Kramer Electronics, Ltd.

USER MANUAL

Model:

VS-401YC

4x1 s-Video / Audio Switcher - DA

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1 Introduction

Welcome to Kramer Electronics (since 1981): a world of unique, creative and affordable solutions to the infinite 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 8 Groups[1], which are clearly defined by function.

Congratulations on purchasing your Kramer **VS-401YC** *4x1 s-Video / Audio Switcher - DA*, which is ideal for the following applications:

- Video duplication studios
- Broadcasting, production, or presentation systems requiring high quality signal distribution
- Schools, retail outlets, sports bars, or other point-of-sale and CCTV

The package includes the following items:

- **VS-401YC** *4x1 s-Video / Audio Switcher - DA*
- Power adapter (12V DC Input)
- This user manual[2]

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 cables[3]

2.1 Quick Start

This quick start chart summarizes the basic setup and operation steps.

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

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

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

Step 1: Mount the machine

Mount the machine in a rack using a Kramer rack-adapter or stick the 4 rubber feet to the underside

Step 2: Connect the inputs and outputs - see section 5

Audio connections are not shown

s-Video Player

s-Video Camera

DVD Player

Set Top Box Source

s-Video Recorder

s-Video Display
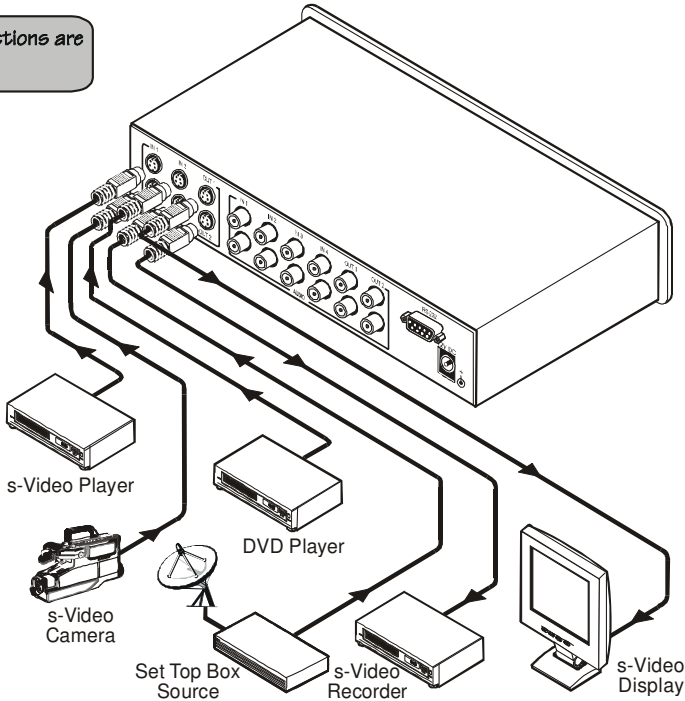
Step 3: Turn the power ON

Step 4: Operate the unit

Press an INPUT SELECT button to route that input to the outputs.

Press a selected button a second time to disconnect the input from the outputs.

Operate via the front panel buttons and RS-232

3 Overview

The **VS-401YC** is a 4x1 switcher and distribution amplifier for s-Video and stereo audio signals, that lets you switch and distribute any of the four inputs to two identical outputs.

In particular, the **VS-401YC**:

- Features video input and output signals on 4p connectors and audio input and output signals on RCA connectors
- Has four selector buttons for selecting the input to switch to the two identical outputs
- Lets you disconnect the input[1] from the outputs by pressing a selected button a second time

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-401YC** away from moisture, excessive sunlight and dust

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Caution – No operator-serviceable parts inside unit.

Warning – Use only the Kramer Electronics input power wall adapter that is provided with this unit[2].

Warning – Disconnect power and unplug unit from wall before installing or removing device or servicing unit.

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1 Except for the sync signal on input 1, resulting in a black screen display

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

4 Your VS-401YC 4x1 s-Video / Audio Switcher - DA

Figure 1 and Table 1 define the **VS-401YC**:
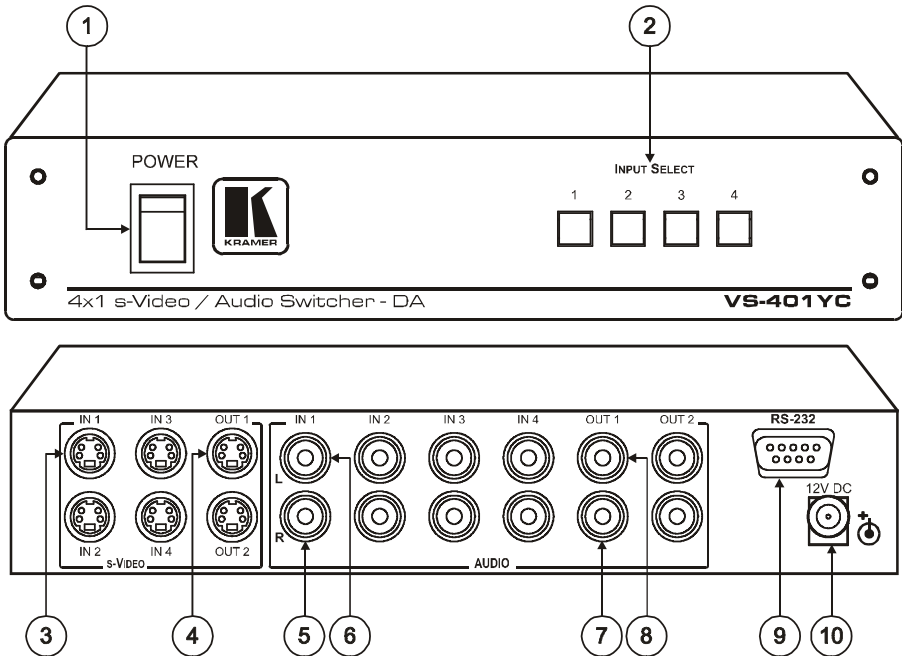
Figure 1: VS-401YC 4x1 s-Video / Audio Switcher - DA

