



KRAMER ELECTRONICS, Ltd.

USER MANUAL

Vertical Interval Switchers

MODELS:

**VS-2016, VS-2031N, VS-2042, VS-2053, VS-2081S,
VS-2481**

**IMPORTANT: Before proceeding, please read paragraph entitled
"Unpacking and Contents"**

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1. INTRODUCTION

Congratulations on your purchase of this Kramer switcher. Since 1981 Kramer has been dedicated to the development and manufacture of high quality video/audio equipment. The Kramer industrial line has become an integral part of many of the best video/audio production and presentation facilities around the world. In recent years, Kramer has redesigned and upgraded most of the industrial line, making the best even better. Kramer's line of professional video electronics is one of the most versatile and complete available, and is a true leader in terms of quality, workmanship, price/performance ratio and innovation. In addition to the Kramer line of high quality video switchers, such as the one you have just purchased, Kramer also offers a full line of high quality industrial and broadcast distribution amplifiers, processors, interfaces, controllers and computer-related products. Kramer welcomes your inquiries for Kramer equipment or custom-manufactured products, engineering, private labeling and OEM manufacturing per your specifications. This manual includes configuration, operation and option information for the following products from the Kramer VS line of video switchers. These VS switchers are similar in operation and features.

VS-2016 - 16x1 Composite Video Switcher	VS-2053 - 3x1 RGB/HV Switcher
VS-2031N - 3x1 Component Video Switcher	VS-2081S - 8x1 YC Video Switcher
VS-2042 - 4x2 Component Video Switcher	VS-2481 - 8x1 Balanced Audio Switcher

1.1 A Word on Video/Audio Switchers

A video/audio switcher usually switches between several sources (inputs) and one or more acceptors (outputs). A switcher that allows several inputs to be connected to several outputs simultaneously is called a Matrix Switcher. Switchers may be of the electronic or mechanical type. Most matrices are of the active electronic type, with many crosspoints. Vertical Interval Switching, frequently used in video, ensures that the transition from one video source to another (such as switching between two genlocked cameras) is smooth and without interference. The switching and changeover is done during the blanked vertical interval period, when the transition is hidden. Vertical Interval Switching is needed when recording or transmitting a video program involving several video sources, as in live broadcast, to ensure clean, undisturbed picture transitions. Matrices and switchers may sometimes be RS-232 or RS-485/422 controlled. Each of these options is a way of remotely controlling a video/audio device (switcher, SEG, etc.) using a PC with a serial port, or another device that uses a similar communication protocol. The switchers can be controlled by touch buttons on the front panel, by a PC, via the Switcher's built-in RS-232 communication ports. Finally, the video signal wide bandwidth permits the switchers to be used in the most demanding of applications. Several machines can be interconnected and cascaded to become 32x1, 48x1 etc. switchers, or connected in parallel to become 16x2, 16x3 etc. and several machines may be operated simultaneously via PC control or looped through to become 8x2, 8x3 etc.

1.2 Factors Affecting Quality of Results

There are many factors affecting the quality of results when signals are transmitted from a source to an acceptor:

- **Connection cables** - Low quality cables are susceptible to interference, they degrade signal quality due to poor matching and cause elevated noise levels. They should therefore be of the best quality.
- **Sockets and connectors of the sources and acceptors** - So often ignored, they should be of highest quality, since "Zero Ohm" connection resistance is the target. Sockets and connectors also must match the required impedance (75ohms in video). Cheap, low quality connectors tend to rust, thus causing breaks in the signal path.
- **Amplifying circuitry** - Must have quality performance when the desired end result is high linearity, low distortion and low noise operation.
- **Distance between sources and acceptors** - Plays a major role in the final result. For long distances (over 15 meters) between sources and acceptors, special measures should be taken in order to avoid cable losses. These include using higher quality cables or adding line amplifiers.
- **Interference from neighboring electrical appliances** - These can have an adverse effect on signal quality. Balanced audio lines are less prone to interference, but unbalanced audio and video lines should be installed far from any mains power cables, electric motors, transmitters, etc. even when the cables are shielded.

2. SPECIFICATIONS

	VS-2016	VS-2031N	VS-2042	VS-2053	VS-2081S	VS-2481
Configuration	16x1	3x1	4x2	3x1	8x1	8x1
Input Type	16 composite/ component video	3 component video (RGBS)	4 component video (Y, R-Y, B-Y sets)	3x5 component video (R, G, B, Hs, Vs)	8 s-video	8 balanced audio
Input Connections	BNC connectors	BNC connectors	BNC connectors	BNC connectors	4P connectors	XLR-3 female
Input Level	1Vpp/75ohm	1Vpp/75ohm	0.7/1Vpp/75ohm	0.7/1Vpp/75ohm or TTL Level Sync	1Vpp/75ohm (Y), 0.3Vpp/75ohm (C) with termination switches for looping	+4dBm nom. acceptor dependent input impedance
Output Type	1 composite/ component video	1 component video (RGBS)	2 component video (Y, R-Y, B-Y)	1 component video (R, G, B, Hs, Vs)	2 s-video	2 balanced audio
Output Connector	BNC connectors	BNC connectors	BNC connectors	BNC connectors	4P connectors	XLR-3 male
Output Level	1Vpp/75ohm	1Vpp/75ohm	0.7/1Vpp/75ohm	0.7/1Vpp/75ohm or TTL level sync	1Vpp/75ohm (Y), 0.3Vpp/75ohm (C)	+4dBm nom. one fixed and one with level control
Output Coupling	DC	Direct	DC	DC	DC for Y, AC for C	AC
S/N Ratio	74dB	72.5dB	74dB	73dB	75dB	>91 dB
Bandwidth	>80MHz (-3dB)	>550MHz (-3dB)	>75MHz (-3dB)	>400MHz (-3dB)	>60MHz (Y -3dB)	>50kHz (-3dB)
Differential Gain	0.07%	0.05%	0.15%	0.1%	0.06%	N.A
Differential Phase	0.28Deg	0.05Deg	0.25Deg	0.07Deg	0.12Deg	N.A
K-Factor	<0.05%	<0.05%	0.3%	<0.03%	<0.05%	N.A
Crosstalk	-48dB (Chroma) @ 5MHz	-50dB @ 5MHz	-50dB @ 5MHz	<-50dB @ 5MHz	-50dB @ 5MHz	< -50dB @ 1kHz
THD	N.A	N.A	N.A	N.A	N.A	Controllable output < 0.04% @ 1KHz/ second output- source dependent
Switch System	During vertical interval	Electro-mechanical	Vertical interval	Vertical interval or delayed (0.1 to 9 Sec.).	Vertical interval	Electro-mechanical
Switch Time	< 1frame	3mS (typical)	< 1frame	< 1frame for vertical interval switching	< 1frame	Less than 3mS (when manual controlled).
Control Type	1 DB-9 connector for RS-232, or touch switches	1 DB-9 connector for RS-232, or touch switches	1 DB-9 connector for RS-232, or touch switches	1 DB-9 connector for controlling next machine, 1 DB-9 connector for RS-232, or touch switches	1 DB-9 connector for controlling next machine, 1 DB-9 connector for RS-232, or touch switches	1 DB-9 connector for controlling next machine, 1 DB-9 connector for RS-232, or touch switches, accessible audio level trimmer on the back panel
Power consumption	8.7VA	5.8VA	11.5VA.	8.3VA	8.3VA	4.1VA
Weight	2.8 kg. (6.2 lbs.) Approx.	2.5 kg. (5.5 lbs.) Approx.	2.9 kg. (6.4 lbs.) Approx.	2.8 kg. (6.2 lbs.) Approx.	2.6 kg. (5.8 lbs.) Approx.	2.6 kg. (2.8 lbs.) Approx.
Dimensions (H x W x D)	19" x 7" x 1U 48.26 cm x 17.78 x 4.5cm	19" x 7" x 1U 48.26 cm x 17.78 x 4.5cm	19" x 7" x 1U 48.26 cm x 17.78 x 4.5cm	19" x 7" x 1U 48.26 cm x 17.78 x 4.5cm	19" x 7" x 1U 48.26 cm x 17.78 x 4.5cm	19" x 7" x 1U 48.26 cm x 17.78 x 4.5cm
Power Source	230 VAC 50/60 Hz (115VAC U.S.A.).	230 VAC, 50/60 Hz (115VAC U.S.A.)	230 VAC, 50/60 Hz (115VAC U.S.A.)	230 VAC, 50/60 Hz (115VAC U.S.A.)	230 VAC, 50/60 Hz, (115VAC U.S.A.)	230 VAC, 50/60 Hz, (115VAC U.S.A.)

3. HOW DO I GET STARTED?

The fastest way to get started is to take your time and do everything right the first time. Taking 15 minutes to read this manual may save you a few hours later. You don't even have to read the whole manual. At the beginning of each section, you'll find an overview of the section. So if the section doesn't apply to you, you don't have to spend your time reading it.

4. UNPACKING AND CONTENTS

The items contained in your Kramer VS switcher package are listed below. Please save the original box and packaging materials for possible future transportation and shipment of the video switcher.

- Switcher
- AC power cable
- User's Manual
- DB-9 to DB-25 or DB-9 to DB-9 Serial Adapter
- PC-Control Software
- A Concise Directory of KRAMER Products

4.1 Optional Accessories

The following accessories which are available from Kramer, can enhance implementation of your switcher. For information regarding cables and additional accessories, contact your Kramer dealer.

- **BNC "Y" Connector** - Used for looping purposes and splits the incoming signal to enable connection of an additional machine.
- **FC-10D** - (Composite-YC Comb Filter/Transcoder) can be serially connected to the switcher for video format conversion (two popular video formats - composite video and YC (Super-Video)). The decoding from composite to Y/C is done digitally using an adaptive comb filter and DSP techniques to minimize dot-crawl and cross-color. A built-in vertical enhancer circuit reduces noise and dot-crawl on the Y signal. In addition, the **FC-10D** provides an independent Y/C to Composite route, for simultaneous bi-directional operation. The Kramer **FC-10D** is very small in size, and is fed from an external 12VDC supply, thus ideal for fieldwork.
- **FC-4041C** - (Genlock RGB/Component to Composite Video/YC Encoder) can be serially connected to the switcher for video format conversion. It is a full broadcast, state-of-the-art designed for studio and other demanding applications. The **FC-4041C** encodes RGBS or Y, R-Y and B-Y signals to composite video and Super-Video signals. All inputs are looped through with termination switches, allowing parallel connection to other RGBS / Component acceptors. The **FC-4041C** allows the user, via front panel switches, to select whether the Sync is separate or riding on Green. The user can also select whether to convert RGBS or Component (Y, R-Y, B-Y) signals to Composite and Y/C. The outputs are DC coupled and Black-Level clamped.
- **FC-4042** - (RGB-Component Transcoder) can be serially connected to the switcher for video format conversion. It interfaces between the two most widely used professional video formats - component video (Y, R-Y, B-Y) and RGBS. In many video studios and production centers there is a need to convert from one format to the other, and the Kramer **FC-4042** is the perfect choice - as it operates simultaneously in both directions.
- **VM-19N** - (RGB Decoder) can be serially connected to the switcher for video format conversion. It is an industrial level decoder, which converts both composite video and Super-Video to their RGB components.
- **VM-1411** (Video/Balanced Stereo Audio Distribution Amplifier) can be serially connected between the switcher and the acceptors for video and audio distribution. It is a full broadcast, state-of-the-art machine, designed for studio and other applications. The **VM-1411** has two inputs, video and audio, each splitting to 5 outputs. The user may select 2 x 1:5 or 1:10 operation via front panel control switches. Several **VM-1411** units may be chained through the looping inputs. Output signals are (user selectable) DC or AC coupled for highest flexibility. Audio outputs are buffered and isolated from each other, allowing Hi-Fi Balanced audio distribution.

