KRAMER ELECTRONICS, Ltd.

USER MANUAL

Video/Audio Distribution Amplifiers

Models:

VM-3S/ VM-3S*xl*

VM-3V/ VM-3V*xl*

<u>IMPORTANT</u>: Before proceeding, please read paragraph entitled "Unpacking and Contents"

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1. INTRODUCTION

Congratulations on your purchase of this Kramer Electronics 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 amplifiers, such as the one you have just purchased, Kramer also offers a full line of high quality switchers, processors, interfaces, controllers and computer-related products. This manual includes configuration, operation and option information for the following products from the Kramer VM-3 line of distribution amplifiers. All these amplifiers are similar in operation and features:

- **VM-3S / VM-3Sxl** - 1:3 Audio/Video Distributor
- **VM-3V / VM-3Vxl** - 1:3 Video Distributor

The ***xl*** versions have a larger video bandwidth and include an external termination switch, so when you use a "T" connector on the input, the incoming signal may be routed to another video user (looping).

1.1 A Word On Distribution Amplifiers

Distribution amplifiers are used to distribute one source to several acceptors for simultaneous recording or monitoring of one source, with no discernible signal degradation. They vary in the number of inputs, looping capability, programming capability, number of outputs, operating format, bandwidth and input/output coupling. A good quality distribution amplifier amplifies the incoming signal, pre-compensates the signal for potential losses (resulting from the use of long cables, noisy source, etc.) and generates several identical buffered and amplified outputs. Often, a signal processor is inserted between the source and the distribution amplifier for correction and fine-tuning of the source signal before multiplication, so that all copies are corrected in the same way. The front panels of these Kramer amplifiers are designed to be simple to operate.

1.2 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 therefore 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 objective. Sockets and connectors also must match the required impedance (75 ohms in video). Cheap, low quality connectors tend to rust, thus causing breaks in the signal path.
Amplifying circuitry - Must have 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 (over 15 meters) 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 - These 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. SPECIFICATIONS

	VM-3S / VM-3Sxl	VM-3V / VM-3Vxl
Function	1:3 s-Video DA	1:3 Composite/Single Component Video DA
Input	1 s-Video, 1Vpp/75ohm (Y), 0.3Vpp/75ohm (C) on a 4P connector	1 Composite Video, 1Vpp/75ohm, on a BNC connector
Output Type	3 s-Video, 1Vpp/75ohm (Y), 0.3Vpp/75ohm (C) on 4P connectors	3 Composite Video, 1Vpp/75ohm, on BNC connectors
Output Coupling	AC	AC
Controls	Termination Switch (VM-3S*xl* only)	Termination Switch (VM-3V*xl* only)
S/N Ratio	70dB (80 dB for VM-3S*xl*)	73dB (77dB for VM-3V*xl*)
Video Bandwidth	60 MHz -3dB (Y); (200 MHz –3dB, Y, VM-3Sxl)	60 MHz -3dB; (430 MHz -3dB,VM-3Vxl)
Max Video Output	2Vpp (Y)	2Vpp
Diff. Gain	0.03%	0.05%
Diff. Phase	0.03Deg.	0.13Deg.
K-Factor	0.4% (0.3% for VM-3S*xl*)	<0.5% (0.2% for VM-3V*xl*)
Dimensions (W, D, H)	11.7cm x 6cm x 3.2cm 4.6" x 2.4" x 1.3"	11.7cm x 6cm x 3.2cm 4.6" x 2.4" x 1.3"
Weight	0.240kg (0.53lbs) Approx.	0.28kg (0.62lbs.) Approx.
Power consumption	0.84VA	0.6VA
Power Source	12VDC, 70mA	12VDC, 50mA

3. 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.

4. UNPACKING AND CONTENTS

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

- Amplifier
- AC adapter
- User Manual
- Rubber feet
- Kramer Concise Catalog

For additional information regarding optional cables and additional accessories, contact your Kramer dealer.

4.1 Optional Accessories

The following Kramer accessories can enhance implementation of your amplifier.

