Kramer Electronics, Ltd.

USER MANUAL

Model:

900xl

Power Amplifier

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1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, and presentation professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 500-plus different models now appear in eight groups[1] that are clearly defined by function.

Thank you for purchasing the Kramer TOOLS **900xl** *Power Amplifier,* which is ideal for:

- Presentation rooms and multimedia applications for quick, local audio amplification
- Personal audio listening (for example, a PC and portable CD player)

The package includes the following items:

- **900xl** Power Amplifier
- Power supply (12V DC/2A 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]

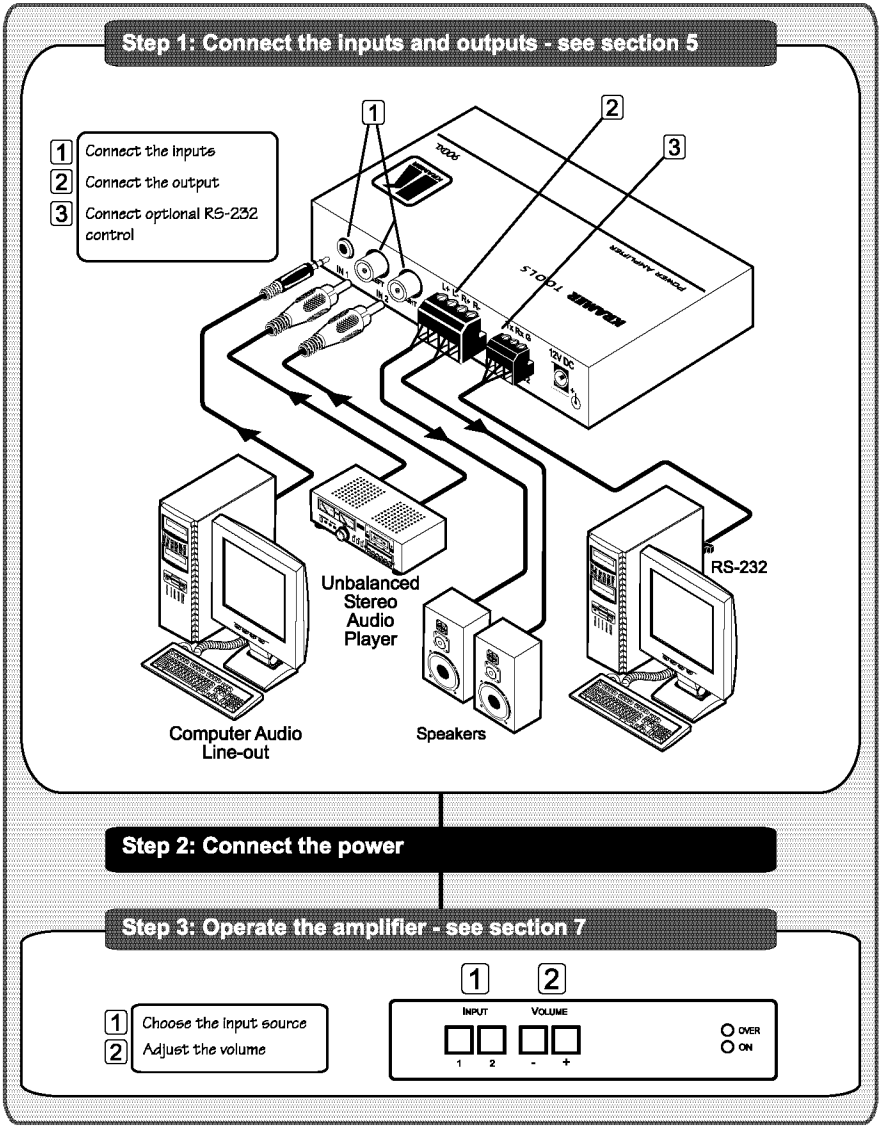
1 GROUP 1: Distribution Amplifiers; GROUP 2: Video and Audio Switchers, Matrix Switchers and Controllers; GROUP 3: Video, Audio, VGA/XGA Processors; GROUP 4: Interfaces and Sync Processors; GROUP 5: Twisted Pair Interfaces; GROUP 6: Accessories and Rack Adapters; GROUP 7: Scan Converters and Scalers;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

2 Download up-to-date Kramer user manuals from our Web site 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.



3 Overview

The Kramer **900xl** is a high-performance power amplifier for line-level stereo audio signals. It accepts either a stereo audio signal on an RCA connector or a stereo audio signal on a 3.5mm mini jack. It delivers a speaker output of 10 watts RMS per channel into a 4-ohm load on a 10A 4-pin terminal block connector.

