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**Kramer Electronics, Ltd.**

# **USER MANUAL**

**4x1 VGA/XGA Switcher**

**Model:**

**VP-41**

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 line has become an integral part of many of the best production and presentation facilities around the world. In recent years, Kramer has redesigned and upgraded most of the line, making the best even better. Kramer's line of professional video/audio 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 switchers, such as the one you have just purchased, Kramer also offers a full line of high quality distribution amplifiers, processors, interfaces, controllers and computer-related products.

This manual includes configuration, operation and option information for the VP-41 VGA/XGA switcher.

### **1.1 A Word on VGA/XGA/Audio Switchers**

VGA/XGA/Audio switchers route signals to one or more selected users. They vary in the number of inputs, looping capability, programming capability, number of outputs, operating format, bandwidth and input/output coupling. VGA/XGA/Audio switchers are used to select which source is to be switched to which acceptor for recording or monitoring, with no discernible signal degradation. A good quality VGA/XGA/Audio switcher amplifies the incoming signal, pre-compensates the signal for potential losses (resulting from the use of long cables, noisy source, etc.) and routes the signal(s) to buffered and amplified outputs. Often, a signal processor is inserted between the source and the VGA/XGA/Audio switcher for correction and fine-tuning of the source signal before routing. The front panel of this Kramer switcher is designed to be simple to operate. It switches one of several PC's to a monitor. It is RS232 controlled for remote PC operation. It excels in high source isolation for minimal crosstalk and very large bandwidth.

### **1.2 Handling Graphics Signals**

A computer generated graphics signal usually comprises 5 signals: Red, Green, Blue - which are analog level signals, and two TTL (logic) level signals - Horizontal Sync and Vertical Sync. (Digital graphics cards and monitors use a different signal format, and will not be discussed here.)

Computer graphics resolution is measured in pixels and signal bandwidth. The more pixels (picture elements) on the screen, the more detailed the image. VGA, S-VGA, XGA, S-XGA and U-XGA are terms describing graphics resolution and color depth. Color depth represents the maximum number of simultaneously displayed colors on the screen and is measured in bits. 24 and 32-36 bits of color

depth represent millions to billions of color shades available on the screen at any given moment. (It should be born in mind, though, that the human eye can resolve only a few thousands colors!) The more detailed the image (higher resolution) and the higher the color depth the more real the image will look. The highest resolution of standard VGA was 640x480 pixels with 4 bits of color (16 colors). The standard VGA was able to use more colors (256) but at a lower resolution, around 320x200 pixels, which was very crude. Common resolutions used nowadays for computer graphics vary from 1024x768 up to 2000x1600 pixels with “high color” - 16 bits of color, representing 64,000 different colors, up to “true color” - 24 bits or more, representing from 16.7 million colors up to several billion. Displaying such a detailed and colorful image on the screen needs enormous graphics memory per frame, as well as very high speeds for “writing” so many pixels on the screen in real time. The amplifiers that carry those signals must be able to handle those speeds and signal bandwidth.

Standard VGA, at 640x480 resolution, needed amplifiers with 20-30MHz bandwidth. At 1600x1200 or even at 1280x1024 (S-XGA), those amplifiers will fail completely. In order to faithfully amplify and transmit modern high-resolution graphics, amplifiers with bandwidths of 300 MHz and more are needed. Those amplifiers, besides the enormous bandwidth they handle, need to be linear, to have very low distortion and be stable. Stability of an amplifier is its ability to avoid bursting into uncontrolled oscillation, which is in adverse relationship to the speed it can handle. The tendency to oscillate is further enhanced by the load impedance. The load impedance of a system is usually not just a resistor. A cable connected to an amplifier (leading to the receiver or monitor) may present a capacitive and/or an inductive load to the amplifier. This is the main cause of instability. The quality problems of a load or cable may severely degrade the bandwidth, linearity, and stability of the amplifier and in general its ability to faithfully reproduce the signal.

