Kramer Electronics, Ltd.

USER MANUAL

Model:

VS-1616D

16x16 Digital Matrix Switcher

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1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, 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 1,000-plus different models now appear in 11 groups[1] that are clearly defined by function.

Congratulations on purchasing your Kramer **VS-1616D** *16x16 Digital Matrix Switcher*. This product is ideal for the following typical applications:

- Professional display systems requiring video signal routing
- Broadcast, presentation and production facilities, as well as monitoring in large duplication systems
- Rental/staging applications

The package includes the following items:

- **VS-1616D** *16x16 Digital Matrix Switcher*
- Power cord
- Kramer **RC-IR3** infrared remote control transmitter (including the required batteries and a separate user manual2)
- This user manual[2]

Note: Throughout this user manual the chassis configuration is shown with 16 DVI inputs and 16 DVI outputs as a representation only. The following cards are available and may be mixed in the same chassis:

- DGKat plus RS-232
- DVI
- DVI dual link
- DVI (HDCP)
- DVI (over 4LC fiber optic cable)
- HDMI (over fiber optic cable) with 670 module (HDCP)
- HDBaseT plus IR, RS-232 and Ethernet
- HDBaseT light, plus IR and RS-232
- HDMI (HDCP)
- HDMI plus analog audio (HDCP)
- HDMI plus digital audio (HDCP)

1 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 Products

2 Download up-to-date Kramer user manuals from http://www.kramerelectronics.com

- HDMI plus RS-232 (HDCP)
- VGA

2 Getting Started

We recommend that you:

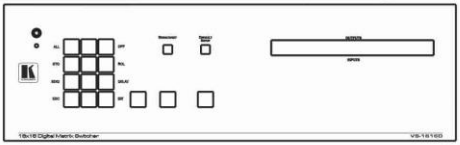
- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual

2.1 Quick Start

The following quick start chart summarizes the basic setup and operation steps.

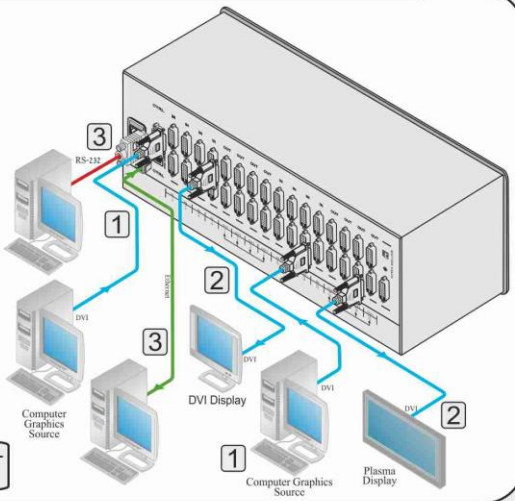
Step 1: Mount the device - see Section 5

Mount the device in a rack or stick the 4 rubber feet to the underside



Step 2: Connect the inputs and outputs - see Section 2

1. Connect up to 16* inputs
2. Connect up to 16* outputs
3. Optional—Connect a PC via RS-232 and/or Ethernet for remote control



* Your maximum number of ports may vary - see Section 9

Step 3: Connect to a controller - see Section 6

If required, connect a controller via the RS-232 and/or the Ethernet port

Step 4: Turn the power on

Step 5: Configure the device - see Section 8

Use the Setup and Config menus to set the device configuration

Step 6: Operate the device - see Section 7

Operate the device using the front panel buttons, IR remote control, RS-232 and Ethernet

3 Overview

The Kramer **VS-1616D** is a high performance matrix switcher chassis that supports up to 16 x 16 ports[1] for various signals (depending on the type of cards installed). It features a very high bandwidth[2] of up to 3.2Gbps (for the chassis only, effective bandwidth of the system depends on the I/O cards) that ensures transparent performance even in the most critical applications. The cards re-clock and equalize the signals and the chassis can route any or all inputs to any or all outputs simultaneously.

The **VS-1616D** is highly configurable–you can add or remove inputs and outputs independently in groups of two and mix different types of input/ouput cards in the same chassis. For example, you can configure a device as a 4 x 12 or a 16 x 8 matrix switcher to exactly suit your needs.

The **VS-1616D** features:

- Full 16 x 16 non-blocking matrix array to switch any of the 16 input digital signals to any or all outputs (see Section 6)
- Easy access to 59 preset memory locations for quick access to user-defined setups
- Fast switching on outputs to reduce or remove switching delay
- The Kramer 2000 Protocol for serial control
- A 40 character by 2 line LCD that shows the operational status or the configuration menu
- A lock function to prevent tampering with the front panel
- A default EDID (Extended Display Identification Data) for each input
- EDID Capture – Copies and stores the EDID from a display device
- EDID PassThru – Passes EDID/HDCP signals from source to display
- Non-volatile EDID storage
- Kramer Core™—flexible infrastructure conversion. Copper, fiber or Twisted Pair, all can be used at the same time according to input/output module selection. The matrix receives signals from compatible Kramer transmitters, automatically converts between available infrastructure options and sends the signals to compatible Kramer receivers
- Equalization and re-clocking on all card types

1 Can also be configured for other sizes (up to a maximum of 16 x 16)

2 For maximum bandwidth supported by each type of card see the Technical Specifications in Section 13

You can operate the **VS-1616D** via the front panel buttons[1] or remotely via:

- RS-232 serial commands transmitted by a touch screen system, PC or other serial controller
- Ethernet over a LAN
- The infrared remote control transmitter
- Kramer **K-Router Plus** software application

The **VS-1616D** is housed in a 19" rack-mountable enclosure.

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 **VS-1616D** in a location free from moisture and away from excessive sunlight and dust

3.1 Recommendations for Best Performance

To achieve the best performance:

- Use only good quality connection cables (we recommend Kramer high-performance, high-resolution cables) thus avoiding 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 and position your **VS-1616D** 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.

3.2 Safety Instructions

Caution: No operator serviceable parts inside the unit

Warning: You use only the power cord that is supplied with the unit. 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

1 The VS-1616D is a sophisticated device but has been designed to be as simple as possible to operate. Due to space limitations on the front panel 32 input/output selector buttons are instead substituted by a keypad. For details of how to route inputs to outputs, see Section 7.4

3.1 Shielded Twisted Pair/Unshielded Twisted Pair

Kramer engineers have developed special twisted pair cables to best match our digital twisted pair products; Kramer's **BC-DGKat524**, **BC-DGKat623/ BC-HDKat6a** and **BC-DGKat7a23** shielded twisted pair (STP) cables. These specially built cables significantly outperform regular CAT 6 and CAT 7a cables.

3.2 About the Power Connect™ Feature

The Power Connect™ feature here means that the **VS-1616D** can supply power to the TP transmitters and receivers (for example, the **PT-573** and **PT-574**).

3.3 About Fast Switching

Older display devices require a longer time between the loss of one digital signal and the introduction of another, as well as a physical disconnection of the interconnecting cable in order to be able to detect and adjust to the new video attributes and parameters. Normal switching, therefore, introduced a 5V signal disconnection along with a delay in switching. Many newer display devices, however, are now capable of accepting "on-the-fly" switching.

Depending on the display device in use, the **VS-1616D** allows for fast switching (minor reset and the connection kept alive) and extra fast switching (no reset and the connection kept alive), see Section 8.2.4. Using the fast and extra fast switching modes allows for fraction-of-a-second switching times when using high performance display devices or when using a scaler on the video output.

3.4 About HDBaseT™ Technology

HDBaseT™ is an advanced all-in-one connectivity technology (supported by the HDBaseT Alliance). It is particularly suitable in the consumer home environment as a digital home networking alternative where it enables you to replace numerous cables and connectors by a single LAN cable used to transmit, for example, uncompressed full high definition video, audio, IR, as well as various control signals.

The products described in this user manual are HDBaseT certified.

3.5 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/*.

4 Defining the VS-1616D 16x16 Digital Matrix Switcher

Figure 1, Table 1, Figure 2 and Table 2 define the front panel of the **VS-1616D**.

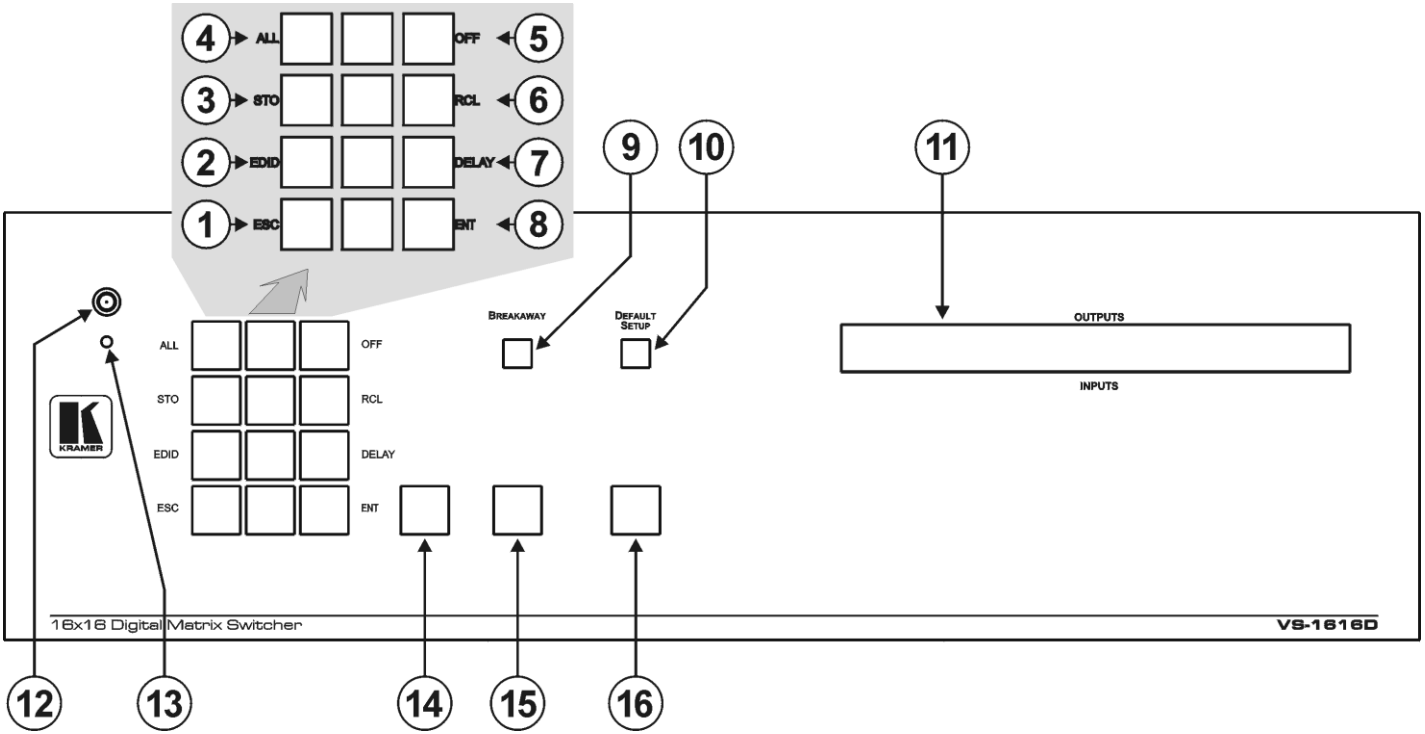


Figure 1: VS-1616D 16x16 Digital Matrix Switcher Front Panel

Note: Buttons 14, 15 and 16 function as the TAKE, MENU and LOCK buttons respectively

Table 1: VS-1616D 16x16 Digital Matrix Switcher Front Panel Features

#	Feature			Function
1	Double-function Selector Buttons Area	Menu Button Functions	*ESC*	Press to exit the current operation
2			*EDID*	Press to assign EDID channels
3			*STO*[1]	Press to store the current setup in a preset
4			*ALL*1	Press to connect an input to all outputs
5			*OFF*1	Press to turn off an output
6			*RCL*1	Press to recall a preset
7			*DELAY*	Press to set the delay between confirming an action and the execution of the action
8			*ENT*	Press to complete the input-output setup when using a one-digit number instead of two digits[2]. Press to enter the options in a setup menu
9	*BREAKAWAY* Button			Press to exit a Menu (see Section 8)
10	*DEFAULT SETUP* Button			Press to recall the default setup (see Section 7.4.5)
11	*OUTPUTS/INPUTS* LCD Display			Displays the outputs (upper row) switched to the selected inputs (lower row), (see Section 7.1). Displays user interface messages and menus
12	IR Receiver			Infrared remote control sensor
13	IR LED			Lights yellow when receiving commands from the IR remote control transmitter
14	*TAKE* Button			Press to confirm actions (see Section 7.3.2)
15	*MENU* Button			Press once to enable the ALL, OFF, STO and RCL buttons (see Section 8). Press again to enter the configuration menu (see Section 8.2). When in a Menu, press to cycle through the menu items
16	*LOCK* Button			Press and hold for approximately 2 sec to lock/unlock the front panel buttons (see Section 7.5)

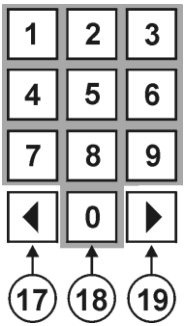


Figure 2: VS-1616D Front Panel Numeric Keypad

Table 2: VS-1616D Front Panel Numeric Keypad Labels

#	Feature	Function
17	◄ (Backward)	Press to shift the sliding window to the right3
18	*1, 2, 3, 4, 5, 6, 7, 8, 9, 0*	Numeric keypad, 1 to 0
19	► (Forward)	Press to shift the sliding window to the left[3]

1 After pressing the MENU button, this button lights and is enabled

2 For example, to enter input 5, you can press either ENT, 05 or 5

3 Since the LCD display is large enough to show only 13 cross-points out of a total of 16

Figure 3 and Table 3 define the rear panel of the **VS-1616D** showing DVI cards installed as an example.

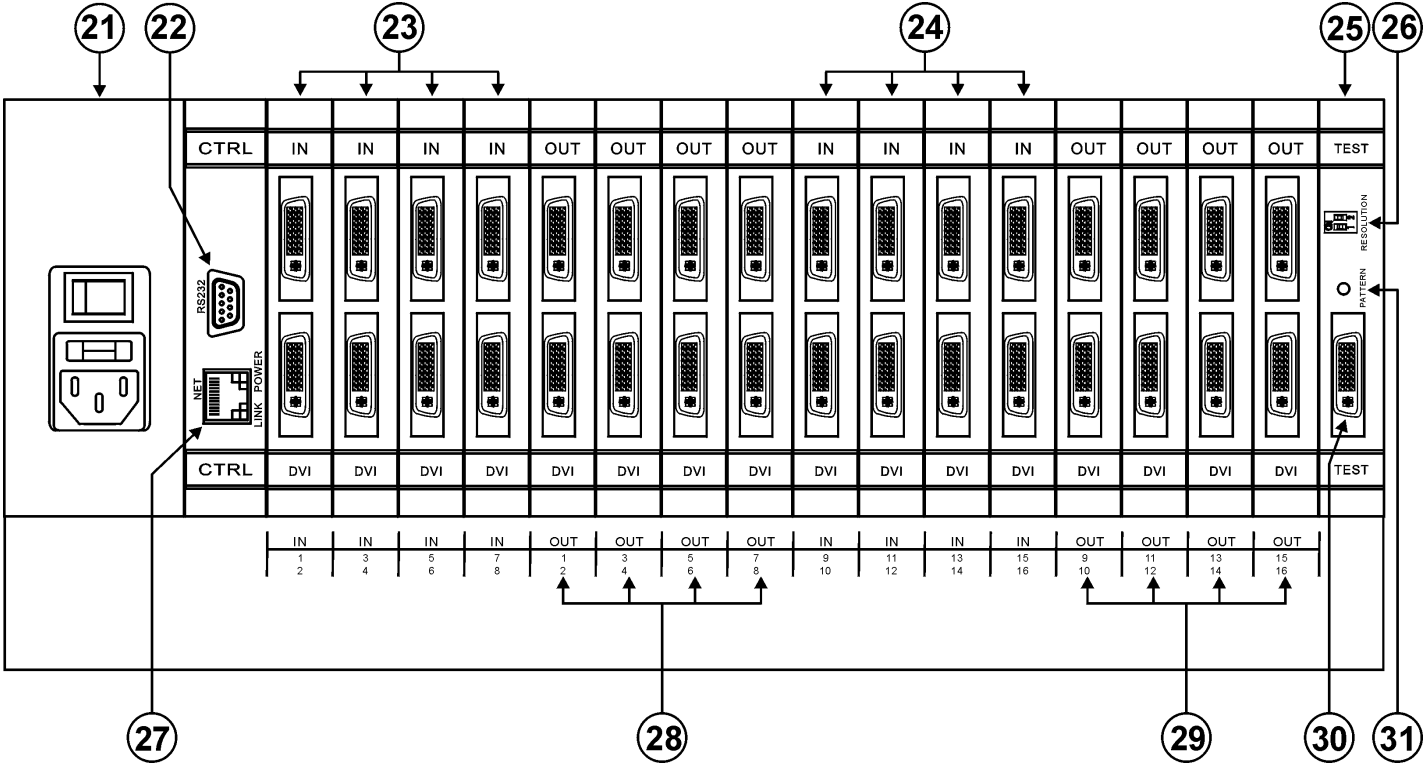


Figure 3: VS-1616D 16x16 Digital Matrix Switcher Rear Panel Showing DVI cards

Table 3: VS-1616D 16x16 Digital Matrix Switcher Rear Panel Features

#	Feature		Function
21	AC Mains Power Module		Fuse holder and power cord socket. Connect to the AC mains supply
22	*RS-232* 9-pin D-sub Port		Connects to the remote operation PC or remote controller[1] (see Section 6.3)
23	*IN 1~4, 5~8* Connectors	INPUTS	Connect to the relevant video sources, depending on the cards installed (1 to 8, see Section 6)
24	*IN 9~12, 13~16* Connectors		Connect to the relevant video sources, depending on the cards installed (9 to 16, see Section 6)
25	*TEST* Module		Signal generator module for testing video outputs (see Section 10)
26	RESOLUTION DIP-switches		Set the resolution for video generated by the Test module (see Section 10.2)
27	*NET* Ethernet RJ-45 Connector		Connect to a PC or controller via the Ethernet LAN (see Section 6.4). *LINK* LED flashes when communication is active. *POWER* LED lights when the interface receives power
28	*OUT 1~4, 5~8* Connectors	OUTPUTS	Connect to the relevant video acceptors, depending on the cards installed (1 to 8, see Section 6)
29	*OUT 9~12, 13~16* Connectors		Connect to the relevant video acceptors, depending on the cards installed (9 to 16, see Section 6)
30	Test Module Output Connector		Connect to one of the relevant video inputs to aid in troubleshooting (see Section 10.4)
31	*PATTERN* Button		Press the button repeatedly to change the video pattern generated by the Test module (see Section 10.3)

4.1 Using the IR Transmitter

You can use the **RC-IR3** IR transmitter to control the machine via the built-in IR receiver on the front panel.

1 If the unit is not the first unit in the line, connects to the RS-232 OUT 9-pin DB port of the previous unit in the line

5 Installing the VS-1616D in a Rack

This section provides instruction on rack mounting the **VS-1616D**.

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

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

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.

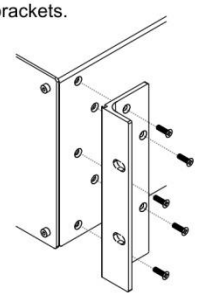
3. The machine is placed straight in the correct horizontal position.

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 (5 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

6 Connecting the VS-1616D 16x16 Digital Matrix Switcher

The configuration of DVI input/output cards shown in Figure 4 is merely an sample representation and different I/O cards may be mixed as required (for limitations, see Page 14). Exactly the same principles apply to installations using other card types.

