Kramer Electronics, Ltd.

USER MANUAL

Model:

VP-2x2

2x2 XGA/Audio Matrix Switcher

Contents

Figures

Tables

1   Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 500-plus different models now appear in eight groups[1] that are clearly defined by function.

Congratulations on purchasing your Kramer **VP-2x2** *2x2 XGA/Audio Matrix Switcher*. This product is ideal for the following typical applications:

- Any professional display system requiring a true 2x2 matrix operation
- Multimedia and presentation sources and acceptors selection
- Remote monitoring of computer activity in schools and businesses

The package includes the following items:

- **VP-2x2** *2x2 XGA/Audio Matrix Switcher*
- Power adapter (12V DC Input)
- Windows®-based Kramer control software[2]
- Null-modem adapter
- This user manual[3]

2   Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual

2.1 Quick Start

This quick start chart summarizes the basic setup and operation steps of the **VP-2x2**.

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1 GROUP 1: Distribution Amplifiers; GROUP 2: Video and Audio Switchers, Matrix Switchers and Controllers; GROUP 3: Video, Audio, VGA/XGA Processors; GROUP 4: Interfaces and Sync Processors; GROUP 5: Twisted Pair Interfaces; GROUP 6: Accessories and Rack Adapters; GROUP 7: Scan Converters and Scalers; and GROUP 8: Cables and Connectors

