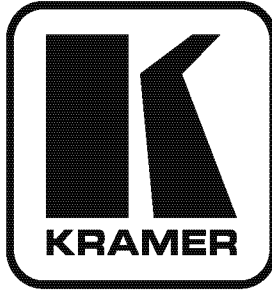


Kramer Electronics, Ltd.



USER MANUAL

Models:

TP-104, TP-104HD, *XGA Line Transmitter / DA*

TP-105, TP-105(HD), *CAT 5 Line Driver / DA*

TP-121, *XGA / Audio Line Transmitter*

TP-122, *XGA / Audio Line Receiver*

TP-123, *XGA / Audio / Data Line Transmitter*

TP-124, *XGA / Audio / Data Line Receiver*

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1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional 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 groups¹ that are clearly defined by function.

Thank you for purchasing your Kramer TOOLS: **TP-104, TP-104HD** XGA Line Transmitter / DA, and/or **TP-105, TP-105(HD)**, CAT 5 Line Driver / DA, and/or **TP-121** XGA / Audio Line Transmitter, and/or **TP-122** XGA / Audio Line Receiver, and/or **TP-123**, XGA / Audio / Data Line Transmitter, and/or **TP-124**, XGA / Audio / Data Line Receiver, which are ideal for:

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

The package includes one or more of the following Kramer TOOLS:

- **TP-104/TP-104HD, TP-105/TP-105(HD), TP-121, TP-122, TP-123, or TP-124**
- Power adapter (12V DC)
- This user manual²

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 cables³

2.1 Quick Start

This quick start chart summarizes the basic setup and operation steps.

1 GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Matrix Switchers; 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 Sealers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters; GROUP 11: Sierra Products

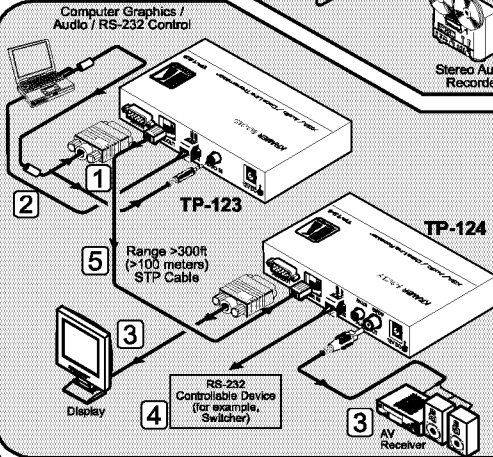
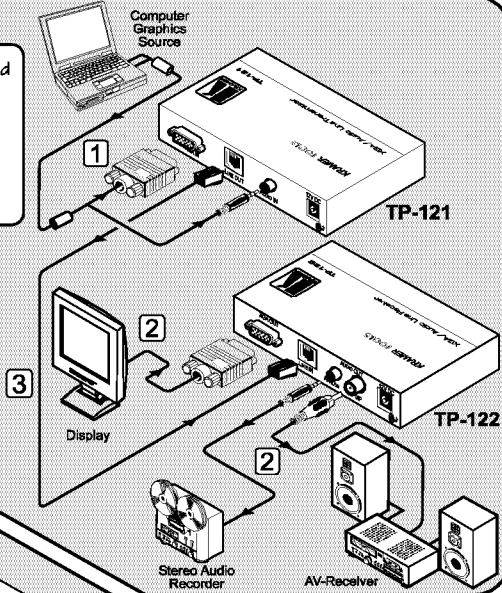
2 Download up-to-date Kramer user manuals at <http://www.kramerelectronics.com>

3 The complete list of Kramer cables is on our Web site at <http://www.kramerelectronics.com>

Step 1: Connect the Machines

**Quick Start: TP-121/TP122
TP-123/TP-124**

- 1 TP-121: Connect the video and audio inputs
- 2 TP-122: Connect the video and audio outputs
- 3 Connect the TP-121 to the TP-122 via the CAT5 cable



- 1 TP-123: Connect the video and audio inputs
- 2 Connect the laptop to the TP-123 via RS-232 cabling
- 3 TP-124: Connect the video and audio outputs
- 4 Connect the TP-124 to an RS-232 controllable device
- 5 Connect the TP-123 to the TP-124 via the CAT5 cable

Step 2: Connect the power

If required:

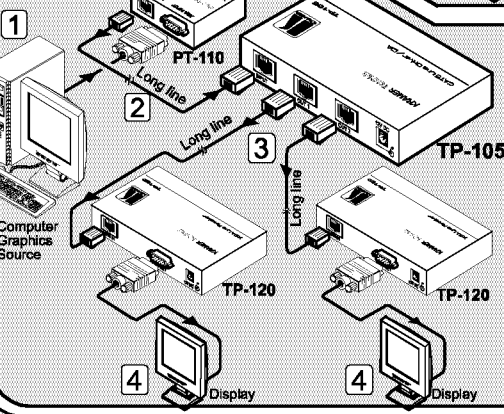
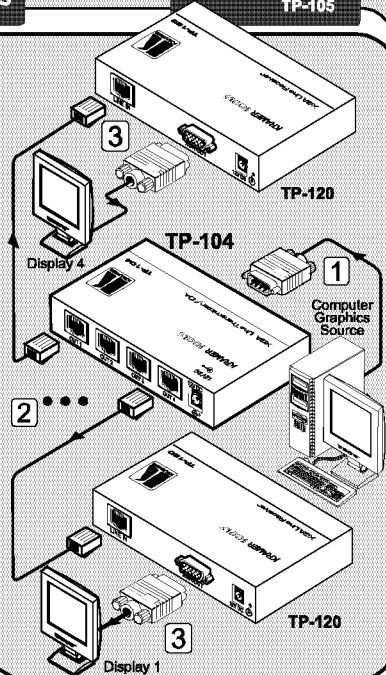
- Adjust the EQ. and LEVEL
- Set the Polarity switches



Step 1: Connect the Machines

Quick Start: TP-104
TP-105

- 1 TP-104: Connect a source to the video input
- 2 TP-104: Connect the OUT connectors (from 1 to 4) to up to four XGA receivers (TP-120) via CAT5 cabling
- 3 TP-120: Connect a video output to each receiver

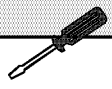


- 1 PT-110: Connect the source
- 2 Connect the PT-110 to the TP-105 via CAT5 cabling
- 3 TP-105: Connect the OUT connectors (1 and 2) to up to two XGA receivers (TP-120) via CAT5 cabling
- 4 TP-120: Connect a video output to each receiver

Step 2: Connect the power

If required:

- Adjust the EQ. and LEVEL
- Set the Polarity switches



3 Overview

This user manual describes the following Kramer TOOLS:

- **TP-104/TP-104HD** *XGA Line Transmitter / DA* is a line transmitter / 1:4 DA that receives an XGA signal and transmits it over four CAT 5 cables to appropriate receivers (see section [4](#))
- **TP-105/TP-105(HD)** *CAT 5 Line Driver / DA* receives a CAT 5 input¹ and distributes it to two identical outputs (see section [5](#))
- **TP-121** *XGA / Audio Line Transmitter* and the **TP-122** *XGA / Audio Line Receiver* (see section [6](#))
- **TP-123** *XGA / Audio / Data Line Transmitter* and the **TP-124** *XGA / Audio / Data Line Receiver* (see section [7](#))

This section describes:

- Using shielded twisted pair (STP) / unshielded twisted pair (UTP), see section [3.1](#)
- The power connect feature, see section [3.2](#)
- Recommendations for achieving the best performance, see section [3.3](#)

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

We recommend that you use shielded twisted pair (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 digital signals and for analog signals where skewing is not an issue. For cases where there is skewing, our 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 was tested using those cables.

