Kramer Electronics, Ltd.

USER MANUAL

Model:

FC-8

Wi-Fi - RS-232 Bridge

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1 Introduction

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

Thank you for purchasing the Kramer TOOLS **FC-8** *Wi-Fi - RS-232 Bridge,* which is ideal for controlling any Kramer device with an RS-232 port in a wireless network environment.

Each package includes the following items:
- The **FC-8** *Wi-Fi - RS-232 Bridge*
- 12V DC Power supply
- 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]

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

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

2.1 Quick Start

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

Step 1: Connect the RS-232 port to the external device - see section 5

Connect the external device to the RS-232 port (for example, a Kramer VS-121HC)

FC-8

VS-121HC

Step 2: Connect the power

Step 3: Configure the Host Wi-Fi settings - see section 6.2

❍ The host detects the default **FC-8** network settings

❍ If needed, change the **FC-8** default settings with host browser

Step 4: Operate the external device - see section 7

Serial commands are transmitted over the wireless network to the RS-232 port of the external device

FC-8

VS-121HC

PC with Wireless Adapter

3 Overview

The Kramer **FC-8** is a serial-to-wireless and wireless-to-serial LAN device server that acts as a bridge for connecting serial devices to an 802.11b/g wireless LAN.

The **FC-8** supports TCP/UDP sockets, a Web server with Web site, and WEP, WPA, WPA2 Wi-Fi encryption. The **FC-8** is housed in a Kramer TOOLS enclosure, and is powered by a 12V DC power supply.

Any legacy Kramer device that has an RS-232 connection can be wirelessly controlled over the customer's LAN or the Internet with an **FC-8** using serial commands or Kramer control software.

The **FC-8** is available in two models: a European model that supports 13 channels over the 2.412–2.472GHz spectrum and an American model that supports 11 channels over the 2.412–2.462GHz spectrum.

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 **FC-8** away from moisture, excessive sunlight and dust

> **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.

4 Your FC-8 Wi-Fi - RS-232 Bridge

Figure 1 and *Table 1* define the unit.

