KRAMER ELECTRONICS LTD.

USER MANUAL

MODELS:

TP-145
XGA/Audio/Data Line
Transmitter

TP-146
UXGA/Audio/Data Line
Receiver

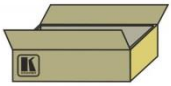
P/N: 2900-000607 Rev 3

TP-145,TP-146 Quick Start Guide

This guide helps you install and use your product for the first time. For more detailed information, go to http://www.kramerelectronics.com/support/product_downloads.asp to download the latest manual or scan the QR code on the left.

Step 1: Check what's in the box

- **TP-145,TP-146** UXGA/Audio/Data Line Transmitter/Receiver
- 2 Power supplies (12V DC)
- 4 Rubber feet
- 1 Quick Start sheet



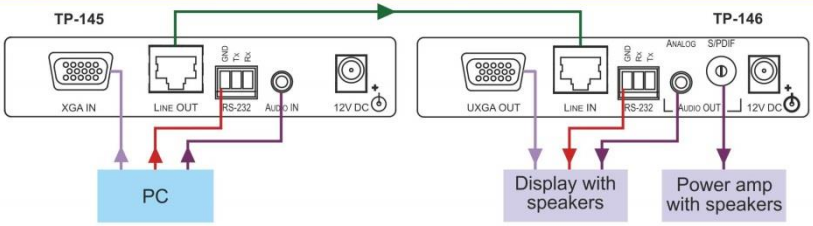
Save the original box and packaging materials in case you need to return your **TP-145,TP-146** for service.

Step 2: Install the TP-145,TP-146

Attach the rubber feet and place on a table or mount the **TP-145,TP-146** in a rack (using an optional **RK-3T** rack adapter).

Step 3: Connect the inputs and outputs

Always switch off the power on each device before connecting it to your **TP-145,TP-146**.



Always use Kramer high-performance cables for connecting AV equipment to the **TP-145,TP-146.**

Step 4: Connect the power

Connect the 12V DC power adapter to the **TP-145,TP-146** and plug the adapter into the mains electricity.

Step 5: Acquiring an EDID

To load the default EDID:

1. Plug the 12V DC power adapter into the power socket on the **TP-145** and connect the adapter to the mains electricity.
2. With no display device connected to the **TP-145**, press the EDID CAPTURE button.
3. The EDID STATUS LED flashes rapidly several times and the new EDID is copied.

To capture EDID information from a display device:

1. Using a short cable, connect the XGA INPUT 15-pin HD connector on the **TP-145** to the input XGA connector of the display.
2. Connect power to the display and switch it on.
3. Plug the 12V DC power adapter into the power socket on the **TP-145** and to the mains electricity.
4. Press the EDID CAPTURE button.
5. The EDID STATUS LED flashes slowly several times and the EDID is captured.
6. Disconnect the display.

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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 video, audio, presentation, and broadcasting professionals 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 that are clearly defined by function: GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Routers; 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 and GROUP 11: Sierra Products.

Congratulations on purchasing your Kramer **TP-145, TP-146** *UXGA/Audio/Data Line Transmitter/Receiver*, which is ideal for the following typical applications:

- Presentation and multimedia applications
- Long-range graphics distribution for schools, hospitals, security, and stores

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

Go to http://www.kramerelectronics.com/support/product_downloads.asp to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

2.1 Achieving the Best Performance

To achieve the best performance:

- Use only good quality connection cables (we recommend Kramer high-performance, high-resolution cables) to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Do not secure the cables in tight bundles or roll the slack into tight coils
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality
- Position your Kramer **TP-145, TP-146** away from moisture, excessive sunlight and dust

This equipment is to be used only inside a building. It may only be connected to other equipment that is installed inside a building.

2.2 Safety Instructions

Caution: There are no operator serviceable parts inside the unit

Warning: Use only the Kramer Electronics input power wall adapter that is provided with the unit

Warning: Disconnect the power and unplug the unit from the wall before installing

2.3 Recycling Kramer Products

The Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC aims to reduce the amount of WEEE sent for disposal to landfill or incineration by requiring it to be collected and recycled. To comply with the WEEE Directive, Kramer Electronics has made arrangements with the European Advanced Recycling Network (EARN) and will cover any costs of treatment, recycling and recovery of waste Kramer Electronics branded equipment on arrival at the EARN facility. For details of Kramer's recycling arrangements in your particular country go to our recycling pages at *http://www.kramerelectronics.com/support/recycling/*.