- **SP-40** - (Video/Audio Processor) Serially connected between the video/audio source and the VM amplifier for video and audio processing, the machine is a high quality processor used for video control and correction in duplication and production studios, camera control, luminance and white balance correction. The SP-40 is capable of Composite to Y/C switching and bi-directional transcoding using its DC coupled video inputs/outputs allowing full control over the video signal. The machine allows video gain control down to full fade, definition control, contrast control, color saturation control, black level control, audio mix control for mixing between the selected source and an audio AUX source and a screen splitter control for "before-after" comparison. A unique limiter switch allows true signal limiting and special effects.

- **SP-11** - (Video/Audio Processor) can be serially connected between the video/audio source and the amplifier for video and audio control/correction. The machine provides camera control and luminance/white balance correction. The SP-11 is also capable of performing Composite to Y/C conversion and bi-directional transcoding. The machine allows full control over the video signal: Video gain down to full fade, log or linear Definition control, log or linear Contrast control, Color saturation control, Black Level control, Red, Green and Blue controls and a Screen Splitter control for "before-after" comparison. The Input switch control is "Audio-follow-Video".

- **104L** - (Video Line Amplifier) Serially connected between the video/audio source and the amplifier for video and audio processing, the machine is used for video line amplification and cable compensation, video field work and SDI signal distribution. Signal loss and the resulting depreciation in the picture quality is a real problem in any video setup requiring considerable distance between video source and acceptors. The KRAMER 104L Video Line Amplifier, one of the KRAMER TOOLS, is a high quality amplifier, which prevents video signal losses over long cables. For best results the 104L amplifier is installed adjacent to the video source. The 104L is housed in the compact KRAMER TOOLS enclosure and is fed by a 12VDC source. High bandwidth and front accessible controls make it suitable for the most demanding analog and SDI studio applications.

- **VM-9YC -** (Video/Audio Line Amplifier) Serially connected between the video/audio source and the amplifier for video and audio processing, the machine is a high quality video/stereo amplifier which compensates for video and audio signal losses when long cables are used. In any video/audio setup requiring considerable distances between video/audio source and acceptors, signal loss and thus depreciation in the quality of both picture and sound is a real problem. To prevent this phenomenon, a VM-9S amplifier is installed adjacent to the video/audio source.

- **VS-4E** - (A Precision Mechanical 4x4 Video/Audio Switcher) Several video/audio sources may be connected to its inputs for switching. The machine may be used in every application where easy and fast video and audio source selection is needed and for high isolation between inputs. All unselected inputs are internally terminated with 75-Ohm resistors. The VM-4E switches Video, SDI and any other high frequency signals. The VM-4E is housed in a small enclosure, occupying very little desk space.

- **VS-81AV -** (A Precision, Mechanical, 8x1 Video/Stereo-Audio Switcher) Several video/audio sources may be connected to its inputs for switching. The machine offers fast and easy video/audio source and acceptor selection. The VM-81AV provides high isolation between inputs and outputs and all unselected video inputs are internally terminated with 75-Ohm resistors. The VM-81AV is housed in a professional 19-inch rack mountable enclosure.

- **VS-801xl**- (8:1 Composite/Single Component Video & Unbalanced Audio Switcher) Several video/audio sources may be connected to its inputs for switching. The machine provides truly effortless switching between eight, video and unbalanced audio inputs to one output. Switching is done during vertical interval, either of source no. 1 or of the video available on the external sync socket. The switcher may be controlled by touch buttons or by contact closure via a remote socket on the back of the machine. Video signal bandwidth is 225 MHz (typical), allowing the machine to be used in the most demanding applications.

- **VS-5x4** -(5x4 Video/Audio Stereo Matrix Switcher) Several video/audio sources may be connected to its inputs for switching. The machine may be used as one 1:4 or two 2:2 Y/C-video/audio DAs or other combinations as well. The VIS-5x4 switches during the vertical interval for smooth transitions between genlocked sources. The machine is microprocessor and RS-232 controlled (software included), and is operated by touching a keypad on the front panel. Front switches control the audio level of each output. Large illuminated display LEDs show connection status at any given moment.

