KRAMER ELECTRONICS LTD.

USER MANUAL

MODEL:

VS-161H
16x1 HDMI Switcher

P/N: 2900-000665 Rev 4

VS-161H Quick Start Guide

This guide helps you install and use your product for the first time. For more detailed information, go to http://www.kramerelectronics.com/support/product_downloads.asp to download the latest manual or scan the QR code on the left.

Step 1: Check what's in the box

☑ The **VS-161H** 16x1 HDMI Switcher
☑ IR remote control transmitter with batteries
☑ 1 Power cord

☑ 1 Quick start guide
☑ 1 Set of ear racks
☑ 4 Rubber feet
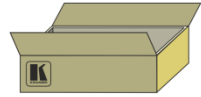
Save the original box and packaging materials in case you need to return your product for service.
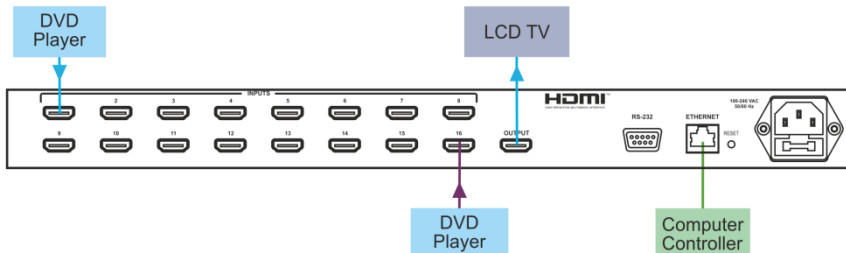
Step 2: Install the VS-161H

To rack mount the machine attach both ear brackets to the machine (by removing the three screws from each side of the machine and replacing those screws through the ear brackets) or place the machine on a table.
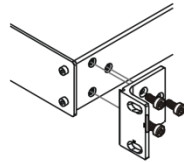
Step 3: Connect inputs and outputs

- Always switch OFF the power on each device before connecting it to your **VS-161H**.
- For best results, we recommend that you always use Kramer high-performance cables to connect AV equipment to the **VS-161H**.

DVD Player

LCD TV

INPUTS   HDMI   RS-232   ETHERNET   RESET   100-240 VAC 50/60 Hz

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 OUTPUT

DVD Player

Computer Controller

Step 4: Connect the power

Connect AC power to the rear of the **VS-161H**, switch on its power and then switch on the power on each device.
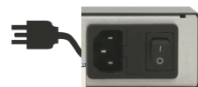
Step 5: Operate the VS-161H

Acquire the EDID from:

☐ A connected output
☐ The default EDID on an unconnected output

Set the device to either the PC mode (default) or DVD mode

Contents

Figures

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 video, audio, presentation, and broadcasting professionals on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better!

Our 1,000-plus different models now appear in 14 groups that are clearly defined by function: GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Routers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters; GROUP 11: Sierra Video Products; GROUP 12: Digital Signage; GROUP 13: Audio; and GROUP 14: Collaboration.

Congratulations on purchasing your Kramer **VS-161H** *16x1 HDMI Switcher*. This product is ideal for:

- Conference room presentations

- Rental and staging

Note: The Kramer **VS-161H** is identical to the **VS-161HDMI**, just the name has changed by replacing the suffix "HDMI" by "H" (according to the HDMI Guideline).

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

> Go to http://www.kramerelectronics.com/support/product_downloads.asp to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

2.1 Achieving the Best Performance

To achieve the best performance:

- Use only good quality connection cables (we recommend Kramer high-performance, high-resolution cables) to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)

- Do not secure the cables in tight bundles or roll the slack into tight coils

- Avoid interference from neighboring electrical appliances that may adversely influence signal quality

- Position your Kramer **VS-161H** away from moisture, excessive sunlight and dust

> This equipment is to be used only inside a building. It may only be connected to other equipment that is installed inside a building.

