



KRAMER ELECTRONICS LTD.

USER MANUAL

MODEL:

TP-410

UXGA-Audio-RS-232 Line
Transmitter / DA

P/N: 2900-000733 Rev 3

TP-410 Quick Start Guide

This guide takes you through a basic installation and first-time use of your **TP-410**. For more detailed information, see the **TP-410** user manual. You can download the latest manual at <http://www.kramerelectronics.com>.

Step 1: Check what's in the box

- The **TP-410** UXGA-Audio-RS-232 Line Transmitter
- 1 Power cord
- 1 Set of rack ears
- 1 Quick start guide
- 4 Rubber feet
- 1 User Manual



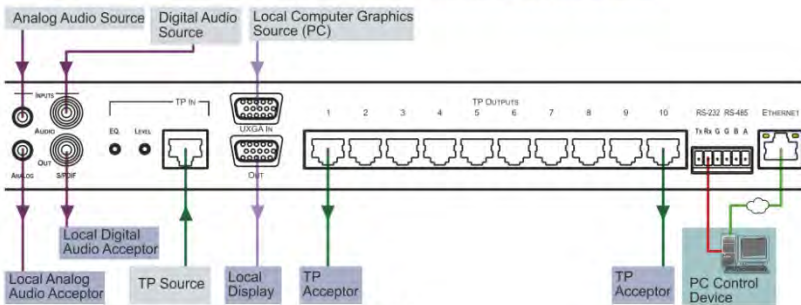
Save the original box and packaging materials in case your Kramer product needs to be returned to the factory for service.

Step 2: Install the TP-410

Mount the machine in a rack or place on a table.

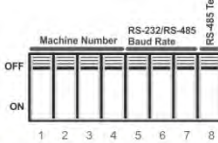
Step 3: Connect inputs and outputs

Always switch OFF the power on each device before connecting it to your **TP-410**.



Set the DIP-switches See Section 7

SETUP



Set the EDID See Section 9

1. Connect the XGA INPUT 15-pin HD connector to the input XGA connector of the display, using a short cable.
2. Connect the display power.
3. On the **TP-410**, connect the power.
4. Press the EDID CAPTURE button.
5. Once the EDID STATUS blinks slowly several times, the EDID is captured.



Press the **SOURCE** button to select the input signal (local or TP) and press the **AUDIO** button to select the analog or digital input)

For best results, we recommend that you always use Kramer high-performance cables to connect AV equipment to the **TP-410**.

Step 4: Connect the power

Connect AC power to the rear of the **TP-410**, switch on its power and then switch on the power on each device.



Contents

1	Introduction	1
2	Getting Started	2
2.1	Achieving the Best Performance	2
3	Overview	3
3.1	Shielded Twisted Pair (STP) / Unshielded Twisted Pair (UTP)	4
3.2	Defining EDID	4
3.3	Defining the TP-410 UXGA-Audio-RS-232 Line Transmitter / DA	4
4	Installing in a Rack	8
5	Connecting the TP-410	9
5.1	Connecting the TP-410	9
5.2	Connecting to the TP-410 via an RS-232 Connection	11
5.3	Connecting to the TP-410 via an RS-485 Connection	11
5.4	Connecting to the TP-410 via the ETHERNET	12
5.5	Connecting Several TP-410 Units	14
6	Configuration and Distribution of Control Data	15
6.1	The Local Mode	15
7	The SETUP DIP-switches	19
7.1	Setting the Machine Number	19
7.2	Setting the RS-232/RS-485 Baud Rate DIP-switches	20
7.3	Setting the RS-485 Bus Termination	21
8	Wiring the CAT 5 LINE IN / LINE OUT RJ-45 Connectors	22
9	Acquiring the EDID	23
10	Flash Memory Upgrade	24
11	Technical Specifications	25
11.1	Communication Parameters	26
12	Default EDID	27
13	Kramer Communication Protocol 2000	28

Figures

Figure 1:	TP-410 UXGA-Audio-RS-232 Line Transmitter / DA Front Panel	5
Figure 2:	TP-410 UXGA-Audio-RS-232 Line Transmitter / DA Rear Panel	6
Figure 3:	Connecting the TP-410, UXGA-Audio-RS-232 Line Transmitter / DA	10
Figure 4:	RS-232 Pinout	11
Figure 5:	Local Area Connection Properties Window	13
Figure 6:	Internet Protocol (TCP/IP) Properties Window	13
Figure 7:	Connecting Multiple TP-410 Units	14
Figure 8:	Local Control via RS-232	16
Figure 9:	Control via the Ethernet	16
Figure 10:	RS-232 Remote Control	17
Figure 11:	Connecting Multiple TP-410 Units via RS-485	18
Figure 12:	The Address # DIP-switches	19
Figure 13:	TP-410 Baud Rate DIP-switches	20
Figure 14:	TP-410 DIP-switch RS-485 Termination	21
Figure 15:	CAT 5 PINOUT	22

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 Video Products.

Congratulations on purchasing your Kramer **TP-410** UXGA-Audio-RS-232 Line Transmitter / DA. This product, which incorporates HDMI™ technology, is ideal for:

- Transmission of video, audio and RS-232 signals for extended distances over standard STP/UTP cables
- Multimedia and presentation source and acceptor selection

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
- Use only the power cord that is supplied with this machine



Go to <http://www.kramerelectronics.com> 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 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-410** away from moisture, excessive sunlight and dust

3 Overview

The **TP-410** UXGA-Audio-RS-232 Line Transmitter / DA is a high performance, 10-channel VGA/UXGA, audio and data to CAT 5 transmitter for high resolution video, unbalanced stereo audio (or S/PDIF digital audio) and full-duplex RS-232 signals. The CAT 5 input can also be connected to any Kramer compatible TP transmitter (for example, the **TP-125EDID**) and the CAT 5 outputs can be connected to any Kramer compatible TP receiver (for example, the **TP-126**).