- **SP-11** - (Video/Audio Processor) can be serially connected between the video/audio source and the switcher for video and audio control/correction. The machine provides camera control and luminance/white balance correction. The SP-11 is also capable of performing composite to Y/C conversion and bi-directional transcoding. The machine allows full control over the video signal: video gain down to full fade, log or linear definition control, log or linear contrast control, color saturation control, black level control, red, green and blue controls and a screen splitter control for "before-after" comparison. The Input switch control is "audio-follow-video".
- **VIDEO TESTER** - A new, unique, patented, indispensable tool for the video professional, the video Tester is used to test a video path leading to/from an amplifier. By pressing only one touch switch it can trace missing signals, distinguish between good and jittery (VCR sourced) signals, and identify the presence of good signals. Whenever a video signal is missing, because of bad connections, cable breaks or faulty sources, the video Tester is all you need.

5. KRAMER "VS" SERIES SWITCHERS

This section shows you all of the controls and connections of your switcher. Understanding all of the controls and connections helps you realize its full power. All the switchers described in this manual are equipped with RS-232 Connector (for PC Control) and the connector wiring is described in Figure 9. The "VS" Vertical Interval Switcher series provide truly effortless switching between sixteen, eight, four, or three video, and eight balanced audio inputs to one or two video outputs (and 2 audio outputs). Switching is done during the vertical interval on the video switchers. They may be controlled in two ways: touch buttons on the front panel and RS-232 on the back of the machines. All the units in this line can be interconnected and cascaded. The video signal bandwidth allows the machines to be used in the most demanding applications.

5.1 Getting To Know Your VS-2016 Switcher

The Kramer VS-2016 Vertical Interval Switcher provides truly effortless switching between sixteen composite/ component video input sources and one acceptor. Switching is done during the Vertical Interval for flicker-free switching between synchronized sources. Several VS-2016 machines can be interconnected and cascaded to become 32x1, 48x1 etc. switchers, or connected in parallel to become 16x2, 16x3 etc. The VS-2016 has both RS-232 and touch switch controls. PC control software is also provided. Video output is DC coupled. Front/rear panel features of the VS-2016 are described in Figure 1, Table 1 and Table 2.

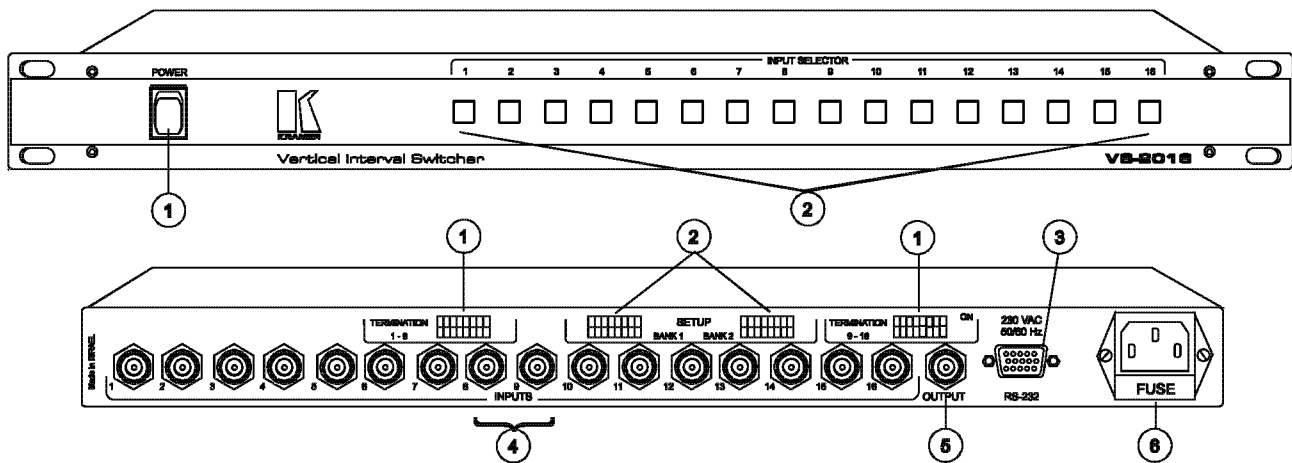


Figure 1: VS-2016 Front/Rear Panel Features

Table 1: VS-2016 Front Panel Features

No.	Feature	Function
1.	Power Switch	Illuminated switch: Supplies power to the unit.
2.	INPUT SELECTOR illuminated Buttons	Each input may be selected by the corresponding input select button. The buttons illuminate when pressed and the illuminated input select button identifies the active input.

Table 2: VS-2016 Rear Panel Features

No.	Feature	Function
1.	TERMINATION switches (1-16)	Switches "on" or "off" the 75ohm termination required when interconnecting video devices. Each input may be individually switched, so that specific video inputs may be looped through to an additional input device. ("ON" = 75ohm, "OFF" = Hi-z)
2.	SETUP DIP switches (BANK 1&2)	Allow proper configuration of the control signals received and transmitted through the RS-232 control port and master/slave configuration and device ID numbers (see section 9.3.1 "Setting the configuration switches").
3.	RS-232 connector	A DB-9 female connector, for bi-directional control of the switcher from a PC or remote control panel.
4.	INPUTS BNC connectors	Video input. Supported formats: composite/component video.
5.	OUTPUT BNC connector	Video outputs that offer same connectors and formats as their respective input
6.	A 3-prong power connector/fuse	A 3-prong AC connector allows power to be supplied to the unit. Directly underneath this connector, a fuse holder houses the appropriate fuse.

5.2 Getting to Know Your VS-2031N Switcher

The KRAMER VS-2031N is a 3x1 Component - RGBS switcher, designed for the most demanding studio applications, as the unit is fully transparent. The VS-2031N allows electronic or RS-232 controlled routing (software included) of one of three component video sources (such as RGBS) to one acceptor.

Designed for broadcast applications, the VS-2031N signal bandwidth exceeds 550MHz. The switcher is designed to operate in the reverse direction as well (upstream).

Front/rear panel features of the VS-2031N are described in Figure 2 and Table 3.

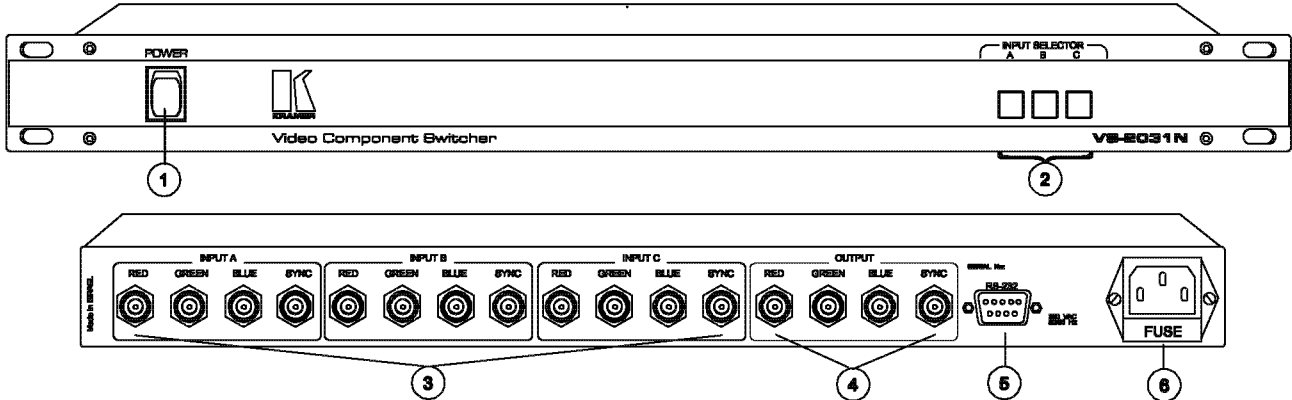


Figure 2: VS-2031N Front/Rear Panel Features

Table 3: VS-2031N Front/Rear Panel Features

No.	Feature	Function
1.	Power Switch	Illuminated switch: Supplies power to the unit.
2.	INPUT SELECTORS (A, B, C) illuminated Buttons	Each input may be selected by the corresponding input select button. The illuminated input select button identifies the active input. The buttons illuminate when pressed.
3.	INPUT A, B, C (Red, Green, Blue Sync). BNC connectors	Video input signal. Supported input formats: Red, Green, Blue and Sync/ Red, Green+ Sync, Blue/R-Y, B-Y, Y.
4.	OUTPUT BNC connector	Video outputs that offer same connectors and formats as their respective input
5.	RS232 CONNECTOR	A DB-9 female connector, for bi-directional control of the switcher from a PC or remote control panel.
6.	A 3-prong power connector/fuse	A 3-prong AC connector allows power to be supplied to the unit. Directly underneath this connector, a fuse holder houses the appropriate fuse.

5.3 Getting To Know Your VS-2042 Switcher

The KRAMER VS-2042 is a 4x2 Video Component Matrix, designed for the most demanding studio applications. The VS-2042 switches during the vertical interval for live studio operation. The VS-2042 has a built-in RS-232 interface for computer controlled operation, (software included) and several machines may be operated simultaneously via PC control. Designed for broadcast applications, the VS-2042 signal bandwidth exceeds 75MHz. The machine has DC coupled inputs and outputs for highest signal quality. Y, R-Y, B-Y or R, Gs, B signals are seamlessly routed with the VS-2042.

Front/rear panel features of the VS-2042 are described in Figure 3 and Table 4.

