

Kramer Electronics, Ltd.



USER MANUAL

Model:

VS-1616SDI

16x16 SDI Video 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, and presentation professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 500-plus different models now appear in eight groups¹ that are clearly defined by function.

Thank you for purchasing the Kramer **VS-1616SDI** *16x16 SDI* (serial digital) *Video Matrix Switcher*, which is ideal for:

- Video broadcast studios for on-air switching and signal routing
- Video production facilities

The package includes the following items:

- **VS-1616SDI** 16x16 SDI Video Matrix Switcher
- Power cord
- Windows®-based Kramer control software
- Null-modem adapter
- This user manual²

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
- Use Kramer high-performance high-resolution cables³

3 Overview

The Kramer **VS-1616SDI** is an adjustment-free, high-performance 16x16 vertical interval matrix switcher for SDI (serial digital) video signals on BNC connectors.

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

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

3 The complete list of Kramer cables is on our Web site at <http://www.kramerelectronics.com>

A main advantage of the **VS-1616SDI** is that it forms part of the series of 16x16 matrix switchers that includes, but is not limited to, **VS-1616A** (a 16x16 analog balanced stereo audio matrix switcher), **VS-1616V** (a 16x16 analog video matrix switcher), **VS-1616AD** (a 16x16 digital audio matrix switcher), **VS-162V** (a 16x16 video matrix switcher), and **VS-162AV** (a 16x16 audio-video matrix switcher).

In particular, the **VS-1616SDI**:

- Is a true matrix switcher, enabling the user to simultaneously route any or all of the 16 inputs to any or all of the 16 outputs
- Provides automatic equalization for losses on 75Ω co-axial cable
- Reclocks each output to provide 16 low-jitter serial digital outputs
- Has automatic video standard recognition
- Accepts either analog or serial video as the external source for its vertical trigger. Alternately, input # 1 can be assigned as the sync source

In addition the **VS-1616SDI**:

- Can be configured into a Kramer multi-signal switcher system including digital and analog video, digital and analog audio, and RS-422 control switchers
- When integrated in a system, all units switch in true audio-follow-video mode
- Recalls up to 99 configuration setups via the non-volatile memory and provides for an unlimited quantity of setups when using the Kramer control software on your PC
- Includes a user-friendly LCD display (making operation even easier)
- With its FLASH memory, lets you upgrade to the latest Kramer firmware version via Internet download
- Comes with a choice of protocol format: hexadecimal or ASCII

You can control the **VS-1616SDI** using:

- The front panel buttons
- Remotely, by RS-485 or RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller
- Remotely, from the Kramer **RC-IR2** Infra-Red Remote Control Transmitter
- External dry-contact push-buttons

To achieve the best performance:

- Use only good quality connection cables¹ to avoid 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 **VS-1616SDI** away from moisture, excessive sunlight and dust.

4 Operating a Single Machine

By default, the **VS-1616SDI** is setup for use as a single machine. This means that it is:

- A 16x16 SDI video switcher
- Switched during the vertical interval of the external analog reference

In particular, be sure that the dipswitches are set as shown in Figure 1 (see section 6.3 for further details). To operate a single machine, see Table 1.

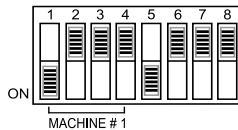


Figure 1: Default Dipswitch Setup on a Single Machine

Table 1: Quick Reference Operating Guide for a Single Machine

To perform this command:	Press:
Connect an input with an output	OUT #; IN #
Clear (disconnect) a specific output	OUT #; OFF
Clear (disconnect) all outputs	ALL; OFF
Connect all outputs to a specific input	ALL; IN #
Store a setup	STO; OUT #; TAKE
Recall a setup	RCL; OUT #; TAKE
Lock front panel	MENU; TAKE
Unlock front panel	TAKE; TAKE
Change default setup	Press the Menu button several times until you reach the appropriate Menu setup command and follow the instructions

5 Your SDI Video Matrix Switcher

Figure 2 illustrates the front and rear panels of the **VS-1616SDI**. Tables 1 and 2 define the front and rear panels of the **VS-1616SDI**, respectively.

¹ Available from Kramer Electronics on our Web site at <http://www.kramerelectronics.com>

Your SDI Video Matrix Switcher

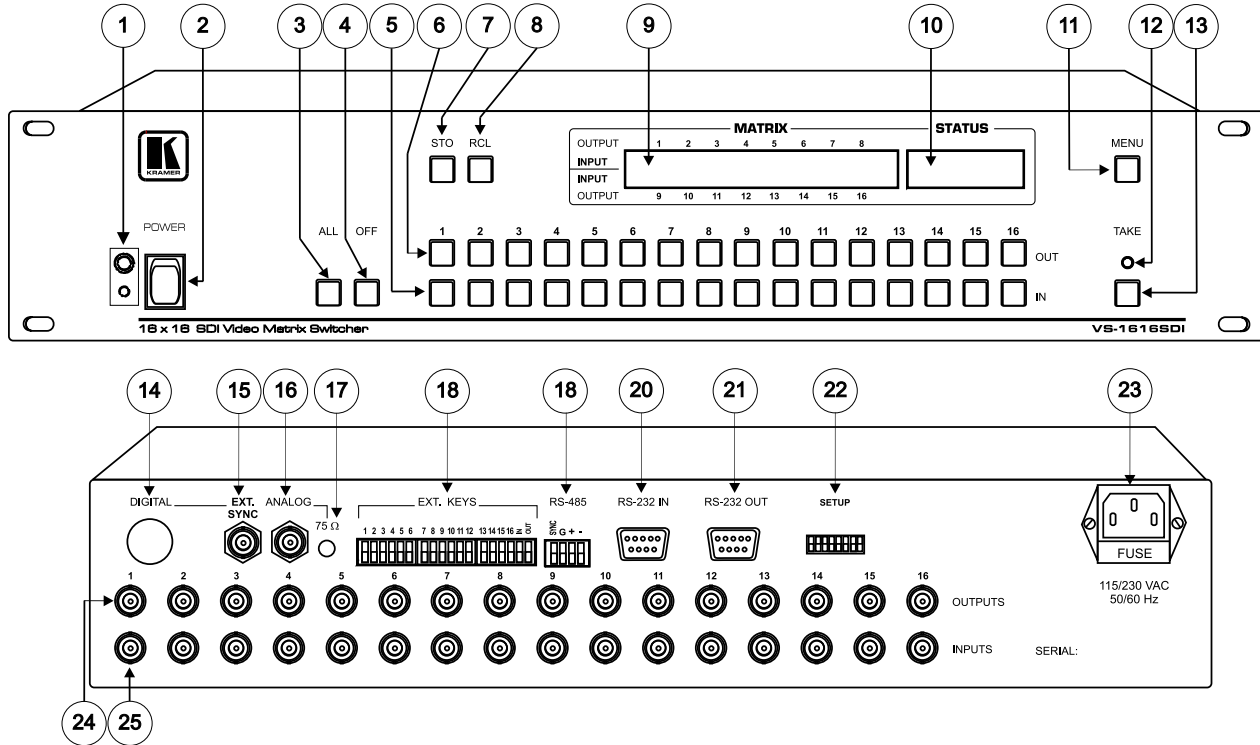


Figure 2: VS-1616SDI 16x16 SDI Video Matrix Switcher

Table 2: Front Panel VS-1616SDI 16x16 SDI Video Matrix Switcher Features

#	Feature	Function
1	IR Receiver	The red LED is illuminated when receiving signals from the Kramer Infra-red remote control transmitter
2	Power Switch	Illuminated switch supplying power to the unit
3	ALL Button	Pressing ALL followed by an INPUT button, connects that input to all outputs
4	OFF Button	An OFF-OUT combination disconnects that output from the inputs; an OFF-ALL combination disconnects all the outputs
5	IN Buttons	Select the input to switch to the output
6	OUT Buttons	Select the output to which the input is switched
7	STO Button	Stores the current setting in the non-volatile memory
8	RCL Button	Recalls a setup from the non-volatile memory
9	LCD MATRIX Display ¹	Displays the selected input(s) switched to the output(s) (above or below the corresponding OUTPUT label) and user interface messages
10	LCD STATUS Display ¹	Displays the matrix status (input to output connections)
11	MENU Button	Selects the programming commands to setup the switcher
12	TAKE LED	Shows the current TAKE button mode
13	TAKE Button	Used to confirm and complete setup and switching