3 Overview

The **TP-145** and **TP-146** are high-performance, twisted pair (TP) transmitter and receivers for computer graphics video (including HDTV), unbalanced stereo audio, and RS-232 control commands.

The **TP-145** converts computer graphics video, unbalanced stereo analog audio, and RS-232 control commands to a TP signal. The **TP-146** converts the TP signal back into computer graphics video, unbalanced stereo and S/PDIF digital audio, and RS-232 control signals. The **TP-145** and **TP-146** together form a computer graphics/audio/control data line transmitter/receiver system.

More specifically, the products feature:

- Resolution up to WUXGA 1920 x 1200
- HDTV compatibility
- EDID capture and status indication (**TP-145**)
- Simultaneous unbalanced stereo and S/PDIF (24-bit 48kHz) audio outputs (**TP-146**)
- Level (gain) and EQ (peaking) controls (**TP-146**)
- Full duplex RS-232 transmission
- Increased level of protection against noise, spikes, and interference in adverse environments
- System range up to 200m (656ft)

3.1 Defining the TP-145 UXGA/Audio/Data Line Transmitter

The **TP-145** is a high-performance transmitter that accepts:

- A computer graphics input signal
- An unbalanced stereo analog audio signal
- RS-232 control commands

The **TP-145** encodes the signals and transmits them over TP cable to a **TP-146** receiver. The stereo analog audio signal is converted to a digital audio (S/PDIF)

stream before transmission, thus preserving the quality of the audio source signals. Commands and data can flow in both directions simultaneously via the RS-232 interface, allowing status requests and control of the destination unit.

When the **TP-145** is connected to a display device and the EDID CAPTURE button is pressed, the **TP-145** reads and stores the EDID (Extended Display Identification Data) from the display device. This prevents the problem whereby a source (for example, a PC), fails to output video because it was not connected to the display device when attempting to read its EDID.

Figure 1 defines the **TP-145** *UXGA/Audio/Data Line Transmitter*.

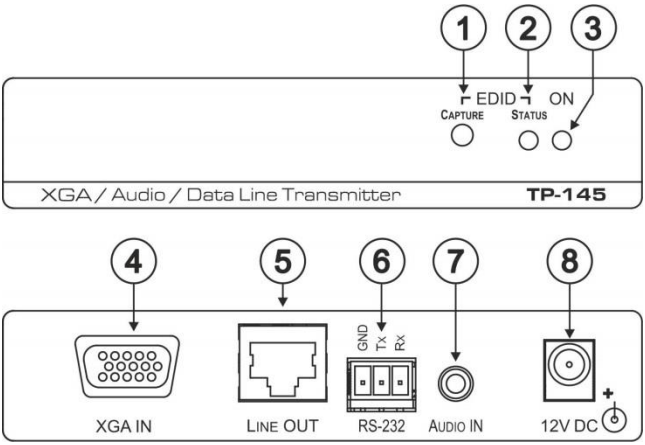


Figure 1: TP-145 UXGA/Audio/Data Line Transmitter

#	Feature	Function
1	*EDID CAPTURE* Button	Press to capture the EDID
2	*EDID STATUS* LED	Lights Green when the EDID has been successfully captured
3	*ON* LED	Lights Green when the unit receives power
4	*XGA IN* 15-pin HD (F) Connector	Connect to the UXGA source
5	*LINE OUT* RJ-45 Connector	Connect to the LINE IN RJ-45 connector on the **TP-146**
6	*RS-232* Terminal Block	Connect to the PC or the remote controller (see Section 4.1)
7	*AUDIO IN* 3.5mm Mini Connector	Connect to the analog audio source
8	*12V DC* Power Connector	Connect to the supplied +12V DC power adapter, center conductor positive

