Kramer Electronics, Ltd.

USER MANUAL

Model:

VS-121HC

12 x 1 Component Video Switcher/Transcoder

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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 500-plus different models now appear in eight groups[1] that are clearly defined by function.

Thank you for purchasing the Kramer **VS-121HC** *12 x 1 Component Video Switcher/Transcoder*. This product is ideal for the following typical applications:

- Home cinema
- Presentation and conference rooms, board rooms and auditoriums
- Production studios, rental and staging

The package includes the following items:

- **VS-121HC** *12 x 1 Component Video Switcher/Transcoder*
- Power cord[2], Null-modem adapter and rack ears
- Windows®-based Kramer control software[3]
- **RC-IR2** infra-red remote control transmitter (including the required battery and a separate user manual[4])
- This user manual[4]

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[5]

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 We recommend that you use only the power cord supplied with this device

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

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

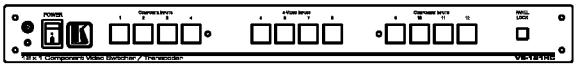
5 The complete list of Kramer cables is on our Web site at http://www.kramerelectronics.com

2.1 Quick Start

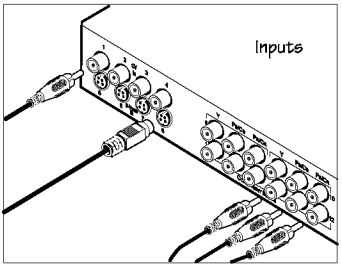
This quick start chart summarizes the basic setup and operation steps.

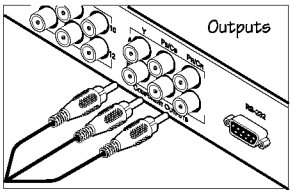
Step 1: Mount the machine - see section 5

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





OPTIONAL:

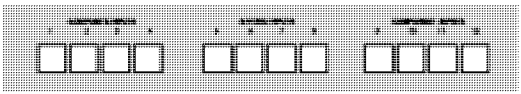
Connect to a remote IR Receiver unit

Step 3: Connect the control port - see section 7

If required, connect an RS-232 Control Port, an RS-485 port and/or the ETHERNET Port
Set the address switches and termination

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

LOCK the front panel buttons to protect

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

3 Overview

The Kramer **VS-121HC** is a high-quality *12 x 1:2 Component Video Switcher/Transcoder* designed for home cinema applications. The **VS-121HC** features:

- Four composite video inputs on RCA connectors
- Four s-Video inputs on 4p connectors
- Four sets of component video inputs on RCA connectors

In particular:

- Composite and s-Video inputs are transcoded to component video, and the component inputs are switched to two identical component video outputs
- The front panel has 12 input selector buttons, as well as a panel lock button to prevent unintentional tampering with the front panel
- The **VS-121HC** has a high video bandwidth, ensuring that it remains transparent even in the most critical applications

The **VS-121HC** can be operated using the front panel buttons, or remotely using:

- RS-232 and RS-485 serial commands transmitted by PC, a touch screen system, or other serial controller
- The ETHERNET
- The Kramer **IC-IR2** infra-red remote control transmitter

The **VS-121HC** is housed in a 19" 1U rack-mountable enclosure, and is powered by a 100-240 VAC universal switching power supply.

To achieve the best performance:

- Use only good quality connection cables[1] to avoid 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 **VS-121HC** away from moisture, excessive sunlight, and dust

4 Your VS-121HC Switcher / Transcoder

Figure 1, Table 1, and *Table 2* define the front and rear panels of the **VS-121HC** *12 x 1 Component Video Switcher/Transcoder.*

1 Available from Kramer Electronics on our Web site at http://www.kramerelectronics.com

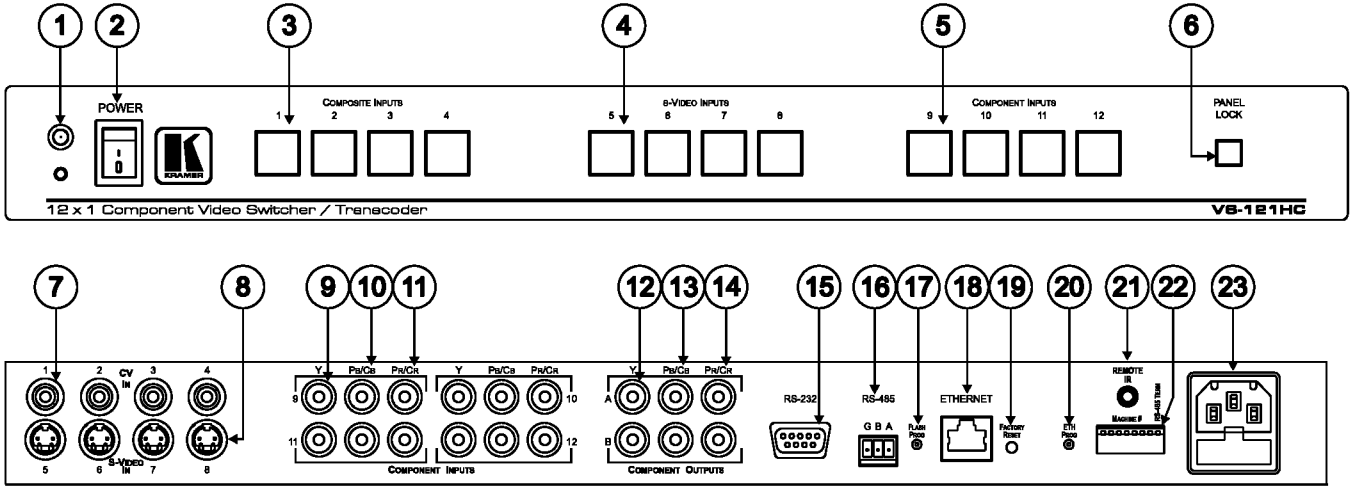


Figure 1: VS-121HC 12 x 1 Component Video Switcher/Transcoder

Table 1: VS-121HC Front Panel 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	*COMPOSITE INPUT* Buttons	Select the composite video input (1 to 4) to switch to the outputs
4	*s-VIDEO INPUT* Buttons	Select the s-Video input (5 to 8) to switch to the outputs
5	*COMPONENT INPUT* Buttons	Select the component video input (9 to 12) to switch to the outputs
6	*PANEL LOCK* Button	Disengages the front panel buttons