Table 3: Rear Panel VS-1616SDI 16x16 SDI Video Matrix Switcher Features

#	Feature	Function
14	DIGITAL	Space for optional digital Genlock input board with BNC Connector
15	EXT. SYNC BNC Connector	Connects to the external sync source
16	ANALOG BNC Connector	Connects to the analog Genlock source
17	75 Ω Analog Genlock Button	Press to terminate at 75 Ω or release for looping ²
18	EXT. (extension) KEYS Terminal Block Connectors	Connects to an external keyboard (remote unit)
19	RS-485 Detachable Terminal Block Port	Pins # 1 and # 2 are for vertical sync and Ground connection, and Pins # 3 and # 4 are for RS 485
20	RS-232 IN DB 9F Port	Connects to the PC or the Remote Controller ³
21	RS-232 OUT DB 9M Port	Connects to the RS-232 IN DB 9F port of the next unit in the daisy-chain connection
22	SETUP Dipswitches	Dipswitches for setup of the unit
23	Power Connector with Fuse	AC connector enabling power supply to the unit
24	INPUTS BNC Connectors	Connect to the digital video sources
25	OUTPUTS BNC Connectors	Connect to the digital video acceptors

1 In sections 7.2.4 and 8, the word “Displays” refers to the LCD MATRIX and STATUS Displays

2 Push in to terminate the sync line. Push out when the sync line extends to another unit

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

6 Installing the SDI Video Matrix Switcher

To install the **VS-1616SDI**, connect the following¹ to the rear panel, as required:

- Power cord
- Video input and output cables
- Control Interface cables between switcher units, or PC (or other controller), as section 6.4 describes
- Set the dipswitches, as section 6.3 describes
- Set the system variables using the MENU function, as section 8 describes

Using the **VS-1616SDI** unit and/or other 16x16 matrix switchers in the series², you can assemble the following kinds of systems:

- A stand alone switcher (see section 6.1)
- A system of interconnected switchers (see section 6.2)

6.1 Configuring a Standalone SDI Video Matrix Switcher

By default, a single **VS-1616SDI** unit is configured as a 16x16 stand alone switcher for SDI video with 16 inputs and 16 outputs, as Figure 3 illustrates:

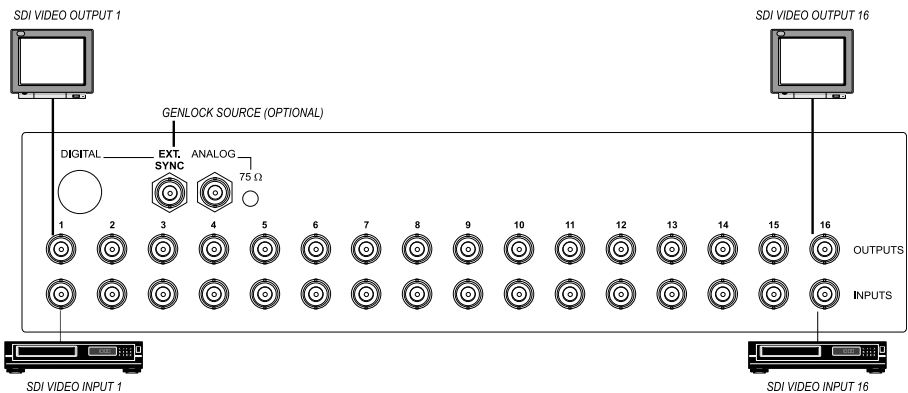


Figure 3: Configuring a Stand Alone 16x16 VS-1616SDI Switcher

1 Switch OFF the power on each device before connecting it to your VS-1616SDI

2 Including the VS-1616A (a 16x16 analog balanced stereo audio matrix switcher), the VS-1616V (a 16x16 analog video matrix switcher), the VS-1616AD (a 16x16 digital audio matrix switcher), VS-162V (a 16x16 video matrix switcher), and the VS-162AV (a 16x16 audio-video matrix switcher)

6.2 Assembling a System of Interconnected Switchers

A major advantage of the **VS-1616SDI** is that it belongs to the series of 16x16 matrix switchers and, as such, can interconnect with other switchers in the series. This series includes, but is not limited to, **VS-1616A** (a 16x16 analog balanced stereo audio matrix switcher), **VS-1616V** (a 16x16 analog video matrix switcher), **VS-1616AD** (a 16x16 digital audio matrix switcher), **VS-162V** (a 16x16 video matrix switcher), and **VS-162AV** (a 16x16 audio-video matrix switcher).

The block diagram in Figure 4 illustrates how to assemble an interconnected varied-format 16x16 series switcher that consists of a 32x32 composite video matrix switcher, a 16x16 digital video matrix switcher, a 32x32 balanced stereo audio matrix switcher, and a 16x16 digital audio matrix switcher.

Note that each group of switchers has a unique **MACHINE #** that is shared by all members of the group. In Figure 4, the 32x32 composite video matrix switcher is **MACHINE # 1**, the 16x16 digital video matrix switcher is **MACHINE # 2** and so on. Control of the system is via the **MACHINE #'s**.

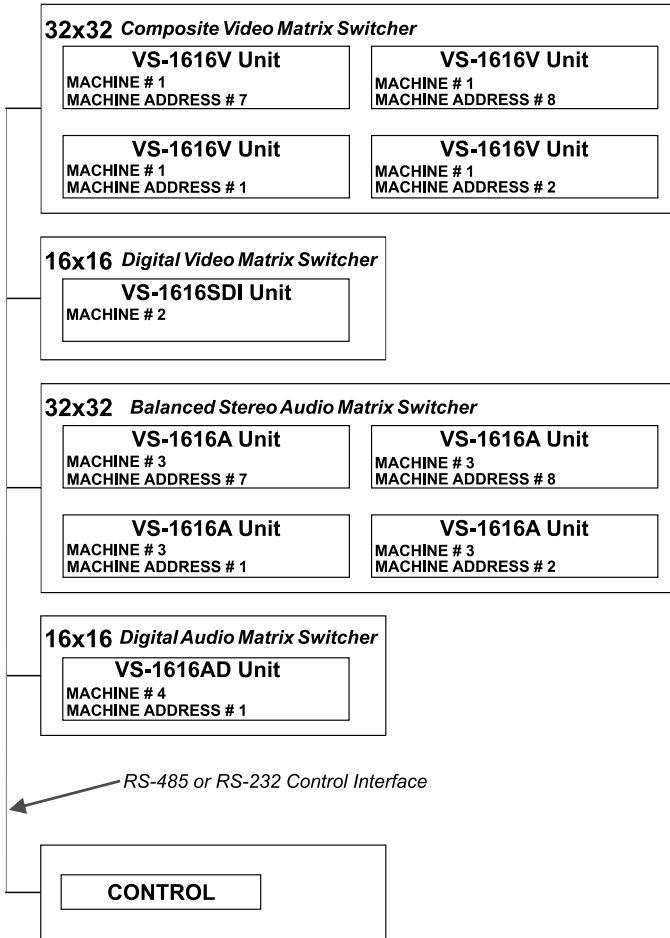


Figure 4: Assembling a System of Interconnected Switchers

Refer to section 6.3 for details of how to set the dipswitches, and to section 6.4 for details of how to control this group of interconnected varied-format 16x16 series switchers, and other configurations.

6.3 Setting the Dipswitches

Configure the **VS-1616SDI** by setting the 8 dipswitches as Figure 5 and Table 4 define:

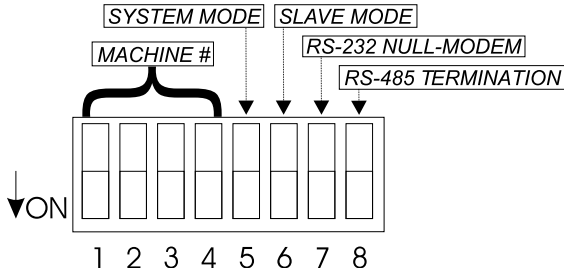


Figure 5: Rear Panel Dipswitches

Table 4: Dipswitch Definitions

Dipswitch #	Function:
1-4	Set the MACHINE # (see Table 5 in section 6.3.1)
5	Enables (ON) or disables (OFF) the <i>Follow-SYSTEM</i> mode
6	Enables (ON) or disables (OFF) the <i>SLAVE</i> mode in a multi-channel configuration
7	Disables use of a null modem adapter ¹ with RS-232 OFF = RS-232 connection via a null modem adapter ON = RS-232 connection without a null modem adapter
8	RS-485 termination for first and last machine = ON (RS-485 line terminates with 110Ω); for others = OFF (RS-485 line is open)

6.3.1 Setting the MACHINE

To control a unit via RS-232 or RS-485, each unit has to be identified via its unique MACHINE #.

Set the MACHINE #² on a **VS-1616SDI** unit according to Table 5.

A valid MACHINE # is from 1 to 15.