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

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

Step 1: Connect the inputs and outputs - see section 5

Computer Graphics Source 1

Computer Graphics Source 2

Display 1

Display 2

RS-232

Amplifier 1

Amplifier 2
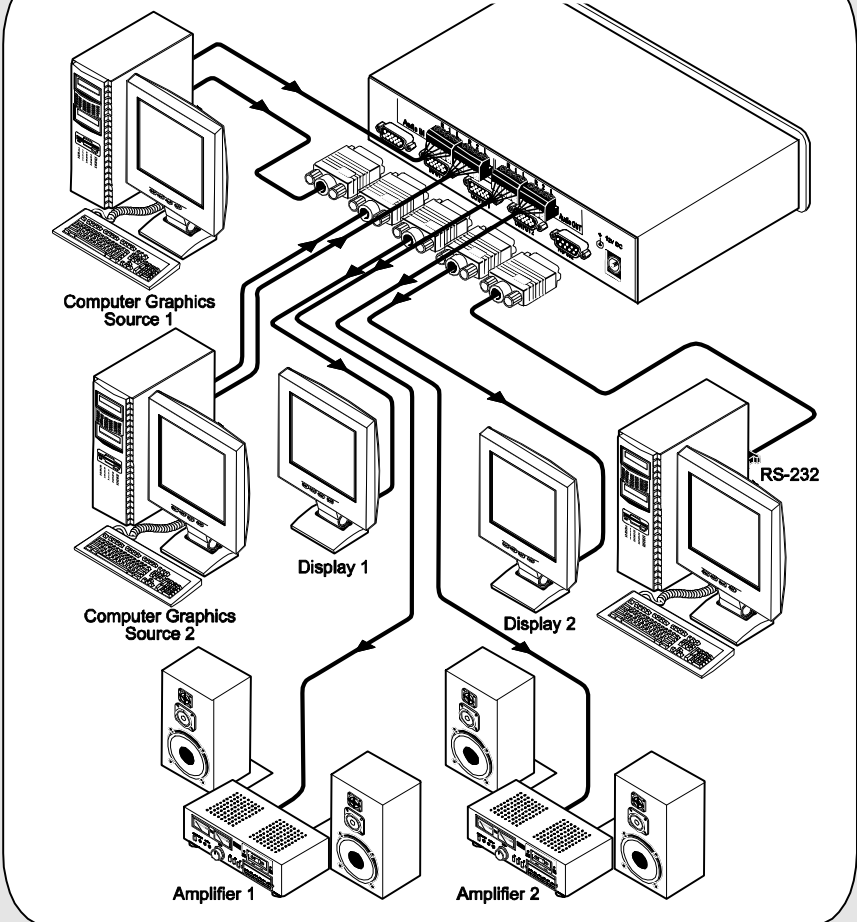
Step 2: Turn the power ON

Step 3: Operate the machine - see section 6

Select the inputs to switch to the outputs

SELECT

PROGRAM

IN 1   IN 2

To OUT 1   VIDEO   AUDIO   AFV   TAKE   LOCK

To OUT 2

LOCK the front panel

Operate also via RS-232

VIDEO - Switching relates to the video signal
AUDIO - Switching relates to the audio signal

AFV - Audio follows video when switching

Press TAKE to confirm actions
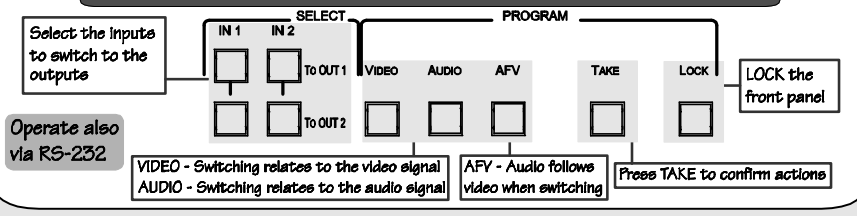
3   Overview

The **VP-2x2** is a high performance matrix switcher for VGA/SVGA/XGA/UXGA signals and balanced stereo audio signals. The user can simultaneously route an input to one or both outputs[1].

In addition, the **VP-2x2** includes:

- Video bandwidth that exceeds 400MHz, ensuring transparent performance in all applications
- Audio-follow-video switching and audio breakaway (when audio and video are switched separately)
- A TAKE button that allows the user to pre-select a setting and then activate it
- A LOCK button to prevent tampering via the front panel
- Control via the front panel buttons, or remotely by RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller

To achieve the best performance:

- Connect only good quality connection cables, thus avoiding interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality and position your Kramer **VP-2x2** in a location free from moisture and away from excessive sunlight and dust

> **Caution** – No operator-serviceable parts inside unit.
>
> **Warning** – Use only the Kramer Electronics input power wall adapter that is provided with this unit[2].
>
> **Warning** – Disconnect power and unplug unit from wall before installing or removing device or servicing unit.

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1 Input 1 (or 2) to outputs 1 and 2 simultaneously, or input 1 (or 2) to output 1 and input 2 (or 1) to output 2

2 For example: model number AD2512C, part number 2535-000251

4 Your VP-2x2 2x2 XGA/Audio Matrix Switcher

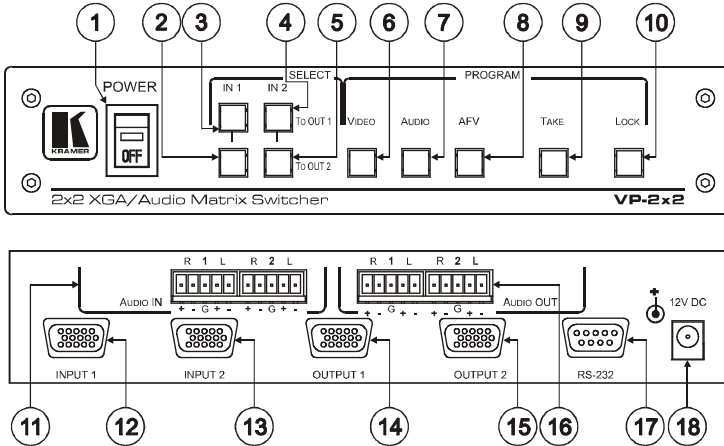Figure 1 and Table 1 define the front and rear panels of the **VP-2x2**:

Figure 1: VP-2x2 2x2 XGA/Audio Matrix Switcher

Table 1: VP-2x2 2x2 XGA/Audio Matrix Switcher Features

#	Feature		Function
1	*POWER* Switch		Illuminated switch for turning the unit ON or OFF
2	*SELECT* Buttons[1]	*IN 1 To OUT 2*	Switches input 1 to output 2
3		*IN 1 To OUT 1*	Switches input 1 to output 1
4		*IN 2 To OUT 1*	Switches input 2 to output 1
5		*IN 2 To OUT 2*	Switches input 2 to output 2
6	*SELECT* Buttons[1]	*VIDEO*	When illuminated, actions relate to video
7		*AUDIO*	When illuminated, actions relate to audio
8		*AFV*	When illuminated, audio channels follow the video channels
9		*TAKE*	Pressing *TAKE* toggles the mode between the Confirm mode[2] and the At Once mode (user confirmation per action is unnecessary). In Confirm mode, TAKE implements the pending action
10		*LOCK*	Disengages/engages the front panel buttons
11	*AUDIO IN* Terminal Block Connectors		Connects to the 2 balanced audio inputs
12	INPUT 1 HD15F Connector		Connects to the video source 1
13	INPUT 2 HD15F Connector		Connects to the video source 2
14	OUTPUT 1 HD15F Connector		Connects to the video acceptor 1
15	OUTPUT 2 HD15F Connector		Connects to the video acceptor 2
16	*AUDIO OUT* Terminal Block Connectors		Connects to the 2 balanced audio outputs
17	*RS-232* 9-pin D-sub Connector		Connects to PC or Remote Controller
18	12V DC		+12V DC connector for powering the unit

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1 Press to select. When selected, the button illuminates

2 When in the Confirm mode, the TAKE button illuminates

5 Connecting the VP-2x2 2x2 XGA/Audio Matrix Switcher

This section describes how to connect:

- The **VP-2x2** rear panel (see section 5.1)
- A balanced stereo audio input/output (see section 5.2)
- The **VP-2x2** to a controlling device via RS-232 (see section 5.2)

5.1 Connecting the VP-2x2 2x2 XGA/Audio Matrix Switcher Rear Panel

To connect[1] the **VP-2x2**, as illustrated in the example in Figure 2, do the following[2]:

1. Connect the VGA/UXGA computer graphics sources to the INPUT 15-pin HD computer graphics video connectors.

2. Connect the balanced[3] stereo audio sources to the AUDIO IN balanced stereo audio 5-pin terminal block connectors.

3. Connect the OUTPUT 15-pin HD computer graphics video connectors to the VGA/UXGA video acceptors (for example, displays).

4. Connect the AUDIO OUT terminal block connectors to the balanced[3] stereo audio acceptors (for example, amplifiers with speakers).

5. Connect a PC and/or controller (if required) to the RS-232 port (see section 5.2).

6. Connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity (not shown in Figure 2).

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1 You do not have to connect both inputs or both outputs

2 Switch OFF the power on each device before connecting it to your VP-2x2. After connecting your VP-2x2, switch on its power and then switch on the power on each device