Table 2: VS-121HC Rear Panel Features

#	Feature		Function
7	*CV IN* RCA connectors		Connect to the composite video sources (from IN 1 to IN 4)
8	*s-VIDEO IN* s-Video connectors		Connect to the s-Video sources (from IN 5 to IN 8)
9	*COMPONENT INPUT* RCA connectors	*Y*	Connect to the Y-component inputs (from IN 9 to IN 12)
10		*PB/CB*	Connect to the PB/CB -component inputs (from IN 9 to IN 12)
11		*PR/CR*	Connect to the PR/CR -component inputs (from IN 9 to IN 12)
12	*COMPONENT OUTPUT* RCA connectors	*Y*	Connect to the Y-component outputs (A and B)
13		*PB/CB*	Connect to the PB/CB -component outputs (A and B)
14		*PR/CR*	Connect to the PR/CR -component outputs (A and B)
15	*RS-232* DB 9F Port		Connect to the PC or the Remote Controller via a null-modem connection
16	*RS-485* Terminal Block Port		Pins B (-) and A (+) are for RS-485; Pin G may be connected to the shield (if required)
17	*FLASH PROG* Button		Release (the factory default) for normal operation or push in[1] for "Program" to upgrade the switcher microcontroller to the latest Kramer firmware (see section 10.1.1)
18	*ETHERNET* RJ-45 Connector		Connects to the PC or other Serial Controller through computer networking LAN
19	*FACTORY RESET* Button		Press to reset to factory default definitions[2]: IP number – 192.168.1.39 Mask – 255.255.255.0 Gateway – 192.168.1.1
20	*ETH PROG* Button		Release for normal operation or push in to upgrade ETH firmware (see section 10.2)
21	*REMOTE IR* 3.5mm Mini Jack		Connect to an external IR receiver unit for controlling the machine via an IR remote controller (instead of using the front panel IR receiver)[3]
22	Setup Dipswitches		Dipswitches for setup of the unit (1 through 7 are for setting the Self Address number; and 8 is for RS 485 termination)
23	Power Connector with Fuse		AC connector enabling power supply to the unit

1 Using a screwdriver if required

2 Turn the machine OFF, then turn the machine ON while pressing the FACTORY RESET button. The unit powers up and loads its memory with the factory default definitions

3 Optional. Can be used instead of the front panel (built-in) IR receiver to remotely control the VS-121HC (only if the internal IR connection cable has been installed)

5 Installing the VS-121HC in a Rack

This section describes how to install the **VS-121HC** in a rack.

Before Installing on a Rack

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

CAUTION!!

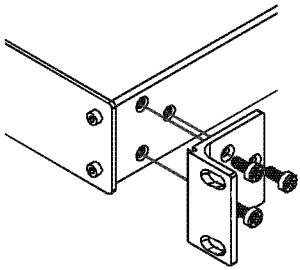
When installing on a 19" rack, avoid hazards by taking care that:

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 (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 VS-121HC Switcher/Transcoder

To connect devices to the **VS-121HC**, as illustrated in the example in *Figure 2*, perform the following:

1. Connect the following video input sources (up to 12 input devices can be connected[1]):
   - One composite video source (for example, composite video player 1) to the CV IN 1 RCA connector
   - One s-Video source (for example, s-Video player 1) to the s-Video IN 8 4p connector
   - One component video source (for example, composite video player 1) to the Y, Pb/Cb, Pr/Cr COMPONENT INPUT 12 RCA connectors
2. Connect the output to an acceptor (1 or 2 output devices can be connected[1]):
   - COMPONENT OUTPUT B (Y, Pb/Cb, Pr/Cr RCA connectors) to a display[2]
3. Connect the power cord (not shown in *Figure 2*).
4. Optionally, you can connect a PC and/or controller to the RS-232, RS-485, or Ethernet ports (see section 7).

1 Not all input or output ports need to be connected

2 In this example an LCD TV display is used, but you can also connect separate outputs such as video recorders, and so on