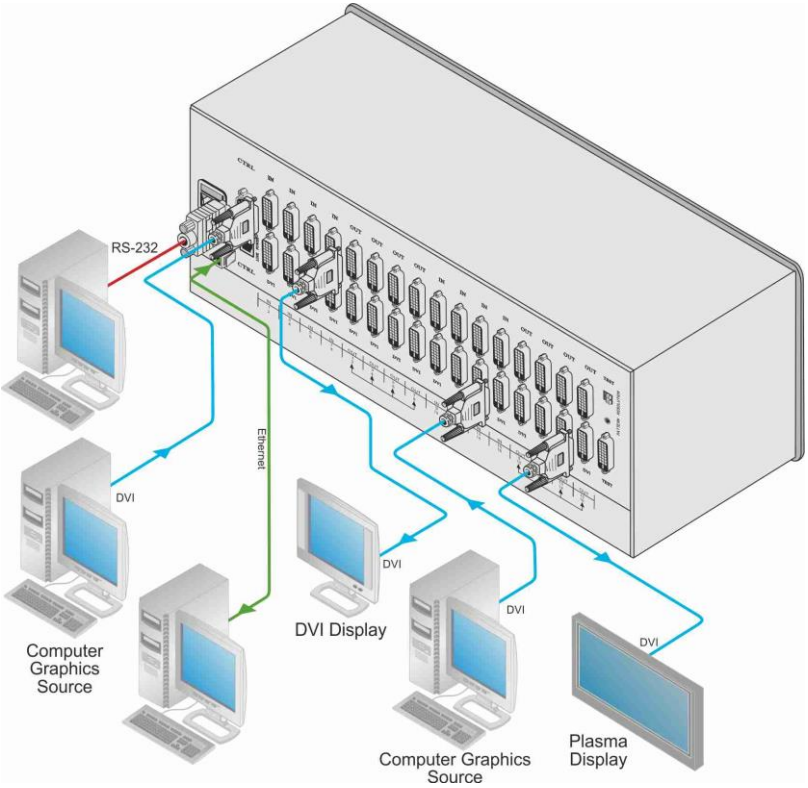


Figure 4: Connecting the VS-1616D

To install[1] the VS-1616D as illustrated in the example in Figure 4:

1. Connect up to 16 DVI video sources (for example[2], computer graphics sources).
2. Connect up to 16 DVI video acceptors, (for example2, a plasma display and a DVI LCD display).
3. If required, connect a PC or remote controller to the RS-232 port (see Section 6.3) and/or the Ethernet port (see Section 6.4).

1 Switch off the power for each device before connecting it to your VS-1616D

2 In this example only two inputs and two outputs are connected

4. Connect the power cord[1].
5. If necessary, review and set the system configuration using the Menu (see Section 8).

Note: Given an input signal that is HDCP encoded, the **VS-1616D** will output a signal only if the output port to which it is switched supports HDCP.

6.1 Port Numbering

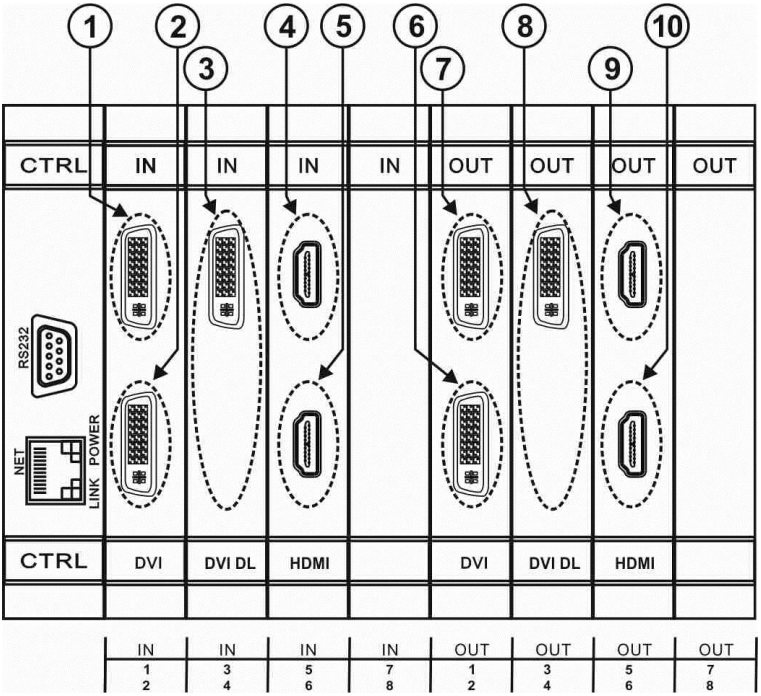


Figure 5: Sample Port Numbering

Table 4: Port Numbering

Diagram #	Actual Port Number	Diagram #	Actual Port Number
1	IN 1	6	OUT 2
2	IN 2	7	OUT 1
3	IN 3	8	OUT 3
4	IN 5	9	OUT 5
5	IN 6	10	OUT 6

Note: There is no IN 4 or OUT 4 because these slots contain DVI dual link cards.

1 We recommend that you use only the power cord that is supplied with the device (not shown in Figure 4)

On all cards apart from the DVI dual link cards, there are two physical ports on each card and numbering of ports is sequential from top to bottom and left to right. Each DVI dual link card provides one physical port which causes the loss of one number in the numbering sequence of that card only. A sample numbering is shown in Figure 5 and explained in Table 4.

6.1.1 EDID Numbering Examples

Table 5 is based on the port numbering shown in Figure 5 and lists requested switching configurations and their results.

Table 5: EDID Configuration Requests and Results

EDID Request	EDID Sent
From OUT 4	Blank (256 bytes of 0xFF)
From IN 8	None (error message displayed)

Note: AV data flow is: **source** > **VS-1616D** > **display**. EDID information flow is: **display** > **VS-1616D** > **source**, which means that the EDID input is the display side and the EDID output is the AV source side. This is the reverse of the AV data flow direction.

When assigning EDIDs, note that the top row of the LCD display labeled OUTPUTS relates to the ports connected to the sources (AV inputs), and the bottom row of the LCD display labeled INPUTS relates to the ports connected to displays (AV outputs).

In Figure 6, the EDID from EDID input 8 (**VS-1616D** Output port 8) has been assigned to all EDID outputs (**VS-1616D** Input ports).

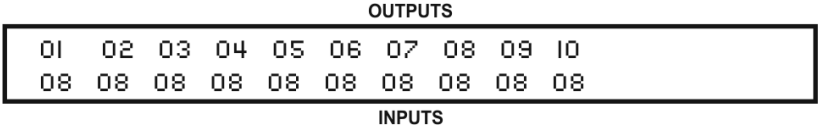


Figure 6: EDID Numbering Assignment

6.2 Serial Data Flow on DGKat Plus RS-232 Cards

Serial data present on the RS-232 port of a DGKat input card is not transmitted via the switcher. This data is transmitted over the TP cable of the same input card (see Figure 7).

Serial data present on the RS-232 port of a DGKat output card is not transmitted via the switcher. This data is transmitted over the TP cable of the same output card.

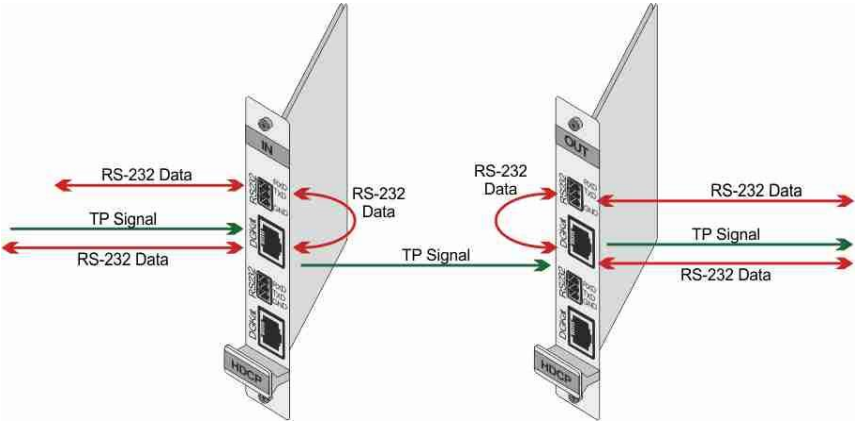


Figure 7: DGKat Card Serial Data Transmission

6.3 Connecting to the VS-1616D via RS-232

You can connect to the **VS-1616D** via an RS-232 connection using, for example, a PC. Note that a null-modem adapter/connection is not required.

To connect to the VS-1616D via RS-232:

- Connect the RS-232 9-pin D-sub rear panel port on the **VS-1616D** unit via a 9-wire straight cable (only pin 2 to pin 2, pin 3 to pin 3, and pin 5 to pin 5 need to be connected) to the RS-232 9-pin D-sub port on your PC

6.4 Connecting to the VS-1616D via Ethernet

You can connect to the **VS-1616D** via Ethernet using either of the following methods:

- Directly to the PC using a crossover cable (see Section 6.4.1)
- Via a network hub, switch, or router, using a straight-through cable (see Section 6.4.2)

Note: If you want to connect via a router and your IT system is based on IPv6, speak to your IT department for specific installation instructions.

6.4.1 Connecting the Ethernet Port Directly to a PC

You can connect the Ethernet port of the **VS-1616D** 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-1616D** with the factory configured default IP address.

After connecting the **VS-1616D** 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 8.

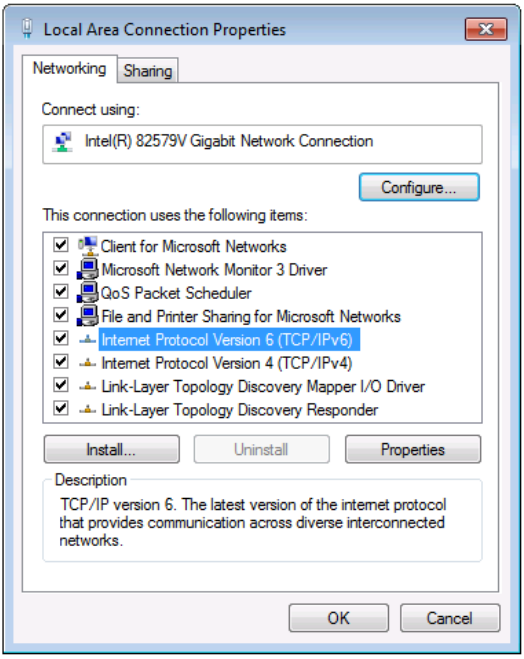


Figure 8: Local Area Connection Properties Window

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 9 or Figure 10.

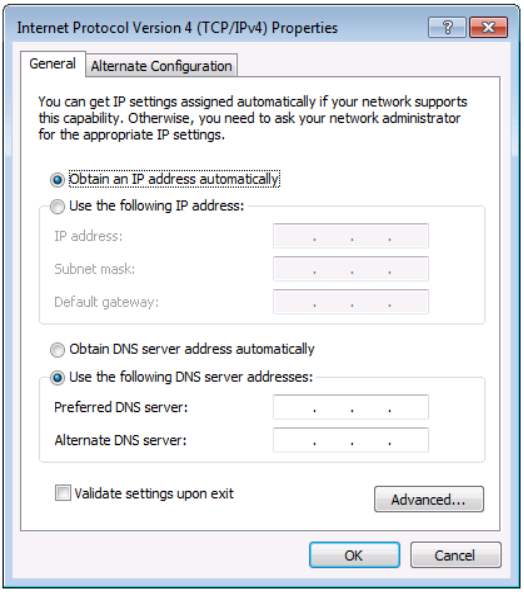


Figure 9: Internet Protocol Version 4 Properties Window

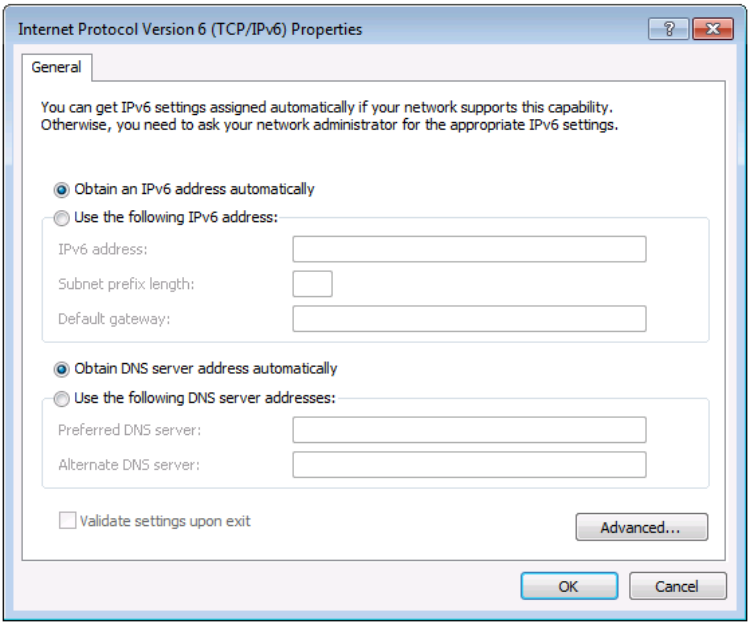


Figure 10: Internet Protocol Version 6 Properties Window

6. Select **Use the following IP Address** for static IP addressing and fill in the details as shown in Figure 11.
   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.

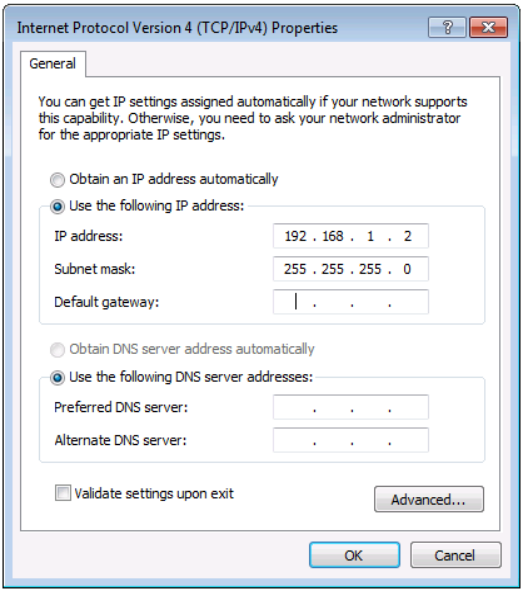


Figure 11: Internet Protocol Properties Window

7. Click **OK**.
8. Click **Close**.

6.4.2 Connecting the Ethernet Port via a Network Hub or Switch

You can connect the Ethernet port of the **VS-1616D** to the Ethernet port on a network hub or using a straight-through cable with RJ-45 connectors.

7 Operating Your Video Matrix Switcher

This section describes:

- The startup display (see Section 7.1)
- Using the selector buttons (see Section 7.2)
- Confirming actions (see Section 7.3)
- Switching options (see Section 7.4)
- Locking the front panel (see Section 7.5)

7.1 Startup Display

After switching on the power, the LCD display[1] shows the following screens in sequence.

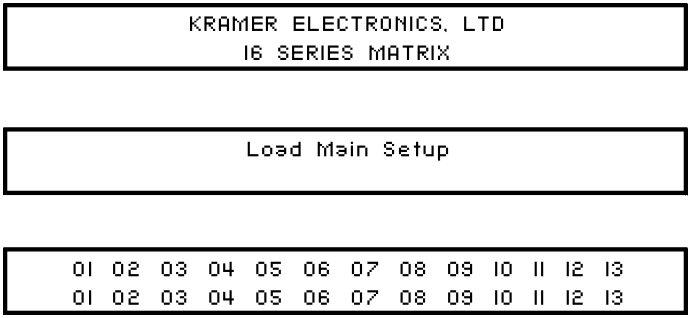


Figure 12: Default Startup Status Display Sequence

The **VS-1616D** does not have separate output and input buttons. Instead, the front panel includes a numeric keypad within the Selector Buttons area[2]. This numeric keypad lets you enter both the output and input numbers as well as various numeric configuration values. (see Section 7.2).

When the unit is powered-on, the last matrix setup that was used is loaded. Use either the setup[3] recall (see Section 8.1.6) or default setup recall[4] (see Section 7.4.5) functions to retrieve other setups.

1 The text in the LCD Display may vary (according to machine settings)

2 See Table 1

3 Records a stored configuration from a preset

4 For quick retrieval, you can program a default setup that is commonly used

7.1.1 Viewing the Display

Figure 12 shows the output-input matrix on the LCD display. The LCD display can show only 13 out of the 16 available matrix combinations at once. To view any of the matrix combinations use the ◄ or the ► buttons on the front panel to shift the sliding window to the right or left.

This sliding window functionality is enabled when:

- The switcher is in between operations[1]
- Recalling a setup using the ◄ or ► buttons

When entering an output/input combination, the contents of the LCD display automatically shift to indicate the current status of the selected output.

7.2 Using the Selector Buttons

For numbers between 1 and 9, the **VS-1616D** can handle two digit numbers as well as single digit numbers. When entering a single digit number (for example 5), you can either press 0 followed by 5, or 5 followed by ENT.

Pressing 00 (or 0, ENT) is only relevant for an input and is used to disconnect the currently entered output number from the input.

For example, the following display indicates that outputs 8 and 12 are disconnected from any input (note that the corresponding inputs in the second line are blank):

06	07	08	09	10	11	12	13
12	08		10	14	13		06

The ESC button is used to cancel an operation without affecting the current status. For example, if you enter an incorrect number by mistake, press the ESC button to cancel the operation.

Note: At any stage, if no button is pressed within approximately 15 seconds, the automatic timeout causes the **VS-1616D** to exit the operation and revert to the output/input display.

1 Waiting for its next operation while all previous operations are complete or cancelled

7.3 Confirming Actions

You can choose to work in the At Once (default[1]) or the Confirm mode.

In the At Once mode:

- The TAKE button does not light
- Pressing an OUT-IN combination implements the switch without further user confirmation
- You save time as execution is immediate and actions require no user confirmation
- No protection is offered to correct an erroneous action

In the Confirm mode:

- The TAKE button lights
- You enter an action and then confirm it by pressing the TAKE button
- Every action requires user confirmation, protecting against erroneous actions
- Execution is postponed until you confirm the action[2]

7.3.1 Toggling between the At Once and Confirm Modes

To toggle between the At Once and Confirm modes:

Note: If the TAKE button is flashing you cannot toggle between the At Once and Confirm modes. A flashing TAKE button indicates that an action is currently pending confirmation.

1. Press TAKE to toggle between the At Once mode and the Confirm mode.
   The TAKE button lights and actions now require user confirmation.
2. Press the lit TAKE button to toggle from the Confirm mode back to the At Once mode.
   The TAKE button is no longer lit and actions no longer require user confirmation.

7.3.2 Confirming a Switching Action

Actions only require confirmation when the device is in the Confirm mode.

To confirm a switching action:

1. Using the numeric keypad, enter an output-input combination.
   The TAKE button flashes.
2. Press the flashing TAKE button to confirm the action.
   The action is confirmed and the TAKE button lights.

1 For all actions except storing/recalling

2 Failure to press the TAKE button within a few seconds results in the action timing out automatically

7.4 Switching Actions

This section describes how to:

- Switch one input to one output (see Section 7.4.1)
- Switch several inputs to several outputs (see Section 7.4.2)
- Turn off several outputs (see Section 7.4.3)

7.4.1 Switching one Input to one Output

To switch one input to one output:

1. Using the numeric keypad, enter the required output (in this example, 12). The following is displayed:

06 07 08 09 10 11 12 13

In__ => Out 12

The left-hand side of the display shows a section of the output/input display automatically sliding the content to include output 12.

2. Using the numeric keypad, enter the required input (in this example, 14):
   - In the At Once mode, the switching takes place immediately and the LCD display shows a segment of the input-output status that includes the switched input and output (for example, 14-12)
     In the Confirm mode, the LCD display shows the following:
     In 14 => Out 12
     Incomplete actions time out after approximately 15 seconds.
   - In the Confirm mode, press the flashing TAKE button to switch the input to the output

7.4.2 Switching Several Inputs to Several Outputs

If you want to switch several inputs to several outputs you must be in the Confirm mode.

In the Confirm mode you can enter a batch of several actions and then confirm the batch by pressing TAKE once (simultaneously switching several output-input combinations).

To switch several inputs to several outputs in the Confirm mode:

1. Using the numeric keypad, enter an output-input combination.
   The TAKE button flashes.

2. Enter additional output-input combinations.
   The LCD display can show up to five pending actions (although the batch is not limited to five actions), as follows[1]:

   09 => 06 05 => 07

3. After entering all output/input combinations, press the flashing TAKE button to confirm the actions.
   The inputs switch to the respective outputs as shown on the LCD display and the TAKE LED is lit.

7.4.3 Turning an Output Off

Turning an output off means that there is no input switched to this output. This is indicated on the display by the Input being blank underneath the relevant Output.

To turn an output off:

1. Press MENU.
   The Menu buttons light and are enabled.
2. Press OFF (3) on the numeric keypad (see Figure 2).
   The following message is displayed:
   out__ => OFF
3. Use the numeric keypad to turn the required output off.
   The output is turned off.

To turn an output off in the Confirm mode:

- Repeat the steps above and then press the flashing TAKE button to confirm the action

Alternatively, you can perform a switching operation (see Section 7.4.1) and set the input to 00.

7.4.4 Turning Off Several Outputs

To turn off several outputs in the Confirm mode, repeat the switching actions described in Section 7.4.2 but set the inputs to 00.

7.4.5 Recalling the Default Setup

You can store a commonly used setup as the default setup (see Section 8.2.8) which can be recalled at any time.

Note: This is not the setup that is loaded when the unit is turned on. When the unit is turned on, the setup that was last used before the unit was turned off is loaded.