The **TP-410** can also route bidirectional data from the RS-232, RS-485 or the Ethernet port to any or all of the CAT 5 outputs.

TP-410 features:

- VGA up to WUXGA (1920 x 1200) and 2k resolutions
- A selectable local input or twisted pair input (UXGA, audio and RS-232)
- Selectable unbalanced stereo or digital audio S/PDIF input signals
- One local output on a 15-pin HD computer graphics video connector
- One digital audio (S/PDIF) local output on an RCA connector, as well as one analog audio local output on a 3.5mm mini jack
- 10 RJ-45 STP/UTP outputs
- Compatibility with most Kramer twisted pair transmitters/receivers
- EDID (Extended Display Identification Data) that can be copied and stored from the display device. The display can be disconnected and later reconnected without rebooting the operating system
- A transmission range of up to 300ft (up to 100 meters) over STP cabling for the input and outputs
- Control via front panel input select button, RS-232, RS-485 and the Ethernet
- A baud rate of up to 19,200 for sending distributed control data and configuration commands
- Data - Extensive Bi-Directional RS-232 handling, including embedding and de-embedding options

In addition, the **TP-410**:

- Can automatically differentiate between RS-232/RS-485 commands that control the unit itself and commands that are destined for end-user equipment (see [Section 6](#))
- Is housed in a 19" 1U rack mountable enclosure, with rack "ears" included, and is fed from a 100-240 VAC universal switching power supply.

3.1 Shielded Twisted Pair (STP) / Unshielded Twisted Pair (UTP)

We recommend that you use Shielded Twisted Pair (STP) cable, and stress that the compliance to electromagnetic interference was tested using STP cable. There are different levels 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 analog signals where skewing is not an issue.

In cases where there is skewing, our Unshielded Twisted Pair (UTP) skew-free cable, Kramer **BC-XTP**, may be advantageous, and UTP cable might also be preferable for long range applications. In any event when using UTP cable, it is advisable to ensure that the cable is installed far away from electric cables, motors and so on, which are prone to create electrical interference.

3.2 Defining EDID

The Extended Display Identification Data (EDID) is a data-structure provided by a display, to describe its capabilities to a graphics card (that is connected to the display's source). The EDID enables the **TP-410** to "know" what kind of monitor is connected to the output. The EDID includes the manufacturer's name, the product type, the timing data supported by the display, the display size, luminance data and (for digital displays only) the pixel mapping data.

EDID is defined by a standard published by the Video Electronics Standards Association (VESA).

3.3 Defining the TP-410 UXGA-Audio-RS-232 Line Transmitter / DA

This section defines the **TP-410**.

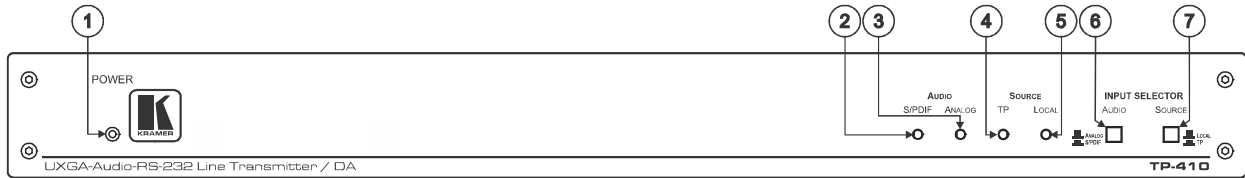


Figure 1: TP-410 UXGA-Audio-RS-232 Line Transmitter / DA Front Panel

#	Feature	Function	
1	POWER LED	Lights when the unit receives power	
2	AUDIO LEDs	S/PDIF	Lights when a local digital audio input is selected
3		ANALOG	Lights when a local analog audio input is selected
4	SOURCE LEDs	TP	Lights when a UXGA/Audio/RS-232 via twisted pair input is selected
5		LOCAL	Lights when the local UXGA/Audio/RS-232 input is selected
6	INPUT SELECTOR Buttons	AUDIO	Press to select the digital audio source or release to select the analog audio source
7		SOURCE	Press to select the twisted pair source or release to select the local source