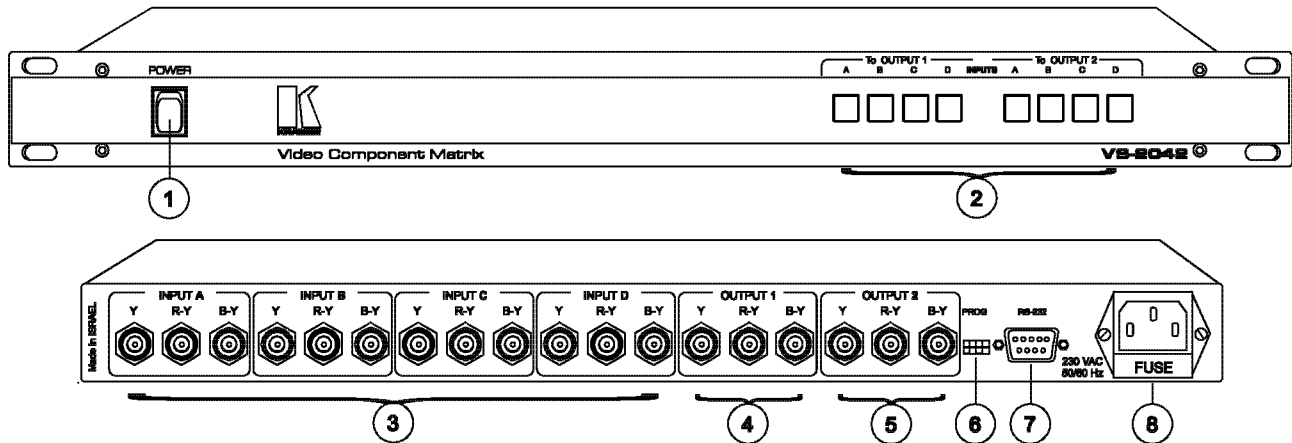


Figure 3: VS-2042 Front/Rear Panel Features

Table 4: VS-2042 Front/Rear Panel Features

No.	Feature	Function
1.	Power Switch	Illuminated switch: Supplies power to the unit.
2.	TO OUTPUT 1 & 2 input select illuminated buttons(A, B, C, D)	Allow inputs to be routed to either of two outputs. Inputs "A", "B", "C" and "D" can be individually selected for either of Output groups 1 or 2. The buttons illuminate when pressed.
3.	A, B, C, D INPUTS BNC connectors (Y, R-Y, B-Y)	Correspond to front panel input select. Supported Input Formats: Y, R-Y, B-Y/R, Gs, B.
4.	OUTPUT 1 Connector (Y, R-Y, B-Y)	Video outputs that offer same connectors and formats as their respective input.
5.	OUTPUT 2 Connector(Y, R-Y, B-Y)	A second set of output connectors, as in "Output 1", and supports the same formats. The input routed to this output may independently be selected from the front panel.
6.	PROG DIPSWITCHES	Allow proper configuration of the control signals received and transmitted through the RS-232 control port, master/slave configurations, and device ID numbers (see section 9.3.1 "Setting the configuration switches").
7.	RS232 CONNECTOR	A DB-9 female connector, for bi-directional control of the switcher from a PC or remote control panel.
8.	A 3-prong power connector/fuse	A 3-prong AC connector allows power to be supplied to the unit. Directly underneath this connector, a fuse holder houses the appropriate fuse.

5.4 Getting To Know Your VS-2053 Switcher

The KRAMER VS-2053 is a 3x1 Video 5-Component/RGBHV Switcher, designed for the most demanding presentation and studio applications. The VS-2053 allows the user to decide whether to switch during the vertical interval or perform a pre-programmed delayed switch between non-genlocked sources. The VS-2053 has a built-in RS-232 interface for computer controlled operation, (software included) and several machines may be operated simultaneously via PC control. The VS-2053 signal bandwidth exceeds 400MHz making it appropriate for use with all analog and SDI video signals. The machine has DC coupled inputs and outputs for highest signal quality.

Front/rear panel features of the VS-2053 are described in Figure 4, Table 5 and Table 6.

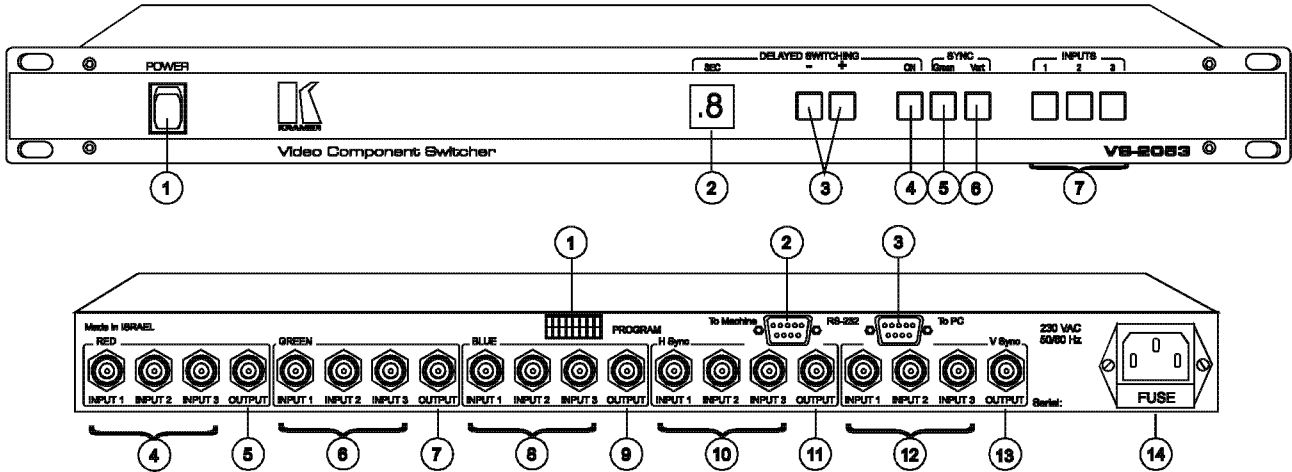


Figure 4: VS-2053 Front/Rear Panel Features

Table 5: VS-2053 Front Panel Features

No.	Feature	Function
1.	Power Switch	Illuminated switch: Supplies power to the unit.
2.	SEC display window	Displays the delayed switching rate (in seconds)
3.	"+" "-" DELAYED SWITCHING buttons	Supports delayed switching operation, for use with non-synchronized sources. The delayed switching function allows elimination of switching interference at the output device.
4.	DELAYED SWITCHING ON illuminated button.	Activates the delayed switching function when pressed. Illuminates when pressed.
5.	Green SYNC Format illuminated button.	Allows manual selection of the source's sync configuration. Pressed= signal is retrieved from the Green input (when sync is on green). Illuminates when pressed.
6.	Vert SYNC Format illuminated buttons.	Allow manual selection of the source's sync configuration (pressed=sync signal is retrieved from the Vertical sync input). Illuminates when pressed.
7.	INPUTS 1, 2, 3 illuminated buttons	Each input may be selected by the corresponding input select button. An illuminated input select button identifies the active input when pressed.

Table 6: VS-2053 Rear Panel Features

No.	Feature	Function
1.	PROGRAM DIP switches	Allow proper configuration of the control signals received and transmitted through the RS-232 control port, master/slave configurations, and device ID numbers. This allows the switchers to operate independently, or in conjunction with each other (see section 9.3.1 "Setting the configuration switches").
2.	To Machine DB-9 daisy chain connector,	Other Kramer switchers can be linked for addressable control from a control panel or computer. If several machines are to be controlled in parallel, connect the DB-9 male to male flat cable from the " TO NEXT MACHINE " connector of the first (MASTER) unit to the RS232 socket on the next machine and so on.
3.	RS-232 DB-9 Control Connector	Used for bi-directional control of the switcher from a PC or remote control panel.
4.	INPUT 1-3 BNC connectors (RED)	Video input that corresponds to the front panel input select buttons. Supported Input Format: RED .
5.	OUTPUT RED BNC connector	RED video output that is identical to its' respective input.
6.	INPUT 1-3 BNC connectors (GREEN)	Video input that corresponds to the front panel input select buttons. Supported Input Format: GREEN .
7.	OUTPUT GREEN BNC connector	GREEN video output that is identical to its' respective input.
8.	INPUT 1-3 BNC connectors (BLUE)	Video input that corresponds to the front panel input select buttons. Supported Input Format: BLUE .
9.	OUTPUT BLUE BNC connector	BLUE video output that is identical to its' respective input.
10.	INPUT 1-3 BNC connectors (H sync)	Video input that corresponds to the front panel input select buttons. Supported Input Format: Horizontal sync .
11.	OUTPUT Hsync BNC connector	Horizontal sync video output that is identical to its' respective input.
12.	INPUT 1-3 BNC connectors (V sync)	Video input that corresponds to the front panel input select buttons. Supported Input Format: Vertical sync .
13.	OUTPUT V sync BNC connector	Vertical sync video output that is identical to its' respective input.
14.	A 3-prong power connector/fuse	A 3-prong AC connector allows power to be supplied to the unit. Directly underneath this connector, a fuse holder houses the appropriate fuse.

5.5 Getting To Know Your VS-2081S Switcher

The VS-2081S Vertical Interval Switcher provides effortless switching between eight s-Video (Y/C) inputs and two parallel sets of video outputs. Switching is during the Vertical Interval for flicker-free switching between synchronized sources. Several VS-2081S machines may be interconnected and cascaded to become 16x1, 24x1 switchers or looped through to become 8x2, 8x3 etc. switchers. The built-in software allows several machines to be operated in parallel, to create an 8x1 component switcher by using the Y and C channels for individual components. The VS-2081S has both RS-232 and touch switch controls and video outputs are DC coupled. PC control software is also provided. Front/rear panel features are described in Figure 5 and Table 7.