1 In this example, input 9 is set to switch to output 6 and input 5 is set to switch to output 7

To recall the default setup:

1. Press DEFAULT SETUP.
   The DEFAULT SETUP button flashes and the following message is displayed:
   recall DEFAULT setup
   press FLASHING button to confirm

2. Press DEFAULT SETUP.
   The following message is displayed:
   all Setups and Connections change
   press TAKE to confirm
   - The TAKE button flashes.
3. Press TAKE.
   The default setup is recalled and the display reverts to the output-input display.

7.5 Locking the Front Panel Buttons

You can lock[1] the **VS-1616D** to prevent tampering with the unit or prevent the settings from being changed accidentally via the front panel buttons.

To lock the front panel buttons:

- Press and hold LOCK until the button lights.
  The front panel buttons are locked

To unlock the front panel buttons:

- Press and hold LOCK until the button is no longer lit.
  The front panel buttons are unlocked

8 Using the Configuration Menus

The configuration menus let you configure the **VS-1616D** to best suit your needs. There are two configuration menus:

- Setup Menu—those that are accessed on a regular basis (for example, storing setups and setting the delay), see Section 8.1
- Config Menu—those that are accessed only occasionally (for example, setting the interface or communication protocol), see Section 8.2

Figure 13 shows the navigation through the menu options.

1 You can still remotely operate via RS-232 or Ethernet even when the front panel is locked

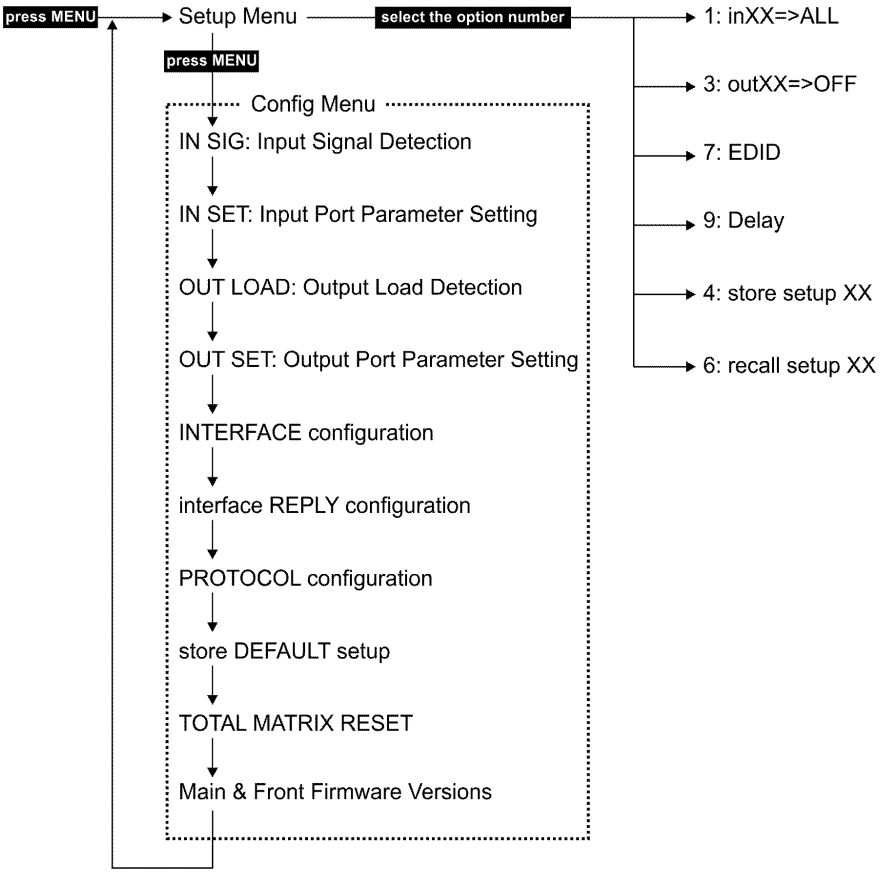


Figure 13: Menu Tree

The following rules apply to the menu operation:

- If no selection is made within approximately 15 seconds, the operation times-out and the display reverts to the output/input display
- At any point in the Menu, press ESC to move up one level or press BREAKAWAY to exit the Menu altogether
- At any point in the Menu, only buttons that are active light or flash
- All of the procedures in this section assume that you are starting the procedure from the standard, operational output/input display

8.1 Using the Setup Menu

The Setup Menu provides access to settings that are regularly changed and comprises the following options:

- **1: inXX=>ALL**, switching one input to all outputs (see Section 8.1.1)
- **3: outXX=OFF**, turning off an output (see Section 8.1.2)
- **7: EDID**, assignment to an output (see Section 8.1.3)
- **9: Delay** setting for an output (see Section 8.1.4)
- **4: store setup XX**, storing the setup in a preset (see Section 8.1.5)
- **6: recall setup XX**, recalling a preset (see Section 8.1.6)

8.1.1 Setup Menu—1: inXX=>ALL, Switching one Input to all Outputs

This option switches one input to all outputs.

To switch one input to all outputs:

1. Press MENU.
   The Setup Menu options are displayed.
2. Press 1 (ALL) on the numeric keypad (see Figure 2).
   The following is displayed:

   in__ => ALL

3. Using the numeric keys, enter the input to be switched to all outputs.
   The TAKE button flashes.
4. Press TAKE.
   The selected input is switched to all outputs.
   The display reverts to the output/input display showing that the selected input is switched to all outputs.

8.1.2 Setup Menu—3: outXX=>OFF, Turning an Output Off

This option turns an output off.

To turn an output off:

1. Press MENU.
   The Setup Menu options are displayed.
2. Press 3 (OFF) on the numeric keypad (see Figure 2).
   The following is displayed:

   out__ => OFF

3. Using the numeric keys, enter the output to be turned off.
   The TAKE button flashes.

4. Press TAKE.
   The selected output is turned off.
   The display reverts to the output/input display showing that the selected output is turned off with the input being blank.

8.1.3 Setup Menu—7: EDID, Assignment to an Input

This option assigns an EDID to between one and eight inputs in non-volatile storage. More than eight EDID assignments must be assigned in multiple batches.

Each input on the **VS-1616D** has a factory default EDID loaded (see Section 15). The EDID for each input can be changed independently via the menu (described below) or by uploading an EDID binary file to each input via the RS-232 port using Kramer K-Router Plus software[1].

Note: It is necessary to have a display/device connected to the output from which you want to read the EDID. Failure to do so results in the default EDID being written to storage.

To assign an EDID to between one and eight inputs:

1. Press MENU.
   The Setup Menu options are displayed.
2. Press 7 (EDID) on the numeric keypad (see Figure 2).
   The following is displayed:

   SETUP EDID
   ENTER to View EDID and Set EDID

3. Press ENT.
   The current EDID matrix configuration is displayed.
4. Using the numeric keys, enter the input in which to store the EDID (in this example, 08), and enter the output (in this example, 05) from which to read the EDID.
   The following is displayed:

   01 02 03 04 05 06 07 08
   05 out05 => in08

   The TAKE button flashes.
5. Repeat Step 4 for up to eight inputs.
6. Press TAKE.
   The EDID is stored and passed through to the input.
   The display reverts to the output/input display.

1 Available for download from http://www.kramerelectronics.com

To view the EDID assignments:

1. Press MENU.
   The Setup Menu options are displayed.
2. Press 7 (EDID) on the numeric keypad (see Figure 2).
   The following is displayed:

   SETUP EDID
   ENTER to View EDID and Set EDID

3. Press ENT.
   The current EDID matrix configuration is displayed. In this example, input 07 is assigned to output 05, all other EDID values are default.

   05 06 07 08 09 10
   05

8.1.4 Setup Menu—9: Delay, Setting for an Output

This option sets the time delay for an output which lapses between entering a switching action and the execution of the action. This delay can be set for each output independently. The delay is defined in units of 200ms and ranges from 0 to 15, providing delays of between 0 and 3 seconds (15 x 200ms = 3 seconds).

To set the execution delay for an output:

1. Press MENU.
   The Setup Menu options are displayed.
2. Press 9 (DELAY) on the numeric keypad (see Figure 2).
   The output/delay times display is shown.
3. Using the numeric keys, enter the output (in this example, 03).
   The following is displayed:

   01 02 03 04 05 06 07 08
   DLY__ =>out03

4. Using the numeric keys, enter the number of delay units.
5. Press TAKE.
   The selected output delay is set.
   The display reverts to the output/input display.

8.1.5 Setup Menu—4: store setup XX, Storing the Setup in a Preset

This option stores the current setup in a preset (1 to 59).

To store the current setup in a preset:

1. Press MENU.
   The Setup Menu options are displayed.

2. Press 4 (STO) on the numeric keypad (see Figure 2).
   The following is displayed:

   store => __

3. Using the numeric keys, enter the preset (1 to 59) in which to store the current setup.
   The following is displayed:

   Wait …..

   After a few seconds, if the preset is not empty, the following is displayed:

   SETUP NOT EMPTY
   CONFIRM

   The TAKE button flashes.
4. Press TAKE.
   The setup is stored in the selected preset for subsequent recall.
   The display reverts to the output/input display.

8.1.6 Setup Menu—6: recall setup XX, Recalling a Preset

This option recalls a stored configuration from a preset (1 to 59).

To recall a stored configuration:

1. Press MENU.
   The Setup Menu options are displayed.
2. Press 6 (RCL) on the numeric keypad (see Figure 2).
   The following is displayed:

   recall <= __

3. Using the numeric keys, enter the preset (in this example, 02) to recall.
   The following is displayed:

   Wait …..

   After a few seconds, the following is displayed on the right hand side:

   CONFIRM
   RECALL <= 02

   The TAKE button flashes.
4. Press TAKE.
   The preset is recalled.
   The display reverts to the output/input display.

8.2 Using the Config Menu

The Config Menu provides access to configuration settings that are not regularly changed and comprises the following options:

- Input signal detection display (Section 8.2.1)
- Input port parameter setting (Section 8.2.4)
- Output load detection display (see Section 8.2.3)
- Output port parameter setting (Section 8.2.4)
- Interface configuration (see Section 8.2.5)
- Interface reply configuration (Section 8.2.6)
- Protocol switching (Section 8.2.7)
- Storing the default setup (Section 8.2.8)
- Total matrix reset (Section 8.2.9)
- Display firmware versions (Section 8.2.10)

To enter the Config Menu press MENU twice. The MENU button lights and the following message is displayed:

> Start configuration menu
> MENU to view setups ENT to change them

When browsing through the configuration menu, enabled buttons light or flash.

Use the Config Menu as follows:

1. Press the MENU button to cycle through the menu items[1].
2. Press the ENT button to enter a submenu.
3. After entering a submenu, you can select between several options.
   Select an option by pressing one of the illuminated buttons in the Selector Buttons area.
4. After selecting the desired option, a description of the desired change is displayed and the TAKE button flashes.
5. Press the flashing TAKE button to confirm the change.
   A description of the current state is displayed for about one second. The unit automatically switches to the next item in the menu.

1 The LCD display shows the current status of the selected menu item

8.2.1 Config Menu—Input Signal Detection Display

This option displays a list of inputs and indicates on which of them signals have been detected.

To display a list of inputs that have detected signals:

1. Press MENU twice.
   The following message is displayed:
   start configuration menu
   MENU to view setup ENT to change them

2. Press MENU.
   The following is displayed:

IN:	01	02	03	04	05	06	07	08	09	10	11
OUT:	Y	X	Y	Y	Y	Y	X	Y	Y	Y	X

Y indicates that a signal is detected and X indicates that no signal is detected on the relevant input.

3. Do one of the following:
   - Press BREAKAWAY to exit the Config Menu
   - Wait approximately 15 seconds for the operation to time out
   - Press MENU to move to the next Config Menu option

8.2.2 Config Menu—Setting Input Port Parameters

This option sets input port-specific parameters. Ports that show an X have no parameters available to modify. Ports that show a 0 have parameters available to modify. The parameters that are available, such as, audio balance, depend on the type of card installed and whether the card is an input or an output card. Tables listing input cards and their parameters can be found at the end of this section.

To set parameters for a port:

1. Press MENU twice.
   The following message is displayed:

   start configuration menu
   MENU to view setup ENT to change them

2. Press MENU until a display is shown similar to the following:

IN:	01	02	03	04	05	06	07	08	09	10	11
SET:	X	X	X	X	O	O	X	X	O	O	X

X indicates that there are no modifiable parameters for the associated port and 0 indicates that there are modifiable parameters for the associated port.

3. Press TAKE to enter the list of ports.
   The cursor flashes on a selected port.
4. Select the required port using the left and right arrow buttons.
5. Press TAKE to enter the parameters list.
   A message similar to the following is displayed with the relevant port number in place of 06:

   IN: 06
   SET: 36.Reset Input

6. To select the next parameter press the right arrow button. (See the table at the end of this section for available parameters.)

Or:

7. To enter the selected parameter press TAKE.
   The parameter options are displayed.
8. Select the required action or number using the keypad numbers and arrows.
9. Press TAKE to save the change.
10. Repeat from Step 6 to modify other parameters.
11. Do one of the following:
    - Press BREAKAWAY to exit the Config Menu
    - Wait approximately 15 seconds for the operation to time out
    - Press MENU to exit to the parameter list

The following tables list the input card types and their relevant parameters.

DGKat plus RS-232 Input Card		
Parameter	**Description**	**Default**
HDCP	Turn HDCP on and off *0=EN, 1=DIS	0

DVI (HDCP) Input Card		
Parameter	**Description**	**Default**
HDCP	Turn HDCP on and off *0=EN, 1=DIS	0

HDMI (over fiber optic cable) with 670 module Input Card		
Parameter	**Description**	**Default**
HDCP	Turn HDCP on and off *0=EN, 1=DIS	0

HDBT plus IR, RS-232 and Ethernet Input Card		
Parameter	**Description**	**Default**
HDCP	Turn HDCP on and off *0=EN, 1=DIS	0
XTRA	Enables range extender. Off for distances of up to 100m at 1080p @60Hz @36bpp; On for distances of up to 150m at 1080p @60Hz @24bpp *0:ON, 1:OFF **Note**: Using Kramer high quality cables such as the BC-HDKat6a can increase the range by approximately 30%	1

HDBT Lite plus IR and RS-232 Input Card		
Parameter	**Description**	**Default**
HDCP	Turn HDCP on and off *0=EN, 1=DIS	0

HDMI (HDCP) Input Card		
Parameter	**Description**	**Default**
HDCP	Turn HDCP on and off *0=EN, 1=DIS	0

HDMI plus Analog Audio Input Card		
Parameter	**Description**	**Default**
Reset Input	Re-power: power cycles the port Factory: performs a factory reset to default values of the port	Re-power
HDCP	Turn HDCP on and off *0=EN, 1=DIS	0
Volume	Sets the audio output volume (0–100)	50
Audio Balance	Sets the audio output channel balance (0–100)	50
Audio Bass	Sets the audio outout bass level (0–100)	50
Audio Treble	Sets the audio output treble level (0–100)	50
Audio Mute	MUTE: mutes the audio input Non-MUTE: unmutes the audio input	Non-MUTE
Audio Select	Auto: audio signal selection is controlled by the presence or absence of a plug in the 3.5mm mini jack AUD-Embedded: HDMI audio is selected AUD-Ex-Analog: Analog audio from the 3.5mm mini jack is selected (only works on HDMI plus analog audio card)	Auto

HDMI plus S/PDIF Audio Input Card		
Parameter	**Description**	**Default**
Reset Input	Re-power: power cycles the port Factory: performs a factory reset to default values of the port	Re-power
HDCP	Turn HDCP on and off *0=EN, 1=DIS	0
Audio Select	Auto: audio signal selection is controlled by the presence or absence of a plug in the 3.5mm mini jack AUD-Embedded: HDMI audio is selected AUD-Ex-Digital: S/PDIF audio is selected (only works on HDMI plus S/PDIF card)	Auto

PC VGA Input Card		
Parameter	**Description**	**Default**
Resolution Detect	Auto, User Defined, Auto Adjust, (see note below table)	Auto
Phase Mode	Auto, User Define, Auto Adjust, (see note below table)	Auto
Brightness	(0–63)	32
Contrast	(0–63)	32
Phase adjustment	(0–63) **Note**: This adjustment is only valid when Phase Mode Is set to User Defined mode.	As detected
Reset Input	Re-power: power cycles the port Factory: performs a factory reset of the port to default values	Re-power
Hor-Total Pixels	Set the value for total horizontal pictures. (0–9999)	As detected
Horizontal-Start	Set the value for horizontal start. (0–16383)	As detected
Horizontal-Active	Set the value for horizontal active pixels. (0–16383)	As detected
Vertical-Start	Set the value for vertical start. (0–255)	As detected
Vertical-Active	Set the value for vertical active pixels. (0–16383)	As detected
Save Timing Para	(0-127)	0
Recall Timing Para	(0-127)	0
Volume	Sets the audio output volume (0–100)	50
Audio Balance	Sets the audio output channel balance (0–100)	50
Audio Bass	Sets the audio outout bass level (0–100)	50
Audio Treble	Sets the audio output treble level (0–100)	50
Audio Mute	MUTE: mutes the audio input Non-MUTE: unmutes the audio input	Non-MUTE
R-offset	(0–63)	32
G-offset	(0–63)	32
B-offset	(0–63)	32
R-gain	(0–63)	32
G-gain	(0–63)	32
B-gain	(0–63)	32

Note: The Auto Adjust feature requires the device to re-calculate the parameters based on the currently connected source. The result may be different from the standard parameters for the currently set resolution. The result is saved in non-volatile memory and is recalled when the same source is used again. In order to revert to auto pre-defined parameters, you should either reset to factory setting with the relevant source connected or connect a different source.

8.2.3 Config Menu—Output Load Detection Display

This option displays a list of outputs and indicates which have loads attached to them.

To display a list of outputs and attached loads:

1. Press MENU twice.
   The following message is displayed:

   start configuration menu
   MENU to view setup ENT to change them

2. Press MENU until the following is displayed:

OUT:	01	02	03	04	05	06	07	08	09	10	11
LOAD:	Y	X	Y	Y	Y	Y	X	Y	Y	Y	X

   Y indicates that a load is attached and X indicates that no load is detected on the relevant output.

3. Do one of the following:
   - Press BREAKAWAY to exit the Config Menu
   - Wait approximately 15 seconds for the operation to time out
   - Press MENU to move to the next Config Menu option

8.2.4 Config Menu—Setting Output Port Parameters

This option sets port-specific parameters. Ports that show an X have no parameters available to modify. Ports that show a 0 have parameters available to modify. The parameters that are available, such as, audio balance, depend on the type of card installed and whether the card is an input or an output card. Tables listing output cards and their parameters can be found at the end of this section.

To set parameters for a port:

1. Press MENU twice.
   The following message is displayed:

   start configuration menu
   MENU to view setup ENT to change them

2. Press MENU until a display is shown similar to the following:

OUT:	01	02	03	04	05	06	07	08	09	10	11
SET:	O	O	X	X	O	O	O	O	X	X	X

   X indicates that there are no modifiable parameters for the associated port and 0 indicates that there are modifiable parameters for the associated port.
3. Press TAKE to enter the list of ports.
   The cursor flashes on a selected port.
4. Select the required port to modify using the left and right arrow buttons.
5. Press TAKE to enter the parameters list.
   A message similar to the following is displayed with the relevant port number in place of 06:

   OUT: 06
   SET: 36.Reset SubBoard

6. To select the next parameter press the right arrow button. (See the table at the end of this section for available parameters.)

Or:

7. To enter the displayed parameter press TAKE.
   The parameter options are displayed.
8. Select the required action or number using the keypad numbers and arrows.
9. Press TAKE to save the change.
10. Repeat from Step 6 to modify other parameters
11. Do one of the following:
    - Press BREAKAWAY to exit the Config Menu
    - Wait approximately 15 seconds for the operation to time out
    - Press MENU to exit to the parameter list

The following tables list the output port types and their relevant parameters.