Although unshielded twisted pair (UTP) cable might be preferred for long range applications, the UTP cable should be installed far away from electric cables, motors and so on, which are prone to create electrical interference. However, since the use of UTP cable might cause inconformity to electromagnetic standards, Kramer does not commit to meeting the standard with UTP cable.

¹ Video only

3.2 About the Power Connect Feature

The Power Connect feature applies as long as the cable can carry power. The distance does not exceed 50m on standard CAT 5 cable, for longer distances, heavy gauge cable should be used¹.

For a CAT 5 cable exceeding a distance of 50m, separate power supplies should be connected to the transmitter and to the receiver simultaneously.

3.3 Recommendations for Achieving the Best Performance

To achieve the best performance:

- Use only good quality connection cables² to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables).
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality and position your Kramer products away from moisture, excessive sunlight and dust



Caution – No operator-serviceable parts inside unit.

Warning – Use only the Kramer Electronics input power wall adapter that is provided with this unit³.

Warning – Disconnect power and unplug unit from wall before installing or removing device or servicing unit.

¹ CAT 5 cable is still suitable for the video/audio transmission, but not for feeding the power at these distances

² Available from Kramer Electronics on our Web site at <http://www.kramerelectronics.com>

³ For example, part number 2535-052001

4 Your TP-104/TP-104HD¹ XGA Line Transmitter / DA

The **TP-104/TP-104HD** is a line transmitter / 1:4 DA that receives an XGA signal² and transmits it over four CAT 5 cables to appropriate receivers.

In particular, the **TP-104/TP-104HD**:

- Has a transmission range of more than 300ft (more than 100m)
- Can power or be powered by the receiver over the same CAT 5 cable and is 12V DC fed

Figure 1 defines the **TP-104** and Figure 2 defines the **TP-104HD**:

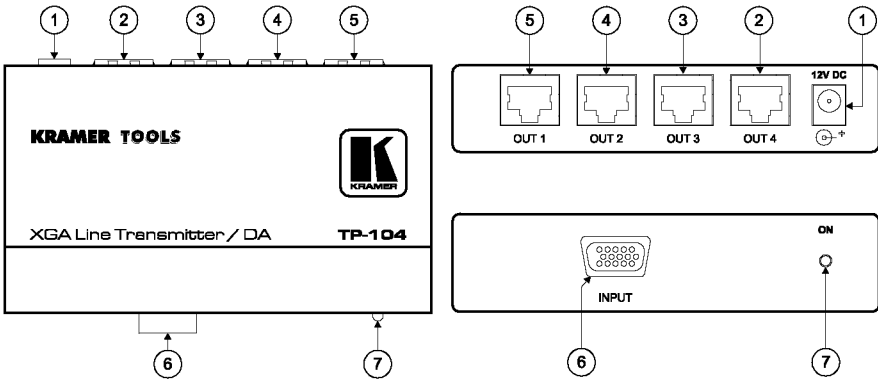


Figure 1: TP-104 XGA Line Transmitter / DA

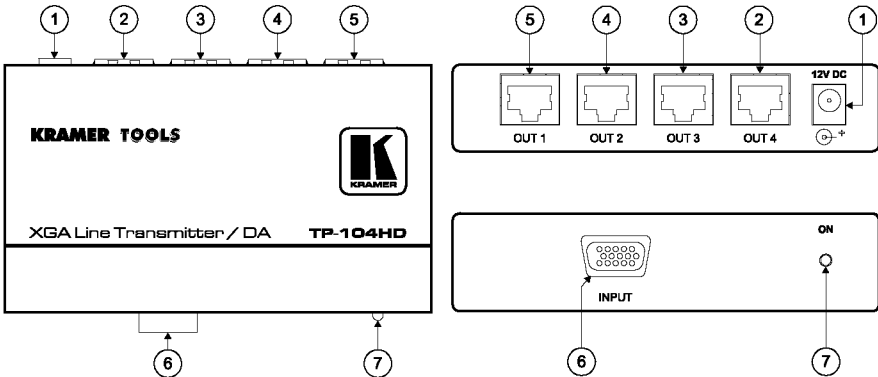


Figure 2: TP-104HD XGA Line Transmitter / DA

1 The TP-104HD is similar to the TP-104 but can also receive HD signals (high definition resolutions: 480p, 576p, 720p, 1080i and 1080p)

2 The terminology XGA is used throughout this manual, where this implies any RGBHV signal on a 15-pin HD (F) connector having a resolution from VGA up to XGA

Table 1: TP-104, TP-104HD XGA Line Transmitter / DA Features

#	Feature	Function
1	12V DC	+12V DC connector for powering the unit
2	OUT 4 RJ-45 connector	Connects to ¹ the LINE IN RJ-45 connector on the TP-122 XGA / Audio Line Receiver or the TP-120 XGA Line Receiver ²
3	OUT 3 RJ-45 connector	Connects to ¹ the LINE IN RJ-45 connector on the TP-122 XGA / Audio Line Receiver or the TP-120 XGA Line Receiver ²
4	OUT 2 RJ-45 connector	Connects to ¹ the LINE IN RJ-45 connector on the TP-122 XGA / Audio Line Receiver or the TP-120 XGA Line Receiver ²
5	OUT 1 RJ-45 connector	Connects to ¹ the LINE IN RJ-45 connector on the TP-122 XGA / Audio Line Receiver or the TP-120 XGA Line Receiver ²
6	INPUT 15-pin HD (F) connector	Connect to the XGA source
7	ON LED	Illuminates when receiving power

Figure 3 and Table 2 define the **TP-104** and **TP-104HD** underside panel:

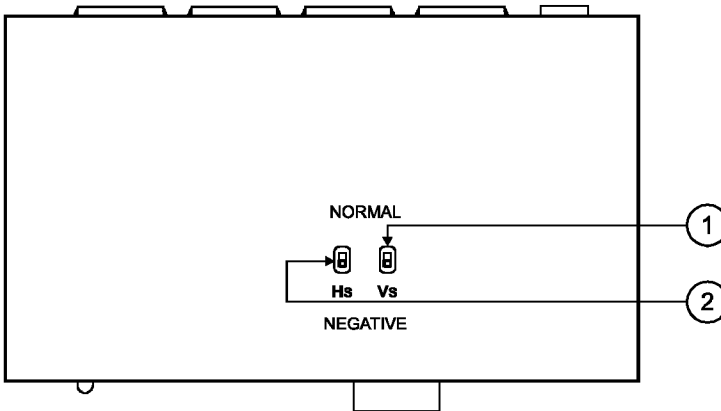


Figure 3: TP-104 (Underside Panel)

Table 2: TP-104 (Underside Panel) Features

#	Feature	Function
1	VS Switch	Slide the switch up (to NORMAL) to retain the polarity Slide the switch down ³ to change the VS polarity to NEGATIVE polarity ⁴
2	HS Switch	Slide the switch up (to NORMAL) to retain the polarity Slide the switch down ³ to change the HS polarity to NEGATIVE polarity ⁴

1 Using a UTP CAT 5 cable with RJ-45 connectors at both ends (the PINOUT is defined in Table 12 and Figure 14)

2 Refer to the separate user manual: PT-110, WP-110, PT-120, TP-120, which can be downloaded at <http://www.kramerelectronics.com>. Also, see the example illustrated in Figure 17.