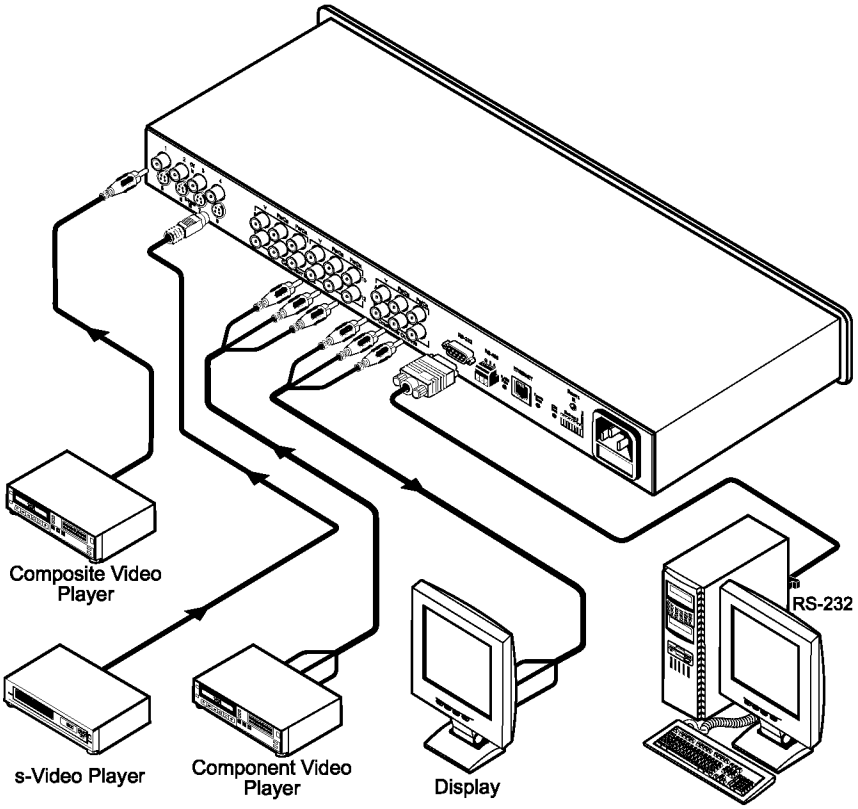


Figure 2: Connecting the VS-121HC Switcher / Transcoder

7 Controlling the VS-121HC Switcher/Transcoder

Besides operating the **VS-121HC** from the front panel buttons, you can control the **VS-121HC** using:

- The RS-232 port (see section 7.1)
- The RS-485 port (see section 7.2)
- An Ethernet network (see section 7.3)
- The **RC-IR2** remote control transmitter[1] (see section 8.3)

1 Refer to the separate user manual. Download it from our Web site at http://www.kramerelectronics.com

7.1 Controlling via the RS-232 Port

The **VS-121HC** can be operated via a PC, touch screen, or serial controller by means of serial commands transmitted through the RS-232 port. For a description of the serial commands, see section 12.

7.1.1 Connecting the RS-232 Port

To connect a PC[1] to the **VS-121HC** unit, using the Null-modem adapter provided with the machine (recommended):

- Connect the RS-232 DB9 rear panel port on the Master **VS-121HC** unit to the Null-modem adapter and connect the Null-modem adapter with a straight cable to the RS-232 DB9 port on your PC

To connect a PC to the **VS-121HC** 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 **VS-121HC** unit, using a cable illustrated in *Figure 3*.

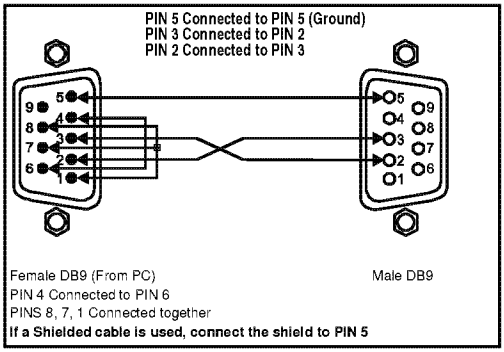


Figure 3: Connecting a PC without using a Null-modem Adapter

7.1.2 Determining the Machine

When controlling a unit over the RS-232 or RS-485 ports, each unit must be identified by a unique Machine #. Set the Machine # using dipswitches 1, 2, 3, and 4 according to *Table 3*.

- When using a single unit, set the unit to Machine # 1
- A master unit must be Machine #1

1 Or a master program remote control system such as the Kramer RC-3000

Note: Dipswitches 5, 6, and 7 are reserved for future use and should be set to OFF.

Table 3: Machine # Dipswitch Settings

Machine #	DIPSWITCH				Machine #	DIPSWITCH			
	1	2	3	4		1	2	3	4
1 (Single unit or master)	OFF	OFF	OFF	OFF	9	ON	OFF	OFF	OFF
2	OFF	OFF	OFF	ON	10	ON	OFF	OFF	ON
3	OFF	OFF	ON	OFF	11	ON	OFF	ON	OFF
4	OFF	OFF	ON	ON	12	ON	OFF	ON	ON
5	OFF	ON	OFF	OFF	13	ON	ON	OFF	OFF
6	OFF	ON	OFF	ON	14	ON	ON	OFF	ON
7	OFF	ON	ON	OFF	15	ON	ON	ON	OFF
8	OFF	ON	ON	ON	16	ON	ON	ON	ON

When connecting more than one **VS-121HC** unit, set a different Machine # on each unit. You do not have to number the units in the order in which they connect to the PC, but each unit must be assigned a unique machine number.

7.1.3 Setting the Dipswitches

Set the Machine # via dipswitches 1 to 4 as determined in the previous section (see *Figure 4* and *Table 4*).

The line termination dipswitch is for use only with the RS-485 port.

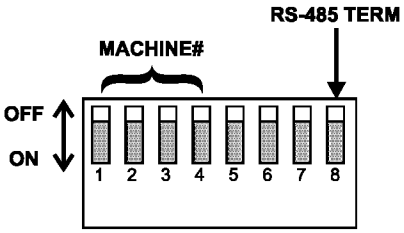


Figure 4: Dipswitch Settings

Table 4: Dipswitch Settings

DIPS	Function	Description
1, 2, 3, 4	Self address	Set the MACHINE # (see section 7.1.2)
5, 6, 7	Reserved	Always OFF
8	RS-485 Term	OFF for no RS-485 Line Termination[1] ON for RS-485 Line Termination with 120Ω

1 When several units are controlled via RS-485, only the first and last RS-485 devices on the line are terminated. All other devices are not terminated

7.2 Controlling via the RS-485 Port

You can control up to 16 **VS-121HC** units via the RS-485 port using:

- A Master Programmable Remote Control system such as the Kramer **RC-3000** controller
- A PC equipped with an RS-485 interface
- A PC that connects via its RS-232 interface to a master **VS-121HC** that connects up to 15 slave units through its RS-485 interface (see *Figure 5*)

If connecting a master **VS-121HC** to an RS-232 port in a PC, first follow the steps in section 7.1.1.