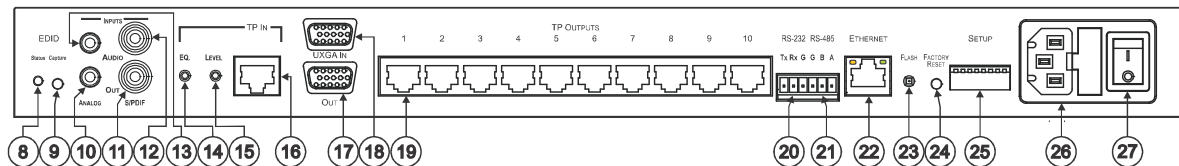


Figure 2: TP-410 UXGA-Audio-RS-232 Line Transmitter / DA Rear Panel

#	Feature	Function	
8	EDID	STATUS LED	Lights during normal operation; blinks when acquiring the EDID
9		CAPTURE Button	Press to acquire the EDID information from the display (see Section 9)
10	AUDIO OUT	ANALOG 3.5mm Mini Connector	Connect to an unbalanced stereo audio local acceptor to monitor any audio source
11		S/PDIF LOOP RCA Connector	Connect to a digital audio local acceptor to monitor any audio source
12	AUDIO INPUTS	S/PDIF AUDIO RCA Connector	Connect to the selectable digital audio source
13		ANALOG AUDIO 3.5mm Mini Connector	Connect to the selectable unbalanced stereo audio source
14	TP IN	EQ. Trimmer	Adjusts the cable compensation (equalization) level for the UXGA (RJ-45 TP input) Degradation and VGA/XGA signal loss can result from using long cables (due to the effects of stray capacitance, for example), sometimes leading to a loss of sharpness in high-resolution signals Use a screwdriver to carefully rotate the trimmer, adjusting the appropriate level
15		LEVEL Trimmer	Adjusts the output signal level for the UXGA (RJ-45 TP input) Use a screwdriver to carefully rotate the trimmer, adjusting the appropriate level
16		RJ-45 Connector	Connect to the LINE OUT connector of a transmitter (the PINOUT is defined in Section 8), for example, the TP-125EDID
17	OUT 15-pin HD Connector	Connect to a local display to monitor any computer graphics source	
18	UXGA IN 15-pin HD Connector	Connect to a computer graphics source	
19	TP OUTPUTS RJ-45 Connectors	Connect to the LINE IN RJ-45 connector on a receiver, for example, the TP-126 (from 1 to 10) Using a UTP CAT 5 cable with RJ-45 connectors at both ends (the PINOUT is defined in Section 8)	
20	RS-232 (Tx, Rx, G)	Connect to the RS-232 controller (PINs 2, 3 and 5 of a standard 9-pin D-sub connector – see Section 5.2)	

#	Feature	Function
21	RS-485 (G,B,A)	Connect to the RS-485 controller. Pins B (-) and A (+) are for RS-485; connect pin G to the cable shield (if required)
22	ETHERNET Connector	Connects to the PC or other Serial Controller through computer networking
23	FLASH	N/A (for factory use only)
24	FACTORY RESET	Turn the machine OFF using the power switch and then turn it ON while pressing the FACTORY RESET button. The unit will power up and load its memory with the following factory default definitions: default Ethernet settings (IP address: 192.168.1.39; TCP port #: 5000 and UDP port #: 50000); RS-232 data is distributed to all 10 outputs and is received by output 1 and the default EDID is acquired
25	SETUP DIP-switches	For setup of the unit (see Section 7)
26	Power Connector with Fuse	AC connector enabling power supply to the unit
27	Power Switch	Switch for turning the unit ON or OFF

4 Installing in a Rack

This section provides instructions for rack mounting the unit.

Before installing in a rack, be sure that the environment is within the recommended range:

OPERATING TEMPERATURE:	0° to +55°C (32° to 131°F)
STORAGE TEMPERATURE:	-45° to +72°C (-49° to 162°F)
HUMIDITY:	10% to 90%, RHL non-condensing



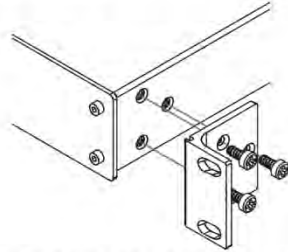
CAUTION!

When installing on a 19" rack, avoid hazards by taking care that:

1. It is located within the recommended environmental conditions, as the operating ambient temperature of a closed or multi unit rack assembly may exceed the room ambient temperature.
2. Once rack mounted, enough air will still flow around the machine.
3. The machine is placed straight in the correct horizontal position.
4. You do not overload the circuit(s). When connecting the machine to the supply circuit, overloading the circuits might have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.
5. The machine is earthed (grounded) in a reliable way and is connected only to an electricity socket with grounding. Pay particular attention to situations where electricity is supplied indirectly (when the power cord is not plugged directly into the socket in the wall), for example, when using an extension cable or a power strip, and that you use only the power cord that is supplied with the machine.

To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.



2. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

Note:

- In some models, the front panel may feature built-in rack ears
- Detachable rack ears can be removed for desktop use
- Always mount the machine in the rack before you attach any cables or connect the machine to the power
- If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions available from our Web site

5 Connecting the TP-410

This section describes how to connect:

- The **TP-410** (see [Section 5.1](#))
- Several **TP-410** units (see [Section 5.5](#))
- To the **TP-410** via RS-232 (see [Section 5.2](#))
- To the **TP-410** via RS-485 (see [Section 5.3](#))
- To the **TP-410** via the Ethernet (see [Section 5.4](#))

5.1 Connecting the TP-410



Always switch off the power to each device before connecting it to your **TP-410**. After connecting your **TP-410**, connect its power and then switch on the power to each device.

To connect the **TP-410**, as illustrated in the example in [Figure 3](#):

1. Connect a computer graphics source to the UXGA IN 15-pin HD connector.
2. Connect an unbalanced stereo audio source (for example, the audio source of the computer) to the AUDIO INPUT 3.5mm mini jack connector.
You can also connect a digital audio source to the S/PDIF RCA connector and select the desired input via the AUDIO INPUT SELECTOR (release the button to select the analog audio and push to select the S/PDIF audio source)
3. Connect a transmitter (for example, the Kramer **TP-125EDID** or another **TP-410** unit) to the TP-IN CAT 5 connector.



You can connect one or both of the inputs (LOCAL and/or TP). Press the SOURCE INPUT SELECT button to select LOCAL (UXGA IN) or release the button to select TP.

4. Connect the OUT 15-pin HD connector to a UXGA acceptor (for example, a local display).
5. Connect the OUT unbalanced stereo audio and/or S/PDIF to unbalanced audio and/or digital audio acceptors, respectively (not shown in [Figure 3](#)).

