Kramer Electronics, Ltd.

USER MANUAL

Model:

VP-23N

Presentation Switcher

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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, 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 eight groups[1] that are clearly defined by function.

Congratulations on purchasing your Kramer **VP-23N** *Presentation Switcher*, which is ideal for presentation and conference room systems, production studios, rental and staging.

The package includes the following items:

- **VP-23N** *Presentation Switcher*
- Windows®-based Kramer control software
- Windows®-based Configuration Manager XPort software and Com Port Redirector
- Null-modem adapter and power cord[2]
- Kramer **RC-IR2** Infra-Red Remote Control Transmitter (including the required battery and a separate user manual[4])
- 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]

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

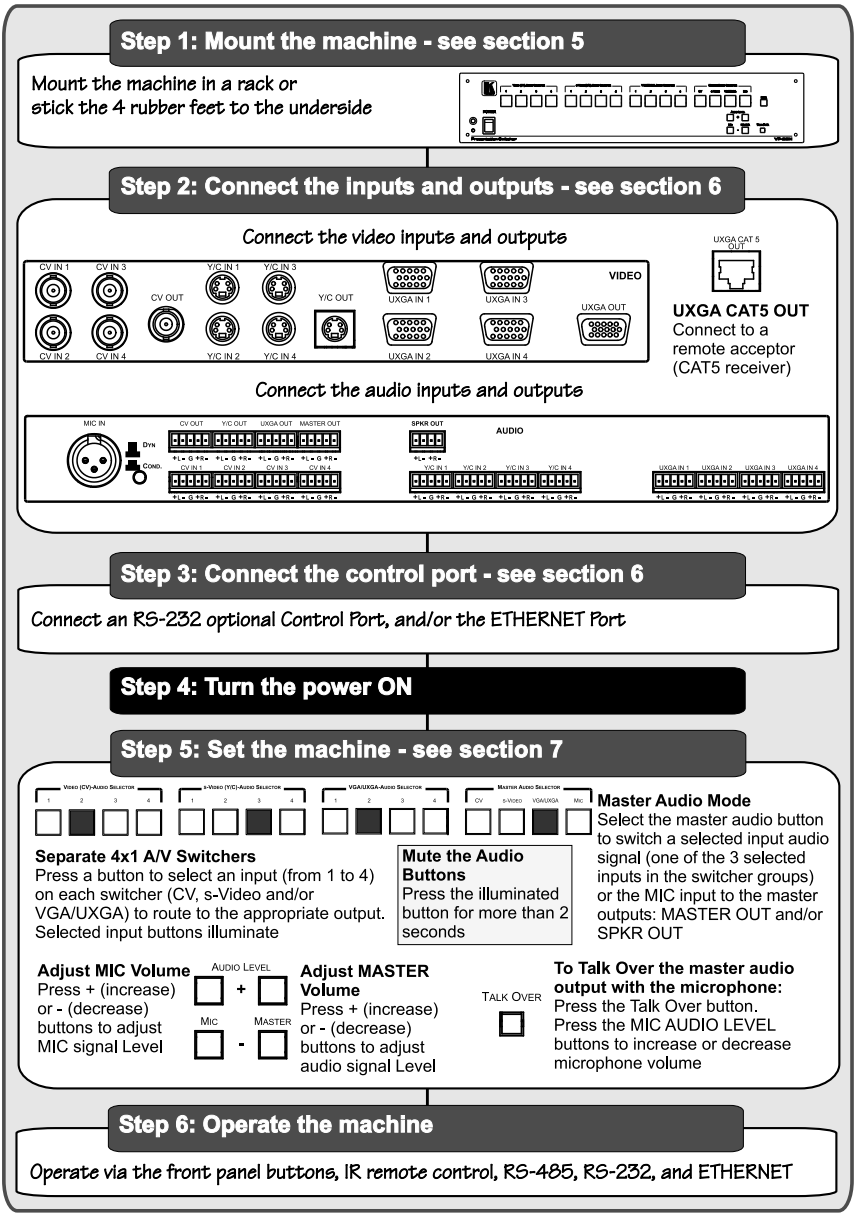
2 We recommend that you use only the power cord that is supplied with this machine

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

2.1 Quick Start

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



3 Overview

This section describes:

- Using shielded twisted pair (STP)/unshielded twisted pair (UTP), see section 3.1
- A summary of the **VP-23N**, see section 3.2
- Recommendations for achieving the best performance, see section 3.3
- The terminology used in this user manual, see section 3.4

3.1 Shielded Twisted Pair (STP) / Unshielded Twisted Pair (UTP)

The decision whether to use shielded twisted pair (STP) cable or unshielded twisted pair (UTP) cable depends on the nature of the application.

It is recommended that in applications with high interference, shielded twisted pair (STP) cable will give better results. However, the shield itself does create a capacitance that degrades the frequency response of the machines. For shorter distances, of 50m or so, shielded twisted pair (STP) cable is preferred because it provides protection from interference (degradation is non apparent).

For a long range application, unshielded twisted pair (UTP) cable is preferred. However, the unshielded twisted pair (UTP) cable should be installed far away from electric cables, motors etc., which are prone to create electrical interference.

Some Kramer twisted pair products include the Power Connect feature[1]. The **VP-23N** does not have this feature.

3.2 About the VP-23N

The **VP-23N** is a high quality one-box presentation switcher, which includes three independent 4x1 audio/video switchers and a master audio switcher. It combines the functions of a 4x1 switcher for composite video and audio, a 4x1 switcher for s-Video and audio, and a 4x1 switcher for computer graphics (VGA/UXGA) signals with audio, as well as the master audio switcher that routes one of the pre-selected audio inputs (from these three switchers) to two separate outputs.

1 The Power Connect feature lets you power a transmitter / receiver system by connecting just one power adapter to either the transmitter or the receiver. The other unit is fed over the same CAT 5 cable. The Power Connect feature applies as long as the CAT 5 cable is heavy gauge cable (that is, it can carry power). The distance does not exceed 50 meters on standard cable. For a distance of 100 meters, separate power supplies must be connected to the transmitter and to the receiver simultaneously, unless using heavy gauge CAT 5 cable

In addition, the **VP-23N** features:

- VGA/UXGA video bandwidth of 350MHz to ensure transparent performance even in the most critical applications, and is HDTV compatible
- Composite/SDI video bandwidth of 650MHz, an s-Video bandwidth of 385MHz, and a CAT 5 output capable of handling resolutions up to UXGA
- 16 selector buttons, digital microphone input level control and digital master audio level control
- A microphone talk-over mode (the microphone input signal lowers the line audio output level when the connected microphone detects sound)
- A CAT 5 output, with a transmission range of more than 300 feet (over 100 meters) that transmits XGA signals to a remote acceptor via a receiver
- An internal 5-Watt per channel (24kHz, -3dB), power amplifier for connecting the speakers directly to the machine
- A panel LOCK button to prevent tampering with the front panel
- Previous setup recall via the non-volatile memory after power up
- Changing the audio output levels via RS-232

The **VP-23N** can be controlled using the front panel buttons, or remotely via:

- RS-485 or RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller
- The Kramer Infra-Red remote control transmitter
- The ETHERNET

3.3 Recommendations for Achieving the Best Performance

To achieve the best performance:

- Connect only good quality connection cables, thus avoiding interference, deterioration in signal quality due to poor matching, and elevated noise- levels (often associated with low quality cables)
- Avoid interference from neighboring electrical appliances and position your Kramer **VP-23N** away from moisture, excessive sunlight and dust

3.4 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 Presentation Switcher

Figure 1, Figure 2, Table 2, and Table 3 describe the front and rear panels of the **VP-23N**, respectively.