DGKat plus RS-232 Output Card		
Parameter	**Description**	**Default**
HDMI	Sets the output signal format (Display, HDMI, DVI). Display—the output is set automatically based on the EDID of the connected display. DVI—Force the output to be DVI. HDMI—Force the output to be HDMI. **Note**: When selecting the DVI option and fast switching is enabled, you must ensure that the source is DVI compatible	Display
Deep Color	Sets maximum color bit depth (Auto, 8 bit). Auto—Set the color depth automatically. 8 bit—Limit the color depth to 8 bits. **Note**: Deep color on DGKat is not supported at higher resolutions (1080p @50/60Hz or WUXGA). When setting deep color to on, ensure that the resolution does not exceed the DGKat maximum data rate of 4.95Gbps (1.65Gbps per graphic channel)	Auto
Switch Speed	When switching between different sources the switching time can be reduced by setting the fast switch level (Ex-fast Switch, Fast Switch or Normal Switch) by reducing color depth to 8-bits	Normal Switch

DVI (HDCP) Output Card		
Parameter	**Description**	**Default**
HDMI	Sets the output signal format (Display, HDMI, DVI). Display—the output is set automatically based on the EDID of the connected display. DVI—Force the output to be DVI. HDMI—Force the output to be HDMI. **Note**: When selecting the DVI option and fast switching is enabled, you must ensure that the source is DVI compatible	Display
Deep Color	Sets maximum color bit depth (Auto, 8 bit). Auto—Set the color depth automatically. 8 bit—Limit the color depth to 8 bits	Auto
Switch Speed	When switching between different sources the switching time can be reduced by setting the fast switch level (Ex-fast Switch, Fast Switch or Normal Switch) by reducing color depth to 8-bits	Normal Switch

HDMI (over fiber optic cable) with 670 module (HDCP) Output Card		
Parameter	**Description**	**Default**
HDMI	Sets the output signal format (Display, HDMI, DVI). Display—the output is set automatically based on the EDID of the connected display. DVI—Force the output to be DVI. HDMI—Force the output to be HDMI. **Note**: When selecting the DVI option and fast switching is enabled, you must ensure that the source is DVI compatible	Display
Deep Color	Sets maximum color bit depth (Auto, 8 bit). Auto—Set the color depth automatically. 8 bit—Limit the color depth to 8 bits	Auto
Switch Speed	When switching between different sources the switching time can be reduced by setting the fast switch level (Ex-fast Switch, Fast Switch or Normal Switch) by reducing color depth to 8-bits	Normal Switch

HDBT plus IR, RS-232 and Ethernet Output Card		
Parameter	**Description**	**Default**
HDMI	Sets the output signal format (Display, HDMI, DVI). Display—the output is set automatically based on the EDID of the connected display. DVI—Force the output to be DVI. HDMI—Force the output to be HDMI. **Note**: When selecting the DVI option and fast switching is enabled, you must ensure that the source is DVI compatible	Display
Deep Color	Sets maximum color bit depth (Auto, 8 bit). Auto—Set the color depth automatically. 8 bit—Limit the color depth to 8 bits	Auto
Switch Speed	When switching between different sources the switching time can be reduced by setting the fast switch level (Ex-fast Switch, Fast Switch or Normal Switch) by reducing color depth to 8-bits	Normal Switch
XTRA	Enables range extender. Off for distances of up to 100m at 1080p @60Hz @36bpp; On for distances of up to 150m at 1080p @60Hz @24bpp *0:ON, 1:OFF **Note**: Using Kramer high quality cables such as the BC-HDKat6a can increase the range by approximately 30%	1

HDBT Lite plus IR and RS-232 Output Card		
Parameter	**Description**	**Default**
HDMI	Sets the output signal format (Display, HDMI, DVI). Display—the output is set automatically based on the EDID of the connected display. DVI—Force the output to be DVI. HDMI—Force the output to be HDMI. **Note**: When selecting the DVI option and fast switching is enabled, you must ensure that the source is DVI compatible	Display
Deep Color	Sets maximum color bit depth (Auto, 8 bit). Auto—Set the color depth automatically. 8 bit—Limit the color depth to 8 bits	Auto
Switch Speed	When switching between different sources the switching time can be reduced by setting the fast switch level (Ex-fast Switch, Fast Switch or Normal Switch) by reducing color depth to 8-bits	Normal Switch

HDMI (HDCP) Output Card		
Parameter	**Description**	**Default**
HDMI	Sets the output signal format (Follow input, HDMI, DVI). Display—the output is set automatically based on the EDID of the connected display. DVI—Force the output to be DVI. HDMI—Force the output to be HDMI. **Note**: When selecting the DVI option and fast switching is enabled, you must ensure that the source is DVI compatible	Follow
Deep Color	Sets maximimum color bit depth (Auto, 8 bit). Auto—Set the color depth automatically. 8 bit—Limit the color depth to 8 bits	Auto
Switch Speed	When switching between different sources the switching time can be reduced by setting the fast switch level (Ex-fast Switch, Fast Switch or Normal Switch) by reducing color depth to 8-bits	Normal Switch

HDMI plus Analog Audio Output Card		
Parameter	**Description**	**Default**
Reset Output	Re-power: power cycle the port Factory default: perform a factory reset of the port to default values	Re-power
HDMI	Sets the output signal format (Follow input, HDMI, DVI). Display—the output is set automatically based on the EDID of the connected display. DVI—Force the output to be DVI. HDMI—Force the output to be HDMI. **Note**: When selecting the DVI option and fast switching is enabled, you must ensure that the source is DVI compatible	Follow
Deep Color	Sets maximimum color bit depth (Auto, 8 bit). Auto—Set the color depth automatically. 8 bit—Limit the color depth to 8 bits	Auto
Switch Speed	When switching between different sources the switching time can be reduced by setting the fast switch level (Ex-fast Switch, Fast Switch or Normal Switch) by reducing color depth to 8-bits	Normal Switch
Volume	Sets the audio output volume (0–100)	50
Audio Balance	Sets the audio output channel balance (0–100)	50
Audio Bass	Sets the audio outout bass level (0–100)	50
Audio Treble	Sets the audio output treble level (0–100)	50
Audio Mute	MUTE: mutes the audio output Non-MUTE: unmutes the audio output	Non-MUTE
Audio Mix-Mode	Close: Downscales the audio channels from 7.1 to 2 to the 3.5mm mini jack analog audio output Open: Audio channels are not modified	Close

HDMI plus S/PDIF Audio Output Card		
Parameter	**Description**	**Default**
Reset Output	Re-power: power cycle the port Factory default: perform a factory reset to default values of the port	Re-power
HDMI	Sets the output signal format (Follow input, HDMI, DVI). Display—the output is set automatically based on the EDID of the connected display. DVI—Force the output to be DVI. HDMI—Force the output to be HDMI. **Note**: When selecting the DVI option and fast switching is enabled, you must ensure that the source is DVI compatible	Follow
Deep Color	Sets maximimum color bit depth (Auto, 8 bit). Auto—Set the color depth automatically. 8 bit—Limit the color depth to 8 bits	Auto
Switch Speed	When switching between different sources the switching time can be reduced by setting the fast switch level (Ex-fast Switch, Fast Switch or Normal Switch) by reducing color depth to 8-bits	Normal Switch

PC VGA Output Card		
Parameter	**Description**	**Default**
Switch Speed	When switching between different sources the switching time can be reduced by setting the fast switch level (Ex-fast Switch, Fast Switch or Normal Switch) by reducing color depth to 8-bits	Normal Switch
Reset Output	Re-power: power cycle the port Factory default: perform a factory reset to default values of the port	Re-power

8.2.5 Config Menu—Interface Configuration

This option lets you activate or deactivate the IR (infrared) and Ethernet interfaces.

To activate or deactivate the IR or Ethernet interfaces:

1. Press MENU twice.
   The following message is displayed:

   start configuration menu
   MENU to view setup ENT to change them

2. Press MENU until the following is displayed:

   INTERFACE configuration
   current:IR-ON Ethernet-ON

   The current status of the IR and Ethernet interfaces is displayed.
3. Press ENT to select the Interface Submenu.
4. Select 1 to modify the status of the IR interface or 2 to modify that status of the Ethernet interface (in this example, 2).
   The following is displayed:

Ethernet interface setup
1:make it ACTIVE 2:turn it OFF

5. Press 1 to activate the interface or 2 to deactivate it.
6. Press TAKE to confirm the action.
   The interface status is changed. After a few seconds the next option on the Config Menu is displayed.

8.2.6 Config Menu—Interface Reply Configuration

This option lets you switch the Reply configuration on or off. Setting Reply to on causes all interfaces that are set to on to accept and execute commands, and also to reply. Setting Reply to off causes all interfaces that are set to on to accept and execute commands, but not to reply.

To switch the Reply configuration on or off:

1. Press MENU twice.
   The following message is displayed:

   start configuration menu
   MENU to view setup ENT to change them

2. Press MENU until the following is displayed:

   interface REPLY configuration
   current interface REPLY – ON

   This indicates the current Reply configuration status.
3. Press ENT to enter the Reply Submenu.
   The following is displayed:

   interface REPLY configuration
   1:turn REPLY ON 2:never REPLY

4. Press 1 to switch Reply on or 2 to switch it off.
5. Press TAKE to confirm the action.
   A message is displayed indicating the new status of the Reply configuration. After a few seconds the next option on the Config Menu is displayed.

8.2.7 Config Menu—Protocol Switching

The **VS-1616D** supports Kramer Protocol 3000 and Protocol 2000.

To switch from Protocol 3000 (default) to Protocol 2000:

1. Press MENU twice.
   The following message is displayed:

start configuration menu
MENU to view setup ENT to change them

2. Press MENU until the following is displayed:

   PROTOCOL configuration
   Current: Kramer-3000

   This indicates the current Protocol setting.
3. Press ENT to enter the Reply Submenu.
   The following is displayed:

   PROTOCOL configuration
   1:KRAMER-2000 2:KRAMER-3000

4. Press 1 to switch to Protocol 2000.
   The following is displayed:

   Set PROTOCOL to KRAMER-2000?
   press TAKE to confirm

5. Press TAKE to confirm the action.
   A message is displayed indicating the new Protocol status. After a few seconds the next option on the Config Menu is displayed.

8.2.8 Config Menu—Store Default Setup

This option lets you store the current setup as the default setup. The default setup can be recalled at any time using the DEFAULT SETUP button (see Section 7.4.5).

Note: This is not the setup that is loaded when the unit is switched on.

To store the current setup as the default setup:

1. Press MENU twice.
   The following message is displayed:

   start configuration menu
   MENU to view setup ENT to change them

2. Press MENU until the following is displayed:

   store DEFAULT setup
   press ENTER to store

3. Press ENT to store the current configuration as the default configuration.
   The following is displayed:

   current matrix stage is OKAY?
   press TAKE to confirm

4. Press TAKE.
   The following is displayed:

   current matrix stage
   store as DEFAULT setup

   This indicates that the current setup is stored as the default setup. After a few seconds the next option on the Config Menu is displayed.

8.2.9 Config Menu—Total Matrix Reset

This option lets you turn all outputs off or reset the unit to its factory default settings.

To reset the matrix setup:

1. Press MENU twice.
   The following message is displayed:

   start configuration menu
   MENU to view setup ENT to change them

2. Press MENU until the following is displayed:

   TOTAL MATRIX RESET
   exit = ESC ENT = submenu

3. Press ENT to enter the Reset Submenu.
   The following is displayed:

   COMPLETELY MATRIX RESET
   1:ALL outputs OFF2:Factory default

4. Press 1 to turn off all outputs or 2 to perform a factory reset of all options.

Caution: Selecting option 2 to perform a factory default reset clears all setups, options and configuration.

5. Press TAKE and wait a few seconds.
   The following is displayed:

Are you Absolutely sure !!!
Once more TAKE to confirm

6. Press TAKE.
   The following is displayed:

   Matrix erased!!!
   Please, wait …

The matrix and device configuration are erased. After a few seconds the next option on the Config Menu is displayed.

8.2.10 Config Menu—Display Firmware Versions

This option displays the main and front firmware versions.

To display the firmware versions:

1. Press MENU twice.
   The following message is displayed:

   start configuration menu
   MENU to view setup ENT to change them

2. Press MENU until the following is displayed:

   Main Firmware Version: 2.1
   Front Firmware Version: 2.1

3. Either:
   - Press BREAKAWAY to exit the Config Menu
   - Wait approximately 15 seconds for the operation to time out

9 Configuring the Number of Installed Input and Output Ports

After installing or removing a module you need to set the number of input and output ports so that the **VS-1616D** recognizes the new configuration. Refer to Section 6.1 for an explanation of port numbering before setting the number of input and output ports.

To set the number of input or output ports:

1. Press ESC, ENT and LOCK together.
   The following is displayed:

   Configuration Device

2. Press ENT.
   The following is displayed:

   Test Board: 0 MaxInput:16 MaxOutput:16

Note: The number of input and output ports can only be set in units of two, for example, 4 x 4, 16 x 4 or 12 x 16.

3. Using the numeric keys, enter the number of input and output ports installed. The TAKE button flashes.
4. Press TAKE.
   The number of installed ports is saved and the display reverts to the output/input display.
5. Reboot the device by turning the power off and then on again.

10 Installing and Using the Test Module to Troubleshoot Video Problems

The **VS-1616D** includes a test module which can act as a video signal generator and can be used to diagnose video issues in an operating environment.

The test module must be installed in the configuration before it can be used. When installing the test module, the number of configured inputs and outputs must be increased by one. For example:

- If your **VS-1616D** has four inputs and eight outputs, you must configure the **VS-1616D** as 5 x 9
- If your **VS-1616D** has 16 inputs and 16 outputs, you must configure the **VS-1616D** as 17 x 17

10.1 Installing the Test Module

To install the test module in the configuration:

1. Press ESC, ENT and LOCK together.
   The following is displayed:

   Configuration Device

2. Press ENT.
   The following is displayed:

   Test Board: 0 MaxInput:16 MaxOutput:16

   where 0 indicates that the test module is not installed.
3. Using the numeric keys, press 1 to indicate that the test module is installed. The TAKE button flashes.
4. Press TAKE.

5. Increase the number of configured inputs and outputs by one (see Section 9).
6. Power cycle the device.
   The test module is now installed and may be used.

10.2 Setting the Resolution of the Generated Video

The test module generates a range of both PC and HD resolutions which are selected by a combination of DIP-switches and an on-board jumper (labeled **B3**). Install the jumper to select HD resolutions or remove the jumper to select PC resolutions.

The Resolution DIP-switch is used to set the resolution of the generated video is listed in Table 6, Table 7 and Figure 14.

Table 6: Available PC Resolutions for Generated Video (Jumper off)

DIP-switch Position		Resolution
1	2	
OFF	OFF	1024 x 768 @60Hz
ON	OFF	1280 x 1024 @60Hz
OFF	ON	1600 x 1200 @60Hz
ON	ON	1920 x 1200 @60Hz

Table 7: Available HD Resolutions for Generated Video (Jumper on, default)

DIP-switch Position		Resolution
1	2	
OFF	OFF	480p (default)
ON	OFF	720p
OFF	ON	1080i
ON	ON	1080p

Figure 14 shows the Resolution DIP-switch with both switches off (up, default, 480p).

Figure 14: Resolution DIP-switch

10.3 Setting the Pattern of the Generated Video

The Pattern button is used to set the pattern of generated video. There are 32 available patterns. Press the button repeatedly to cycle through the patterns.

10.4 Using the Test Module to Troubleshoot Video Problems

The test module may be used in various ways to isolate video problems.

The following examples are based on the signal paths shown in Figure 15 and a **VS-1616D** device installed as follows:

- 16 inputs and 16 outputs
- The test module is installed and configured (see Section 10.1)
- 17 configured inputs and 17 configured outputs (see Section 9)

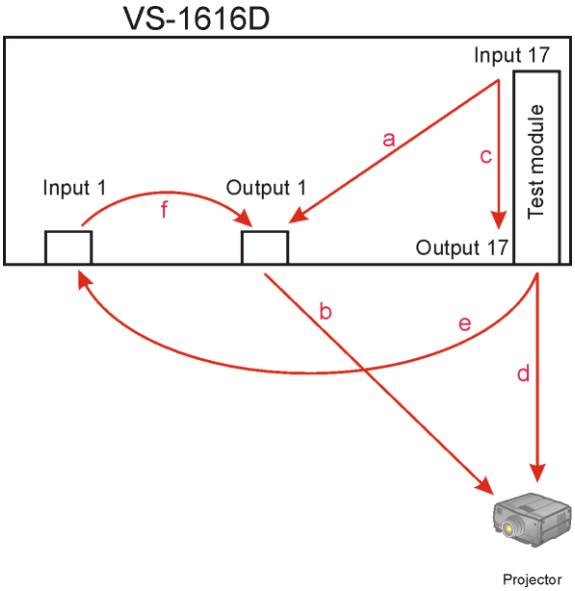


Figure 15: Signal Paths for Isolating problems

10.4.1 Testing the Projector Output

Signal path: c to d; d to projector

To test the projector output:

1. Configure Input 17 to Output 17 (see Section 7.4).
2. Connect Output 17 to the projector.
3. Set the generated video resolution (see Section 10.2).
4. Set the pattern for the generated video (see Section 10.3).
5. Verify that the projector output is as expected.

10.4.2 Testing the Output Signal Path to the Projector

Signal path: a to b; b to projector

To test the output signal path to the projector:

1. Configure Input 17 to Output 1 (see Section 7.4).
2. Connect Output 1 to the projector.
3. Set the generated video resolution (see Section 10.2).
4. Set the pattern for the generated video (see Section 10.3).
5. Verify that the projector output is as expected.

10.4.3 Testing the Input and Output Signal Path to the Projector

Signal path: c to e; e to f; f to b; b to projector

To test the input and output signal path to the projector:

1. Configure Input 17 to Output 17 (see Section 7.4).
2. Connect Output 17 to Input 1.
3. Configure Input 1 to Output 1.
4. Connect Output 1 to the projector.
5. Set the generated video resolution (see Section 10.2).
6. Set the pattern for the generated video (see Section 10.3).
7. Verify that the projector output is as expected.

11 I/O Card Hardware Installation Instructions

The **VS-1616D** I/O cards mount in one of the 16 slots on the rear of the **VS-1616D** chassis. Slots are numbered from left to right and must be filled consecutively from left to right, **without leaving empty slots**.

WARNING: An input card must only be mounted in a slot designated for input cards (slots 1 to 4 and 9 to 12) and an output card must only be mounted in a slot designated for output cards (slots 5 to 8 and 13 to 16).

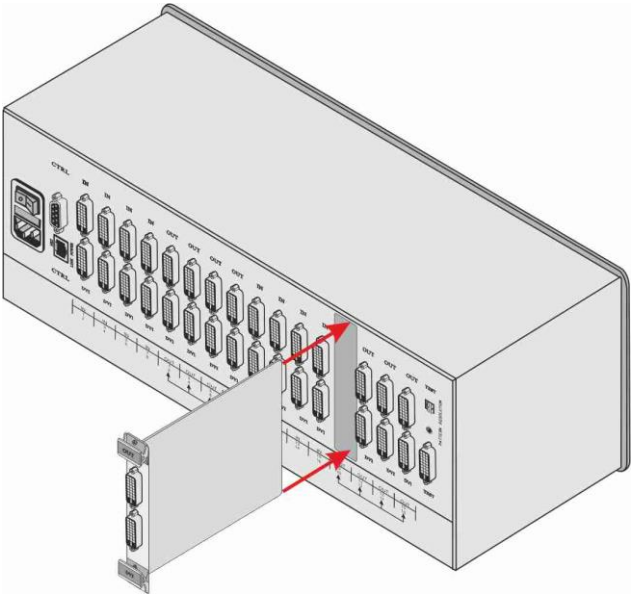


Figure 16: Inserting the Card into a Slot

To install an I/O card as shown in Figure 16:

1. Power off the **VS-1616D** and all devices connected to it.
2. Using a Phillips screwdriver, loosen the screws at the top and bottom of the blanking plate (see Figure 17).

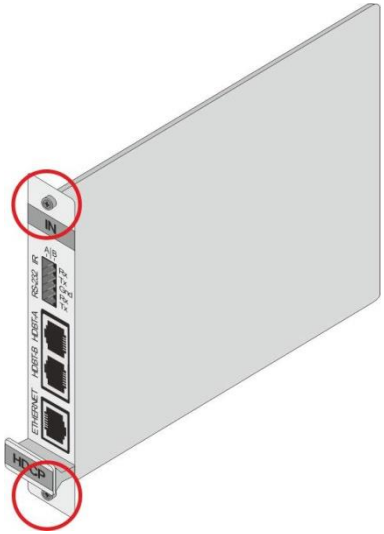


Figure 17: Card Handles

3. Remove the blanking plate from the slot and store it for possible future use.
4. Remove the new card from its shipping box and anti-ESD bag.
5. Holding the card by the lower handle, align the card with the plastic guide rails.
6. Slide the card into the chassis until the front of the card makes contact with the connector inside the chassis.
7. Press the card firmly into the slot until the connector plate is flush with the rear panel of the chassis and the connector is fully seated.
8. Using a Phillips screwdriver, tighten the retaining screws at the top and bottom of the card to secure it to the chassis.
9. Power on the VS-1616D and follow the procedure to configure the new card (see Section 9).
10. Power on the peripheral devices.

12 Upgrading the VS-1616D Firmware

Upgrading the firmware on the **VS-1616D** can be done only by authorized service personnel.

13 Technical Specifications

Table 8 lists the technical specifications of the **VS-1616D**.