3 By default, both switches are set to NORMAL

4 Downgoing syncs

5 Your TP-105/TP-105(HD¹) CAT 5 Line Driver / DA

The **TP-105** receives a CAT 5 input, and distributes it to two identical outputs.

In particular, the **TP-105**:

- Has a transmission range of more than 300ft (more than 100m) over UTP cabling
- Includes EQ, and level controls and is 12V DC fed

Figure 4 and Table 3 define the **TP-105**:

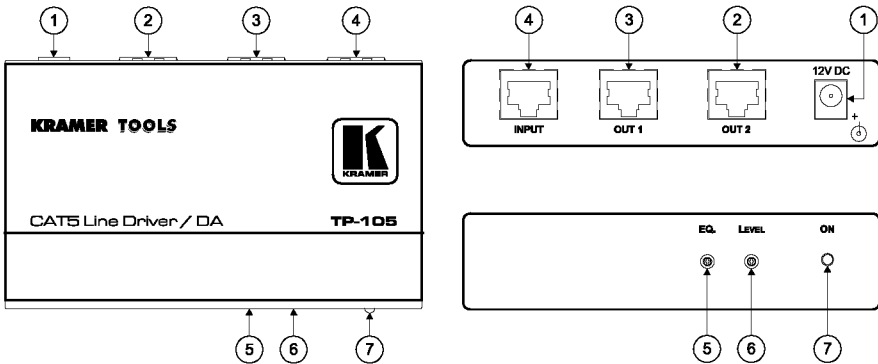


Figure 4: TP-105 CAT 5 Line Driver / DA

Table 3: TP-105 CAT 5 Line Driver / DA Features

#	Feature	Function
1	12V DC	+12V DC connector for powering the unit
2	OUT 2 RJ-45 connector	Connects to ² the LINE IN RJ-45 connector on the TP-120 XGA Line Receiver
3	OUT 1 RJ-45 connector	Connects to ² the LINE IN RJ-45 connector on the TP-120 XGA Line Receiver
4	INPUT RJ-45 connector	Connects to ² the LINE OUT RJ-45 connector on the PT-110 XGA Line Transmitter
5	EQ trimmer	Adjusts the video EQ. (equalization) compensation
6	LEVEL trimmer	Adjusts ³ the video signal level
7	ON LED	Illuminates when receiving power

1 The TP-105HD (identified by a sticker on its underside) is identical in appearance to the TP-105. However, the TP-105HD can also receive HD signals (high definition resolutions: 480p, 576p, 720p, 1080i and 1080p), for example, from a TP-112HD XGA/HD Line Transmitter-DA, and not only computer graphics signals (for example, from a PT-110 as [Figure 18](#) illustrates)

2 Using a UTP CAT 5 cable with RJ-45 connectors at both ends (the PINOUT is defined in [Table 12](#) and [Figure 14](#))

3 Insert a screwdriver into the hole and carefully rotate it, to trim the level

6 Your TP-121 / TP-122

This section defines the **TP-121 XGA / Audio Line Transmitter** (see section [6.1](#)), and the **TP-122 XGA / Audio Line Receiver** (see section [6.2](#)).

6.1 Your TP-121 XGA / Audio Line Transmitter

The **TP-121** is an XGA / audio stereo line transmitter that receives an XGA signal and an unbalanced stereo analog audio signal and transmits them over CAT 5 cable to a **TP-122** receiver, converting the unbalanced stereo analog audio signal to digital audio (S/PDIF) stream before transmitting, thus preserving the quality of the audio signal. In particular, the **TP-121**:

- Has a transmission range of more than 300ft (more than 100m), and a 20kHz audio bandwidth with an S/N ratio that exceeds 80dB on the same transmission range
- Can power or be powered by the receiver over the same CAT 5 cable
- Is 12V DC fed

[Figure 5](#) and [Table 4](#) define the **TP-121**:

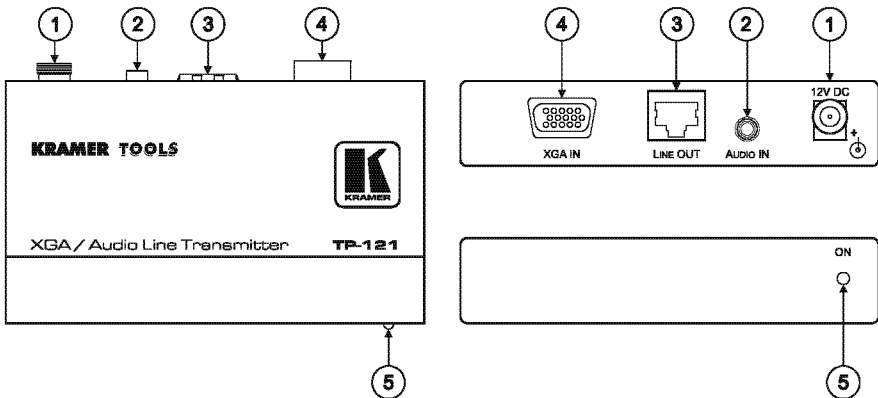


Figure 5: TP-121 XGA / Audio Line Transmitter

Table 4: TP-121 XGA / Audio Line Transmitter Features

#	Feature	Function
1	12V DC	+12V DC connector for powering the unit
2	AUDIO IN 3.5mm mini jack	Connects to the audio source
3	LINE OUT RJ-45 connector	Connects to ¹ the LINE IN RJ-45 connector on the TP-122 XGA / Audio Line Receiver
4	XGA IN 15-pin HD (F) connector	Connect to the XGA source
5	ON LED	Illuminates when receiving power

¹ Using a UTP CAT 5 cable with RJ-45 connectors at both ends (the PINOUT is defined in [Table 12](#) and [Figure 14](#))

6.1.1 The TP-121 Internal Polarity Switches

Figure 6 and Table 5 define the internal sync polarity switches inside the TP-121.

Note, that you need to open the TP-121 unit to gain access to the Vs and Hs Polarity switches. After setting the switches, close the TP-121 unit.