- **TP-1** (Video Line Transmitter) If one output is to be sent over a distance of 100 meter or more, it is necessary to convert the signal to twisted pair type. The TP-1 converts and sends a color video signal over long distances using telephone wire or any other twisted pair wire thus extending the range of operation of a DA. The TP-1 maintains the bandwidth of an industrial color video signal up to several hundred meters and of broadcast quality signals (up to 12 MHz) up to 100 meters. At shorter distances, as in a studio, bandwidth of 30 MHz is easily achieved. By using the TP-1 together with the TP-2 (Video Line Receiver) coax wiring (in a studio, for example) can be completely eliminated. The TP-1 can also be used for simplification of security and CCTV installations, and for teleconferencing in offices and hospitals using existing intercom or telephone wiring.

- **VA-11 -** (Video/Audio Combiner) Used to distribute audio/video signals. The machine can be inserted before a DA, to allow the DA to distribute a video signal and two audio signals simultaneously, using only one standard coax cable, in real time. The machine maintains the bandwidth of an industrial color video signal and the output signal may be viewed and recorded as a normal video signal. By using the VA-11 together with the VA-12 (Video/Audio Separator) the audio stereo signal may be recovered so audio signals may be sent in a hidden mode, to be recovered only by the VA-12. The VA-11 can be used for simplification of security and CCTV installations, using existing video coax wiring for video and audio transmissions.

- **611T/611R -** (611T full bandwidth Fiber Optic Transmitter and 611R matching Fiber Optic Receiver) Part of the KRAMER TOOLS series, and designed for studio and other demanding applications, these machines, in combination, may be used to send one of the distributed channels to distances of 5-25Km. The 611T and 611R use state-of-the-art fiber optic circuitry and allow the user (via rear panel trimmers) to adjust input and output video levels and high frequency peaking to achieve best performance. Both machines, like all KRAMER TOOLS, are fed from a 12VDC source, making them perfectly suitable for fieldwork as well.

- **VIDEO TESTER** - A new, unique, patented, indispensable tool for the video professional, the Video Tester is used to test a video path leading to/from an amplifier. By pressing only one touch switch it can trace missing signals, distinguish between good and jittery (VCR sourced) signals, and identify the presence of good signals. Whenever a video signal is missing, because of bad connections, cable breaks or faulty sources, the Video Tester is all you need.

5. VM SERIES AMPLIFIERS

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

5.1 Getting To Know Your VM-3S/*xl* Amplifier

The KRAMER **VM-3S/*xl*** is a full bandwidth, state-of-the-art, 1:3 s-Video distribution amplifier designed for studio and other demanding applications. The **VM-3S/*xl*** splits a single input source into three identical outputs with no discernible signal degradation. Video output and input signals are AC coupled for maximal flexibility. The **VM-3S/*xl*** receives external 12VDC feed, and is housed in a very compact enclosure, making it ideal for field use.
Front/Rear panel features of the **VM-3S*xl*** are described in Figure 1 and Table 1.