Table 8: Technical Specifications of the 16x16 Digital Matrix Switcher

BANDWIDTH:	Supports up to 3.2Gbps bandwidth per channel (limited by the card installed)
MAX RESOLUTION:	Up to UXGA; 1080p, 1920x1200
CONTROLS:	Front panel buttons, Infrared remote control transmitter, RS-232, Ethernet
SWITCHING:	Confirm or At Once for immediate switching
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 14.2" x 4U (W, D, H) rack-mountable
POWER CONSUMPTION:	100-240V AC, 50/60Hz, 135VA
WEIGHT:	8.1kg (17.9lbs) approx
INCLUDED ACCESSORIES:	Power cord, Infrared remote control transmitter

Table 9 lists the technical specifications of the cards that are compatible with the **VS-1616D** chassis.

Table 9: Technical Specifications of VS-1616D Compatible Cards

Card	Ports	Bandwidth per Channel	Compliance	3D Pass Through
DVI	2 DVI-D on a DVI Molex 24-pin (F) connector	1.65Gbps	DVI 1.0	
DVI Dual Channel	1 DVI-D on a DVI Molex 24-pin (F) connector	3.3Gbps	DVI 1.0	
HDCP	2 DVI-D on a DVI Molex 24-pin (F) connector	2.25Gbps	HDCP/HDMI	Yes
HDMI	2 HDMI	2.25Gbps		
HDMI plus Digital Audio	2 HDMI 2 Digital audio on an RCA connector	2.25Gbps		
HDMI plus Analog Audio	2 HDMI 2 Analog audio on 3.5mm mini jacks	2.25Gbps		
HDMI (SC Fiber Optic)	2 SC	2.25Gbps		
DVI (4LC Fiber Optic[1])	2 4 LC	1.65Gbps	DVI 1.0	
HDMI (F-670[2])	2 SC	2.25Gbps	HDCP/HDMI	Yes
DGKat[3] plus RS-232	2 TP DGKat ports on RJ-45 2 Serial ports on 3-pin terminal blocks	Video: 1.65Gbps Serial Data: 19200	HDCP/HDMI	
HDBaseT[4]	2 HDBaseT TP on RJ45 connectors 2 RS-232 Serial ports and 2 IR ports on a 10-pin terminal block 1 Ethernet port on an RJ-45 connector	Video: 6.75Gbps Serial Data: 115200	HDCP/HDMI/ HDBaseT	
HDBaseT Lite	2 HDBaseT TP on RJ45 connectors 2 RS-232 Serial ports and 2 IR ports on a 10-pin terminal block	Video: 8.91Gbps Serial Data: 115200	HDCP/HDMI/ HDBaseT	
VGA	2 VGA on 15-pin HD connectors			

1 Multi-mode glass fiber cables with LC connections must be used, such as the Kramer C-4LC/4LC

2 Multi-mode glass fiber cables with SC connections must be used, such as the Kramer C-SC/SC/OM3

3 Twisted pair cables with RJ-45 connections must be used, such as the Kramer BC-DGKat623

4 Twisted pair cables with RJ-45 connections must be used, such as the Kramer BC-HDKat6a

14 Default Communication Parameters

Table 10 lists the default communication parameters for the **VS-1616D**.

Table 10: Default Communication Parameters for the VS-1616D

EDID	
EDID data is passed between Output 1 and Input 1	
RS-232	
Protocol 2000/3000	
Baud Rate:	9600
Data Bits:	8
Stop Bits:	1
Parity:	None
Command Format:	HEX
P2000, to switch Output 1 to Input 1:	0x01, 0x81, 0x81, 0x81
P3000, to switch Output 1 to Input 4:	#AV 4>1
Ethernet	
IP Address	192.168.1.39
TCP Port #	5000
UDP Port #	50000

15 Factory Default EDID

15.1 DVI Input Card

Monitor
Model name..... VS-16DVIS
Manufacturer..... KMR
Plug and Play ID..... KMR0200
Serial number..... 1
Manufacture date..... 2006, ISO week 12

EDID revision..... 1.3
Input signal type..... Digital (DVI)
Color bit depth..... Undefined
Display type..... RGB color
Screen size..... 700 x 390 mm (31.5 in)
Power management..... Not supported
Extension blocs..... None

DDC/CI..... n/a

Color characteristics
Default color space..... Non-sRGB
Display gamma..... 2.20
Red chromaticity..... Rx 0.640 - Ry 0.341
Green chromaticity..... Gx 0.286 - Gy 0.610
Blue chromaticity..... Bx 0.146 - By 0.069
White point (default).... Wx 0.284 - Wy 0.293
Additional descriptors... None
Timing characteristics
Horizontal scan range.... 31-94kHz
Vertical scan range..... 50-85Hz
Video bandwidth..... 170MHz
CVT standard..... Not supported
GTF standard..... Not supported
Additional descriptors... None

Preferred timing..... Yes
Native/preferred timing.. 1280x768p at 60Hz (4:3)
Modeline..... "1280x768" 79.500 1280 1344 1472 1664 768 771 778 798 +hsync +vsync
Detailed timing #1..... 1920x1200p at 60Hz (16:10)
Modeline..... "1920x1200" 154.000 1920 1968 2000 2080 1200 1203 1209 1235 +hsync -vsync

Standard timings supported
720 x 400p at 70Hz - IBM VGA
720 x 400p at 88Hz - IBM XGA2
640 x 480p at 60Hz - IBM VGA
640 x 480p at 67Hz - Apple Mac II
640 x 480p at 72Hz - VESA
640 x 480p at 75Hz - VESA
800 x 600p at 56Hz - VESA
800 x 600p at 60Hz - VESA
800 x 600p at 72Hz - VESA
800 x 600p at 75Hz - VESA
832 x 624p at 75Hz - Apple Mac II
1024 x 768i at 87Hz - IBM
1024 x 768p at 60Hz - VESA
1024 x 768p at 70Hz - VESA
1024 x 768p at 75Hz - VESA
1280 x 1024p at 75Hz - VESA
1152 x 870p at 75Hz - Apple Mac II
1360 x 765p at 60Hz - VESA STD
1280 x 800p at 60Hz - VESA STD
1440 x 900p at 60Hz - VESA STD
1280 x 960p at 60Hz - VESA STD
1280 x 1024p at 60Hz - VESA STD
1400 x 1050p at 60Hz - VESA STD
1680 x 1050p at 60Hz - VESA STD
1600 x 1200p at 60Hz - VESA STD

Raw data
00,FF,FF,FF,FF,FF,FF,00,2E,4D,00,02,01,00,00,00,0C,10,01,03,81,46,27,78,0A,D5,7C,A3,57,49,9C,25,11,48,4B,FF,FF,80,
8B,C0,81,00,95,00,81,40,81,80,90,40,B3,00,A9,40,0E,1F,00,80,51,00,1E,30,40,80, 37,00,6F,13,11,00,00,1E,28,3C,80,A0,
70,B0,23,40, 30,20, 36, 00,06,44,21,00,00,1A,00,00,00,FC,00,56, 53,2D,33,32,44,56,49,53,0A,20,20,20,00,00,
00,FD,00,32,55,1F,5E,11,00,0A, 20,20,20, 20, 20,20,00,39

15.2 HDCP Input Card

Monitor
Model name..... VS-16HDCP
Manufacturer..... KMR
Plug and Play ID..... KMR0200
Serial number..... 1
Manufacture date..... 2010, ISO week 24

EDID revision..... 1.3
Input signal type..... Digital (DVI)
Color bit depth..... Undefined
Display type..... RGB color
Screen size..... 700 x 390 mm (31.5 in)
Power management..... Not supported
Extension blocs..... 1 (CEA-EXT)

DDC/CI..... n/a

Color characteristics
Default color space..... Non-sRGB
Display gamma..... 2.20
Red chromaticity..... Rx 0.640 - Ry 0.341
Green chromaticity..... Gx 0.286 - Gy 0.610
Blue chromaticity..... Bx 0.146 - By 0.069
White point (default).... Wx 0.284 - Wy 0.293
Additional descriptors... None

Timing characteristics
Horizontal scan range.... 31-94kHz
Vertical scan range..... 50-85Hz
Video bandwidth..... 170MHz
CVT standard..... Not supported

```
  GTF standard..... Not supported
  Additional descriptors... None
  Preferred timing..... Yes
  Native/preferred timing.. 1920x1080p at 60Hz (16:9)
    Modeline..... "1920x1080" 148.500 1920 2008 2052 2200 1080 1084 1089 1125 +hsync +vsync
  Detailed timing #1..... 1920x1200p at 60Hz (16:10)
    Modeline..... "1920x1200" 154.000 1920 1968 2000 2080 1200 1203 1209 1235 +hsync -vsync

Standard timings supported
    720 x  400p at  70Hz - IBM VGA
    720 x  400p at  88Hz - IBM XGA2
    640 x  480p at  60Hz - IBM VGA
    640 x  480p at  67Hz - Apple Mac II
    640 x  480p at  72Hz - VESA
    640 x  480p at  75Hz - VESA
    800 x  600p at  56Hz - VESA
    800 x  600p at  60Hz - VESA
    800 x  600p at  72Hz - VESA
    800 x  600p at  75Hz - VESA
    832 x  624p at  75Hz - Apple Mac II
    1024 x  768i at  87Hz - IBM
    1024 x  768p at  60Hz - VESA
    1024 x  768p at  70Hz - VESA
    1024 x  768p at  75Hz - VESA
    1280 x 1024p at  75Hz - VESA
    1152 x  870p at  75Hz - Apple Mac II
    1280 x  720p at  60Hz - VESA STD
    1280 x  800p at  60Hz - VESA STD
    1440 x  900p at  60Hz - VESA STD
    1280 x  960p at  60Hz - VESA STD
    1280 x 1024p at  60Hz - VESA STD
    1400 x 1050p at  60Hz - VESA STD
    1680 x 1050p at  60Hz - VESA STD
    1600 x 1200p at  60Hz - VESA STD

EIA/CEA-861 Information
  Revision number..... 3
  IT underscan..... Not supported
  Basic audio..... Supported
  YCbCr 4:4:4..... Not supported
  YCbCr 4:2:2..... Not supported
  Native formats..... 1
  Detailed timing #1..... 720x480p at 60Hz (4:3)
    Modeline..... "720x480" 27.000 720 736 798 858 480 489 495 525 -hsync -vsync
  Detailed timing #2..... 1920x1080i at 60Hz (16:9)
    Modeline..... "1920x1080" 74.250 1920 2008 2052 2200 1080 1084 1094 1124 interlace +hsync +vsync
  Detailed timing #3..... 1920x1080i at 50Hz (16:9)
    Modeline..... "1920x1080" 74.250 1920 2448 2492 2640 1080 1084 1094 1124 interlace +hsync +vsync
  Detailed timing #4..... 1280x720p at 60Hz (16:9)
    Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync
  Detailed timing #5..... 1280x720p at 50Hz (16:9)
    Modeline..... "1280x720" 74.250 1280 1720 1760 1980 720 725 730 750 +hsync +vsync

CE video identifiers (VICs) - timing/formats supported
     720 x  576p at  50Hz - EDTV (4:3, 16:15)
    1280 x  720p at  50Hz - HDTV (16:9, 1:1)
    1920 x 1080i at  60Hz - HDTV (16:9, 1:1)
    1920 x 1080i at  50Hz - HDTV (16:9, 1:1)
    1280 x  720p at  60Hz - HDTV (16:9, 1:1) [Native]
    1920 x 1080p at  60Hz - HDTV (16:9, 1:1)
    1920 x 1080p at  50Hz - HDTV (16:9, 1:1)
    NB: NTSC refresh rate = (Hz*1000)/1001

CE audio data (formats supported)
  LPCM    3-channel, 24-bits            at 44/48 kHz

CE speaker allocation data
  Channel configuration.... 3.0
  Front left/right..... Yes
  Front LFE..... No
  Front center..... Yes
  Rear left/right..... No
  Rear center..... No
```

Front left/right center.. No
Rear left/right center... No
Rear LFE..... No

CE vendor specific data (VSDB)
IEEE registration number. 0x000C03
CEC physical address..... 1.0.0.0
Maximum TMDS clock..... 165MHz

Raw data
00,FF,FF,FF,FF,FF,FF,00,2E,4D,00,02,01,00,00,00,18,14,01,03,81,46,27,78,0A,D5,7C,A3,57,49,9C,25,
11,48,4B,FF,FF,80,81,C0,81,00,95,00,81,40,81,80,90,40,B3,00,A9,40,02,3A,80,18,71,38,2D,40,58,2C,
45,00,C4,8E,21,00,00,1E,28,3C,80,A0,70,B0,23,40,30,20,36,00,06,44,21,00,00,1A,00,00,00,FC,00,56,
53,2D,33,32,48,44,43,50,0A,20,20,20,00,00,00,FD,00,32,55,1F,5E,11,00,0A,20,20,20,20,20,20,01,F9,
02,03,1A,41,47,11,13,05,14,84,10,1F,23,0A,06,04,83,05,00,00,65,03,0C,00,10,00,8C,0A,D0,8A,20,E0,
2D,10,10,3E,96,00,58,C2,21,00,00,18,01,1D,80,18,71,1C,16,20,58,2C,25,00,C4,8E,21,00,00,9E,01,1D,
80,D0,72,1C,16,20,10,2C,25,80,C4,8E,21,00,00,9E,01,1D,00,72,51,D0,1E,20,6E,28,55,00,C4,8E,21,00,
00,1E,01,1D,00,BC,52,D0,1E,20,B8,28,55,40,C4,8E,21,00,00,1E,00,00,00,00,00,00,00,00,00,00,00,C0

15.3 HDMI Input Card

Monitor
Model name..... VS-16HDCP
Manufacturer..... KMR
Plug and Play ID..... KMR0200
Serial number..... 1
Manufacture date..... 2006, ISO week 12

EDID revision..... 1.3
Input signal type..... Digital (DVI)
Color bit depth..... Undefined
Display type..... RGB color
Screen size..... 700 x 390 mm (31.5 in)
Power management..... Not supported
Extension blocs..... 1 (CEA-EXT)

DDC/CI..... n/a

Color characteristics
Default color space..... Non-sRGB
Display gamma..... 2.20
Red chromaticity..... Rx 0.640 - Ry 0.341
Green chromaticity..... Gx 0.286 - Gy 0.610
Blue chromaticity..... Bx 0.146 - By 0.069
White point (default).... Wx 0.284 - Wy 0.293
Additional descriptors... None

Timing characteristics
Horizontal scan range.... 31-94kHz
Vertical scan range..... 50-85Hz
Video bandwidth..... 170MHz
CVT standard..... Not supported
GTF standard..... Not supported
Additional descriptors... None
Preferred timing..... Yes
Native/preferred timing.. 1280x768p at 60Hz (4:3)
Modeline..... "1280x768" 79.500 1280 1344 1472 1664 768 771 778 798 +hsync +vsync
Detailed timing #1..... 1920x1200p at 60Hz (16:10)
Modeline..... "1920x1200" 154.000 1920 1968 2000 2080 1200 1203 1209 1235 +hsync -vsync

Standard timings supported
720 x 400p at 70Hz - IBM VGA
720 x 400p at 88Hz - IBM XGA2
640 x 480p at 60Hz - IBM VGA
640 x 480p at 67Hz - Apple Mac II
640 x 480p at 72Hz - VESA
640 x 480p at 75Hz - VESA
800 x 600p at 56Hz - VESA
800 x 600p at 60Hz - VESA
800 x 600p at 72Hz - VESA
800 x 600p at 75Hz - VESA

```
    832 x  624p at  75Hz - Apple Mac II
   1024 x  768i at  87Hz - IBM
   1024 x  768p at  60Hz - VESA
   1024 x  768p at  70Hz - VESA
   1024 x  768p at  75Hz - VESA
   1280 x 1024p at  75Hz - VESA
   1152 x  870p at  75Hz - Apple Mac II
   1360 x  765p at  60Hz - VESA STD
   1280 x  800p at  60Hz - VESA STD
   1440 x  900p at  60Hz - VESA STD
   1280 x  960p at  60Hz - VESA STD
   1280 x 1024p at  60Hz - VESA STD
   1400 x 1050p at  60Hz - VESA STD
   1680 x 1050p at  60Hz - VESA STD
   1600 x 1200p at  60Hz - VESA STD

EIA/CEA-861 Information
  Revision number..... 3
  IT underscan..... Not supported
  Basic audio..... Supported
  YCbCr 4:4:4..... Not supported
  YCbCr 4:2:2..... Not supported
  Native formats..... 1
  Detailed timing #1..... 720x480p at 60Hz (4:3)
    Modeline..... "720x480" 27.000 720 736 798 858 480 489 495 525 -hsync -vsync
  Detailed timing #2..... 1920x1080i at 60Hz (16:9)
    Modeline..... "1920x1080" 74.250 1920 2008 2052 2200 1080 1084 1094 1124 interlace +hsync +vsync
  Detailed timing #3..... 1920x1080i at 50Hz (16:9)
    Modeline..... "1920x1080" 74.250 1920 2448 2492 2640 1080 1084 1094 1124 interlace +hsync +vsync
  Detailed timing #4..... 1280x720p at 60Hz (16:9)
    Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync
  Detailed timing #5..... 1280x720p at 50Hz (16:9)
    Modeline..... "1280x720" 74.250 1280 1720 1760 1980 720 725 730 750 +hsync +vsync

CE video identifiers (VICs) - timing/formats supported
    720 x  576p at  50Hz - EDTV (4:3, 16:15)
   1280 x  720p at  50Hz - HDTV (16:9, 1:1)
   1920 x 1080i at  60Hz - HDTV (16:9, 1:1)
   1920 x 1080i at  50Hz - HDTV (16:9, 1:1)
   1280 x  720p at  60Hz - HDTV (16:9, 1:1) [Native]
   1920 x 1080p at  60Hz - HDTV (16:9, 1:1)
   1920 x 1080p at  50Hz - HDTV (16:9, 1:1)
   NB: NTSC refresh rate = (Hz*1000)/1001

CE audio data (formats supported)
  LPCM    3-channel, 24-bits            at 44/48 kHz

CE speaker allocation data
  Channel configuration.... 3.0
  Front left/right..... Yes
  Front LFE..... No
  Front center..... Yes
  Rear left/right..... No
  Rear center..... No
  Front left/right center.. No
  Rear left/right center... No
  Rear LFE..... No
CE vendor specific data (VSDB)
  IEEE registration number. 0x000C03
  CEC physical address..... 1.0.0.0
  Maximum TMDS clock..... 165MHz

Raw data
  00,FF,FF,FF,FF,FF,FF,00,2E,4D,00,02,01,00,00,00,0C,10,01,03,81,46,27,78,0A,D5,7C,A3,57,49,9C,25,
  11,48,4B,FF,FF,80,8B,C0,81,00,95,00,81,40,81,80,90,40,B3,00,A9,40,0E,1F,00,80,51,00,1E,30,40,80,
  37,00,6F,13,11,00,00,1E,28,3C,80,A0,70,B0,23,40,30,20,36,00,06,44,21,00,00,1A,00,00,00,FC,00,56,
  53,2D,31,36,48,44,43,50,0A,20,20,20,00,00,00,FD,00,32,55,1F,5E,11,00,0A,20,20,20,20,20,20,01,4D,
  02,03,1A,41,47,11,13,05,14,84,10,1F,23,0A,06,04,83,05,00,00,65,03,0C,00,10,00,8C,0A,D0,8A,20,E0,
  2D,10,10,3E,96,00,58,C2,21,00,00,18,01,1D,80,18,71,1C,16,20,58,2C,25,00,C4,8E,21,00,00,9E,01,1D,
  80,D0,72,1C,16,20,10,2C,25,80,C4,8E,21,00,00,9E,01,1D,00,72,51,D0,1E,20,6E,28,55,00,C4,8E,21,00,
  00,1E,01,1D,00,BC,52,D0,1E,20,B8,28,55,40,C4,8E,21,00,00,1E,00,00,00,00,00,00,00,00,00,00,00,C0
  Model name..... VS-16HDCP
  Manufacturer..... KRM
```

Plug and Play ID..... KRM0200
Serial number..... 1
Manufacture date..... 2010, ISO week 24

15.4 HDMI plus Audio Input Card

Monitor
Model name..... VS-16H+AUD
Manufacturer..... KMR
Plug and Play ID..... KMR0200
Serial number..... 1
Manufacture date..... 2012, ISO week 12
Filter driver..... None

EDID revision..... 1.3
Input signal type..... Digital (DVI)
Color bit depth..... Undefined
Display type..... RGB color
Screen size..... 700 x 390 mm (31.5 in)
Power management..... Not supported
Extension blocs..... 1 (CEA-EXT)

DDC/CI..... Not supported

Color characteristics
Default color space..... Non-sRGB
Display gamma..... 2.20
Red chromaticity..... Rx 0.640 - Ry 0.341
Green chromaticity..... Gx 0.286 - Gy 0.610
Blue chromaticity..... Bx 0.146 - By 0.069
White point (default).... Wx 0.284 - Wy 0.293
Additional descriptors... None