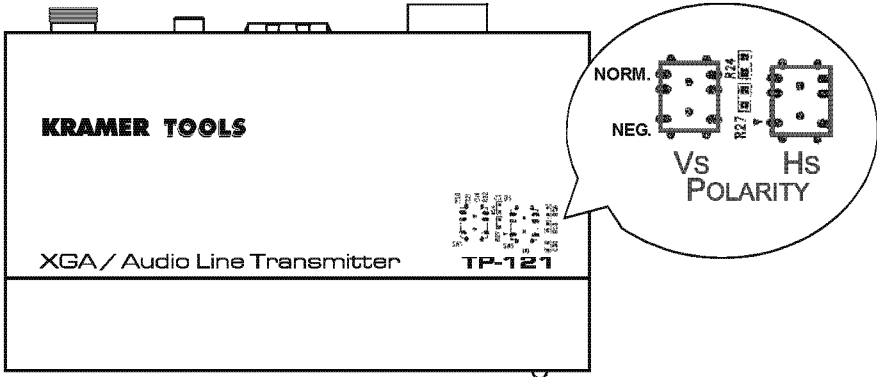


Figure 6: TP-121 Internal Polarity Switches

Table 5: Features of the TP-121 Internal Polarity Switches

Feature	Function
VS Switch	Slide the switch down ² , to set the V SYNC to negative polarity (NEG.); slide the switch up, to set the V SYNC to its input polarity (NORM.)
HS Switch	Slide the switch down ¹ , to set the H SYNC to negative polarity (NEG.); slide the switch up, to set the H SYNC to its input polarity (NORM.)

6.2 Your TP-122 XGA / Audio Line Receiver

This section describes the topside (see section 6.2.1), and the underside² (see section 6.2.2) of the TP-122 XGA / Audio Line Receiver.

6.2.1 Your TP-122 XGA / Audio Line Receiver (Topside)

The TP-122 is an XGA / audio line receiver that receives the coded CAT 5 signal transmitted by a TP-121, decodes it and converts it to XGA, stereo analog and S/PDIF digital audio outputs. The TP-122, with a TP-121, allows an operation range of more than 300ft (more than 100m) over standard CAT 5 cable.

¹ By default, both switches are set down (for a negative V SYNC and H SYNC polarity)

² The underside is identical on the TP-122 and TP-124

In addition, the **TP-122**:

- Can power or be powered by the transmitter over the same CAT 5 cable
- Can change the polarity of decoding H and V Sync for video
- Includes EQ, and level controls
- Is 12V DC fed

Figure 7 and Table 6 define the **TP-122 XGA / Audio Line Receiver** topside:

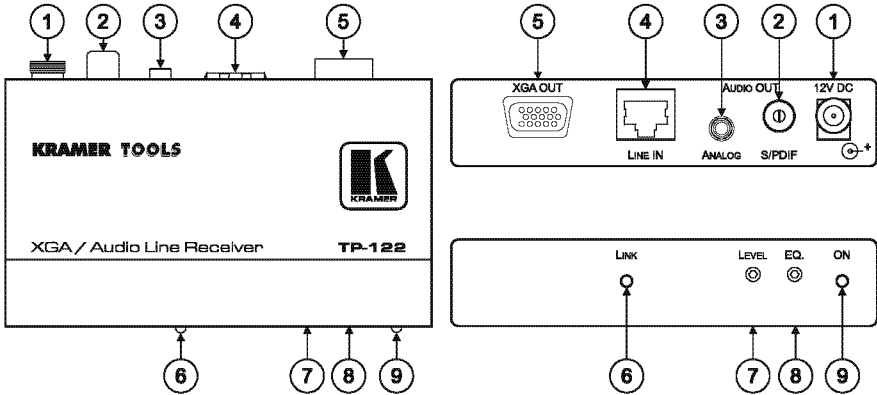


Figure 7: TP-122 XGA / Audio Line Receiver (Topside)

Table 6: TP-122 XGA / Audio Line Receiver (Topside) Features

#	Feature	Function
1	12V DC	+12V DC connector for powering the unit
2	AUDIO OUT	S/PDIF RCA connector Connects to the digital audio acceptor
3		ANALOG 3.5mm mini jack Connects to the analog audio acceptor
4	LINE IN RJ-45 connector	Connects to ¹ the TP-121 or the TP-104 ²
5	XGA OUT 15-pin HD (F) connector	Connects to the XGA acceptor
6	LINK LED	Illuminates when receiving the correct input signal
7	LEVEL trimmer	Adjusts ⁴ the output signal level
8	EQ. ³ trimmer	Adjusts ⁴ the cable compensation equalization level
9	ON LED	Illuminates when receiving power

1 Using a UTP CAT 5 cable with RJ-45 connectors at both ends (the PINOUT is defined in Table 12 and Figure 14)

2 The TP-104 does not accept the audio signals

3 Degradation and VGA/XGA signal loss can result from using long cables (due to stray capacitance), sometimes leading to a total loss of sharpness in high-resolution signals

4 Use a screwdriver to carefully rotate the trimmer, adjusting the appropriate level

6.2.2 Your TP-122 XGA / Audio Line Receiver (Underside)

Figure 8 and Table 7 define the underside¹ of the **TP-122 XGA / Audio Line Receiver**:

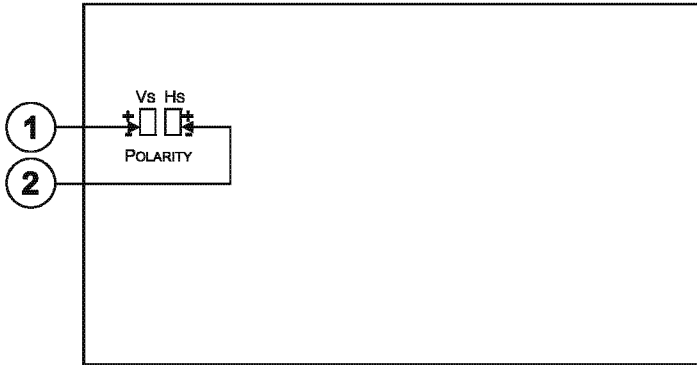


Figure 8: TP-122 XGA / Audio Line Receiver (Underside¹)

Table 7: TP-122 XGA / Audio Line Receiver (Underside) Features

#	Feature	Function
1	VS Switch	Slide the switch up ² to set the V SYNC to positive polarity; slide the switch down to set the V SYNC to negative polarity
2	HS Switch	Slide the switch up ² to set the H SYNC to positive polarity; slide the switch down to set the H SYNC to negative polarity

¹ The underside is identical on the TP-122 and TP-124

² By default, both switches are set down (for a negative V SYNC and H SYNC polarity)

7 Your TP-123 / TP-124

This section describes the **TP-123 XGA / Audio / Data Line Transmitter** (see section [7.1](#)), and the **TP-124 XGA / Audio / Data Line Receiver** (see section [7.2](#)).

