Kramer Electronics, Ltd.

USER MANUAL

Model:

SP-12HD

HD-SDI Processor

Contents

Figures

Tables

1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 1,000-plus different models now appear in 11 groups[1] that are clearly defined by function.

Thank you for purchasing the Kramer **SP-12HD** *HD-SDI Processor*, which is ideal for:

- Video broadcasting and editing studios
- All postproduction uses
- Presentation applications for multi-standard / multi-format sources use

Each package includes the following items:

- The **SP-12HD** *HD-SDI Processor*
- Power cord[2], rack "ears", and null-modem adapter
- This user manual[3]

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use Kramer high-performance high-resolution cables[4]

1 GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Matrix Switchers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters; GROUP 11: Sierra Products

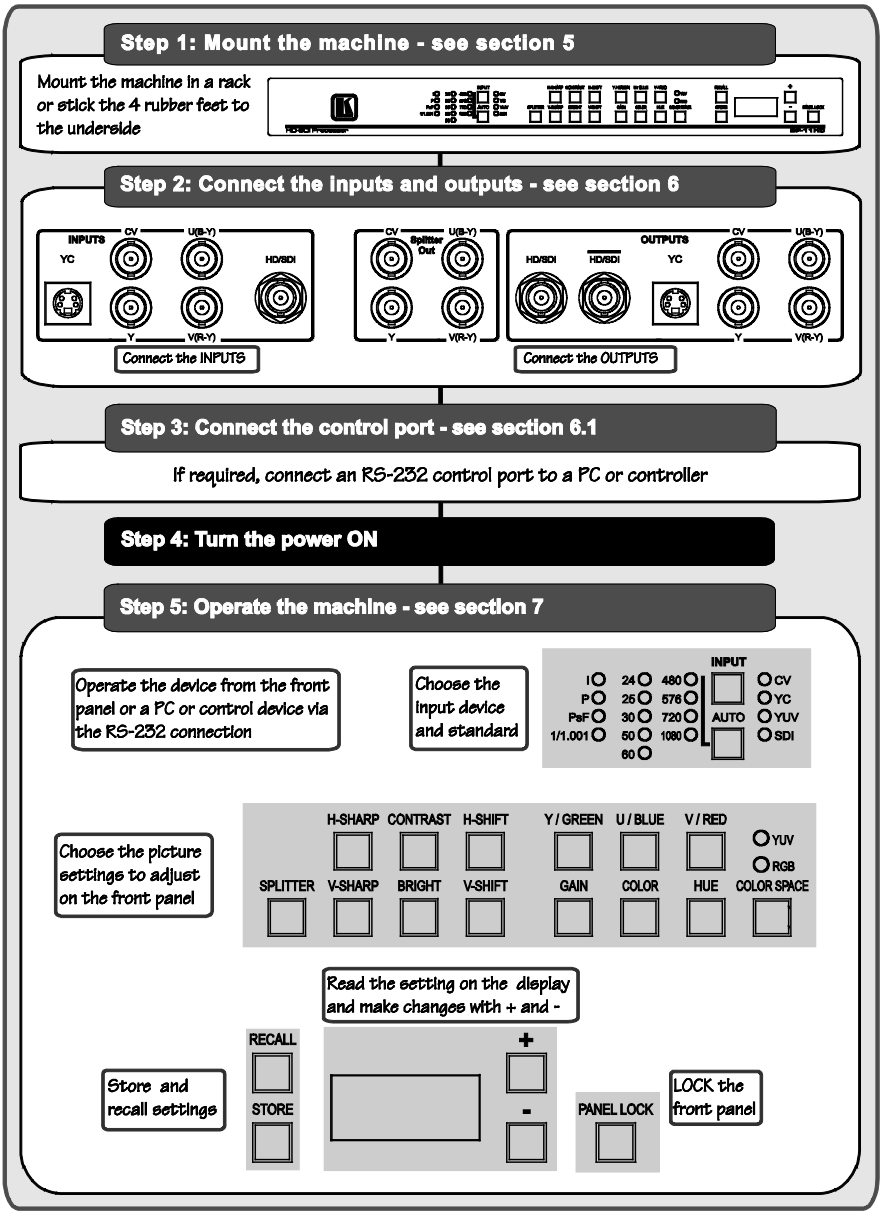
2 We recommend that you use only the power cord supplied with this device

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

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

2.1 Quick Start

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



3 Overview

The Kramer **SP-12HD** is a multi-standard/multi-format, broadcast-quality video processor and ProcAmp. It is a universal single-box solution for all your video processing requirements.