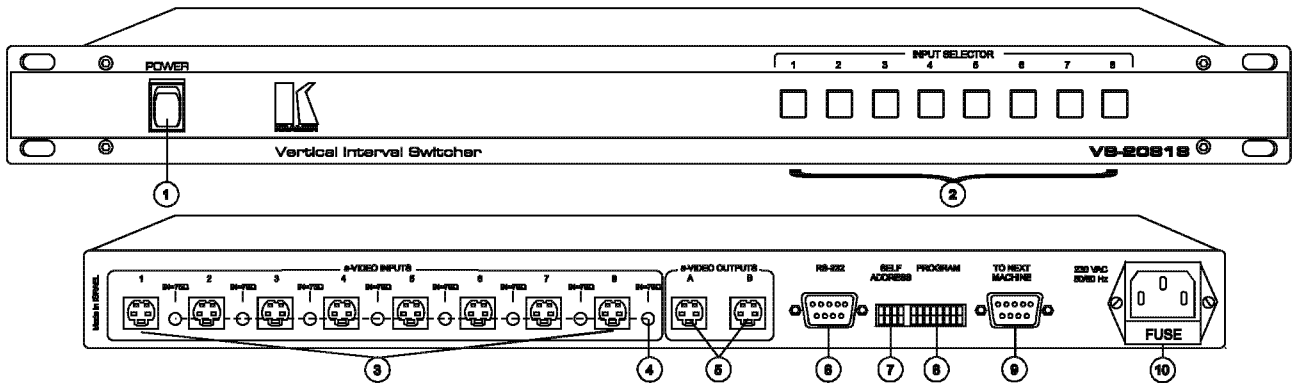


Figure 5: VS-2081S Front/Rear Panel Features

Table 7: VS-2081S Front/Rear Panel Features

No.	Feature	Function
1.	Power Switch	Illuminated switch: Supplies power to the unit.
2.	INPUT SELECTOR 1-8 illuminated buttons	Each input may be selected by the corresponding input select button. An illuminated input select button identifies the active input when pressed.
3.	VIDEO INPUTS 1-8 4-Pin DIN connectors	Video inputs that correspond to the front panel input select buttons, Supported Input Formats: Y/C.
4.	IN=75ohm termination switches (1-8)	Selects "75ohm" or "HI-z" impedance (pressed=75ohm). For looping select "Hi-z".
5.	VIDEO OUTPUTS A, B 4-Pin DIN Connectors	Video outputs that offer same connectors and formats as their respective input.
6.	RS-232 DB-9 Control Connector	Used for bi-directional control of the switcher from a PC or remote control panel.
7, 8	SELF ADDRESS, PROGRAM DIP switches	Allow proper configuration of the control signals received and transmitted through the RS-232 control port, master/slave configurations, and device ID numbers. This allows the switchers to operate independently, or in conjunction with each other (see section 9.3.1 "Setting the configuration switches").
9.	To Next Machine DB-9 daisy chain connector	Used for looping to the next switcher.
10.	A 3-prong power connector/fuse	A 3-prong AC connector allows power to be supplied to the unit. Directly underneath this connector, a fuse holder houses the appropriate fuse.

5.6 Getting To Know Your VS-2481 Switcher

The KRAMER VS-2481 Balanced Audio Switcher provides truly effortless switching between eight-Balanced Audio inputs and two parallel sets of Balanced Audio outputs. Switching is performed by a built-in microprocessor and maybe controlled by either using the 8 front-panel touch switches or via the built-in RS-232 interface. Several VS-2481 machines may be interconnected and cascaded to become 16x1, 24x1 switchers or looped through to become 8x2, 8x3 etc. switchers. The built-in software allows for parallel operation of several VS-2481 machines or a combination of VS-2481 and VS-2081S or VS-801/XL machines for video/audio applications. PC control software is also provided. Front/rear panel features of the VS-2481 are described in Figure 6 and Table 8.

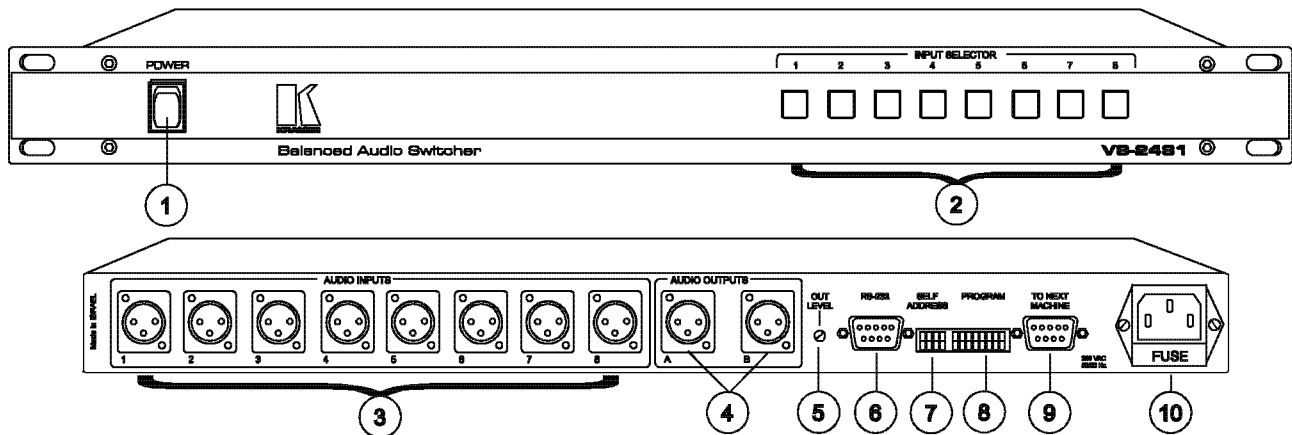


Figure 6: VS-2481 Front/Rear Panel Features

Table 8: VS-2481 Front/Rear Panel Features

No.	Feature	Function
1.	Power Switch	Illuminated switch: Supplies power to the unit.
2.	INPUT SELECTOR 1-8 illuminated buttons	Each input may be selected by the corresponding input select button. An illuminated input select button identifies the active input when pressed.
3.	AUDIO INPUTS 1-8 XLR Male connectors	Audio inputs that correspond to the front panel input select buttons. Supported Input Formats: balanced audio signal.
4.	AUDIO OUTPUTS A, B XLR Male Connectors	Balanced audio outputs identical to the inputs.
5.	OUT LEVEL trimmer	Adjusts the audio output level of output "A" (OUTPUT "B" is unaffected by this adjustment!
6.	RS-232 DB-9 Control Connector	Used for bi-directional control of the switcher from a PC or remote control panel.
7.	SELF ADDRESS DIP switches	Allow proper configuration of the switcher ID numbers.
8.	PROGRAM DIP switches	Allow proper configuration of the control signals received and transmitted through the RS-232 control port, master/slave configurations,.
9.	To Next Machine DB-9 daisy chain connector	Used for looping to the next switcher.
10.	A 3-prong power connector/fuse	A 3-prong AC connector allows power to be supplied to the unit. Directly underneath this connector, a fuse holder houses the appropriate fuse.

6. INSTALLATION

6.1 Rackmounting

Each of the amplifiers included in this manual may be rackmounted in a standard 19" (1U) EIA rack assembly and includes rack "ears" at the ends of the front panel. (The optional VS-2000 controller requires 2U of rack height, at 3.5".) These devices do not require any specific spacing above or below the unit for ventilation. To rackmount any of the switchers, simply place the unit's rack ears against the rack rails of the rack, and insert standard screws through each of the four corner holes in the rack ears.

7. CONNECTING TO VIDEO DEVICES

Video sources (such as cameras and VCRs) and output devices (such as monitors, projectors or recorders) may be connected to the switchers through the connectors located on the back of the unit. Please keep in mind that the input signal format must match that of the output signal format. (Example: If the input is composite video, then the output is composite video.) All signal formats that use more than one interconnecting cable between devices should be of equal length. (Example: RGB cables between a camera and the switcher should be equal in length).

7.1 Connecting to the VS-2016

Video sources and output devices may be connected to the switcher through the BNC connectors located at the back of the machine. Please keep in mind that the output signal format will match that of the input signal format. The VS-2016 supports composite/component signal types (using three machines).

7.2 Connecting to the VS-2031N

Video sources and output devices may be connected to the switcher through the BNC connectors located at the back of the machine. Please keep in mind that the output signal format will match that of the input signal format. All signal formats that use more than one interconnecting cable between devices should be of equal length. The VS-2031N supports component video (R, G, B, S).

7.3 Connecting to the VS-2042

Video sources and output devices may be connected to the switcher through the BNC connectors located at the back of the machine. Please keep in mind that the output signal format will match that of the input signal format. The VS-2042 supports component video (Y, R-Y, B-Y, or R, Gs, B).

7.4 Connecting to the VS-2053

Video sources and output devices may be connected to the switcher through the BNC connectors located at the back of the machine. Please keep in mind that the output signal format will match that of the input signal format. The VS-2053 supports component video (R, G, B, Hs, Vs).

7.5 Connecting to the VS-2081S

Video sources and output devices may be connected to the switcher through the 4p connectors located at the back of the machine. Please keep in mind that the output signal format will match that of the input signal format. The VS-2081S supports Y/C (S-Video) signal types.

8. CONNECTING to AUDIO DEVICES (VS-2481 only)

Audio sources and output devices (such as amplifiers or recorders) may be connected to the VS-2481 switcher through the XLR type connectors located on the back of the unit. Input connections are made using female 3-pin connectors, while output connections are made using male 3-pin XLR connectors. The VS-2081S supports balanced audio signal types.

9. USING the SWITCHER

9.1 Powering on the Switcher

The video switcher should only be powered on after all connections are completed, and all source devices have been powered on. Do not attempt to connect or disconnect any video, audio or control signals to the switcher while it is powered on. The switcher may be powered on by pressing the toggle switch on the far-left front panel to the up position. In the up position, the toggle switch glows red, and the active input button illuminates as well.

9.2 Using the Front Panel Controls

The front panels of Kramer switchers are designed to be simple to operate, and accomplish the basic function of selecting an input source (and output device). Keep in mind that a glowing input button always represents the active input.

9.2.1 Selecting an Input on the VS-2016

Input selection on the VS-2016 is made by pressing any of the buttons marked “1” through “16” on the front panel. These buttons correspond to input connections as marked on the back panel.

9.2.2 Selecting an Input on the VS-2031N

Input selection on the VS-2031N is made by pressing any of the buttons marked “A”, “B” or “C” on the front panel. These buttons correspond to the input connections as marked on the back panel.

9.2.3 Selecting an Input on the VS-2042

Input selection on the VS-2042 is divided into two groups: Outputs 1 and 2 each have four input selections “A”, “B”, “C” and “D”. This allows you to make independent input selections for each output, if needed. These buttons under each output label correspond to the input connections as marked on the back panel.

9.2.4 Selecting an Input on the VS-2053

Input selection on the VS-2053 is made by pressing any of the buttons marked “1”, “2” or “3” on the front panel. These buttons correspond to the input connections as marked on the back panel.

9.2.5 Selecting an Input on the VS-2081S

Input selection on the VS-2081S is made by pressing any of the buttons marked “1” through “8” on the front panel. These buttons correspond to input connections as marked on the back panel.

9.2.6 Selecting an Input on the VS-2481

Input selection on the VS-2481 is made by pressing any of the buttons marked “1” through “8” on the front panel. These buttons correspond to input connections as marked on the back panel.

9.2.7 Selecting the Proper Sync Format (VS-2053 only)

The VS-2053 supports sync-on-green, composite and separate sync configurations. (Please keep in mind that all inputs must share the same input format.) Input sync selection is made using the Sync “Green” and “Vert” buttons on the front panel. For sync-on-green operation, press the “Green” sync button. For RGBS (composite) or RGBHV (separate sync) operation, press the “Vert” sync button. This modifies the input circuit to look for the proper input sync source.

