Kramer Electronics, Ltd.

USER MANUAL

Model:

FC-4046

Video MultiCoder®

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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 **FC-4046** *Video MultiCoder®*, which is ideal for the following typical applications:

- Video production, editing and duplication studios
- Interfacing between machines with differing formats

The package includes the following items:

- **FC-4046** *Video MultiCoder®*
- Power cord[2]
- Null-modem adapter and 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]

3 Overview

The Kramer **FC-4046** *Video MultiCoder®* is a multi-standard all-in-one encoder[5]/decoder[6]. The user selects the video source and the converted video is available on all the outputs.

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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 We recommend that you use only the power cord that is supplied with the machine

3 Download up-to-date Kramer user manuals from the Internet at this URL: http://www.kramerelectronics.com

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

5 Converting RGB or YUV analog or digital input signals to composite or Y/C video output signals

6 Converting composite or Y/C video input signals to RGB or YUV analog or digital output signals

In addition, the **FC-4046**:

- Includes analog inputs and outputs compatible with the formats and standards in use today

- Is highly automated for hassle-free operation

- Includes user-friendly front panel buttons for full Procamp control

- Labels each dipswitch for easy and convenient identification

- Automatically recognizes the input video standard[1]: PAL B/D/G/H/I/M/N/Nc, NTSC3.58/4.43 and SECAM

- Can output PAL B/D/G/H/I/Nc/60 and NTSC3.58/4.43[2]

- Has CV, YC and component[3] inputs and outputs

- Simultaneously outputs to CV, YC and component (RGB or YUV) formats

- Can be used as a multi-format switcher, always converting to all the formats

- Includes non-volatile memory that retains the last setting, after switching the power off and then on again

- Is controllable via the front panel buttons, and/or remotely by RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller

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

- Position your Kramer **FC-4046** in a location free from moisture and away from excessive sunlight and dust

4 Your FC-4046 Video MultiCoder®

Figure 1 illustrates the front and rear panels of the **FC-4046**. Table 1 and Table 2 define the front and rear panels of the **FC-4046**, respectively.

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1 When the fifth dipswitch, AUTO, is set to ON for the multi-standard

2 Only supporting actions that are capable of performance. For example, you cannot convert the PAL standard to NTSC

3 Note that this unit does not scale or scan convert the signal. For example, a PAL input would produce 50Hz interlaced output on the RGB output
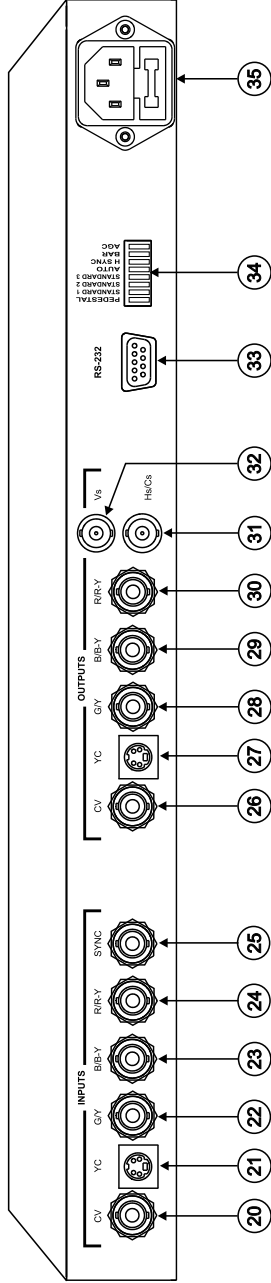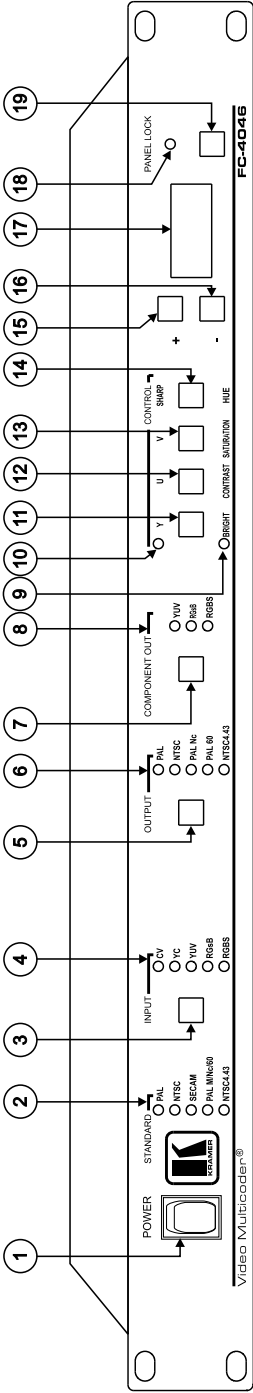
Your FC-4046 Video MultiCoder®

