Kramer Electronics, Ltd.

USER MANUAL

XGA Line Amplifier

Model:

VP-210xl

IMPORTANT: Before proceeding, please read paragraph entitled "Unpacking and Contents"

Table Of Contents

List Of Illustrations

List Of Tables

1 INTRODUCTION

Congratulations on your purchase of this Kramer **XGA Line Amplifier**. Since 1981, Kramer has been dedicated to the development and manufacture of high quality video/audio equipment. The Kramer line has become an integral part of many of the best production and presentation facilities around the world. In recent years, Kramer has redesigned and upgraded most of the line, making the best even better. Kramer's line of professional video/audio electronics is one of the most versatile and complete available, and is a true leader in terms of quality, workmanship, price/performance ratio and innovation. In addition to the Kramer line of high quality **XGA Line Amplifiers**, such as the one you have just purchased, Kramer also offers a full line of high quality distribution amplifiers, switchers, processors, interfaces, controllers and computer-related products. This manual includes configuration, operation and option information for the VP-210xl, one of the line of Kramer VP Tools.

1.1 A Word on VGA/XGA Distribution / Line Amplifiers

VGA/XGA distribution amplifiers distribute one or more signals to several users. They vary in the number of inputs, looping capability, programming capability, number of outputs, operating format, bandwidth and input/output coupling. VGA/XGA distribution amplifiers are used to distribute one source to several acceptors (wide screen projectors, format converters etc.) for simultaneous recording or monitoring of one source, with no discernible signal degradation. The machines excel in very large bandwidth (some approaching 400Mhz) and very good linearity, making them usable for even the highest graphics standards. A good quality distribution amplifier amplifies the incoming signal, may pre-compensate the signal for potential losses (resulting from the use of long cables, noisy source, etc.) and generates several identical buffered and amplified outputs. The front panels of these Kramer amplifiers are designed to be simple to operate. Typical applications of the machines are: computer graphics distribution in classes, point of sale and multimedia studios, displaying computer graphics before large audiences using the data input of a wide screen video projector.

1.2 Handling Graphics Signals

A computer generated graphics signal usually comprises 5 signals: Red, Green, Blue - which are analog level signals - and two TTL (logic) level signals - Horizontal Sync and Vertical Sync. (Digital graphics cards and monitors use a different signal format, and will not be discussed here.)

Computer graphics resolution is measured in pixels and signal bandwidth. The more pixels (picture elements) on the screen, the more detailed the image. VGA,

S-VGA, XGA, S-XGA and U-XGA are terms describing graphics resolution and color depth. Color depth represents the maximum number of simultaneously displayed colors on the screen and is measured in bits. 24 and 32-36 bits of color depth represent millions to billions of color shades available on the screen at any given moment. (It should be born in mind, though, that the human eye can resolve only a few thousands colors!) The more detailed the image (higher resolution) and the higher the color depth, the more real the image will look. The highest resolution of standard VGA was 640x480 pixels with 4 bits of color (16 colors). Standard VGA was able to use more colors (256) but at a lower resolution, around 320x200 pixels, which was very crude. Common resolutions used today for computer graphics vary from 1024x768 up to 2000x1600 pixels with "high color" - 16 bits of color, representing 64,000 different colors, up to "true color" - 24 bits or more, representing from 16.7 million colors, up to several billion. Displaying such a detailed and colorful image on the screen (e.g. "writing" so many pixels on the screen in real time) needs enormous graphics memory per frame, as well as very high speeds. The amplifiers that carry those signals must be able to handle those speeds and signal bandwidths.

Standard VGA, at 640x480 resolution, needed amplifiers with 20-30MHz bandwidth. At 1600x1200 or even at 1280x1024 (S-XGA), those amplifiers fail completely. In order to faithfully amplify and transmit modern high-resolution graphics, amplifiers with bandwidths of 300 MHz and more are needed. Those amplifiers, besides the enormous bandwidth they handle, need to be linear, to have very low distortion and to be stable. Stability of an amplifier is its ability to avoid bursting into uncontrolled oscillation, which is in adverse relationship to the speed it can handle. The tendency to oscillate is further increased by the load impedance. The load impedance of a system is usually not just a resistor. A cable connected to an amplifier (leading to the receiver or monitor) may present a capacitive and/or an inductive load to the amplifier. This is the main cause of instability. The quality problems of a load or cable may severely degrade the bandwidth, linearity, and stability of the amplifier and in general its ability to faithfully reproduce the signal.