6. Connect the 10 TP OUTPUT STP/UTP connectors to up to 10 TP receivers (for example, the **TP-126** or additional **TP-410** units).
7. If required, you can connect a PC and/or controller to the:
 - RS-232 terminal block (see [Section 5.2](#))
 - RS-485 terminal block (see [Section 5.3](#) and [Section 6](#))
 - Ethernet connector (see [Section 5.4](#))
8. Set the DIP-switches (see [Section 7](#))
9. Connect the power cord (not shown in [Figure 3](#)).
We recommend that you use only the power cord that is supplied with this machine

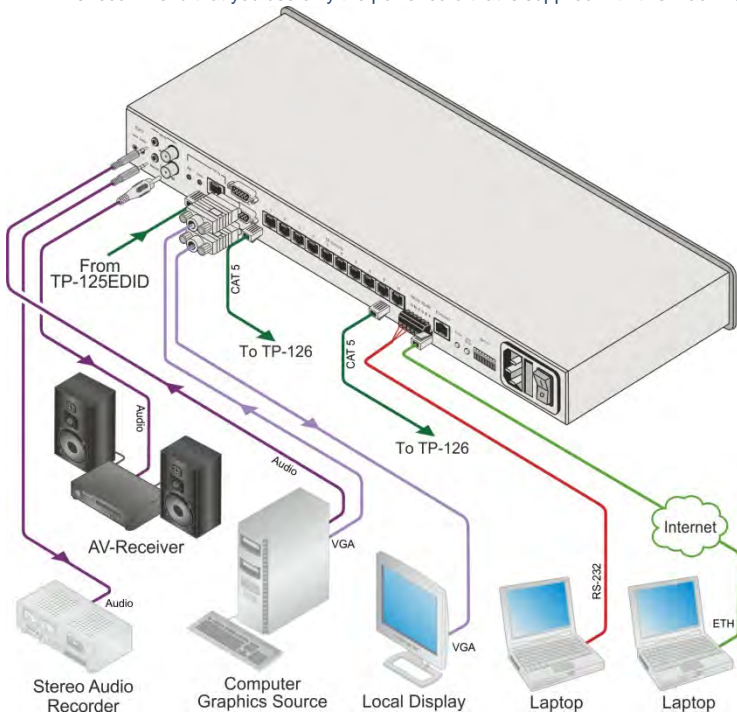


Figure 3: Connecting the TP-410, UXGA-Audio-RS-232 Line Transmitter / DA



When using the TP as the source, adjust the EQ/LEVEL trimmers immediately after turning the power ON. It is recommended to perform this adjustment using the OUT local display.

5.2 Connecting to the TP-410 via an RS-232 Connection

You can operate the destination devices (for example, displays) or the **TP-410** via the RS-232 port from a distance of up to 25m (82ft) using a PC or other controller with an RS-232 port.

To connect the RS-232 port on the **TP-410** to an RS-232 device:

1. Connect the RS-232 Tx pin on the **TP-410** to pin 2 (9-pin D-sub) on the RS-232 device.
2. Connect the RS-232 Rx pin on the **TP-410** to pin 3 (9-pin D-sub) on the RS-232 device.
3. Connect the RS-232 G pin on the **TP-410** to pin 5 (9-pin D-sub) on the RS-232 device.

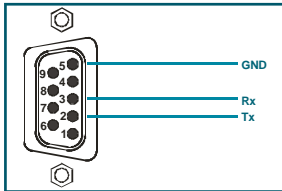


Figure 4: RS-232 Pinout

5.3 Connecting to the TP-410 via an RS-485 Connection

You can operate the destination devices (for example, displays) or the **TP-410** via the RS-485 port from a distance of up to 1000m (3000ft) using a PC or other controller with an RS-485 port.

To connect a PC or controller to the RS-485 port on the unit:

1. Connect the pins on the following ports:
 - Connect the A(+) pin on the RS-485 port of the PC to the A pin on the RS-485 port on the rear panel of the **TP-410**
 - Connect the B(-) pin on the RS-485 port of the PC to the B pin on the RS-485 port on the rear panel of the **TP-410**

- If required, connect the GND pin on the RS-485 port of the PC to the G (ground) pin on the rear panel of the **TP-410**

For RS-485 communication, the ground is usually not connected between the devices. When using a shielded cable, the shield may be grounded on one side

2. If this is the only **TP-410** on the RS-485 bus, set the RS-485 termination DIP-switch (see [Section 7.3](#)) to ON (for RS-485 line termination with 120Ω). If several units are connected via the RS-485 bus, set the termination switches on both physical ends of the bus

5.4 Connecting to the TP-410 via the ETHERNET

You can connect the **TP-410** via the Ethernet, using a crossover cable (see [Section 5.4.1](#)) for direct connection to the PC or a straight through cable (see [Section 5.4.2](#)) for connection via a network hub or network router.

5.4.1 Connecting the ETHERNET Port directly to a PC (Crossover Cable)

You can connect the Ethernet port of the **TP-410** to the Ethernet port on your PC, via a crossover cable with RJ-45 connectors.



This type of connection is recommended for identification of the factory default IP Address of the **TP-410** during the **initial configuration**.

After connecting the Ethernet port, configure your PC as follows:

1. Right-click the My Network Places icon on your desktop.
2. Select **Properties**.
3. Right-click Local Area Connection Properties.
4. Select **Properties**.
The Local Area Connection Properties window appears.
5. Select the Internet Protocol (TCP/IP) and click the **Properties** Button (see [Figure 5](#)).

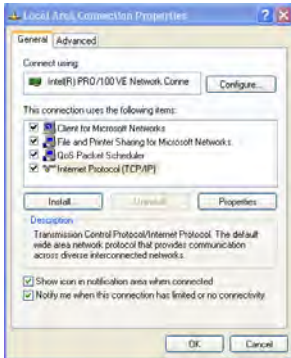


Figure 5: Local Area Connection Properties Window

6. Select Use the following IP Address, and fill in the details as shown in [Figure 6](#).
7. Click **OK**.



Figure 6: Internet Protocol (TCP/IP) Properties Window

5.4.2 Connecting the ETHERNET Port via a Network Hub (Straight-Through Cable)

You can connect the Ethernet port of the **TP-410** to the Ethernet port on a network hub or network router, via a straight-through cable with RJ-45 connectors.