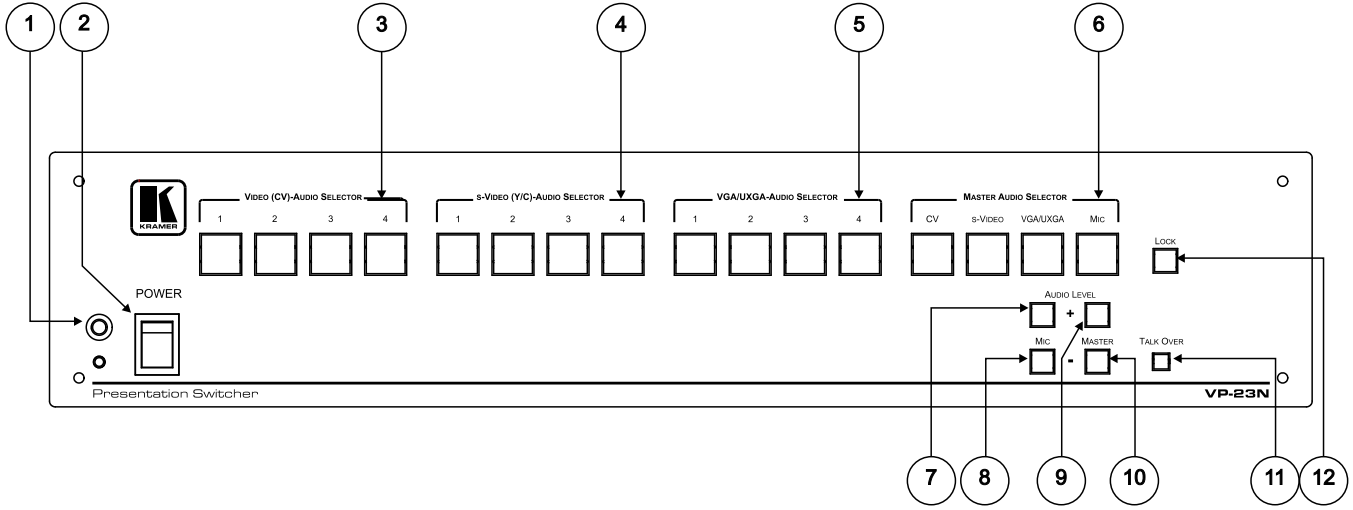


Figure 1: VP-23N Presentation Switcher – Front View

Table 2: Front Panel VP-23N Presentation Switcher Features

#	Feature			Function
1	IR (Infra-Red) Receiver			Signals from the remote control transmitter illuminate the LED
2	*POWER* Switch			Illuminated switch supplying power to the unit
3	*VIDEO (CV)-AUDIO SELECTOR* Buttons			Selects the composite video-audio source (from 1 to 4)
4	*s-VIDEO (Y/C)-AUDIO SELECTOR* Buttons			Selects the s-Video-audio source (from 1 to 4)
5	*VGA/UXGA-AUDIO SELECTOR* Buttons			Selects the VGA/UXGA video-audio source from (1 to 4)
6	*MASTER AUDIO SELECTOR*	*CV* Button		Press to route the selected audio signal from the composite video section to the master audio outputs[1]
		s-VIDEO Button		Press to route the selected audio signal from the s-Video section to the master audio outputs[1]
		VGA/UXGA Button		Press to route the selected audio signal from the VGA/UXGA section to the master audio outputs[1]
		MIC Button		Press to route the microphone input to the master audio outputs[1]
7	*AUDIO LEVEL*	*MIC*	+ Button	Increase the microphone audio signal level
8			- Button	Decrease the microphone audio signal level
9		*MASTER*	+ Button	Increase the master audio signal level
10			- Button	Decrease the master audio signal level
11	*TALK OVER* Button			Push the button to activate talk over[2]
12	*LOCK* Button			Press to lock the front panel buttons

1 MASTER OUT and SPKR OUT

2 With the TALK OVER button pressed in, speaking into the microphone amplifies the voice of the speaker, overriding and fading out all other audio channels. However, pressing the MIC button in the Master Audio Selector renders the Talk Over function inactive

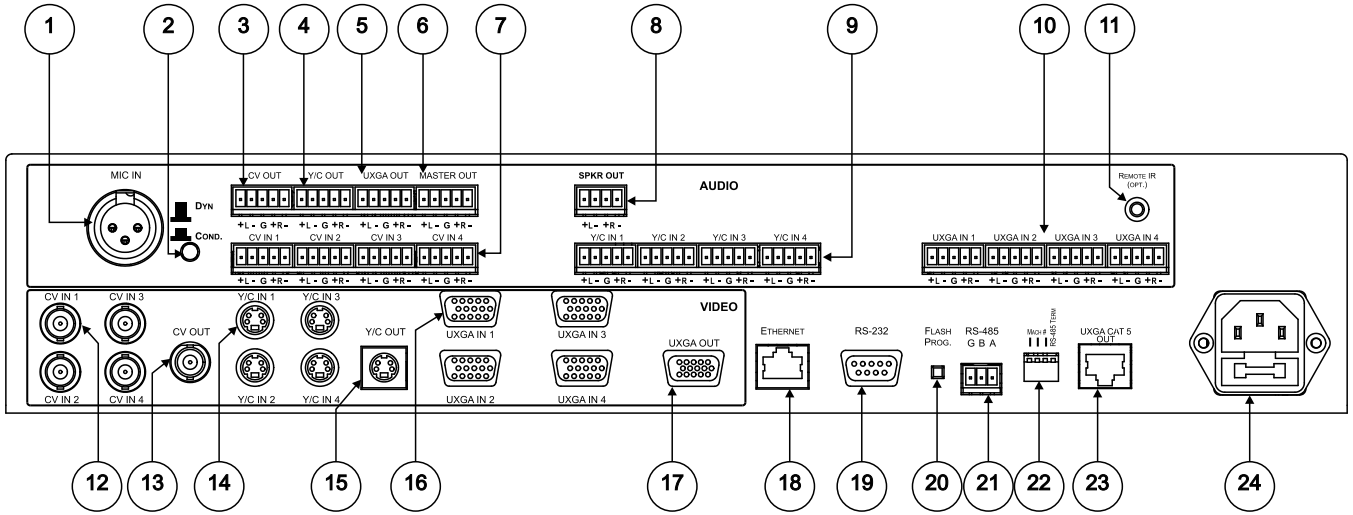


Figure 2: VP-23N Presentation Switcher – Rear View

Table 3: Rear Panel VP-23N Presentation Switcher Features

#	Feature		Function
1	*AUDIO*	*MIC IN* Connector	Connect to the microphone
2		*COND. / DYN* Selector Switch	Push in to select a condenser, push out to select a dynamic microphone
3		*CV OUT* Terminal Block Connector	Connect to the composite video balanced audio acceptor
4		*Y/C OUT* Terminal Block Connector	Connect to the s-Video balanced audio acceptor
5		UXGA *OUT* Terminal Block Connector	Connect to the VGA/UXGA balanced audio acceptor
6		*MASTER OUT* Terminal Block Connector	Connect the master balanced audio channel acceptor[1]
7		*CV IN* Terminal Block Connectors	Connect to the composite video balanced audio sources[2]
8		*SPKR OUT* Terminal Block Connector	Connect to a pair of loudspeakers
9		*Y/C IN* Terminal Block Connectors	Connect to the s-Video balanced audio sources[2]
10		*UXGA IN* Terminal Block Connectors	Connect to the VGA/UXGA balanced audio sources[2]
11	*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]
12	*VIDEO*	*CV IN* BNC Connectors	Connect to the composite video sources[2]
13		*CV OUT* BNC Connector	Connect to the composite video acceptor
14		*Y/C IN* 4p Connectors	Connect to the s-Video sources[2]
15		*Y/C OUT* 4p Connector	Connect to the s-Video acceptor
16		*UXGA IN HD15* Connectors	Connect to the VGA/UXGA video sources[2]
17		*UXGA OUT HD15* Connector	Connect to the VGA/UXGA video acceptor
18	*ETHERNET* Connector		Connects to the PC or other Serial Controller through computer networking
19	*RS-232* DB 9F Port		Connects to the PC or the Remote Controller
20	*FLASH PROG.* Button		Push in for "Program" to upgrade to the latest Kramer firmware (see section 8), or release for Normal (the factory default)[4]
21	*RS-485* Terminal Block Port		Pins B (-) and A (+) are for RS-485; Pin G may be connected to the shield (if required)
22	Dipswitches		Dipswitches for setup of the unit (DIPs 1, 2 and 3 are for setting the machine # and DIP 4 is for RS-485 termination; see section 6.8)

1 Both the MASTER OUT and the SPKR OUT terminal block connecters receive the same signal: the MASTER OUT outputs it as it is while the SPKR OUT is amplified

2 From 1 to 4

3 Optional. Can be used instead of the front panel (built-in) IR receiver to remotely control the VP-23N (only if the internal IR connection cable has been installed)

4 The FLASH PROG reset button is located on the underside of the unit (see Figure 3)

#	Feature	Function
23	*UXGA CAT 5 OUT* *Twisted Pair Connector*	Connect to a remote computer graphics acceptor via a receiver (for example, the **TP-120**[1])
24	Power Connector with Fuse	AC connector enabling power supply to the unit

Figure 3 and Table 4 define the RESET button (located on the machine's underside).