Cables also affect image resolution. Longer cables, due to their imperfections, cause high frequency deterioration and hence image "smear" and loss of resolution. In computer graphics especially, this adverse effect is very much accentuated. Amplifiers should therefore cope with an additional task - compensating for cable losses up to the maximum useful operation distance. High-resolution graphics systems should use very high quality cables for image transmission. The cables should be shielded to eliminate externally induced interference but the shield might itself increase the capacitance of the cable, and therefore, cause deterioration in the image's resolution and clarity. Standard

quality cables can only be a few meters long. For longer distances, compound cable is replaced by five individual coax cables, which are bulky and cumbersome for use. Even then, the distance is limited to several tens of meters.
Cables may create other problems, which result from their failure to accurately match the system's required impedance. The result of this, especially at high frequencies, is "shadows" or "ghosts" on the image, resulting from standing waves and electronic reflections running back and forth between transmitter and receiver. Another aspect to consider is the sync. As sync signals are logic signals, which are not treated as analog signals, the receiver does not terminate the line, and therefore the line is not matched. A host of problems can occur when sync signals are sent over long, unterminated, unmatched cables. The result might be image breakdown or distortion due to improper sync information. The amplifier that drives the analog section of the graphics data should also be able to buffer, recover and send the sync information in such a way that it is received properly at the receiving end.

1.3 Factors Affecting Quality of Results

There are many factors affecting the quality of results when signals are transmitted from a source to an acceptor:

- **Connection cables** - Low quality cables are susceptible to interference; they degrade signal quality due to poor matching and cause elevated noise levels. They should be of the best quality.
- **Sockets and connectors of the sources and acceptors** - So often ignored, they should be of highest quality, since "Zero Ohm" connection resistance is the target. Sockets and connectors must also match the required impedance (75ohm in video). Cheap, low quality connectors tend to rust, thus causing breaks in the signal path.
- **Amplifying circuitry** - Must provide quality performance when the desired end result is high linearity, low distortion and low noise operation.
- **Distance between sources and acceptors** - Plays a major role in the final result. For long distances of over 15 meters (~2 to 3 meters for VGA/XGA) between sources and acceptors, special measures should be taken in order to avoid cable losses. These include using higher quality cables or adding line amplifiers.
- **Interference from neighboring electrical appliances** - They can have an adverse effect on signal quality. Balanced audio lines are less prone to interference, but unbalanced audio should be installed far from any mains power cables, electric motors, transmitters, etc. even when the cables are shielded.

2 HOW DO I GET STARTED?

The fastest way to get started is to take your time and do everything right the first time. Taking 15 minutes to read the manual may save you a few hours later. You don't even have to read the whole manual. If a section doesn't apply to you, you don't have to spend your time reading it.

3 UNPACKING AND CONTENTS

The items contained in your Kramer distributor package are listed below. Please save the original box and packaging materials for possible future shipment.

- **Line Amplifier**
- **Power Supply (wall transformer)**
- **This User Manual**
- **Kramer Concise Product Catalog or CD**
- **Two Mounting Brackets**
- **4 Rubber Feet**

3.1 Optional Accessories

The following accessories, which are available from Kramer, can enhance implementation of your machine. For information regarding cables and additional accessories, contact your Kramer dealer.

- **Rack Adapter -** Used to install smaller size machines in a standard 1U or 3U rack space. One or more machines may be installed on each adapter.

- **VP-211 -** (2x1 Automatic VGA/Audio Switcher) can be serially inserted between the XGA/audio source and the Line Amplifier for XGA long-line use. It is a full bandwidth switcher designed for computer and presentation applications. The **VP-211** automatically detects the presence of a VGA/XGA signal on input no. 1 and routes it to the output. If the signal disappears, the machine switches to input no. 2 and routes it to the output. When the signal on input no. 1 re-appears, the **VP-211** reroutes input no. 1 to the output. The machine operates in audio-follow-video (VGA) mode and switches the stereo audio input appropriate to the VGA input. Signal bandwidth of 517MHz ensures that the **VP-211** remains transparent even in the most critical applications. The VP-211 is part of the Kramer TOOLS family of compact, high quality and cost effective solutions for a variety of applications.