3 See section 5.2
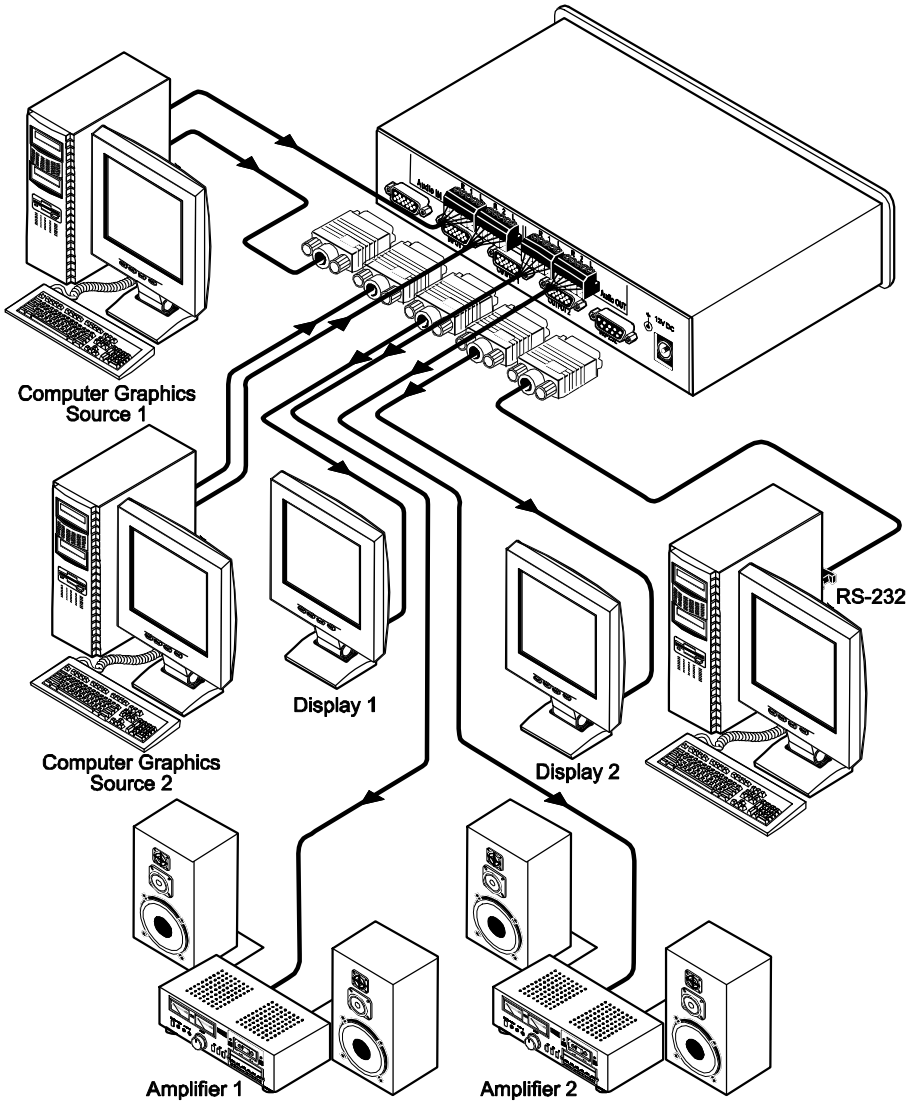
Figure 2: Connecting the VP-2x2 2x2 XGA/Audio Matrix Switcher

5.2 Connecting the Balanced/Unbalanced Stereo Audio Input/Output

This section illustrates how to wire:

- A balanced input/output connection, see Figure 3
- An unbalanced audio input, see Figure 4
- An unbalanced audio output, see Figure 5

Figure 3: Connecting the Balanced Stereo Audio Input/Output
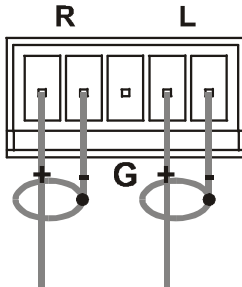
Figure 4: Connecting the Unbalanced Stereo Audio Input
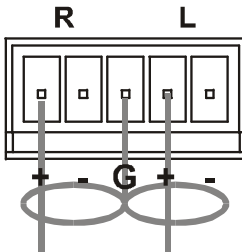
Figure 5: Connecting an Unbalanced Output

5.3 Connecting a PC

You can connect a PC (or other controller) to the **VP-2x2** via the RS-232 port for remote control, and for upgrading the firmware.