Table 5: Machine # Dipswitch Settings

MACHINE #	DIPSWITCH			
	1	2	3	4
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON

¹ See section 6.4.1

² When using a single unit, set the unit to MACHINE # 1

MACHINE #	DIPSWITCH			
	1	2	3	4
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

6.3.2 Understanding the SYSTEM Mode

The terms *audio-follow-video*¹ and *audio breakaway*² are well known. Sometimes signals other than audio signals need to switch simultaneously and at other times, need to switch independently. For example:

- Non-linear editing systems, that sometimes combine video with analog audio and at other times combine video with digital audio
- Duplication systems, that make Master tapes from programs with different formats: composite analog, component analog and component digital

DIP 5 defines whether the **VS-1616SDI** unit communicates with other switchers via a common control line.

You can set **DIP 5 OFF** to disable the *Follow-SYSTEM* mode in stand alone switcher applications³.

You **must set DIP 5 ON** to enable the *Follow-SYSTEM* mode in an interconnected varied-format switcher application⁴.

Refer to section 8.2 for a description of the MENU's *Follow-SYSTEM* and *Breakaway-from-SYSTEM* modes.

6.3.3 Understanding the SLAVE Mode

The SLAVE mode is only used for the multi-channel video switcher configuration, for example, when joining together **VS-1616V** analog video and **VS-1616SDI** digital video units.

One unit is used as the Master, and the other unit is the Slave. The Slave always follows the Master. In the example the first **VS-1616V** unit is the Master (with DIP 6 set OFF disabling the Slave mode) and the second

¹ Video and the audio channels switch simultaneously in the same way

² Audio channels switch independently from the video channels

³ See section 6.1

⁴ See section 6.2

VS-1616SDI unit is the Slave (with DIP 6 set ON enabling the Slave mode).

On the Slave **VS-1616SDI** unit, the MATRIX and STATUS Displays do not illuminate and the STATUS Display shows the following message:

Keyboard LOCKED

However, the STATUS Display on the Slave **VS-1616SDI** unit dynamically shows¹ all changes made from the Master **VS-1616V** unit (which are implemented also on the Slave unit).

Front panel control is via the Master **VS-1616V** unit, on which the front panel buttons are unlocked and both the MATRIX and STATUS Displays illuminate.

6.4 Connecting a Control Interface

Connect a control interface (RS-232 or RS-485) unless operating a **VS-1616SDI** as a stand alone unit without any control device (that is, with control from the front panel or IR port, and not via a remote controller or a PC).

The control interface must be identical on each switcher in the series of 16x16 matrix switchers; either RS-232 or RS-485. One control interface suffices. Do not use both RS-232 and RS-485 control interfaces in the same configuration. For example, in an interconnected varied-format 16x16 switcher application², if the switcher that connects to the PC connects via the RS-232 control interface, each switcher must interconnect via the RS-232 control interface and not via the RS-485 control interface.

Choose the RS-232 control interface, for a range of up to about 25 meters used for a point-to-point connection.

Choose the RS-485 control interface, to operate the switcher for a distance of up to 1000 meters.

6.4.1 Connecting the RS-232 Control Interface

Connect several switchers (from the series of 16x16 matrix switchers) and the control unit in an RS-232 daisy chain arrangement, with or without using a Null-modem adapter, as Figure 6 illustrates.

¹ Albeit with an LCD Display that does not illuminate

² See section 6.2

The RS-232 daisy chain switcher arrangement is transparent. This lets you arrange the switchers (from the series of 16x16 matrix switchers) according to your requirements, and not according to a fixed sequence dependent on the MACHINE #.

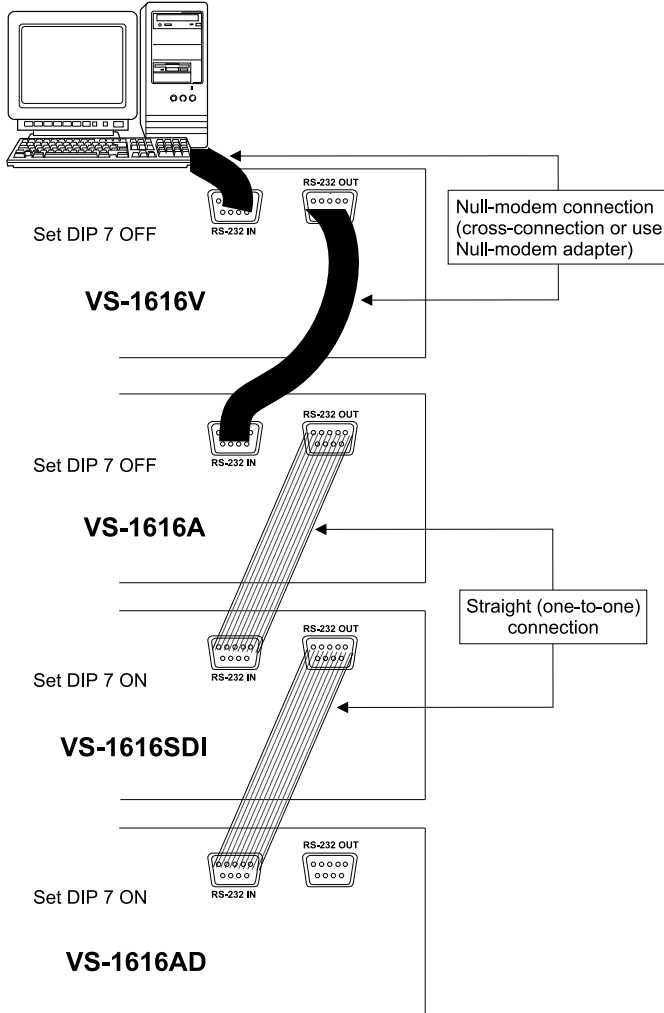


Figure 6: Connecting a PC to Four Switchers

You can connect any of the following:

- A **VS-1616SDI** unit with any matrix switcher that forms part of the series of 16x16 matrix switchers, using a Null-modem adapter (see section 6.4.1.1) or without using a Null-modem adapter (see section 6.4.1.2)
- The PC's DB9 COM port to a **VS-1616SDI** unit with a Null-modem adapter (see section 6.4.1.3) or without a Null-modem adapter (see section 6.4.1.4)
- The PC's DB25 COM port to a **VS-1616SDI** unit without a Null-modem adapter (see section 6.4.1.5)

6.4.1.1 Connecting with a Null-modem Adapter

To connect a **VS-1616SDI** unit with any matrix switcher that forms part of the series of 16x16 matrix switchers, **using a Null-modem adapter** provided with the machine (default):

1. Connect a flat cable¹ between the RS-232 OUT DB9 port on the **VS-1616SDI** unit and the Null-modem adapter that attaches to the RS-232 IN DB9 port on the other 16x16 matrix switcher.
2. On the other 16x16 matrix switcher, set **DIP 7 OFF** (enabling Null-modem adapter use).

6.4.1.2 Connecting without a Null-modem Adapter

To connect a **VS-1616SDI** unit with any matrix switcher that forms part of the series of 16x16 matrix switchers, **without using a Null-modem adapter**:

1. Connect a flat cable¹ between the RS-232 OUT DB9 port on the **VS-1616SDI** unit and the RS-232 IN DB9 port on the other 16x16 matrix switcher.
2. On the other 16x16 matrix switcher, set **DIP 7 ON** (disabling Null-modem adapter use²).

6.4.1.3 Connecting to a DB9 COM Port with a Null-modem Adapter

To connect the PC's DB9 COM port to a **VS-1616SDI** unit, **using a Null-modem adapter**:

1. Connect a flat cable¹ between the PC's DB9 COM port and the Null-modem adapter that attaches to the RS-232 IN DB9 port on the **VS-1616SDI** unit.

¹ Straight one-to-one uncrossed connections with at least the 3 wires pins # 2, # 3 and # 5

² See section 6.3

2. **Set DIP 7 OFF** (enabling Null-modem adapter use²) on the **VS-1616SDI** unit.

6.4.1.4 Connecting to a DB9 COM Port without a Null-modem Adapter

To connect the PC's DB9 COM port to a **VS-1616SDI** unit, **without using a Null-modem adapter**:

1. Connect a flat cable¹ between the PC's DB9 COM port and the RS-232 IN DB9 port on the **VS-1616SDI** unit.
2. **Set DIP 7 ON** (disabling Null-modem adapter use²) on the **VS-1616SDI** unit.