The **900xl** includes:

- Input selector buttons
- Audio gain buttons for volume control
- Overheating warning protection with LED indicator
- A 12V DC power source

The **900xl** is housed in a Kramer TOOLS enclosure.

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
- Position your Kramer **900xl** 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.

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

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

4 Your 900xl Power Amplifier

Figure 1, *Figure 2*, *Table 1*, and *Table 2* define the unit.

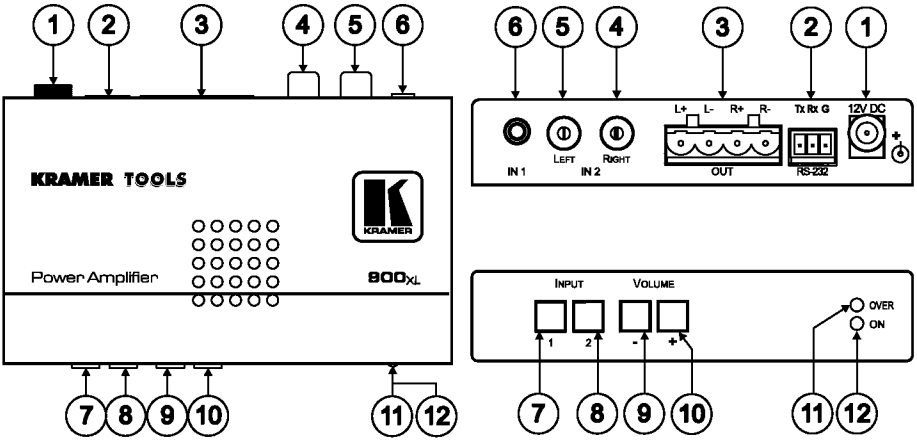


Figure 1: 900xl Power Amplifier – Top, Front, and Rear Views

Table 1: 900xl Power Amplifier Front, and Rear Functions

#	Feature	Function
1	*12V DC* Connector	+12V DC for powering the unit
2	*RS-232 Tx Rx G* Terminal Block Connector	Connect to PC
3	*L+ L– R+ R– OUT* Terminal Block Connector	Speaker output
4	*IN 2 RIGHT* RCA Connector	Connect to stereo audio right input of source 2
5	*IN 2 LEFT* RCA Connector	Connect to stereo audio left input of source 2
6	*IN 1* 3.5mm Mini-jack Connector	Connect to stereo audio input of source 1
7	*INPUT 1* Button	Selects the input from audio source 1
8	*INPUT 2* Button	Selects the input from audio source 2
9	*VOLUME* – Button	Decreases output volume
10	*VOLUME* + Button	Increases output volume
11	*OVER* LED	Illuminates red when device is overheating and mutes output
12	*ON* LED	Illuminates green when receiving power

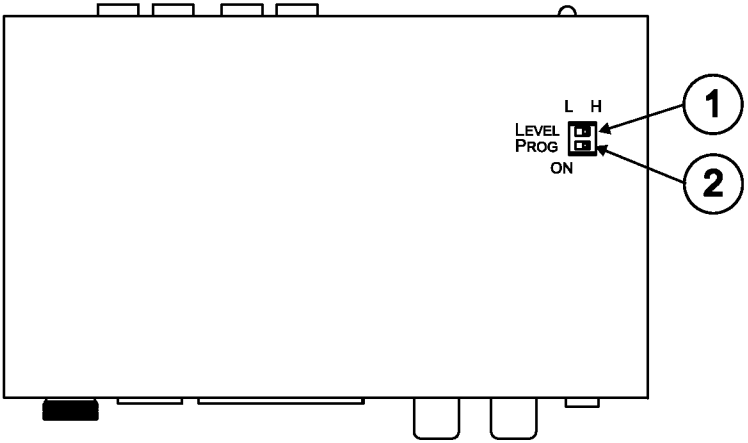


Figure 2: 900xl Power Amplifier – Underside View

Table 2: 900xl Power Amplifier Underside Functions

#	Feature	Function
1	*LEVEL L/H* Switch	Input level – low / high gain; set to low in case of distortion
2	*PROG ON* Switch	For use when upgrading device firmware