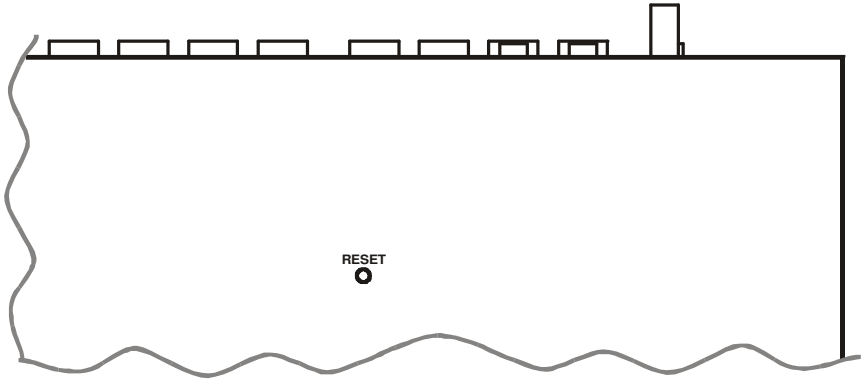


Figure 3: VP-23N Presentation Switcher– Underside View

Table 4: VP-23N Underside Panel Feature

Feature	Function
RESET Button	Press to reset the unit prior to firmware upgrade (see section 8.3)

1 See section 6.1

5 Installing the VP-23N in a Rack

This section describes how to install the **VP-23N** in a rack.

Before Installing in a rack

Before installing in a rack, be sure that the environment is within the recommended range:	
Operating temperature range	+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!!

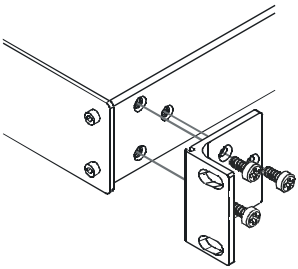
When installing on a 19" rack, avoid hazards by taking care that:

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 VP-23N Presentation Switcher

This section describes how to:

- Connect the rear panel (see section 6.1)
- Wire the CAT 5 connector (see section 6.2)
- Connect balanced or unbalanced stereo audio (see section 6.3)
- Connect a PC or other controller via the RS-232 port (see section 6.4)
- Connect a controller via the RS-485 port (see section 6.5)
- Control the VP-23N via the ETHERNET (see section 6.6)
- Cascade several machines (see section 6.7)
- Set the dipswitches (see section 6.8)

6.1 Connecting the VP-23N Rear Panel

In Figure 4, the audio connections are not shown, except for the microphone and speakers connections.

In this example, all the outputs are connected to the same projector. Use the projector controller to switch between the **VP-23N** video outputs[1].

To connect[2] the **VP-23N**, as illustrated in Figure 4, do the following[3]:

1. Connect the following video sources:
   - One[4] composite video source (for example, a composite video player) to the CV IN 1 BNC connector
   - One[4] s-Video source (for example, an s-Video player) to the Y/C IN 1 4p connector
   - One[4] VGA/UXGA source (for example, a computer graphics source) to the UXGA IN 1 HD15F connector

1 Or projector inputs

2 You do not need to connect all the inputs

3 Switch OFF the power on each device before connecting it to your VP-23N. After connecting your VP-23N, switch on its power and then switch on the power on each device. Switching on the VP-23N, recalls the previous setup from the non-volatile memory

4 Although in this example only one source is connected, you can connect all of the four inputs, that is, 12 in total

2. Connect the acceptors to a projector[1] as follows:
   - The composite video CV OUT BNC connector to the composite video input of the projector
   - The s-Video Y/C OUT 4p connector to the s-Video input of the projector
   - The VGA/UXGA UXGA OUT HD15F connector to the VGA/UXGA input of the projector
3. Connect the appropriate balanced audio sources and acceptors (not shown in Figure 4).
4. Connect the MASTER OUT terminal block connector, if required (not shown in Figure 4; see section 7.3).
5. Connect the SPKR OUT block connector to a pair of loudspeakers, by connecting the left loudspeaker to the "L+" and the "L-" terminal block connectors, and the right loudspeaker to the "R+" and the "R-" terminal block connectors. **Do not ground the loudspeakers**.
6. Connect the UXGA CAT 5 OUT twisted pair connector (see section 6.2) to a line receiver (for example, the **TP-120** *XGA Line Receiver*[2], which is connected to a remote display).
7. Connect a dynamic or a condenser microphone[3], if required, to the MIC IN XLR connector.
8. As an option, you can connect a PC and/or controller to:
   - The RS-232 port (see section 6.4)
   - The RS-485 port (see section 6.5)
   - The ETHERNET (see section 6.6)
9. Connect the unit to additional machines (if required) via the RS-485 port (see section 6.7).
10. Connect the power cord.

1 In this example a projector is used, but you can also connect separate outputs such as displays, video recorders and so on

2 The receiver receives the CAT 5 signal, decodes it and outputs it to a VGA acceptor

3 Use the Con / Dyn switch (refer to the rear panel, item 2 in Figure 2) to select a dynamic microphone or a condenser

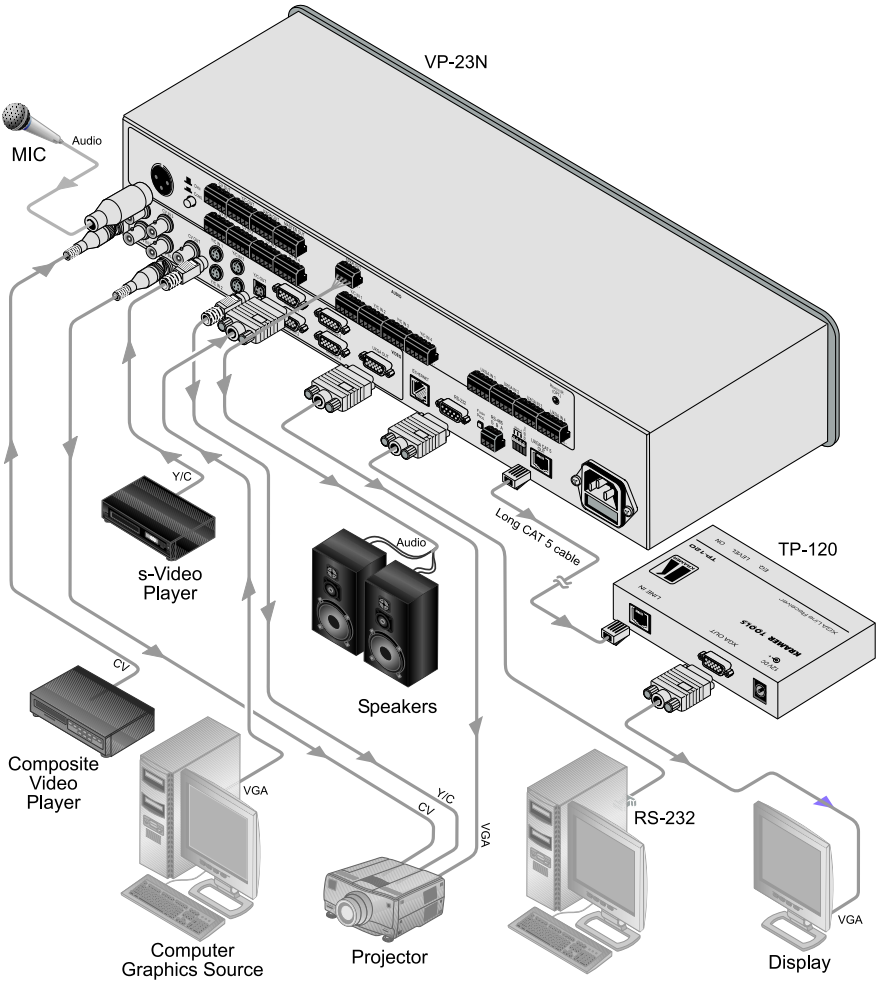


Figure 4: Connecting the VP-23N Presentation Switcher

6.2 Wiring the CAT 5 LINE OUT RJ-45 Connector

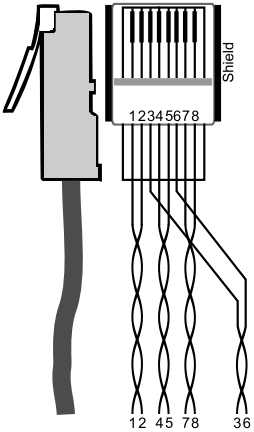
Table 5 and Figure 5 define the CAT 5 PINOUT, using a straight pin-to-pin cable with RJ-45 connectors:

Table 5: CAT 5 PINOUT

EIA /TIA 568A	
PIN	**Wire Color**
1	Green / White
2	Green
3	Orange / White
4	Blue
5	Blue / White
6	Orange
7	Brown / White
8	Brown
Pair 1	4 and 5
Pair 2	3 and 6
Pair 3	1 and 2
Pair 4	7 and 8

EIA /TIA 568B	
PIN	**Wire Color**
1	Orange / White
2	Orange
3	Green / White
4	Blue
5	Blue / White
6	Green
7	Brown / White
8	Brown
Pair 1	4 and 5
Pair 2	1 and 2
Pair 3	3 and 6
Pair 4	7 and 8