Figure 1: FC-4046 Video MultiCoder®

Table 1: Front Panel FC-4046 Video MultiCoder® Features

#	Feature	Function
1	POWER Switch	Illuminated switch for turning the unit ON or OFF
2	STANDARD LEDs	Automatically recognize[1] the input video standard[2], lighting the appropriate LED
3	INPUT Button	Press to choose the input format[3]
4	INPUT LEDs	Light the specific INPUT chosen via the INPUT button
5	OUTPUT Button	Press to select the output standard on CV and YC outputs
6	OUTPUT LEDs	Light the specific OUTPUT chosen via the OUTPUT button
7	COMPONENT OUT Button	Press to select the output[4] format on the component BNC connectors
8	COMPONENT OUT LEDs	Light the specific COMPONENT OUT chosen via the COMPONENT OUT button
9	Lower CONTROL LED	Selects the function printed under the lit ProAmp button
10	Upper CONTROL LED	Selects the function printed above the lit ProAmp button
11	Y CONTROL Button	
	BRIGHT Button	
12	U CONTROL Button	Press the appropriate button once or twice (until the upper/lower LED is lit) to select control of the Y / BRIGHTNESS / U / CONTRAST / V / SATURATION / SHARP / HUE[5]. Adjust using the + and – buttons
	CONTRAST Button	
13	V CONTROL Button	
	SATURATION Button	
14	SHARP CONTROL Button	
	HUE Button	
15	+ Button	Press to increase the level[6]
16	- Button	Press to decrease the level[6]
17	7-segment Display	Displays data when selecting a CONTROL button. After powering up the machine, the firmware version number displays briefly for versions higher than 1.0
18	PANEL LOCK LED	Lights when the panel is locked (blinks after pressing a button while the panel is locked)
19	PANEL LOCK Button	Disengages the front panel buttons

1 When the FC-4046 is set to the Automatic mode

2 PAL (B/D/G/H/I/N), NTSC(3.58), SECAM, PAL (M/Nc/60) and NTSC (4.48)

3 CV, YC, YUV, RGsB, or RGBS

4 YUV, RGsB, or RGBS

5 Note that this function is not applicable to all standards

6 Operational only when the 7-segment display displays data after choosing a control button

Table 2: Rear Panel FC-4046 Video MultiCoder® Features

#	Feature	Function
20	CV INPUT BNC Connector	Connects to the composite video source[1]
21	YC INPUT 4p Connector	Connects to the s-Video (Y/C) source when selecting Y/C as the input
22	G/Y INPUT BNC Connector	Connects to the component video source when selecting RGB/S or YUV as the input
23	B/B-Y INPUT BNC Connector	
24	R/R-Y INPUT BNC Connector	
25	SYNC INPUT BNC Connector	Connects to the SYNC source in the RGBS mode
26	CV OUTPUT BNC Connector	Connects to the composite video acceptor
27	YC OUTPUT 4p Connector	Connects to the s-Video (Y/C) acceptor
28	G/Y OUTPUT BNC Connector	Connects to the component video output
29	B/B-Y OUTPUT BNC Connector	
30	R/R-Y OUTPUT BNC Connector	
31	Hs/Cs OUTPUT BNC Connector	Connects to the horizontal or composite sync output[2]
32	Vs OUTPUT BNC Connector	Connects to the vertical sync output
33	RS-232 DB 9 Connector	Connects to PC or Serial Controller
34	Dipswitches	Dipswitches setup of the unit
35	Power Connector with Fuse	AC connector enabling power supply to the unit

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1 When selecting CV as the input

2 Select the SYNC type via the DIP

5   Installing on a Rack

This section describes what to do before installing on a rack (see section 5.1) and how to install on a rack (see section 5.2).

5.1 Before Installing on a Rack

Before installing the machine in a 19" rack, be sure that the environment is within the recommended range:

Table 3: Recommended Ambient Temperature and Humidity Range

Operating temperature range	+5 to +45 Deg. Centigrade
Operating humidity range	5 to 65 % RHL, non-condensing
Storage temperature range	-20 to +70 Deg. Centigrade
Storage humidity range	5 to 95% RHL, non-condensing

5.1.1   ⚠ CAUTION!!

When installing the **FC-4046** in 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 supply connections other than direct connections to the branch circuit (for example, the use of power strips), and that you use only the power cord that is supplied with the machine.

5.2 Instructions for Rack-Mounting

To install the **FC-4046** in a 19" rack, place the rack ears of the machine against the rack rails of the rack, and insert the proper rack screws through each of the four holes in the rack ears[1].