To connect a PC to a **VP-2x2** unit, using the Null-modem adapter provided with the machine (recommended):

- Connect the RS-232 9-pin D-sub rear panel port on the **VP-2x2** unit to the Null-modem adapter and connect the Null-modem adapter with a 9-wire flat cable to the RS-232 9-pin D-sub port on your PC
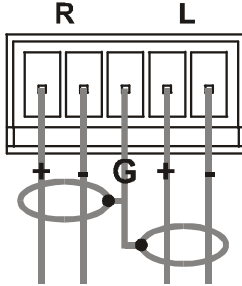
To connect a PC to a **VP-2x2** unit, without using a Null-modem adapter:

- Connect the RS-232 9-pin D-sub port on your PC to the RS-232 9-pin D-sub rear panel port on the **VP-2x2** unit, forming a cross-connection[1], as Figure 6 illustrates

PIN 5 Connected to PIN 5 (Ground)
PIN 3 Connected to PIN 2
PIN 2 Connected to PIN 3

9-pin D-sub
(From PC)

9-pin D-sub
(To Switcher)

If a shielded cable is used, connect the shield to PIN 5

Figure 6: Connecting the PC

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1 Also known as a Null-modem connection

6 Operating Your XGA/Audio Matrix Switcher

Operate your **VP-2x2** via:

- The front panel buttons
- RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller

6.1 Choosing the Audio-Follow-Video or Breakaway Option

You can switch balanced stereo audio signals in one of two ways, either:

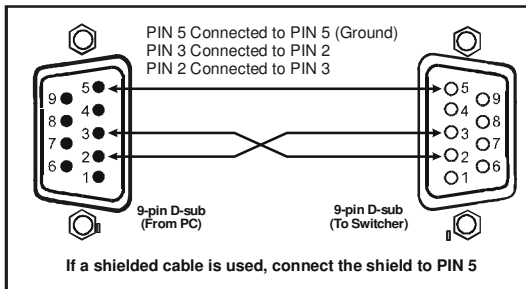- Audio-follow-video (AFV), in which all operations relate to both the video and the audio channels[1]; or
- Breakaway, in which video and audio channels switch independently

6.1.1   Setting the Audio-Follow-Video Option

To set the Audio-follow-video (AFV) option press the AFV button:

- If the AUDIO and VIDEO configurations are the same, then the AFV button illuminates. The audio will follow the video
- If the AUDIO differs from the VIDEO, then the AUDIO button will flash, and require reconfiguring for AFV operation. Press the TAKE button to confirm the modification (reconfiguring the audio according to the video)

6.1.2   Setting the Breakaway Option

To set the Breakaway option:

Press either the AUDIO (for audio control only) or the VIDEO (for video control only) button:

- If the AUDIO button illuminates, switching operations relate to audio
- If the VIDEO button illuminates, switching operations relate to video

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1 Audio and video connections are the same

6.2 Locking the Front Panel

To prevent changing the settings accidentally or tampering with the unit via the front panel buttons, lock[1] your **VP-2x2**. Unlocking releases the protection mechanism.

To lock the **VP-2x2**:

- Press the LOCK button for more than two seconds, until the LOCK button is illuminated
  The front panel is locked. Pressing a button will have no effect other than causing the LOCK button to blink[2]

To unlock the **VP-2x2**:

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

7 Technical Specifications

Table 2 includes the technical specifications:

Table 2: Technical Specifications of the VP-2x2 2x2 XGA/Audio Matrix Switcher

INPUTS:	2 VGA/UXGA on HD15F connectors 2 balanced stereo audio on detachable terminal block connectors
OUTPUTS:	2 VGA/UXGA on HD15F connectors 2 balanced stereo audio on detachable terminal block connectors
MAX. OUTPUT LEVEL:	Video: 1.7Vpp; Audio: 7.2Vpp
BANDWIDTH (-3dB):	Video: 400MHz, Audio: 100kHz
DIFF. GAIN:	0.05%
DIFF. PHASE:	0.05 deg.
K-FACTOR:	<0.05%
S/N RATIO:	Video: 78.3dB; Audio: 95dB, unweighted
CROSSTALK:	Video: -43dB; Audio: 77dB @ 1kHz
CONTROLS:	Front panel touch switches, RS-232
COUPLING:	DC
AUDIO THD + NOISE:	<0.049%
AUDIO 2nd HARMONIC:	<0.003%
POWER SOURCE:	12VDC, 150mA.
DIMENSIONS:	22cm x 18cm x 4.5cm (8.7" x 7" x 1.7") W, D, H, (half 19", 1U).
WEIGHT:	1.1kg (2.4lbs) approx.
ACCESSORIES:	Power supply, Null modem adapter, Windows 95/98/2000/NT™ Kramer control software
OPTIONS:	19" rack adapters