Timing characteristics
Horizontal scan range.... 31-94kHz
Vertical scan range..... 50-85Hz
Video bandwidth..... 170MHz
CVT standard..... Not supported
GTF standard..... Not supported
Additional descriptors... None
Preferred timing..... Yes
Native/preferred timing.. 1280x720p at 60Hz (4:3)
Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 746 +hsync +vsync
Detailed timing #1..... 1920x1080p at 60Hz (16:10)
Modeline..... "1920x1080" 148.500 1920 2008 2052 2200 1080 1084 1089 1125 +hsync -vsync

Standard timings supported
720 x 400p at 70Hz - IBM VGA
720 x 400p at 88Hz - IBM XGA2
640 x 480p at 60Hz - IBM VGA
640 x 480p at 67Hz - Apple Mac II
640 x 480p at 72Hz - VESA
640 x 480p at 75Hz - VESA
800 x 600p at 56Hz - VESA
800 x 600p at 60Hz - VESA
800 x 600p at 72Hz - VESA
800 x 600p at 75Hz - VESA
832 x 624p at 75Hz - Apple Mac II
1024 x 768i at 87Hz - IBM
1024 x 768p at 60Hz - VESA
1024 x 768p at 70Hz - VESA
1024 x 768p at 75Hz - VESA
1280 x 1024p at 75Hz - VESA
1152 x 870p at 75Hz - Apple Mac II
1360 x 765p at 60Hz - VESA STD
1280 x 800p at 60Hz - VESA STD
1440 x 900p at 60Hz - VESA STD
1280 x 960p at 60Hz - VESA STD
1280 x 1024p at 60Hz - VESA STD
1400 x 1050p at 60Hz - VESA STD
1680 x 1050p at 60Hz - VESA STD
1600 x 1200p at 60Hz - VESA STD

EIA/CEA-861 Information
Revision number..... 3
IT underscan..... Not supported
Basic audio..... Supported
YCbCr 4:4:4..... Supported
YCbCr 4:2:2..... Supported
Native formats..... 1
Detailed timing #1..... 720x480p at 60Hz (4:3)
Modeline..... "720x480" 27.000 720 736 798 858 480 489 495 525 -hsync -vsync
Detailed timing #2..... 1920x1080i at 60Hz (16:9)
Modeline..... "1920x1080" 74.250 1920 2008 2052 2200 1080 1084 1094 1124 interlace +hsync +vsync
Detailed timing #3..... 1920x1080i at 50Hz (16:9)
Modeline..... "1920x1080" 74.250 1920 2448 2492 2640 1080 1084 1094 1124 interlace +hsync +vsync
Detailed timing #4..... 1280x720p at 60Hz (16:9)
Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync
Detailed timing #5..... 1280x720p at 50Hz (16:9)
Modeline..... "1280x720" 74.250 1280 1720 1760 1980 720 725 730 750 +hsync +vsync

CE video identifiers (VICs) - timing/formats supported
720 x 576p at 50Hz - EDTV (4:3, 16:15)
1280 x 720p at 50Hz - HDTV (16:9, 1:1)
1920 x 1080i at 60Hz - HDTV (16:9, 1:1)
1920 x 1080i at 50Hz - HDTV (16:9, 1:1)
1280 x 720p at 60Hz - HDTV (16:9, 1:1) [Native]
1920 x 1080p at 60Hz - HDTV (16:9, 1:1)
1920 x 1080p at 50Hz - HDTV (16:9, 1:1)
NB: NTSC refresh rate = (Hz*1000)/1001

CE audio data (formats supported)
LPCM 3-channel, 24-bits at 44/48 kHz

CE speaker allocation data
Channel configuration.... 3.0
Front left/right..... Yes
Front LFE..... No
Front center..... Yes
Rear left/right..... No
Rear center..... No
Front left/right center.. No
Rear left/right center... No
Rear LFE..... No

CE vendor specific data (VSDB)
IEEE registration number. 0x000C03
CEC physical address..... 1.0.0.0
Maximum TMDS clock..... 165MHz

Report information
Date generated..... 11/10/2013
Software revision..... 2.60.0.972
Data source..... Real-time 0x0051
Operating system..... 5.1.2600.2.Service Pack 3

Raw data
00,FF,FF,FF,FF,FF,FF,00,2E,4D,00,02,01,00,00,00,0C,16,01,03,81,46,27,78,0A,D5,7C,A3,57,49,9C,25,
11,48,4B,FF,FF,80,8B,C0,81,00,95,00,81,40,81,80,90,40,B3,00,A9,40,01,1D,00,72,51,D0,1A,20,6E,28,
55,00,6F,13,11,00,00,1E,02,3A,80,18,71,38,2D,40,58,2C,45,00,06,44,21,00,00,1A,00,00,00,FC,00,56,
53,2D,31,36,48,2B,41,55,44,0A,20,20,00,00,00,FD,00,32,55,1F,5E,11,00,0A,20,20,20,20,20,20,01,80,
02,03,1A,71,47,11,13,05,14,84,10,1F,23,0A,06,04,83,05,00,00,65,03,0C,00,10,00,8C,0A,D0,8A,20,E0,
2D,10,10,3E,96,00,58,C2,21,00,00,18,01,1D,80,18,71,1C,16,20,58,2C,25,00,C4,8E,21,00,00,9E,01,1D,
80,D0,72,1C,16,20,10,2C,25,80,C4,8E,21,00,00,9E,01,1D,00,72,51,D0,1E,20,6E,28,55,00,C4,8E,21,00,
00,1E,01,1D,00,BC,52,D0,1E,20,B8,28,55,40,C4,8E,21,00,00,1E,00,00,00,00,00,00,00,00,00,00,00,90

15.5 DVI Dual Channel Input Card

Monitor
Model name..... VS-16DUAL
Manufacturer..... KMR
Plug and Play ID..... KMR0200
Serial number..... 1
Manufacture date..... 2006, ISO week 12
Filter driver..... None

EDID revision..... 1.3
Input signal type..... Digital (DVI)
Color bit depth..... Undefined
Display type..... RGB color
Screen size..... 700 x 390 mm (31.5 in)
Power management..... Not supported
Extension blocs..... None

DDC/CI..... n/a

Color characteristics
Default color space..... Non-sRGB
Display gamma..... 2.20
Red chromaticity..... Rx 0.640 - Ry 0.341
Green chromaticity..... Gx 0.286 - Gy 0.610
Blue chromaticity..... Bx 0.146 - By 0.069
White point (default).... Wx 0.284 - Wy 0.293
Additional descriptors... None

Timing characteristics
Horizontal scan range.... 31-94kHz
Vertical scan range..... 50-85Hz
Video bandwidth..... 170MHz
CVT standard..... Not supported
GTF standard..... Not supported
Additional descriptors... None
Preferred timing..... Yes
Native/preferred timing.. 1024x768p at 60Hz (4:3)
Modeline..... "1024x768" 65.000 1024 1048 1184 1344 768 771 777 806 +hsync +vsync
Detailed timing #1..... 1920x1200p at 60Hz (16:10)
Modeline..... "1920x1200" 154.000 1920 1968 2000 2080 1200 1203 1209 1235 +hsync -vsync

Standard timings supported
720 x 400p at 70Hz - IBM VGA
720 x 400p at 88Hz - IBM XGA2
640 x 480p at 60Hz - IBM VGA
640 x 480p at 67Hz - Apple Mac II
640 x 480p at 72Hz - VESA
640 x 480p at 75Hz - VESA
800 x 600p at 56Hz - VESA
800 x 600p at 60Hz - VESA
800 x 600p at 72Hz - VESA
800 x 600p at 75Hz - VESA
832 x 624p at 75Hz - Apple Mac II
1024 x 768i at 87Hz - IBM
1024 x 768p at 60Hz - VESA
1024 x 768p at 70Hz - VESA
1024 x 768p at 75Hz - VESA
1280 x 1024p at 75Hz - VESA
1152 x 870p at 75Hz - Apple Mac II
1360 x 765p at 60Hz - VESA STD
1280 x 800p at 60Hz - VESA STD
1440 x 900p at 60Hz - VESA STD
1280 x 960p at 60Hz - VESA STD
1280 x 1024p at 60Hz - VESA STD
1400 x 1050p at 60Hz - VESA STD
1680 x 1050p at 60Hz - VESA STD
1600 x 1200p at 60Hz - VESA STD

EIA/CEA-861 Information
Revision number..... 3
IT underscan..... Not supported

Basic audio..... Supported
YCbCr 4:4:4..... Not supported
YCbCr 4:2:2..... Not supported
Native formats..... 1
Detailed timing #1..... 720x480p at 60Hz (4:3)
Modeline..... "720x480" 27.000 720 736 798 858 480 489 495 525 -hsync -vsync
Detailed timing #2..... 1920x1080i at 60Hz (16:9)
Modeline..... "1920x1080" 74.250 1920 2008 2052 2200 1080 1084 1094 1124 interlace +hsync +vsync
Detailed timing #3..... 1920x1080i at 50Hz (16:9)
Modeline..... "1920x1080" 74.250 1920 2448 2492 2640 1080 1084 1094 1124 interlace +hsync +vsync
Detailed timing #4..... 1280x720p at 60Hz (16:9)
Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync
Detailed timing #5..... 1280x720p at 50Hz (16:9)
Modeline..... "1280x720" 74.250 1280 1720 1760 1980 720 725 730 750 +hsync +vsync

CE video identifiers (VICs) - timing/formats supported
720 x 576p at 50Hz - EDTV (4:3, 16:15)
1280 x 720p at 50Hz - HDTV (16:9, 1:1)
1920 x 1080i at 60Hz - HDTV (16:9, 1:1)
1920 x 1080i at 50Hz - HDTV (16:9, 1:1)
1280 x 720p at 60Hz - HDTV (16:9, 1:1) [Native]
1920 x 1080p at 60Hz - HDTV (16:9, 1:1)
1920 x 1080p at 50Hz - HDTV (16:9, 1:1)
NB: NTSC refresh rate = (Hz*1000)/1001

CE audio data (formats supported)
LPCM 3-channel, 24-bits at 44/48 kHz

CE speaker allocation data
Channel configuration.... 3.0
Front left/right..... Yes
Front LFE..... No
Front center..... Yes
Rear left/right..... No
Rear center..... No
Front left/right center.. No
Rear left/right center... No
Rear LFE..... No

CE vendor specific data (VSDB)
IEEE registration number. 0x000C03
CEC physical address..... 1.0.0.0
Maximum TMDS clock..... 165MHz

Raw data
00,FF,FF,FF,FF,FF,FF,00,2E,4D,00,02,01,00,00,00,0C,10,01,03,81,46,27,78,0A,D5,7C,A3,57,49,9C,25,
11,48,4B,FF,FF,80,8B,C0,81,00,95,00,81,40,81,80,90,40,B3,00,A9,40,64,19,00,40,41,00,26,30,18,88,
36,00,6F,13,11,00,00,1E,28,3C,80,A0,70,B0,23,40,30,20,36,00,06,44,21,00,00,1A,00,00,00,FC,00,56,
53,2D,31,36,44,55,41,4C,0A,20,20,20,00,00,00,FD,00,32,55,1F,5E,11,00,0A,20,20,20,20,20,20,00,60,
02,03,1A,41,47,11,13,05,14,84,10,1F,23,0A,06,04,83,05,00,00,65,03,0C,00,10,00,8C,0A,D0,8A,20,E0,
2D,10,10,3E,96,00,58,C2,21,00,00,18,01,1D,80,18,71,1C,16,20,58,2C,25,00,C4,8E,21,00,00,9E,01,1D,
80,D0,72,1C,16,20,10,2C,25,80,C4,8E,21,00,00,9E,01,1D,00,72,51,D0,1E,20,6E,28,55,00,C4,8E,21,00,
00,1E,01,1D,00,BC,52,D0,1E,20,B8,28,55,40,C4,8E,21,00,00,1E,00,00,00,00,00,00,00,00,00,00,00,C0

15.6 DGKat Input Card

Monitor
Model name..... VS-16hCat5e
Manufacturer..... KMR
Plug and Play ID..... KMR0200
Serial number..... 1
Manufacture date..... 2006, ISO week 12
Filter driver..... None

EDID revision..... 1.3
Input signal type..... Digital (DVI)
Color bit depth..... Undefined
Display type..... RGB color
Screen size..... 700 x 390 mm (31.5 in)
Power management..... Not supported
Extension blocs..... 1 (CEA-EXT)

DDC/CI..... n/a

Color characteristics
Default color space..... Non-sRGB
Display gamma..... 2.20
Red chromaticity..... Rx 0.640 - Ry 0.341
Green chromaticity..... Gx 0.286 - Gy 0.610
Blue chromaticity..... Bx 0.146 - By 0.069
White point (default).... Wx 0.284 - Wy 0.293
Additional descriptors... None

Timing characteristics
Horizontal scan range.... 31-94kHz
Vertical scan range..... 50-85Hz
Video bandwidth..... 170MHz
CVT standard..... Not supported
GTF standard..... Not supported
Additional descriptors... None
Preferred timing..... Yes
Native/preferred timing.. 1280x768p at 60Hz (4:3)
Modeline..... "1280x768" 79.500 1280 1344 1472 1664 768 771 778 798 +hsync +vsync
Detailed timing #1..... 1920x1200p at 60Hz (16:10)
Modeline..... "1920x1200" 154.000 1920 1968 2000 2080 1200 1203 1209 1235 +hsync -vsync

Standard timings supported
720 x 400p at 70Hz - IBM VGA
720 x 400p at 88Hz - IBM XGA2
640 x 480p at 60Hz - IBM VGA
640 x 480p at 67Hz - Apple Mac II
640 x 480p at 72Hz - VESA
640 x 480p at 75Hz - VESA
800 x 600p at 56Hz - VESA
800 x 600p at 60Hz - VESA
800 x 600p at 72Hz - VESA
800 x 600p at 75Hz - VESA
832 x 624p at 75Hz - Apple Mac II
1024 x 768i at 87Hz - IBM
1024 x 768p at 60Hz - VESA
1024 x 768p at 70Hz - VESA
1024 x 768p at 75Hz - VESA
1280 x 1024p at 75Hz - VESA
1152 x 870p at 75Hz - Apple Mac II
1360 x 765p at 60Hz - VESA STD
1280 x 800p at 60Hz - VESA STD
1440 x 900p at 60Hz - VESA STD
1280 x 960p at 60Hz - VESA STD
1280 x 1024p at 60Hz - VESA STD
1400 x 1050p at 60Hz - VESA STD
1680 x 1050p at 60Hz - VESA STD
1600 x 1200p at 60Hz - VESA STD

EIA/CEA-861 Information
Revision number..... 3
IT underscan..... Not supported
Basic audio..... Supported
YCbCr 4:4:4..... Not supported
YCbCr 4:2:2..... Not supported
Native formats..... 1
Detailed timing #1..... 720x480p at 60Hz (4:3)
Modeline..... "720x480" 27.000 720 736 798 858 480 489 495 525 -hsync -vsync
Detailed timing #2..... 1920x1080i at 60Hz (16:9)
Modeline..... "1920x1080" 74.250 1920 2008 2052 2200 1080 1084 1094 1124 interlace +hsync +vsync
Detailed timing #3..... 1920x1080i at 50Hz (16:9)
Modeline..... "1920x1080" 74.250 1920 2448 2492 2640 1080 1084 1094 1124 interlace +hsync +vsync
Detailed timing #4..... 1280x720p at 60Hz (16:9)
Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync
Detailed timing #5..... 1280x720p at 50Hz (16:9)
Modeline..... "1280x720" 74.250 1280 1720 1760 1980 720 725 730 750 +hsync +vsync

CE video identifiers (VICs) - timing/formats supported
720 x 576p at 50Hz - EDTV (4:3, 16:15)
1280 x 720p at 50Hz - HDTV (16:9, 1:1)
1920 x 1080i at 60Hz - HDTV (16:9, 1:1)

1920 x 1080i at 50Hz - HDTV (16:9, 1:1)
1280 x 720p at 60Hz - HDTV (16:9, 1:1) [Native]
1920 x 1080p at 60Hz - HDTV (16:9, 1:1)
1920 x 1080p at 50Hz - HDTV (16:9, 1:1)
NB: NTSC refresh rate = (Hz*1000)/1001

CE audio data (formats supported)
LPCM 3-channel, 24-bits at 44/48 kHz

CE speaker allocation data
Channel configuration.... 3.0
Front left/right..... Yes
Front LFE..... No
Front center..... Yes
Rear left/right..... No
Rear center..... No
Front left/right center.. No
Rear left/right center... No
Rear LFE..... No

CE vendor specific data (VSDB)
IEEE registration number. 0x000C03
CEC physical address..... 1.0.0.0
Maximum TMDS clock..... 165MHz

Raw data
00,FF,FF,FF,FF,FF,FF,00,2E,4D,00,02,01,00,00,00,0C,10,01,03,81,46,27,78,0A,D5,7C,A3,57,49,9C,25,
11,48,4B,FF,FF,80,8B,C0,81,00,95,00,81,40,81,80,90,40,B3,00,A9,40,0E,1F,00,80,51,00,1E,30,40,80,
37,00,6F,13,11,00,00,1E,28,3C,80,A0,70,B0,23,40,30,20,36,00,06,44,21,00,00,1A,00,00,00,FC,00,56,
53,2D,31,36,68,43,61,74,35,65,0A,20,00,00,00,FD,00,32,55,1F,5E,11,00,0A,20,20,20,20,20,20,01,92,
02,03,1A,41,47,11,13,05,14,84,10,1F,23,0A,06,04,83,05,00,00,65,03,0C,00,10,00,8C,0A,D0,8A,20,E0,
2D,10,10,3E,96,00,58,C2,21,00,00,18,01,1D,80,18,71,1C,16,20,58,2C,25,00,C4,8E,21,00,00,9E,01,1D,
80,D0,72,1C,16,20,10,2C,25,80,C4,8E,21,00,00,9E,01,1D,00,72,51,D0,1E,20,6E,28,55,00,C4,8E,21,00,
00,1E,01,1D,00,BC,52,D0,1E,20,B8,28,55,40,C4,8E,21,00,00,1E,00,00,00,00,00,00,00,00,00,00,C0

15.7 HDBaseT Input Card

Monitor
Model name..... VS-16HDBST
Manufacturer..... KMR
Plug and Play ID..... KMR0400
Serial number..... 1
Manufacture date..... 2006, ISO week 12
Filter driver..... None

EDID revision..... 1.3
Input signal type..... Digital (DVI)
Color bit depth..... Undefined
Display type..... RGB color
Screen size..... 700 x 390 mm (31.5 in)
Power management..... Not supported
Extension blocs..... 1 (CEA-EXT)

DDC/CI..... n/a

Color characteristics
Default color space..... Non-sRGB
Display gamma..... 2.20
Red chromaticity..... Rx 0.640 - Ry 0.341
Green chromaticity..... Gx 0.286 - Gy 0.610
Blue chromaticity..... Bx 0.146 - By 0.069
White point (default).... Wx 0.284 - Wy 0.293
Additional descriptors... None