5.4.3 Ethernet Port Configuration

To configure the Ethernet parameters, set DIP-switches 1 to 4 to ON (ON-ON-ON-ON), turn the power off and then back on.

Use your PC initially to configure the Ethernet settings using K-UPLOAD software.

When configuration is complete, set the DIP-switches to their previous position and then turn the power Off and On again.



The latest version of K-UPLOAD and installation instructions can be downloaded from the Kramer Web site at www.kramerelectronics.com

5.5 Connecting Several TP-410 Units

You can daisy chain up to 15 **TP-410** machines, as illustrated in [Figure 7](#).

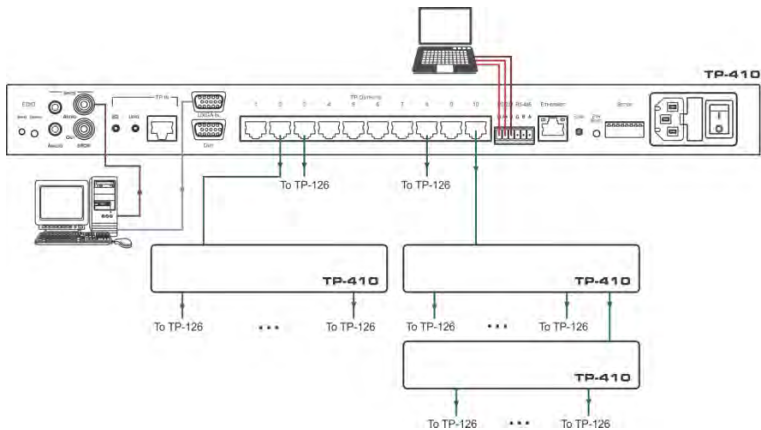


Figure 7: Connecting Multiple TP-410 Units

6 Configuration and Distribution of Control Data

The **TP-410** distributes VGA, audio and control data signals:

- The VGA and audio signals always operate as a 1:10 distributor: the input signal is distributed to all 10 outputs
- By default, the control data is distributed to all 10 outputs and the reply is received from output 1

Using the **TP-410** you can configure and distribute control data via the **TP-410**, in the local or remote mode.

You can select the TP output/s to which the control data is distributed, as well as the TP output for reply, using the Protocol 2000 configuration commands (see [Section 12](#)).



Note that Protocol 2000 commands are sent together with the distributed control data. This applies to a single unit or multiple cascaded units, supplying up to 150 destination control points.

6.1 The Local Mode

In the local mode, you can configure and distribute the control data via the RS-232/RS-485 port or the Ethernet port on the **TP-410** rear panel. Each connected unit is identified by the machine number and the output to which it is connected.

6.1.1 Connecting a PC via RS-232/RS-485

In this example, a local computer graphics source is connected to the UXGA IN 15-pin HD connector and the S/PDIF audio input of the **TP-410** unit that is in the local mode. Outputs 2 and 5 are connected to **TP-126** units and output 10 is connected to the TP IN RJ-45 connector of an additional **TP-410** unit that is in the remote mode (see [Section 6.1.3](#)). The system is controlled by a laptop via RS-232. Each machine in this configuration is identified by its address number and output location, as illustrated in [Figure 8](#).

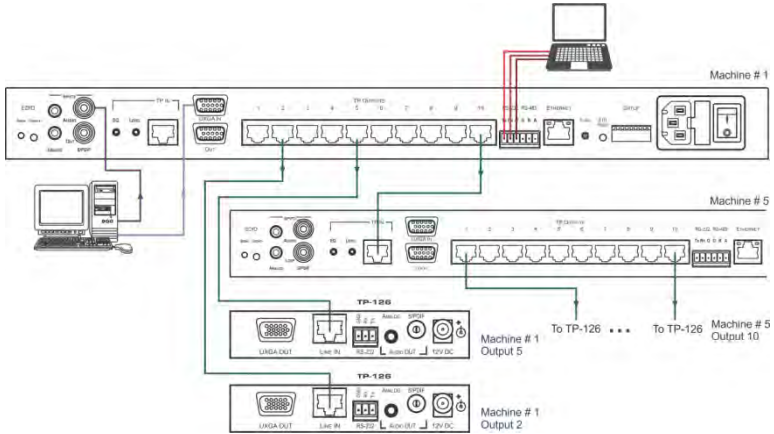


Figure 8: Local Control via RS-232

6.1.2 Connecting a PC via the Ethernet

In this example, a computer graphics source is connected via a transmitter to the TP IN RJ-45 connector. Outputs 1, 4 and 5 are connected to **TP-126** units. The system is controlled by a laptop via the Ethernet. The machines in this configuration are identified by their address number and output location, as illustrated in [Figure 9](#).

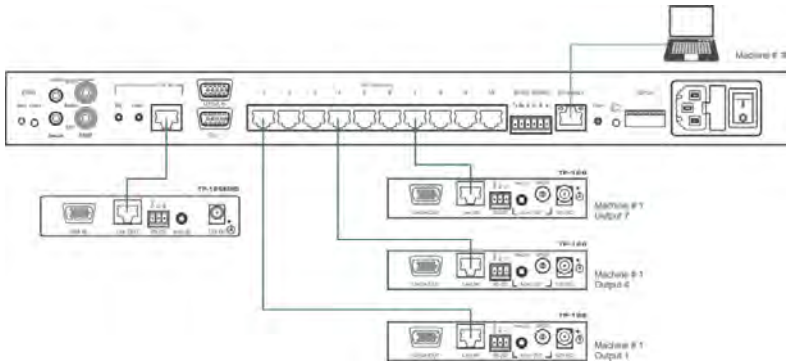


Figure 9: Control via the Ethernet

6.1.3 The Remote Mode

In the remote mode, the PC is connected to the RS-232 port on the transmitter (for example, **TP-125EDID**). In this example, the PC controls machine # 1 and all its outputs, as well as machine # 2 and its outputs.