3.2 Defining the TP-146 UXGA/Audio/Data Line Receiver

The **TP-146** is a high-performance receiver that accepts the computer graphics signal/audio/control data from the Kramer **TP-145** via TP cabling at its RJ-45 LINE IN input. The **TP-146** outputs a computer graphics signal, an unbalanced stereo analog audio signal, a converted digital audio (S/PDIF) signal, and bi-directional RS-232 control commands and data. The RS-232 interface makes it possible to control virtually any device over a transmission range of up to 200m (660ft) with a Kramer **TP-141/145** transmitter over TP cabling. In addition, the **TP-146** features:

- Level and equalization control for the UXGA signal
- The capability to change the polarity of the vertical and horizontal sync signals
- 24-bit 48kHz S/PDIF digital audio

Figure 2 defines the **TP-146** *UXGA/Audio/Data Line Receiver*.

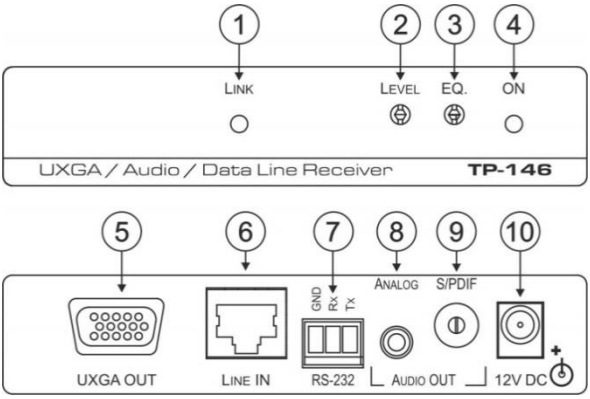


Figure 2: TP-145, TP-146 UXGA/Audio/Data Line Transmitter/Receiver

#	Feature	Function
1	*LINK* LED	Lights green when a link is established
2	*LEVEL* Trimmer	Adjusts the output signal level
3	*EQ.* Trimmer	Adjusts the cable compensation equalization level
4	*ON* LED	Lights green when the unit receives power
5	*UXGA OUT* 15-pin HD (F) Connector	Connect to the UXGA acceptor
6	*LINE IN* RJ-45 Connector	Connect to the LINE OUT RJ-45 connector on the **TP-145** Using a TP cable with RJ-45 connectors at both ends (pinout is defined in Figure 6)
7	*RS-232* Terminal Block	Connect to the controlled unit

#	Feature	Function
8	*AUDIO OUT ANALOG* 3.5mm Mini Connector	Connect to the analog audio acceptor
9	*AUDIO OUT S/PDIF* RCA Connector	Connect to the digital audio acceptor
10	*12V DC* Connector	Connect to the supplied +12V DC power adapter. Center pin positive

3.3 Internal Polarity and Sync Mode Switches

Figure 3 defines the internal horizontal and vertical polarity switches of the **TP-146**.

Note: Open the **TP-146** unit to gain access to the Hs and Vs polarity and video selection switches which are located on the lower part of the printed circuit board next to the ON LED. After setting the switches, close the **TP-146**.

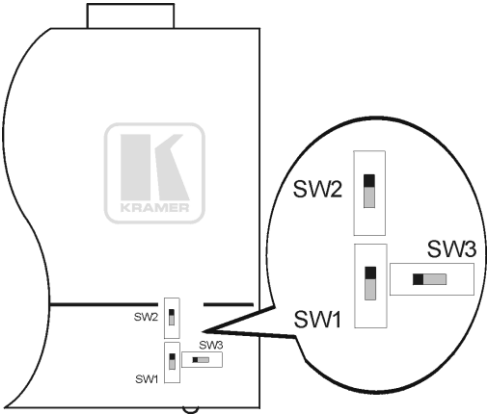


Figure 3: TP-146 Internal Polarity Switches

Switch/Jumper	Function
SW1 Horizontal Sync Switch	Slide up to set the H Sync to positive polarity Slide down to set the H Sync to negative polarity Default = up (positive polarity)
SW2 Vertical Sync Switch	Slide up to set the V Sync to positive polarity Slide down to set the V Sync to negative polarity Default = up (positive polarity)
SW3 Video Selection Switch	Slide left to set the video to RGBHV/VGA Slide right to set the video to component/composite video with sync Default = left (RGBHV/VGA video)