9.2.8 Using Delayed Switching (VS-2053 only)

The VS-2053 supports both vertical interval and delayed switching operation. Vertical interval switching is used when all input sources are synchronized or “genlocked” with each other. If input sources are not synchronized, switching between input sources in vertical interval mode causes brief glitches in the output. Delayed operation compensates for non-synchronized input sources by briefly delaying the switch between inputs after the input select button is pressed. To enable delayed operation, press the “On” button, which illuminates. The LED window also illuminates, displaying a numeric indication of the period of delay (in seconds). Use “+” and “-” buttons to adjust the delay period until the glitch appearing in the output device is minimized while switching between input sources. The range of this adjustment is from 0.1 to 0.9 seconds, then from 1 to 9 seconds.

9.3 Using the Back Panel Controls

The back panels of Kramer switchers described in this manual are designed to be simple to operate, and accomplish the basic function of proper configuration of the switcher ID numbers and to allow proper configuration of the control signals received and transmitted through the RS-232 control port, master/slave configurations. Another function available is the audio level control (VS-2481 model only).

9.3.1 Setting the Configuration Switches

Setting the configuration switches is accomplished through a bank of DIP switches located on the back panel of each switcher. The chart below refers to the settings and configurations for each of the “**Program**” DIP switches. To set the configuration switches, confirm that power to the switcher is removed, and with a small flathead screwdriver, move the dip switches to the appropriate "on" or "off" position as in Table 9 to Table 10. Master/Slave DIP switches configure the switcher for operation in a multiple switcher configuration. If a switcher is operating and being controlled independently, it should be assumed that it is operating in the “**Master**” configuration. If the control ports of multiple Kramer switchers are “daisy-chained”, then one switcher must be configured as the master switcher, or ID number 1, while all others are assigned as slave switchers or an ID other than 1. (Available addresses vary per switcher, but support from 8 up to 16 switchers in a daisy chain configuration. If you desire to control more than one switcher that does not support master/salve configurations, you may do so using the VS-2000 control panel, which offers control of up to 6 switchers or master/slave configurations. For more information, please see Section 9.7 of this manual “Using Remote Control Panels”. Other DIPswitches available on some models allow you to enable or disable bi-directional communication. The RS-232 protocol supported by these Kramer switchers is designed to support bi-directional (transmit and receive) communication. This is desirable, so that the controlling device “knows” that the controlled device has carried out it’s instructions. Some controlling devices do not receive communication, and can only send out or transmit commands. In this scenario, you may want to disable bi-directional communication by disabling “ACK”, or acknowledgement commands.

Table 9: VS-2016 Dip Switches Configuration

BANK 2					BANK 1	
Machine Number	SW4	SW3	SW2	SW1	Switch#6, Switch#7, Switch#8	Switch #5
1.	ON	ON	ON	ON	OFF FOR Slave ON for Master (Machine #1)	OFF Enables reply from switcher to PC. ON Disables reply from switcher to PC.
2.	ON	ON	ON	OFF		
3.	ON	ON	OFF	ON		
4.	ON	ON	OFF	OFF		
5.	ON	OFF	ON	ON		
6.	ON	OFF	ON	OFF		
7.	ON	OFF	OFF	ON		
8.	ON	OFF	OFF	OFF		
9.	OFF	ON	ON	ON		
10.	OFF	ON	ON	OFF		
11.	OFF	ON	OFF	ON		
12.	OFF	ON	OFF	OFF		
13.	OFF	OFF	ON	ON		
14.	OFF	OFF	ON	OFF		
15.	OFF	OFF	OFF	ON		
16.	OFF	OFF	OFF	OFF		

Table 10: VS-2042 Dip Switches Configuration

Machine Number	SW4	SW3	SW2	SW1
1.	ON	ON	ON	OFF (for Slave machines) ON (for Master machine #1)
2.	ON	ON	OFF	
3.	ON	OFF	ON	
4.	ON	OFF	OFF	
5.	OFF	ON	ON	
6.	OFF	ON	OFF	
7.	OFF	OFF	ON	
8.	OFF	OFF	OFF	

Table 11: VS-2053 Dip Switches Configuration

Machine Number	1	2	3	4	5	6	7	8
1. (Master)	OFF	OFF	OFF	OFF	ON	ON	ON	ON
2. (Slave)	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
3. (Slave)	OFF	ON	OFF	OFF	ON	OFF	OFF	OFF
4. (Slave)	ON	ON	OFF	OFF	ON	OFF	OFF	OFF
5. (Slave)	OFF	OFF	ON	OFF	ON	OFF	OFF	OFF
6. (Slave)	ON	OFF	ON	OFF	ON	OFF	OFF	OFF
7. (Slave)	OFF	ON	ON	OFF	ON	OFF	OFF	OFF
8. (Slave)	ON	ON	ON	OFF	ON	OFF	OFF	OFF
9. (Slave)	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF
10. (Slave)	ON	OFF	OFF	ON	ON	OFF	OFF	OFF
11. (Slave)	OFF	ON	OFF	ON	ON	OFF	OFF	OFF
12. (Slave)	ON	ON	OFF	ON	ON	OFF	OFF	OFF
13. (Slave)	OFF	OFF	ON	ON	ON	OFF	OFF	OFF
14. (Slave)	ON	OFF	ON	ON	ON	OFF	OFF	OFF
15. (Slave)	OFF	ON	ON	ON	ON	OFF	OFF	OFF
16. (Slave)	ON	ON	ON	ON	ON	OFF	OFF	OFF

Switch#5	Reply ON/OFF
Switch#6, Switch#7	RS232 hardware control to PC
Switch#8	Vertical sync (distributed from "Master" to all "Slaves").

Table 12: VS-2081S & VS-2481S Dip Switches Configuration

Machine Number	SELF ADDRESS				PROGRAM							
	1	2	3	4	1	2	3	4	5	6	7	8
1. (Master)	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF
2. (Slave)	OFF	OFF	OFF	ON	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF
3. (Slave)	OFF	OFF	ON	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF
4. (Slave)	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF
5. (Slave)	OFF	ON	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF
6. (Slave)	OFF	ON	OFF	ON	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF
7. (Slave)	OFF	ON	ON	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF
8. (Slave)	OFF	ON	ON	ON	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF
9. (Slave)	ON	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF
10. (Slave)	ON	OFF	OFF	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF
11. (Slave)	ON	OFF	ON	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF
12. (Slave)	ON	OFF	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF
13. (Slave)	ON	ON	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF
14. (Slave)	ON	ON	OFF	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF
15. (Slave)	ON	ON	ON	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF
16. (Slave)	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF

For audio follow video or parallel operation:

Machine Number	SELF ADDRESS				PROGRAM							
	1	2	3	4	1	2	3	4	5	6	7	8
1 (Master)	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF
Follow (2)	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	ON
Follow (3)	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	ON

For a 16 x 1 or 24 x 1 etc. configuration:

Machine Number	SELF ADDRESS				PROGRAM							
	1	2	3	4	1	2	3	4	5	6	7	8
1 (Master)	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	OFF	ON	OFF
2	OFF	OFF	OFF	ON	OFF	OFF	ON	ON	ON	OFF	ON	OFF
3	OFF	OFF	ON	OFF	OFF	OFF	ON	ON	ON	OFF	ON	OFF

9.3.2 Controlling the Audio Level (VS-2481 only)

The trimmer is located and accessed on the back side of the switcher. It allows you, if necessary, to adjust the audio output signal level, by using a small flathead screwdriver, until a satisfactory level is achieved.

9.4 Switching Component Video/RGB

One of the most common video formats is component video. Switching three or four signals (components) simultaneously is sometimes a complicated task, especially when video production is involved. Figure 7 describes a typical component video/RGB setup (VS-2031N e.g.) where every signal is composed of several (3-4) sub signals (components) which should be switched together. Perform the following steps (if necessary):

- 1) Connect all component sources to the appropriate inputs of the switcher.
- 2) Connect all component video acceptors to the outputs of the switcher.
- 3) Operate the switcher, sources and acceptors.
- 4) Select the required video input to be switched, using front panel input selector pushbuttons.

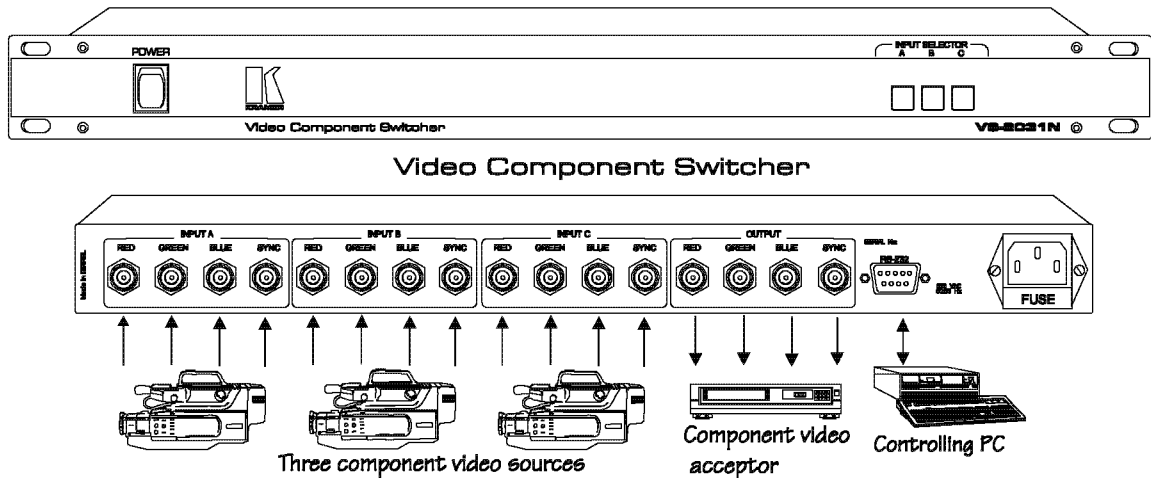


Figure 7: Switching Component Video/RGB

9.5 Adding Inputs (VS-2016, VS-2081S, VS-2481 only)

In order to add inputs connect all the output sockets via "T" connectors and chain the machines via RS-232 flat cable as described in Figure 8. No termination control is needed, as it is done automatically by the machine. When a machine is to be extended in both directions, both inputs and outputs are paralleled. Set the Dipswitches in the appropriate position as described in Table 9 and Table 12.