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1 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"), refer to the Rack Adapters user manual (download it at: http://www.kramerelectronics.com) for installation instructions

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6 Connecting the FC-4046 Video MultiCoder®

To connect the **FC-4046**, as the example in Figure 2 illustrates, do the following[1]:

1. Connect one or more of the following sources:

- A composite video source (for example, a camera) to the CV INPUT BNC connector
- A Y/C source (for example, an s-Video player) to the 4p INPUT connector
- A component video source (for example, a DVD Player) to the G/Y, B/B-Y, and R/R-Y INPUT BNC connectors

2. Connect the OUTPUT:

- CV BNC connector to the composite video acceptor (for example, a composite video display)
- 4p connector to the s-Video acceptor (for example, an s-Video display)
- G/Y, B/B-Y, and R/R-Y BNC connectors to the component video acceptor (for example, a projector)

3. Connect the power cord.

4. Connect a PC or other RS-232 controller (optional), see section 6.1.

5. Set the dipswitches, see section 6.2.

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1 Switch OFF the power on each device before connecting it to your FC-4046. After connecting your FC-4046, switch on its power and then switch on the power on each device
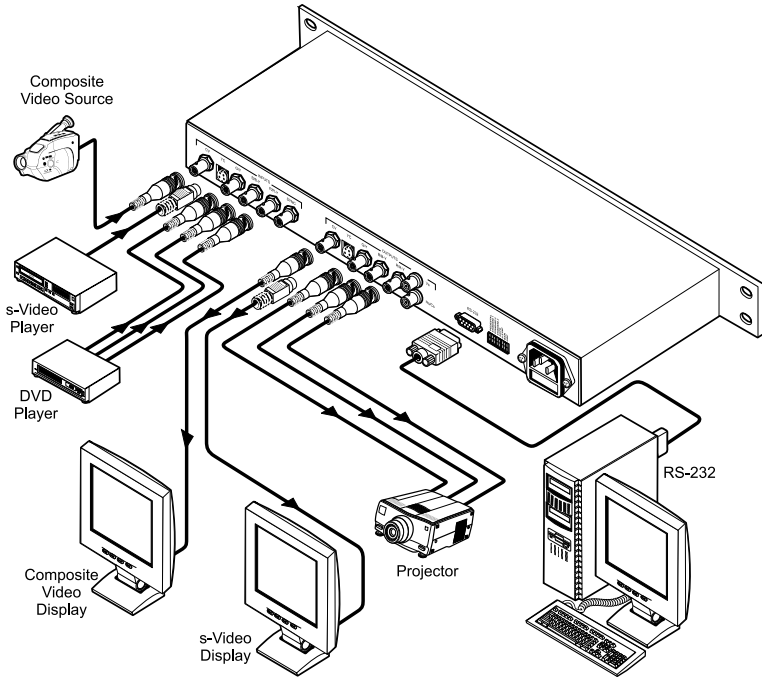
Figure 2: Connecting the FC-4046

6.1 Connecting a PC

To connect a PC to the **FC-4046**, using the Null-modem adapter provided with the machine (recommended):

• Connect the RS-232 DB9 rear panel port on the **FC-4046** unit 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 a PC to the **FC-4046**, 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 **FC-4046** unit, as Figure 3 illustrates

Figure 3: Connecting a PC without using a Null-modem Adapter

6.2 Dipswitch Settings

Configure the **FC-4046** unit by setting the 8 dipswitches, as Figure 4 and Table 4 define:
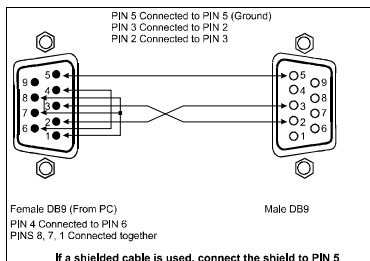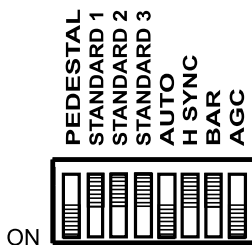

Figure 4: Dipswitches (Factory Default)

Table 4: Dipswitch Settings

	Dipswitch	Set as follows:
1	PEDESTAL[1]	ON for pedestal; OFF for no pedestal (7.5 IRE offset selection for NTSC)
2	STANDARD 1	
3	STANDARD 2	See Table 5 (for selecting the INPUT video standard)
4	STANDARD 3	
5	AUTO[2, 3]	ON for multi-standard; OFF for user-selected (fixed) standard
6	H SYNC	ON for Horizontal sync on Hs/Cs BNC; OFF for composite sync output
7	BAR	ON for machine to operate as a 75% color bar generator[4]
8	AGC[5]	ON for automatic gain control; OFF for fixed gain