Table 1: Features and Functions of the VS-401YC 4x1 s-Video / Audio Switcher - DA

#	Feature		Function
1	*POWER* Switch		Illuminated switch for turning the unit ON or OFF
2	*INPUT SELECT* Buttons		Press to select the input to switch to the output
3	*s-VIDEO IN* 4p Connectors		Connect to the s-Video sources (from 1 to 4)
4	*s-VIDEO OUT* 4p Connectors		Connect to the s-Video acceptors (OUT 1 and OUT 2)
5	*AUDIO IN*	*R* RCA connector	Connect to the right audio sources (from 1 to 4)
6		*L* RCA Connector	Connect to the left audio source (from 1 to 4)
7	*AUDIO OUT*	*R* RCA Connectors	Connect to the right audio acceptor (OUT 1 and OUT 2)
8		*L* RCA Connectors	Connect to the left audio acceptor (OUT 1 and OUT 2)
9	*RS-232* DB 9F Port		Connects to the PC or the Remote Controller[1]
10	*12VDC*		+12V DC connector for powering the unit

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1 Via a null-modem connection

Figure 2 and Table 2 define the underside of the **VS-401YC**:
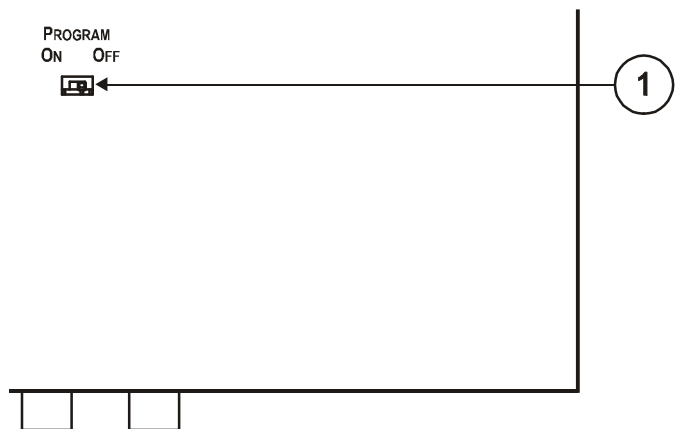
Figure 2: VS-401YC 4x1 s-Video / Audio Switcher - DA Underside view

Table 2: VS-401YC 4x1 s-Video / Audio Switcher - DA Underside Features

#	Feature	Function
1	*PROGRAM* ON / OFF Switch	Select OFF for normal operation (the factory default), and ON to upgrade to the latest Kramer firmware (see section 6)

5 Connecting the VS-401YC 4x1 s-Video / Audio Switcher - DA

To connect[1] the **VS-401YC** *4x1 s-Video / Audio Switcher - DA*, as the example in Figure 3 illustrates, do the following:

1. Connect up to[2] four s-Video sources to the s-VIDEO IN 4p connectors:
   - An s-Video player to IN 1
   - An s-Video camera to IN 2
   - A DVD player to IN 3
   - A set top box source to IN 4

2. Connect[3] the respective[2] audio sources to the L (left) and R (right) AUDIO IN RCA connectors (from IN 1 to IN 4).

3. Connect the s-VIDEO OUT 4p connectors[4]:
   - OUT 1 to an s-Video display
   - OUT 2 to an s-Video recorder

4. Connect the respective L (left) and R (right) AUDIO OUT RCA connectors to the appropriate audio inputs on the s-Video acceptors[3].

5. Connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity.

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1 Switch OFF the power on each device before connecting it to your VS-401YC. After connecting your VS-401YC, switch on its power and then switch on the power on each device

2 You do not have to connect all the inputs

3 Not shown in Figure 3

4 You do not have to connect all the outputs

KRAMER: SIMPLE CREATIVE TECHNOLOGY

Audio Connections
are not Shown

s-Video Player

s-Video
Camera

DVD Player

Set Top Box
Source

s-Video
Recorder
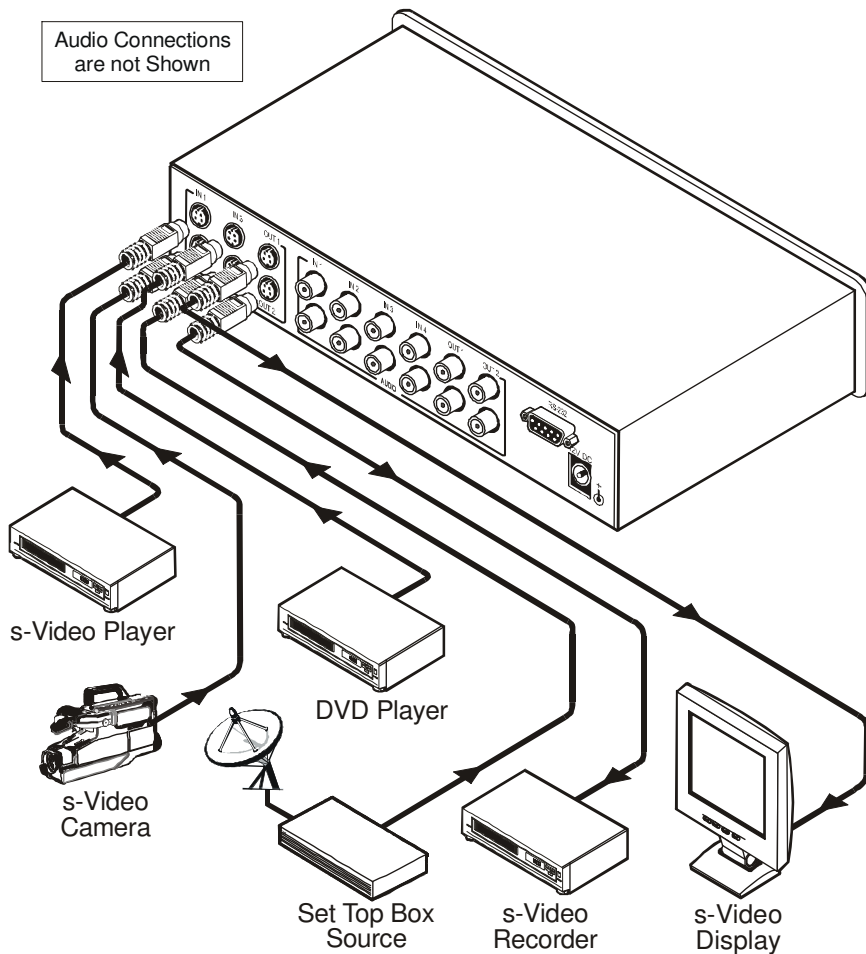
s-Video
Display

Figure 3: Connecting the VS-401YC 4x1 s-Video / Audio Switcher - DA

5.1 Connecting a PC

You can connect a PC (or other controller) to the **VS-401YC** via the RS-232 port.

To connect using the Null-modem adapter provided with the machine (recommended method):

- Connect the RS-232 DB9 rear panel port on the **VS-401YC** to the Null-modem adapter and connect the Null-modem adapter with a 9-wire flat cable to the RS-232 DB9 port on your PC

To connect without using a Null-modem adapter:

- Connect the RS-232 DB9 port on your PC to the RS-232 DB9 rear panel port on the **VS-401YC**, as Figure 4 illustrates
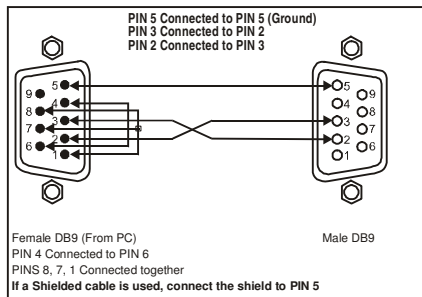
Figure 4: Connecting a PC without using a Null-modem Adapter

6 Flash Memory Upgrade

The **VS-401YC** firmware is located in FLASH memory, which lets you upgrade to the latest Kramer firmware version in minutes! The process involves:

- Downloading from the Internet (see section 6.1)
- Connecting the PC to the RS-232 port (see section 6.2)
- Upgrading Firmware (see section 6.3)

6.1 Downloading from the Internet

You can download the up-to-date file[1] from the Internet. To do so:

1. Go to our Web site at http://www.kramerelectronics.com and download the file: "*FLIP_VS401YC.zip*" from the Technical Support section.

2. Extract the file: "*FLIP_VS401YC.zip*" to a folder (for example, C:\Program Files\Kramer Flash).

3. Create a shortcut on your desktop to the file: "*FLIP.EXE*".

6.2 Connecting the PC to the RS-232 Port

Before installing the latest Kramer firmware version on a **VS-401YC** unit, do the following:

1. Connect the RS-232 DB9 rear panel port on the **VS-401YC** unit to the Null-modem adapter and connect the Null-modem adapter with a 9-wire flat cable to the RS-232 DB9 COM port on your PC (see section 5.1).