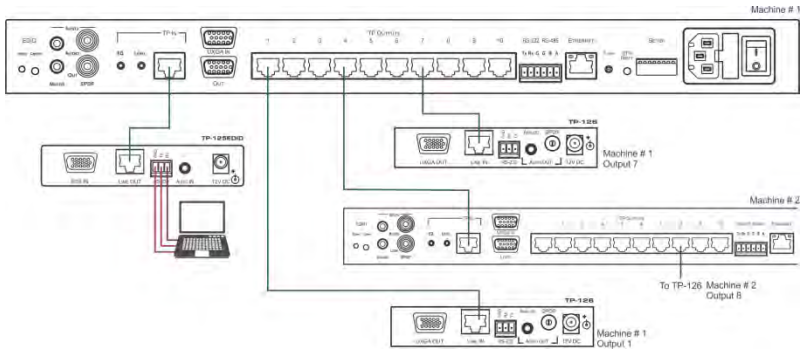


Figure 10: RS-232 Remote Control

6.1.4 Connecting Multiple TP-410 Units via the RS-485 Bus

You can connect up to 15 **TP-410** units via the RS-485 bus with control from a PC or serial controller. To connect up to 15 **TP-410** units via RS-485 (see [Figure 11](#)):

1. Connect the RS-485 terminal block of the first **TP-410** to the RS-485 terminal block of the second **TP-410**, and so on (see [Section 5.3](#)), connecting all the **TP-410** units via the RS-485 terminal blocks.
2. Set each **TP-410** address number to be a unique number (see [Section 7.1](#)).
3. On the first and last **TP-410** physical devices on the RS-485 bus, set the RS-485 termination DIP-switch ON (terminating the RS-485 line at 120Ω, see [Section 7.3](#)).
4. On all other **TP-410** units, ensure that the RS-485 termination DIP-switch is OFF.

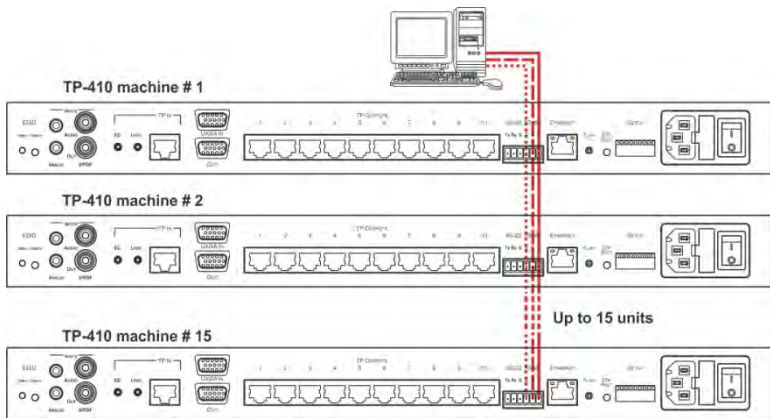


Figure 11: Connecting Multiple TP-410 Units via RS-485

7 The SETUP DIP-switches

The DIP-switches on the **TP-410** set the machine number of the unit.



Moving a DIP-switch down turns the switch on, moving it up turns the switch off. Changing any DIP-switch requires that you turn the **TP-410** power off and then on again.

7.1 Setting the Machine Number

To control a unit remotely via RS-232, RS-485 or the Ethernet, each unit has to be identified via its unique machine #. DIP-switches 1, 2, 3 and 4 set the machine number (according to the table below).

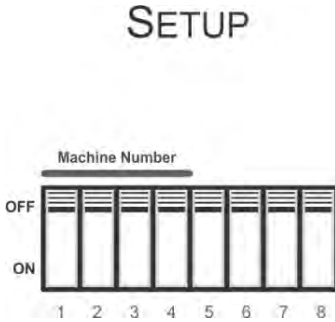


Figure 12: The Address # DIP-switches

Add. #	DIP 1	DIP 2	DIP 3	DIP 4
1	OFF	OFF	OFF	OFF
2	ON	OFF	OFF	OFF
3	OFF	ON	OFF	OFF
4	ON	ON	OFF	OFF
5	OFF	OFF	ON	OFF
6	ON	OFF	ON	OFF
7	OFF	ON	ON	OFF
8	ON	ON	ON	OFF

Add. #	DIP 1	DIP 2	DIP 3	DIP 4
9	OFF	OFF	OFF	ON
10	ON	OFF	OFF	ON
11	OFF	ON	OFF	ON
12	ON	ON	OFF	ON
13	OFF	OFF	ON	ON
14	ON	OFF	ON	ON
15	OFF	ON	ON	ON



When using a single unit, set the unit to Address # 1. Do not use the 1111 DIP-switch combination for normal operation (see [Section 10](#))

After setting a new machine number, turn the power off and then on again.

7.1.1 ETH Configuration

To configure the Ethernet parameters, set DIP-switches 1 to 4 to ON (ON-ON-ON-ON), turn the power off and then turn the power on again.

Use the Kramer K-UPLOAD software to configure the Ethernet.



The latest version of K-UPLOAD and installation instructions can be downloaded from the Kramer Web site at www.kramerelectronics.com

7.2 Setting the RS-232/RS-485 Baud Rate DIP-switches

DIP-switches 5, 6 and 7 set the serial port baud rate.



In a multiple device configuration, all devices must be set to the same baud rate.