To connect an **RC-3000** to a **VS-121HC** unit, or slave units to a master **VS-121HC:**

1. Connect the "A" (+) PIN on the RS-485 rear panel port of the master (or **RC-3000**) to the "A" (+) PIN on the RS-485 rear panel port of the **VS-121HC** slave unit.
2. Connect the "B" (–) PIN on the RS-485 rear panel port of the master (or **RC-3000**) to the "B" (–) PIN on the RS-485 rear panel port of the **VS-121HC** slave unit.
3. 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 master).

To cascade up to 15 individual **VS-121HC** units, via RS-485, as illustrated in *Figure 5*, do the following:

- Connect the RS-485 terminal block port on the first **VS-121HC** unit to the RS-485 port on the second **VS-121HC** unit and so on, connecting all the RS-485 ports

7.2.1 Setting the Address Switches

To set the address dipswitches, as shown in *Figure 4*:

- Assign self address #1 to the master unit
- Use *Table 3,* assign a unique self address # from 2 to 16 for each **VS-121HC** slave unit. The units do not have to be sequentially numbered but they must have unique addresses

7.2.2 Setting the Line Termination

To ensure correct operation, the RS-485 line must be terminated at both ends. The master unit may be located at any part of the line, but when it is at the end of the line, the termination switch must be set ON.

To set line termination, as shown in *Figure 4*:

- For the **VS-121HC** units located at the ends of the RS-485 line (whether master or slave), set DIP 8 ON
- For all other **VS-121HC** units in the middle of the line, set DIP 8 OFF

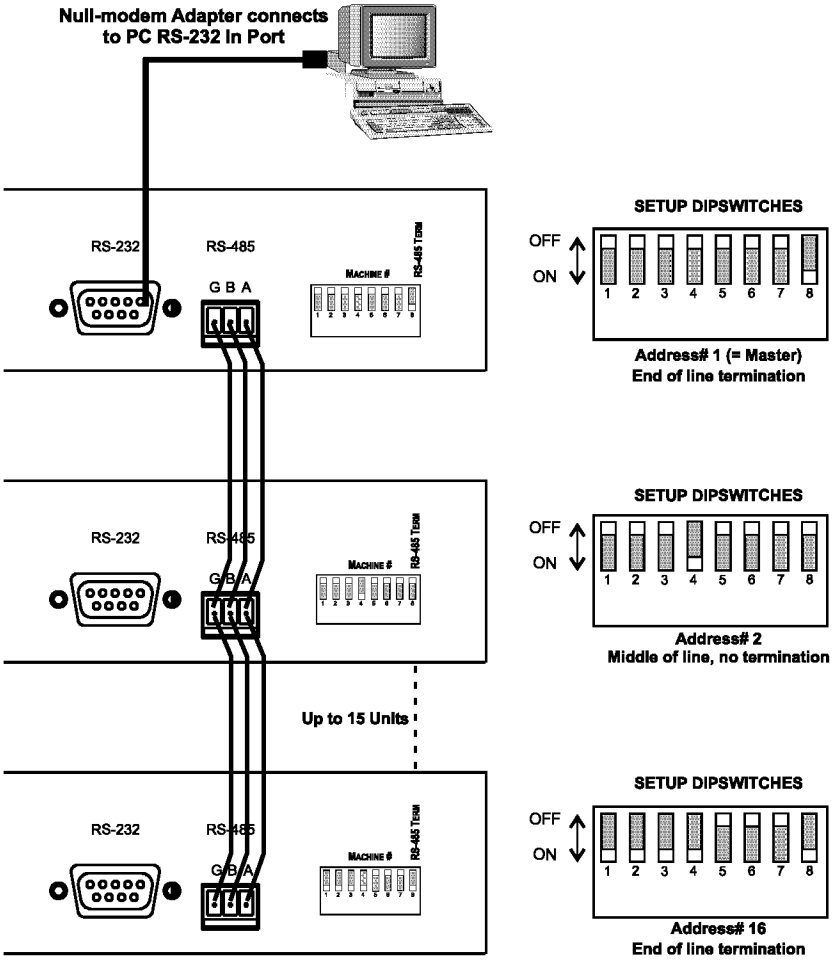


Figure 5: Master/Slave Configuration

7.3 Controlling via the ETHERNET Port

You can control the **VS-121HC** via the Ethernet, using a crossover cable (see section 7.3.1) for direct connection to the PC or a straight through cable (see section 7.3.2) for connection via a network hub or network router.

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

You can connect the Ethernet port of the **VS-121HC** to the Ethernet port on your PC, via a crossover cable with RJ-45 connectors.

This type of connection is recommended for identification of the factory default IP Address of the **VS-121HC** 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 6*).

