lined-up" to be executed later. Instruction 58 executes the loaded data.

NOTE 23 – 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 24 – Further information needed in instructions 21, 22, 25 and 26, is sent using instruction 42 – which is sent prior to the instruction. For example, to request the audio gain value of right input # 9, send hex codes

2A	84	80	81

and then send HEX codes

19	89	81	81.

To set MIX mode, send hex codes

2A	81	84	81

and then send HEX codes

16

NOTE 25 – For units which detect the validity of the video inputs, Instruction 16 will be sent whenever the unit detects a change in the state of an input (in real-time).

For example, if input 3 is detected as invalid, the unit will send the HEX codes

10	83	84	81

If input 7 is detected as valid, then the unit will send HEX codes

10	87	85	81.

LIMITED WARRANTY

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

HOW LONG IS THE WARRANTY

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

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

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

1. Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed.
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.
   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).
   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:

2. 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:
3. 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.

![Kramer logo]

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.

Safety Warning:
Disconnect the unit from the power supply before opening/servicing.

Caution

ISO 9001:2000
IQC
Institute of
Quality & Control
Certified Quality System

CE