3.4 Shielded Twisted Pair/Unshielded Twisted Pair

We recommend that you use Shielded Twisted Pair (STP) cable. There are different categories of STP cable available and we advise you to use the best quality STP cable that you can afford. Our non-skew-free cable, Kramer **BC-STP** is intended for digital signals and for analog signals where skewing is not an issue. For cases where there is skewing, our Unshielded Twisted Pair (UTP) skew-free cable, Kramer **BC-XTP**, may be used. Bear in mind though, that we advise using STP cables where possible, since the compliance to electromagnetic interference has been tested using STP cables.

Although UTP cable might be preferred for long range applications, the UTP cable should be installed as far as possible from electric cables, motors, and so on, which often create electrical interference.

However, since the use of UTP cable might cause non-conformity to electromagnetic standards, Kramer does not commit to meeting the standard with UTP cable.

4 Connecting the TP-145, TP-146

Always switch off the power to each device before connecting it to your **TP-145, TP-146**. After connecting your **TP-145, TP-146**, connect its power and then switch on the power to each device.

You can use the **TP-145** *UXGA/Audio/Data Line Transmitter* and the **TP-146** *UXGA/Audio/Data Line Receiver* to configure a TP transmitter and receiver system that transmit video, audio, and RS-232 control signals via TP cable.

To connect the **TP-145** and the **TP-146** to create a TP transmitter and receiver system, as illustrated in Figure 4:

1. On the **TP-145**, connect:
   - A UXGA source (for example, the graphics card on a laptop) to the UXGA IN 15-pin HD (F) connector
   - An audio source to the AUDIO IN 3.5mm mini connector, for example, using a Kramer C-GMA/GMA cable (VGA 15-pin HD (M) +Audio jack to VGA 15-pin HD (M) +Audio jack)

     Not supplied. The full list of Kramer cables is available from http://www.kramerelectronics.com. Alternatively, you can connect a UXGA source to the UXGA IN 15-pin HD (F) connector, and a separate audio source to the AUDIO IN 3.5mm mini connector
   - An RS-232 cable with a 9-pin D-sub connector at one end to the laptop, and a 3-pin terminal block connector at the other end to the **TP-145** RS-232 port (as defined in Section 4.1)
2. On the **TP-146**, connect:
   - The UXGA OUT 15-pin HD (F) connector to the AV display system
   - The S/PDIF AUDIO OUT RCA connector to a digital AV Receiver
   - An RS-232 cable with a 3 pin terminal block connector at one end to the **TP-146** RS-232 port, and a 9-pin D-SUB connector at the other end to the RS-232 port on the AV display system
3. Using STP cabling, connect the LINE OUT RJ-45 connector on the **TP-145** to the LINE IN RJ-45 connector on the **TP-146**.

   For details of how to wire a TP RJ-45 connector, see Section 4.2

4. Connect the power adapter to the power socket on the **TP-145** and/or **TP-146** (if needed), and connect the adapter(s) to the mains electricity.

5. On the **TP-146**:

   - If necessary, adjust the video output signal level and/or cable compensation equalization level with a flat screwdriver
   - If necessary, set the horizontal sync switches, vertical sync switches, and the sync mode jumpers