2. On the underside panel, switch to PROGRAM ON.

3. Connect the power on the **VS-401YC** unit.

6.3 Upgrading Firmware

Follow these steps to upgrade the firmware:

1. Double click the desktop icon: "*Shortcut to FLIP.EXE*".
   The Splash screen appears as follows:

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1 The files indicated in this section are given as an example only. These file names are liable to change from time to time
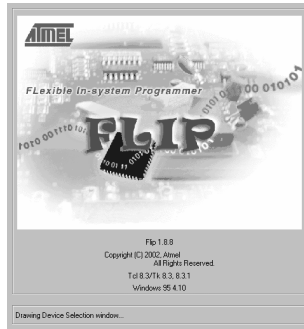
Figure 5: Splash Screen

2. After a few seconds, the Splash screen is replaced by the "*Atmel – Flip*" window:

Figure 6: Atmel – Flip Window

3. Press the keyboard shortcut key *F2* (or select the "*Select*" command from the *Device* menu, or press the integrated circuit icon in the upper right corner of the window).
The "*Device Selection*" window appears:

Figure 7: Device Selection Window

4. Click the button next to the name of the device and select from the list: AT89C51RD2:
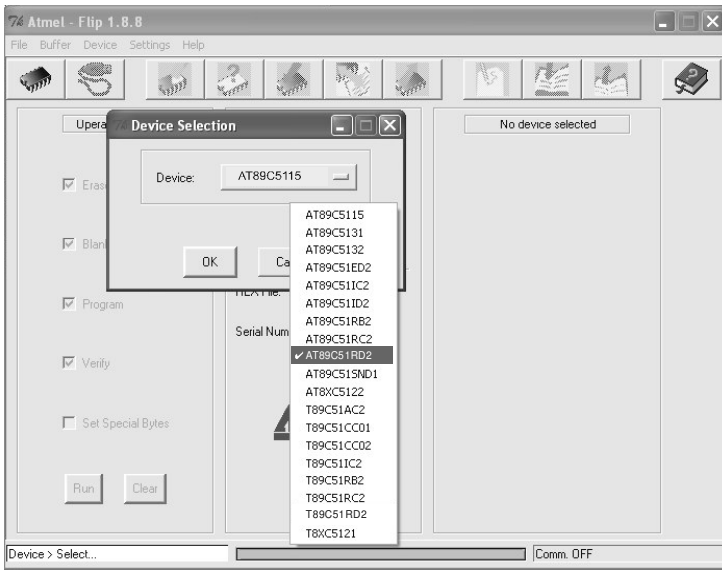
Figure 8: Selecting the Device from the Selection Window

5. Click OK and select "*Load Hex*" from the *File* menu.
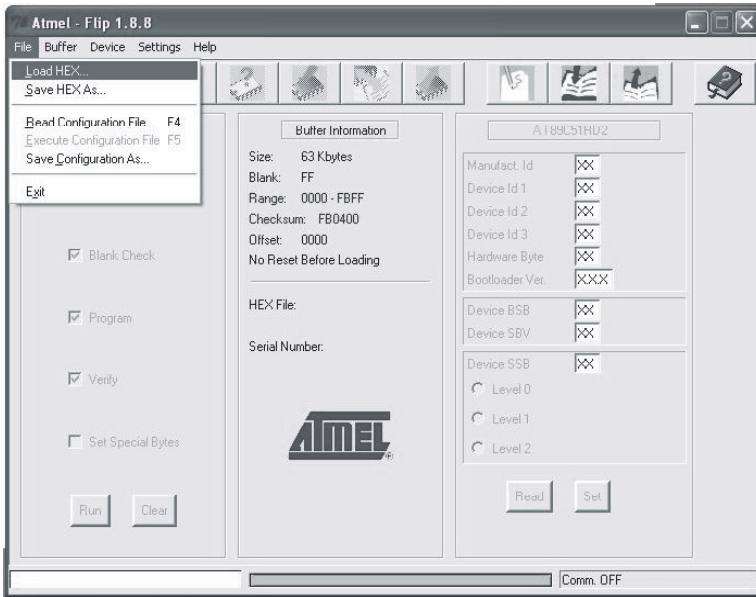
Figure 9: Loading the Hex

6. The Open File window opens. Select the correct HEX file that contains the updated version of the firmware for **VS-401YC** (for example, ***401YCM_V1p2.hex***) and click Open.

7. Press the keyboard shortcut key *F3* (or select the "*Communication / RS232*" command from the *Settings* menu, or press the keys: *Alt SCR*).
   The "*RS232*" window appears. Change the COM port according to the configuration of your computer and select the 9600 baud rate:
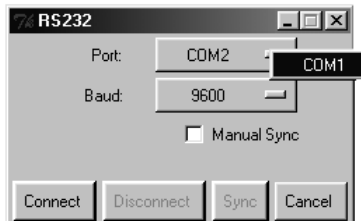
Figure 10: RS-232 Window

8. Click Connect.
   In the "*Atmel – Flip*" window, in the *Operations Flow* column, the *Run* button is active, and the name of the chip appears as the name of the third column: *AT89C51RD2*.