7.1 Your TP-123 XGA / Audio / Data Line Transmitter

The **TP-123** is a high-performance transmitter that accepts a computer graphics input signal, an unbalanced stereo analog audio signal, unidirectional (RxD) RS-232 control commands and 12V DC power, over CAT 5 cable, and transmits to a **TP-124** receiver. The stereo analog audio signal is converted to the digital audio (S/PDIF) stream before transmitting, thus preserving the quality of the audio source signals.

The **TP-123 / TP-124** pair has a transmission range of more than 300ft (more than 100m) over UTP cabling. In addition, the **TP-123**:

- Can power or be powered by the **TP-124** receiver over the same CAT 5 cable and is 12V DC fed

[Figure 9](#) and [Table 8](#) define the **TP-123**:

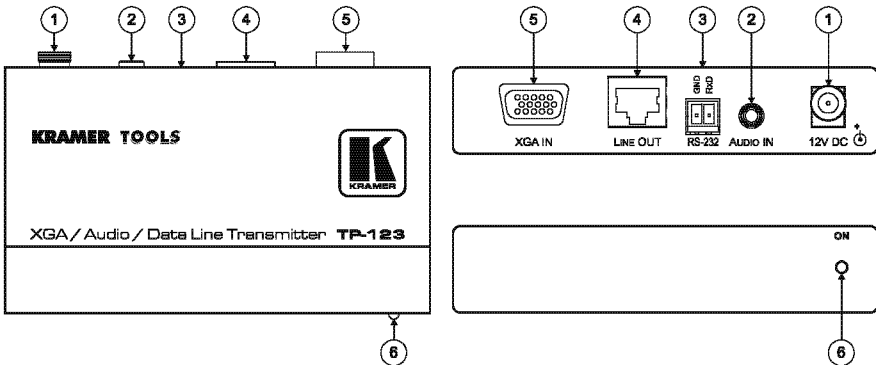


Figure 9: TP-123 XGA / Audio / Data Line Transmitter

Table 8: TP-123 XGA / Audio / Data Line Transmitter Features

#	Feature	Function
1	12V DC	+12V DC connector for powering the unit
2	AUDIO IN 3.5mm mini jack	Connects to the audio source
3	RS-232 terminal block connector	Connects to the PC or the Remote Controller (see section 9.1)
4	LINE OUT RJ-45 connector	Connects to ¹ the LINE IN RJ-45 connector on the TP-124 XGA / Audio Line Receiver
5	XGA IN 15-pin HD (F) connector	Connect to the XGA source
6	ON LED	Illuminates when receiving power

7.1.1 The TP-123 Internal Polarity Switches

Figure 10 and Table 9 define the internal sync polarity switches inside the TP-123.

Note, that you need to open the TP-123 unit to gain access to the Vs and Hs Polarity switches. After setting the switches, close the TP-123 unit.

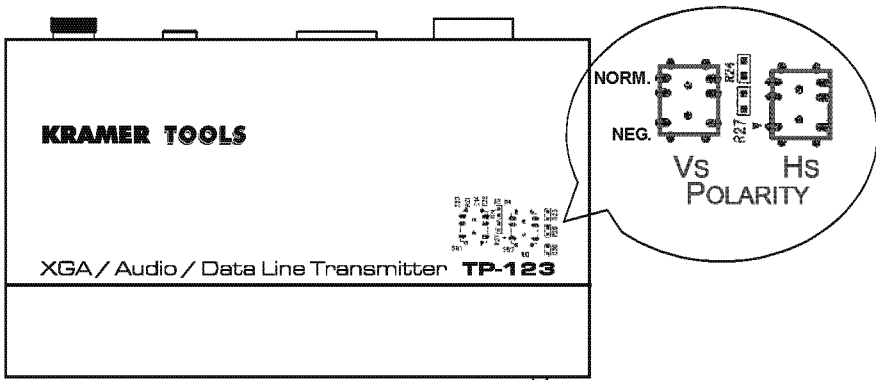


Figure 10: TP-123 Internal Polarity Switches

Table 9: Features of the TP-123 Internal Polarity Switches

Feature	Function
VS Switch	Slide the switch down ² to set the V SYNC to negative polarity (NEG.); slide the switch up to set the V SYNC to its input polarity (NORM.)
HS Switch	Slide the switch down ² to set the H SYNC to negative polarity (NEG.); slide the switch up to set the H SYNC to its input polarity (NORM.)

¹ Using a UTP CAT 5 cable with RJ-45 connectors at both ends (the PINOUT is defined in Table 12 and Figure 14)

² By default, both switches are set down (for a negative V SYNC and H SYNC polarity)

7.2 Your TP-124 XGA / Audio / Data Line Receiver

The **TP-124** is a high-performance receiver obtaining the computer graphics signal/audio/control data from the Kramer **TP-123** via UTP cabling at its CAT 5 Line input. The **TP-124** outputs a computer graphics signal, an unbalanced stereo analog audio signal, a converted digital audio (S/PDIF) signal and RS-232 control commands. The unidirectional (Tx/D) RS-232 interface makes it possible to control virtually any devices over a transmission range of more than 300ft (more than 100m) over UTP cabling. The **TP-124** can power or be powered by the **TP-123** transmitter over the same CAT 5 cable.

In addition, the **TP-124** features:

- Level and EQ. control for the XGA signals
- The capability to change the polarity of decoding H and V Sync
- 24 bit 48kHz S/PDIF digital audio that supplies the highest quality audio
- Is 12V DC fed

This section describes the topside of the **TP-124 XGA / Audio / Data Line Receiver**. The underside¹ of the **TP-124** is described in section 6.2.2.

Figure 11 and Table 10 define the topside of the **TP-124 XGA / Audio / Data Line Receiver**:

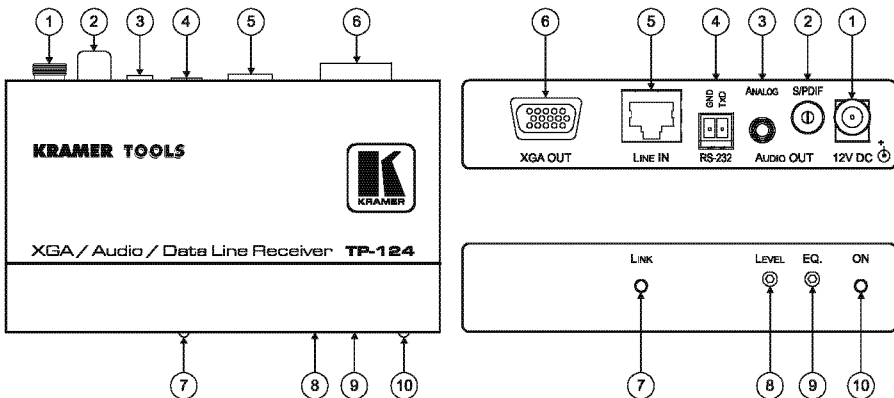


Figure 11: TP-124 XGA / Audio / Data Line Receiver (Topside)