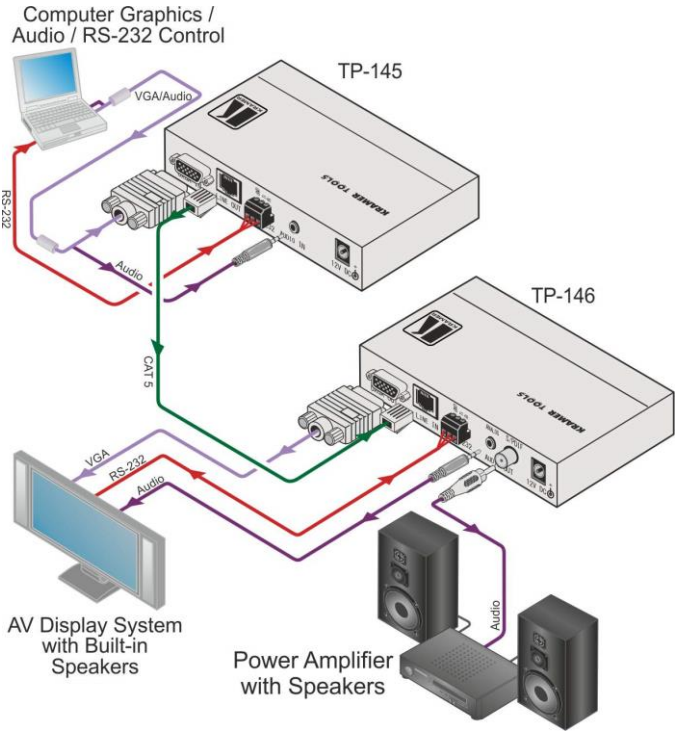


Figure 4: Connecting the TP-145, TP-146 UXGA/Audio/Data Line Transmitter/Receiver

4.1 Transmitting via RS-232

It is possible to transmit data (for example, using a PC) between the **TP-145** and **TP-146** via the RS-232 terminal block.

Prepare an RS-232 cable with a 9-pin D-sub connector at one end, and a 3-pin terminal block at the other end as defined in Figure 5.

Terminal Block	9-pin D-sub Connector
TxD	Pin 2
RxD	Pin 3
GND	Pin 5

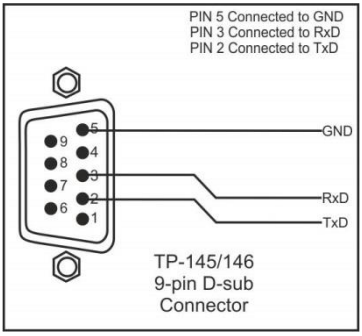


Figure 5: RS-232 Pinout Connection

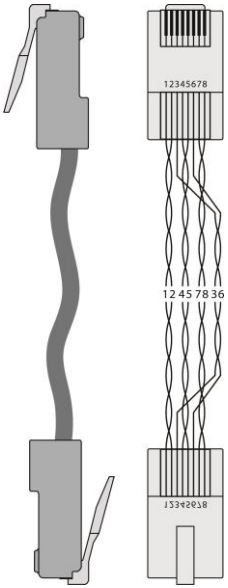
4.2 Wiring the TP LINE IN / LINE OUT RJ-45 Connectors

This section defines the TP pinout, using a **straight** pin-to-pin cable with RJ-45 connectors.

Note, that the cable ground shielding must be connected/soldered to the connector shield.

EIA /TIA 568B	
PIN	**Wire Color**
1	Orange / White
2	Orange
3	Green / White
4	Blue
5	Blue / White
6	Green
7	Brown / White
8	Brown

Figure 6: TP PINOUT



5 Acquiring the EDID

The **TP-145** transmitter can capture the EDID information from a display device.

To load the default EDID:

1. Plug the 12V DC power adapter into the power socket on the **TP-145** and connect the adapter to the mains electricity.
2. With no display device connected to the **TP-145**, press the EDID CAPTURE button.
3. The EDID STATUS LED flashes rapidly several times and the new EDID is copied.

To capture the EDID information from a display device:

1. Using a short cable (for example, Kramer model number **C-MGM/MGM-1**), connect the XGA INPUT 15-pin HD connector on the **TP-145** to the input XGA connector of the display.
2. Connect power to the display and switch it on.
3. Plug the 12V DC power adapter into the power socket on the **TP-145** and to the mains electricity.
4. Press the EDID CAPTURE button.
5. The EDID STATUS LED flashes slowly several times and the EDID is captured.
6. Disconnect the display.