Cables affect image resolution. Longer cables, due to imperfect characteristics, cause high frequency deterioration and hence image “smear” and loss of resolution. In computer graphics especially, this adverse effect is very much accentuated. The amplifiers should therefore cope with an additional task - compensating for cable losses up to the maximum useful operation distance. High-resolution graphics systems should use very high quality cables for image transmission. The cables should be shielded to eliminate externally induced interference but the shield might itself increase the capacitance of the cable, and therefore, cause deterioration in the image’s resolution and clarity. Standard quality cables can only be a few meters long. For longer distances, compound cable is replaced by five individual coax cables, which are bulky and cumbersome for use. Even then, the distance is limited to several tens of meters.

Cables may create other problems which result from their failure to accurately match the system's required impedance. The result of this, especially at high frequencies, is "shadows" or "ghosts" on the image, resulting from standing waves and electronic reflections running back and forth between transmitter and receiver. Another aspect to consider is the sync. As sync signals are logic signals, which are not treated as analog signals, the receiver does not terminate the line, and therefore the line is not matched. A host of problems can occur when sync signals are sent over long, unterminated, unmatched cables. The result might be image breakdown or distortion due to improper sync information. The amplifier that drives the analog section of the graphics data should also be able to buffer, recover and send the sync information in such a way that it is received properly at the receiving end.

### 1.3 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 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 must also match the required impedance (75ohm in video). Cheap, low quality connectors tend to rust, thus causing breaks in the signal path.
- ☒ **Amplifying circuitry** - Must provide 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 of over 15 meters (~2 to 3 meters for VGA/XGA) 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** - They can have an adverse effect on signal quality. Balanced audio lines are less prone to interference, but unbalanced audio should be installed far from any mains power cables, electric motors, transmitters, etc. even when the cables are shielded.

## 2 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 the manual may save you a few hours later. You don't even have to read the whole manual. If a section doesn't apply to you, you don't have to spend your time reading it.

## 3 UNPACKING AND CONTENTS

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

- ☒ Switcher
- ☒ This User Manual
- ☒ Kramer concise product catalog/CD
- ☒ Rubber feet

### 3.1 Optional Accessories

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

- ☐ **VP-300** - (1:3 High Resolution VGA Distribution Amplifier) can be serially inserted between the switcher and the acceptors. It is a full bandwidth distributor designed for computer and workstations applications. The **VP-300** splits a VGA/Super-VGA/XGA graphics card output to 3 monitors, with no discernible signal degradation. State-of-the-art video amplifying circuitry and microchip technology make the **VP-300** the first choice Graphics Component Distributor. Signal bandwidth of 345MHz allows the **VP-300** to be used with the highest quality graphics workstations.
- ☐ **VP-211** - (2x1 Automatic VGA/Audio Switcher) can be serially inserted between the VGA/audio switcher and the acceptors for VGA/audio distribution. It is a full bandwidth switcher designed for computer and presentation applications. The **VP-211** automatically detects the presence of a VGA/XGA signal on input no. 1 and routes it to the output. If the signal disappears, the machine switches to input no. 2 and routes it to the output. When the signal on input no. 1 re-appears, the **VP-211** reroutes input no. 1 to the output. The machine operates in audio-follow-video (VGA) mode and switches the stereo audio input appropriate to the VGA input. Signal bandwidth of 517MHz ensures that the **VP-211** remains transparent even in the most critical applications. The **VP-211** is part of the Kramer TOOLS

family of compact, high quality and cost effective solutions for a variety of applications.