Figure 5: CAT 5 PINOUT



6.3 Connecting the Balanced/Unbalanced Stereo Audio Input/Output

Figure 6, Figure 7, and Figure 8 illustrate how to wire a balanced/unbalanced input and/or output connection:

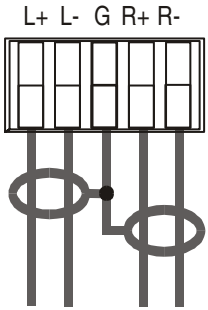


Figure 6: Connecting a Balanced Stereo Audio Input/Output

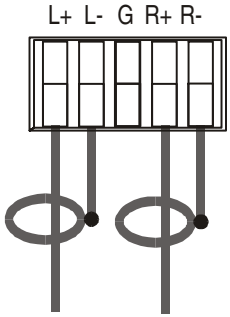


Figure 7: Connecting an Unbalanced Stereo Audio Input

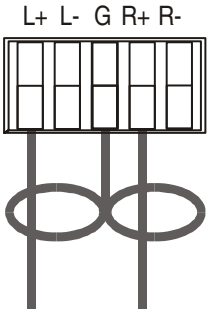


Figure 8: Connecting an Unbalanced Stereo Audio Output

6.4 Connecting a PC

You can connect a PC (or other controller) to the **VP-23N** via the RS-232 port.

To connect using the Null-modem adapter provided with the machine (recommended method):

- Connect the RS-232 DB9 rear panel port on the **VP-23N** 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 without using a Null-modem adapter:

- Connect the RS-232 DB9 port on your PC to the RS-232 DB9 rear panel port on the **VP-23N**, as Figure 9 illustrates

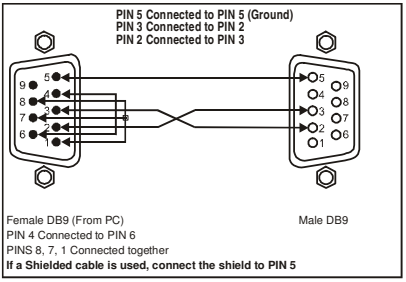


Figure 9: Connecting a PC without using a Null-modem Adapter

6.5 Connecting via RS-485

You can control a **VP-23N** unit via an RS-485 controller, or a Master Programmable Remote Control system such as the Kramer **RC-3000**[1].

To connect an **RC-3000** to a **VP-23N** unit (see Figure 10), connect the RS-485 terminal block port on the **RC-3000** to the RS-485 port on the **VP-23N** unit, as follows:

- Connect the "A" (+) PIN on the RS-485 rear panel port of the **RC-3000** to the "A" (+) PIN on the RS-485 rear panel port of the **VP-23N** unit
- Connect the "B" (-) PIN on the RS-485 rear panel port of the **RC-3000** to the "B" (-) PIN on the RS-485 rear panel port of the **VP-23N** unit

1 Previously known as the VS-3000

- If shielded twisted pair cable is used, the shield may be connected to the "G" (Ground) PIN on one of the units (for example, on the **RC-3000**)
- Set the **VP-23N** unit to a Machine # other than 1, according to Table 9, and set DIP 4 ON (for RS-485 Line Termination with 120Ω)

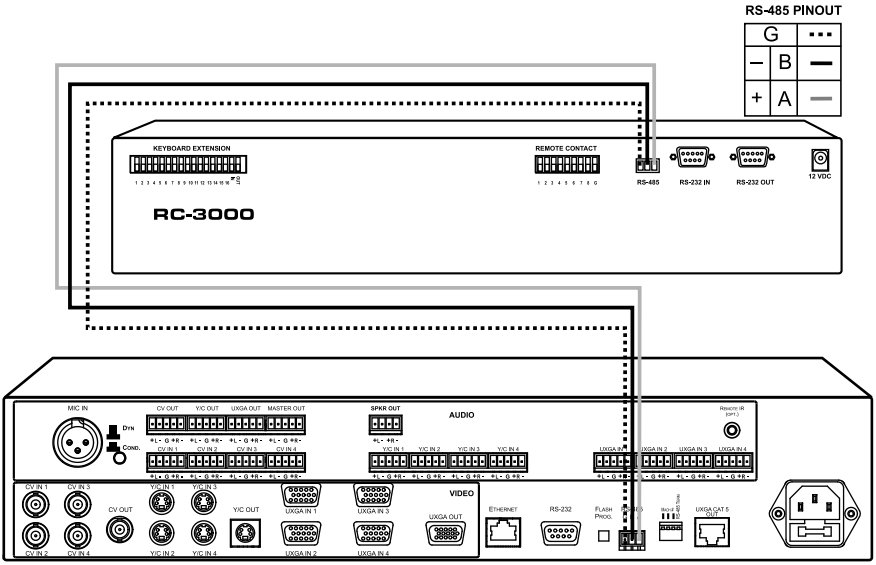


Figure 10: Controlling via RS-485 (for example, using an RC-3000)

6.6 Controlling via ETHERNET

You can connect the **VP-23N** via the Ethernet, using a crossover cable (see section 6.6.1) for direct connection to the PC or a straight through cable (see section 6.6.2) for connection via a network hub or network router[1].

1 After connecting the Ethernet port, you have to install and configure your Ethernet Port and also install the COM Port Redirector. For detailed instructions, see the "Ethernet Configuration (Lantronix) guide.pdf" file in the technical support section on our Web site: http://www.kramerelectronics.com

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

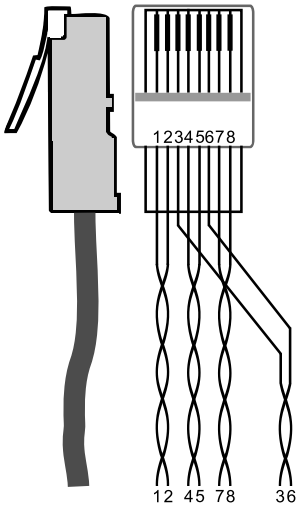
You can connect the Ethernet port of the **VP-23N** to the Ethernet port on your PC, via a crossover cable with RJ-45 connectors, as Table 6 and Figure 11 define.

Table 6: Crossover Cable RJ-45 PINOUT

EIA /TIA 568A Side 1	
PIN	**Wire Color**
1	White-orange
2	Orange
3	White-green
4	Blue
5	White-blue
6	Green
7	White-brown
8	Brown
Pair 1	4 and 5
Pair 2	1 and 2
Pair 3	3 and 6
Pair 4	7 and 8

EIA /TIA 568B Side 2	
PIN	**Wire Color**
1	White-green
2	Green
3	White-orange
4	Blue
5	White-blue
6	Orange
7	White-brown
8	Brown
Pair 1	4 and 5
Pair 2	3 and 6
Pair 3	1 and 2
Pair 4	7 and 8

Figure 11: RJ-45 PINOUT



This type of connection is recommended for identification of the factory default IP Address of the **VP-23N** 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 12).

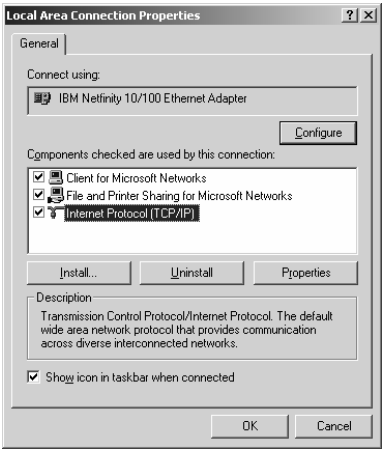


Figure 12: Local Area Connection Properties Window

6. Select Use the following IP Address, and fill in the details as shown in Figure 13.
7. Click **OK**.

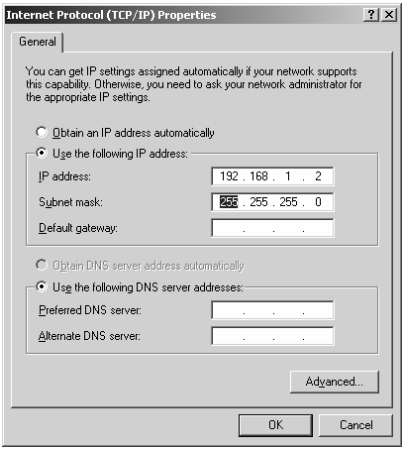


Figure 13: Internet Protocol (TCP/IP) Properties Window

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

You can connect the Ethernet port of the **VP-23N** to the Ethernet port on a network hub or network router, via a straight-through cable with RJ-45 connectors, as Table 7 defines.