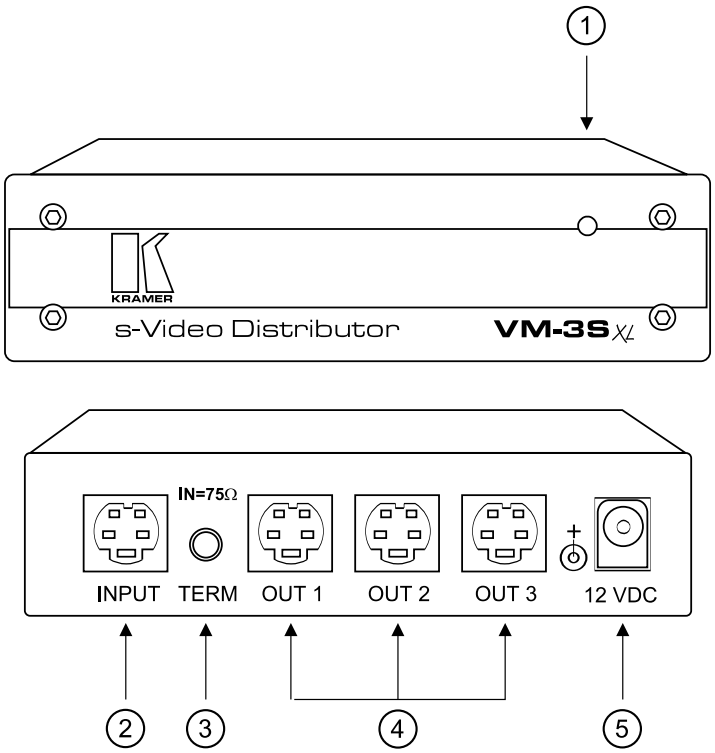

Figure 1: VM-3S*xl* Front/Rear Panel Features

Table 1: VM-3S*xl* Front/Rear Panel Features

No.	Feature	Function
1.	Power indication LED (on front panel)	Indicates that the machine is on.
2.	s-Video **INPUT** 4P connector	s-Video input
3.	**TERM**ination switch	Terminates the input with 75 ohms. (**VM-3S*xl*** only).
4.	**OUT 1-OUT 3 -** 4P connectors	3 amplified and buffered s-Video outputs.
5.	**12VDC** feed connector	A DC connector that allows power to be supplied to the unit.

5.2 Getting To Know Your VM-3V/*xl* Amplifier

The KRAMER **VM-3V/*xl*** is a full bandwidth, state-of-the-art, 1:3 video distribution amplifier designed for studio and other demanding applications. The **VM-3V/*xl*** splits a single input source into three identical outputs with no discernible signal degradation. Video output and input signals are AC coupled for maximal flexibility. The **VM-3V/*xl*** receives external 12V DC feed, and is housed in a very compact enclosure, making it ideal for field use.

Front/Rear panel features of the **VM-3V*xl*** are described in Figure 2 and Table 2.

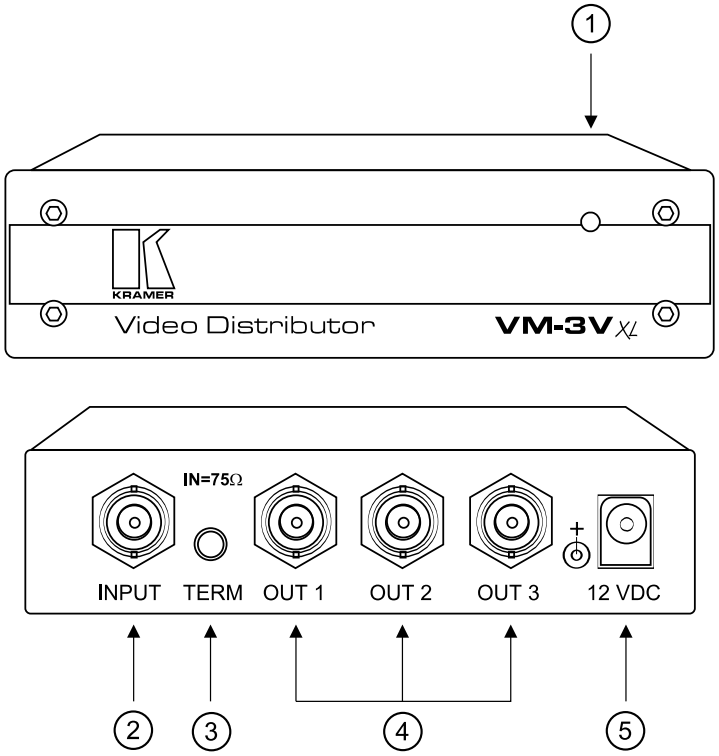

Figure 2: VM-3V*xl*: Front/Rear Panel Features

Table 2: VM-3V*xl* Front/Rear Panel Features

No.	Feature	Function
1.	Power indication LED (on front panel)	Indicates that the machine is on.
2.	Video **INPUT** BNC connector	Video input
3.	**TERM**ination switch	Terminates the input with 75 ohms. (**VM-3V*xl*** only).
4.	**OUT 1-OUT 3 -** BNC connectors	3 amplified and buffered video outputs.
5.	**12VDC** feed connector	A DC connector that allows power to be supplied to the unit.

6. INSTALLATION

The amplifier is provided with four rubber feet packed in a separate bag. Fit the feet to the unit, place it on the table remote from heat generating sources and make the required connections.

7. CONNECTING TO VIDEO DEVICES

Video sources and output devices (such as amplifiers or recorders) may be connected to the amplifier through the BNC connectors (VM-3V model) or 4p type connectors (VM-3S model) located at the back of the machine. If looping is needed, the VM-3S*xl* and VM-3V*xl* should be used. For looping (allowing another amplifier or any video acceptor to use the same video input) use a "T" connector on the video input, and branch the input, via this "T" connector to the other acceptor. Release the TERMination switch of the VM-3V*xl*/VM-3S*xl* (Hi-Z position) and terminate the line with 75 ohms load at the remote acceptor. Please keep in mind that the output signal format will match that of the input signal format.