- **VP-103** - (VGA to RGBS/HV Converter) can be serially inserted between the XGA Line Amplifier and the acceptors for XGA to RGBS/HV conversion. The **VP-103** is a high performance VGA/XGA/UXGA-to-BNC converter which allows a single VGA/XGA/UXGA source to simultaneously drive a local monitor and up to two compatible large display devices. Many projectors and large monitors use BNC connectors rather than multi-pin D connectors found on computers. The VP-103 solves this physical incompatibility, and also provides the local monitor loop-through, and the necessary buffering, amplification, and sync processing for remote acceptor applications. Note that the **VP-103** does not perform any scan rate conversion. The **VP-103** will accept all typical VGA modes such as VGA, SVGA, XGA, SXGA, and UXGA and will output RGsB, RGBS, or RGBHV. Video bandwidth of 315 MHz ensures transparent operation at multiple resolutions including XGA. For applications not requiring a local monitor, a front-panel termination switch is provided eliminating the need for external termination plugs. The machine provides Level and Cable Equalization from easy-access front panel controls. The **VP103** is rugged, dependable, and runs on a standard 12VDC source, and is therefore perfectly suitable for fieldwork.

4 XGA LINE AMPLIFER

This section describes the controls and connections of your amplifier. Understanding the controls and connections helps you realize the full power of your machine.

4.1 Getting to Know Your VP-210xl Line Amplifier

The Kramer **VP-210*xl*** is a high performance Line Amplifier for VGA/XGA signals. It accepts one input, provides correct buffering and isolation, loops it out to a local monitor or another acceptor and outputs an amplified and equalized signal to a remote acceptor. The machine provides output level control and cable equalization, using two rotary controls on the front panel of the machine. The machine allows input signal termination and ID bit control via 4 small switches under the chassis. Video bandwidth exceeding 380 MHz ensures that the **VP-210*xl*** remains transparent even at the highest resolution UXGA modes (1600x1200). It is ideal for remote monitor applications, or presentation systems requiring a local monitor and a large screen display such as a projector, at close or remote locations. A 12V power supply is included.