Verify that in the *Buffer Information* column, the "*HEX File: VS401YC.hex*" appears.
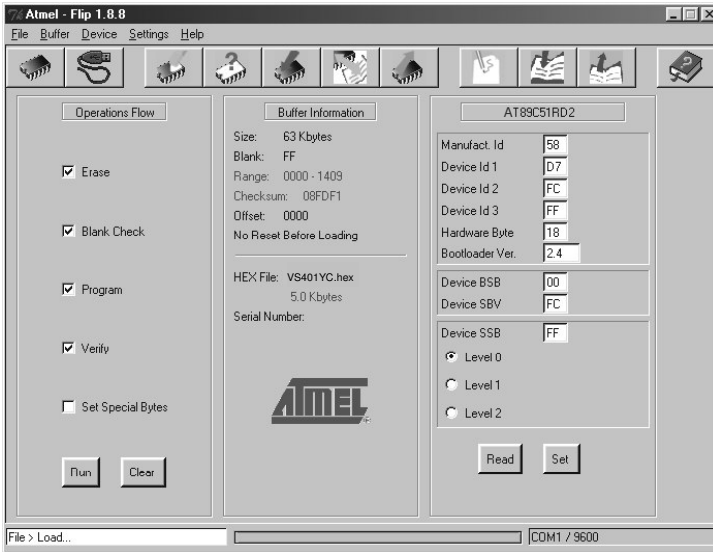
Figure 11: Atmel – Flip Window (Connected)

9. Click *Run*.
   After each stage of the operation is completed, the check-box for that stage becomes colored green[1].
   When the operation is completed, all 4 check-boxes will be colored green and the status bar message: *Memory Verify Pass* appears[2]:

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1 See also the blue progress indicator on the status bar

2 If an error message: "Not Finished" shows, click Run again
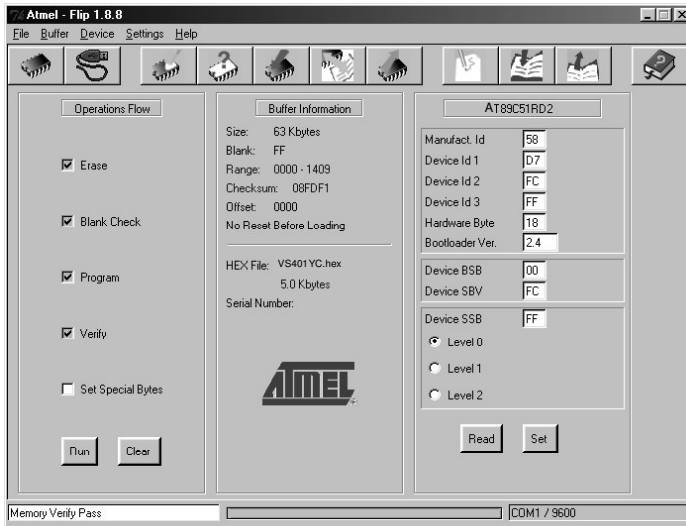
Figure 12: Atmel – Flip Window (Operation Completed)

10. Close the "*Atmel – Flip*" window.

11. Disconnect the power to the **VS-401YC**.

12. Disconnect the RS-232 rear panel port on the **VS-401YC** unit from the Null-modem adapter.

13. Switch to OFF on the machine underside.

14. Connect the power to the **VS-401YC**.

7 Technical Specifications

Table 3 includes the technical specifications.

Table 3: VS-401YC[1] 4x1 s-Video / Audio Switcher - DA Technical Specifications

INPUTS:	4 YC, 1Vpp/75Ω (Y), 0.3Vpp/75Ω (C) on 4p connectors 4 stereo, 1Vpp/50kΩ on RCA connectors	
OUTPUTS:	2 YC 1Vpp/75Ω (Y), 0.3Vpp/75Ω (C) on 4p connectors 2 stereo, 5Vpp/150Ω on RCA connectors	
MAX. OUTPUT LEVEL:	VIDEO: 2.3Vpp	AUDIO: 7.2Vpp
BANDWIDTH (-3dB):	VIDEO: Y: 520MHz	AUDIO: >100kHz
DIFF. GAIN:	0.05%	
DIFF. PHASE:	0.03 Deg.	
K-FACTOR:	<0.05%	
S/N RATIO:	VIDEO: 73dB	AUDIO: 85dB
CROSSTALK (all hostile):	VIDEO: -56dB@5MHz	AUDIO: -74dB@1kHz
COUPLING:	VIDEO: DC	AUDIO: input: AC; output: DC
AUDIO THD + NOISE:	0.013%@1kHz	
AUDIO 2nd HARMONIC:	0.004%@1kHz	
POWER SOURCE:	12V, 120mA	
DIMENSIONS:	21.5cm x 16.3cm x 4.36cm (8.46" x 6.4" x 1.7") W, D, H	
WEIGHT:	0.64kg (1.4lbs.) approx.	
ACCESSORIES:	12 VDC power supply	
OPTIONS:	19" rack adapter RK-80, RK-80N	

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1 Specifications are subject to change without notice

8 VS-401YC Communication Protocol

The **VS-401YC** is compatible with Kramer's Protocol 2000 (version 0.46) (below). This RS-232/RS-485 communication protocol uses four bytes of information as defined below. For RS-232, a null-modem connection between the machine and controller is used. The default data rate is 9600 baud, with no parity, 8 data bits and 1 stop bit.