Timing characteristics
Horizontal scan range.... 31-94kHz
Vertical scan range..... 50-85Hz
Video bandwidth..... 170MHz
CVT standard..... Not supported
GTF standard..... Not supported
Additional descriptors... None
Preferred timing..... Yes

```
  Native/preferred timing.. 1280x720p at 60Hz
    Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 746 +hsync -vsync
  Detailed timing #1..... 1920x1200p at 60Hz (16:10)
    Modeline..... "1920x1200" 154.000 1920 1968 2000 2080 1200 1203 1209 1235 +hsync -vsync

Standard timings supported
     720 x  400p at  70Hz - IBM VGA
     720 x  400p at  88Hz - IBM XGA2
     640 x  480p at  60Hz - IBM VGA
     640 x  480p at  67Hz - Apple Mac II
     640 x  480p at  72Hz - VESA
     640 x  480p at  75Hz - VESA
     800 x  600p at  56Hz - VESA
     800 x  600p at  60Hz - VESA
     800 x  600p at  72Hz - VESA
     800 x  600p at  75Hz - VESA
     832 x  624p at  75Hz - Apple Mac II
    1024 x  768i at  87Hz - IBM
    1024 x  768p at  60Hz - VESA
    1024 x  768p at  70Hz - VESA
    1024 x  768p at  75Hz - VESA
    1280 x 1024p at  75Hz - VESA
    1152 x  870p at  75Hz - Apple Mac II
    1360 x  765p at  60Hz - VESA STD
    1280 x  800p at  60Hz - VESA STD
    1440 x  900p at  60Hz - VESA STD
    1280 x  960p at  60Hz - VESA STD
    1280 x 1024p at  60Hz - VESA STD
    1400 x 1050p at  60Hz - VESA STD
    1680 x 1050p at  60Hz - VESA STD
    1600 x 1200p at  60Hz - VESA STD

EIA/CEA-861 Information
  Revision number..... 3
  IT underscan..... Not supported
  Basic audio..... Supported
  YCbCr 4:4:4..... Supported
  YCbCr 4:2:2..... Supported
  Native formats..... 1
  Detailed timing #1..... 720x480p at 60Hz (4:3)
    Modeline..... "720x480" 27.000 720 736 798 858 480 489 495 525 -hsync -vsync
  Detailed timing #2..... 1920x1080i at 60Hz (16:9)
    Modeline..... "1920x1080" 74.250 1920 2008 2052 2200 1080 1084 1094 1124 interlace +hsync +vsync
  Detailed timing #3..... 1920x1080i at 50Hz (16:9)
    Modeline..... "1920x1080" 74.250 1920 2448 2492 2640 1080 1084 1094 1124 interlace +hsync +vsync
  Detailed timing #4..... 1280x720p at 60Hz (16:9)
    Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync
  Detailed timing #5..... 1280x720p at 50Hz (16:9)
    Modeline..... "1280x720" 74.250 1280 1720 1760 1980 720 725 730 750 +hsync +vsync

CE video identifiers (VICs) - timing/formats supported
     720 x  576p at  50Hz - EDTV (4:3, 16:15)
    1280 x  720p at  50Hz - HDTV (16:9, 1:1)
    1920 x 1080i at  60Hz - HDTV (16:9, 1:1)
    1920 x 1080i at  50Hz - HDTV (16:9, 1:1)
    1280 x  720p at  60Hz - HDTV (16:9, 1:1) [Native]
    1920 x 1080p at  60Hz - HDTV (16:9, 1:1)
    1920 x 1080p at  50Hz - HDTV (16:9, 1:1)
    NB: NTSC refresh rate = (Hz*1000)/1001

CE audio data (formats supported)
  LPCM    3-channel, 24-bits          at 44/48 kHz

CE speaker allocation data
  Channel configuration.... 3.0
  Front left/right..... Yes
  Front LFE..... No
  Front center..... Yes
  Rear left/right..... No
  Rear center..... No
  Front left/right center.. No
  Rear left/right center... No
  Rear LFE..... No
```

CE vendor specific data (VSDB)
IEEE registration number. 0x000C03
CEC physical address..... 1.0.0.0
Maximum TMDS clock..... 165MHz

Report information
Date generated..... 14/07/2013
Software revision..... 2.60.0.972
Data source..... File
Operating system..... 6.1.7601.2.Service Pack 1

Raw data
00,FF,FF,FF,FF,FF,FF,00,2E,4D,00,02,01,00,00,00,0C,10,01,03,81,46,27,78,0A,D5,7C,A3,57,49,9C,25,
11,48,4B,FF,FF,80,8B,C0,81,00,95,00,81,40,81,80,90,40,B3,00,A9,40,01,1D,00,72,51,D0,1A,20,6E,28,
55,00,7E,88,42,00,00,1A,28,3C,80,A0,70,B0,23,40,30,20,36,00,06,44,21,00,00,1A,00,00,00,FC,00,56,
53,2D,31,36,48,44,42,53,54,0A,20,20,00,00,00,FD,00,32,55,1F,5E,11,00,0A,20,20,20,20,20,20,01,D3,
02,03,1A,71,47,11,13,05,14,84,10,1F,23,0A,06,04,83,05,00,00,65,03,0C,00,10,00,8C,0A,D0,8A,20,E0,
2D,10,10,3E,96,00,58,C2,21,00,00,18,01,1D,80,18,71,1C,16,20,58,2C,25,00,C4,8E,21,00,00,9E,01,1D,
80,D0,72,1C,16,20,10,2C,25,80,C4,8E,21,00,00,9E,01,1D,00,72,51,D0,1E,20,6E,28,55,00,C4,8E,21,00,
00,1E,01,1D,00,BC,52,D0,1E,20,B8,28,55,40,C4,8E,21,00,00,1E,00,00,00,00,00,00,00,00,00,00,00,90

15.8 VGA Input Card

Monitor
Model name..... VGA-IN2-F16
Manufacturer..... KMR
Plug and Play ID..... KMR040B
Serial number..... 17056
Manufacture date..... 2011, ISO week 48
Filter driver..... None

EDID revision..... 1.3
Input signal type..... Analog 0.700,0.300 (1.0V p-p)
Sync input support..... Not available
Display type..... RGB color
Screen size..... 700 x 390 mm (31.5 in)
Power management..... Not supported
Extension blocs..... None

DDC/CI..... n/a

Color characteristics
Default color space..... Non-sRGB
Display gamma..... 2.20
Red chromaticity..... Rx 0.640 - Ry 0.341
Green chromaticity..... Gx 0.286 - Gy 0.610
Blue chromaticity..... Bx 0.146 - By 0.069
White point (default).... Wx 0.284 - Wy 0.293
Additional descriptors... None

Timing characteristics
Range limits..... Not available
GTF standard..... Supported
Additional descriptors... None
Preferred timing..... Yes
Native/preferred timing.. 640x480p at 60Hz (4:3)
Modeline..... "640x480" 25.180 640 656 752 800 480 490 492 525 -hsync -vsync
Detailed timing #1..... 1920x1080p at 60Hz (16:9)
Modeline..... "1920x1080" 148.500 1920 2008 2052 2200 1080 1084 1089 1125 +hsync +vsync
Detailed timing #2..... 1600x1200p at 60Hz (4:3)
Modeline..... "1600x1200" 162.000 1600 1664 1856 2160 1200 1201 1204 1250 +hsync +vsync

Standard timings supported
720 x 400p at 70Hz - IBM VGA
720 x 400p at 88Hz - IBM XGA2
640 x 480p at 60Hz - IBM VGA
640 x 480p at 67Hz - Apple Mac II
640 x 480p at 72Hz - VESA
640 x 480p at 75Hz - VESA
800 x 600p at 56Hz - VESA
800 x 600p at 60Hz - VESA

800 x 600p at 72Hz - VESA
800 x 600p at 75Hz - VESA
832 x 624p at 75Hz - Apple Mac II
1024 x 768i at 87Hz - IBM
1024 x 768p at 60Hz - VESA
1024 x 768p at 70Hz - VESA
1024 x 768p at 75Hz - VESA
1280 x 1024p at 75Hz - VESA
1152 x 870p at 75Hz - Apple Mac II
640 x 480p at 60Hz - VESA STD
800 x 600p at 60Hz - VESA STD
1024 x 768p at 60Hz - VESA STD
1152 x 864p at 75Hz - VESA STD
1280 x 1024p at 75Hz - VESA STD
1280 x 960p at 60Hz - VESA STD
1280 x 1024p at 60Hz - VESA STD
1360 x 765p at 60Hz - VESA STD

Report information
Date generated..... 14/07/2013
Software revision..... 2.60.0.972
Data source..... File
Operating system..... 6.1.7601.2.Service Pack 1

Raw data
00,FF,FF,FF,FF,FF,FF,00,2E,4D,0B,04,A0,42,00,00,30,15,01,03,00,46,27,78,0B,D5,7C,A3,57,49,9C,25,
11,48,4B,FF,FF,80,31,40,45,40,61,40,71,4F,81,8F,81,40,81,80,8B,C0,D6,09,80,A0,20,E0,2D,10,10,60,
A2,00,04,03,00,00,00,18,02,3A,80,18,71,38,2D,40,58,2C,45,00,10,09,00,00,00,1E,00,00,00,FC,00,56,
47,41,2D,49,4E,32,2D,46,31,36,0A,20,48,3F,40,30,62,B0,32,40,40,C0,13,00,6F,13,11,00,00,1E,00,0C

16 Communication Protocols

16.1 Protocol 3000

The **VS-1616D** can be operated using serial commands from a PC, remote controller or touch screen using the Kramer Protocol 3000.

This section describes the:

- Kramer Protocol 3000 syntax (see Section 16.1.1)
- Kramer Protocol 3000 commands (see Section 16.1.8)

16.1.1 Kramer Protocol 3000 Syntax

16.1.1.1 Host Message Format

Start	Address (optional)	Body	Delimiter
#	*device_id@*	**Message**	CR

16.1.1.2 Simple Command

Command string with only one command without addressing:

Start	Body	Delimiter
#	**Command** SP *Parameter_1,Parameter_2,…*	CR

16.1.1.3 Command String

Formal syntax with commands concatenation and addressing:

Start	Address	Body	Delimiter
#	*device_id@*	**Command_1** *Parameter1_1,Parameter1_2,…*| **Command_2** *Parameter2_1,Parameter2_2,…*| **Command_3** *Parameter3_1,Parameter3_2,…*|…	CR

16.1.2 Device Message Format

Start	Address (optional)	Body	delimiter
~	*device_id@*	**Message**	CR LF

16.1.2.1 Device Long Response

Echoing command:

Start	Address (optional)	Body	Delimiter
~	*device_id@*	**Command** SP [*Param1 ,Param2 …*] **result**	CR LF

CR = Carriage return (ASCII 13 = 0x0D)
LF = Line feed (ASCII 10 = 0x0A)
SP = Space (ASCII 32 = 0x20)

16.1.3 Command Terms

Command
A sequence of ASCII letters ('A'-'Z', 'a'-'z' and '-').
Command and parameters must be separated by at least one space.

Parameters
A sequence of alphanumeric ASCII characters ('0'-'9','A'-'Z','a'-'z' and some special characters for specific commands). Parameters are separated by commas.

Message string
Every command entered as part of a message string begins with a **message starting character** and ends with a **message closing character**.
Note: A string can contain more than one command. Commands are separated by a pipe ('|') character.

Message starting character
'#' – For host command/query
'~' – For device response

Device ID (Optional, for K-NET)
K-NET Device ID followed by '@'

Query sign
'?' follows some commands to define a query request.

Message closing character
CR – For host messages; carriage return (ASCII 13)
CRLF – For device messages; carriage return (ASCII 13) + line-feed (ASCII 10)

Command chain separator character
When a message string contains more than one command, a pipe ('|') character separates each command.

Spaces between parameters or command terms are ignored.

16.1.4 Entering Commands

You can directly enter all commands using a terminal with ASCII communications software, such as HyperTerminal, Hercules, etc. Connect the terminal to the serial or Ethernet port on the Kramer device. To enter **CR** press the Enter key.
(**LF** is also sent but is ignored by command parser).

For commands sent from some non-Kramer controllers like Crestron, some characters require special coding (such as, /X##). Refer to the controller manual.

16.1.5 Command Forms

Some commands have short name syntax in addition to long name syntax to allow faster typing. The response is always in long syntax.

16.1.6 Chaining Commands

Multiple commands can be chained in the same string. Each command is delimited by a pipe character ("|"). When chaining commands, enter the **message starting character** and the **message closing character** only once, at the beginning of the string and at the end.

Commands in the string do not execute until the closing character is entered.

A separate response is sent for every command in the chain.

16.1.7 Maximum String Length

64 characters

16.1.8 Table of Protocol 3000 Commands

Command	Description
#	Protocol handshaking
BUILD-DATE?	Read device build date
CPEDID	Copy EDID data from the output to the input EEPROM
DISPLAY	Valid / Invalid output
FACTORY	Reset to factory default configuration
FCT-MODEL	Set model name
FCT-SN	Set Serial Number
GEDID	Read EDID data
GEDID-EXT	Read EDID data from external device connected to output
HELP	List of commands
IDV	Visual identify device
INFO-IO?	Read in/out count
INFO-PRST?	Read max preset count
LDEDID	Load EDID data
LDFW	Load new firmware
LOCK-FP	Lock front panel
MODEL?	Read device model
P2000	Switch to protocol 2000
PROT-VER?	Read device protocol version
PRST-LST?	Read saved presets list
PRST-RCL	Recall saved preset
PRST-STO	Store current connections to preset
PRST-VID?	Read video connections from saved preset
RESET	Reset device
SIGNAL	Valid / Invalid input
SN?	Read device serial number
VERSION?	Read device firmware version
VID	Switch Video only

Note: Not every command listed by the Help command is relevant to every matrix configuration.

Command - #		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	#	End User	Public
Get:	-	-	-
Description		**Syntax**	
Set:	Protocol handshaking	#CR	
Get:	-	-	
Response			
~nn@SP**OK**CR LF			
Parameters			
Response Triggers			
Notes			
Use to validate the Protocol 3000 connection and get the machine number			

Command - BUILD-DATE		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	-	-	-
Get:	**BUILD-DATE?**	End User	Public
Description		**Syntax**	
Set:	Get device build date	#**BUILD-DATE**CR	
Get:	-	-	
Response			
~nn@**BUILD-DATE**SP*date*SP*time*CR LF			
Parameters			
date - Format: YYYY/MM/DD where YYYY = Year, MM = Month, DD = Day *time* - Format: hh:mm:ss where hh = hours, mm = minutes, ss = seconds			
Response Triggers			
Notes			

Command - **FACTORY**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**FACTORY**	End User	Public
Get:	**-**	-	-
Description		**Syntax**	
Set:	Reset device to factory default configuration	#**FACTORY**CR	
Get:	-	-	
Response			
~nn@**FACTORY**SP**OK**CR LF			
Parameters			
Response Triggers			
Notes			
This command deletes all user data from the device. The deletion can take some time.			

Command - **HELP**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**HELP**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get command list or help for specific command	2 options: 1. #**HELP**CR 2. #**HELP**SP*command_name*CR	
Response			
1. Multi-line: ~nn@**Device available protocol 3000 commands:**CR LF*command*,SP*command*…CR LF **To get help for command use: HELP (COMMAND_NAME)**CR LF 2. Multi-line: ~nn@**HELP**SP*command*:CR LF*description*CR LF**USAGE:***usage*CR LF			
Parameters			
Response Triggers			
Notes			

Command - **MODEL?**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**MODEL?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get device model	#**MODEL?**CR	
Response			
~nn@**MODEL**SP*model_name*CR LF			
Parameters			
model_name - String of up to 19 printable ASCII chars			
Response Triggers			
Notes			

Command - **PROT-VER?**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**PROT-VER?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get device protocol version	#**PROT-VER?**CR	
Response			
~nn@**PROT-VER**SP3000:*version*CR LF			
Parameters			
Version - XX.XX where X is a decimal digit			
Response Triggers			
Notes			

Command - **RESET**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**RESET**	Administrator	Public
Get:	**-**	-	-
Description		**Syntax**	
Set:	Reset device	#**RESET**CR	
Get:	-	-	
Response			
~nn@**RESET**SP**OK**CR LF			
Parameters			
Response Triggers			
Notes			
To avoid locking the port due to a USB bug in Windows, disconnect USB connections immediately after running this command. If the port was locked, disconnect and reconnect the cable to reopen the port.			

Command - **SN?**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**SN?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get device serial number	#**SN?**CR	
Response			
~nn@**SN**SP*serial_number*CR LF			
Parameters			
serial_number - 11 decimal digits, factory assigned			
Response Triggers			
Notes			
For new products with 14 digit serial numbers, use only the last 11 digits			

Command - **VERSION?**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**VERSION?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get firmware version number	#**VERSION?**CR	
Response			
~nn@**VERSION**SP*firmware_version*CR LF			
Parameters			
firmware_version - XX.XX.XXXX where the digit groups are: major.minor.build version			
Response Triggers			
Notes			

Command - **CPEDID**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**CPEDID**	End User	Public
Get:	-	-	-
Description		**Syntax**	
Set:	Copy EDID data from the output to the input EEPROM	#**CPEDID**SP*src_type, src_id, dst_type, dest_bitmap*CR	
Get:	-	-	
Response			
~nn@**CPEDID**SP*src_stg, src_id, dst_type, dest_bitmap*CR LF			
Parameters			
src_type - *EDID* source type (usually output) *src_id* - number of chosen source stage (1.. max number of inputs/outputs) *dst_type* - *EDID destination* type (usually input) (see Section 5.12 EDID Source) *dest_bitmap* - bitmap representing destination IDs. Format: XXXX…X, where X is hex digit. The binary form of every hex digit represents corresponding destinations. Setting '1' says that EDID data has to be copied to this destination			
Response Triggers			
Response is sent to the com port from which the Set was received (before execution)			
Notes			
Destination bitmap size depends on device properties (for 64 inputs it is a 64-bit word) Example: bitmap 0x0013 means inputs 1,2 and 5 are loaded with the new EDID			

Command - **DISPLAY?**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	-	-	-
Get	**DISPLAY?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get output HPD status	#**DISPLAY?** SP *out_id* CR	
Response			
~nn@**DISPLAY** SP *out_id*,*status* CR LF			
Parameters			
out_id - output number *status* - HPD status according to signal validation			
Response Triggers			
After execution, response is sent to the com port from which the Get was received Response is sent after every change in output HPD status ON to OFF Response is sent after every change in output HPD status OFF to ON and ALL parameters (new EDID, etc.) are stable and valid			
Notes			

Command - FCT-MODEL		Command Type - System (Secret)	
Command Name		**Permission**	**Transparency**
Set:	**FCT-MODEL**	Factory	Internal
Get:	**-**	-	-
Description		**Syntax**	
Set:	Set model name	#**FCT-MODEL** SP *model_name* CR	
Get:	-	-	
Response			
~nn@**FCT-MODEL** SP *model_name* SP **OK** CR LF			
Parameters			
model_name - String of printable ASCII chars (up to 19 chars)			
Response Triggers			
Notes			
Used where a single firmware file is adaptable for many devices, but the user needs to know (by protocol) which specific model is used			

Command - FCT-SN		Command Type - System-mandatory (Secret)	
Command Name		**Permission**	**Transparency**
Set:	**FCT-SN**	Factory	Internal
Get:	**-**	-	-
Description		**Syntax**	
Set:	Set serial number	#**FCT-SN** SP *serial_number* CR	
Get:	-	-	
Response			
~nn@**FCT-SN** SP *serial_number* SP **OK** CR LF			
Parameters			
serial_number - 11 decimal digits			
Response Triggers			
Notes			
For new products with 14 digit serial numbers, use only the last 11 digits			

Command - **GEDID**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**GEDID**	Administrator	Public
Get:	**GEDID?**	End User	Public
Description		**Syntax**	
Set:	Set EDID data from device	#**GEDID** SP *stage, stage_id* CR	
Get:	Get EDID support on certain input/output	#**GEDID?** SP *stage, stage_id* CR	
Response			
Set: Multi-line response: ~nn@**GEDID** SP *stage,stage_id,size* CR LF EDID_data CR LF ~nn@**GEDID** SP *stage,stage_id* SP **OK** CR LF Get: ~nn@**GEDID** SP *stage,stage_id,size* CR LF			
Parameters			
stage - input/output *stage_id* - number of chosen stage (1.. max number of inputs/outputs) *size* - EDID data size. For Set, size of data to be sent from device, for Get, 0 means no EDID support			
Response Triggers			
Response is sent to the com port from which the Set (before execution) / Get command was received			
Notes			
For Get, size=0 means EDID is not supported For old devices that do not support this command, ~nn@ ERR 002 CR LF is received			

Command - IDV		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**IDV**	End User	Public
Get:	**-**	-	-
Description		**Syntax**	
Set:	Set visual indication from device	#**IDV**CR	
Get:	-	-	
Response			
~nn@**IDV**SP**OK**CR LF			
Parameters			
Response Triggers			
Notes			
Using this command, some devices can light a sequence of buttons or LEDs to allow identification of a specific device from similar devices			

Command - INFO-IO?		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**INFO-IO?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get in/out count	#**INFO-IO?**CR	
Response			
~nn@**INFO-IO?**SP IN SP *inputs_count*, OUT SP *outputs_count* CR LF			
Parameters			
inputs_count - number of inputs in the unit *outputs_count* - number of outputs in the unit			
Response Triggers			
Notes			

Command - **INFO-PRST?**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**INFO-PRST?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get maximum preset count	#**INFO-PRST?**CR	

Response

~nn@**INFO-PRST?**SP VIDSP *preset_video_count*, AUDSP *preset_audio_count*CR LF

Parameters

preset_video_count - maximum number of video presets in the unit
preset_audio_count - maximum number of audio presets in the unit

Response Triggers

Notes

In most units, video and audio presets with the same number are stored and recalled together by commands #PRST-STO and #PRST-RCL

Command - **LDEDID**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**LDEDID**	End User	Public
Get:	-	-	-
Description		**Syntax**	
Set:	Write EDID data from external application to device	Multi-step syntax (see following steps)	
Get:	None	None	

Communication Steps (Command and Response)

Step 1: #**LDEDID** SP *dst_type, dest_bitmask, size, safe_mode* CR

Response 1: ~nn@**LDEDID** SP *dst_type, dest_bitmask, size, safe_mode* SP **READY** CR LF or

~nn@**LDEDID** SP **ERRnn** CR LF

Step 2: If **ready** was received, send EDID_DATA

Response 2: ~nn@**LDEDID** SP *dst_type, dest_bitmask, size, safe_mode* SP **OK** CR LF or

~nn@**LDEDID** SP **ERRnn** CR LF

Parameters

dst_type - EDID destination type (usually input)

dest_bitmask - bitmap representing destination IDs. Format: 0x********, where * is ASCII presentation of hex digit. The binary presentation of this number is a bit mask for destinations. Setting '1' means EDID data has to be copied to this destination

size - EDID data size

safe_mode - 0 - Device accepts the EDID as is without trying to adjust

1 - Device tries to adjust the EDID

EDID_DATA - data in protocol packets

Response Triggers

Response is sent to the com port from which the **Set** (before execution)

Notes

When the unit receives the **LDEDID** command it replies with **READY** and enters the special EDID packet wait mode. In this mode the unit can receive only packets and not regular protocol commands.