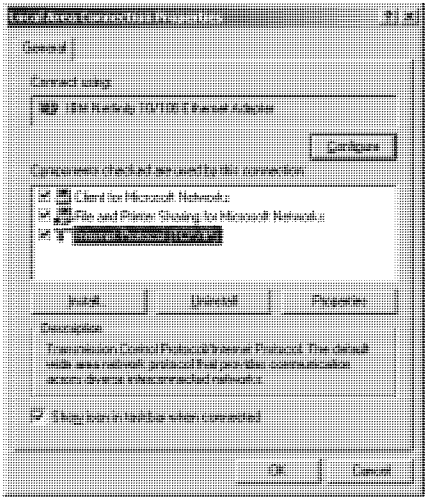


Figure 6: Local Area Connection Properties Window

6. Select Use the following IP address, and fill in the details as shown in *Figure 7*.
7. Click **OK**.

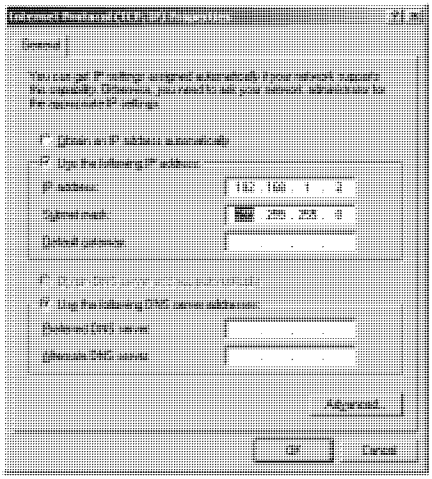


Figure 7: Internet Protocol (TCP/IP) Properties Window

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

You can connect the Ethernet port of the **VS-121HC** to the Ethernet port on a network hub or network router, via a straight-through cable with RJ-45 connectors.

7.3.3 Configuring the Ethernet Port

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

8 Operating the VS-121HC Switcher/Transcoder

You can operate your **VS-121HC** using:

- The front panel buttons
- RS-232/RS-485 serial commands transmitted by a PC, touch screen system, or other serial controller
- The **RC-IR2** infra-red remote control transmitter

8.1 Operating Using the Front Panel Buttons

The front panel includes 4 COMPOSITE input, 4 s-VIDEO input, 4 COMPONENT input, and one PANEL LOCK button.

To operate the unit:

- Press one of the 12 INPUT SELECTOR buttons to choose the relevant video signal.
  The selected button illuminates in red[1] and the converted or switched signal is outputted to both component video outputs

To lock the input buttons (to prevent tampering with the unit):

- Press and hold the PANEL LOCK button for two seconds.
  When the panel is locked and a channel selector button is pressed, the PANEL LOCK button flashes
- Press and hold the button again for two seconds to unlock the buttons

8.2 Operating Using Serial Commands

To operate your device using serial commands, you need to install Kramer's control software that can be downloaded from the Kramer Electronics website.

For an explanation of all serial commands, see section 12.

8.3 Using the Infra-red Remote Controller

You can use the **RC-IR2** IR transmitter to control the machine via the built-in IR receiver on the front panel or, instead, via an optional external IR receiver[2]. The external IR receiver can be located 15 meters away from the machine. This distance can be extended to up to 60 meters when used with three extension cables[3].

Before using the external IR receiver, be sure to arrange for your Kramer dealer to insert an internal IR connection cable[4], which is required so that the REMOTE IR 3.5mm connector can be used. Connect the external IR receiver to the REMOTE IR 3.5mm connector.

To operate your device using the infra-red remote controller, see the User Manual packed with the remote controller.

1 Pressing an illuminated button for more than 2 seconds will disconnect the output and the button will no longer illuminate

2 P/N: 95-0104050

3 P/N: 95-0103050

4 P/N: 505-70434010-S

9 Technical Specifications

Table 5 includes the technical specifications:

Table 5: VS-121HC Technical Specifications[1]

INPUTS:	4 composite video (1Vpp/75Ω) on RCA connectors 4 s-Video 1 Vpp (Y), 0.3Vpp (C) / 75Ω on 4p connectors 4 component video (1Vpp/75Ω) on RCA connectors	
OUTPUTS:	2 component video (1Vpp/75Ω) on RCA connectors	
MAX. OUTPUT LEVEL:	VIDEO: 2.1Vpp; XGA: 0.77Vpp	AUDIO: 27Vpp
BANDWIDTH (-3dB):	VIDEO: VGA / UXGA: 400MHz; s-Video (Y): 310MHz; Composite/SDI video: 310MHz; HDTV compatible	AUDIO: 40kHz
DIFF. GAIN:	<0.07% all channels	
DIFF. PHASE:	<0.05 Deg. all channels	
S/N RATIO:	VIDEO: 75dB all channels	AUDIO: 75dB /1Vpp all channels
CONTROLS:	12 selector buttons, lock button, RS-232, RS-485, Ethernet, IR	
POWER SOURCE:	100-240V AC, 50/60Hz, (115V AC, U.S.A.) 7VA	
DIMENSIONS:	19-inch (W), 7-inch (D) 1U (H) rack-mountable	
WEIGHT:	2.6kg (8lbs.) approx	
ACCESSORIES:	Power cord, Null modem adapter, rack ears, RC-IR2 remote control transmitter, Windows®-based Kramer control software	

1 Specifications are subject to change without notice

10 Upgrading the VS-121HC Firmware

The **VS-121HC** functions by means of a device microcontroller and an Ethernet microcontroller that run firmware located in FLASH memory. The latest version of firmware can be downloaded from the Kramer Web site and upgraded in minutes using the following procedures:

- To upgrade the device firmware, see section 10.1
- To upgrade the Ethernet firmware, see section 10.2

Note: The firmware upgrade should be carried out by skilled technical personnel. Failure to upgrade correctly can cause machine malfunction.

10.1 Upgrading the Device Firmware

To upgrade the **VS-121HC** device firmware:

- Download the file from the Internet (see section 10.1.1)
- Connect a PC to the RS-232 port (see section 10.1.2)
- Install the latest firmware (see section 10.1.3)

10.1.1 Downloading from the Internet

To download the latest file[1] from the Internet:

1. Go to our Web site at www.kramerelectronics.com.
2. Select the appropriate device from the drop-down list.
3. Click the appropriate firmware link.
4. Click **Download File Now**.
5. Extract the downloaded file to a folder (for example, C:\Program Files\Kramer Flash).
6. Create a shortcut on your desktop to the file: "*FLIP.EXE*".