6.4.1.5 Connecting to a DB25 COM Port

To connect the PC's DB25 COM port to a **VS-1616SDI** unit:

1. Connect the PC's DB25 COM port to the RS-232 IN DB9 port on the **VS-1616SDI** unit, as Figure 7 illustrates:

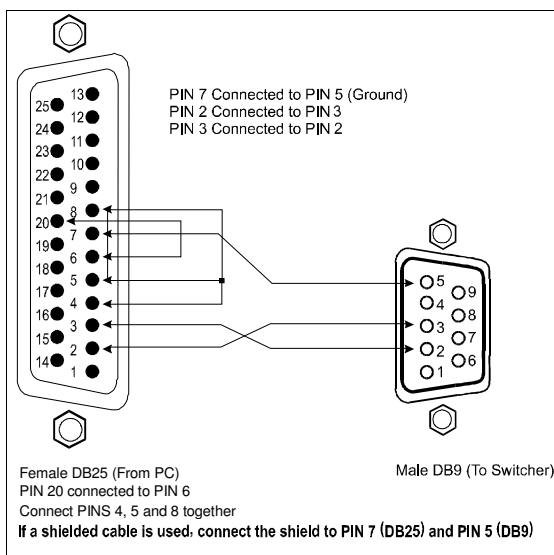


Figure 7: Connecting a PC (with a 25-pin connector) without a Null-modem Adapter

2. **Set DIP 7 ON** (disabling Null-modem adapter use²) on the **VS-1616SDI** unit.

¹ Straight one-to-one uncrossed connections with at least the 3 wires pins # 2, # 3 and # 5

² See section 6.3

6.4.2 Connecting the RS-485 Control Interface

Figure 8 defines the RS-485 connector PINOUT for external RS-485 control. The RS-485 connector is also used (if required) for vertical sync:

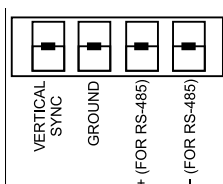


Figure 8: RS-485 Connector PINOUT

To connect an RS-485 connector on a **VS-1616SDI** unit to an RS-485 connector on one or more other switchers (from the series of 16x16 matrix switchers), as Figure 9 illustrates:

1. Connect the “+” PIN on the **VS-1616SDI** unit to the “+” PIN on the other 16x16 matrix switcher unit
2. Connect the “-” PIN on the **VS-1616SDI** unit to the “-” PIN on other 16x16 matrix switcher unit
3. If shielded cable is used for an RS-485 connection, connect the shield to the Ground PIN.

For details about how to configure the vertical sync (if required), refer to section 6.5 and Figure 14.

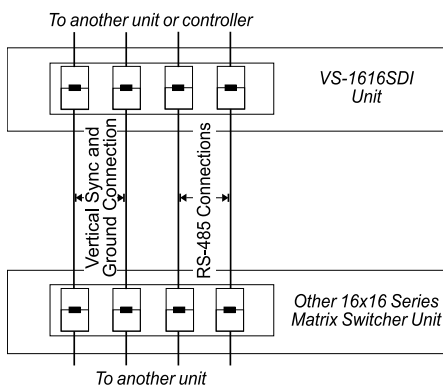


Figure 9: Connecting the RS-485 Connectors

Figure 10 illustrates the RS-485 line that connects:

- Between the **VS-1616V**, **VS-1616A**, **VS-1616SDI**, and **VS-1616AD** switchers

- To the PC via a Kramer Tools **VP-43xl Interface Converter** (connect the PC's DB 9 COM port to the "RS-232 in" DB9F port on the **VP-43xl**. Next, connect the RS-485 port on the **VP-43xl** to the RS-485 ports on the switchers by connecting the "A" terminal of the **VP-43xl** to the "+" terminals of the switchers, and "B" to "-" terminals)

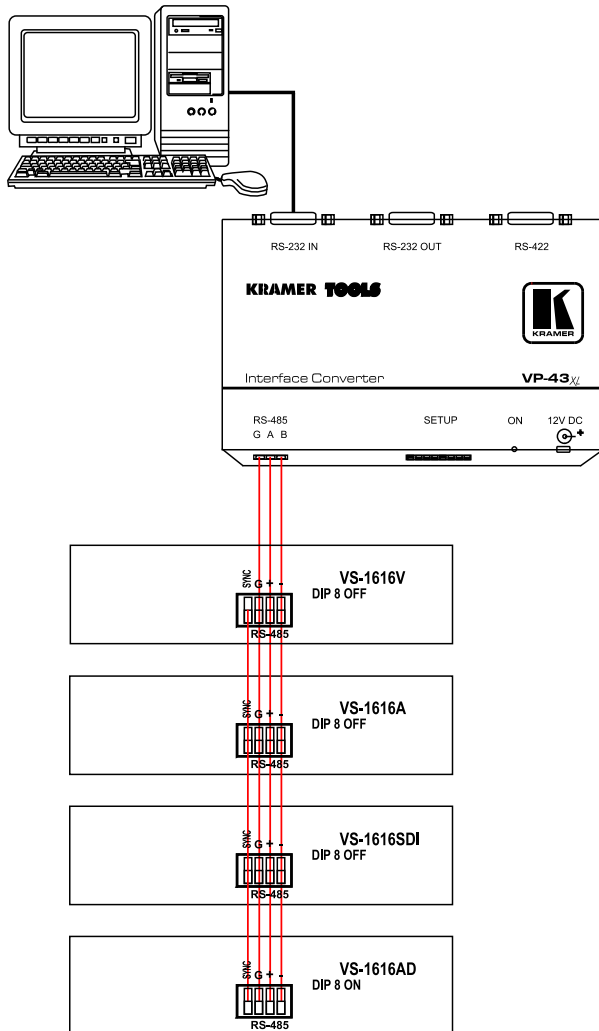


Figure 10: An RS-485 Control Interface Setup

6.5 Configuring the Sync

On the **VS-1616SDI**, you can select one of the following, as the sync input:

- EXTERNAL SYNC ANALOG BNC connector
- INT# 1 DIGITAL BNC connector
- MTX (Sync from Matrix) RS-485 Terminal Block connector, when using multiple machines¹

Configure the sync via the SWITCHING METHOD Menu command setting². When setting up multiple machines (for example, a 48x64 switcher), linking a common sync to all the machines may be necessary to facilitate simultaneous vertical interval switching.

Usually, the easiest method is to choose the sync source from the first machine (for example, from the **VS-1616V** composite video unit) and then connect all the terminal block connectors.

In this case, set the first machine to select the sync source from the external sync connector or from the INPUT # 1 connector. This sync is now available to the other machines via the RS-485 terminal block connector, as Figure 8 and Figure 9 illustrate. Select the MTX sync on the other machines that receive that sync.

6.6 Connecting the Keyboard Extension

Connecting dry contact-closure switches to the Keyboard Extension (*EXT. KEYS*) connector enables you to route an input to an output by remote control from a distance of up to 1000 meters. These IN and OUT keys are expandable³. Figure 11 illustrates how to connect the Keyboard Extension (*EXT. KEYS*):

¹ Refer to section 8.3.1

² Refer to section 8.3

³ Add an unlimited number of push buttons to the existing keys (in parallel) by attaching one end of the push button to the corresponding number and the other end to the IN or OUT terminal

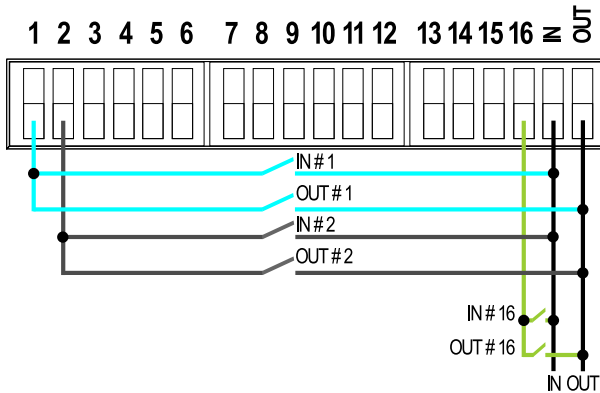


Figure 11: Keyboard Extension (EXT. KEYS) Connector

To use the Keyboard Extension, activate the extended KEYBOARD setting Menu command, as section 8.4 describes.