2.2 Safety Instructions

> **Caution:** There are no operator serviceable parts inside the unit
>
> **Warning:** Use only the power cord that is supplied with the unit
>
> **Warning:** Do not open the unit. High voltages can cause electrical shock! Servicing by qualified personnel only
>
> **Warning:** Disconnect the power and unplug the unit from the wall before installing

2.3   Recycling Kramer Products

The Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC aims to reduce the amount of WEEE sent for disposal to landfill or incineration by requiring it to be collected and recycled. To comply with the WEEE Directive, Kramer Electronics has made arrangements with the European Advanced Recycling Network (EARN) and will cover any costs of treatment, recycling and recovery of waste Kramer Electronics branded equipment on arrival at the EARN facility. For details of Kramer's recycling arrangements in your particular country go to our recycling pages at *http://www.kramerelectronics.com/support/recycling/*.

3   Overview

The Kramer **VS-161H** is a high quality switcher for HDMI signals.

In particular, the **VS-161H** features:

- Support for up to 1.65Gbps bandwidth per graphic channel
  Suitable for resolutions up to UXGA at 60Hz, and for all HD resolutions

- HDCP support (High Definition Digital Content Protection)

- HDMI support (HDMI V1.3 with Lip Sync and CEC)

- EDID PassThru that passes EDID/HDCP signals from source to display

- A Mute button to disconnect the output

- A Panel Lock button to prevent unwanted tampering with the buttons on the front panel

- Installation in 1U of a standard 19" professional rack enclosure

You can control the **VS-161H** using the front panel buttons, or remotely via:

- RS-232/RS-485 serial commands transmitted by a PC, touch screen system or other serial controller

- The Kramer **RC-IR3** infrared remote control transmitter

- A PC connected to the Ethernet port on the device via a LAN

3.1 Defining the VS-161H 16x1 HDMI Switcher

Figure 1 defines the front and rear panels of the **VS-161H**.
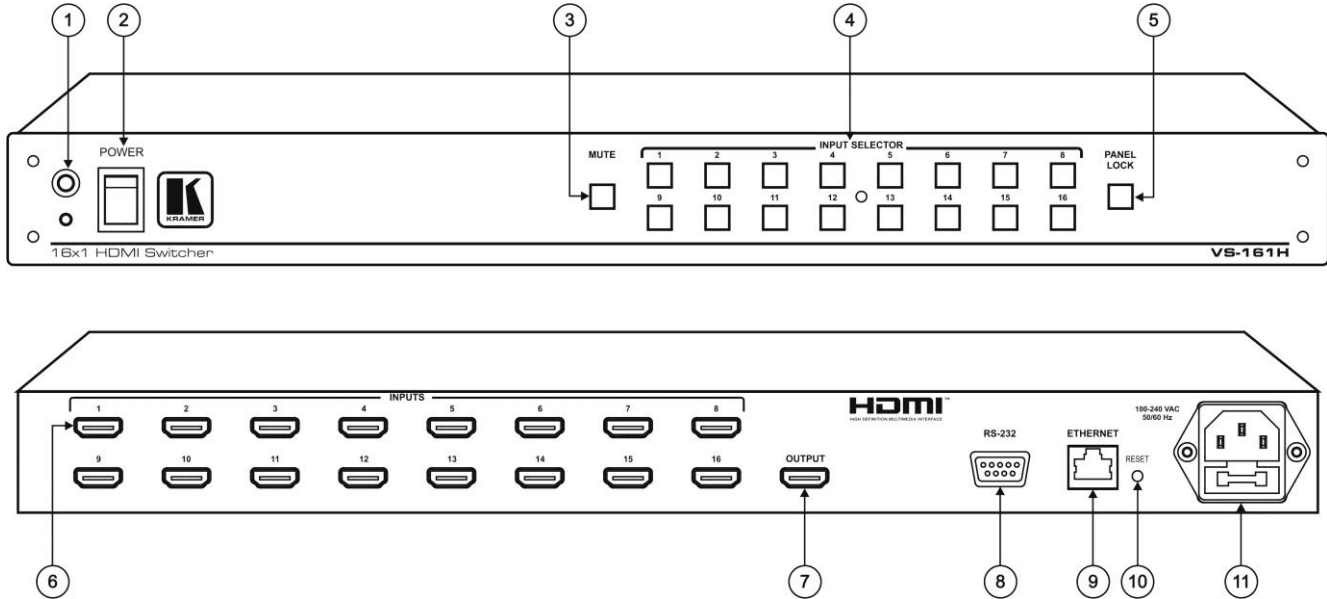
Figure 1: VS-161H 16x1 HDMI Switcher Front and Rear Panels