The **SP-12HD** *HD-SDI Processor* features the following:

- **Inputs**: composite video, s-Video, component video (YUV), SD/HD-SDI
- **Outputs**[1]: composite video, s-Video, component video (YUV), SD/HD-SDI (2 outputs), "Before/after" split-screen
- **Input Video Standards**: composite PAL-B, PAL-M, PAL-N, NTSC-3.58, NTSC-4.43, SECAM; component (with auto identification) 480i/60, 480p/60, 576i/50, 576p/50, 720p/50, 720p/60, 1080p/24, 1080p/25, 1080p/30, 1080i/50, 1080i/60, 1080psf/24, 1080psf/25, 1080psf/30
- **ProcAmp Functions**: video gain, brightness, contrast, color, hue, and sharpness (independent H and V). A full range of color control features in both YUV and RGB color space
- **Time Base Corrector**
- 5-line super-adaptive 2D comb filter for CVBS decoding
- Individual H and V chroma-luma delay

In addition, the **SP-12HD** *Digital Video Processor* includes:

- 16 non-volatile memory setups available for saving the settings
- Power-down save
- A screen splitter that provides simultaneous "before and after" image comparison on one monitor
- Full 10-bit digital processing throughout, for the highest possible video quality

Control the **SP-12HD**:

- Using the front panel buttons and the 7-segment display
- Remotely, by RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller

1 All output formats are always available except where a format does not support the resolution in use. For example, composite video and s-Video outputs are not available when an HD input (e.g. 1080p) is used

To achieve the best performance:

- Use only good quality connection cables[1] 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 Kramer **SP-12HD** away from moisture, excessive sunlight and dust

4 Your SP-12HD HD-SDI Processor

Figure 1 and Table 1 define the unit.