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

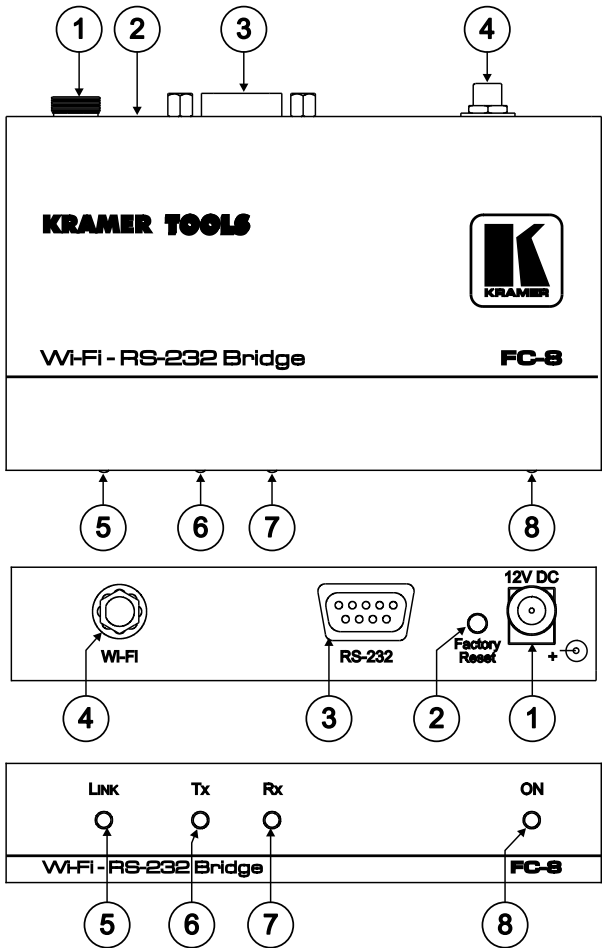2 For example, part number 2535-000251

Figure 1: FC-8 Wi-Fi - RS-232 Bridge Front and Back Views

Table 1: FC-8 Wi-Fi - RS-232 Bridge Front and Back Functions

#	Feature	Function
1	*12V DC* Connector	+12V DC for powering the unit
2	*FACTORY RESET* Button	When pressed, erases all configuration data. Use only under the guidance of Kramer Technical Support.
3	*RS-232* DB-9F Port	Connects to the controlled device via a null-modem connection
4	*WI-FI* Antenna	Transmits and receives signals over the wireless network
5	*LINK* LED	Illuminates green when there is a link
6	*TX* LED	Illuminates green when transmitting data over the wireless connection
7	*RX* LED	Illuminates green when receiving data over the wireless connection
8	*ON* LED	Illuminates green when power is supplied

5 Connecting the FC-8 Wi-Fi - RS-232 Bridge

The **FC-8** can be used to wirelessly control an RS-232-based device from a PC via an ad-hoc network (see *Figure 2*) or via an access point (router) to a larger network or the Internet (see *Figure 3*).

5.1 Connecting the Controlled Device to the FC-8

To connect a controlled device to the **FC-8**, as the example in *Figure 2* illustrates[1], connect the RS-232 DB-9 rear panel port on the **FC-8** to the attached device[2]:
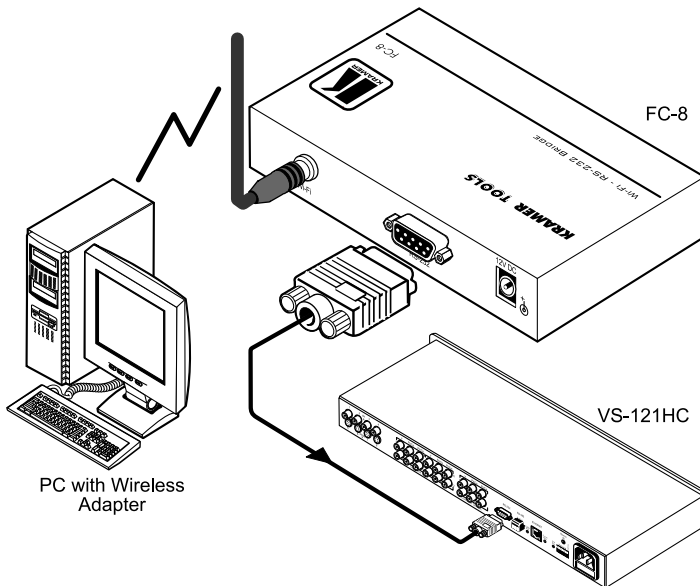

Figure 2: Connecting the FC-8 Wi-Fi - RS-232 Bridge (Ad-Hoc Network)

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1 Switch OFF the power on each device before connecting it to your **FC-8**. After connecting your **FC-8**, switch on its power and then switch on the power on each device

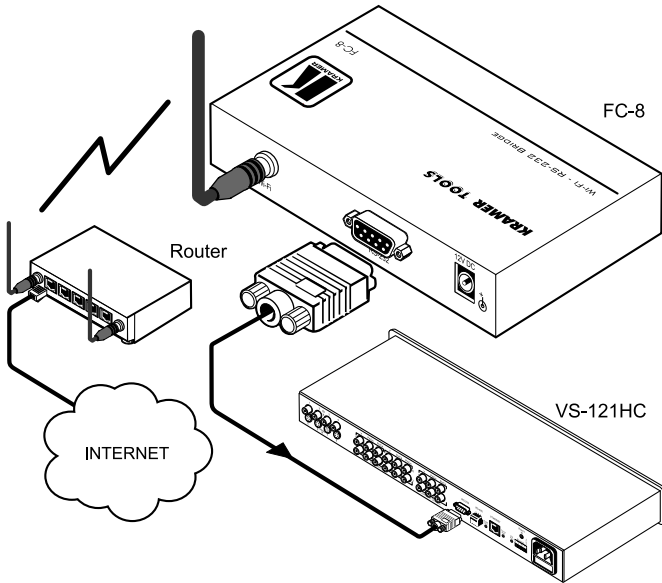2 Use the same RS-232 wiring as for a connection to the PC

Figure 3: Connecting the FC-8 Wi-Fi - RS-232 Bridge (Access Point)

5.2   Connecting the FC-8 to a Network

The **FC-8** is connected to the network by software configuration as described in Section 6.