#	Feature	Function
1	IR Receiver	The red LED lights when receiving signals from the Infrared remote control transmitter
2	*POWER* Switch	Illuminated switch for turning the unit on or off
3	*MUTE* Button	Press to toggle disconnecting the output
4	*INPUT SELECTOR* Buttons	Press the INPUT button to select input (from 1 to 16)
5	*PANEL LOCK Button*	Press to toggle disengaging the front panel buttons, to acquire the EDID and to set to the PC/DVD mode
6	*INPUT* HDMI Connectors	Connect to the HDMI sources (from 1 to 16)
7	*OUTPUT* HDMI Connector	Connect to the HDMI acceptor
8	*RS-232* DB-9 (F) Port	Connect to a PC/serial controller (see Section 5.1)
9	*ETHERNET* Connector	Connect to a PC via a LAN (see Section 5.2)
10	*RESET* Button	Press while turning on the device to reset the device to factory default values (see Section 6.4 and Section 8)
11	Power Connector with Fuse	Plug in the power cord and switch the device on and off

4   Installing in a Rack

This section provides instructions for rack mounting the unit.

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

| OPERATING TEMPERATURE:	0° to +40ºC (32° to 104ºF)
STORAGE TEMPERATURE:	-40° to +70ºC (-40° to 158ºF)
HUMIDITY:	10% to 90%, RHL non-condensing

CAUTION!

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

1. It is located within the recommended environmental conditions, as the operating ambient temperature of a closed or multi unit rack assembly may exceed the room ambient temperature.

2. Once rack mounted, enough air will still flow around the machine.

3. The machine is placed straight in the correct horizontal position.

4. You do not overload the circuit(s). When connecting the machine to the supply circuit, overloading the circuits might have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.

5. The machine is earthed (grounded) in a reliable way and is connected only to an electricity socket with grounding. Pay particular attention to situations where electricity is supplied indirectly (when the power cord is not plugged directly into the socket in the wall), for example, when using an extension cable or a power strip, and that you use only the power cord that is supplied with the machine.

To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.
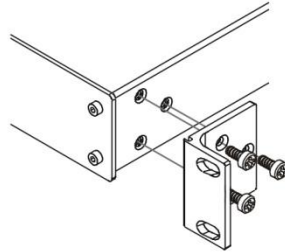
2. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

Note:
• In some models, the front panel may feature built-in rack ears
• Detachable rack ears can be removed for desktop use
• Always mount the machine in the rack before you attach any cables or connect the machine to the power
• If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions available from our Web site