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

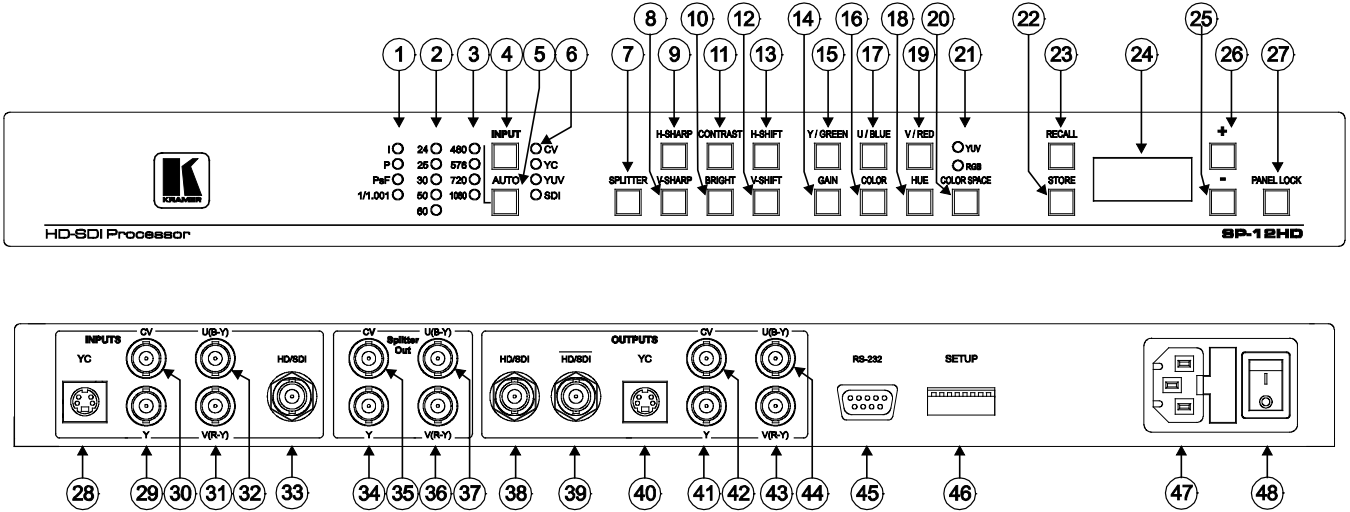


Figure 1: SP-12HD HD-SDI Processor Functions

Table 1: SP-12HD HD-SDI Processor Functions

#	Feature	Function
1	Scanning Format LEDs	*i* = interlaced *p* = progressive *PsF* = progressive segmented frame *1/1.001* lights in HDTV mode only if the frame rate is 23.98, 29.97 or 59.94 (instead of 24, 30 or 60 respectively)
2	Field/Frame Rate LEDs	Corresponds to *24, 25, 30, 50* and *60* fields/s (interlaced) or frames/s (progressive and Psf).
3	Active Lines Per Frame LEDs	Corresponds to *480, 576, 720* and *1080* lines per frame
4	*INPUT* Selector Button	Press to select the source, illuminating the appropriate LED
5	*AUTO* Button	Toggles between automatically recognizing the input standard (lighting the appropriate LEDs) and the manual selection mode. The cycle sequence: AUTO, 480i/60, 480p/60, 576i/50, 576p/50, 720p/50, 720p/59.94, 720p/60, 1080i/50, 1080i/59.94, 1080i/30, 1080p/23.98, 1080p/24, 1080p/60, 1080p/29.97, 1080p/30, 1080psf/23.98, 1080psf/24, 1080psf/25, 1080psf/29.97 and 1080psf/30. **Note**: Standards 1080psf/25, 1080psf/29.97 and 1080psf/30 in AUTO mode are identified as 1080i/50, 1080i/59.94, 1080i/25, respectively. If the input source is CVBS or Y/C, the cycling sequence is reduced to three modes: AUTO, 480i/60 and 576i/50.
6	INPUT LEDs	Cycles through the video sources: CV, YC, YUV and SDI
7	SPLITTER Button	Press the SPLITTER button and adjust the position of the boundary between the edited image and the original image in a split screen using the + and - buttons
8	V-SHARP Button	Press the V-SHARP button and adjust the vertical sharpness using the + and – buttons
9	H-SHARP Button	Press the H-SHARP button and adjust the horizontal sharpness using the + and – buttons
10	BRIGHT Button	Press the BRIGHT button and adjust the brightness using the + and – buttons
11	CONTRAST Button	Press the CONTRAST button and adjust using the + and – buttons
12	V-SHIFT Button	Press the V-SHIFT button and adjust V-Chroma-Luma delay using the + and – buttons
13	H-SHIFT Button	Press the H-SHIFT button and adjust the H-Chroma-Luma delay using the + and – buttons
14	GAIN Button	Press the VIDEO GAIN button and adjust the using the + and – buttons
15	Y/GREEN Button	Press the Y[1]/GREEN[2] button and adjust using the + and – buttons, when COLOR SPACE button is activated
16	COLOR Button	Press the COLOR[3] button and adjust using the + and – buttons
17	U/BLUE Button	Press the U[1]/BLUE[2] button and adjust using the + and – buttons, when COLOR SPACE button is activated
18	*HUE* Button	Press the HUE button and adjust using the + and – buttons. This function is available for all input and output formats and standards

1 For YUV

2 For RGB

3 Pressing the + button enhances dull colors. Pressing the – button reduces distortion (snow)

#	Feature		Function
19	V/RED Button		Press the V[1]/RED[2] button and adjust using the + and – buttons, when COLOR SPACE button is activated
20	COLOR SPACE Button		Press to select the color space of color control; if the COLOR SPACE button doesn't illuminate, color control is disabled in any color space
21	YUV/RGB LEDs		Cycle between different color spaces of color control: YUV and RGB. The corresponding LED lights
22	*STORE* Button		Stores the current setup in the non-volatile memory[3]
23	RECALL Button		Recalls a setup from the non-volatile memory[3]
24	7-segment Display		Displays data when using a front panel button
25	- Button		Press to decrease the level
26	+ Button		Press to increase the level
27	PANEL LOCK Button		Disengages/engages the front panel buttons (press and hold down for 2 seconds to toggle)
28	INPUTS	Y/C 4-pin Connector	Connects to the s-Video source
29		*Y* BNC Connector	Connects to the Y component of the YUV source
30		CV BNC Connector	Connects to the composite video source
31		V(R-Y) BNC Connector	Connects to the V component of the YUV source
32		U(B-Y) BNC Connector	Connects to the U component of the YUV source
33		HD-SDI BNC Connector	Connects to the HD-SDI source
34	OUTPUTS	SPLITTER Y BNC Connector	Connects to the split image Y component of the YUV acceptor
35		SPLITTER CV BNC Connector	Connects to the split image CV acceptor
36		SPLITTER V BNC Connector	Connects to the split image V component of the YUV acceptor
37		SPLITTER U BNC Connector	Connects to the split image U component of the YUV acceptor
38		HD/SDI BNC Connector	Connects to the serial digital video acceptor 1
39		HD/SDI BNC Connector	Connects to the serial digital video acceptor 2
40		YC 4-pin Connector	Connects to the s-Video (Y/C) acceptor
41		*Y* BNC Connector	Connects to the Y input of the YUV acceptor
42		CV BNC Connector	Connects to the composite video acceptor
43		*U(B-Y)* BNC Connector	Connects to the U input of the YUV acceptor
44		*V(R-Y)* BNC Connector	Connects to the V input of the YUV acceptor
45	RS-232 Port		Connects to the PC or the remote controller
46	SETUP DIP-switches		Use to configure and test the unit (see section 6.2)
47	Power Connector with Fuse		AC connector enabling power supply to the unit
48	Power Switch		Illuminated switch for turning the unit ON or OFF

1 For YUV

2 For RGB

3 See section 7.1

5 Installing the SP-12HD HD-SDI Processor in a Rack

This section describes how to install the **SP-12HD** in a rack.