¹ The underside is identical on the TP-124 and TP-122

Table 10: TP-124 XGA / Audio / Data Line Receiver (Topside) Features

#	Feature	Function
1	12V DC	+12V DC connector for powering the unit
2	AUDIO OUT	S/PDIF RCA connector
3		ANALOG 3.5mm mini jack
4	RS-232 Terminal Block connector	Connects to the controlled unit
5	LINE IN RJ-45 connector	Connects to ¹ the LINE OUT RJ-45 connector on the TP-123 or the TP-104 ²
6	XGA OUT 15-pin HD (F) connector	Connect to the XGA acceptor
7	LINK LED	Illuminates when receiving the correct input signal
8	LEVEL trimmer	Adjusts ⁴ the output signal level
9	EQ. ³ trimmer	Adjusts ⁴ the cable compensation equalization level
10	ON LED	Illuminates when receiving power

7.2.1 Your TP-124 XGA / Audio / Data Line Receiver (Underside)

Figure 12 and Table 11 define the underside⁵ of the TP-124 XGA / Audio / Data Line Receiver:

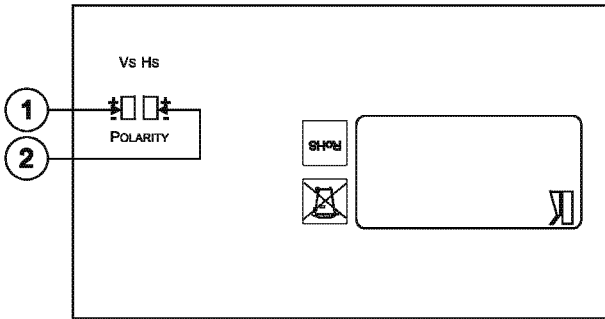


Figure 12: TP-124 XGA / Audio / Data Line Receiver (Underside¹)

Table 11: TP-124 XGA / Audio / Data Line Receiver (Underside) Features

#	Feature	Function
1	VS Switch	Slide the switch up ² to set the V SYNC to positive polarity; slide the switch down to set the V SYNC to negative polarity
2	HS Switch	Slide the switch up ⁶ to set the H SYNC to positive polarity; slide the switch down to set the H SYNC to negative polarity

1 Using a UTP cable with CAT 5 connectors at both ends (the PINOUT is defined in Table 12 and Figure 14)

2 The TP-104 does not accept the audio signals

3 Degradation and VGA/XGA signal loss can result from using long cables (due to stray capacitance), sometimes leading to a total loss of sharpness in high-resolution signals

4 Use a screwdriver to carefully rotate the trimmer, adjusting the appropriate level

5 The underside is identical on the TP-122 and TP-124

6 By default, both switches are set down (for a negative V SYNC and H SYNC polarity)

8 Connecting the XGA / Audio Line Transmitter / Receiver

You can use the **TP-121** and **TP-122** to configure an XGA/Audio Line-to-Twisted Pair Transmitter and Receiver system.

To connect the **TP-121 XGA / Audio Line Transmitter** with the **TP-122 XGA / Audio Line Receiver**, as the example in Figure 13 illustrates, do the following:

1. On the **TP-121**, connect the XGA source (for example, a laptop's graphics card) to the XGA INPUT 15-pin HD (F) connector and an audio source to the AUDIO IN 3.5mm mini jack, for example, using a Kramer C-GMA/GMA cable (VGA 15-pin HD (M) +Audio jack to VGA 15-pin HD (M) +Audio jack)1. Alternatively, you can connect an XGA source to the XGA INPUT 15-pin HD (F) connector, and a separate audio source to the AUDIO IN 3.5mm mini jack.
2. On the **TP-122**, connect the XGA OUT 15-pin HD (F) connector to the XGA acceptor (for example, a display), and connect the AUDIO OUT S/PDIF RCA connector to the digital audio acceptor (for example, an AV Receiver), and the ANALOG 3.5mm mini jack to the analog audio acceptor (for example, a stereo audio recorder).
3. Connect the LINE OUTPUT RJ-45 connector on the **TP-121** to the LINE IN RJ-45 connector on the **TP-122**, via UTP cabling (with a range of more than 300ft (>100m)), see section [8.1](#).
4. Connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity on both² the **TP-121** and the **TP-122**. The signal from the XGA source is transmitted via CAT 5 cable, decoded and converted at the XGA OUT 15-pin HD (F) connector to the XGA acceptor.
5. On the **TP-122**:
 - Adjust³ the video output signal level and/or cable compensation equalization level, if required
 - If necessary, set the H SYNC and V SYNC switches⁴, on the underside

1 Not supplied. The complete list of Kramer cables is on our Web site at <http://www.kramerelectronics.com>

2 If you cannot connect the power to both the TP-121 and TP-122, you can just connect the power to the TP-122

3 Use a screwdriver to carefully rotate the trimmer, adjusting the appropriate level

4 By default, both switches are set down (for negative V SYNC and H SYNC polarity)

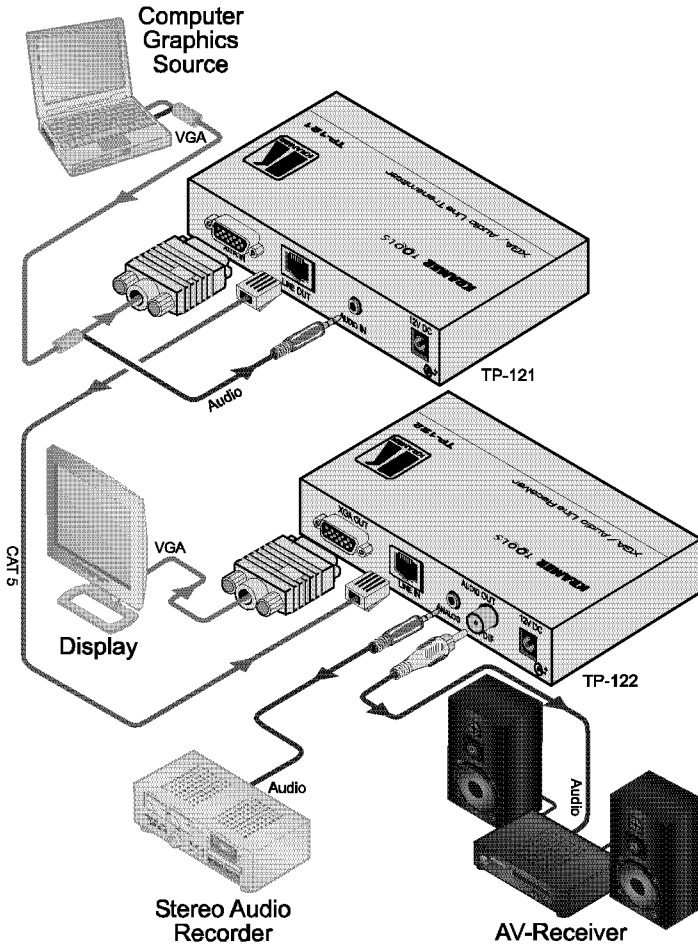


Figure 13: Connecting the XGA / Audio Line Transmitter / Receiver System

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

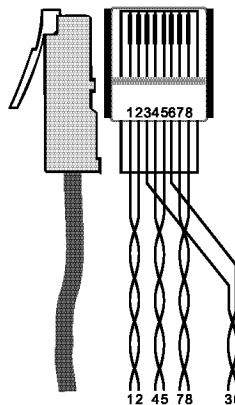
Table 12 and Figure 14 define the UTP CAT 5 PINOUT, using a straight pin to pin cable with RJ-45 connectors:

Table 12: CAT 5 PINOUT

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

Figure 14: CAT 5 PINOUT

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



9 Connecting the XGA / Audio / Data Line Transmitter / Receiver

You can use the **TP-123 XGA / Audio / Data Line Transmitter** and the **TP-124 XGA / Audio / Data Line Receiver** to configure a twisted pair transmitter and receiver system, to transmit the video, audio and RS-232 control signals via CAT 5 UTP cable. To connect the **TP-123** and the **TP-124** to configure a twisted pair transmitter and receiver system, as the example in [Figure 15](#) illustrates, do the following:

- On the **TP-123**, connect:
 - An XGA source (for example, a laptop's graphics card) to the XGA IN 15-pin HD (F) connector and an audio source to the Audio IN 3.5mm mini jack, for example, using a Kramer C-GMA/GMA cable (VGA 15-pin HD (M) +Audio jack to VGA 15-pin HD (M) +Audio jack)¹
 - An RS-232 cable with a 9-pin D-sub connector at one end to the laptop, and a 2 PIN terminal block connector at the other end to the **TP-123** RS-232 port²

1 Not supplied. The full list of Kramer cables is on our Web site at <http://www.kramerelectronics.com>. Alternatively, you can connect an XGA source to the XGA IN 15-pin HD (F) connector, and a separate audio source to the AUDIO IN 3.5mm mini jack

2 As defined in [Figure 16](#) and [Table 13](#)

2. On the **TP-124**, connect:
 - The XGA OUT 15-pin HD (F) connector to a display
 - The S/PDIF Audio OUT RCA connector to a digital AV Receiver (leave the ANALOG Audio OUT 3.5mm mini jack unconnected)
 - An RS-232 cable with a 2 PIN terminal block connector at one end to the **TP-124** RS-232 port², and a 9-pin D-sub connector at the other end to the RS-232 port on an RS-232 controllable device (for example, a switcher)
3. Connect the Line OUT RJ-45 connector on the **TP-123** to the LINE IN RJ-45 connector on the **TP-124**, via UTP cabling¹ (with a range of more than 300ft (>100m)).
4. Connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity on both² the **TP-123** and the **TP-124**.
5. On the **TP-124**:
 - Adjust³ the video output signal level and/or cable compensation equalization level, if required
 - If necessary, set the H SYNC and V SYNC switches⁴, on the underside

1 For details of how to wire a CAT 5 LINE IN / LINE OUT RJ-45 connector, see section [8.1](#).

2 If you cannot connect the power to both the TP-123 and TP-124, you can just connect the power to any one unit

3 Use a screwdriver to carefully rotate the trimmer, adjusting the appropriate level

4 By default, both switches are set down (for negative V SYNC and H SYNC polarity)

Connecting the XGA / Audio / Data Line Transmitter / Receiver

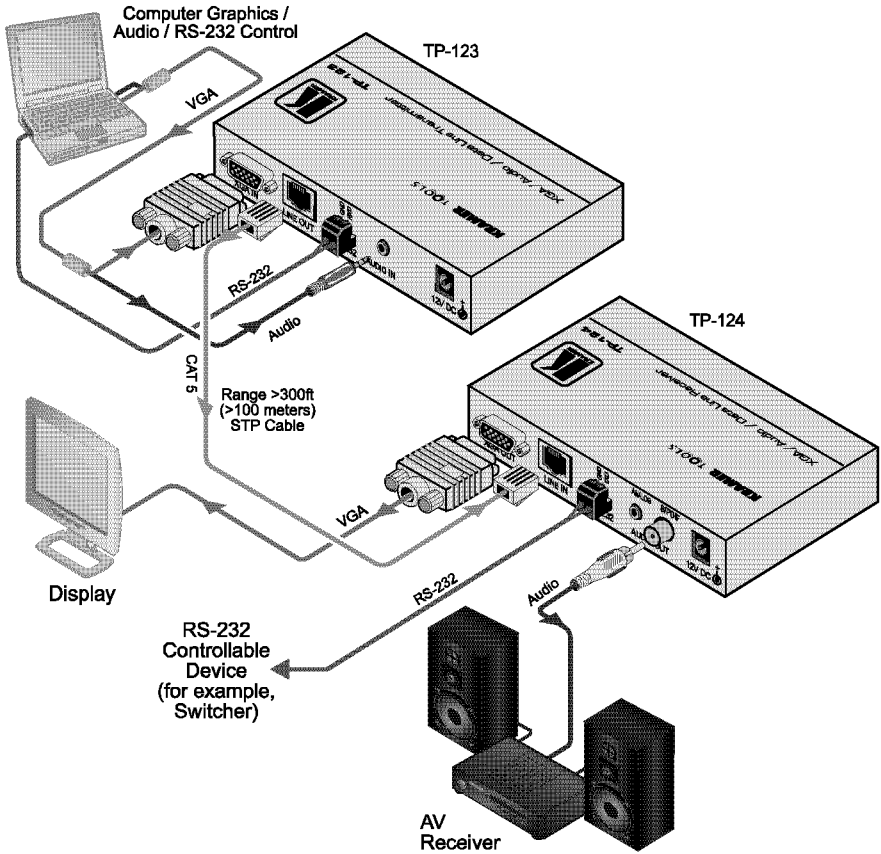


Figure 15: Connecting the XGA / Audio / Data Line Transmitter / Receiver System

9.1 Controlling via RS-232 (for example, using a PC)

Prepare an RS-232 cable with a 9-pin D-sub connector at one end, and a 2 PIN terminal block connector at the other end, as defined in [Figure 16](#) and [Table 13](#):

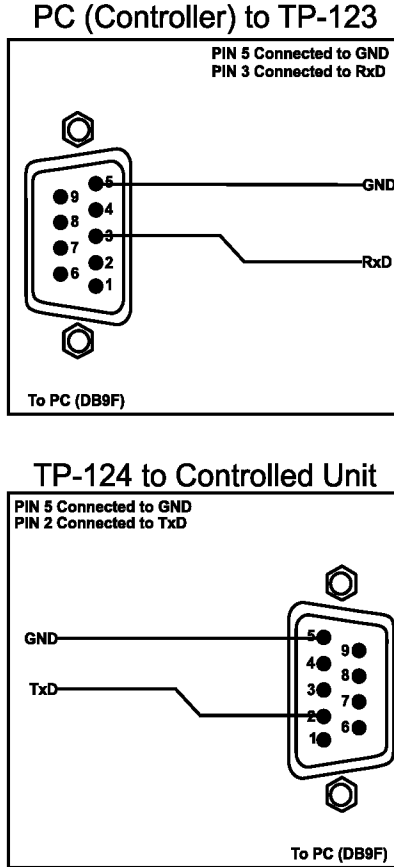


Figure 16: RS-232 PINOUT Connection

Table 13: RS-232 PINOUT Connection

Connect this PIN on the Terminal Block Connector:	To this PIN on the 9-pin D-sub Connector
TxD	PIN 2
RxD	PIN 3
GND	PIN 5

10 Configuring a 1:4 XGA to TP Transmitter / Receiver / DA

You can use the **TP-104 XGA Line Transmitter / DA** with the **TP-120 XGA Line Receiver**¹ to configure a 1:4 XGA-to-Twisted Pair DA system.