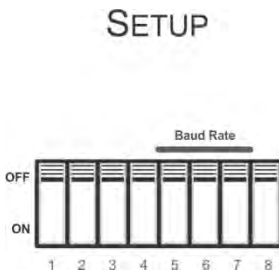


Figure 13: TP-410 Baud Rate DIP-switches

Baud Rate	DIP-switch		
	5	6	7
1200	OFF	OFF	OFF
2400	ON	OFF	OFF
4800	OFF	ON	OFF
9600 (default)	ON	ON	OFF
19200	OFF	OFF	ON

7.3 Setting the RS-485 Bus Termination

The DIP-switch sets the RS-485 bus termination. Only the first and last physical devices on the RS-485 bus must be terminated (set to ON), all other devices must be set to OFF.

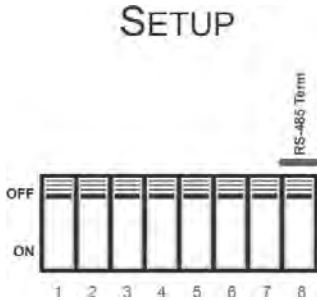


Figure 14: TP-410 DIP-switch RS-485 Termination

8 Wiring the CAT 5 LINE IN / LINE OUT RJ-45 Connectors

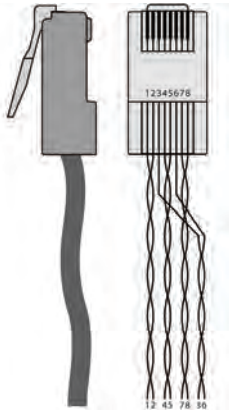
This section defines the CAT 5 pinout, using a straight pin-to-pin cable with RJ-45 connectors.



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
Pair 1	4 and 5
Pair 2	1 and 2
Pair 3	3 and 6
Pair 4	7 and 8

Figure 15: CAT 5 PINOUT



9 Acquiring the EDID

The **TP-410** can acquire the EDID information from a display connected to the UXGA IN 15-pin HD connector on the **TP-410**, or acquire the default EDID.

To acquire the display EDID, do the following:

1. Connect the UXGA IN 15-pin HD connector to the input XGA connector of the display, using a short cable.
The EDID is carried over pins 12 and 15 of the VGA connector. It is essential that the cable used for capturing the EDID passes all 15 pins
2. Connect the display power.
3. On the **TP-410**, connect the power.
4. Press the EDID CAPTURE button.
5. Once the EDID STATUS blinks slowly several times, the EDID is captured.
6. Disconnect the display.

To acquire the default EDID, turn the unit OFF and then ON again while pressing the Factory Reset button, located on the rear panel of the unit.

The default EDID is uploaded.



Note that when performing factory reset, other parameters are reset to their default settings (see [Section 11.1](#)).

10 Flash Memory Upgrade

You can upgrade the **TP-410** via the Kramer K-UPLOAD software.

Before running K-UPLOAD, set DIP-switches 1 to 4 to ON (ON-ON-ON-ON), turn the power Off and then back On.

After completion of flash memory upgrade, set DIP-switches 1 to 4 to their previous position and reset the power.



The latest version of K-UPLOAD and installation instructions can be downloaded from the Kramer Web site at www.kramerelectronics.com

11 Technical Specifications

INPUTS:	1 UXGA on a 15-pin HD connector 1 unbalanced stereo audio on a 3.5mm mini jack 1 S/PDIF on an RCA connector 1 TP on an RJ-45 connector	
OUTPUTS:	10 TP on RJ-45 connectors 1 UXGA on 15-pin HD connectors 1 unbalanced stereo audio 3.5mm mini jacks 1 S/PDIF on RCA connectors	
CONTROL PORTS:	RS-232 3 pin terminal block (data and control) RS-485 3 pin terminal block (data and control) RJ-45 Ethernet (data and control)	
RESOLUTION:	Up to WUXGA (1920 x 1200) and 2k	
MAX. OUTPUT LEVEL:	VIDEO: 1.6Vpp	AUDIO: 2.3Vpp
CONTROLS:	RS-232/RS-485/Ethernet program control Source control from front panel TP-IN level and equalization from rear panel	
SERIAL BAUD RATE:	Up to 19200 bps	
SERIAL MODE:	Full-duplex	
BANDWIDTH:	AUDIO: 20Hz to 20kHz @0.5dB	
S/N RATIO:	AUDIO: <-80dB	
TOTAL GAIN:	Audio: 0dB	
COUPLING:	Audio: AC	
AUDIO THD + NOISE:	Audio: <0.03%	
OPERATING TEMPERATURE:	0° to +55°C (32° to 131°F)	
STORAGE TEMPERATURE:	-45° to +72°C (-49° to 162°F)	
HUMIDITY:	10% to 90%, RHL non-condensing	
POWER SOURCE:	100-240V AC, 16VA	
DIMENSIONS:	48.26cm x 19.1cm x 1U (19" x 7.52" x 1U) W, D, H	
WEIGHT:	3.8kg (8.4lbs) approx	
ACCESSORIES:	Power cord, Windows®-based control software, rack "ears"	
Specifications are subject to change without notice Go to our Web site at http://www.kramerelectronics.com to access the list of resolutions		

11.1 Communication Parameters

EDID	
EDID data is passed to the local Input	
RS-232	
Protocol 2000	
Baud Rate:	Up to 19200
Data Bits:	8
Stop Bits:	1
Parity:	None
Command Format:	HEX
Ethernet	
Default Settings	Factory Reset Settings
IP Address: 192.168.1.39	Power cycle the unit while pressing the Factory Reset button, located on the rear panel of the unit. The unit will reset to its factory default definitions: default Ethernet settings; RS-232 data is distributed to all 10 outputs and is received by output 1 and default EDID is restored (see Section 12)
TCP Port #: 5000	
UDP Port #: 50000	

12 Default EDID

The factory default EDID is listed below.