Before Installing in a rack

Before installing in a rack, be sure that the environment is within the recommended range:	
Operating temperature range	+5° to +45° C (41° to 113° F)
Operating humidity range	10 to 90% RHL, non-condensing
Storage temperature range	-20° to +70° C (-4° to 158° F)
Storage humidity range	5 to 95% RHL, non-condensing

CAUTION!!

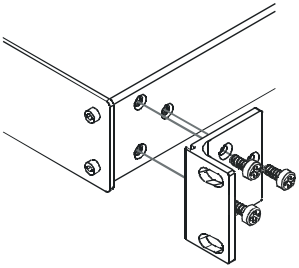
When installing on a 19" rack, avoid hazards by taking care that:

1. It is located within the recommended environmental conditions, as the operating ambient temperature of a closed or multi unit rack assembly may exceed the room ambient temperature.
2. Once rack mounted, enough air will still flow around the machine.
3. The machine is placed straight in the correct horizontal position.
4. You do not overload the circuit(s). When connecting the machine to the supply circuit, overloading the circuits might have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.
5. The machine is earthed (grounded) in a reliable way and is connected only to an electricity socket with grounding. Pay particular attention to situations where electricity is supplied indirectly (when the power cord is not plugged directly into the socket in the wall), for example, when using an extension cable or a power strip, and that you use only the power cord that is supplied with the machine.

How to Rack Mount

To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.



2. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

Note that:

- **In some models, the front panel may feature built-in rack ears**
- Detachable rack ears can be removed for desktop use
- Always mount the machine in the rack before you attach any cables or connect the machine to the power
- If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions (you can download it at: http://www.kramerelectronics.com)

6 Connecting the SP-12HD HD-SDI Processor

You can use your **SP-12HD** to convert[1] composite video, s-Video, component video (YUV), or SDI signals to composite video (PAL or NTSC), s-Video, component video (YUV) and[2] SDI, as well as to a "Before/after" split-screen, as the example illustrates in Figure 2.

To connect[3] the **SP-12HD** *Digital Video Processor*, do the following[4]:

1. Connect the following sources to the **SP-12HD**:
   - The composite video source (for example, a DVD player) to the CV INPUT BNC connector
   - The s-Video source (for example, an S-VHS player) to the Y/C INPUT 4-pin connector
   - The SDI source (for example, a digital video player) to the SDI INPUT BNC connector
2. Connect the component video INPUTS BNC connectors, Y, B-Y, and R-Y to YUV video source.
3. Connect the following acceptors to the **SP-12HD**:
   - The SPLITTER OUTPUT BNC connector to the split image acceptor (for example, a display)
   - The Y/C OUTPUT 4-pin connector to an s-Video acceptor (for example, a display)
   - The CV OUTPUT BNC connector to a composite video acceptor (for example, a display)
   - The BNC OUTPUTS connectors: Y, B-Y and R-Y to a video acceptor (for example, a plasma display)
   - The two SDI OUTPUTS BNC connectors to two serial digital video acceptors (for example, two monitors: SDI 1 and SDI 2)
4. Connect a PC or other controller, if required (see section 6.1).
5. Set the DIP-switches (see section 6.2).
6. Connect the AC power cord.

1 The **SP-12HD** does not perform standard conversion or scaling. The output resolution is always identical to the input resolution

2 All output formats are always available when the format is valid for the input resolution being used

3 When only one output is required, connect that output of the **SP-12HD**, and leave the other outputs unconnected

4 Switch OFF the power on each device before connecting it to your **SP-12HD**. After connecting your **SP-12HD**, switch on its power and then switch on the power on each device