5 Connecting the VS-161H 16x1 HDMI Switcher

> Always switch off the power to each device before connecting it to your **VS-161H**. After connecting your **VS-161H**, connect its power and then switch on the power to each device.
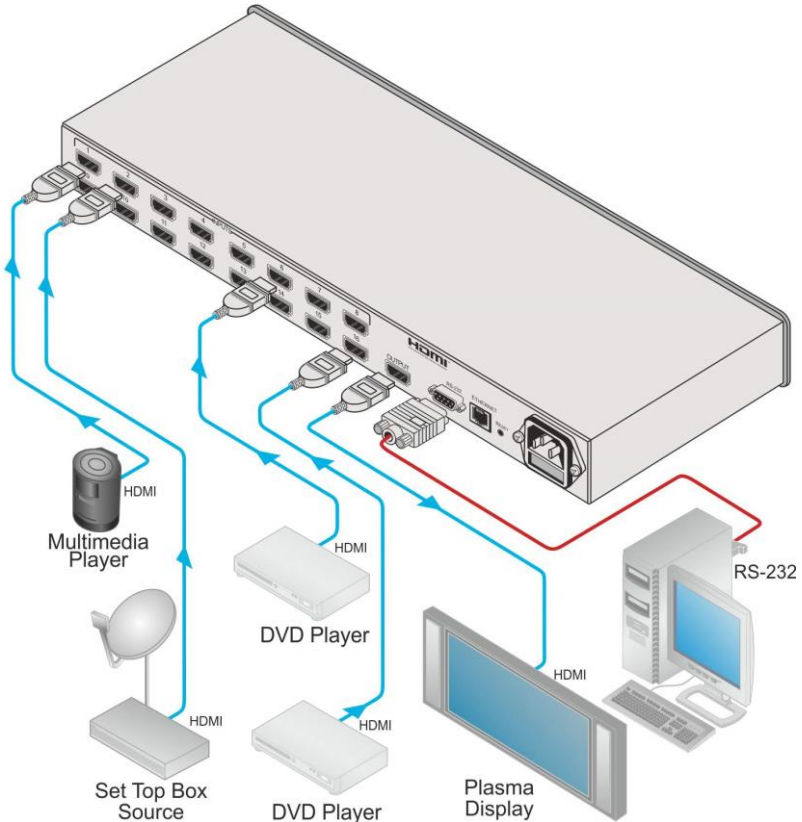

Figure 2: Connecting the VS-161H 16x1 HDMI Switcher

To connect the VS-161H 16x1 HDMI Switcher as illustrated in the example in [Figure 2](#)**:**

1. If required:

    - Set the appropriate INPUTS to the DVD/PC mode

    - Acquire the EDID

2. Connect the HDMI sources as follows:

    - A multimedia player to INPUT 1

    - A set top box to INPUT 2

    - A DVD player to INPUT 6

    - A DVD player to INPUT 16

3. Connect the OUTPUT HDMI connector to an HDMI acceptor (for example, a plasma display).

4. If required, connect a PC and/or controller to the RS-232 port and/or the Ethernet port.

5. Connect the power cord and power the device on.

Note: The Mute button flashes if the EDID of the device connected to the output is different from the EDID which is currently stored.

5.1 Connecting to the VS-161H Using the RS-232 Connection

You can connect to the unit via a crossed RS-232 connection, using for example, a PC. A crossed cable or null-modem is required as shown in method A and B respectively. If a shielded cable is used, connect the shield to pin 5.

Method A ([Figure 3](#))—Connect the RS-232 9-pin D-sub port on the unit via a crossed cable (only pin 2 to pin 3, pin 3 to pin 2, and pin 5 to pin 5 need be connected) to the RS-232 9-pin D-sub port on the PC.
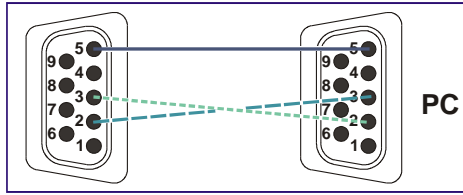**Note:** There is no need to connect any other pins.

Figure 3: Crossed Cable RS-232 Connection

Hardware flow control is not required for this unit. In the rare case where a controller requires hardware flow control, short pin 1 to 7 and 8, and pin 4 to 6 on the controller side.

Method B (Figure 4)—Connect the RS-232 9-pin D-sub port on the unit via a straight (flat) cable to the null-modem adapter, and connect the null-modem adapter to the RS-232 9-pin D-sub port on the PC. The straight cable usually contains all nine wires for a full connection of the D-sub connector. Because the null-modem adapter (which already includes the flow control jumpering described in Method A above) only requires pins 2, 3 and 5 to be connected, you are free to decide whether to connect only these 3 pins or all 9 pins.
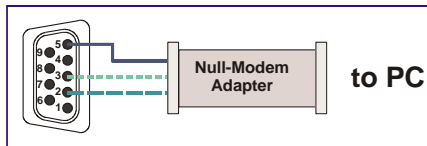
Figure 4: Straight Cable RS-232 Connection with a Null Modem Adapter

5.2   Connecting to the VS-161H Using Ethernet

You can connect the **VS-161H** via the Ethernet, using a crossover cable (see Section 5.2.2) for direct connection to the PC or a straight through cable (see Section 5.2.3) for connection via a network hub or network router.