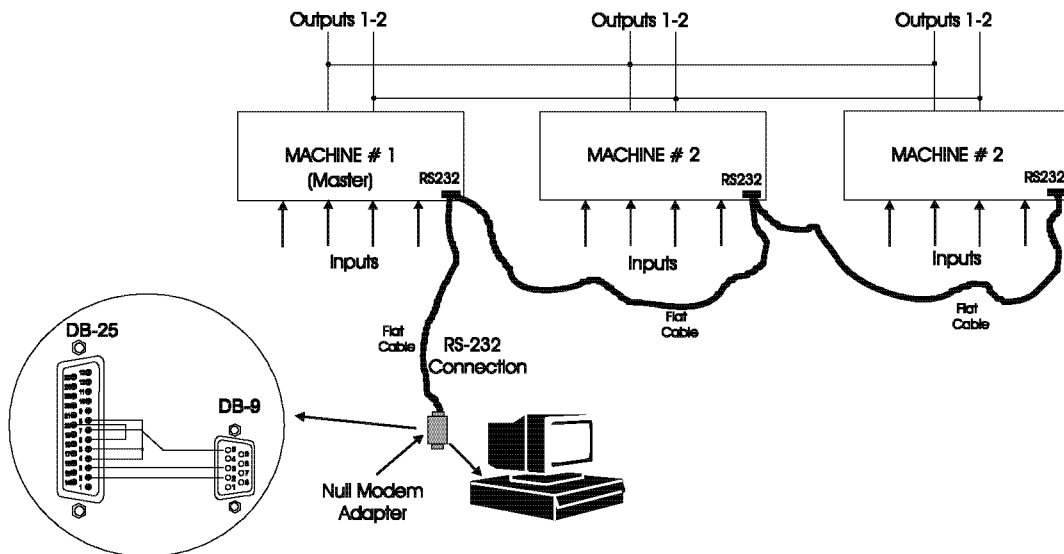


Figure 8: Extending the Inputs

10. REMOTE CONTROL OPERATION

10.1 The VS-2000 Control Panel

The VS-2000 Control Panel is an option for your switcher, designed for broadcast and industrial studio and presentation applications (available from Kramer). The VS-2000 allows access and control over 6 Kramer switchers or 6 master/slave configurations. The internal program can be easily changed or updated, as the machines provide easy access to the switcher EPROM through the back panel. Each of the 6 control ports can be assigned to communicate with a specific Kramer switcher, so that commands can be understood by the switcher when executed from the front panel of the VS-2000 or from a PC connected to the VS-2000. The VS-2000 can store internally and recall various setups for convenient studio control, and offers features, such as RS-422/485 connection to video production switchers and other studio equipment. For more details on these applications, please reference the separate user manual that comes with your VS-2000 Control Panel. Connections made between the VS-2000 and the Kramer switcher are made using a DB-9 9-pin connection cable. This cable should be wired straight through. If a PC is to be used in conjunction with your VS-2000 control panel, this cable should be wired as shown in Figure 9 and connected to the port on the back of the VS-2000 marked "To PC".

10.2 Connecting to a PC or Compatible System

Connections made between your switcher and a PC are accomplished using your computer's RS-232 communication port. This port is either a DB-9 9-pin port or DB-25 25-pin port. The cable connecting your switcher to the PC should be wired as shown in Figure 9. A 9-25 pin adapter or 9-9 pin adapter is included for your convenience. Please keep in mind that it is not recommended to extend an RS-232 signal beyond a length of 25 feet, without the use of an RS-232 to RS-422 protocol converter at both the PC and the switcher.

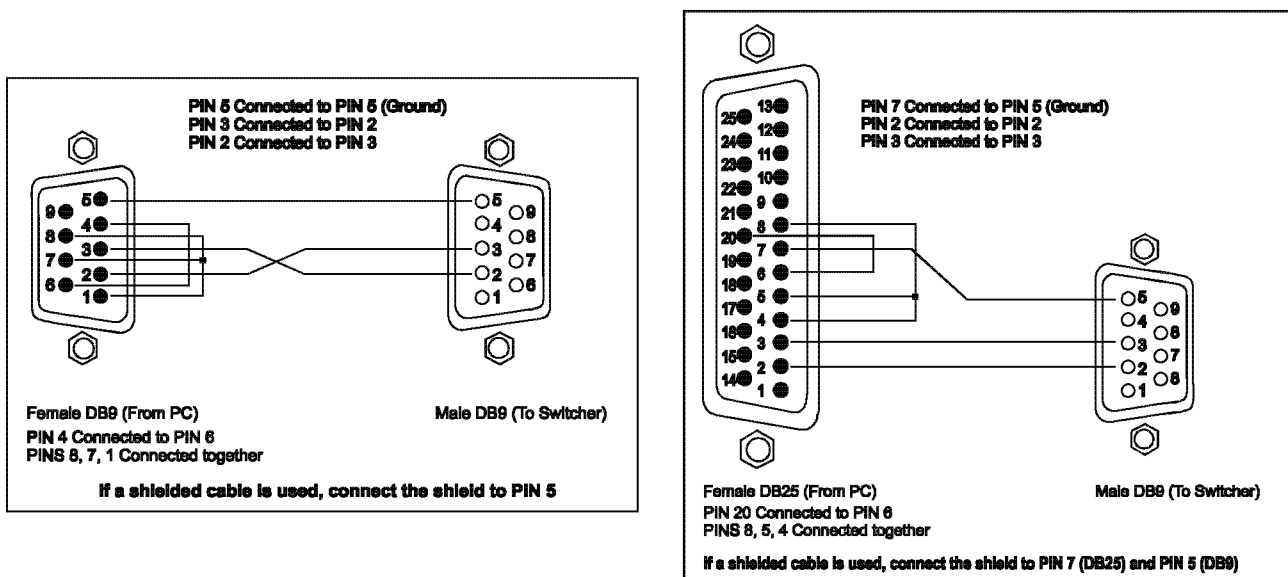


Figure 9: RS-232 Control Connector Wiring

Figure 10 describes a typical implementation of the switchers described in this manual (VS-2042 in this case): One of the most popular devices used in presentation and lecturing is the wide screen projector, allowing to display video and data in front of a large audience. Most of high quality projectors use component/RGB inputs in order to achieve highest image quality on the screen. In many cases, several sources and even several projectors are used at the same time, preferably PC controlled.

Perform the following steps (if necessary):

- 1) Connect all component sources to the appropriate inputs of the switcher.
- 2) Connect all component video acceptor to the outputs of the switcher.
- 3) Operate the switcher, sources and acceptors.
- 4) Select the required video input to be switched, using front panel input selector pushbuttons.

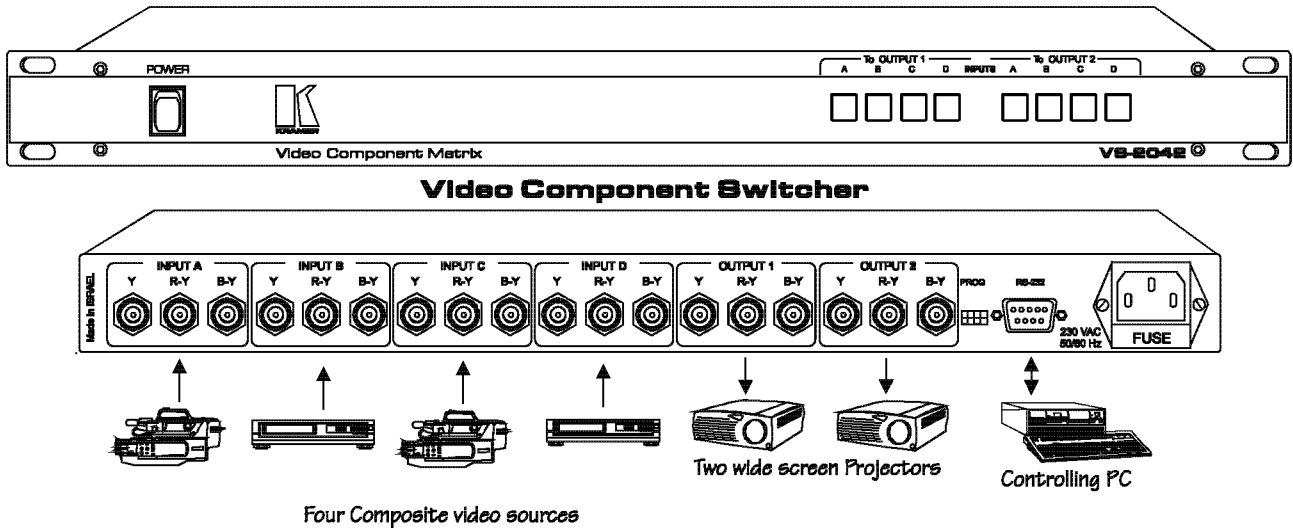


Figure 10: Connecting a Component Video Matrix for Presentation Applications

10.3 Using the VS-2000 Remote Control Panel

After connecting all switcher control cables, PC control cables and the DC adapter to the VS-2000, you may power up the connected video switchers, then power on the VS-2000. Upon applying power, the power button, the LCD window on the left side of the front panel and three LED windows on the right side of the front panel all illuminate. The LCD window briefly displays the following information:

Kramer Electronics
VS-2000 VER. 1.4B

(Depending on the version of the EPROM installed in your VS-2000, your display may indicate a later version.) The illumination of the LCD disappears after a few seconds, but returns when any front panel button is pressed. After the initial boot-up display, the LCD window displays the following information:

OPERATE...
1 - [Switcher Model]

In addition, the LED windows on the right side of the switcher front panel displays the following:

PORT	MACHINE	INPUT	OUTPUT
1	1	01	01

“PORT” indicates the control port number (1-6) active on the back of the VS-2000. “MACHINE” indicates the master or slave switcher number that is active on that port. If only one switcher is connected to that specific port, then this number should always appear as “1”. “INPUT” indicates the input that is selected on the active switcher, whether selected from the VS-2000 controller, the switcher front panel, or a PC. The input number may not exceed the maximum number of inputs on the connected switcher. “OUTPUT” indicates the output that is selected on the active switcher, whether selected from the VS-2000 controller, the switcher front panel, or a PC. The output number may not exceed the maximum number of outputs on the connected switcher. A flashing LED at the bottom of one of the LED windows indicates the function that is presently active for modification. The switcher type connected to each control port must be assigned for proper configuration. To select the switcher type, press the left arrow key until the flashing LED appears to the right of the port number. Press the up or down key until the port number that you want to configure appears. Press “ENT”, then “ESC” and a new menu appears on the LCD window, displaying the following information:

1) SET UP >
2) OPERATE >

A flashing cursor appears over the "1)" indication. Press **ENT** to select the setup function. The following window appears:

1) PORT 3 2) MACHINE [Model Number]
--

Press the down arrow to select the "2)" function. You are now presented with a list of possible switcher model numbers. Press the up and down buttons to scroll through them, until you find the appropriate model number. Press **ENT** to select this switcher model. This returns you to the previous menu, indicating the port number and machine model. Press **ESC** to return to the **SETUP** and operate menus. Press the down key, then **ENT** to select the **OPERATE** function, which returns you to normal operation. All settings are automatically saved. In normal mode, you may use the left and right arrows to move the blinking LED to the right of the **INPUT** window. Inputs may be selected by using the up or down keys to toggle to the appropriate input number, or manually key them in on the numeric keypad. Either method requires you to press **ENT** to finalize your selection. (The **INPUT LED** blinks until **ENT** is pressed.) A number in excess of the maximum number of inputs on the selected switcher can not be selected. When using the VS-2042, you may use the left and right arrows to move the blinking LED to the right of the **OUTPUT** window. Outputs may be selected by using the up or down keys to toggle to the appropriate output number, or manually key them in on the numeric keypad. Either method requires you to press **ENT** to finalize your selection. (The **OUTPUT LED** blinks until **ENT** is pressed.) A number in excess of the maximum number of outputs on the selected switcher can not be selected.