7 Operating Your SDI Video Matrix Switcher

Operate your **VS-1616SDI** via:

- The front panel buttons (as this section describes)
- RS-232 or RS-485 serial commands transmitted by a touch screen system, PC¹, or other serial controller
- The Kramer **RC-IR2** Infra-Red Remote Control Transmitter
- Dry contact-closure switches connected to the Keyboard Extension

7.1 Using the Startup Display

After switching on the power, the *MATRIX* and *STATUS*² displays show the following screens in sequence:

¹ For instructions on using Kramer Windows® Control Software, refer to the separate user manual (included on the CD-ROM in .pdf format), *Kramer Control Software*

² Version 1.5 is shown in the Status Display as an example; text in the Matrix Display may vary (according to machine settings)

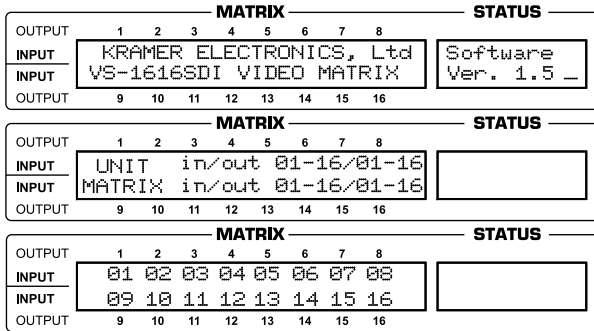


Figure 12: Default Startup Status Display Sequence

7.2 Using the Front Panel Buttons

You can switch (see section 7.2.2) and clear (see section 7.2.3):

- One input to one output
- Several inputs to several outputs
- One input to all outputs

7.2.1 Confirming the Settings

Choose to work in the *AT ONCE* mode or the *CONFIRM* mode:

In the *AT ONCE* (default¹) mode:

- Actions require no user confirmation
- Execution is immediate
- No protection is offered against changing an action in error

In the *CONFIRM* mode²:

- You have an optional method to help avoid making a mistake
- Every action requires user confirmation
- Execution is delayed³ until the user confirms the action
- Protection is offered to prevent erroneous switching
- You can key-in several actions and then confirm them by pressing the TAKE button once, to simultaneously switch several monitors

1 For all actions except storing/recalling setups

2 The CONFIRM mode is the default for storing/recalling setups (see section 8.5)

3 Failure to press the TAKE button within about 30 seconds (the Timeout) will abort the action

7.2.1.1 Toggling Between the AT ONCE and CONFIRM Modes

To toggle between the AT ONCE (default) mode and the CONFIRM mode, press the TAKE button.

In CONFIRM mode: Actions require user confirmation and the TAKE LED lights.

In AT ONCE mode: Actions do not require user confirmation and the TAKE LED does not light.

When the TAKE LED blinks:

- You cannot toggle between the AT ONCE and CONFIRM modes
- You can execute the previous action, by pressing the TAKE button
- You can cancel the previous action, by pressing a non-relevant button (for example, the MENU button)

7.2.2 Switching Outputs

You can switch:

- One input to one output (see section 7.2.2.1)
- Several inputs to several outputs (see section 7.2.2.2)
- One input to all outputs (see section 7.2.2.3)

7.2.2.1 Switching One Input to One Output

Pressing an OUT-IN combination when your **VS-1616SDI** operates in the AT ONCE mode implements the switch immediately.

To switch one input to one output (AT ONCE mode):

1. Press the appropriate OUT button.
The MATRIX Display shows the 2 blinking digits, representing the present input number connected to that specific output¹. If the present output is clear, the 2 blinking digits 00 appear in the MATRIX Display.
The STATUS Display shows the message:

out # x

Where x is the output number

2. Press the appropriate IN button.
The output switches to the input and the MATRIX Display shows the Input # instead of the blinking digits.
The STATUS Display momentarily shows the message:

¹ For example, pressing OUT button 9 shows the blinking digits 01 if input 1 was previously routed to OUT 9

out # x
from in # y

Where x is the output number and y is the input number

Pressing an OUT-IN combination when your **VS-1616SDI** operates in the CONFIRM mode (and the TAKE LED is lit), requires user confirmation.

To switch one input to one output (CONFIRM mode):

1. Repeat step 1 above.
2. Press the appropriate IN button.
The MATRIX Display shows the 2 blinking digits, representing the input number and the TAKE LED blinks.
The STATUS Display shows¹ the message:

out # x
from in # y

Where x is the output number and y is the input number

3. Press the TAKE button to confirm the action.
The output switches to the input and the TAKE LED lights.

7.2.2.2 Switching Several Inputs to Several Outputs

In the *AT ONCE* mode, you need to execute each OUT-IN combination separately (see section 7.2.2.1). When switching many inputs to many outputs it is recommended to toggle to the CONFIRM mode.

In the CONFIRM mode you can key-in several actions and then confirm them by pressing the TAKE button once (simultaneously switching several inputs to several outputs).

To switch several inputs to several outputs in the CONFIRM mode (the TAKE LED is lit), do the following:

1. Press the appropriate OUT button.
The MATRIX Display shows the 2 blinking digits, representing the previous input number for that specific output². If the previous input is clear, the 2 blinking digits 00 appear in the MATRIX Display.
The STATUS Display shows the message:

out # x

Where x is the output number

¹ Continuously, within the limit of the timeout (approximately 30 seconds)

² For example, pressing OUT button 9 shows the blinking digits 01 if input 1 was previously routed to OUT 9

2. Press the appropriate IN button.
The MATRIX Display shows the 2 blinking digits, representing the input number and the TAKE LED blinks.
The STATUS Display shows¹ the message:

**out # x
from in # y**

Where x is the output number and y is the input number

3. Press the second appropriate OUT button, repeating step 1 above.
4. Press the appropriate² IN button, repeating step 2 above.
5. Continue with this OUT-IN button sequence, pressing the appropriate OUT and IN buttons, as required. You can also combine an OUT-OFF or OFF-OUT combination with this sequence.
6. After completing the sequence, press the TAKE button to confirm the actions.
The inputs switch to the respective outputs, as the MATRIX Display shows (no digits blink) and the TAKE LED lights.

7.2.2.3 Switching One Input to All Outputs

To switch one input to all the outputs (in the AT ONCE mode):

1. Press the ALL button.
The MATRIX Display shows all the sets of 2 blinking digits (each representing the present input number for that respective output) blinking simultaneously.
The STATUS Display shows the message:

all OUTs

2. Press the appropriate IN button.
This input switches to all the outputs and the MATRIX Display shows the identical non-blinking 2 digits (representing that input number).

To switch one input to all the outputs (in the CONFIRM mode, (the TAKE LED is lit)):

1. Repeat steps 1 and 2 above.
The TAKE LED blinks.
2. Press the TAKE button to confirm the action.
The selected input switches to all the outputs and the TAKE LED lights.

¹ Continuously, within the limit of the timeout (approximately 30 seconds)

² That corresponds with the second OUT button

The MATRIX Display shows the identical 2 non-blinking digits (representing that input number) for all outputs.

7.2.3 Clearing¹ Outputs

You can clear (delete):

- One output (see section 7.2.3.1)
- Several outputs (see section 7.2.3.2)
- All outputs (see section 7.2.3.3)

7.2.3.1 Clearing One Output

To clear an output (in the AT ONCE mode):

1. Press the appropriate OUT button.
The MATRIX Display shows the 2 blinking digits, representing the present input number for that specific output². If the present input is clear, the 2 blinking digits 00 appear in the MATRIX Display.
The STATUS Display shows the message:

out # x

Where x is the output number

2. Press the OFF button³.
The input is cleared and the MATRIX Display does not show any Input # in its place.
The STATUS Display momentarily shows the message:

**out # x
reset**

Where x is the output number

To clear an output (in the CONFIRM mode (the TAKE LED is lit)):

1. Repeat step 1 above.
2. Press the OFF button³.
The MATRIX Display shows the 2 blinking digits 00 instead of the previous 2 blinking digits and the TAKE LED blinks.
The STATUS Display shows⁴ the message:

**out # x
reset**

1 "Clearing" means disconnecting the output from any of the inputs, and leaving it disconnected

2 For example, pressing OUT button 9 shows the blinking digits 01 if input 1 was previously routed to OUT 9

3 You can press the OFF button first, and then an OUT button (the order is irrelevant)

4 Continuously, within the limit of the timeout (approximately 30 seconds)

Where x is the output number

3. Press the TAKE button to confirm the action.
The input is cleared and the TAKE LED lights. The MATRIX Display does not show any Input # in its place.

7.2.3.2 Clearing Several Outputs

To clear several outputs (in the AT ONCE mode):

1. Press the appropriate OUT button.
The MATRIX Display shows the 2 blinking digits, representing the present input number for that specific output¹. If the present output is clear, the 2 blinking digits 00 appear in the MATRIX Display.
The STATUS Display shows the message:

out # x

Where x is the output number

2. Press the OFF button.
The output is cleared and the MATRIX Display does not show any Input # in its place.
The STATUS Display momentarily shows the message:

**out # x
reset**

Where x is the output number

To clear several outputs (in the CONFIRM mode (the TAKE LED is lit)):

1. Repeat step 1 above.
2. Press the OFF button.
The MATRIX Display shows the 2 blinking digits 00 instead of the previous 2 blinking digits and the TAKE LED blinks.
The STATUS Display shows¹ the message:

**out # x
reset**

Where x is the output number

3. Press the second appropriate OUT button, by repeating step 1 above.
4. Repeat step 2 above.
5. Continue with this OUT-OFF button sequence, pressing the appropriate OUT buttons and the OFF, as required.