Table 5: Dipswitch Standard Definitions (for AUTO switch off)

STANDARD	DIP STANDARD 1	DIP STANDARD 2	DIP STANDARD 3
NTSC	OFF	OFF	ON
PAL	OFF	ON	OFF
PAL-M	OFF	ON	ON
PAL-Nc	ON	OFF	OFF
NTSC-4.43	ON	OFF	ON
SECAM	ON	ON	OFF
PAL-60	ON	ON	ON

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1 NTSC offsets the black level within the active video signal by 7.5 IRE when selected

2 If the AUTO dipswitch is set to ON, dipswitches STANDARD 1, STANDARD 2 and STANDARD 3 have no effect

3 When the AUTO function is on, then the machine will auto-select PAL, NTSC and SECAM standards when all 3 STANDARD switches are **off**. When the AUTO function is on, then the machine will auto-select between all the standards when all 3 STANDARD switches are **on**. This situation may be unreliable, and therefore it is not recommended to work in this manner

4 When operating as a bar generator, it is recommended to connect an external CV source (50Hz or 60Hz, according to the required output standard) in order to stabilize the color sub-carrier frequency

5 For firmware versions up to 2.0, the AGC function cannot be disabled. The AGC dipswitch is only relevant for firmware versions 2.0 and higher

7 Operating Your FC-4046 Video MultiCoder®

Operate your **FC-4046** via:

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

7.1 Using the Front Panel Buttons

Section 7.1.1 describes how to convert (encode) RGB or YUV input signals to composite or Y/C video output signals and vice versa (decode).

7.1.1 Encoding and Decoding Video Signals

To encode/decode a video signal, do the following:

- Select the desired input using the INPUT button

The illuminated INPUT LED indicates the selected input

7.1.2 Adjusting the CONTROL Levels

To adjust a specific CONTROL level:

1. Press the appropriate CONTROL button.
   The CONTROL button illuminates and the 7-segment display shows the current level (in digits)[1].

2. 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 down the + button or - button, continuously[2]. To end the rapid adjustment, release the + button or – button.

7.1.3 Locking the Front Panel

To prevent changing the settings accidentally or tampering with the front panel, lock your **FC-4046**. Unlocking releases the protection mechanism.

To lock the **FC-4046**:

- Press the PANEL LOCK button (for about 2 seconds) until the PANEL LOCK LED illuminates freezing the front panel controls. Pressing a button will have no effect, except to cause the PANEL LOCK LED to blink[3]. Nevertheless, even though the front panel is locked you can still operate your PC control software.

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1 It could be pressed again to choose the "other" CONTROL function on the button

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

3 Warning that you need to unlock to regain control via the front panel

To unlock the **FC-4046**:

- Press the PANEL LOCK button (for about 2 seconds) until the front panel controls unlock and the PANEL LOCK LED no longer illuminates.

8   Technical Specifications

Table 6 includes the technical specifications:

Table 6: Technical Specifications[1] of the FC-4046 Video MultiCoder®

INPUTS:	CV: 1Vpp / 75Ω on BNC connector; YC: 1Vpp / 75Ω (Y); 0.3Vpp / 75Ω (C) on 4p connector; R/R-Y, G/Y, B/B-Y SYNC on BNC connectors
OUTPUTS:	CV: 1Vpp / 75Ω on BNC connector; YC: 1Vpp / 75Ω (Y); 0.3Vpp / 75Ω (C) on 4p connector; R/R-Y, G/Y, B/B-Y, H, V on BNC connectors
MAX. OUTPUT LEVEL:	1.4Vpp
BANDWIDTH (-3dB):	5MHz, Fully Loaded
DIFF. GAIN:	1%
DIFF. PHASE:	0.7 Deg.
K-FACTOR:	0.4%
S/N RATIO:	66dB
CONTROLS:	Input/output format selectors, hue, bright, contrast and saturation controls
POWER SOURCE:	90-264 VAC, 50/60 Hz; 15VA
DIMENSIONS:	19-inch (W), 7-inch (D) 1U (H) rack-mountable
WEIGHT:	2.6kg. (5.8 lbs.) approx.
ACCESSORIES:	Power cord, Null modem adapter, Windows®-based control software[2]

9   Communication Protocol[2]

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1 Specifications are subject to change without notice

2 Not available at the time of printing. See our Web site (go to this URL: http://www.kramerelectronics.com) for the latest updated information

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.

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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.

<table>
<tr>
<td>⚠
Caution</td>
<td>**Safety Warning**:
Disconnect the unit from the power supply before opening/servicing.</td>
</tr>
</table>

ISO 9001:2000
IQC
Institute of
Quality & Control
Certified Quality System

C E