6 Technical Specifications

	TP-145	TP-146
INPUTS:	1 XGA on a 15-pin HD connector, 1 unbalanced stereo audio a 3.5mm mini connector	1 twisted pair on an RJ-45 connector
OUTPUTS:	1 twisted pair on an RJ-45 connector	1 UXGA on a 15-pin HD connector, 1 S/PDIF on an RCA connector, 1 unbalanced stereo audio a 3.5mm mini connector
PORTS:	1 RS-232 bidirectional terminal block	
RESOLUTION:	Up to WUXGA, 1080p	
MAX. OUTPUT LEVEL:		Video: 1.6V Audio: 2.3V
CONTROLS:	EDID capture button	Level: –7.5dB to +4.4dB, EQ.: 0dB to +33dBm (130m) @ 50MHz
RS-232 BAUD RATE:	Up to 19200kbps	
RS-232 MODE:	Full-duplex	
BANDWIDTH:	Audio: 20Hz – 20kHz @0.5dB	
S/N RATIO:	Audio: <–80dB	
TOTAL GAIN:	Analog/analog: 0dB Analog/SPDIF: –12dBFS	
COUPLING:	AC	
TND+N:	Audio: <0.01%	
POWER CONSUMPTION:	12V DC 215mA	12V DC 550mA
OPERATING TEMPERATURE:	0° to +40°C (32° to 104°F)	
STORAGE TEMPERATURE:	-40° to +70°C (-40° to 158°F)	
HUMIDITY:	10% to 90%, RHL non-condensing	
DIMENSIONS:	12.0cm x 7.8cm x 2.5cm (4.7" x 3.1" x 1.0") W, D, H	
WEIGHT:	0.18kg. (0.4lbs.) approx.	
INCLUDED ACCESSORIES:	Power supply	
OPTIONAL:	RK-3T 19” rack adapter	
Specifications are subject to change without notice at http://www.kramerelectronics.com		

LIMITED WARRANTY

The warranty obligations of Kramer Electronics for this product are limited to the terms set forth below:

What is Covered

This limited warranty covers defects in materials and workmanship in this product.

What is Not Covered

This limited warranty does not cover any damage, deterioration or malfunction resulting from any alteration, modification, improper or unreasonable use or maintenance, misuse, abuse, accident, neglect, exposure to excess moisture, fire, improper packing and shipping (such claims must be presented to the carrier), lightning, power surges, or other acts of nature. This limited warranty does not cover any damage, deterioration or malfunction resulting from the installation or removal of this product from any installation, any unauthorized tampering with this product, any repairs attempted by anyone unauthorized by Kramer Electronics to make such repairs, or any other cause which does not relate directly to a defect in materials and/or workmanship of this product. This limited warranty does not cover cartons, equipment enclosures, cables or accessories used in conjunction with this product.

Without limiting any other exclusion herein, Kramer Electronics does not warrant that the product covered hereby, including, without limitation, the technology and/or integrated circuit(s) included in the product, will not become obsolete or that such items are or will remain compatible with any other product or technology with which the product may be used.

How Long Does this Coverage Last

Seven years as of this printing; please check our Web site for the most current and accurate warranty information.

Who is Covered

Only the original purchaser of this product is covered under this limited warranty. This limited warranty is not transferable to subsequent purchasers or owners of this product.

What Kramer Electronics will do

Kramer Electronics will, at its sole option, provide one of the following three remedies to whatever extent it shall deem necessary to satisfy a proper claim under this limited warranty:

1. Elect to repair or facilitate the repair of any defective parts within a reasonable period of time, free of any charge for the necessary parts and labor to complete the repair and restore this product to its proper operating condition. Kramer Electronics will also pay the shipping costs necessary to return this product once the repair is complete.
2. Replace this product with a direct replacement or with a similar product deemed by Kramer Electronics to perform substantially the same function as the original product.
3. Issue a refund of the original purchase price less depreciation to be determined based on the age of the product at the time remedy is sought under this limited warranty.

What Kramer Electronics will not do Under This Limited Warranty

If this product is returned to Kramer Electronics or the authorized dealer from which it was purchased or any other party authorized to repair Kramer Electronics products, this product must be insured during shipment, with the insurance and shipping charges prepaid by you. If this product is returned uninsured, you assume all risks of loss or damage during shipment. Kramer Electronics will not be responsible for any costs related to the removal or re-installation of this product from or into any installation. Kramer Electronics will not be responsible for any costs related to any setting up this product, any adjustment of user controls or any programming required for a specific installation of this product.