¹ For example, pressing OUT button 9 shows the blinking digits 01 if input 1 was previously routed to OUT 9

The MATRIX Display shows the sets of 2 blinking digits, representing the present input number for each specific output.

6. After completing the sequence, press the TAKE button to confirm the actions.

The inputs are cleared and the TAKE LED lights. The MATRIX Display does not show any Input # in its place.

7.2.3.3 Clearing All Outputs

To clear all outputs (in the AT ONCE mode):

1. Press the ALL button.

The MATRIX Display shows all the sets of 2 blinking digits (each representing the present input number connected to that respective output) blinking simultaneously.

The STATUS Display shows the message:

all OUTs

2. Press the OFF button¹.

All the outputs are cleared and the MATRIX Display momentarily shows the message:

Reset ALL connections

!!!!

To switch one input to all the outputs (in the CONFIRM mode (the TAKE LED is lit)):

1. Repeat step 1 above.
2. Press the OFF button¹.

The TAKE LED blinks and the MATRIX Display shows the message:

Reset ALL ?

Press TAKE to execute

3. Press the TAKE button to confirm.

All the outputs are cleared and the TAKE LED lights.

7.2.4 Storing and Recalling Setups

You can store up to 99 settings in the non-volatile memory with the ability to recall each of those settings.

¹ You can press the OFF button first, and then the ALL button (the order is irrelevant)

7.2.4.1 Storing Setups

To store a setting, do the following:

1. Press the *STO* button.
The Displays show the messages:

Enter SETUP number	Store
use two digit # 01-99	# xy

Where xy are the OUT buttons.

2. Press two OUT buttons, using the OUTkeys # 1 to 9, and 10 (for 0).
The OUTkeys function on a decimal-basis, and not on a positional-basis.
For example, to enter the # 14, press # 1 followed by # 4 (not # 14). To enter the # 3, press # 3 followed by the *TAKE* button¹.
The *TAKE* LED blinks and the Displays show the messages:

STORE this SETUP ?	Store
YES -> TAKE	# xy

3. Press the *TAKE* button.
The memory stores the setup and the *MATRIX* Display shows the message:

Setup # xy stored

Note, saving a setup to an already allocated setup #, prompts the message in the *MATRIX* Display:

Setup already exists
Press TAKE to overwrite

Pressing the *TAKE* button replaces the stored setup with the current setup. Alternatively, press a different OUT button to change the setup #.

7.2.4.2 Recalling Setups

To recall a setting, do the following:

1. Press the *RCL* button.
The Displays show the messages:

Enter SETUP number	RECALL
use two digit # 01-99	# xy

where xy are the OUT buttons.

2. Press the appropriate two OUT buttons, using the OUTkeys # 1 to 9, and 10 (for 0). The OUTkeys function on a decimal-basis, and not on a positional-

¹ Alternatively, pressing # 10 followed by # 3 will also enter the # 3

basis. For example, to enter the # 14, press # 1 followed by # 4 (not # 14). To enter the # 3, press # 3 followed by the TAKE button¹. The memory recalls the setup. The MATRIX Display shows the blinking setup and the TAKE LED blinks. The STATUS Display shows the message:

**SETUP # xy
Load ?**

Where xy are the OUT buttons.

3. Preview the setup to decide whether to implement it. If not, you can scan the other setups, by pressing different OUT buttons. To stop previewing the setups, press a non-relevant button, for example, an IN button.
4. Press the TAKE button.
The specific setup is implemented.

If trying to recall an empty setup², the MATRIX Display would show a message saying that that particular setup is empty and would return you to step 1 above.

8 Using the MENU Command Sequence

You can press the MENU button up to 11 times in straight sequence to scan the range of commands.

¹ Alternatively, pressing # 10 followed by # 3 will also enter the # 3

² That is, a setup # for which no setup is actually stored

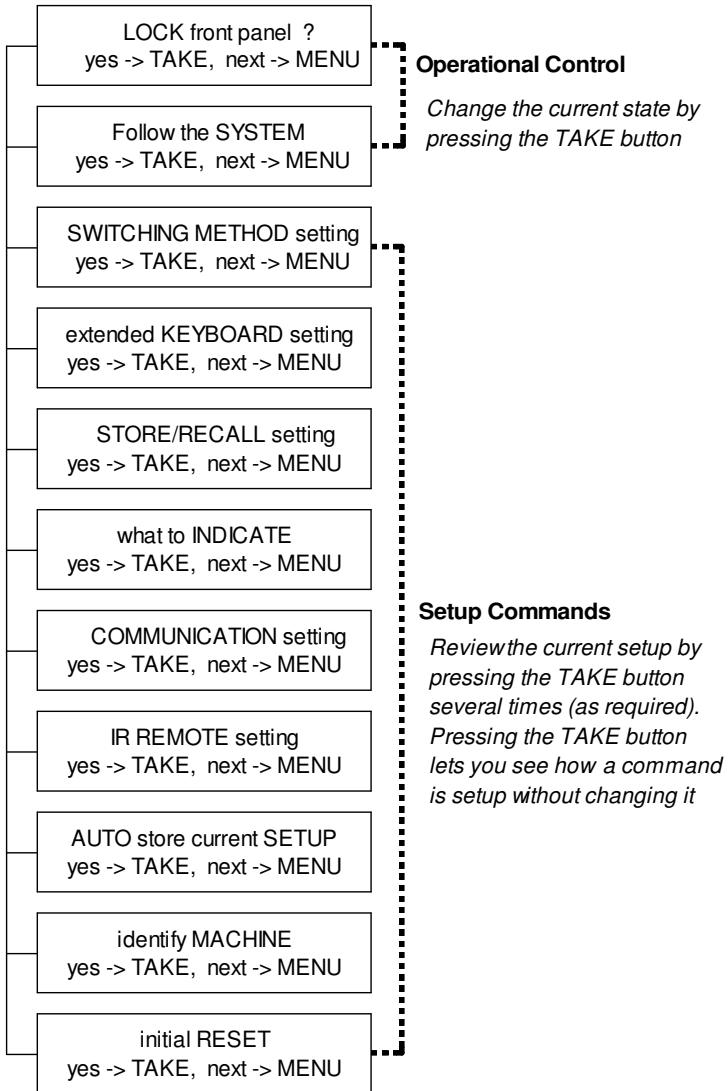


Figure 13: Sequence of MENU Commands

You can stop changing a setup at any time by pressing any IN button.

8.1 Locking and Unlocking the Front Panel

To prevent changing the settings accidentally or tampering with the unit via the front panel buttons, lock¹ your **VS-1616SDI**. Unlocking releases the protection mechanism.

- To lock the **VS-1616SDI**:

1. Press the MENU button once.

The MATRIX Display shows the message:

LOCK front panel ?
yes -> TAKE, next -> MENU

2. Press the *TAKE* button.

The front panel locks and the Displays momentarily show the messages:

Front panel LOCKED **Keyboard LOCKED³**
to unlock- press MENU²

Pressing a front panel button has no effect⁴ but remote RS-232 and RS-485 commands function and show on the MATRIX Display.

- To unlock the **VS-1616SDI**:

Either:

1. Press the MENU button.

The MATRIX Display shows the message:

to UNLOCK front panel
press TAKE

The *TAKE* LED blinks.

2. Press the *TAKE* button.

The front panel unlocks⁵ and the MATRIX Display momentarily² shows the message:

Front panel
UNLOCKED

Or:

1 Nevertheless, even though the front panel is locked you can still operate via RS-232 or RS-485 serial (remote controller or PC)

2 After a few seconds, the status of the unit replaces this message

3 This message appears continuously in the STATUS Display, until the front panel is unlocked

4 IR and Keyboard Extension (EXT. KEYS) commands are also blocked

5 Switching the power off and on again also unlocks the front panel

1. Press the *TAKE* button twice.
The front panel unlocks and the same messages show as in steps 1 and 2 above.

8.2 Choosing the System Modes

The terms *audio-follow-video*¹ and *audio breakaway*² are well known. Sometimes signals other than audio signals need to switch simultaneously and at other times, need to switch independently. For example:

- Non-linear editing systems, that sometimes combine video with analog audio and at other times combine video with digital audio
- Duplication systems, that make Master tapes from programs with different formats: composite analog, component analog and component digital

When the **VS-1616SDI** functions in the:

- *Follow-SYSTEM* mode, the **VS-1616SDI** switches with other 16x16 matrix switchers³, implementing the same action simultaneously
- *Breakaway-from-SYSTEM* mode, the **VS-1616SDI**⁴ functions independently, implementing an action independently of the others

The **VS-1616SDI** unit will function⁵ in the *Follow-SYSTEM* mode if at least one other **VS-1616SDI** unit⁶ is set to the *Follow-SYSTEM* mode and these units interconnect via an RS-232 and/or RS-485 communication line.