After connecting the Ethernet port, you have to install and configure your Ethernet Port. For detailed instructions, see the "Ethernet Configuration (FC-11) guide.pdf" file in the technical support section at http://www.kramerelectronics.com.

5.2.1 Configuring the Ethernet Port

After connecting the Ethernet port, you have to install and configure it.

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

5.2.2 Connecting the Ethernet Port directly to a PC

You can connect the Ethernet port of the **VS-161H** directly to the Ethernet port on your PC using a crossover cable with RJ-45 connectors.

This type of connection is recommended for identifying the **VS-161H** with the factory configured default IP address.

After connecting the **VS-161H** to the Ethernet port, configure your PC as follows:

1. Click **Start** > **Control Panel** > **Network and Sharing Center**.

2. Click **Change Adapter Settings**.

3. Highlight the network adapter you want to use to connect to the device and click **Change settings of this connection**.
   The Local Area Connection Properties window for the selected network adapter appears as shown in Figure 5.
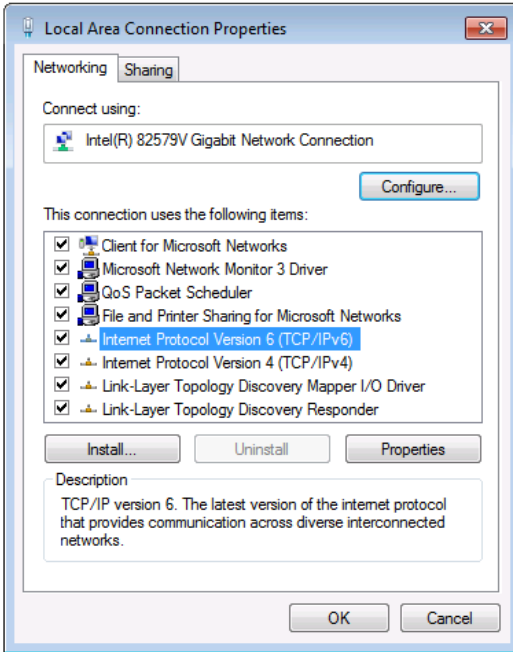
Figure 5: Local Area Connection Properties Window

4. Highlight either **Internet Protocol Version 6 (TCP/IPv6)** or **Internet Protocol Version 4 (TCP/IPv4)** depending on the requirements of your IT system.

5. Click **Properties**.
   The Internet Protocol Properties window relevant to your IT system appears as shown in Figure 6 or Figure 7.
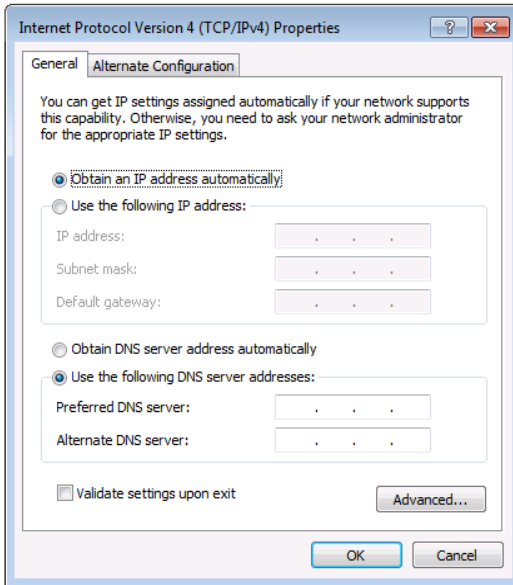
Figure 6: Internet Protocol Version 4 Properties Window
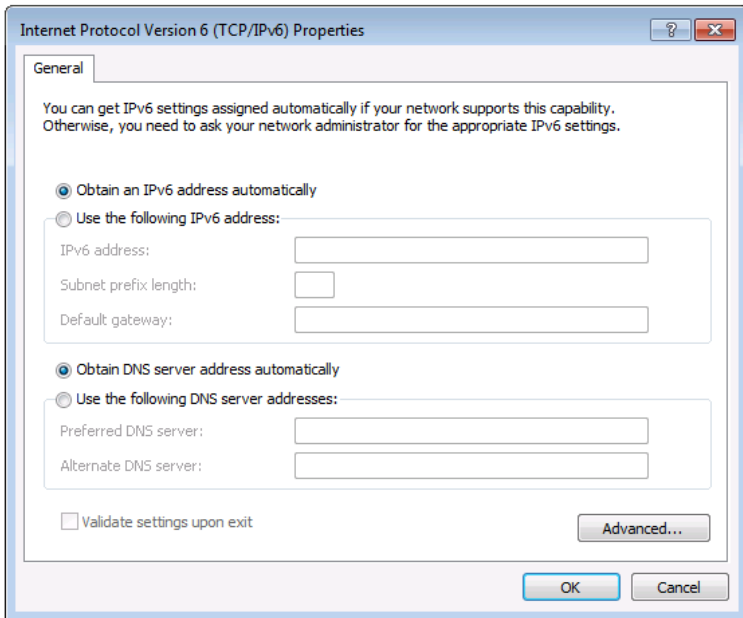
Figure 7: Internet Protocol Version 6 Properties Window