5 Connecting the 900xl Power Amplifier

To connect the **900xl**, as illustrated in *Figure 3*, perform the following:

1. Connect an unbalanced stereo audio source (for example, a computer audio line out) to the IN 1 mini jack connector.
2. Connect an unbalanced stereo audio source (for example, an unbalanced stereo audio player) to the LEFT and RIGHT IN 2 RCA connectors.
3. Connect the SPKR OUT terminal block to a pair of loudspeakers: Connect the "L+" and the "L-" terminal block connectors to the left loudspeaker, and the "R+" and the "R-" terminal block connectors to the right loudspeaker. **Do not ground the loudspeakers**.
4. Connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity (not shown in *Figure 3*).

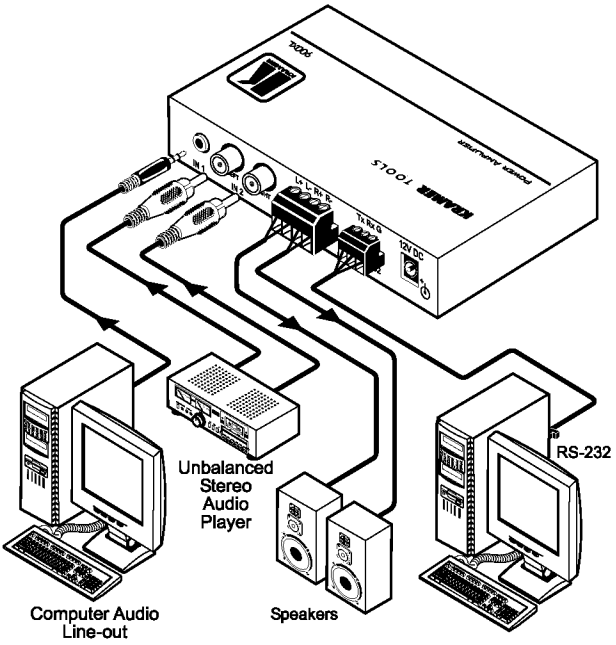


Figure 3: Connecting the 900xl Power Amplifier

5.1 Connecting a PC

You can control the **900xl** with a PC (or other controllers) via the RS-232 port using serial commands.

To connect a PC to the **900xl**:

- Connect the RS-232 9-pin D-sub port on your PC to the RS-232 rear panel port on the Master **900xl** using a cable as shown in *Figure 4*:

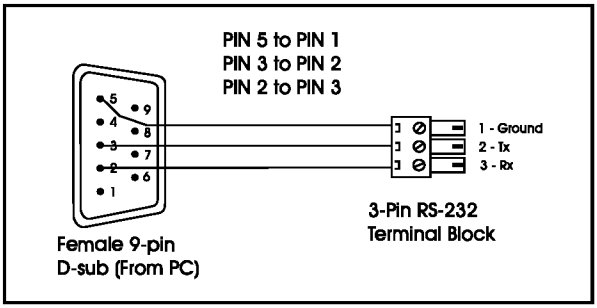


Figure 4: RS-232 Control Cable

6 Operating the 900xl Power Amplifier

You can operate your **900xl** using:

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

6.1 Using the Front Panel Buttons

To operate the **900xl** using the front panel buttons:

- To choose audio input source 1 (the PC line-out as shown in *Figure 3*), press INPUT 1 button.
- To choose audio input source 2 (a stereo tape), press INPUT 2 button.

Adjust the output volume to the speakers using the VOLUME + and – buttons.

Note: In the case of output distortion that cannot be corrected using the volume controls, try switching the LEVEL switch on the underside of the unit (see *Figure 2*) from H to L and alter the output using the volume control.

6.2 Using Serial Commands

To operate your device using serial commands, you need to install Kramer's control software[1].

For an explanation of all control commands, see sections 8 and 9.