To set the **VS-1616SDI** unit to function in the *Follow-SYSTEM* mode:

1. Press the MENU button twice.
The MATRIX Display shows the message:

Follow the SYSTEM
yes -> TAKE, next -> MENU

1 Video and the audio channels switch simultaneously in the same way

2 Audio channels switch independently from the video channels

3 16x16 matrix switchers in the same series, that include, for example, the VS-1616V (a 16x16 analog video matrix switcher), the VS-1616A (16x16 balanced stereo audio matrix switcher), the VS-1616AD (16x16 digital audio matrix switcher units), the VS-162V (a 16x16 video matrix switcher), and the VS-162AV (a 16x16 audio-video matrix switcher) units

4 Also applies to a VS-1616A unit or a VS-1616AD unit

5 The VS-1616SDI unit changes its status immediately and goes to the Follow-system mode

6 Or VS-1616A or VS-1616AD unit (as well as other 16x16 matrix switchers in the same series)

8.3.1 Understanding the SWITCHING METHOD Settings

Setting the **VS-1616SDI** unit as a Stand-Alone UNIT provides a choice of 4 SWITCHING METHOD settings:

- **NoVIS** - switching occurs immediately after completion of front panel or dry-contact operation or immediately after receiving an RS-232 or RS-485 command, or an IR command. The switching is independent of the vertical reference
- **EXTERNAL SYNC ANALOG** - switching occurs during the vertical interval of the video reference signal connected to the ANALOG connector (this signal should be properly terminated via the 75Ω (Term) button¹)
- **EXTERNAL SYNC DIGITAL** - switching occurs during the vertical interval of the video reference signal connected to the DIGITAL connector
- **INT# 1 DIGITAL** - switching occurs during the vertical interval of the video signal connected to Input # 1

Before choosing the **EXTERNAL SYNC DIGITAL** or the **INT# 1 DIGITAL SWITCHING METHOD** setting, it is necessary to install a digital Genlock input board². Without installing the optional digital Genlock input board, these SWITCHING METHOD setting commands will be unavailable.

Setting the **VS-1616SDI** unit as a Large Matrix (instead of as a Stand-Alone UNIT) provides a choice of 5 SWITCHING METHOD settings:

- **NoVIS, EXTERNAL SYNC ANALOG, EXTERNAL SYNC DIGITAL, INT# 1 DIGITAL**, (as described above)
- **MTX (SYNC from Matrix)** - the vertical interval of the video reference (selected on one unit in the Large Matrix system) is present on the “SYNC” RS-485 terminal block connector³. This reference signal applies to all switchers in the multi-switcher system and facilitates switching all **VS-1616SDI** units simultaneously

To choose the **MTX (SYNC from Matrix)** setting⁴ as the example in Figure 14 illustrates:

1 Item 4 in Figure 2

2 Available for purchase as an optional extra

3 Item 6 in Figure 2

4 This sets the matrix sync configuration from another (Master) machine

8.5 Setting the STORE/RECALL KEYBOARD Mode

Choose one of these STORE/RECALL KEYBOARD modes:

- At ONCE mode in which setups are stored/recalled immediately without the need for user confirmation
- CONFIRM mode in which storing/recalling setups require user confirmation. The CONFIRM mode is the default¹ for storing/recalling setups and is recommended to prevent erroneously storing/recalling of setups

To set the STORE/RECALL KEYBOARD mode to the AT ONCE mode, instead of the CONFIRM (default) mode, do the following:

1. Press the MENU button until reaching the STORE/RECALL setting. The MATRIX Display shows the message:

STORE/RECALL setting
yes -> TAKE, next -> MENU

2. Press the TAKE button and choose the appropriate Outkey 1 for the AT ONCE mode (Outkey 2 is for the CONFIRM mode). The Displays show the messages:

STO/RCL mode
changed

current:
At once

8.6 Choosing What to INDICATE

Choose what is displayed during regular operation: between scrolling the switcher setup as Figure 15 illustrates, and showing the IN/OUT range².

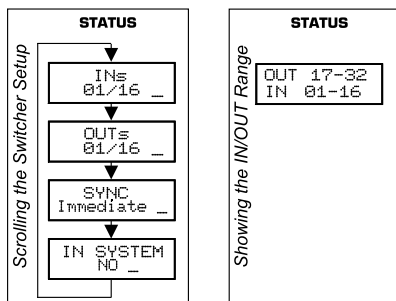


Figure 15: Choosing what to INDICATE

¹ The AT ONCE mode is the default for all actions except storing/recalling setups

² Useful in an expanded matrix configuration

To scroll the switcher setup (instead of showing the IN/OUT range), do the following:

1. Press the MENU button until you reach the “What to INDICATE” command.

The MATRIX Display shows the message:

what to INDICATE
yes -> TAKE, next -> MENU

2. Press the *TAKE* button.
The Displays show the messages:

Use OUTkey to configure **Current:**
1: scroll SETUP 2: OUTs/INs **OUTs/INs**

3. Press the *OUT* button *1*.
The TAKE LED blinks and the Displays show the messages:

Scroll switcher setup? **Current:**
Press TAKE to execute **OUTs/INs**

4. Press the *TAKE* button.
The Displays show the messages:

display mode **Current:**
changed **SETUP**

8.7 Choosing the COMMUNICATION Setting

Choose the response option (reply or no reply).

To choose the No Reply response option, for example, do the following:

1. Press the MENU button until you reach the COMMUNICATION setting.
The MATRIX Display shows the message:

COMMUNICATION setting
yes -> TAKE, next -> MENU

2. Press the *TAKE* button.
The MATRIX Display shows the message:

Use OUTkey to configure
1: REPLY 2: No Reply

3. Press the *OUT* button *2*.
The TAKE LED blinks and the Displays show the messages:

Set serial port No reply **Current:**
Press TAKE to execute **Reply**

4. Press the *TAKE* button again.
The Displays show the messages:

**Switcher response
changed**

**Current:
No reply**

8.8 Setting the IR REMOTE Control

Set the IR REMOTE control to enable remote control of the **VS-1616SDI 16x16 Video Matrix Switcher**, using the **Kramer RC-IR2 Infra-Red Remote Control Device**¹. Refer to the **RC-IR2 Infra-Red Remote Control Device user manual**², for full details. Table 6 and Table 7 summarize the setup and operational commands.

Table 6: Summary of Basic RC-IR2 Setups

To execute this command:	Press the following keys in this sequence:
Allocate the VS-1616SDI to Group 12	SHIFT + GROUP + 12
Set the MACHINE #	UNIT + # key ³ (according to the VS-1616SDI dipswitch settings)

To enable IR REMOTE control (when set OFF), do the following:

1. Press the MENU button until reaching the IR REMOTE setting.
The MATRIX Display shows the message:

IR REMOTE setting
yes -> TAKE, next -> MENU

2. Press the TAKE button.
The Displays show the messages:

Outkey 1: InfraredREMOTE OFF **current:
remote OFF**
2: InfraredREMOTE ON

3. Press the OUT button 2.
The TAKE LED blinks and the Displays show the messages:

Turn ON infrared REMOTE ? **Current:
remote OFF**
Press TAKE to execute

4. Press the TAKE button again.
The Displays show the messages:

Infrared REMOTE mode **Current:
remote ON**
changed

¹ After enabling the IR REMOTE control command, remotely control the VS-1616SDI via the IR-1 remote control transmitter pointed at the remote receiver on the VS-1616SDI's front panel (item 1 in Figure 2)

² Download up-to-date Kramer user manuals from our Web site at <http://www.kramerelectronics.com>

³ For example, press UNIT + # 1 if the VS-1616SDI is set as MACHINE # 1

Table 7: Summary of Basic RC-IR2 Operations

To execute this command:	Press the following keys in this sequence:
Switch an Input to an Output	# key (for the output) + # key (for the input) ¹
Store/Recall a setup	SHIFT + STO/RCL + # key (for the setup)

8.9 Choosing the AUTO STORE Current SETUP

Choose whether or not to save the current setup automatically, that is, whether to save the machine's status on power down, so that it returns to the same status after cycling power.

To save the current setup automatically (when set OFF), do the following:

1. Press the MENU button until you reach the AUTO Store Current SETUP command.

The MATRIX Display shows the message:

AUTO store current SETUP
yes -> TAKE, next -> MENU

2. Press the TAKE button.

The Displays show the messages:

OUTkey 1: no AutoSave	current:
2: AutoSave CURRENT setup	NO save

3. Press the OUT button 2.

The TAKE LED blinks and the Displays show the messages:

Auto store CURRENT setup ?	Current:
Press TAKE to execute	NO save

4. Press the TAKE button again.

The Displays show the messages:

AUTOSAVE mode	Current:
changed	AutoSave

8.10 Identifying the MACHINE

Display essential information (the product name and version number) to identify your machine, for example, for technical support purposes.