8. USING VM VIDEO/AUDIO AMPLIFIERS

8.1 Turning on the Amplifier

NOTES

1. *Amplifier should only be turned on, after all connections are completed, and all source devices have been turned on. Do not attempt to connect or disconnect any video signals to the amplifier while it is turned on!*
2. *The socket-outlet should be near the equipment and should be easily accessible. To fully disconnect equipment, remove power cord from its socket.*

1) Connect the amplifier's DC socket to an appropriate DC source. Observe proper polarity!
2) Operate the acceptors.

8.2 Coupling

The coupling function enables the operator to determine whether the incoming video signal is DC or AC coupled. When DC coupling is selected and proper standard video signal is applied to the amplifier's input, the output signal is equal to the input signal. When AC coupling is selected, DC components of the incoming signal are removed. DC coupling is always preferable since AC coupling might cause some linearity distortions in low and high frequencies (due to imperfect behavior of capacitors). A problem may arise when the incoming signal is riding on a DC offset especially when the acceptors are very effected by deviation of DC offsets (A/D converters for example), which in turn results in a distorted picture. The coupling used in the amplifiers described in this manual is AC.

8.3 Installing a VM Amplifier in a Video System

In fieldwork, it is sometimes necessary to add a monitor or a VCR. A small audio or video DA, and with the capability to eliminate signal degradation, is the best solution. Figure 3 illustrates a typical field setup of a VM amplifier (fed by a 12VDC source.)
For this setup, perform the following steps:

1) Connect your video or audio source to the input of the field operated DA (VM-3V/VM-3V*xl*, VM-3S/VM-3S*xl*). Locate the DA as close as possible to your video source.
2) Connect a power source (battery belt, car battery) to the power socket of the DA. Verify that proper polarity of power supply is maintained. Invert polarity if necessary. In extreme cases where external power is not available, a 9VDC battery may be used as a power source for no more than 2-3 hours.
3) Connect your video or audio acceptors to the outputs of the DA.

NOTE

Do not use excessively long cables if possible, as signal quality may degrade rapidly.