Table 7: Straight-through Cable RJ-45 PINOUT

Side 1	
PIN	Wire Color
1	White-orange
2	Orange
3	White-green
4	Blue
5	White-blue
6	Green
7	White-brown
8	Brown

Side 2	
PIN	Wire Color
1	White-orange
2	Orange
3	White-green
4	Blue
5	White-blue
6	Green
7	White-brown
8	Brown

6.6.3 Control Configuration via the Ethernet Port

To control several units via the Ethernet, connect the Master unit (Machine # 1) via the Ethernet port to the LAN port of your PC. Use your PC initially to configure the settings (see section 6.6).

6.7 Controlling via RS-232 and RS-485

You can cascade up to eight **VP-23N** units with control from a PC or serial controller.

To cascade up to eight individual **VP-23N** units, via RS-232 and RS-485, as illustrated in Figure 14, do the following:

1. Connect the video sources and acceptors, as well as the appropriate audio sources and acceptors, as described in section 6.1.
2. Connect the RS-232 port on the first **VP-23N** unit to the PC using the Null-modem adapter provided with the machine (recommended), as section 6.4 describes.
3. Connect the RS-485 terminal block port on the first **VP-23N** unit to the RS-485 port on the second **VP-23N** unit and so on, connecting all the RS-485 ports.
4. Set the dipswitches, as section 6.8.1 describes. In particular:
   - Set the first **VP-23N** unit as Machine # 1, the second unit to Machine # 2, and so on - up to Machine # 8 for the eighth unit
   - Set Dip 4 ON on the first and last **VP-23N** units (terminating the RS-485 line at 120Ω). On the other units, set DIP 4 OFF

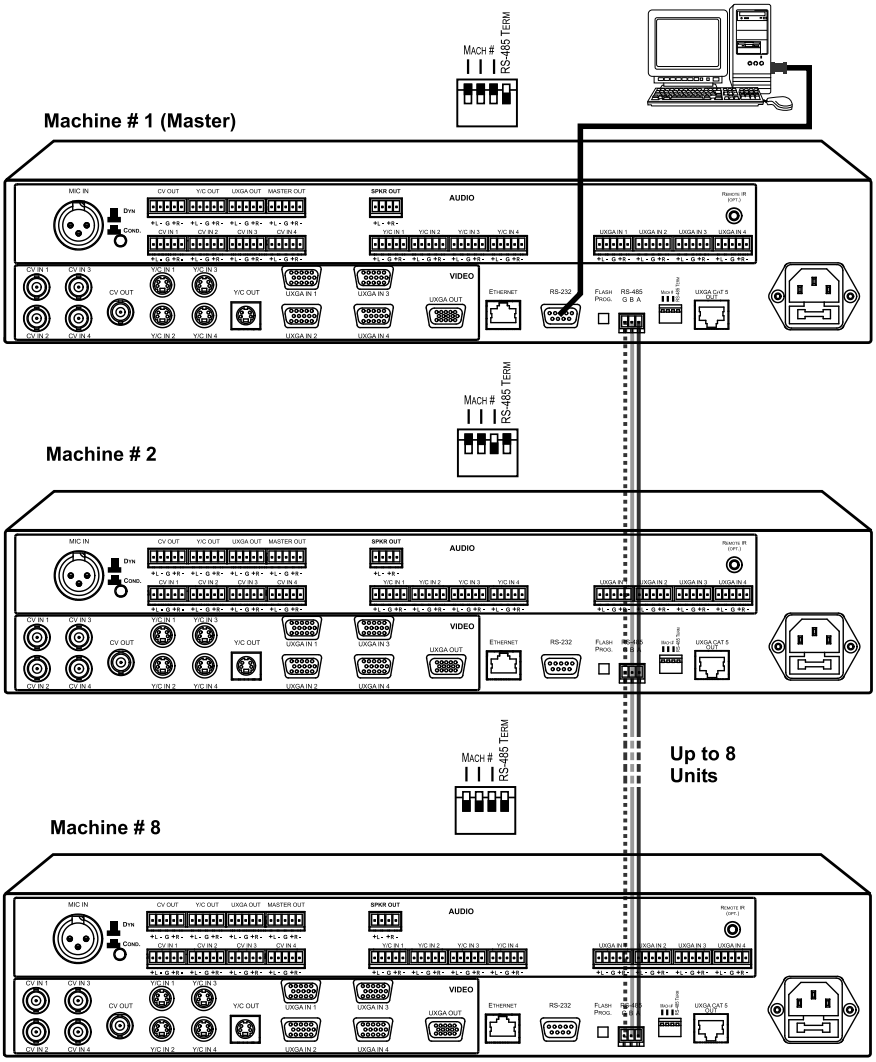


Figure 14: Control Configuration via RS-232 and RS-485

6.8 Dipswitch Settings

Figure 15 and Table 8 define the factory default dipswitch settings[1]:

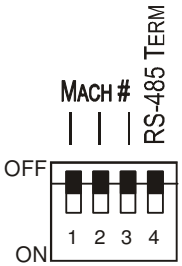


Figure 15: Default Dipswitch Settings

Table 8: Dipswitch Settings

DIPS	Function	Description
1, 2, 3	Machine #	Determines the number of the machine in the sequence
4	RS-485 TERM	ON for RS-485 Line Termination with 120Ω; OFF for no RS-485 Line Termination

6.8.1 Setting the Machine # Dipswitches

You can cascade up to eight **VP-23N** units. The Machine # determines the position of a **VP-23N** unit, specifying which **VP-23N** unit is being controlled when several **VP-23N** units connect to a PC or serial controller. Set the Machine # on a **VP-23N** unit via Setup DIPS 1, 2 and 3, according to Table 9.

Table 9: Machine # Dipswitch Settings

Machine #	Dipswitch		
	1	2	3
1 Master	OFF	OFF	OFF
2	OFF	OFF	ON
3	OFF	ON	OFF
4	OFF	ON	ON
5	ON	OFF	OFF
6	ON	OFF	ON
7	ON	ON	OFF
8	ON	ON	ON

1 By default, all dipswitches are set to OFF

7 Operating Your Switcher

This section describes the:

- Front panel buttons (see section 7.1)
- Separate switchers mode (see section 7.2)
- Master audio switcher mode (see section 7.3)
- IR Remote Controller (see section 7.4)

7.1 The Front Panel Buttons

The front panel buttons include the:

- VIDEO (CV)-AUDIO SELECTOR buttons (1 to 4)
- S-VIDEO (Y/C)-AUDIO SELECTOR buttons (1 to 4)
- VGA/UXGA-AUDIO SELECTOR buttons (1 to 4)
- MASTER AUDIO SELECTOR buttons (CV, S-VIDEO, VGA/UXGA and MIC)
- TALK OVER button[1], which lowers or mutes the MASTER AUDIO LEVEL when the microphone picks up speech[2]
- MIC AUDIO LEVEL up and down buttons to adjust the level at the master audio out[3] connectors[4] and the talk-over function threshold[5]
- MASTER AUDIO LEVEL up and down buttons to adjust the audio output level at the master audio out connectors[3], without influencing any other audio output
- Panel LOCK button to lock the front panel buttons

By default[6], the stereo audio signals switch together with the video, that is, the unit is set in an audio-follow-video[1] (AFV) mode. You can change to breakaway mode[2], via RS-232.

1 Two channels are active in the Talk Over mode, a source selected via the MASTER AUDIO SELECTOR buttons and the microphone channel

2 Adjust the microphone level via the MIC AUDIO LEVEL + and - buttons

3 MASTER OUT and SPKR OUT

4 Useful in the TALK OVER mode, when the microphone level needs to be adjusted separately

5 Achieving optimum results for a particular environment when using a microphone may require experimentation in adjusting the AUDIO and MIC LEVELS

6 This is, the pre-installed factory default. The default can be modified via the Windows®-based Kramer control software

Pressing an illuminated AUDIO SELECTOR button for more than 2 seconds disconnects that master audio output, and the button no longer illuminates. The video will continue to display but without sound.

The Master Audio automatically follows the last input selected (for example, VGA/UXGA), regardless of the switcher group (VGA, s-Video, or composite video), and the respective button[3] under the MASTER AUDIO SELECTOR section illuminates, indicating that the selected input (for example, VGA/UXGA) is routed to the master outputs.

7.2 The Independent Switchers Mode

In the independent switchers mode, the three switchers of the **VP-23N** operate independently from each other, as illustrated in Figure 16. You can route one of the 4 CV inputs, one of the 4 Y/C inputs and one of the 4 VGA/UXGA inputs to the corresponding CV, Y/C and UXGA[4] outputs, respectively.