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1 Even when the front panel is locked you can still operate via RS-232

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

8   Kramer Protocol 2000[1]

The **VP-2x2** is compatible with Kramer's Protocol 2000 (version 0.50) (below). This RS-232/RS-485 communication protocol uses four bytes of information as defined below. For RS-232, a null-modem connection between the machine and controller is used. The default data rate is 9600 baud, with no parity, 8 data bits and 1 stop bit.

Table 3: Protocol Definitions

MSB   LSB

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

1st byte

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

2nd byte

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

3rd byte

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

4th byte

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

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

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

4th BYTE: Bit 7 – Defined as 1.
             Bit 5 – Don't care.
             OVR – Machine number override.
             M4…M0 – MACHINE NUMBER.
Used to address machines in a system via their machine numbers. When several machines are controlled from a single serial port, they are usually configured together with each machine having an individual machine number. If the OVR bit is set, then all machine numbers will accept (implement) the command, and the addressed machine will reply.

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1 You can download our user-friendly "Software for Calculating Hex Codes for Protocol 2000" from the technical support

section on our Web site at: http://www.kramerelectronics.com

For a single machine controlled via the serial port, always set M4…M0 = 1, and make sure that the machine itself is configured as MACHINE NUMBER = 1.

Table 4: Instruction Codes for Protocol 2000

Note: All values in the table are decimal, unless otherwise stated.

INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	DESCRIPTION	INPUT	OUTPUT	
0	RESET VIDEO	0	0	1
1	SWITCH VIDEO	Set equal to video input which is to be switched (0 = disconnect)	Set equal to video output which is to be switched (0 = to all the outputs)	2
2	SWITCH AUDIO	Set equal to audio input which is to be switched (0 = disconnect)	Set equal to audio output which is to be switched (0 = to all the outputs)	2
5	REQUEST STATUS OF A VIDEO OUTPUT	0	Equal to output number whose status is reqd	4
6	REQUEST STATUS OF AN AUDIO OUTPUT	0	Equal to output number whose status is reqd	4
8	BREAKAWAY SETTING	0	0 - audio-follow-video 1 - audio breakaway	2
11	REQUEST BREAKAWAY SETTING	0, or set to 126 or 127 to request if machine has this function	0 - Request audio breakaway setting	4, 6
12	REQUEST VIDEO / AUDIO TYPE SETTING	0, or set to 126 or 127 to request if machine has this function	0 - for video 1 - for audio 2 - for VGA	4, 6
30	LOCK FRONT PANEL	0 - Panel unlocked 1 - Panel locked	0	2
31	REQUEST WHETHER PANEL IS LOCKED	0	0	16
57	SET AUTO-SAVE	I3 - no save I4 - auto-save	0	12, 2
61	IDENTIFY MACHINE	1 - video machine name 2 - audio machine name 3 - video software version 4 - audio software version	0	13
62	DEFINE MACHINE	1 - number of inputs 2 - number of outputs 3 - number of setups	1 - for video 2 - for audio 3 - for SDI 4 - for remote panel 5 - for RS-422 controller	14

NOTES on the above table:

NOTE 1 - When the master switcher is reset, (e.g. when it is turned on), the reset code is sent to the PC. If this code is sent to the switchers, it will reset according to the present power-down settings.

NOTE 2 - These are bi-directional definitions. That is, if the switcher receives the code, it will perform the instruction; and if the instruction is performed (due to a keystroke operation on the front panel), then these codes are sent. For example, if the HEX code

01	82	81	81

was sent from the PC, then the switcher (machine 1) will switch input 2 to output 1. If the user switched input 1 to output 2 via the front panel keypad, then the switcher will send HEX codes:

41	81	82	81

to the PC.