NOTE

For more information on using the VS-2000, refer to the separate user manual enclosed with your VS-2000 Control Panel.

10.4 PC Control Software

10.4.1 Installation

NOTE

The PC Control Software is named "K-switch" for all the switchers described in this manual, except for the VS-2053's software which is called "2053"!

To install the Control Software perform the following steps:

- 1) Insert the program diskette #1 into the floppy drive of your PC.
- 2) Run from within Windows95 the Setup.exe file on the first diskette and follow the instructions.
- 3) The **K-switch** software & icon) is automatically installed in a specific destination folder on the hard disk.
- 4) Once the **K-switch** program ends its installation procedure, it is ready for its first run.

10.4.2 Software Controls

The software controls function as described below:

◆ **Machine Number** (where applicable)

The number of the machine in a group of chained switchers, where each machine can be addressed individually using this option. Note that machine number "1" is always the Master.

◆ **In/Input Selector** buttons

When clicked, selects the active inputs to be connected to the outputs. The input button default color is yellow and it turns red when connected (clicked).

◆ **Out/Output** buttons (where applicable)

This function is used in switchers with more than 1 output. Numbers, buttons and descriptions of corresponding outputs of the active switcher that are to be connected with the different inputs.

◆ **OFF** button (where applicable)

When clicked, disconnects the output and then the red active input button turns yellow again.

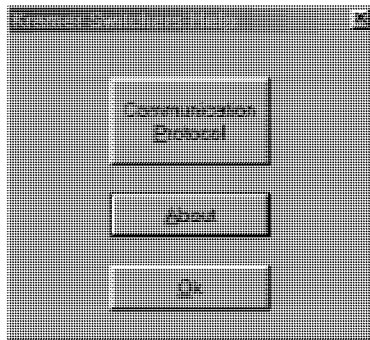
◆ **Save** button

When clicked, saves the current configuration of all the chained switchers: To save configuration: click on **Save** and finally click on the desired **Setup Window Number**. Note that after clicking Save, the selected blinks in red when occupied and in green when its free. The saved setup can be recalled by clicking the **Recall** button.

NOTE

Canceling Save/Recall functions and deactivating Setup Window Number can be done by clicking Save/Recall buttons once again or by clicking the right button of the mouse.

- ◆ **Recall button**
When clicked recalls and displays on the screen a saved configuration (via the **Save** function) of all the chained switchers. To recall a configuration, click on **Recall** button and then select the desired **Setup Window Number**.
- ◆ **Switcher button**
When clicked, allows you to select a different switcher model.
- ◆ **Port button**
Defines the active serial port (COM1-COM4) to which the switcher/matrix is connected. To select a port, click on the **Port** button. When **Port** screen appears, select the desired port and then click **Ok**. Switching a number from 1-4 followed by clicking **Save** button, changes the active port number.
- ◆ **Restart button**
Displays the current configuration of the connected switcher on the screen.
- ◆ **Help button**
When clicked, a **Kramer Switchers Help** screen appears allowing you to view either the Communication protocol (by clicking the **Communication protocol** button), or the current software version (by clicking **About**). Click **Ok** after the selection is complete.



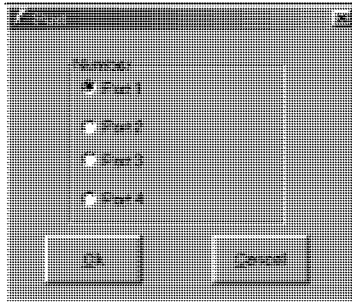
- ◆ **Exit button**
When clicked, allows you to exit the program. You are prompted if you really want to exit.
- ◆ **Input Description Labels**
Used by the operator to name a selected input. The input name is saved when the **Save** button is clicked.
- ◆ **Setup Description Labels**
Used by the operator to name each setup. The setup names correspond to the **Setup** window numbers and are stored when the **Save** button is clicked.

10.4.3 Using the PC Control Software

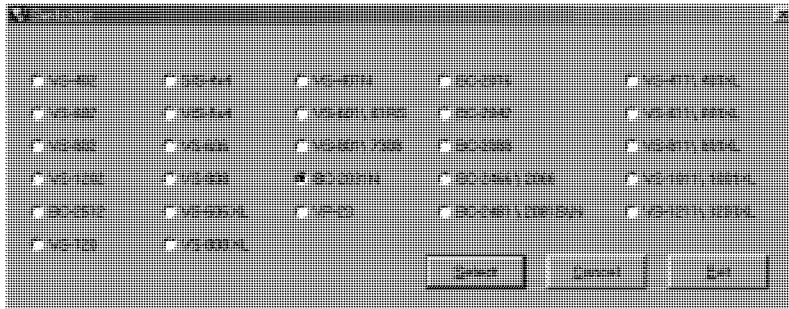
Included with your switcher are diskettes with software drivers for the following products as shown in the following **Switcher** screen:

After installing the program perform the following steps (The VS-2031N is an example in this case):

- 1) Connect your switcher or matrix to an identified serial port of the PC.
- 2) Turn on the switcher/matrix.
- 3) Open the folder where the program was installed (the default folder is named **K-Switch**) and double click on the **K-switch** icon. You may create a shortcut to the program and locate it in a convenient location.
- 4) When the program is launched **for the first time**, the **Port** screen appears together with the **Switcher** screen. Select the active serial port (COM1-COM4) to which the switcher/matrix is connected and then click **Ok**. The **Port** screen disappears and the **Switcher** screen remains.



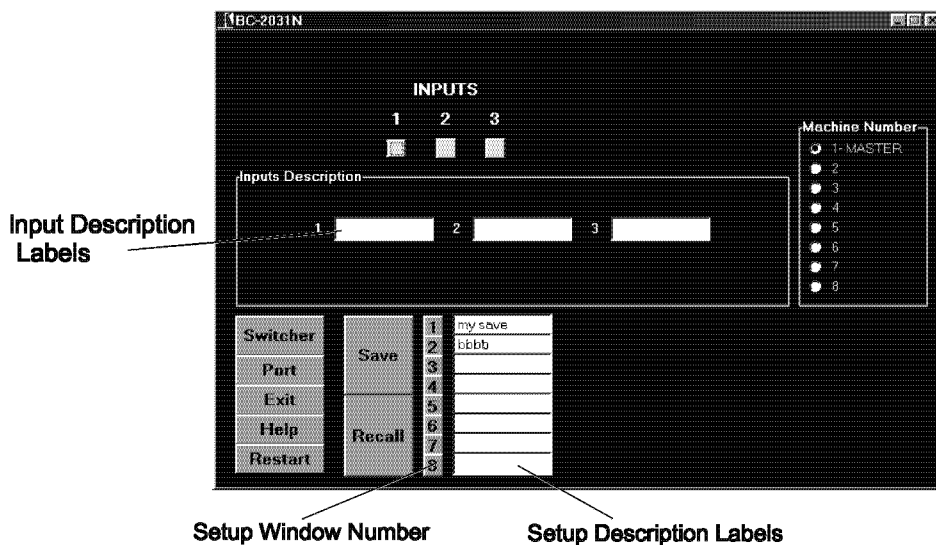
- 5) Select the desired switcher model and then click **Select** button to confirm your selection.



NOTE

If the program was launched before, the Main Menu appears immediately with the previously saved configuration!

- 6) The **Main Menu** (with the switcher model number on top) appears.



- 7) If properly connected and with the right COM selected, you can identify your switcher and view an image representing its control panel on the PC monitor (with the current configuration).
- 8) If the COM or switcher are not properly selected, "**Communication Error**" message appears.



- 9) To exit the program, click the "**Exit**" button. You are prompted if you really want to exit.

NOTE

When clicking "Exit", the program automatically stores the active port number and your switcher ID. When the

program is run again, this port and switcher ID automatically appear.

11. TAKING CARE OF YOUR SWITCHER

Do not locate your switcher in an environment where it is susceptible to dust or moisture. Both of these may damage the electronics, and cause erratic operation or failure. Do not locate your switcher where temperature and humidity may be excessive. Doing so may also damage the electronics, and cause erratic operation or failure of your switcher. Do not clean your switcher with abrasives or strong cleaners. Doing so may remove or damage the finish, or may allow moisture to build up. Take care not to allow dust or particles to build up inside unused or open connectors.

12. TROUBLESHOOTING

NOTES

1. *Please note that if the output signal is disturbed or interrupted by very strong external electromagnetic interference, it should return and stabilize when such interference ends. If not, turn the power switch off and on again to reset the machine.*
2. *If the recommended actions still do not result in satisfactory operation, please consult your KRAMER Dealer.*

12.1 Power And Indicators

Problem	Remedy
No power	<ol style="list-style-type: none"> 1. Confirm that the rocker switch is in the "ON" position, and that the lamp is illuminated. 2. Confirm that power connections are secured at the amplifier and at the receptacle. Make sure the receptacle is active, outputting the proper mains voltage. 3. If there is still no power, check the fuse. Remove power cord from the AC outlet and from the machine and then, using a flat head screwdriver, remove the fuse holder located directly below the power connector. Confirm that the fuse is good by looking at the wire connected to the ends of the fuse. If the wire is broken, replace the fuse with another.

12.2 Video Signal

Problem	Remedy
No video at the output device, regardless of input selected.	<ol style="list-style-type: none"> 1. Confirm that your sources and output device are powered on and connected properly. Video signals connected to the input of your switcher should be of an identical signal format at the output of your source. Video signals at the output of your switcher should be of an identical signal format as at the input of your display or recorder. 2. Confirm that any other switchers in the signal path have the proper input and/or output selected. 3. Use the Video Tester to test the video path leading to/from your switcher (see section 4.1 "Video Tester")
Video level is too high or too dim.	<ol style="list-style-type: none"> 1. Verify that the video line is well matched through 75ohm impedance, otherwise it results in a video level that is too high or too dim when looping is performed and the termination switches are not in proper position. 2. Confirm that the connecting cables are of high quality, properly built and terminated with 75ohm BNC connectors. Check level controls located on your source input device or output display or recorder.