To identify your machine, do the following:

¹ For example, press # 6 followed by # 2 to switch input 2 to output 6

1. Press the MENU button until you reach the Identifying the MACHINE command.

The MATRIX Display shows the message:

identify MACHINE
yes -> TAKE, next -> MENU

2. Press the TAKE button.

The MATRIX Display (as Figure 16 illustrates) shows the message:

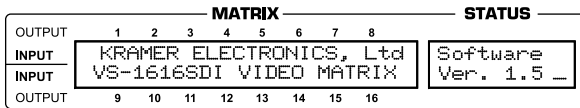


Figure 16: Machine Identification

8.11 Choosing the Initial RESET

Choose to reset the machine¹ to the:

- Current status² (reloads the current setup)
- Factory default (resets to the pre-installed factory default state³)

To reset the machine, do the following:

1. Press the MENU button until you reach the initial RESET command.

The MATRIX Display shows the message:

initial RESET
yes -> TAKE, next -> MENU

2. Press the TAKE button.

The MATRIX Display shows the message:

Outkey 1: Current status
2: Factory default

3. Press the OUT button 2, for example, to reset to the factory default.

The TAKE LED blinks and the Displays show the messages:

Reset to factory default
Press TAKE to execute

WARNING
!!!!

¹ Without having to switch the power off and on

² Sometimes called a "soft reset"

³ Each VS-1616SDI unit ships in its factory default state that is a 16x16 SDI video matrix, with all setups empty and each input connected to its corresponding output (for example, 1-to-1)

4. Press the *TAKE* button again.

The Displays show the messages:

**Reset to factory default
confirm by pressing OUT # 7**

WARNING !!!!!

5. Press the *OUT* # 7.

The machine resets to the factory default and the Displays show the first messages of the reloading progress (as Figure 16 illustrates).

9 Upgrading Flash Memory

The main part of the **VS-1616SDI** firmware is located in FLASH¹ memory, which lets you upgrade to the latest Kramer firmware version in minutes!

Download the up-to-date file from the Internet or obtain it from your dealer. The following example shows how to install a file named (for example) “1616-15.hex” to the FLASH memory².

The current **VS-1616SDI** software version shows in the *STATUS* display as Figure 12 illustrates in section 7.1.

9.1 Connecting the PC to the RS-232 Port

Before installing the latest Kramer firmware version on a **VS-1616SDI** unit, connect:

- The COM port on your PC to the RS-232 IN port on the **VS-1616SDI** unit

When upgrading the firmware on several **VS-1616SDI** units at once:

- Connect the COM port on your PC to the RS-232 IN port on the first **VS-1616SDI** unit
- Connect the RS-232 OUT port on the first **VS-1616SDI** unit to the RS-232 IN port on the second **VS-1616SDI** unit or another 16x16 unit
- Connect All 16x16 units that you want to upgrade, in this way, linking them in a daisy chain connection
- Set DIP 7 according to whether or not a Null-modem connection is being used³

1 Electrically programmable and erasable

2 The number “15” in the file name indicates the version number “1.5”. Be sure you receive the latest version, and that it is a “.hex” file

3 Refer to section 6.3 for full details

9.2 Upgrading the Firmware

1. Install and run the *K-Sender* program on your PC.
2. Open the *K-Sender* program.
The File COM Port Sender window opens.
3. Choose the appropriate COM port.
Be sure that “9600 Baud rate” is chosen.
Click the *File* button.
4. Locate the file “1616-15.hex” and click the *Open* button.
The filename appears in the lower part of the window (in bold script).
5. Press and **hold** the *TAKE* button while simultaneously turning on the *POWER* switch on the **VS-1616SDI**.
After a few seconds, following the initial machine identification message, the MATRIX Display shows the following message:

**Please,
release key TAKE**

6. Release the *TAKE* button.
The TAKE LED blinks and the MATRIX Display shows the following message:

**Update program?
Please confirm < TAKE >**

7. Press the *TAKE* button.
The MATRIX Display shows the following message:

**YOU will lose current SETUP¹
Confirm < TAKE >**

8. Press the *TAKE* button again.
The MATRIX Display shows the following message:

**Are you ABSOLUTELY sure?
Press TAKE to execute**

At this stage, and at any time previously, you can cancel the operation by pressing any button, other than the TAKE button.

9. Press the *TAKE* button once again.
The program starts working and the TAKE LED turns off.
The MATRIX Display shows the following message:

**ERASE flash MEMORY
Please, wait...**

¹ Upgrading firmware resets your VS-1616SDI unit to the factory default. This includes erasing all setups

10 Technical Specifications

Table 8 includes the technical specifications:

Table 8: Technical Specifications of the VS-1616SDI Video Matrix Switcher

Inputs:	16 SMPTE-259M Serial Video, 75 Ω on BNC connectors
Outputs:	16 reclocked SMPTE-259M Serial Video, 75 Ω on BNC connectors
Reference Input:	Analog loop through on BNC connectors, 75 Ω /Hi-Z, switchable SMPTE-259M serial video (option)
Switching:	Vertical interval
Resolution:	8 or 10-bits, automatic
Standards:	143Mb/s (4fsc NTSC) 177Mb/s (4fsc PAL) 270Mb/s (4:2:2 Component) 360Mb/s (4:2:2 Widescreen)
Equalization:	Automatic up to 300m, (Belden 8281 cable, 270Mb/s)
Jitter:	<300ps at 270Mb/s, 10Hz
Overshoot:	<5%
Output Level:	800mV, +/- 5%
Control:	38 selector switches; RS-232, RS-485, IR remote, dry keyboard extension
Dimensions:	19-inch (W), 7-inch (D) 2U (H) rack-mountable
Power Source:	230 VAC, 50/60 Hz, (115VAC, U.S.A.) 10VA
Weight:	3.5 kg (7.8 lbs.) approx
Accessories:	Power cord, Null modem adapter, Windows®-based Kramer control software

11 Hex Codes

Table 9 includes the Protocol 2000¹ hexadecimal codes². The communication parameters are: 9600 baud, with no parity, 8 data bits and 1 stop bit.

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

² This example assumes MACHINE # 1, and node 0



Hex Codes

Table 9: Hex Table for the VS-1616SDI Video Matrix Switcher

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

12 ASCII Protocol: General

The ASCII protocol has three basic commands: **Y** for connect, **T** for recall, **P** for store.

Before using the ASCII protocol, you need to select it from the machine's front panel:

1. Press the MENU button until you get to "set communication protocol".
2. Choose the ASCII protocol.
This is saved in the non-volatile memory, so the machine remains in ASCII even after turning OFF and ON.
3. To check that the protocol has been selected, and to confirm that the communication is OK, send the string ****!!** to the VS-1616SDI.
It should reply by sending the string **OK!!**

13 ASCII Protocol: Description

The three basic commands are **Y**, **T**, and **P**.

"Y" command: MAKE A CROSSPOINT CONNECTION.

Format:

**** Y o#, i# !!**

where **i#** is the input number, and **o#** is the output number.

Note: The string does not need a space (spaces are used here just to add clarity to the explanation).

Example:

****Y3,4!!** connects input 4 to output 3.

****Y9,6!!** connects input 6 to output 9.

****Y2,17,Y43,12,Y7,6!!** connects input 17 to output 2, input 12 to output 43, and input 6 to output 7.

The buffer allows up to 63 characters. Thus, a single string can include about 10 cross-point connections.

Also:

****Y0,5!!** connects input 5 to all outputs.

****Y3,0!!** disconnects output 3.

“T” command: RECALL A SETUP.

Format:

**** T s# !!**

where s# is the setup number (1 to 99) to recall.

Example:

**T13!! recalls setup number 13.

“P” command: STORE A SETUP.

Format:

**** P s# !!**

where s# is the setup number (up to 99) that stores the present status of the machine.

Example:

**P13!! stores in setup number 13

The reply for all commands is:

OK!! or ERROR!!

LIMITED WARRANTY

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

HOW LONG IS THE WARRANTY

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

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

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

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

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

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

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

HOW YOU CAN GET WARRANTY SERVICE

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

LIMITATION OF IMPLIED WARRANTIES

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

EXCLUSION OF DAMAGES

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

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

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

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

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

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

CAUTION!

- ☒ Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- ☒ Use the supplied DC power supply to feed power to the machine.
- ☒ Please use recommended interconnection cables to connect the machine to other components.



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



Caution

Safety Warning:

Disconnect the unit from the power supply before opening/servicing.



Kramer Electronics, Ltd.

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P/N: 2900-002063 REV 2

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