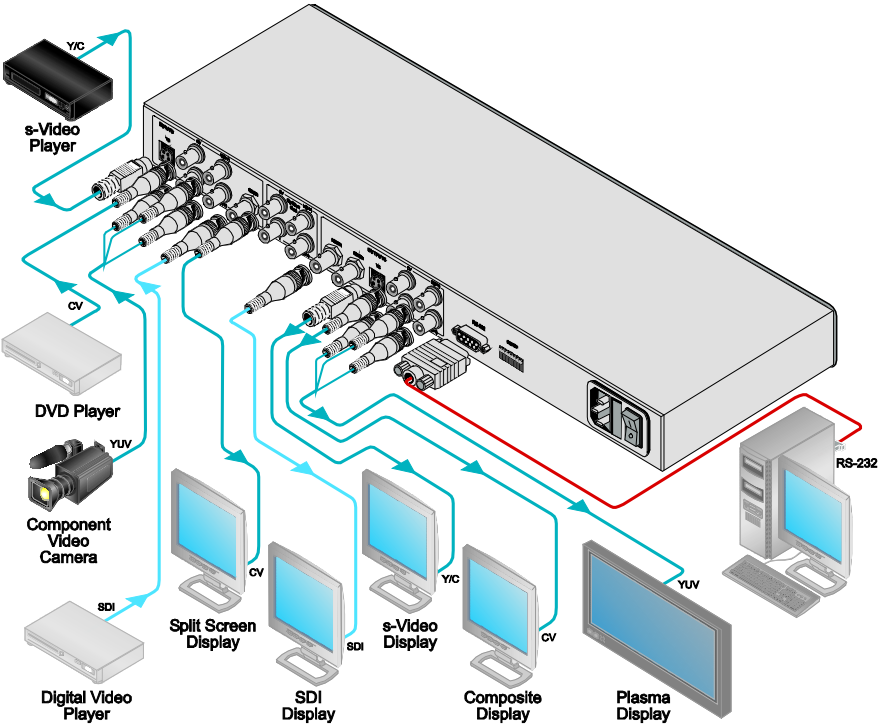


Figure 2: Connecting the SP-12HD HD-SDI Processor

6.1 Connecting the RS-232 Port

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

Method A—Connect the RS-232 9-pin D-sub port on the unit via a crossed cable (pin **2** to pin **3**, pin **3** to pin **2**, and pin **5** to pin **5**) to the RS-232 9-pin D-sub port on the PC.

Note: There is no need to connect any other pins.

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

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

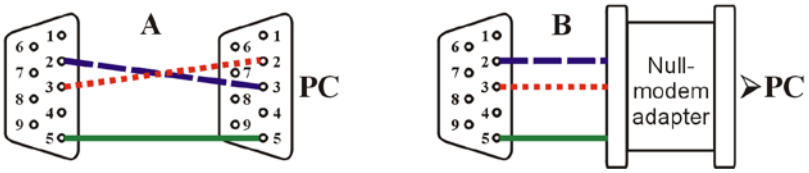


Figure 3: Connecting the RS-232 Port

6.2 Setting the DIP-Switches

Configure the **SP-12HD** unit by setting the 8 DIP-switches, as defined in Table 2 and Table 3:

Table 2: DIP-Switch Settings

DIP-Switch		Set as follows:
1	PEDESTAL	ON for pedestal of output signal (7.5 IRE offset selection for NTSC); OFF for no pedestal
2	Input sync bi-level or tri-level (HDTV)	Active only in HDTV mode: ON for bi-level input sync, OFF for tri-level.
3	Output sync bi-level or tri-level (HDTV)	Active only in HDTV mode: ON for bi-level output sync, OFF for tri-level.
4	TEST - 4	These three switches define test signals (see Table 3)
5	TEST - 5	
6	TEST - 6	
7	AGC	ON to enable Auto Gain Control ; OFF to disable
8	ADDR	Defines address of machine: OFF – 0x18; ON – 0x19

Table 3: Test Signals

#	TEST-4	TEST-5	TEST-6	Test Signal
1	OFF	OFF	OFF	Normal operating mode, no test active
2	ON	OFF	OFF	RAMP 100%
3	OFF	ON	OFF	Y-SWEEP (5.8MHz – SDTV, 11.6MHz – EDTV, 30MHz – HDTV)
4	OFF	OFF	ON	COLOR BARS 100%
5	ON	ON	OFF	SPLIT BARS 100%
6	OFF	ON	ON	PULSE 2T and BAR
7	ON	OFF	ON	C-SWEEP (1.5MHz – SDTV, 3MHz – EDTV, 15MHz – HDTV)
8	ON	ON	ON	GRID

7 Operating the SP-12HD HD-SDI Processor

Operate your **SP-12HD** via:

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

To operate the **SP-12HD** using the front panel buttons, do the following:

1. Turn on the power and press the INPUT button to select the source to convert: CV, YC, YUV or SDI.
   The appropriate INPUT LED lights (indicating selection of that source).
2. Press the AUTO button to select input standard that cycles as follows: AUTO, 480i/60, 480p/60, 576i/50, 576p/50, 720p/50, 720p/59.94, 720p/60, 1080i/50, 1080i/59.94, 1080i/60, 1080p/23.98, 1080p/24, 1080p/25, 1080p/29.97, 1080p/30, 1080psf/23.98, 1080psf/24, 1080psf/25, 1080psf/29.97 and 1080psf/30.
   With a CVBS or Y/C input source, the cycling sequence is reduced to three modes: AUTO, 480i/60 and 576i/50. The appropriate *1/1.001* LED, one *SCANNING FORMAT* LED, one *FIELD/FRAME RATE* LED and one *ACTIVE LINES PER FRAME* LED lights. If the AUTO button does not illuminate, it means a forced input standard. Otherwise, the AUTO button illuminates, lighting LEDs to indicate the detected input standard.
3. Adjust the color, brightness, contrast, hue, sharpness[1], H-shift, V-shift[2], and/or video gain of the picture, as follows:
   - Press the appropriate button[3]
     The button illuminates and blinks and the 7-segment

1 Using the V-SHARP and H-SHARP buttons

2 Using the V-SHIFT and H-SHIFT buttons

3 See the relevant items defined in Table 1

display shows the current level (in digits). “0” corresponds to normal level (“NORM”)

- Press the + button or - button once to gradually increase or decrease the current level by one unit (the 7-segment display shows the new level)
  To increase or decrease the current level rapidly, press and hold the + button or - button, continuously[1]
  To end the rapid adjustment, release the + button or – button
- To set “NORM” of the current level rapidly, press and hold down the + button and – button together, continuously, the 7-segment display shows “0”
- To undo the adjustment, press the appropriate button one more time. The appropriate button no longer blinks
- To save result of adjustment, press the STORE button twice
- To store result of adjustment in other setup #, press the STORE button once and then select a setup # between 1 and 16 by pressing the + and – button. Then press STORE button one more time
- If the result of the adjustment equals “NORM”, then the appropriate button no longer illuminates, otherwise this button continues to illuminate in main mode

7.1 Storing/Recalling Setups

You can store and recall up to 16 setups (or adjustments) in non-volatile memory, using the STORE and RECALL buttons together with the + and – buttons.

To store[2] a setup, do the following:

- Press the STORE button and then select a setup # between 1 and 16 by pressing the + and – buttons (the current settings are saved to that setup #)
- Then press STORE button one more time

To recall a setup, do the following:

1 The 7-segment display starts to quickly scan the range. When it stops running, it has reached the maximum or minimum, respectively

2 Storing a new setup over a previous setup # replaces the previous setup #

- Press the RECALL button and then select the appropriate # (that corresponds to the setup #) by pressing the + and – buttons (the selected setup is recalled)
- Then press RECALL button one more time

7.2 Locking the Front Panel

To prevent changing the settings accidentally or tampering with the front panel, lock your **SP-12HD**. Unlocking releases the protection mechanism.

To lock the **SP-12HD**:

- Press the PANEL LOCK button continuously until it illuminates freezing the front panel controls. Pressing a button has no effect[1].

To unlock the **SP-12HD**:

- Press the PANEL LOCK button continuously until the front panel controls unlock and the PANEL LOCK button no longer illuminates

7.3 Black Screen/Blue Screen Selection

To toggle between black screen and blue screen modes in the absence of a video signal, do the following:

- Turn the power off
- Press and hold down the U/BLUE button
- Turn on the power while pressing the U/BLUE button

1 Nevertheless, even though the front panel is locked you can still operate your PC control software

8 Technical Specifications

The **SP-12HD** technical specifications are shown in Table 4:

Table 4: Technical Specifications[1] of the SP-12HD HD-SDI Processor

INPUTS:	1 composite video: 1Vpp/75Ω on a BNC connector; 1 Y/C: 1Vpp/75Ω (Y), 0.3Vpp/75Ω (C) on a 4-pin connector; 1 component: Y/R-Y/B-Y (1Vpp/0.7Vpp/0.7Vpp)/75Ω on BNC connectors; 1 SDI: SMPTE-259M, SMPTE-292M, SMPTE-344M, ITU-R BT.601 on a BNC connector
OUTPUTS:	1 composite video: 1Vpp/75Ω on a BNC connector; 1 Y/C: 1Vpp/75Ω (Y), 0.3Vpp/75Ω (C) on a 4-pin connector; 1 component: Y/R-Y/B-Y (1Vpp/0.7Vpp/0.7Vpp)/75Ω on BNC connectors; 2 SDI: SMPTE-259M, SMPTE-292M, SMPTE-344M, ITU-R BT.601 on BNC connectors
BANDWIDTH:	0.5dB to 5MHz (SDTV), to 10MHz (EDTV), to 30MHz (HDTV), fully loaded
S/N RATIO:	60dB
CONTROLS:	Front-panel and RS-232: contrast, brightness, video gain, color, hue, H/V sharpness, H/V chroma-luma shift; R-Y, B-Y level; screen splitter (process to bypass); panel lock
INPUT VIDEO STANDARDS:	CVBS (SDTV): PAL-B/D/G/H/I/M/N, NTSC-3.58/4.43, SECAM; EDTV: 480p/60, 576p/50; HDTV: 720p/50, 720p/59.94, 720p/60, 1080i/50, 1080i/59.94, 1080i/60, 1080p/23.98, 1080p/24, 1080p/25, 1080p/29.97, 1080p/30, 1080psf/23.98, 1080psf/24, 1080psf/25, 1080psf/29.97 and 1080psf/30
OUTPUT VIDEO STANDARDS:	Same as input standard with these exceptions: for a CVBS input signal, the output standard can be only PAL-B or NTSC-3.58 depending on input frame rate; for EDTV or HDTV input signals, the CVBS output signal is not available
DIGITAL RESOLUTION:	10 bits
LUMA NON-LINEARITY:	1%
CHROMA / LUMA DELAY:	<15ns
POWER SOURCE:	Universal, 100-240V AC, 50/60Hz, 22VA max.
DIMENSIONS:	19" x 7" x 1U W, D, H, rack mountable
WEIGHT:	2.6kg (5.7lbs) approx.
ACCESSORIES:	Power cord, rack "ears", null-modem adapter

1 Specifications are subject to change without notice

9 Communication Protocol

RS-232 communication between the **SP-12HD** and the PC is performed using this protocol (VER 0.1). The protocol[1] uses four bytes of information, and transmission settings are 9600 baud, no parity, 8 data bits and 1 stop bit.

The controller and the machine should be connected via a null-modem connection, that is, if using a 9-pin D-sub port, connect pin 5 of the PC to pin 5 of the machine, cross pins 2 and 3, that is, connect pin 2 of the PC to pin 3 of the machine, and connect pin 3 of the PC to pin 2 of the machine. On the PC side, short pins 4 and 6, and short pins 1, 7 and 8.

Table 5: Structure of the Protocol

MSB							LSB
		INSTRUCTION					
0	TO PC	I5	I4	I3	I2	I1	I0
7	6	5	4	3	2	1	0
Byte 1							
	DATA						
1	D6	D5	D4	D3	D2	D1	D0
7	6	5	4	3	2	1	0
Byte 2							
	EXTENDED DATA						
1	E6	E5	E4	E3	E2	E1	E0
7	6	5	4	3	2	1	0
Byte 3							

	MSBs		ADDR				
1	E7	D7	1	1	0	0	0
7	6	5	4	3	2	1	0
Byte 4							

Note that the MSBs of the DATA (D7) and the EXTENDED DATA (E7) are in the fourth byte.

Terminology:
- TO PC is the “DESTINATION BIT”
- I4..I0 is the “INSTRUCTION”
- D7..D0 is the “DATA”
- E7..E0 is the “EXTENDED DATA”

The destination bit, TO PC, is 0 when sending from the PC to the machine, or 1 when sending from the machine to the PC.

1 This protocol complements Kramer’s “Protocol 2000” (Kramer’s switcher protocol), that is, the two protocols can co-exist without disturbing one another (according to Protocol 2000’s definitions, the **SP-12HD** would be machine number 24).

Table 6: Instruction Set

#	INSTRUCTION	I5	I4	I3	I2	I1	I0
0	Reset	0	0	0	0	0	0
16	Error	0	1	0	0	0	0
32	Read front-panel switch data	1	0	0	0	0	0
33	Write front-panel switch data	1	0	0	0	0	1
34	Recall	1	0	0	0	1	0
35	Store	1	0	0	0	1	1
61	Identify machine	1	1	1	1	0	1