Monitor

Model name..... TP-410
Manufacturer..... KRM
Plug and Play ID..... KRM0808
Serial number..... 2
Manufacture date..... 2009, ISO week 10

EDID revision..... 1.3
Input signal type..... Analog 0.700,0.000 (0.7V p-p)
Sync input support..... Separate, Composite, Sync-on-green
Display type..... RGB color
Screen size..... 360 x 290 mm (18.2 in)
Power management..... Standby, Suspend, Active off/sleep
Extension blocs..... None

DDC/CI..... Not supported

Color characteristics

Default color space..... sRGB
Display gamma..... 2.00
Red chromaticity..... Rx 0.611 - Ry 0.329
Green chromaticity..... Gx 0.312 - Gy 0.559
Blue chromaticity..... Bx 0.148 - By 0.131
White point (default).... Wx 0.320 - Wy 0.336
Additional descriptors... None

Timing characteristics

Range limits..... Not available
GTF standard..... Not supported
Additional descriptors... None
Preferred timing..... Yes
Native/preferred timing.. 1024x768p at 60Hz (4:3)
 Modeline..... "1024x768" 65.000 1024 1048 1184 1344 768 771 777 806 -hsync -
vsync
Detailed timing #1..... 1280x800p at 60Hz (1:1)
 Modeline..... "1280x800" 71.000 1280 1328 1360 1440 800 803 809 823 +hsync -
vsync

Standard timings supported

640 x 480p at 60Hz - IBM VGA	1024 x 768p at 75Hz - VESA
640 x 480p at 67Hz - Apple Mac II	1280 x 1024p at 75Hz - VESA
640 x 480p at 72Hz - VESA	1280 x 1024p at 60Hz - VESA STD
640 x 480p at 75Hz - VESA	1280 x 960p at 60Hz - VESA STD
800 x 600p at 56Hz - VESA	1400 x 1050p at 60Hz - VESA STD
800 x 600p at 60Hz - VESA	1440 x 900p at 60Hz - VESA STD
800 x 600p at 72Hz - VESA	1600 x 1200p at 60Hz - VESA STD
800 x 600p at 75Hz - VESA	1920 x 1200p at 60Hz - VESA STD
1024 x 768p at 60Hz - VESA	1920 x 1080p at 60Hz - VESA STD
1024 x 768p at 70Hz - VESA	

13 Kramer Communication Protocol 2000

The RS-232/RS-485 Protocol 2000 uses four bytes of information as shown below. The data rate is set by the DIP-switches (see [Section 7.2](#)), with no parity, 8 data bits and 1 stop bit.

MSB	DESTINATION INSTRUCTION							LSB
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	I0	
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 – “NSTRUCTION”

The function that is to be performed by the switcher(s) is defined by the NSTRUCTION (6 bits). Similarly, if a function is performed via the machine’s keyboard, then these bits are set with the NSTRUCTION NO., which 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 – “NPUT”.

When switching (ie. instruction codes 1 and 2), the NPUT (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 NPUT 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.

INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTES
#	DESCRIPTION	INPUT	OUTPUT	
2C	CONTROLS THE STATUS OF A PORT	0–close 1–open	Output bit: O0–O5 = output # or 0 for all outputs O6–0 = Tx; 1 = Rx	1, 2, 4, 5
2D	READS THE STATUS OF A PORT	0–open	Output bit: O0–O5 = output # O6–0 = Tx; 1 = Rx	2, 3, 4, 5



All the values in the table above are hexadecimal, unless otherwise stated

NOTES:

NOTE 1 – When the PC sends this command, if the instruction is valid the unit replies by sending the PC the same 4 bytes that it was sent (except for the first byte where the Destination bit is set high).

NOTE 2 – If O6 = 0 (Tx) – This command defines/reads the definition of the output # (1, 2 or3) to pass the RS-232/Direct command from any input. In this case the instruction does not modify previously set output numbers, allowing the setting of multiple outputs for the Direct command. If O6 = 1 (Rx), the command defines/reads the definition of the output # (1, 2 or 3) to pass the reply from the output to inputs. In this case, the instruction resets a previously set output number, preventing the setting of multiple outputs for the reply.

NOTE 3 – The reply to this command is as follows: The same command and output codes as were sent are returned, and the input is assigned the value of the parameter that was read. The reply is per the definitions in command 44.

NOTE 4 – At initial power-on or on reception of command 44 or 45, any received bytes are analyzed to see whether it is a command 44 or 45. If not, it is transmitted to the output based on the existing setup. If the analyzed bytes are a command 44 or 45, the unit waits for the other 3 bytes and interprets them as a Protocol 2000 command. The command is executed if relevant to this machine number or discarded if not.

NOTE 5 – This command works only when the unit is configured for Software mode.

Sample TP-410 Control Commands		
Command	Description	Reply
2C 80 80 81	Close all output ports for direct command	6C 80 80 81
2C 80 C0 81	Close all output ports for reply command	6C 80 C0 81
2C 81 82 81	Open port 2 for direct command	6C 81 82 81
2C 81 C1 81	Open port 1 for reply command	6C 81 C1 81
2D 80 81 81	Check status of port 1 for direct command. Port is closed	6D 80 81 81
2D 80 82 81	Check status of port 2 for direct command. Port is open	6D 81 82 81
2D 80 C1 81	Check status of port 1 for reply command. Port is open	6D 81 C1 81
2D 80 C2 81	Check status of port 2 for reply command. Port is closed	6D 80 C2 81



All the values in the table above are hexadecimal, unless otherwise stated

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 APPLICABLE 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 APPLICABLE 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 2900-000733QS



Rev: 3