10.1.2 Connecting a PC to the RS-232 Port

To connect a PC to the RS-232 port of the **VS-121HC**:

1. Power the **VS-121HC** OFF.
2. Connect a serial cable from the **VS-121HC** RS-232 DB9 rear panel port to a PC as explained in section 7.1.1.
3. On the rear panel of the device, press the FLASH PROG switch inward using a small screwdriver (see *Figure 1*).

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

4. Power the **VS-121HC** ON.

Note: This sequence is critical – first operate the FLASH PROG switch and then power on the unit

10.1.3 Installing the Device Firmware

To install the firmware, perform the following steps:

1. Double-click the desktop icon **Shortcut to FLIP.EXE**.
   The Splash screen appears[1]:

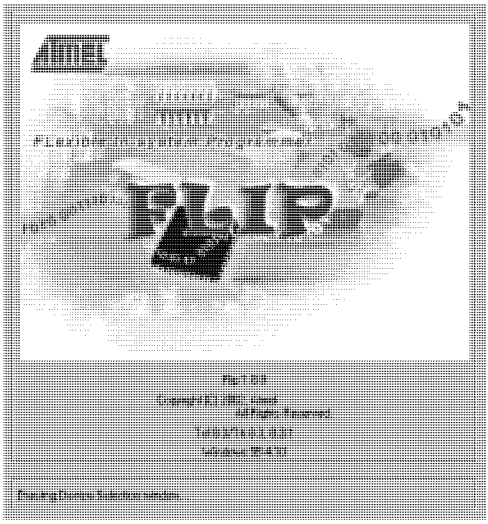


Figure 8: Splash Screen

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

1 The screens appearing in this manual are examples of the process. The actual screens may differ in their content.

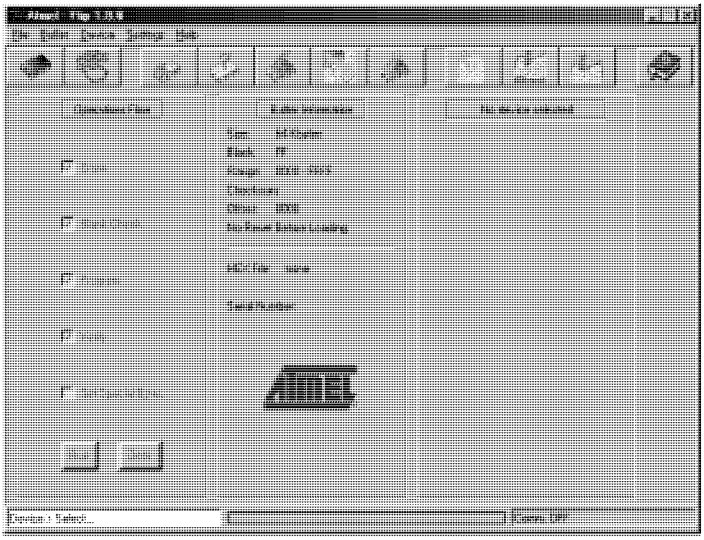


Figure 9: Atmel – Flip Window

3. Open the Device Selection window by:
   - pressing the keyboard shortcut key **F2**, or
   - choosing the **Select** command from the Device menu, or
   - pressing the integrated circuit icon in the upper right corner of the window).

   The Device Selection window appears:

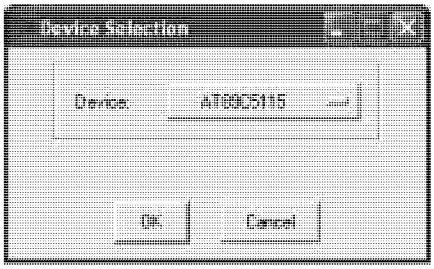


Figure 10: Device Selection Window

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

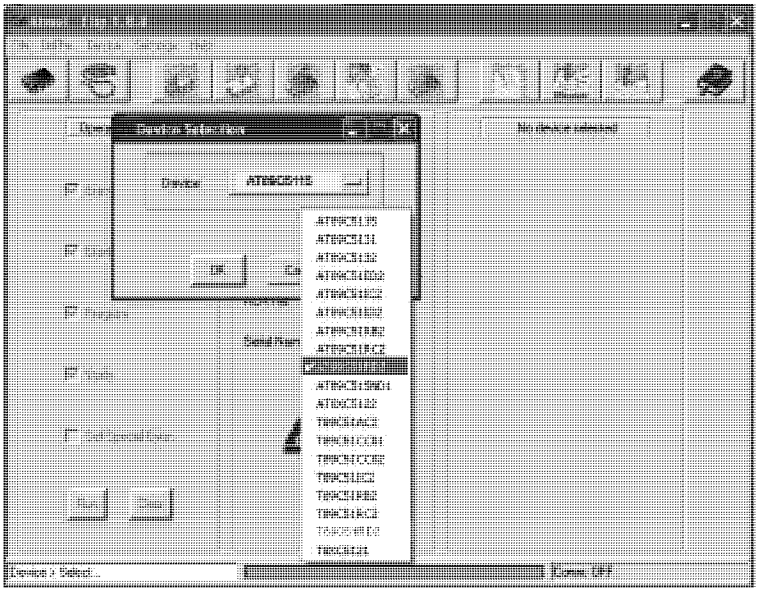


Figure 11: Device Selection Window

5. Click **OK**.
6. From the File menu, select **Load Hex**.

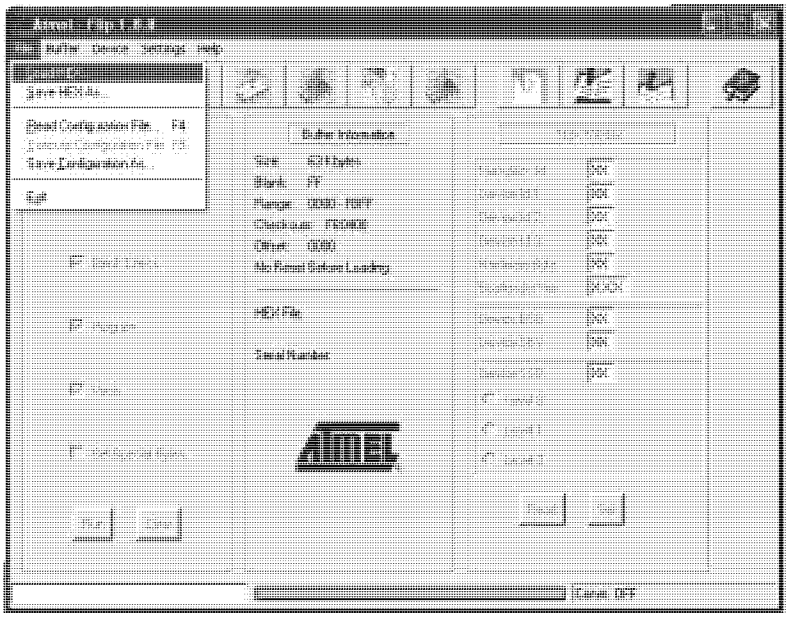


Figure 12: Loading the Hex

7. The Open File window opens. Select the correct HEX file that contains the upgraded version of the **VS-121HC** firmware (for example, ***PL3_V1p2.hex***) and click **Open**.
8. Open the RS-232 window by pressing 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.
9. Change the COM port settings according to the configuration of your computer and select the 9600 baud rate:

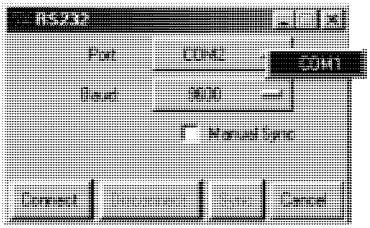


Figure 13: RS-232 Window

10. Click **Connect**.
    In the Operations Flow column of the Atmel – Flip window, 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: PL3.hex" appears.

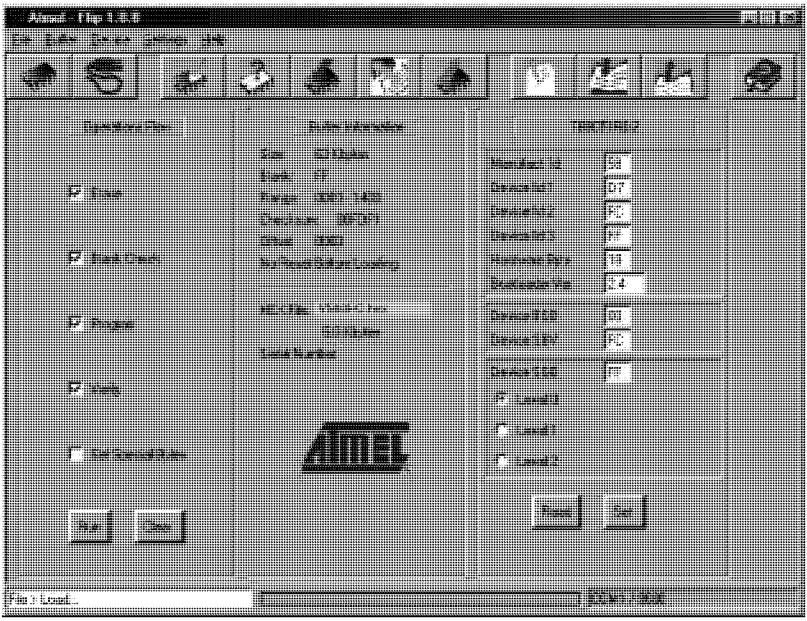


Figure 14: Atmel – Flip Window (Connected)

11. Click **Run**.
    As each stage of the operation completes, the check-box for that stage changes to green[1].
    When the operation is complete, all four check-boxes are green and the message Memory Verify Pass appears[2] in the status bar.

1 See also the blue progress indicator on the status bar

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

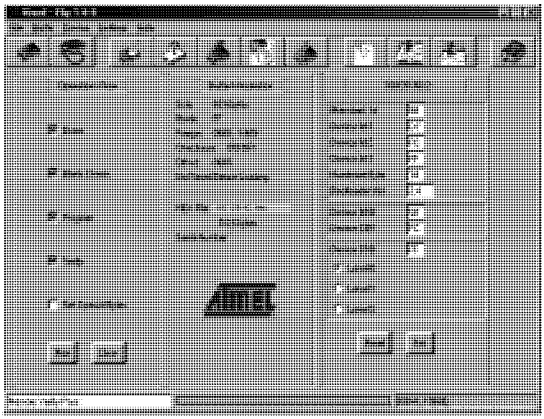


Figure 15: Atmel – Flip Window (Operation Completed)

12. Close the Atmel – Flip window.
13. Power OFF the **VS-121HC**.
14. If required, disconnect the null-modem adapter from the **VS-121HC**.
15. Press the FLASH PROG button on the front panel of the **VS-121HC** outward to its original position (see *Figure 1*).
16. Power ON the **VS-121HC**.

10.2 Upgrading the Ethernet Firmware

To upgrade the **VS-121HC** Ethernet firmware:

- Download the file from the Internet (see section 10.2.1)
- Connect a PC to the RS-232 port (see section 10.2.2)
- Install the latest firmware (see section 10.2.3)

10.2.1 Downloading from the Internet

To download the latest file[1] from the Internet to your PC:

1. Go to our Web site at http://www.Kramerelectronics.com
2. From the technical support section, download the file: *SetKFRETH11-xx.zip*.
3. Extract the file "*SetKFRETH11-xx.zip*" (that includes the KFR-Programmer application setup and the *.s19* firmware file) to a folder (for example, C:\Program Files\KFR Upgrade).