DESCRIPTION OF INSTRUCTIONS

Inst No	Instruction name	Data Number	Data Name	Extended	Notes
0	RESET	0	Initialize machine	0	When the machine is initialized, it sends the RESET code (DATA = 0). If the machine receives this code, it resets to its "power-up" state.
		1	Configure the machine to its factory default state	0	When the machine receives this code, all programmable parameters are reset to their factory-default values.
16	ERROR				If the machine receives an invalid instruction, it replies by sending this error code.
32	READ FRONT PANEL SWITCH DATA (send)		Front panel switch number*	0	
	READ FRONT PANEL SWITCH DATA (reply)		Front panel switch number*	Front panel switch value*	
33	WRITE FRONT-PANEL SWITCH DATA		Front panel switch number*	Front panel switch value*	The PC sends a value directly to the machine. If valid, the machine implements this new value, and replies by sending the same data back to the PC. Note that the addressed front-panel switch does not need to be pressed in order to change its value via RS-232. If the "+" or "-" button is pressed on the machine, resulting in a change in a switch value, then this switch number and value is sent to the PC.
34	RECALL	0	0–15	Program number	Program 0 = Setup 1 … Program 15 = Setup 16
35	STORE	0	0–15	Program number	Program 0 = Setup 1 … Program 15 = Setup 16
61	IDENTIFY MACHINE	3	Request software version number	0	If the software version is requested, the machine replies with DATA as the version number before the decimal point, and EXTENDED DATA is the value following the decimal point. For example, for version 3.4, the machine replies with DATA = 03 (hex), and EXTENDED DATA = 04 (hex).

* See following table: SWITCH NUMBER AND SWITCH VALUE PARAMETERS

SWITCH NUMBER AND SWITCH VALUE PARAMETERS

Switch Number	Description	Switch Value	Description
0	INPUT FORMAT	0	CV (default)
		1	YC
		2	YUV
		3	SDI
1	INPUT_STAND_YUV/SDI (for input format YUV or SDI)	0	AUTO (default)(read D=24 for STANDARD_AUTO)
		1-480i/60 11-1080p/23.9	
		2-480p/60 12-1080p/24	
		3-576i/50 13-1080p/25	
		4-576p/50 14-1080p/29.9	
		5-720p/50 15-1080p/30	
		6-720p/59.9 16-1080psf/23.9	
		7-720p/60 17-1080psf/24	
		8-1080i/50 18-1080psf/25	
		9-1080i/59.9 19-1080psf/29.9	
		10-1080i/60 20-1080psf/30	
2	SPLITTER	-100 – +100 (2's complement)	0 - default
3	SHARP_H	0 - 15	0 - default
4	SHARP_V	0 - 15	0 - default
5	CONTRAST	-100 – +100 (2's complement)	0 - default
6	BRIGHTNESS	-100 – +100 (2's complement)	0 - default
7	VIDEO_GAIN	-100 – +100 (2's complement)	0 - default
8	H_SHIFT	-8– +7 (2's complement)	0 - default
9	V_SHIFT	-1– +1 (2's complement)	0 - default
10	Y	-100 – +100 (2's complement)	0 - default
11	U	-100 – +100 (2's complement)	0 - default
12	V	-100 – +100 (2's complement)	0 - default
13	GREEN	-100 – +100 (2's complement)	0 - default
14	BLUE	-100 – +100 (2's complement)	0 - default
15	RED	-100 – +100 (2's complement)	0 - default
16	COLOR	-100 – +100 (2's complement)	0 - default
17	HUE	-100 – +100 (2's complement)	0 - default
18	COLOR_SPACE	0 1 2	0 – OFF default 1 – YUV 2 - RGB
19	INPUT_STAND_CV/YC_ (In case of input format CV or YC)	0 1 2	0 - AUTO (default) (read D=24 for STANDARD_AUTO) 1 – NTSC 2 – PAL
20	PANEL_LOCK	0 1	Off (default) On
21	REQUEST CURRENT SETUP	0 – 15	For I = 32 - read_only. For recall or store use I = 34 or 35
22	FREE_COLOR	0 – 1	0 - Black_screen (default) 1 - Blue_screen

Switch Number	Description	Switch Value	Description
23	TEST	0 - 7	Read only - switch controlled 0 - Test off (default) 1 - Color bars 100% 2 - Y-sweep 3 - Pulse 2T and bar 4 - Ramp 100% 5 - C-sweep 6 - Split bars 100% 7 - Grid
24	ACTIV_AUTO_STAND status of standard auto-identification, read only	0 - 19	In case of forced input standard value "E" corresponds to this standard. In both cases (auto or forced) the coding differs from parameter D=1 (input_stand_YUV/SDI) and is following:
		0 – 720p/60 10- 1080p/23.9	
		1 – 720p/59.9 11- 1080psf/30	
		2 – 720p50 12- 1080psf29.9	
		3 - 1080i/60 13- 1080psf/25	
		4 - 1080i/59.9 14- 1080psf/24	
		5 - 1080i/50 15- 1080psf/23.9	
		6 - 1080p/30 16- 480p/60	
		7 - 1080p/29.9 17- 576p/50	
		8 - 1080p/25 18- 480i/60	
		9 - 1080p/24 19- 576i/50	

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.

  * FCC and CE approved using STP cable (for twisted pair products)

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

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

Kramer Electronics, Ltd.
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P/N: 2900-000628 REV 2