How to Obtain a Remedy under this Limited Warranty

To obtain a remedy under this limited warranty, you must contact either the authorized Kramer Electronics reseller from whom you purchased this product or the Kramer Electronics office nearest you. For a list of authorized Kramer Electronics resellers and/or Kramer Electronics authorized service providers, please visit our web site at www.kramerelectronics.com or contact the Kramer Electronics office nearest you.

In order to pursue any remedy under this limited warranty, you must possess an original, dated receipt as proof of purchase from an authorized Kramer Electronics reseller. If this product is returned under this limited warranty, a return authorization number, obtained from Kramer Electronics, will be required. You may also be directed to an authorized reseller or a person authorized by Kramer Electronics to repair the product.

If it is decided that this product should be returned directly to Kramer Electronics, this product should be properly packed, preferably in the original carton, for shipping. Cartons not bearing a return authorization number will be refused.

Limitation on Liability

THE MAXIMUM LIABILITY OF KRAMER ELECTRONICS UNDER THIS LIMITED WARRANTY SHALL NOT EXCEED THE ACTUAL PURCHASE PRICE PAID FOR THE PRODUCT. TO THE MAXIMUM EXTENT PERMITTED BY LAW, KRAMER ELECTRONICS IS NOT RESPONSIBLE FOR DIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY BREACH OF WARRANTY OR CONDITION, OR UNDER ANY OTHER LEGAL THEORY. Some countries, districts or states do not allow the exclusion or limitation of relief, special, incidental, consequential or indirect damages, or the limitation of liability to specified amounts, so the above limitations or exclusions may not apply to you.

Exclusive Remedy

TO THE MAXIMUM EXTENT PERMITTED BY LAW, THIS LIMITED WARRANTY AND THE REMEDIES SET FORTH ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, REMEDIES AND CONDITIONS, WHETHER ORAL OR WRITTEN, EXPRESS OR IMPLIED. TO THE MAXIMUM EXTENT PERMITTED BY LAW, KRAMER ELECTRONICS SPECIFICALLY DISCLAIMS ANY AND ALL IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IF KRAMER ELECTRONICS CANNOT LAWFULLY DISCLAIM OR EXCLUDE IMPLIED WARRANTIES UNDER APPLICABLE LAW, THEN ALL IMPLIED WARRANTIES COVERING THIS PRODUCT, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL APPLY TO THIS PRODUCT AS PROVIDED UNDER APPICABLE LAW.

IF ANY PRODUCT TO WHICH THIS LIMITED WARRANTY APPLIES IS A "CONSUMER PRODUCT" UNDER THE MAGNUSON-MOSS WARRANTY ACT (15 U.S.C.A. §2301, ET SEQ.) OR OTHER APPICABLE LAW, THE FOREGOING DISCLAIMER OF IMPLIED WARRANTIES SHALL NOT APPLY TO YOU, AND ALL IMPLIED WARRANTIES ON THIS PRODUCT, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR THE PARTICULAR PURPOSE, SHALL APPLY AS PROVIDED UNDER APPLICABLE LAW.

Other Conditions

This limited warranty gives you specific legal rights, and you may have other rights which vary from country to country or state to state.

This limited warranty is void if (i) the label bearing the serial number of this product has been removed or defaced, (ii) the product is not distributed by Kramer Electronics or (iii) this product is not purchased from an authorized Kramer Electronics reseller. If you are unsure whether a reseller is an authorized Kramer Electronics reseller, please visit our Web site at www.kramerelectronics.com or contact a Kramer Electronics office from the list at the end of this document.

Your rights under this limited warranty are not diminished if you do not complete and return the product registration form or complete and submit the online product registration form. Kramer Electronics thanks you for purchasing a Kramer Electronics product. We hope it will give you years of satisfaction.

For the latest information on our products and a list of Kramer distributors, visit our Web site where updates to this user manual may be found.

We welcome your questions, comments, and feedback.
Web site: www.kramerelectronics.com
E-mail: info@kramerel.com

SAFETY WARNING
Disconnect the unit from the power supply before opening and servicing

P/N: 2900-000607 Rev: 3