6. Select **Use the following IP Address** for static IP addressing and fill in the details as shown in Figure 8.
For TCP/IPv4 you can use any IP address in the range 192.168.1.1 to 192.168.1.255 (excluding 192.168.1.39) that is provided by your IT department.
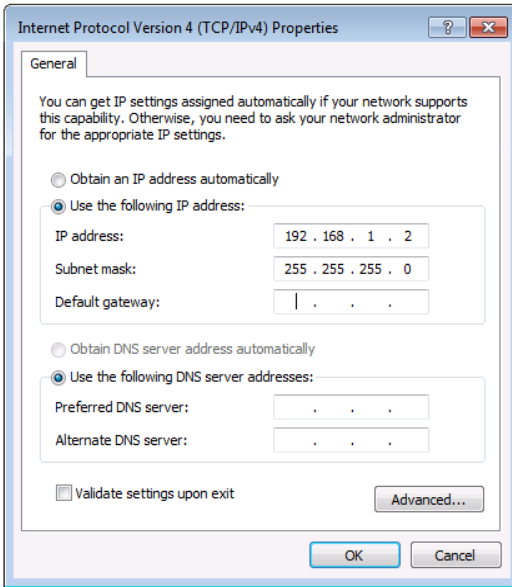
Figure 8: Internet Protocol Properties Window

7. Click **OK**.

8. Click **Close**.

5.2.3   Connecting the Ethernet Port via a Network Hub

You can connect the Ethernet port of the **VS-161H** to the Ethernet port on a network hub or using a straight-through cable with RJ-45 connectors.

6 Operating the VS-161H 16x1 HDMI Switcher

This section describes:

- The PC and DVD modes (see Section 6.1)

- Acquiring the EDID (see Section 6.2)

- Locking and unlocking the front panel buttons (see Section 6.3)

- Resetting to the factory default values (see Section 6.4)

- Upgrading the firmware (see Section 6.5)

6.1 The PC and DVD Modes

The **VS-161H** has two operation modes that are specific per input: the PC mode (default) and the DVD mode:

- The PC mode is used when connecting a computer or several computers to one or more of the inputs via a DVI-to-HDMI converter cable (for example, the Kramer HDMI-DVI Gold Plated Cable in various lengths). This is the default mode

- The DVD mode is used when connecting a DVD or several DVDs to the inputs

When in the PC mode, the input has access to the EDID (default or acquired) to prevent the computer from resetting if an output is not connected. In the DVD mode, the EDID of the connected output is available only when the input to which the DVD is connected, is switched to the output.