6   Configuring the FC-8 Wi-Fi - RS-232 Bridge

This section explains how to configure the **FC-8** and the host system for operation. The section includes:

- Using the Default Network Configuration, see section 6.1
- Configuring the Host System, see section 6.2
- Changing the **FC-8** Configuration, see section 6.3
- Configuring an Active Station, see section 6.4

6.1 Using the Default Network Configuration

The **FC-8** is configured in the factory with the following default configuration that can be used immediately in an ad-hoc network:

Table 2: FC-8 Default Network Configuration

Parameter	Value
Network Name	!Kramer-FC8 (ad hoc network)
IP Address	192.168.3.2
Subnet Mask	255.255.255.0
Mode	Serial Net
Port	10000

6.2 Configuring the Host System to Operate with FC-8

The wireless connection on the host system must be configured to communicate with the **FC-8**. (It is assumed that a wireless network adapter is installed and operating on the host system.)

To configure the host system for first-time wireless operation:

1. Power on the **FC-8** by connecting its 12V DC power supply.
   Verify that the ON LED lights.

2. The host automatically detects the wireless adapter and displays an icon in the lower-right corner showing that a wireless network was detected.

3. Click the wireless network icon, then click **View Available Wireless Networks**.
   The Wireless Network Connection window appears (see *Figure 4*). You should see your wireless network listed with the network name **Kramer-FC8**. If you don't see the network, click **Refresh network list** in the upper-left corner.

4. Make sure the status **Connected** is shown.
   If the network status is not **Connected**, click **Kramer-FC8**, and click **Connect** in the lower-right corner.
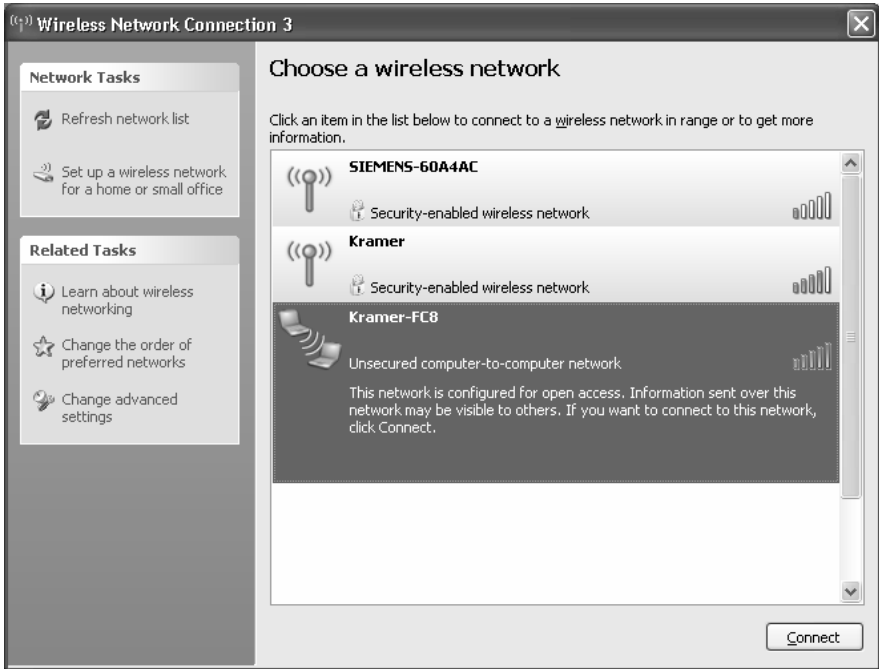
Figure 4: Wireless Network Connection Window

5. If the Kramer-FC8 network does not connect:
   ▪ Click on **Kramer-FC8** to open the network and click **Change Advanced Settings**.
   ▪ Choose to highlight **Internet Protocol** (**TCP/IP**) and click **Properties**.
   ▪ Make sure **Obtain an IP address automatically** is selected.
6. Begin operating the device as described in section 7 or if necessary, change the **FC-8** configuration as described in section 6.3.