If the unit does not receive correct packets for 30 seconds or is interrupted for more than 30 seconds before receiving all packets, it sends timeout error ~nn@**LDEDID** SP **ERR01** CR LF and returns to the regular protocol mode. If the unit received data that is not a correct packet, it sends the corresponding error and returns to the regular protocol mode.

Command - **LDFW**		System - Packets	
Command Name		**Permission**	**Transparency**
Set:	**LDFW**	Internal SW	Public
Get:	**-**	-	-
Description		**Syntax**	
Set:	Load new firmware file	Step 1: #**LDFW** SP *size* CR Step 2: If ready was received, send FIRMWARE_DATA	
Get:	-	-	
Response			
Response 1: ~nn@**LDFW** SP *size* SP **READY** CR LF or ~nn@**LDFW** SP **ERRnn** CR LF Response 2: ~nn@**LDFW** SP *size* SP **OK** CR LF			
Parameters			
size - size of firmware data that is sent FIRMWARE_DATA - HEX or KFW file in protocol packets (see Section 4)			
Response Triggers			
Notes			
In most devices firmware data is saved to flash memory, but the memory does not update until receiving the "UPGRADE" command and is restarted. Use this command in dedicated SW application			

Command - **LOCK-FP**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**LOCK-FP**	End User	Public
Get:	**LOCK-FP?**	End User	Public
Description		**Syntax**	
Set:	Lock front panel	Option 1: #**LOCK-FP** SP *lock_mode* CR Option 2: #**LOCK-FP** SP *device_id,lock_mode* CR	
Get:	Get front panel lock state	Option 1: #**LOCK-FP?** CR Option 2: #**LOCK-FP?** SP *device_id* CR	
Response			
Set: Option 1: ~nn@**LOCK-FP** SP *lock_mode* SP **OK** CR LF Option 2: ~01@**LOCK-FP** SP *device_id,lock_mode* SP **OK** CR LF Get: Option 1: ~nn@**LOCK-FP** SP *lock_mode* CR LF Option 2: ~01@**LOCK-FP** SP *device_id, lock_mode* CR LF			
Parameters			
lock_mode - 0/OFF - unlocks the front panel buttons, 1/ON - locks the front panel buttons *device_id* - for K-Net controllers, select the button panel to lock. Locking is allowed only from the master			
Response Triggers			
Notes			

Command - **P2000**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**P2000**	End User	Public
Get:	**-**	-	-
Description		**Syntax**	
Set:	Switch to protocol 2000	#**P2000** CR	
Get:	-	-	
Response			
~nn@**P2000** SP **OK** CR LF			
Parameters			
Response Triggers			
Notes			
Available only for devices that support Protocol 2000 Protocol 2000 has a command to switch back to an ASCII protocol like Protocol 3000			

Command - **PRST-LST?**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**PRST-LST?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get saved preset list	#**PRST-LST?**CR	
Response			
~nn@**PRST-LST**SP *preset, preset, …* CR LF			
Parameters			
preset - preset number			
Response Triggers			
Notes			
In most units, video and audio presets with the same number are stored and recalled together by commands #PRST-STO and #PRST-RCL			

Command - **PRST-RCL**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**PRST-RCL**	End User	Public
Get:	**-**	-	-
Description		**Syntax**	
Set:	Recall saved preset list	#**PRST-RCL**SP *preset* CR	
Get:	-	-	
Response			
~nn@**PRST-RCL**SP*preset*CR LF			
Parameters			
preset - preset number			
Response Triggers			
Notes			
In most units, video and audio presets with the same number are stored and recalled together by commands #PRST-STO and #PRST-RCL			

Command - **PRST-STO**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**PRST-STO**	End User	Public
Get:	**-**	-	-
Description		**Syntax**	
Set:	Store current connections, volumes and modes in preset	#**PRST-STO** SP *preset* CR	
Get:	-	-	
Response			
~nn@**PRST-STO** SP *preset* CR LF			
Parameters			
preset - preset number			
Response Triggers			
Notes			
In most units, video and audio presets with the same number are stored and recalled together by commands #PRST-STO and #PRST-RCL			

Command - **PRST-VID?**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**PRST-VID?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get video connections from saved preset	#**PRST-VID?** SP *preset, out* CR #**PRST-VID?** SP *preset, ** CR	

Response

~nn@**PRST-VID** SP *preset, in>out* CR LF

~nn@**PRST-VID** SP *preset, in>1, in>2, in>3*, … CR LF

Parameters

preset - preset number
n - input number or '0' if output disconnected
> - connection character between in and out parameters
out - output number or '*' for all outputs

Response Triggers

Notes

In most units, video and audio presets with the same number are stored and recalled together by commands #PRST-STO and #PRST-RCL

Examples

Store current audio and video connections, volumes and modes to preset 5	#PRST-STO 5 CR	~PRST-STO 5 CR LF
Recall audio and video connections from preset 3	#PRCL 3 CR	~PRST-RCL 3 CR LF
Show source of video output 2 from preset 3	#PRST-VID? 3,2 CR	~PRST-VID 3, 4>2 CR LF

Command - **SIGNAL**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	-	-	-
Get	**SIGNAL?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get input signal lock status	#**SIGNAL?** SP *inp_id* CR	
Response			
~ nn@**SIGNAL** SP *inp_id*,*status* CR LF			
Parameters			
inp_id - input number *status* - lock status according to signal validation (see Section 16.1.9.13)			
Response Triggers			
After execution, a response is sent to the com port from which the Get was received Response is sent after every change in input signal status ON to OFF, or OFF to ON			
Notes			

Command - VID		Command Type - Switch	
Command Name		**Permission**	**Transparency**
Set:	**VID**	End User	Public
Get:	**VID?**	End User	Public
Description		**Syntax**	
Set:	Set video switch state	#**VID** SP *in>out, in>out,…* CR	
Get:	Get video switch state	#**VID?** SP *out* CR #**VID?** SP * CR	

Response

Set: ~nn@**VID** SP *in>out* CR LF
~nn@**VID** SP *in>out* CR LF …
Get: ~nn@**VID** SP *in>out* CR LF
~nn@**VID** SP *in>1, in>2, …* CR LF

Parameters

in - input number or '0' to disconnect output
> - connection character between in and out parameters
out - output number or '*' for all outputs

Response Triggers

Notes

When AFV switching mode is active, this command also switches audio and the unit replies with command ~AV.

Examples

When AFV switching mode is active, this command also switches audio and the unit replies with command ~AV.

Switch video and audio input 3 to output 7	#AV 3>7CR	~01@AV 3>7CRLF
Switch video input 2 to output 4	#V 2>4CR	~01@VID 2>4CRLF
Switch video input 4 to output 2 in machine 6	#6@VID 4>2CR	~06@VID 4>2CRLF
Disconnect video and audio output 4	#AV 0>4CR	~01@AV 0>4CRLF
Switch video input 3 to all outputs	#V 3>* CR	~01@VID 3>* CRLF
Chaining multiple commands	#AV 1>* **|** V 3>4, 2>2, 2>1, 0>2 **|** V 3>9 **|** A 0>1 **|** V? * CR 1. Switch audio and video from input 1 to all outputs 2. Switch video input 3 to output 4, video input 2 to output 2, video input 2 to output 1 and disconnect video output 2 3. Switch video input 3 to output 9 (non-existent) 4. Disconnect audio output 1 5. Get status of all video links Command processing begins after entering CR A response is sent for each command after processing	~AV 1>*CRLF ~VID 3>4 CRLF ~VID 2>2 CRLF ~VID 2>1 CRLF ~VID 0>2 CRLF ~VID ERR003 CRLF ~AUD 0>1CRLF ~VID 2>1, 0>2, 1>3, 3>4 CRLF

16.1.9 Parameters

16.1.9.1 On/Off

Number	Value
0	Off
1	On

16.1.9.2 Color Space

Number	Value
0	RGB
1	YCbCr 4:2:2
2	YCbCr 4:4:4

16.1.9.3 Stage

Number	Value
0	Input
1	Output
2	(Reserved)
3	(Reserved)

16.1.9.4 Signal Type

Number	Value
0	No signal
1	DVI
2	HDMI
3	DisplayPort
4	HDBaseT
5	SDI
6	VGA
7	Follow output
8	DGKat

16.1.9.5 Video Resolutions

VIC Number	Resolution
0	No Signal (for input) / Native - EDID (for output)
1	640x480p @59.94Hz/60Hz
2	720x480p @59.94Hz/60Hz
3	720x480p @59.94Hz/60Hz
4	1280x720p @59.94Hz/60Hz
5	1920x1080i @59.94Hz/60Hz
6	720(1440)x480i @59.94Hz/60Hz
7	720(1440)x480i @59.94Hz/60Hz
8	720(1440)x240p @59.94Hz/60Hz
9	720(1440)x240p @59.94Hz/60Hz
10	2880x480i @59.94Hz/60Hz
11	2880x480i @59.94Hz/60Hz
12	2880x240p @59.94Hz/60Hz
13	2880x240p @59.94Hz/60Hz
14	1440x480p @59.94Hz/60Hz
15	1440x480p @59.94Hz/60Hz
16	1920x1080p @59.94Hz/60Hz
17	720x576p @50Hz
18	720x576p @50Hz
19	1280x720p @50Hz
20	1920x1080i @50Hz
21	720(1440)x576i @50Hz
22	720(1440)x576i @50Hz
23	720(1440)x288p @50Hz
24	720(1440)x288p @50Hz
25	2880x576i @50Hz
26	2880x576i @50Hz
27	2880x288p @50Hz
28	2880x288p @50Hz
29	1440x576p @50Hz
30	1440x576p @50Hz
31	1920x1080p @50Hz
32	1920x1080p @23.97Hz/24Hz
33	1920x1080p @25Hz
34	1920x1080p @29.97Hz/30Hz
35	2880x480p @59.94Hz/60Hz
36	2880x480p @59.94Hz/60Hz
37	2880x576p @50Hz
38	2880x576p @50Hz
39	1920x1080i @50Hz
40	1920x1080i @100Hz

VIC Number	Resolution
41	1280x720p @100Hz
42	720x576p @100Hz
43	720x576p @100Hz
44	720(1440)x576i @100Hz
45	720(1440)x576i @100Hz
46	1920x1080i @119.88/120Hz
47	1280x720p @119.88/120Hz
48	720x480p @119.88/120Hz
49	720x480p @119.88/120Hz
50	720(1440)x480i @119.88/120Hz
51	720(1440)x480i @119.88/120Hz
52	720x576p @200Hz
53	720x576p @200Hz
54	720(1440)x576i @200Hz
55	720(1440)x576i @200Hz
56	720x480p @239.76/240Hz
57	720x480p @239.76/240Hz
58	720(1440)x480i @239.76/240Hz
59	720(1440)x480i @239.76/240Hz
60	1280x720p @23.97Hz/24Hz
61	1280x720p @25Hz
62	1280x720p @29.97Hz/30Hz
63	1920x1080p @119.88/120Hz
64	1920x1080p @100Hz
65-100	(Reserved)
100	Custom resolution 1
101	Custom resolution 2
102	Custom resolution 3
103	Custom resolution 4
104	Custom resolution 5
104-254	(Reserved)

16.1.9.6 Genlock Types

Number	Value
0	Free run
1	Digital
2	Analog

16.1.9.7 Custom Resolution Parameters

Number	Value
0	Width
1	Height
2	HTotal
3	VTotal
4	HSync width
5	HSync back porch
6	VSync width
7	VSync back porch
8	Frame rate
9	Interlaced (0)/Progressive (1)

16.1.9.8 Audio Signal Types

Number	Value
0	No info
1	PCM
2	AC-3
3	MPEG1
4	MP3
5	MPEG2
6	AAC LC
7	DTS
8	ATRAC
9	DSD
10	E-AC-3
11	DTS-HD
12	MLP
13	DST
14	WMA Pro

16.1.9.9 Layer Enumeration

Number	Value
1	Video
2	Audio
3	Data

16.1.9.10 Layers

Number	Value
0	Small
1	Medium
2	Large

16.1.9.11 Software Programmed Table

Number	Value
0	Do nothing
1	Step-in out 1
2	Step-in out 2
…	…
128	Step-in out 128
129	Echo to controller

16.1.9.12 EDID Source

Number	Value
0	Input
1	Output
2	Default EDID

16.1.9.13 Signal Validation

Number	Value
0	Signal or sink is not valid
1	Signal or sink is valid
2	Sink and EDID is valid

16.1.9.14 Ethernet Port Types

Number	Value
0	TCP
1	UDP

16.1.9.15 HDCP Types

Number	Value
0	HDCP Off
1	HDCP On
2	Follow input
3	Mirror output (“MAC mode”)

16.1.9.16 Parity Types

Number	Value
0	No
1	Odd
2	Even
3	Mark
4	Space

16.1.9.17 Serial Types

Number	Value
0	232
1	485

16.2 Protocol 2000

Tables of HEX Codes for Serial Communication (Protocol 2000)

Table 11 lists the Protocol 2000[1] hex codes for switching inputs 1 through 16 to outputs 1 through 16.

Table 11: Hex Table (IN 1-16 to OUT 1-16)

	OUT 1	OUT 2	OUT 3	OUT 4	OUT 5	OUT 6	OUT 7	OUT 8	OUT 9	OUT 10	OUT 11	OUT 12	OUT 13	OUT 14	OUT 15	OUT 16
IN 1	01 81 81 81	01 81 82 81	01 81 83 81	01 81 84 81	01 81 85 81	01 81 86 81	01 81 87 81	01 81 88 81	01 81 89 81	01 81 8A 81	01 81 8B 81	01 81 8C 81	01 81 8D 81	01 81 8E 81	01 81 8F 81	01 81 90 81
IN 2	01 82 81 81	01 82 82 81	01 82 83 81	01 82 84 81	01 82 85 81	01 82 86 81	01 82 87 81	01 82 88 81	01 82 89 81	01 82 8A 81	01 82 8B 81	01 82 8C 81	01 82 8D 81	01 82 8E 81	01 82 8F 81	01 82 90 81
IN 3	01 83 81 81	01 83 82 81	01 83 83 81	01 83 84 81	01 83 85 81	01 83 86 81	01 83 87 81	01 83 88 81	01 83 89 81	01 83 8A 81	01 83 8B 81	01 83 8C 81	01 83 8D 81	01 83 8E 81	01 83 8F 81	01 83 90 81
IN 4	01 84 81 81	01 84 82 81	01 84 83 81	01 84 84 81	01 84 85 81	01 84 86 81	01 84 87 81	01 84 88 81	01 84 89 81	01 84 8A 81	01 84 8B 81	01 84 8C 81	01 84 8D 81	01 84 8E 81	01 84 8F 81	01 84 90 81
IN 5	01 85 81 81	01 85 82 81	01 85 83 81	01 85 84 81	01 85 85 81	01 85 86 81	01 85 87 81	01 85 88 81	01 85 89 81	01 85 8A 81	01 85 8B 81	01 85 8C 81	01 85 8D 81	01 85 8E 81	01 85 8F 81	01 85 90 81
IN 6	01 86 81 81	01 86 82 81	01 86 83 81	01 86 84 81	01 86 85 81	01 86 86 81	01 86 87 81	01 86 88 81	01 86 89 81	01 86 8A 81	01 86 8B 81	01 86 8C 81	01 86 8D 81	01 86 8E 81	01 86 8F 81	01 86 90 81
IN 7	01 87 81 81	01 87 82 81	01 87 83 81	01 87 84 81	01 87 85 81	01 87 86 81	01 87 87 81	01 87 88 81	01 87 89 81	01 87 8A 81	01 87 8B 81	01 87 8C 81	01 87 8D 81	01 87 8E 81	01 87 8F 81	01 87 90 81
IN 8	01 88 81 81	01 88 82 81	01 88 83 81	01 88 84 81	01 88 85 81	01 88 86 81	01 88 87 81	01 88 88 81	01 88 89 81	01 88 8A 81	01 88 8B 81	01 88 8C 81	01 88 8D 81	01 88 8E 81	01 88 8F 81	01 88 90 81
IN 9	01 89 81 81	01 89 82 81	01 89 83 81	01 89 84 81	01 89 85 81	01 89 86 81	01 89 87 81	01 89 88 81	01 89 89 81	01 89 8A 81	01 89 8B 81	01 89 8C 81	01 89 8D 81	01 89 8E 81	01 89 8F 81	01 89 90 81
IN 10	01 8A 81 81	01 8A 82 81	01 8A 83 81	01 8A 84 81	01 8A 85 81	01 8A 86 81	01 8A 87 81	01 8A 88 81	01 8A 89 81	01 8A 8A 81	01 8A 8B 81	01 8A 8C 81	01 8A 8D 81	01 8A 8E 81	01 8A 8F 81	01 8A 90 81
IN 11	01 8B 81 81	01 8B 82 81	01 8B 83 81	01 8B 84 81	01 8B 85 81	01 8B 86 81	01 8B 87 81	01 8B 88 81	01 8B 89 81	01 8B 8A 81	01 8B 8B 81	01 8B 8C 81	01 8B 8D 81	01 8B 8E 81	01 8B 8F 81	01 8B 90 81
IN 12	01 8C 81 81	01 8C 82 81	01 8C 83 81	01 8C 84 81	01 8C 85 81	01 8C 86 81	01 8C 87 81	01 8C 88 81	01 8C 89 81	01 8C 8A 81	01 8C 8B 81	01 8C 8C 81	01 8C 8D 81	01 8C 8E 81	01 8C 8F 81	01 8C 90 81
IN 13	01 8D 81 81	01 8D 82 81	01 8D 83 81	01 8D 84 81	01 8D 85 81	01 8D 86 81	01 8D 87 81	01 8D 88 81	01 8D 89 81	01 8D 8A 81	01 8D 8B 81	01 8D 8C 81	01 8D 8D 81	01 8D 8E 81	01 8D 8F 81	01 8D 90 81

1 Full details are available on our Web site at http://www.kramerelectronics.com

	OUT 1	OUT 2	OUT 3	OUT 4	OUT 5	OUT 6	OUT 7	OUT 8	OUT 9	OUT 10	OUT 11	OUT 12	OUT 13	OUT 14	OUT 15	OUT 16
IN 14	01 8E 81 81	01 8E 82 81	01 8E 83 81	01 8E 84 81	01 8E 85 81	01 8E 86 81	01 8E 87 81	01 8E 88 81	01 8E 89 81	01 8E 8A 81	01 8E 8B 81	01 8E 8C 81	01 8E 8D 81	01 8E 8E 81	01 8E 8F 81	01 8E 90 81
IN 15	01 8F 81 81	01 8F 82 81	01 8F 83 81	01 8F 84 81	01 8F 85 81	01 8F 86 81	01 8F 87 81	01 8F 88 81	01 8F 89 81	01 8F 8A 81	01 8F 8B 81	01 8F 8C 81	01 8F 8D 81	01 8F 8E 81	01 8F 8F 81	01 8F 90 81
IN 16	01 90 81 81	01 90 82 81	01 90 83 81	01 90 84 81	01 90 85 81	01 90 86 81	01 90 87 81	01 90 88 81	01 90 89 81	01 90 8A 81	01 90 8B 81	01 90 8C 81	01 90 8D 81	01 90 8E 81	01 90 8F 81	01 90 90 81

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.

How to Obtain a Remedy under this Limited Warranty

To obtain a remedy under this limited warranty, you must contact either the authorized Kramer Electronics reseller from whom you purchased this product or the Kramer Electronics office nearest you. For a list of authorized Kramer Electronics resellers and/or Kramer Electronics authorized service providers, please visit our web site at www.kramerelectronics.com or contact the Kramer Electronics office nearest you.

In order to pursue any remedy under this limited warranty, you must possess an original, dated receipt as proof of purchase from an authorized Kramer Electronics reseller. If this product is returned under this limited warranty, a return authorization number, obtained from Kramer Electronics, will be required. You may also be directed to an authorized reseller or a person authorized by Kramer Electronics to repair the product.

If it is decided that this product should be returned directly to Kramer Electronics, this product should be properly packed, preferably in the original carton, for shipping. Cartons not bearing a return authorization number will be refused.

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Caution

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

P/N: 2900-000727 Rev: 5

Kramer Electronics, Ltd.
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P/N: 2900-000727 REV 5