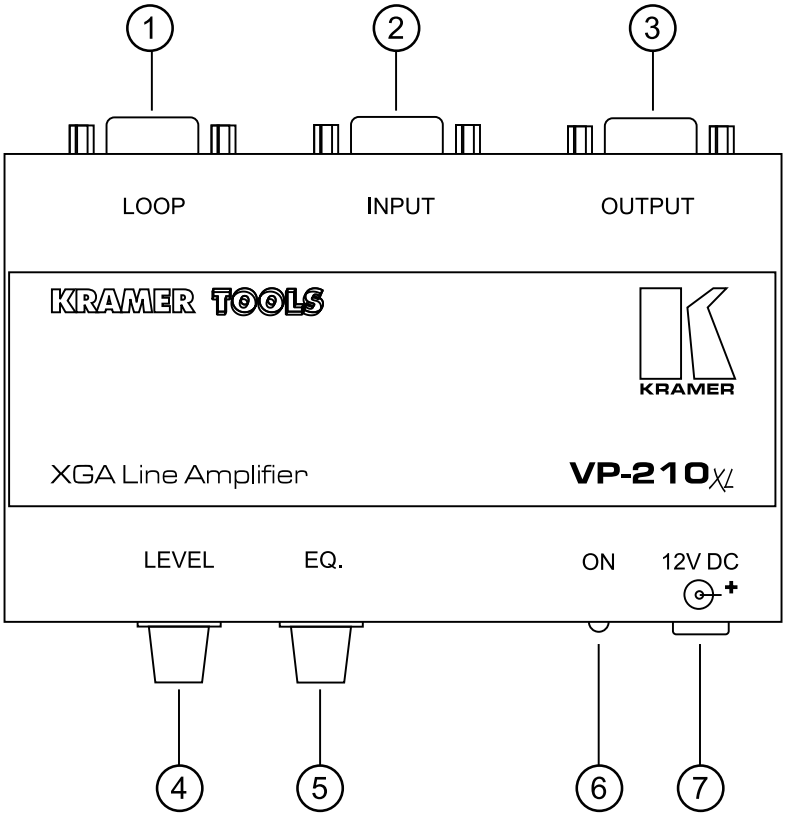

Figure 1: VP-210xl Front/Rear Panel Features

Table 1: VP-210xl Front/Rear Panel Features

No.	Feature	Function
1	**LOOP HD 15 connector**	VGA/XGA loop output to local monitor.
2	**INPUT HD 15 connector**	VGA/XGA input
3	**OUTPUT HD 15 connector**	VGA/XGA output to remote acceptor.
4	**LEVEL Control Knob**	Adjusting VGA/XGA signal output level
5	**EQ. Control Knob**	Adjusting VGA/XGA cable equalization
6	**ON LED**	Glows when power is supplied
7	**12VDC Socket**	12 Volts power feed to the machine

5 INSTALLATION

5.1 Rack Mounting

The VP-210xl line amplifier may be rackmounted in a standard 19" (1U or 3U) EIA rack assembly, using either the **RK-T1** optional adapter (1U rack space - for mounting up to three machines) or the **RK-T3** optional adapter (3U rack space for mounting up to eight machines).

5.2 Connecting TO VGA/XGA Devices

VGA/XGA sources and output devices (such as monitors, projectors or recorders) may be connected through the HD 15F connectors located on the back of the unit.

6 USING The Line Amplifier

6.1 Typical Application

A typical application is described in figure 2 below.

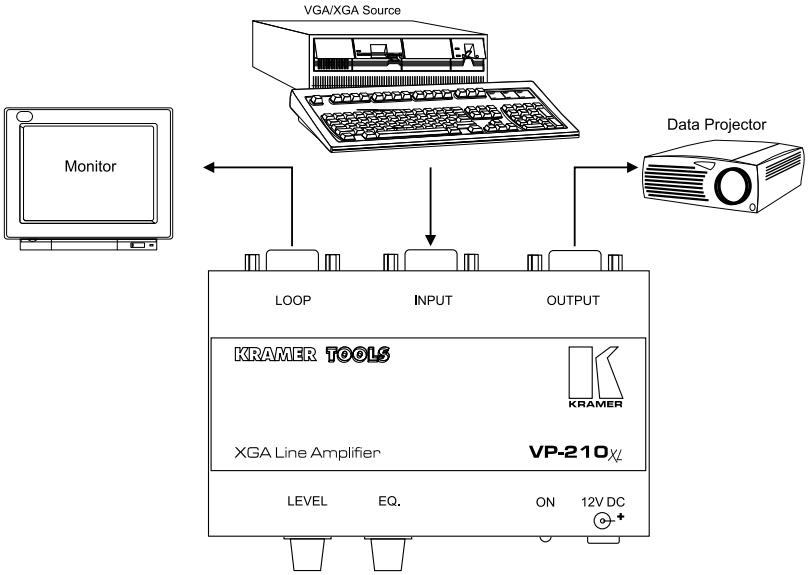

Figure 2: A typical application of the VP-210xl

Computer based graphics is used in video production, in presentation applications, for education purposes and more. It is frequently necessary to distribute PC graphics from one source to a remote acceptor. Figure 2 describes a typical XGA line amplification where the source feeds a local monitor and is distributed to a remote acceptor.

Perform the following steps:

1) Preset the machine according to the description in section 6.2.
2) Connect VGA/XGA source to the input of the amplifier.
3) Connect a local XGA/VGA monitor (if needed) to the loop connector of the amplifier.
4) Operate the amplifier, source and acceptors.
5) Adjust, if needed, the level control and the cable EQ. control. As described in section 6.3 - "handling signal losses".