Table 4: Protocol Definitions

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

1st byte

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

2nd byte

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

3rd byte

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

4th byte

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

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

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

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

Table 5: Instruction Codes for Protocol 2000

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

#	INSTRUCTION DESCRIPTION	DEFINITION FOR SPECIFIC INSTRUCTION INPUT	OUTPUT	NOTE
0	RESET VIDEO	0	0	1
1	SWITCH VIDEO	Set equal to video input which is to be switched (0 = disconnect)	Set equal to video output which is to be switched (0 = to all the outputs)	2, 15
2	SWITCH AUDIO	Set equal to audio input which is to be switched (0 = disconnect)	Set equal to audio output which is to be switched (0 = to all the outputs)	2
3	STORE VIDEO STATUS	Set as SETUP #	0 - to store 1 - to delete	2, 3, 15
4	RECALL VIDEO STATUS	Set as SETUP #	0	2, 3, 15
5	REQUEST STATUS OF A VIDEO OUTPUT	Set as SETUP #	Equal to output number whose status is reqd	4, 3
6	REQUEST STATUS OF AN AUDIO OUTPUT	Set as SETUP #	Equal to output number whose status is reqd	4, 3
7	VIS SOURCE	Set as input # when OUTPUT byte = 6; OR set as output # when OUTPUT byte = 7; OR set as blank period (in steps of 25ms) when OUTPUT byte = 32; OR set = 0. *****	0 - No VIS (immediate) 1 - Input # 1 2 - External digital sync 3 - External analog sync 4 - Dynamic sync 5 - Inter-machine sync 6 - Input # (INPUT byte) 7 - Output #(INPUT byte) 8 - User-defined sync 32 - RGBHV seamless switching 64 - Set for delayed switch 65 - Execute delayed switch 66 - Cancel delayed switch setting	2, 5, 17, 18
8	BREAKAWAY SETTING	0	0 - audio-follow-video 1 - audio breakaway	2
		1	0 - FOLLOW mode 1 - Normal mode	15
9	VIDEO / AUDIO TYPE SETTING	0 - for video	0 - CV 4 - SDI 1 - YC 5 - CV+YC 2 - YUV 6 - VGA scaler 3 - RGBS 7 - DVI	2
		1 - for audio	O0=0 – Unbalanced audio O0=1 – Balanced audio O1=0 – Digital audio O1=1 – Analog audio O4=0, O3=0, O2=0-Mono O4=0, O3=0,O2=1-Stereo	
		2 - for VGA and DVI	1 - 640X480 2 - 800X600 3 - 1024X768	
10	REQUEST VIS SETTING	Set as SETUP #, or set to 126 or 127 to request if machine has this function	0 - VIS source 1 - Input # or output # of source 2 - Vertical sync freq (Hz)	3, 4, 6, 7
11	REQUEST BREAKAWAY SETTING	Set as SETUP #, or set to 126 or 127 to request if machine has this function	0 - Request audio breakaway setting 1 - Request "FOLLOW" setting	3, 4, 6, 15
12	REQUEST VIDEO / AUDIO TYPE SETTING	Set as SETUP #, or set to 126 or 127 to request if machine has this function	0 - for video 1 - for audio 2 - for VGA	3, 4, 6
13	SET HIGHEST MACHINE ADDRESS	0 - for video 1 - for audio	Set equal to highest machine address	2
14	REQUEST HIGHEST MACHINE ADDRESS	0 - for video 1 - for audio	0	4
15	REQUEST WHETHER SETUP IS DEFINED / VALID INPUT IS DETECTED	SETUP # or Input #	0 - for checking if setup is defined 1 - for checking if input is valid	8

INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	DESCRIPTION	INPUT	OUTPUT	
16	ERROR / BUSY	For invalid / valid input (i.e. OUTPUT byte = 4 or OUTPUT byte = 5), this byte is set as the input #	0 - error 1 - invalid instruction 2 - out of range 3 - machine busy 4 - invalid input 5 - valid input	9, 25
17	RESERVED	- - - -	- - - -	10
18	RESET AUDIO	0	0	1
19	STORE AUDIO STATUS	Set as SETUP #	0 - to store 1 - to delete	2, 3
20	RECALL AUDIO STATUS	Set as SETUP #	0	2, 3
21	SET VIDEO PARAMETER	Equal to input / output number whose video parameter is to be set (0 = all)	Set as parameter value	2, 11, 24
22	SET AUDIO PARAMETER	Equal to input / output number whose gain is to be set (0 = all)	Set as parameter value	2, 11, 24
23	INCREASE / DECREASE VIDEO PARAMETER	Equal to input / output number whose video parameter is to be increased / decreased (0 = all)	0 - increase video gain 1 - decrease video gain 2 - increase contrast 3 - decrease contrast 4 - increase brightness 5 - decrease brightness 6 - increase colour 7 - decrease colour 8 - increase hue 9 - decrease hue 16 - increase H-phase 17 - decrease H-phase 18 - increase V-position 19 - decrease V-position	24
24	INCREASE / DECREASE AUDIO PARAMETER	Equal to input / output number whose parameter is to be increased / decreased (0 = all)	0 - increase output 1 - decrease output 2 - increase left output 3 - decrease left output 4 - increase right output 5 - decrease right output 6 - increase input 7 - decrease input 8 - increase left input 9 - decrease left input 10 - increase right input 11 - decrease right input	24
25	REQUEST AUDIO PARAMETER	Equal to input / output number whose parameter is requested	0	6, 24
26	REQUEST VIDEO PARAMETER	Equal to input / output number whose video parameter is requested	0	6, 24
30	LOCK FRONT PANEL	0 - Panel unlocked 1 - Panel locked	0	2
31	REQUEST WHETHER PANEL IS LOCKED	0	0	16
32 to 35	RESERVED	- - - -	- - - -	10
40	DIRECT MEMORY SAVE	Memory address	Data	20
42	AUDIO PARAMETER SETTINGS FOR INSTRUCTIONS 22, 24, 25	INPUT Bit: I0 - 0=input; 1=output I1 - Left I2 - Right	0 - Gain 1 - Bass 2 - Treble 3 - Midrange	24

INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	DESCRIPTION	INPUT	OUTPUT	
43	VIDEO PARAMETER SETTINGS FOR INSTRUCTIONS 21, 23, 26	1 – Input 2 – Output	0 - video gain 1 - contrast 2 - brightness 3 - colour 4 - hue 5 - H-phase 6 - V-position	24
56	CHANGE TO ASCII	0	1 - SVS protocol 2 - Generic protocol	19
57	SET AUTO-SAVE	I3 - no save I4 - auto-save	0	12, 2
58	EXECUTE LOADED DATA	Set as 0, or as SETUP #.	1-Take 2-Cancel	22, 3
59	LOAD VIDEO DATA	Set equal to video input (0 = disconnect) (127 = load SETUP #)	Set equal to video output (0 = to all the outputs) or SETUP #	22, 23
60	LOAD AUDIO DATA	Set equal to audio input (0 = disconnect) (127 = load SETUP #)	Set equal to audio output (0 = to all the outputs) or SETUP #	22, 23
61	IDENTIFY MACHINE	1 - video machine name 2 - audio machine name 3 - video software version 4 - audio software version 5 - RS422 controller name 6 - RS422 controller version 7 - remote control name 8 - remote software version 9 - Protocol 2000 revision	0 - Request first 4 digits 1 - Request first suffix 2 - Request second suffix 3 - Request third suffix 10 - Request first prefix 11 - Request second prefix 12 - Request third prefix	13
62	DEFINE MACHINE	1 - number of inputs 2 - number of outputs 3 - number of setups	1 - for video 2 - for audio 3 - for SDI 4 - for remote panel 5 - for RS-422 controller	14
63	EXTENDED DATA	7 MSBs for INPUT data	7 MSBs for OUTPUT data	20

NOTES on the above table:

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

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

01   85   88   83

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

41   81   87   83

to the PC.

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

NOTE 3 - SETUP # 0 is the present setting. SETUP # 1 and higher are the settings saved in the switcher's memory, (i.e. those used for Store and Recall).

NOTE 4 - The reply to a "REQUEST" instruction is as follows: the same instruction and INPUT codes as were sent are returned, and the OUTPUT is assigned the value of the requested parameter. The replies to instructions 10 and 11 are as per the definitions in instructions 7 and 8 respectively. For example, if the present status of machine number 5 is breakaway setting, then the reply to the HEX code

0B   80   80   85

would be HEX codes

4B   80   81   85

NOTE 5 – For the OUTPUT byte set as 6, the VIS source is the input selected using the OUTPUT byte. Similarly, for the OUTPUT byte set as 7, the VIS source is the output selected using the OUTPUT byte. Note also, that on some machines the sync source is not software selectable, but is selected using switches, jumpers, etc!

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

If the INPUT is set to 126 for these instructions, then, if possible, the machine will return the current setting of this function, even for the case that the function is not defined. For example, for a video switcher which always switches during the VIS of input #1, (and its VIS setting cannot be programmed otherwise), the reply to the HEX code

0A   FE   80   81 (ie. request VIS setting, with INPUT set as 126$_{dec}$)

would be HEX codes

4A   FE   81   81 (ie. VIS setting = 1, which is defined as VIS from input #1).

NOTE 7 – Setting OUTPUT to 0 will return the VIS source setting as defined in instruction #7. Setting to 1 will return the input # or output # of the sync source (for the case where the VIS source is set as 6 or as 7 in instruction #7). Setting to 2 returns the vertical sync frequency (0 for no input sync, 50 for PAL, 60 for NTSC, 127 for error).

NOTE 8 - The reply is as in TYPE 3 above, except that here the OUTPUT is assigned with the value 0 if the setup is not defined / no valid input is detected; or 1 if it is defined / valid input is detected.