- ❑ **VP-22** - (VGA / XGA Line Amplifier & Processor) can be serially inserted between the VGA switcher and the acceptors for signal processing. It is a full bandwidth machine designed for computer and workstation applications where remote monitoring is needed. The **VP-22** splits a VGA/Super VGA/XGA graphics card output to 2 remote monitors and allows the user to control signal level and cable equalization for each channel independently. The machine also allows control of horizontal and vertical sync delay on the BNC coaxial outputs. On its H/HV SYNC output BNC, the **VP-22** allows either horizontal or composite sync while on its green output BNC, it allows either green or green + composite sync. State-of-the-art video amplifying circuitry makes the **VP-22** the perfect graphics component amplifier. Signal bandwidth of over 350MHz allows it to be used with the highest quality graphics workstations.
- ❑ **VP-102** - (VGA to RGBS Converter) can be serially inserted between the VGA switcher and the acceptors for VGA to RGBS conversion. It is a full bandwidth machine especially designed for computer, workstation and presentation applications. The **VP-102** converts a VGA/Super-VGA/XGA graphics card output to red, green, blue, horizontal/composite sync and vertical sync signals available on BNC connectors. The **VP-102** allows the user to select either a composite or horizontal sync output and the green output either includes composite sync or is blanked. The composite sync generated by the machine is always at the correct polarity (negative), for any polarity of Hs and Vs inputs. As the signal bandwidth is well over 315MHz, the **VP-102** may be used with the highest quality graphics workstations.

#### 4 VGA/XGA SWITCHER

This section describes the controls and connections of your switcher. Understanding the controls and connections helps you realize the full power of your machine.

## 4.1 Getting to Know Your VP-41 Switcher

The Kramer **VP-41** is a high performance mechanical 4x1 switcher for VGA/XGA signals. It is designed to route one of up to four inputs to one output using 15pin HD female connectors. Bandwidth exceeding 750MHz ensures transparent performance even at the highest resolution UXGA modes (1600x1200.) High quality switching components provide excellent isolation between inputs. The **VP-41** is extremely rugged and dependable. Its unpowered, passive design is an advantage in applications where various regulatory compliances would otherwise be required. The passive “hard-wire” signal path offers very high bandwidth and can also switch other signal formats.

It is housed in a desktop enclosure but the optional **RK-MED** rack adaptor kit can be used to mount up to two **VP-41** units in one vertical rack space.

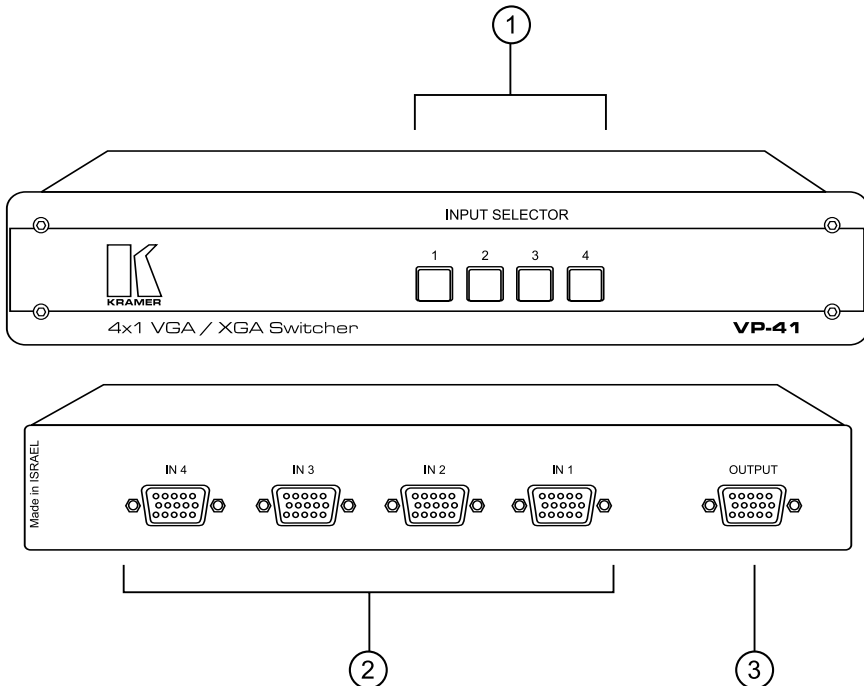


Figure 1: VP-41 Front/Rear Panel Features



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**Table 1: VP-41 Front/Rear Panel Features**

No.	Feature	Function
1	INPUT SELECTOR Switches	4 switches with interlock for input signal selections.
2	<b>INPUT 1-4</b> connectors	4 VGA/XGA inputs.
3	<b>OUTPUT</b> Connector	VGA/XGA output.