6.3   Changing the FC-8 Configuration

The **FC-8** is normally configured to work as a listening station in an ad-hoc, peer-to-peer network or over an access point such as a router to connect to the Internet. (To configure the **FC-8** as an active station, see section 6.4.)

To connect the **FC-8** to another network you must change its configuration using a built-in Web page configuration program over an Internet browser.

To change the **FC-8** configuration, do the following:

1. In the Internet browser of a PC attached to the **FC-8** network, enter the IP address of the **FC-8** (for example, using the default IP address: 192.168.3.2).
   The Serial Net setup page appears (see *Figure 5*). *Table 3* explains the fields.

Figure 5: Serial Net Configuration Screen of the FC-8

Table 3: FC-8 Serial Net Configuration Parameters

Parameter	Possible Values	Notes
MAC Address		Ethernet hardware address (read-only)
Bootblock Version		For technical use (read-only)
Serial Number		Factory serial number of the device (read-only)
Web Server Status Message	Must be I/OK	(read-only)
Firmware Version	Must end with b17 or above	(read-only)
Hardware Version		For technical use (read-only)
Active IP Address	192.168.3.2 (Default)	Active IP address of the **FC-8**
Subnet Address	255.255.255.0 (Default)	
IP Gateway	0.0.0.0 (Default)	
Wireless LAN SSID	Alpha-numeric Kramer-FC8 (Default) An ad-hoc network must begin with the character "!"	Network name (SSID)
IP Registration Host Server Name	nnn.nnn.nnn.nnn:ppp Where: nnn.nnn.nnn.nnn = a server name or IP address ppp = 0..65535 If Registration Host Server Name is empty, no IP registration server name is defined. 192.168.3.1 (Default)	The Registration Host Server Name is used to locate and establish a connection after FC-8 establishes an Internet session connection as a result of an explicit command or as a result of automated Internet session establishment procedures. The dynamically assigned IP address is sent to the server in ASCII form, after which the socket is closed. See Socket IP Registration. It is assumed that the host server is "listening" on port number. **FC-8** registers itself by opening a socket to a registration server and sending its ID information and current IP address. When the Registration Host Server Name parameter contains a value, the **FC-8** establishes a socket to the server defined in Registration Host Server Name during the registration procedure. When a socket is established, **FC-8** transmits its ID information and current IP address in the following format: FC-8-<D/L/S> S/N:<RP5> version: <RP1> HN:<HSTN> IP:<IPA or RRRL> Port:<LPRT or 80 or 0>" The registration socket is then closed.
SerialNet Listening Port	0 to 64000 10000 (Default)	
Socket Type	0 – TCP (Default) 1 – UDP	
Host Server & Port	nnn.nnn.nnn.nnn:ppp	To configure the **FC-8** as an active station, see section 6.4.
Security Type	0 – N 1 – WEP64 2 – WEP128 3 – WPA 4 – WPA2	No security

Parameter	Possible Values	Notes
Wireless LAN WEP Key1	WEP64 – no more than 10 characters (5 bytes) allowed (hex 0-9 A-F) WEP128 – no more than 26 characters (13 bytes)allowed (hex 0-9 A-F)	
Wireless LAN WEP Key2	Same as WEP Key1	
Wireless LAN WEP Key3	Same as WEP Key1	
Wireless LAN WEP Key4	Same as WEP Key1	
Pre-shared Key Passphrase	WPA – ASCII string must be between 8-63 alphameric characters	
SerialNet Serial Parameters	<b, d, p, s, f > 5, 8, N, 1, 0 (Default)	Where: b = baud [1–9 or h] (see *Table 4*) d = data bits [7 or 8] p = parity [N, E, O] s = stop bits [1] f = flow [0, 1]
Default IP	192.168.3.2 Set to 0.0.0.0 to receive IP address from a DHCP server	Factory default address
[Submit]		Enters the changes made in the configuration table
[Refresh]		Redisplays values of the configuration screen

Table 4: Baud Rate Settings

Baud Code	Baud Rate	Baud Code	Baud Rate
1	600	6	19200
2	1200	7	38400
3	2400	8	57600
4	4800	9	115200
5	9600	h	230400

2. Change the parameters as needed to attach the **FC-8** to the new network and press **Submit**.

Important: When changing the IP address, input the same new address into both the Active IP Address field and in Default IP field.