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

4. Install the KFR-Programmer Application.

10.2.2 Connecting the PC to the RS-232 Port

To connect a PC to the RS-232 port of the **VS-121HC**:

1. Power the **VS-121HC** OFF.
2. Connect a serial cable from the **VS-121HC** RS-232 DB9 rear panel port to a PC as explained in section 7.1.1.
3. On the back panel of the device, press the ETH PROG switch inward using a small screwdriver (see *Figure 1*).
4. Power the **VS-121HC** ON.

10.2.3 Installing the Ethernet Firmware

To install the firmware, perform the following steps:

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

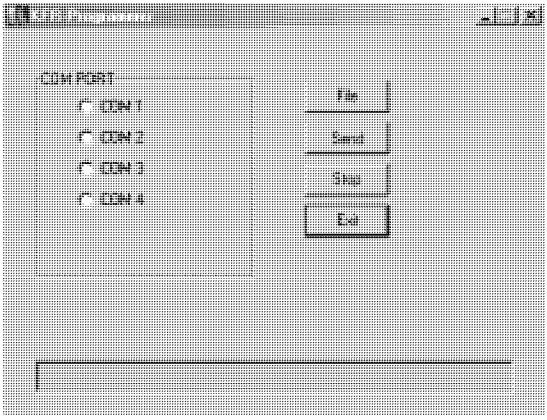


Figure 16: The KFR-Programmer Window

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 the download is complete and the red Send button turns off.
6. Power OFF the **VS-121HC**.

1 To which the **Product** is connected on your PC

7. Press the ETH PROG button on the front panel of the **VS-121HC** outward to its original position (see *Figure 1*).
8. Power ON the **VS-121HC**.

11 Hex Table

Table 6 lists the Hex values (which the protocol in section 12 describes in more detail) for the **VS-121HC** *Switcher and Transcoder*:

Table 6: VS-121HC Hex Table

Inputs		Component Video OUT
Group	#	
Composite Video	In 1	01 81 81 81
	In 2	01 82 81 81
	In 3	01 83 81 81
	In 4	01 84 81 81
s-Video	In 1	01 85 81 81
	In 2	01 86 81 81
	In 3	01 87 81 81
	In 4	01 88 81 81
Component Video	In 1	01 89 81 81
	In 2	01 8A 81 81
	In 3	01 8B 81 81
	In 4	01 8C 81 81

12 Kramer Protocol 2000

VS-121HC is compatible with Kramer's Protocol 2000 (version 0.50) (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 7: 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 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 8: Instruction Codes

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 0-12: 0: Disconnect 1–4: CV group 5–8: SV group 9–12: Component group	Set equal to video output which is to be switched 1	2
5	REQUEST STATUS OF A VIDEO OUTPUT	Set as SETUP # 0	OUTPUT # 1	3, 4
30	LOCK FRONT PANEL	0: Panel unlocked 1: Panel locked	0	2
31	REQUEST WHETHER PANEL IS LOCKED	0	0	16
55	REPLY ON	0	0 - Off 1 - On	26
57	SET AUTO SAVE	I3: No save I4: Autosave	0	12, 2
61	IDENTIFY MACHINE	1: Video machine name 3: Video software version	0: Request first 4 digits 1: Request first suffix 10: Request first prefix	13
62	DEFINE MACHINE	1: Number of inputs 2: Number of outputs	1	14

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 81 83

was sent from the PC, then the switcher (machine 3) will switch input 5 to output 1. If the user switched input 7 to output 1 via the front panel keypad, then the switcher will send HEX codes:

41 87 81 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 (Status).

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 instruction 5 is per the definitions in instruction 1. For example, if the present status of machine number 5 is input 7, then the reply to the HEX code

05 80 81 85

would be HEX codes

45 80 87 85

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, the machine will send its name. The reply is the decimal value of the INPUT and OUTPUT. For example, for a VS-121HC, the reply to the request to send the audio machine name would be (HEX codes):

7D 81 95 81 (i.e. 128dec+ 1dec for 2nd byte, and 128dec+ 21dec 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 C8 C3 81 (i.e. 128dec+ ASCII for "H"; 128dec+ ASCII for "C").

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).

NOTE 14 – The number of inputs and outputs refers to the specific machine which is being addressed, not to the system.

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 26 – After this instruction is sent with OUTPUT defined OFF, the unit will not send reply to the protocol commands. In order to return to working with REPLY, this instruction must be sent with OUTPUT defined ON. In cases where there is hardware control of the REPLY, (e.g. a DIP-switch to disable replying), this instruction is only valid when the hardware REPLY is set ON.

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.

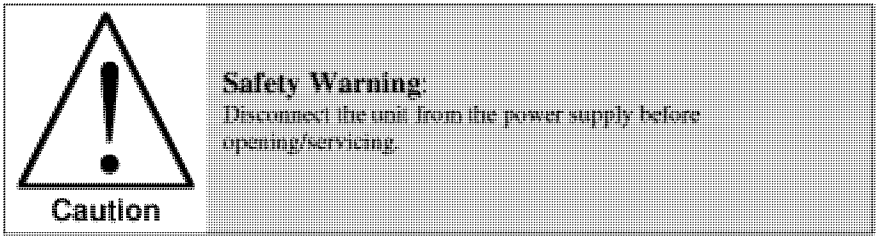
This equipment has been tested to determine compliance with the requirements of:

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.

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.



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