NOTE 9 - An error code is returned to the PC if an invalid instruction code was sent to the switcher, or if a parameter associated with the instruction is out of range (e.g. trying to save to a setup greater than the highest one, or trying to switch an input or output greater than the highest one defined). This code is also returned to the PC if an RS-232 instruction is sent while the machine is being programmed via the front panel. Reception of this code by the switcher is not valid.

NOTE 10 – This code is reserved for internal use.

NOTE 11 – For machines where the video and / or audio gain is programmable.

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

NOTE 13 - This is a request to identify the switcher/s in the system. If the OUTPUT is set as 0, and the INPUT is set as 1, 2, 5 or 7, the machine will send its name. The reply is the decimal value of the INPUT and OUTPUT. For example, for a 2216, the reply to the request to send the audio machine name would be (HEX codes):

          7D   96   90   81 (i.e. 128$_{dec}$+ 22$_{dec}$ for 2nd byte, and 128$_{dec}$+ 16$_{dec}$ for 3rd byte).

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

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

If the OUTPUT is set as 1, then the ASCII coding of the lettering following the machine's name is sent. For example, for the VS-7588YC, the reply to the request to send the first suffix would be (HEX codes):

          7D   D9   C3   81 (i.e. 128$_{dec}$+ ASCII for "Y"; 128$_{dec}$+ ASCII for "C").

NOTE 14 - The number of inputs and outputs refers to the specific machine which is being addressed, *not* to the system. For example, if six 16X16 matrices are configured to make a 48X32 system (48 inputs, 32 outputs), the reply to the HEX code

3E   82   81   82 (ie. request the number of outputs)

would be HEX codes

7E   82   90   82

ie. 16 outputs

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

NOTE 16 - The reply to the "REQUEST WHETHER PANEL IS LOCKED" is as in NOTE 4 above, except that here the OUTPUT is assigned with the value 0 if the panel is unlocked, or 1 if it is locked.

NOTE 17 – For clean switching of RGBHV video, the "seamless switching" option may be used. The blanking period for the transition of the RGB sources may be set in this case, in steps of 25 milliseconds.

For example, to set for 350ms blanking time (14 steps), send HEX codes

07   8E   A0   81

NOTE 18 – Delayed execution allows switching after a delay dictated by RS-232. To do this, the user sends instruction 7 with the "Set for delayed switch" option (64$_{dec}$) before sending the switch command (instruction 1) or pressing via front panel. The switch is not executed (unless timed-out) until the "Execute delayed switch" code is sent, or the "Set for delayed switch"

code is sent again. (The mode is automatically cancelled after implementation of the switch if the "execute" command is used).

For example, to connect input 4 to output 3 after a delay, send HEX codes

07	80	C0	81	(set for delayed switch)
01	84	83	81	(switch code)

then, after the required delay, send HEX codes

07	80	C1	81	(execute delayed switch)

to implement the switch.

NOTE 19 – After this instruction is sent, the unit will respond to the ASCII command set defined by the OUTPUT byte. The ASCII command to operate with the HEX command set must be sent in order to return to working with HEX codes.

NOTE 20 – When data (ie. the INPUT and/or OUTPUT bytes) of more than 7 bits is required, this instruction is sent before sending the instruction needing the additional bits. The data in this intruction then becomes the Most Significant Bits of that next instruction. For example, to set the audio gain (instruction 22) of output 3 to 681_{dec} ($2A9_{hex}$), you would first send HEX codes

3F	80	85	81

and then send HEX codes

16	83	A9	81.

To set the audio gain of output 6 to 10013_{dec} ($271D_{hex}$), first send HEX codes

3F	80	CE	81

followed by HEX codes

16	86	9D	81.

NOTE 21 – To store data in the non-volatile memory of the unit, eg. the EEPROM for saving SETUPS. The EEPROM address is sent using the INPUT byte, and the data to be stored is sent using the OUTPUT byte. To use this instruction, it is necessary to understand the memory map, and memory structure of the particular machine.

NOTE 22 – Instruction 59 and instruction 60 load data for sending to the crosspoint switcher (or for storing in a SETUP), ie. the data is "lined-up" to be executed later. Instruction 58 executes the loaded data.

NOTE 23 – If the INPUT byte is set as 127_{dec}, then the data stored in a SETUP is loaded. The SETUP # is in the OUTPUT byte.

NOTE 24 – Further information needed in instructions 21, 22, 25 and 26, is sent using instruction 42 – which is sent prior to the instruction. For example, to request the audio gain value of right input # 9, send hex codes

2A	84	80	81

and then send HEX codes

19	89	81	81.

NOTE 25 – For units which detect the validity of the video inputs, Instruction 16 will be sent whenever the unit detects a change in the state of an input (in real-time).

For example, if input 3 is detected as invalid, the unit will send the HEX codes

10	83	84	81

If input 7 is detected as valid, then the unit will send HEX codes

10	87	85	81.

LIMITED WARRANTY

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

HOW LONG IS THE WARRANTY

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

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

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

1. Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed.
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.

⚠ ! Caution	**Safety Warning**: Disconnect the unit from the power supply before opening/servicing.