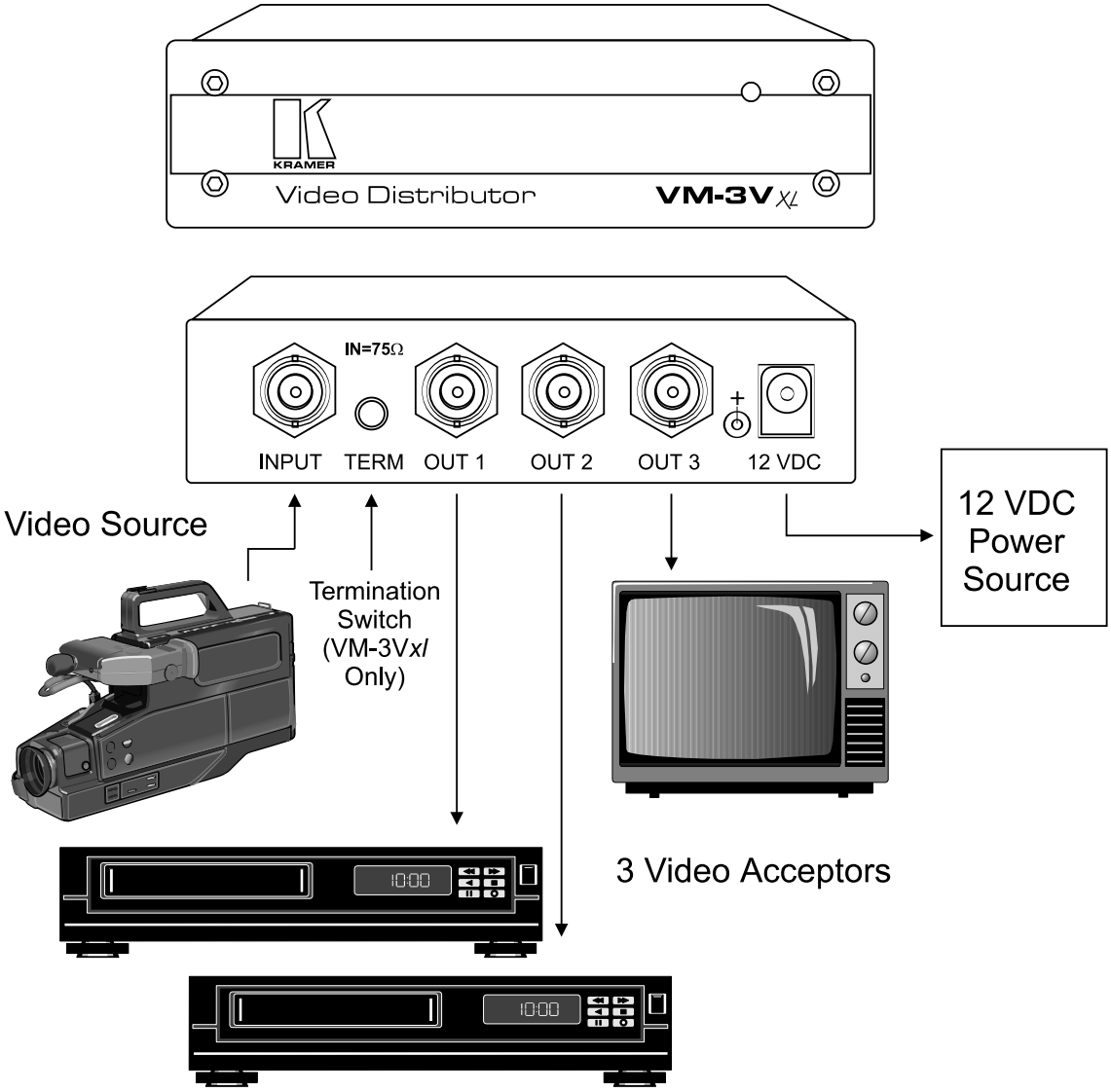

Figure 3: Installing a VM Amplifier in a Video System

9. TAKING CARE OF YOUR VIDEO AMPLIFIER

Do not locate your amplifier in an environment where it is susceptible to dust or moisture. These may damage the electronics, and cause erratic operation or failure. Do not locate your amplifier where temperature and humidity may be excessive. Do not clean your amplifier with abrasives or strong cleaners. Doing so may remove or damage the finish, or may allow moisture to build up. Take care not to allow dust or particles to build up inside unused or open connectors.

10. 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 source from the machine and reconnect again to reset the machine.*
2. *If the following recommended actions still do not result in satisfactory operation, please consult your KRAMER Dealer.*

10.1 Power And Indicators

Problem	Remedy
No power	1. Confirm that the LED is illuminated. 2. Confirm that power connections are secured at the amplifier and at the receptacle. Make sure the receptacle is active, outputting the appropriate voltage.

10.2 Video Signal

Problem	Remedy
No video at the output device, regardless of input selected	1. Confirm that your sources and output device are turned on and connected properly. Video signals connected to the input of your amplifier should be of an identical signal format at the output of your source. Video signals at the output of your amplifier should be of an identical signal format as at the input of your display or recorder. 2. Confirm that any other amplifiers in the signal path have the proper input and/or output selected. 3. Use the Video Tester to test the video path leading to/from your amplifier (see section 4.1 "Video Tester")
Video level is too high or too dim	1. Confirm that the connecting cables are of high quality, properly built and terminated with 75ohm BNC connectors. Check level controls located on your source input device or output display or recorder.

Problem	Remedy
Noise bars "roll" up or down in the output image or: Low frequency hum in the output signal	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 video cables. **WARNING**! ***Do not disconnect the ground from any piece of video equipment in your signal path!*** Check the following to remove hum bars: 1. Confirm that all interconnected equipment is connected to the same phase of power, if possible. 2. Remove equipment connected to the phase that may be introducing noise, such as motors, generators, etc. 3. Disconnect all cables and reconnect them one at a time until ground loop reappears. Disconnect the affected cable and replace, or insert an isolation device (opto isolator or transformer) in the signal path.

LIMITED WARRANTY

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

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