The PC mode and the DVD mode can be applied to a single input or to several inputs. For example, if you want to connect a computer to INPUT 1, another computer to INPUT 2, and DVD machines to all the other inputs (from INPUT 3 to INPUT 16), set INPUT 1 and INPUT 2 to the PC mode and all the other inputs to the DVD mode.

To set the inputs to either the PC or the DVD mode:

1. Turn the power off.

2. Press the PANEL LOCK button while turning the POWER on again.
   The INPUT buttons flash simultaneously.

3. Keep pressing and holding the PANEL LOCK button for a few seconds and
   then release it.
   The PANEL LOCK button flashes. If an input button lights this indicates that
   that input is set to the DVD mode. If no input button lights this indicates that
   that input is set to the PC mode.

4. Toggle between the PC mode (input button not lit) and the DVD mode (input
   button lights) by pressing that input.

5. Press the PANEL LOCK button to exit this mode.

6. You can connect a computer to the input(s) that is set to the PC mode and a
   DVD to the input(s) that is set to the DVD mode.

The following table summarizes the differences between the PC mode and the
DVD mode.

PC Mode	DVD Mode
The input is connected to a computer	The input is connected to a multimedia application, such as a DVD, a set top box and so on
The EDID is available at all times (to prevent computer reset)	The EDID is available only when that input is connected to an output
The input EDID source is the default EDID or an acquired EDID (see Section 6.2)	The input EDID source is acquired directly from the connected output

6.2 Acquiring the EDID

The acquired EDID is used when an input is set to the PC mode.

To acquire the EDID:

1. Turn the POWER off.

2. Press the PANEL LOCK button and the INPUT 16 button while turning the
   POWER on again.
   The INPUT buttons flash in sequence until the unit has completed reading
   the EDID.

3. Release the PANEL LOCK and INPUT 16 buttons.
    If an output was connected, the output EDID is read to all the inputs. If an output was not connected to the machine, the default EDID is read to the inputs.

Note: The Mute button flashes if the EDID of the device connected to the output is different from the EDID which is currently stored.

6.3   Locking and Unlocking the Front Panel

To lock and unlock the front panel buttons:

1. Press and hold the Panel Lock button until the button lights.
    The front panel buttons are locked.

2. Press and hold the Panel Lock button again until the button no longer lights.
    The front panel buttons are unlocked.

6.4   Resetting the Device to Factory Default Values

To reset to factory default values:

1. Turn the **VS-161H** off.

2. Press and hold the Reset button on the rear panel while turning the device on.

3. After approximately five seconds release the Reset button.
    The device is reset to its factory default values (see Section 6.4).

6.5   Upgrading the Firmware

For instructions on upgrading the firmware see "*Upgrading the **VS-161H** Firmware Using the K-Upload Software*".

7   Technical Specifications

INPUTS:	16 HDMI connectors
OUTPUT:	1 HDMI connector
BANDWIDTH:	Supports up to 1.65Gbps bandwidth per graphic channel
COMPLIANCE WITH HDMI STANDARD:	Supports HDMI and HDCP
RESOLUTION:	Up to UXGA; 1080p
POWER CONSUMPTION:	90–240VAC; 50/60Hz, 22VA
CONTROLS:	Front panel buttons, infrared remote control transmitter, RS-232, Ethernet
OPERATING TEMPERATURE:	0° to +40°C (32° to 104°F)
STORAGE TEMPERATURE:	40° to +70°C (-40° to 158°F)
HUMIDITY:	10% to 90%, RHL non-condensing
DIMENSIONS:	19" x 7" x 1U (W, D, H)
WEIGHT:	2.5kg (5.5lbs) approx.
INCLUDED ACCESSORIES:	Power cord, null-modem adapter, rack "ears", IR remote control
OPTIONS:	Kramer HDMI cables (for example, the C-HM/HM series, the C-HM/DM series and/or our HDMI over fiber optics C-FOHM/FOHM series)
Specifications are subject to change without notice at http://www.kramerelectronics.com	

8   Default Communication Parameters

RS-232	
Protocol 2000	
Baud Rate:	9600
Data Bits:	8
Stop Bits:	1
Parity:	None
Command Format:	Hex
Example (Output 1 to Input 1):	0x01, 0x81, 0x81, 0x81
Ethernet	
Default Settings	**Reset Settings**
IP Address: 192.168.1.39	Power cycle the device while holding in the Factory Reset button, located on the rear panel of the unit
TCP Port #: 5000	
UDP Port #: 50000	

9 Kramer Protocol 2000

The Kramer Protocol 2-000 RS-232/RS-485 communication uses four bytes of information as defined below. All the values in the table are decimal, unless otherwise stated.