To switch an input to an output[5]:

- Press one[6] button from the set of 4 buttons in the VIDEO (CV)-AUDIO SELECTOR section and/or[7]
- One button from the set of 4 buttons in the s-VIDEO (Y/C)-AUDIO SELECTOR section and/or
- One button from the set of 4 buttons in the VGA/UXGA-Audio SELECTOR section

Each pressed button illuminates[8], indicating selection and outputting of that video and audio source.

1 In which all operations relate to both the video and the audio channels

2 In which video and audio channels switch independently

3 Replacing the previous illuminated button

4 And to the UXGA CAT 5 OUT connector

5 Assuming that all inputs are connected

6 You cannot select more than one button in a section

7 You can overlook a section and choose not to select a button from it

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

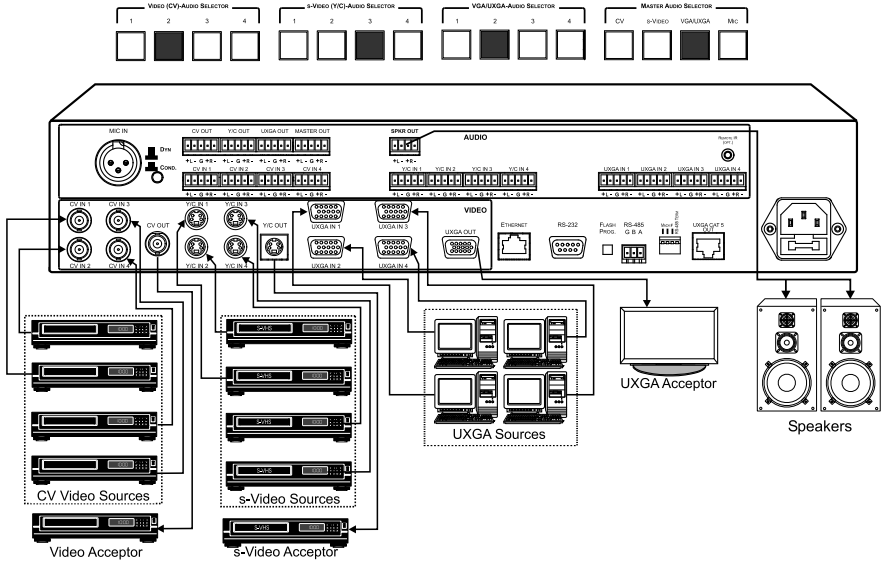


Figure 16: Separate Switcher Mode

7.3 The Master Audio Mode

In the master audio mode, you can route an audio input signal from any of the A/V switchers or from the microphone, to the MASTER OUT and/or SPKR OUT outputs.

Figure 17 shows a plasma-display connected to the **VP-23N** unit via the UXGA OUT HD15F connector, and a pair of speakers connected to the SPKR OUT terminal block connector.

(I) When pressing button 2 under the VGA/UXGA-AUDIO SELECTOR, the UXGA IN 2 signal is routed to the display[1]. The VGA/UXGA button under the MASTER AUDIO SELECTOR section automatically illuminates, and the UXGA audio signal is routed to the SPKR OUT[2] and the MASTER OUT[2] terminal block connectors simultaneously[3].

1 The UXGA output is simultaneously routed to the UXGA CAT 5 OUT connector

2 The MASTER audio signal is routed simultaneously to the SPKR OUT and the MASTER OUT channels. The only difference between them is that the SPKR OUT channel has an internal power amplifier, which lets you connect the speakers directly to the unit

3 As well as to the AUDIO UXGA OUT terminal block connector, which is not connected in this example

(II) After connecting a microphone to the MIC IN XLR connector, the MIC button under the MASTER AUDIO SELECTOR section illuminates and the speakers output the MIC IN[1] audio signal, while retaining the UXGA display. You can return to the UXGA audio output by pressing the VGA/UXGA button under the MASTER AUDIO SELECTOR section once again.

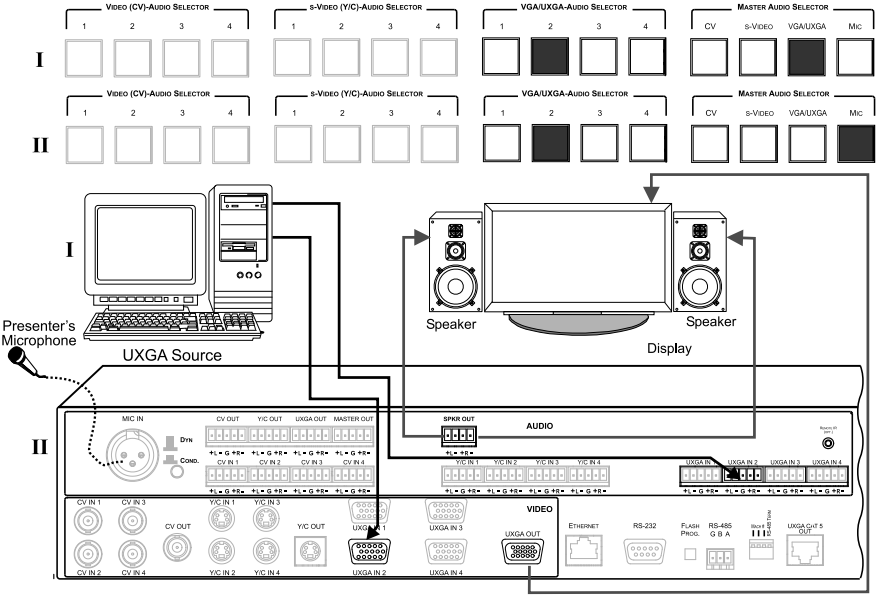


Figure 17: Switching in the Master Audio Mode

1 Another way to use the microphone is to press the TALK OVER button: the main audio level is lowered when the microphone picks up speech

7.4 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[1]. 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[2].

Before using the external IR receiver, be sure to arrange for your Kramer dealer to insert an internal IR connection cable[3], 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.

8 Flash Memory Upgrade

The **VP-23N** firmware is located in FLASH memory, which lets you upgrade to the latest Kramer firmware version in minutes! The process involves:

- Downloading from the Internet (see section 8.1)
- Connecting the PC to the RS-232 port (see section 8.2)
- Upgrading Firmware (see section 8.3)

8.1 Downloading from the Internet

You can download the up-to-date file[4] from the Internet. To do so:

1. Go to our Web site at http://www.kramerelectronics.com and download the file: "*FLIP_VP23N.zip*" from the Technical Support section.
2. Extract the file: "*FLIP_VP23N.zip*" to a folder (for example, C:\Program Files\Kramer Flash).
3. Create a shortcut on your desktop to the file: "*FLIP.EXE*".

1 P/N: 95-0104050

2 P/N: 95-0103050

3 P/N: 505-70434010-S

4 The files indicated in this section are given as an example only. These file names are liable to change from time to time

8.2 Connecting the PC to the RS-232 Port

Before installing the latest Kramer firmware version on a **VP-23N** unit, do the following:

1. Connect the RS-232 DB9 rear panel port on the **VP-23N** unit to the Null-modem adapter and connect the Null-modem adapter with a 9-wire flat cable to the RS-232 DB9 COM port on your PC (see section 6.4).
2. On the rear panel, push in the FLASH PROG button (to program), using a screwdriver.
3. Connect the power on the **VP-23N** unit and switch it ON.
4. On the underside panel, push in the RESET FOR PROGRAM button (see Figure 3), using a screwdriver.

8.3 Upgrading the Firmware

Follow these steps to upgrade the firmware:

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

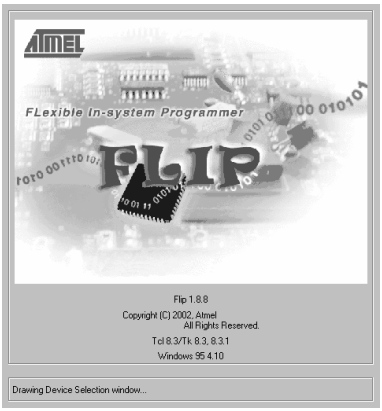


Figure 18: Splash Screen

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

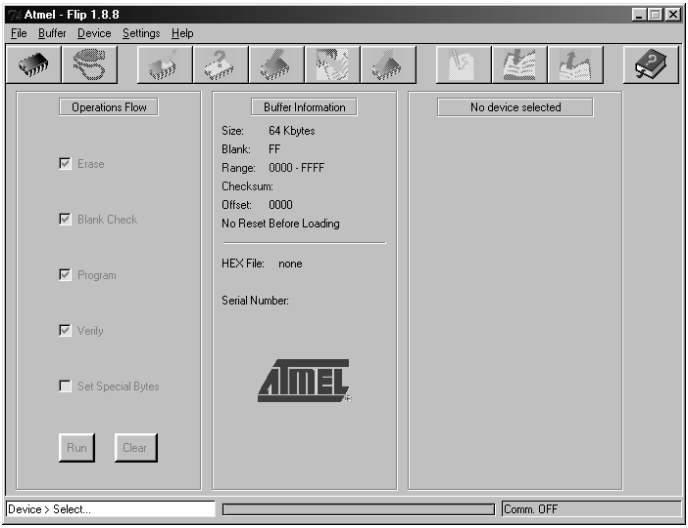


Figure 19: Atmel – Flip Window

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 20: Device Selection Window