7 Technical Specifications

900xl technical specifications are shown in *Table 3*:

Table 3: 900xl Technical Specifications[2]

INPUTS:	1. Stereo audio on a 3.5mm mini-jack connector 2. Stereo audio on RCA connectors
OUTPUTS:	1 stereo differential speaker output
MAX. OUTPUT LEVEL:	18.4Vpp, 10 RMS per channel
BANDWIDTH (-3dB):	25kHz
S/N RATIO:	60dB
CONTROLS[3]:	Gain range: -14.8 to +32dB at high-gain -21.3 to +20.2dB at low-gain
COUPLING:	Input: AC; Output: DC
AUDIO THD + NOISE:	2.2%
AUDIO 2nd HARMONIC:	1.2%
POWER SOURCE:	12V DC x 2.3A DC Fuse:4A/16V
DIMENSIONS	12cm x 7.5cm x 2.5cm (4.7" x 3.0" x 1.0") W, D, H
WEIGHT:	0.2kg (0.4lbs)
ACCESSORIES:	Power supply

1 Download control software from our Web site at http://www kramerelectronics com

2 Specifications are subject to change without notice

3 External controls: IN1, IN2, VOLUME-, VOLUME+ by front panel pushbuttons RS-232 connection by 3-pin terminal block

8 Hex Table

Table 4 lists the Hex values (described in section 9) for the **900xl**:

Table 4: 900xl Hex Table

Instruction #	Hex Code		Description
2. Switch Audio	02 81 81 81		Connect Input 1 to output
	02 82 81 81		Connect Input 2 to output
22. Gain Control	**Input 1**	**Input 2**	
	16 81 80 81	16 82 80 81	Mute
	16 81 81 81	16 82 81 81	…
	16 81 82 81	16 82 82 81	
	…	…	
	16 81 FF 81	16 82 FF 81	Maximum gain
24. Increase/Decrease Audio Parameter	18 81 80 81		Increase output
	18 81 81 81		Decrease output

9 Kramer Protocol 2000

The **900xl** is compatible with Kramer's Protocol 2000, version 0.50. 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.

Note: Compatibility with Kramer's Protocol 2000 does not mean that a machine uses all of the commands below. Each machine uses a sub-set of Protocol 2000, according to its needs.

Table 5: Protocol Definitions

MSB							LSB
	DESTINATION	**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	0
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 to be performed by the switcher(s) is defined by the INSTRUCTION (6 bits) Also, if a function is performed via the machine's keyboard, then these bits are set with the INSTRUCTION NO that 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 (i e 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 6: Instruction Codes for Protocol 2000

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

INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	DESCRIPTION	INPUT	OUTPUT	
0	RESET MACH NE	0	0	1
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
6	REQUEST STATUS OF AN AUDIO OUTPUT	Set as SETUP #	Equal to output number whose status is reqd	4, 3
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
22	SET AUDIO PARAMETER	Equal to output number whose parameter is to be set = 1	Set as parameter value 0–127	2, 11
24	INCREASE / DECREASE AUDIO PARAMETER	Equal to output number whose parameter is to be increased / decreased by 1	0 - increase output 1 - decrease output	24
25	REQUEST AUDIO PARAMETER	Equal to output number whose parameter is requested	0	6, 20, 24
57	SET AUTO-SAVE	I3 - no save I4 - auto-save	0	12, 2
61	IDENTIFY MACHINE	2 - audio machine name 4 - audio software version 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	13
62	DEFINE MACH NE	1 - number of inputs 2 - number of outputs 3 - number of setups	2 - for audio	14

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

02 82 81 81

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

42 81 81 81

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

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

NOTE 11 – For machines where the audio parameter 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

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 128dec+ 3dec for 2nd byte, 128dec+ 5dec for 3rd byte)

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 (i e request the number of outputs)

would be HEX codes

7E 82 90 82 i e 16 outputs

LIMITED WARRANTY

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

HOW LONG IS THE WARRANTY

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

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

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

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

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

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

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

HOW YOU CAN GET WARRANTY SERVICE

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

LIMITATION OF IMPLIED WARRANTIES

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

EXCLUSION OF DAMAGES

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

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

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

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

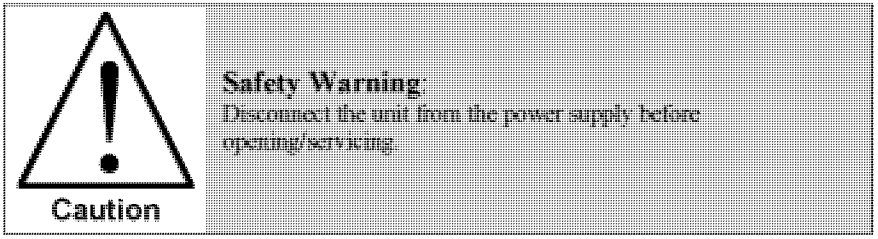
This equipment has been tested to determine compliance with the requirements of:

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

CAUTION!

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

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



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