Note: It may take a few minutes for the update to complete.

> *Warning*: You must enter the correct network parameters. If the parameters are incorrect, the network will not recognize the unit and you will not be able to access the device until it is reconfigured using a special program[1], which can be downloaded from the Kramer Web site.

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1 The **FC-8** must be connected to a PC over the serial port while running the program

3. After submitting the new parameters, reset the **FC-8** by clicking the Reset iChip link at the bottom of the window. The new window with the message "iChip is performing reset" opens. Wait about 1 minute and close this new window.

Note: To start using the new settings, disconnect the wireless connection from the **FC-8** and reconnect it again with new parameters.

Note: If you made changes to the name of the wireless network (Wireless LAN SSD) after clicking the submit button, the connection with the **FC-8** is lost and the connection error message appears. In this case do not perform the Reset iChip procedure. Reconnect the **FC-8** with the new parameters.

6.4 Configuring an Active Station

The **FC-8** can also be configured as an active station to communicate with another listening station.

To configure an active station:

1. Set the other station as a listener if necessary. (This is the normal default setting for the **FC-8**.)

2. In the active station, under Host Server and Port, set the remote IP address and remote port (example, 192.168.5.10:3000).

3. Click **Reset iChip**.

4. The actual connection begins when the active station starts transmitting data on the serial port.

7 Operating the FC-8

After the **FC-8** is fully configured it works transparently as a bridge between the network and the attached device. The attached device can then be operated using RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller.

To operate the attached device using serial commands, install Kramer's control software that can be downloaded from the Kramer Electronics Web site[1].

For an explanation of all control commands, see the Kramer Protocol 2000 commands in the User Manual of the attached device.

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

8 Technical Specifications

The **FC-8** technical specifications are shown in *Table 5*:

Table 5: FC-8 Technical Specifications[1]

INPUT:	RS-232 DB9F connector
OUTPUT:	Antenna
HARDWARE DESCRIPTION:	Core CPU: 32-bit RISC ARM7TDMI, low-leakage, 0.13 micron, running at 48MHz Operating Voltage (input): 12VDC 70mA RoHS-compliant; lead-free
PERFORMANCE SPECIFICATIONS:	RS-232: Asynchronous character; binary; 7 or 8 data bits; odd, even, or no parity; 1 stop bit Flow Control: Hardware (RTSH, CTSH) and software flow control
STANDARDS SUPPORTED:	IEEE 802.11b, IEEE 802.11g
FREQUENCY:	Europe: 2.412 to 2.472GHz USA: 2.412 to 2.462GHz
CHANNELS:	Europe: 13 channels USA: 11 channels
TRANSMIT POWER LEVELS:	802.11b: 17dBm 802.11g: 17dBm
RECEIVE MINIMUM INPUT LEVEL SENSITIVITY:	11Mbps: -86dBm 54Mbps: -72dBm
INTERNET PROTOCOLS:	ARP, ICMP, IP, UDP, TCP, DHCP, DNS, NTP, SMTP
SECURITY PROTOCOLS:	WEP, WPA and WPA2
PROTOCOLS ACCELERATED IN HW:	AES, 3DES and SHA
APPLICATION PROGRAM INTERFACE:	Kramer configuration program – Configure a factory default: Ad hoc net, permanent IP, DHCP server and serialNET mode. Kramer application Web page, enabling changing Net details, Security and IP
PROTOCOLS:	HTTP web server with two on-chip websites: configuration site and application site. DHCP client and server
OPERATING HUMIDITY:	90% max., non-condensing
OPERATING TEMPERATURE:	-40° to 85°C (-40° to 185°F)
DIMENSIONS:	12cm x 7.5cm x 2.5cm (4.7" x 3.0" x 1.0") W, D, H
WEIGHT:	0.3kg (0.7lbs)
ACCESSORIES:	12V DC power supply, antenna, null-modem adapter

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1 Specifications are subject to change without notice

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.

<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