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

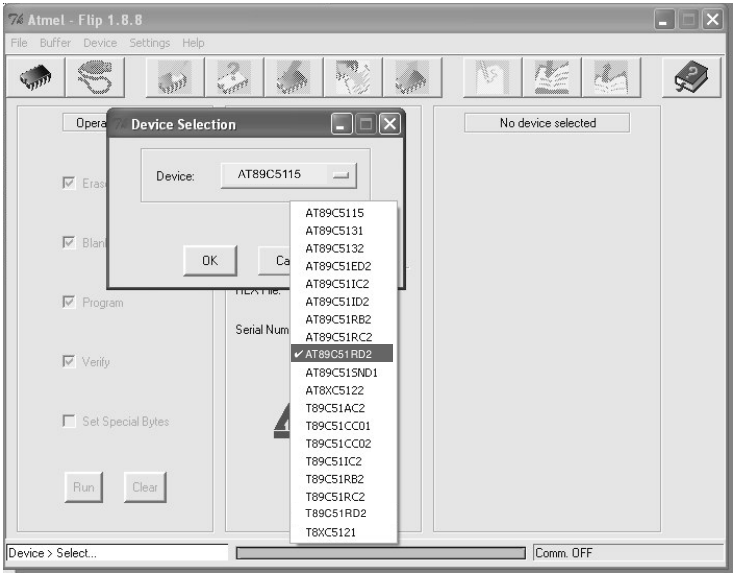


Figure 21: Selecting the Device from the Selection Window

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

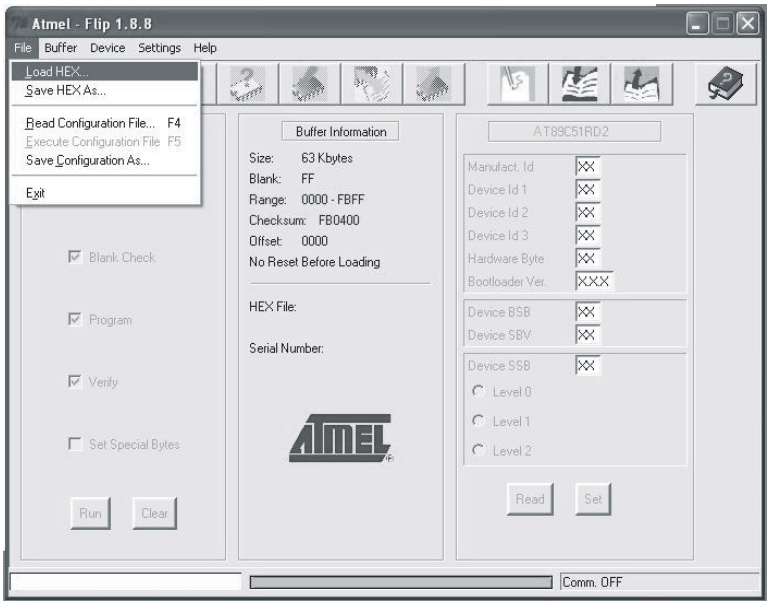


Figure 22: Loading the Hex

6. The Open File window opens. Select the correct HEX file that contains the updated version of the firmware for **VP-23N** (for example, ***23NM_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:

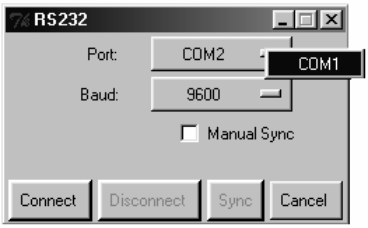


Figure 23: RS-232 Window

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: VP23N.hex*" appears.

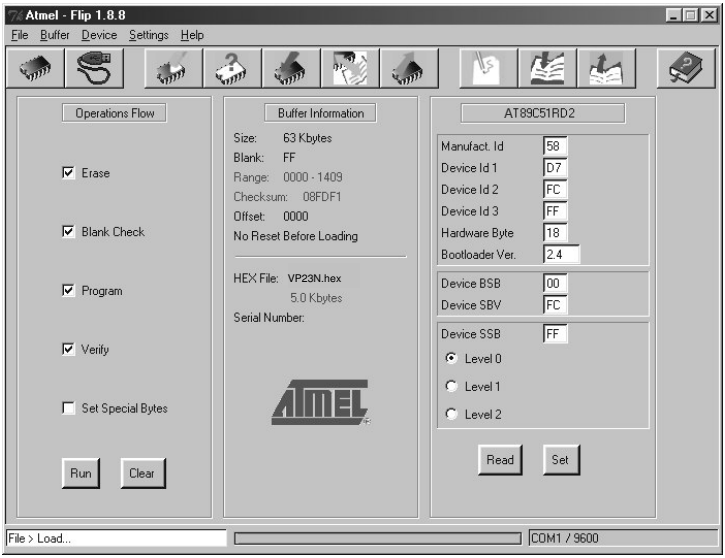


Figure 24: Atmel – Flip Window (Connected)

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]:

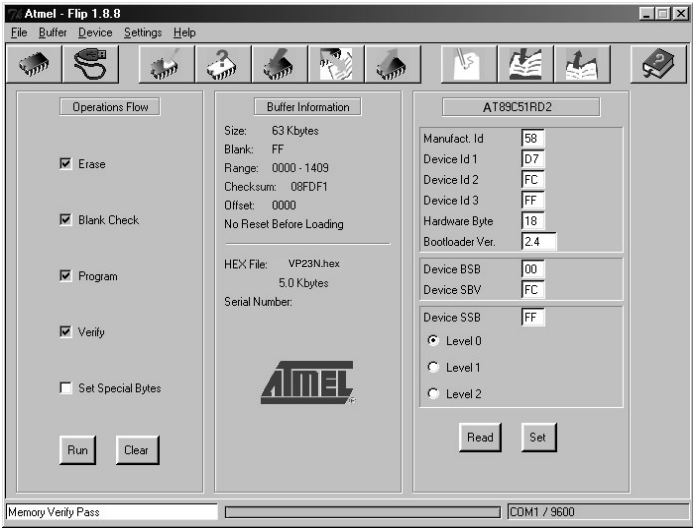


Figure 25: Atmel – Flip Window (Operation Completed)

10. Close the "*Atmel – Flip*" window.
11. Disconnect the power on the **VP-23N**.
12. Disconnect the *RS-232* rear panel port on the **VP-23N** unit from the Null-modem adapter.
13. Release the FLASH PROG button on rear panel.
14. Connect the power to the **VP-23N**.

1 See also the blue progress indicator on the status bar

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

9 Technical Specifications

Table 10 includes the technical specifications[1]:

Table 10: Technical Specifications of the VP-23N Presentation Switcher

INPUTS:	4 VGA / XGA on HD15F connectors 4 s-Video, 1 Vpp (Y), 0.3Vpp (C) / 75Ω on 4 pin connectors 4 composite video 1Vpp / 75Ω on BNC connectors Each input is accompanied by the appropriate balanced stereo-audio channels: +4dBm / 50kΩ on detachable terminal block connectors Mic: 3mV / 10 kΩ condenser / dynamic on an XLR connector	
OUTPUTS:	1 x VGA / XGA on an HD15F connector 1 s-Video - 1 Vpp (Y), 0.3Vpp (C), / 75Ω on 4 pin connector 1 composite video 1 Vpp / 75 Ω on a BNC connector 1 UTP CAT 5 connector (Line OUT) Each output channel is accompanied by the appropriate balanced stereo-audio channel: +4dBm / 150Ω on detachable terminal blocks 1 master stereo audio +4dBm / 150Ω on a detachable 4-pin terminal block 1 stereo speaker output 2x5W continuous into 4Ω	
MAX. OUTPUT LEVEL:	VIDEO: YC: 1.8Vpp; CV: 1.8Vpp XGA: 1.7Vpp	AUDIO: Group: 20dBm Master: 15dBm
BANDWIDTH (-3dB):	VIDEO: YC: 385MHz; CV: 650MHz XGA: 350MHz	AUDIO: Group: 46kHz Speakers: 40kHz Master: 33kHz
DIFF. GAIN:	YC: 0.03%; CV: 0.03%; XGA: 0.15%	
DIFF. PHASE:	YC: 0.03 Deg.; CV: 0.03 Deg.; XGA: 0.09 Deg.	
K-FACTOR:	<0.1%	
S/N RATIO:	VIDEO: YC: 81dB; CV: 75dB XGA: 75dB (unweighted)	AUDIO: Group: 74dB Speakers: 53dB (max pwr weighted) Master out: 72dB
CROSSTALK (all hostile):	VIDEO: 49dB @5MHZ	AUDIO: Group: < -76dB Master: < -69dB @1kHz
CONTROLS:	Channel selector for video and audio, for YC, CV and XGA; master audio output selector, audio level, talkover, lock	
COUPLING:	VIDEO: DC	AUDIO: AC
AUDIO THD + NOISE@1kHZ:	Group: 0.08%; Speakers: 2% (max pwr); Master: 0.25%	
AUDIO 2nd HARMONIC:	Group: 0.065%; Speakers: 1.6% (max pwr); Master: 0.155%	
POWER SOURCE:	100-240VAC, 50/60Hz, 35VA	
DIMENSIONS:	19-inch (W), 7-inch (D) 2U (H) rack-mountable	
WEIGHT:	3.8 kg (8.4 lbs.) approx.	
ACCESSORIES:	Power cord, infra-red remote control transmitter, PC control software, Windows®-based Configuration Manager XPort software and Com Port Redirector	