When the PC sends one of the commands in this group to the switcher, then, if the instruction is valid, the switcher replies by sending to the PC the same four bytes that it was sent (except for the first byte, where the DESTINATION bit is set high).

NOTE 4 - The reply to a "REQUEST" instruction is as follows: the same instruction and INPUT codes as were sent are returned, and the OUTPUT is assigned the value of the requested parameter. The reply to instruction 11 is as per the definitions in instruction 8. For example, if the present status of machine number 1 is breakaway setting, then the reply to the HEX code

0B	80	80	81

would be HEX codes

4B	80	81	81

NOTE 6 – If INPUT is set to 127 for these instructions, then, if the function is defined on this machine, it replies with OUTPUT=1. If the function is not defined, then the machine replies with OUTPUT=0, or with an error (invalid instruction code).

If the INPUT is set to 126 for these instructions, then, if possible, the machine will return the current setting of this function, even for the case that the function is not defined.

NOTE 12 - Under normal conditions, the machine's present status is saved each time a change is made. The "power-down" save (auto-save) may be disabled using this code. Note that whenever the machine is turned on, the auto-save function is set.

NOTE 13 - This is a request to identify the switcher/s in the system. If the OUTPUT is set as 0, and the INPUT is set as 1 or 2, the machine will send its name. The reply is the decimal value of the INPUT and OUTPUT. For example, for a VP-2x2, the reply to the request to send the audio machine name would be (HEX codes):

7D	82	82	81 (i.e. 128dec+ 21dec for 2nd byte, and 128dec+ 2dec for 3rd byte).

If the request for identification is sent with the INPUT set as 3 or 4, the appropriate machine will send its software version number. Again, the reply would be the decimal value of the INPUT and OUTPUT - the INPUT representing the number in front of the decimal point, and the OUTPUT representing the number after it. For example, for version 3.5, the reply to the request to send the version number would be (HEX codes):

7D	83	85	81 (i.e. 128dec+ 3dec for 2nd byte, 128dec+ 5dec for 3rd byte).

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

9   Table of Hex Codes for Serial Communication

Table 5 lists the Hex values for switching on the **VP-2x2**.

Table 5: Hex Codes

	OUT 1	OUT 2
OUT 1	01 81 81 81	01 81 82 81
OUT 2	01 82 81 81	01 82 82 81

LIMITED WARRANTY

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

HOW LONG IS THE WARRANTY

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

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

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

1. Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the Web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed, or on which the WARRANTY VOID IF TAMPERED sticker has been torn, reattached, removed or otherwise interfered with.
3. Damage, deterioration or malfunction resulting from:
   i) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
   ii) Product modification, or failure to follow instructions supplied with the product
   iii) Repair or attempted repair by anyone not authorized by Kramer
   iv) Any shipment of the product (claims must be presented to the carrier)
   v) Removal or installation of the product
   vi) Any other cause, which does not relate to a product defect
   vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

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

EN-50081:	"Electromagnetic compatibility (EMC); generic emission standard. Part 1: Residential, commercial and light industry"
EN-50082:	"Electromagnetic compatibility (EMC) generic immunity standard. Part 1: Residential, commercial and light industry environment".
CFR-47:	FCC Rules and Regulations: Part 15: "Radio frequency devices Subpart B Unintentional radiators"

CAUTION!

⊠ Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.

⊠ Use the supplied DC power supply to feed power to the machine.

⊠ Please use recommended interconnection cables to connect the machine to other components.

For the latest information on our products and a list of Kramer distributors, visit our Web site: www.kramerelectronics.com, where updates to this user manual may be found. We welcome your questions, comments and feedback.

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

Caution

Kramer Electronics, Ltd.
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P/N: 2900-002059 REV 3