## **5 INSTALLATION**

### **5.1 Rack Mounting**

The VP-41 switcher may be rackmounted in a standard 19" (1U) EIA rack assembly, using the RK-MEDN optional adapter.

### **5.2 Connecting TO VGA/XGA Devices**

Video sources and output devices (such as monitors, projectors or recorders) may be connected to the switcher through the HD 15F connectors located on the back of the unit.

## **6 USING THE SWITCHER**

### **6.1 Selecting an Input on the Switcher**

Input selection is made simply by pressing the front panel buttons marked "1", "2", "3", etc. The buttons correspond to the input connections as marked on the back panel. In this way, one of four sources is connected to an acceptor.

### **6.2 Operating "BACKWARDS"**

Since the **VP-41** is a passive switcher, it maybe easily operated backward, e.g., using the OUTPUT socket as input and using the INPUT sockets as outputs. In this way, the switcher becomes a 1x4 switcher, connecting for example one PC to one of four monitors. This is made simply by pressing the front panel buttons marked "1", "2", "3", etc. The buttons correspond to the marking on the back panel. In this way, one source may be connected to four acceptors.

### **6.3 Adding more outputs**

If more outputs than the single output the **VP-41** provides are needed, then any of Kramer VGA/XGA distribution amplifiers may be used. The VP-200, for example, provides 2 outputs, the VP-300 provides 3, the VP-400 provides 4 and



so on up to the VP-12 that is able to provide 12 parallel outputs from a single input.

## 6.4 Driving long VGA/XGA lines

As the design of the VP-41 is passive (no power and amplification is used), in order to drive long lines over long distances, one of the Kramer VGA/XGA line amplifiers may be used at the output of the machine. Suitable machines for this job are the VP-200xl and the VP-22. The latter allows conversion of the incoming VGA/XGA signal on an HD15 type connector to BNC type cables (RGBHV) to be used driving the signals to very remote locations.

## 7 SPECIFICATIONS

<b>INPUTS:</b>	4 VGA / XGA on HD 15F connectors.
<b>OUTPUT:</b>	1 VGA / XGA on an HD 15F connector.
<b>VIDEO BANDWIDTH:</b>	Exceeding 750 MHz.
<b>SWITCH CONTROL:</b>	Four front panel switches.
<b>CROSSTALK:</b>	<-58 dB at adjacent channels @ 10MHz.
<b>COUPLING:</b>	Direct.
<b>DIMENSIONS:</b>	22cm x 18 cm x 4.5 cm (8.7"x7"x1.8", W, D, H.).
<b>WEIGHT:</b>	1.1 kg. (2.4 lbs.) Approx.

## 8 TROUBLESHOOTING

### NOTES

*The VP-41 due it's passive design is not prone electromagnetic interference, however, if one of the connected devices to the switcher 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.*

## 8.1 VGA/XGA Signal

Problem	Remedy
No signal at the output device	<ol style="list-style-type: none"><li>1. Confirm that your sources and output device are turned on and connected properly.</li><li>2. Confirm that any other device in the signal path have the proper input and/or output selected.</li><li>3. Confirm that inputs and outputs haven't been reversed.</li></ol>
Weak or distorted signals	<ol style="list-style-type: none"><li>1. Check connections and verify that you are using proper cables.</li><li>2. If the distance between the output of the switcher and the acceptor is large (over three meters), use one of Kramer's VGA/XGA line amplifiers to compensate for signal losses.</li></ol>



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## **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 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](http://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".

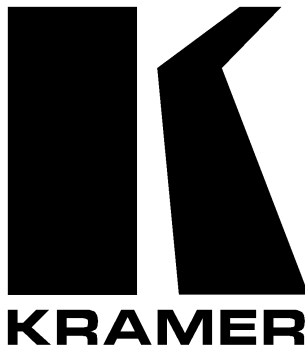
**CFR-47** FCC Rules and Regulations:

Part 15- "Radio frequency devices:

Subpart B- Unintentional radiators"

### **CAUTION!**

- ☒ 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.



**The list of Kramer distributors appears on our web site:  
[www.kramerelectronics.com](http://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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