1 Specifications are subject to change without notice

10 Hex Table

Table 11 lists the Hex values (which the protocol in section 11 describes in more detail) for the **VP-23N** *Presentation Switcher*:

Table 11: VP-23N Hex Table

Inputs		Composite Video OUT and Audio OUT CV	s-Video OUT and Audio OUT s-Video	VGA OUT and Audio OUT VGA
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 81 82 81	
	In 2		01 82 82 81	
	In 3		01 83 82 81	
	In 4		01 84 82 81	
VGA	In 1			01 81 83 81
	In 2			01 82 83 81
	In 3			01 83 83 81
	In 4			01 84 83 81

Table 12: VP-23N Master Audio Selector Hex Table

Master Audio Selector (Group Audio OUT)	Audio Master OUT
Composite Video Audio OUT	02 81 81 81
s-Video Audio OUT	02 82 81 81
VGA Audio OUT	02 83 81 81
Microphone	02 84 81 81
Disconnect All	02 80 81 81

10.1 Audio Gain Control Hex Tables

The following tables describe the audio gain controls.

Table 13: Set the Audio Output Gain Control for the Groups

Audio Gain Control for Groups			
Composite Video	s-Video	VGA	Notes
16 81 80 81	16 82 80 81	16 83 80 81	Mute
⋮	⋮	⋮	
16 81 EC 81	16 82 EC 81	16 83 EC 81	0dB (1:1)
⋮	⋮	⋮	
16 81 FF 81	16 82 FF 81	16 83 FF 81	9dB

Table 14: Set the Audio Output Gain Control for the Microphone

Audio Gain Control for Microphone	
16 84 80 81	Mute
⋮	
16 84 CD 81	
⋮	
16 84 FF 81	Maximum

Table 15: Set the Audio Output Gain Control for the Master Audio

Audio Gain Control for Master Out	
16 85 80 81	Mute
⋮	
16 85 F9 81	0dB
⋮	
16 85 FF 81	3dB

Table 16: Increase or Decrease the Audio Output Gain by One Step

	Composite Video	s-Video	VGA	Microphone	Master Out
Increase	18 81 80 81	18 82 80 81	18 83 80 81	18 84 80 81	18 85 80 81
Decrease	18 81 81 81	18 82 81 81	18 83 81 81	18 84 81 81	18 85 81 81

11 Communication Protocol

This protocol, which enables RS-232 communication between the **VP-23N** and the PC, uses 4 bytes of information, and data is at 9600 baud, no parity, 8 data bits and 1 stop bit.

Table 17: Protocol Definitions

MSB **LSB**

	DESTINATION	INSTRUCTION					
0	D	N5	N4	N3	N2	N1	N0
7	6	5	4	3	2	1	0

1st byte

				INPUT			
1	0	0	0	0	I2	I1	I0
7	6	5	4	3	2	1	0

2nd byte

						OUTPUT	
1	0	0	0	0	0	O1	O0
7	6	5	4	3	2	1	0

3rd byte

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

4th byte

1st BYTE: Bit 7 – Defined as 0.
D – "DESTINATION BIT".
This bit is always low, when sending from the PC to the switchers, and high for information sent to the PC.
N5…N0 – "INSTRUCTION".
These 6 bits define the function that is to be performed by the switcher(s). 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.
Bits 3 – 6 - Defined as 0.
I2… I0 – "INPUT".
For disconnect, set as 0. For other operations, these bits are defined according to Table 18.
3rd BYTE: Bit 7 – defined as 1.
Bits 2-6 defined as 0.
O1, O0 – "OUTPUT"
For operations, these bits are defined according to Table 18.

4th BYTE: Bit 7 – Defined as 1.
Bits 3-6 Defined as 0.
M3… M0 – "MACHINE NUMBER".
MACHINE NUMBER = (DIPSWITCH CODE) + 1.

Table 18: Instruction Codes

INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	DESCRIPTION	INPUT	OUTPUT	
0	RESET MACHINE	0	0	1
1	SWITCH GROUPS	1-4 Set equal to video and audio inputs to be switched for the relative group	1-3 Set equal to group to which output is to be switched	2
2	SWITCH AUDIO OUTPUTS	1-5* Set equal to audio output to be switched to Master Audio out	1	2
5	REQUEST GROUP STATUS	0	1-3 Set equal to the group of which status is required	3
6	REQUEST STATUS OF MASTER AUDIO OUTPUT	0	1	3
8	BREAKAWAY SETTING	0	0 – Audio-follow-video 1 – Audio breakaway	2
11	REQUEST BREAKAWAY SETTING	0	0	3
16	ERROR	Don't care	0 – Invalid instruction 1 – Out of range	4
18	RESET MACHINE	0	0	1
22	SET AUDIO GAIN OF AUDIO OUTPUT	1-5*	Gain value	7
24	INCREASE/DECREASE AUDIO GAIN	1-5*	0 – Increase gain 1 – Decrease gain	8
25	REQUEST GAIN	1-5*	0 – Video gain 1 – Audio gain	3, 9
30	LOCK FRONT PANEL	0 – Panel unlocked 1 – Panel locked	0	
31	REQUEST WHETHER PANEL IS LOCKED	0	0	3
57	SET AUTO SAVE	1 – Autosave 2 – No save	Don't care	5
61	IDENTIFY MACHINE	1 or 2 – Machine name 3 or 4 – Program version	0 – request first 4 digits 1 – request first suffix 10 – request first prefix	6
62	DEFINE MACHINE	1 – Number of inputs 2 – Number of outputs	1 – For video 2 – For audio	3

* 1 – for CV group, 2 – for SV group, 3 – for VGA group, 4 – for microphone, 5 – for master audio out

NOTES on to Table 18:

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:
0000 0001 Instruction "Switch Groups"
1000 0010 Input #2
1000 1001 in composite video group
1000 0001 Machine #1 (master)
Was sent from the PC, then the switcher (machine #1) will switch input 2 in composite video group to its output. If the user switched input 4 in the VGA group via the front panel keypad, then the switcher will send:
0100 0001
1000 0100
1000 0011
1000 0001 to the PC.
When the PC sends instruction #1 or #2 to the switcher, then, if the instruction is valid, the switcher replies by sending the same four bytes to the PC that were sent (except for the first byte, where the DESTINATION bit is set high).

NOTE 3

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 to the value of the requested parameter. The reply to the instruction #5 (what is the status of the VGA group?):
0000 0101
1000 0000
1000 0011
1000 0001
Would be:
0100 0101
1000 0000
1000 0100
1000 0001

NOTE 4

An error code is returned to the PC if an invalid code was sent to the switcher (for example, when trying to switch an input or a group which is 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 will not be valid.

NOTE 5

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

NOTE 6

This is a request to identify the switchers in a system. If the INPUT is set as 1 or 2, the machine will send its name. The reply is the decimal value of the INPUT and the OUTPUT. For example, the reply to the request to send the machine's name (for machine #001) will be:
0111 1101
1000 0000 (i.e. 128+0)
1001 0111 (i.e. 128+23)
1000 0001
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 following the decimal point. For example, for version 3.5 the reply will be:
0111 1101
1000 0011 (i.e. 128+3)
1000 0101 (i.e. 128+5)
1000 0001

NOTE 7

GAIN VALUE – Number from 0 to 127

NOTE 8

Answer = Current Audio Gain (0 –127)

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.

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

Kramer Electronics, Ltd.
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P/N: 2900–000110 REV 2