6.2 VP-210xl Preset

In order to use the **VP-210xl** efficiently, the machine should be preset to the required application. There are four dip switches accessible from the bottom of the machine. Three are used for enabling the looping option, and one is used for pin 4 ID control. The use of those switches is described below and in Figure 3.
When looping is needed (connecting a local monitor) the three dipswitches labeled R, G, B should be switched away from the INPUT connector side. When a local monitor is not used, they should be in the "TERM" (terminate) position, (towards the INPUT connector side.) When using a notebook PC that requires that the ID bit will be set ON in order to output the graphics on a local monitor, then the last switch, marked ID, should be switched ON, in the INPUT socket direction. *Incorrect setting of the termination switches might result in a too-bright or too-dim image, and might damage the monitors! All RGB switches should be moved together. Failing to so will result in severe color distortion.*

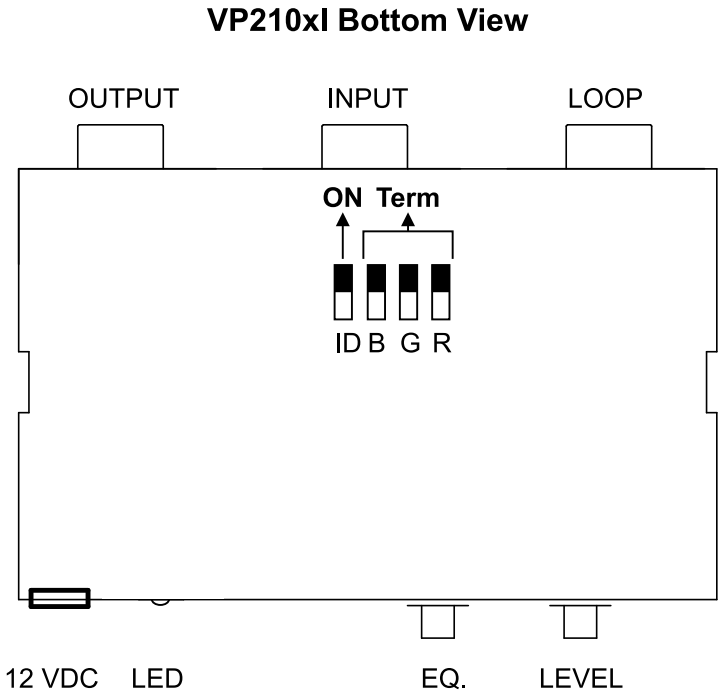

Figure 3: Dip switch map of the VP-210xl

6.3 Handling signal losses

High-resolution VGA/XGA signals are very sensitive to cable length and quality. Long and/or low quality cables tend to degrade the signal quality, resulting in image "smear" and fine-detail loss, as well as signal level attenuation.

The VP-210xl allows the user to handle and correct those problems, using the built-in amplifiers. Using very high quality cables of 1-2 meter length will not require adjustment, even when the signals involved are UXGA signals (1600x1200 resolution). At that length, standard cables will allow resolutions of 640x480 and sometimes 800x600. If longer standard cables are used, even at those low resolutions, cable compensation is needed.

Even with the best available compound cables (several thin cables in one sleeve) at SXGA resolution (1280x1024) or UXGA resolution, there will be apparent signal depreciation at over five meters. In low quality cables, those high-resolution signals will be affected at distances even shorter than one meter.

The VP-210xl has two user adjustable controls, which should be used as following:

1. If you see a signal detail loss (resulting in image "smear" and blurring on the screen) carefully turn the EQ. control knob clockwise, until the lost details reappear and the original resolution is resumed. This control gradually compensates for the losses incurred within the cable due to its design or length. Bear in mind though that beyond a certain distance, dictated by the cable stray-capacitance (cable measure of quality) losses cannot be completely recovered. In this case, it is advised that a lower graphics resolution should be chosen or the cable should be replaced with a better one.
2. If the whole signal is attenuated, the image on the screen will become darker. In this case, carefully turn the LEVEL control knob clockwise. Overdoing this control will result in image "burnout" and might damage the signal receiver, therefore, adjusting this control should be done very carefully. Between the EQ. control (that should be adjusted first) and the LEVEL control, much of the lost signals may be restored.

6.4 Adding more outputs

If more outputs than the two outputs the **VP-210xl** provides are needed, then any of Kramer VGA/XGA distribution amplifiers may be used. The VP-200, for example, provides 2 outputs, the VP-300 provides 3, the VP-400 provides 4 and so on up to the VP-12xl that is able to provide 12 parallel outputs from a single input. All that is needed is to connect the output of the VP-210xl to the input of the selected distributor.