Problem	Remedy
<p>Noise bars are “rolling” up or down in the output image</p> <p>or:</p> <p>Low frequency hum in the output signal</p>	<p>Hum bars (ground loop) are caused by a difference in the ground potential of any two or more devices connected to your signal path. This difference is compensated by passing that voltage difference through any available interconnection, including your video cables.</p> <p style="text-align: center;">WARNING! <i>Do not disconnect the ground from any piece of video equipment in your signal path!</i></p> <p>Check the following to remove hum bars:</p> <ol style="list-style-type: none"> 1. Confirm that all interconnected equipment is connected to the same phase of power, if possible. 2. Remove equipment connected to that phase that may introduce noise, such as motors, generators, etc. 3. Disconnect all interconnect cables and reconnect them one at a time until the ground loop reappears. Disconnect the affected cable and replace, or insert an isolation transformer in the signal path.

12.3 Audio Signal (VS-2481 only)

Problem	Remedy
No audio at the output device, regardless of input selected	<ol style="list-style-type: none"> 1. Confirm that your sources and output device are powered on and connected properly. Audio signals connected to the input of your switcher should be properly wired to the output of your source. Audio signals connected to output of your switcher should be properly wired to the input of your switcher or recorder. 2. Confirm that any other switchers in the signal path have the proper input and/or output selected.
Audio level is too low	<ol style="list-style-type: none"> 1. Confirm that the connecting cables are of high quality and properly built. Take special care in noting the wiring configuration of balanced to unbalanced cables. 2. Check level controls located on your source input device or output display or recorder. 3. Using a flathead screwdriver, gently try to adjust the audio level, using the trimmer on the back side of the machine (see Section 9.3.2)

12.4 Control

Problem	Remedy
No control of switcher from VS-2000 control panel	<ol style="list-style-type: none"> 1. Confirm that the connecting cable is wired for pins 1-9 straight through. 2. Confirm that all DIP switches on the switcher have been set properly. Keep in mind that if you are only controlling one switcher on a specific port, that switcher must be assigned the ID of “1”. 3. If controlling more than one switcher on a single port, all switchers must be of the same type and power to all switchers must be on. 4. Confirm that you have the proper machine number and control port selected on the VS-2000. For instance, if you are controlling a single machine on port 1, then both of these should be set to “1”. 5. Confirm that you have the proper switcher type selected on the VS-2000. If not, go back to Section 9.6 of this manual “Using the VS-2000 Remote Control Panel”.

Problem	Remedy
No control of switcher from PC software	<ol style="list-style-type: none"> 1. Confirm the wiring of the connecting cable. This pin configuration may be found in Figure 10. Cable length should not exceed 25 feet. 2. Confirm that all DIP switches on the switcher have been set properly. Keep in mind that if you are only controlling one switcher on a specific port, that switcher must be assigned the ID of "1". 3. If controlling more than one switcher on a single port, all switchers must be of the same type and power to all switchers must be on. 4. Confirm that the baud rate of your computer COM port is set to the same as that of your switcher (9600-Baud). Confirm that the proper COM port is selected in the control software. 5. Confirm that bi-directional communication is enabled on all switchers. Please refer to Section 9.3.1 "Setting the Configuration Switches" for proper configuration for your switcher. 6. With custom software, do not send multiple commands at the same time. The switcher must complete one command before receiving another. 7. Confirm that the computer you are using supports true RS-232C protocol. Computers such as the Apple Macintosh do not!

12.5 Switching Malfunctions

Problem	Remedy
The switcher succeeds in switching a number of sources then fails to switch one	<p>Malfunction in the particular source or cable assembly.</p> <p style="text-align: center;">NOTE <i>The most common failure mode in transferring the signal of an audio source is a break in the connecting wire.</i></p> <p>Disconnect the source from a channel that is switching successfully and connect the suspect source to it. If the channel continues to switch successfully, then there is something wrong with the switcher or the suspect source was not connected properly. If it does not continue to switch successfully, then there is something wrong with the source or cable assembly. Check them.</p>
The switcher turns ON but will not switch at all	One of the two flat cables leading from the main board to the control board may be disconnected and the switch command is not being transferred to the switcher.

13. PROTOCOL USED for the VS-2016 COMMUNICATION

The protocol used for communication between the PC and the VS-2016 is done using two bytes of information as defined below. The rate of data is 9600 baud with no parity, 8 data bits and one stop bit.

1st byte

				ADDRESS			
0	X	0	0	X	X	X	X
N7	N6	N5	N4	N3	N2	N1	N0

2nd byte

COMMAND				DATA			
0	X	0	0	X	X	X	X
N7	N6	N5	N4	N3	N2	N1	N0

13.1 Detailed Description

1st byte

N3N2N1N0 = Describe the number of the machine being addressed.

N6 = Destination bit. When sending a message from the PC (i.e. to machine) this bit must be "0". When the machine sends a message to the PC, this bit must be "1".

is used for communication between the Slave and the Master only and is always 0 for communication with the PC.

N7N5N4 = Must be "0".

2nd byte

N0N1N2N3 = Data. These bits describe the input number that is to be connected to the output.

N4N5N6 = Command

13.2 Detailed Description

1st byte

N3N2N1N0 = Describe the number of the machine being addressed.

N6 = Destination bit. When sending a message from the PC (i.e. to machine) this bit must be "0". When the machine sends a message to the PC, this bit must be "1".

is used for communication between the Slave and the Master only and is always 0 for communication with the PC.

N7N5N4 = Must be "0".

2nd byte

N0N1N2 = Data bits that describe the input number that is to be connected to the output.

N4N5N6 = Command

14. PROTOCOL USED for the VS-2031N COMMUNICATION

The protocol used for communication between the PC and the VS-2031N is defined below. The rate of data is 1200 baud with no parity, 8 data bits and one stop bit.

MSB							LSB
N7	N6	N5	N4	N3	N2	N1	N0

14.1 Detailed Description

N7 is used for communication between the Slave and the Master only and is always 0 for communication with the PC.

N6N5N4 is the binary value of the machine we are addressing minus one, e.g., if we wish to address the Master (machine 1 by definition), then N6N5N4 = 000, if we wish to address machine 6, then N6N5N4 = 101.

N3N2N1N0 is the binary value of the input to be selected, i.e. N3N2N1N0 = 0111 is equivalent to pressing switch 3 of the machine.

Several special codes are also valid:

N3N2N1N0 = 1101 requests that the Machine being addressed sends its present status to the PC, i.e. which input is selected on its front panel.

N3N2N1N0 = 1110 is an "OK" handshake, i.e. confirmation that the instruction was received by the addressed Machine. (If the addressed machine is not present, then this confirmation is not sent to the PC). When a button is pressed on the front panel of a machine, information is sent from the master to the PC using the same format, i.e.

0	Machine number-1	New switch status
N7	N6N5N4	N3N2N1N0

15. PROTOCOL USED for the VS-2042 COMMUNICATION

The protocol used for communication between the PC and the VS-2042 is done using two bytes of information as defined below. The rate of data is 9600 baud with no parity, 8 data bits and one stop bit.

1st byte

				ADDRESS			
0	X	0	0	X	X	X	X
N7	N6	N5	N4	N3	N2	N1	N0

2nd byte

COMMAND				DATA			
1	X	0	0	X	X	X	X
N7	N6	N5	N4	N3	N2	N1	N0

15.1 Detailed Description

1st byte

N3N2N1N0 = Describe the number of the machine being addressed.

N6 = destination bit. When sending a message from the PC (i.e. to machine) this bit must be "0". When the machine sends a message to the PC, this bit must be "1".

It is used for communication between the Slave and the Master only and is always "0" for communication with the PC.

N7N5N4 = Must be "0".

2nd byte

N0N1N2N3 = Data. These bits describe the input number that is to be connected to the output.

N4N5N6 = Command

16. PROTOCOL USED for the VS-2053 COMMUNICATION

The protocol used for communication between the PC and the VS-2053 is done using two bytes of information as defined below. The rate of data is 9600 baud with no parity, 8 data bits and one stop bit.

1st byte

				ADDRESS			
0	X	0	0	X	X	X	X
N7	N6	N5	N4	N3	N2	N1	N0

2nd byte

COMMAND				DATA			
1	X	X	X	X	X	X	X
N7	N6	N5	N4	N3	N2	N1	N0

16.1 Detailed Description

1st byte

N3N2N1N0 = Describe the number of the machine being addressed.

N6 = destination bit. When sending a message from the PC (i.e. to machine) this bit must be "0". When the machine sends a message to the PC, this bit must be "1".

is used for communication between the Slave and the Master only and is always 0 for communication with the PC.

N7N5N4 = Must be "0".

2nd byte

N0N1N2N3 = Data which is defined according to the command with which it is sent.

N4N5N6 = Command

17. PROTOCOL USED for the VS-2081S/VS-2481 COMMUNICATION

The protocol used for communication between the PC and the VS-2081S/VS-2481 is done using two bytes of information as defined below. The rate of data is 9600 baud with no parity, 8 data bits and one stop bit.

1st byte

				ADDRESS			
0	X	0	0	X	X	X	X
N7	N6	N5	N4	N3	N2	N1	N0

2nd byte

COMMAND				DATA			
1	X	X	X	0	X	X	X
N7	N6	N5	N4	N3	N2	N1	N0

17.1 Detailed Description

1st byte

N3N2N1N0 = Describe the number of the machine being addressed.

N6 = destination bit. When sending a message from the PC (i.e. to machine) this bit must be "0". When the machine sends a message to the PC, this bit must be "1".

is used for communication between the Slave and the Master only and is always 0 for communication with the PC.

N7N5N4 = Must be "0".

2nd byte

N0N1N2 = Data

N4N5N6 = Command

N3 = Must be "0".

LIMITED WARRANTY

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

HOW LONG IS THE WARRANTY

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

WHO IS PROTECTED

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

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

- 1) Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the web site www.kramerelectronics.com.
- 2) Any product, on which the serial number has been defaced, modified or removed.
- 3) Damage, deterioration or malfunction resulting from:
 - a) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature.
 - b) Product modification, or failure to follow instructions supplied with the product.
 - c) Repair or attempted repair by anyone not authorized by Kramer.
 - d) Any shipment of the product (claims must be presented to the carrier).
 - e) Removal or installation of the product.
 - f) Any other cause, which does not relate to a product defect.
 - g) 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

Kramer's liability for any defective 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.

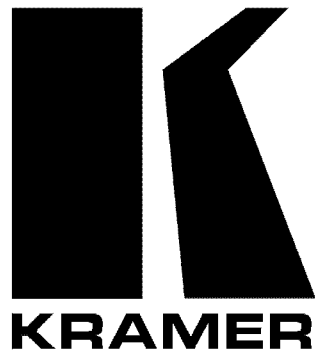
NOTICE

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

- 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 AC power cord (when applicable) to supply power to the machine and controllers.
- Please use recommended interconnect cables to connect the machine to controllers and other components.



**The list of Kramer distributors appears on our web site:
www.kramerelectronics.com
From the web site it is also possible to e-mail factory headquarters.
We welcome your questions, comments and feedback.**

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