MSB   LSB

	DESTINATION	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 accept (implement) the command, and the addressed machine replies. 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.

Instruction Codes for Protocol 2000			
Instruction	**Definition for Specific Instruction**		**Notes**
# **Description**	**Input**	**Output**	
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, 15
30 LOCK FRONT PANEL	0 - Panel unlocked 1 - Panel locked	0	2

NOTES on the above table:

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

01   85   88   83

was sent from the PC, then the switcher (machine 3) switches input 5 to output 8. If the user switched input 1 to output 7 via the front panel keypad, then the switcher sends HEX codes:

41   81   87   83

to the PC.

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

NOTE 15 – When the OVR bit (4th byte) is set, then the "video" commands have universal meaning. For example, instruction 1 (SWITCH VIDEO) causes all units (including audio, data, etc.) to switch. Similarly, if a machine is in "FOLLOW" mode, it performs any "video" instruction.

LIMITED WARRANTY

The warranty obligations of Kramer Electronics for this product are limited to the terms set forth below:

What is Covered

This limited warranty covers defects in materials and workmanship in this product.

What is Not Covered

This limited warranty does not cover any damage, deterioration or malfunction resulting from any alteration, modification, improper or unreasonable use or maintenance, misuse, abuse, accident, neglect, exposure to excess moisture, fire, improper packing and shipping (such claims must be presented to the carrier), lightning, power surges, or other acts of nature. This limited warranty does not cover any damage, deterioration or malfunction resulting from the installation or removal of this product from any installation, any unauthorized tampering with this product, any repairs attempted by anyone unauthorized by Kramer Electronics to make such repairs, or any other cause which does not relate directly to a defect in materials and/or workmanship of this product. This limited warranty does not cover cartons, equipment enclosures, cables or accessories used in conjunction with this product.

Without limiting any other exclusion herein, Kramer Electronics does not warrant that the product covered hereby, including, without limitation, the technology and/or integrated circuit(s) included in the product, will not become obsolete or that such items are or will remain compatible with any other product or technology with which the product may be used.

How Long Does this Coverage Last

Seven years as of this printing; please check our Web site for the most current and accurate warranty information.

Who is Covered

Only the original purchaser of this product is covered under this limited warranty. This limited warranty is not transferable to subsequent purchasers or owners of this product.

What Kramer Electronics will do

Kramer Electronics will, at its sole option, provide one of the following three remedies to whatever extent it shall deem necessary to satisfy a proper claim under this limited warranty:

1. Elect to repair or facilitate the repair of any defective parts within a reasonable period of time, free of any charge for the necessary parts and labor to complete the repair and restore this product to its proper operating condition. Kramer Electronics will also pay the shipping costs necessary to return this product once the repair is complete.

2. Replace this product with a direct replacement or with a similar product deemed by Kramer Electronics to perform substantially the same function as the original product.

3. Issue a refund of the original purchase price less depreciation to be determined based on the age of the product at the time remedy is sought under this limited warranty.

What Kramer Electronics will not do Under This Limited Warranty

If this product is returned to Kramer Electronics or the authorized dealer from which it was purchased or any other party authorized to repair Kramer Electronics products, this product must be insured during shipment, with the insurance and shipping charges prepaid by you. If this product is returned uninsured, you assume all risks of loss or damage during shipment. Kramer Electronics will not be responsible for any costs related to the removal or re-installation of this product from or into any installation. Kramer Electronics will not be responsible for any costs related to any setting up this product, any adjustment of user controls or any programming required for a specific installation of this product.

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