6.5 Adding more inputs

If more inputs are needed, then one of Kramer's VGA/XGA switchers may be installed in front of the VP-210xl. Some suitable machines are the VP-201 (2 inputs), VP-32xl (3 inputs), VP-61xl (6 inputs), etc.

7 SPECIFICATIONS

INPUTS:	Looping analog Red, Green, Blue signals - 0.7 Vpp/75 Ω, H & V sync, TTL level, on HD15F connectors.
OUTPUT:	1 Analog Red, Green, Blue signals - 0.7 Vpp/75 Ω, H & V syncs-TTL level, on HD15F connectors.
VIDEO BANDWIDTH:	380 MHz -3dB.
CONTROLS:	Level: -0.6 to +4.1dB, EQ.: 0 to +4dB @ 5 MHz
VIDEO S/N RATIO:	73 dB.
DIFF. GAIN:	<0.05%.
DIFF. PHASE:	<0.03 Deg.
K-FACTOR:	<0.05%.
DIMENSIONS:	12cm x 7.5cm x 2.5cm (4.7" x 2.95" x 0.98", W, D, H.).
POWER SOURCE:	12 VDC, 60 mA.
WEIGHT:	0.25 kg. (0.55 lbs.) Approx.
ACCESSORIES:	Power supply, mounting brackets.
OPTIONS:	Model VA-50P power supply with six 12VDC outlets, RK-T1 and RK-T3 rack adapters.

8 TROUBLESHOOTING

NOTES

1. *Please note that if the output signal is disturbed or interrupted by very strong external electromagnetic interference, it should return and stabilize when such interference ends. If not, disconnect power from the machine and reconnect again to reset the machine.*
2. *If the recommended actions still do not result in satisfactory operation, please consult your KRAMER Dealer.*

8.1 Power and Indicators

Problem	Remedy
No Power	**1.** Confirm that power connections are secured at the machine and at the receptacle. Make sure the receptacle is active, outputting the proper voltage. **2.** If there is still no power use a Philips screwdriver to remove two screws on both sides of the machine and release the panel. **3.** Locate the fuse holder located inside your machine. Confirm that the fuse is good by looking for the wire connected between the ends of the fuse. If this wire is broken, replace the fuse with another, with the same rating. **4.** Install the machine's cover by tightening its Philips screws.

8.2 VGA/XGA Signal

Problem	Remedy
No VGA/XGA the output device	**1.** Confirm that your source and output devices are powered on and connected properly. The input of your machine should be of an identical signal format at the output of your source. **2.** Confirm that any other device in the signal path have the proper input and/or output selected. **3.** Use a VP-800 together with a known working monitor to help trace faulty cables and equipment.
VGA/XGA level is too high or too dim.	**1.** Verify that the lines are well matched through 75ohm impedances; otherwise it results in a video level that is too high or too dim. **2.** Confirm that the connecting cables are of high quality and properly inserted. **3.** Check level controls on your source input device or output display.

Noise bars "roll" up or down in the output image or: Low Frequency Hum in the output signal	**1.** Hum bars (ground loop) are caused by a difference in the ground potential of any two or more devices connected to your signal path. This difference is compensated by passing that voltage difference through any available interconnection, including your cables. **WARNING**! ***Do not disconnect the ground from any piece of equipment in the signal path!*** **2.** Check the following to remove hum bars: **3.** Confirm that all interconnected equipment is connected to the same power phase, if possible. **4.** Remove equipment connected to that phase that may introduce noise, such as motors, generators, etc. **5.** Disconnect all interconnecting cables and reconnect them one at a time until the ground loop reappears. Disconnect the affected cable and replace, or insert an isolation transformer in the signal path.

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 three 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:

a) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature.

b) Product modification, or failure to follow instructions supplied with the product.
c) Repair or attempted repair by anyone not authorized by Kramer.
d) Any shipment of the product (claims must be presented to the carrier).
e) Removal or installation of the product.
f) Any other cause, which does not relate to a product defect.
g) 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

Kramer's liability for any defective 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.

NOTICE

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.
Updates to this user manual may be found at http://www.kramerelectronics.com/manuals.html.
We welcome your questions, comments and feedback.

Kramer Electronics, Ltd.
Web site: www.kramerelectronics.com
E-mail: info@kramerel.com
P/N: 2900-001020 REV 2