To connect the **TP-104** to four **TP-120** units, as the example in [Figure 17](#) illustrates, do the following:

1. On the **TP-104**, connect the XGA source (for example, a computer graphics source) to the XGA INPUT 15-pin HD (F) connector, and connect the line output RJ-45 connector²:
 - OUT 1 to the LINE IN RJ-45 connector on the **TP-120** Unit I
 - OUT 2 to the LINE IN RJ-45 connector on the **TP-120** Unit II
 - OUT 3 to the LINE IN RJ-45 connector on the **TP-120** Unit III
 - OUT 4 to the LINE IN RJ-45 connector on the **TP-120** Unit IV
2. On the four **TP-120** units, connect the:
 - XGA OUT 15-pin HD (F) connector of Unit I to the XGA acceptor (for example, Display 1)
 - XGA OUT 15-pin HD (F) connector of Unit II to the XGA acceptor (for example, Display 2)
 - XGA OUT 15-pin HD (F) connector of Unit III to the XGA acceptor (for example, Display 3)
 - XGA OUT 15-pin HD (F) connector of Unit IV to the XGA acceptor (for example, Display 4)
3. On each of the five Kramer TOOLS, connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity. The signal from the XGA source is transmitted via the four CAT 5 cables, decoded and converted at the each of the XGA OUT 15-pin HD (F) connectors to the XGA acceptors.
4. On each of the five Kramer TOOLS:
 - Adjust³ the video output signal level and/or cable compensation equalization level, if required
 - If necessary, on the **TP-120** units, set the H SYNC and V SYNC switches⁴, on the underside

1 Refer to the separate user manual: PT-110, WP-110, PT-120, TP-120, which can be downloaded at <http://www.kramerelectronics.com>

2 Via UTP cabling (with a range of more than 300ft (>100m)). For details of how to wire a CAT 5 LINE IN / LINE OUT RJ-45 connector, see section [8.1](#)

3 Use a screwdriver to carefully rotate the trimmer, adjusting the appropriate level

4 By default, both switches are set down (for negative V SYNC and H SYNC polarity)

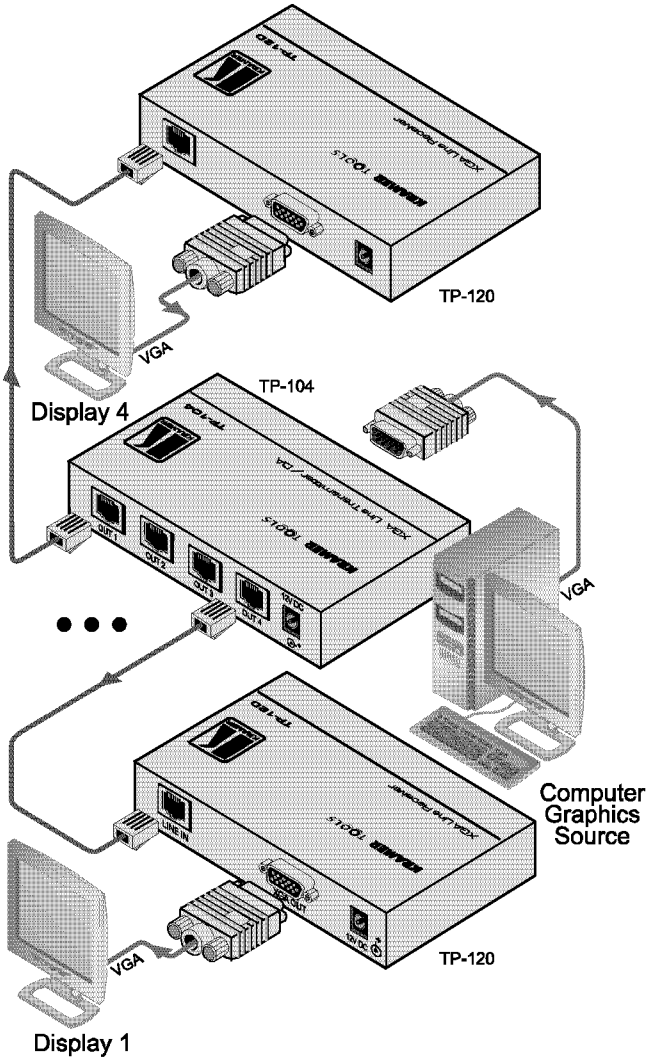


Figure 17: Configuring a 1:4 XGA to Twisted Pair Transmitter / Receiver / DA

11 Configuring a TP-105 CAT 5 Line Driver / DA

You can connect the **TP-105 CAT 5 Line Driver / DA**—using a **PT-110 XGA Line Transmitter** and two **TP-120 XGA Line Receiver**¹ units—to transmit a computer graphics signal to two displays via long line CAT 5 UTP cabling.

To connect the **TP-105**, as the example in *Figure 17* illustrates, do the following:

1. On the **PT-110**, connect the:
 - Computer graphics source to the XGA INPUT 15-pin HD (F) connector
 - LINE OUTPUT RJ-45 connector² to the INPUT RJ-45 connector on the **TP-105**
2. On the **TP-105**, connect the:
 - OUT 1 RJ-45 connector to the LINE IN RJ-45 on the first **TP-120**
 - OUT 2 RJ-45 connector to the LINE IN RJ-45 on the second **TP-120**
3. On the two **TP-120** units, connect the:
 - XGA OUT 15-pin HD (F) connector on the first **TP-120** unit to the XGA acceptor (for example, Display 1)
 - XGA OUT 15-pin HD (F) connector on the second **TP-120** unit to the XGA acceptor (for example, Display 2)
4. On each of the four Kramer units, connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity.
The signal from the XGA source is transmitted via the two CAT 5 cables, decoded and converted at the each of the XGA OUT 15-pin HD (F) connectors to the XGA acceptors.
5. If necessary:
 - Adjust³ the video output signal level and/or cable compensation equalization level on the **TP-105** and on both the **TP-120** units
 - Set the H SYNC and V SYNC switches⁴ on the underside of the **TP-120** units

1 Refer to the separate user manual: PT-110, WP-110, TP-120, which can be downloaded from the Internet at <http://www.kramerelectronics.com>

2 Via UTP cabling (with a range of more than 300ft (>100m)). For details of how to wire a CAT 5 LINE IN / LINE OUT RJ-45 connector, see section 8.1

3 Use a screwdriver to carefully rotate the trimmer, adjusting the appropriate level

4 By default, both switches are set down (for negative V SYNC and H SYNC polarity)

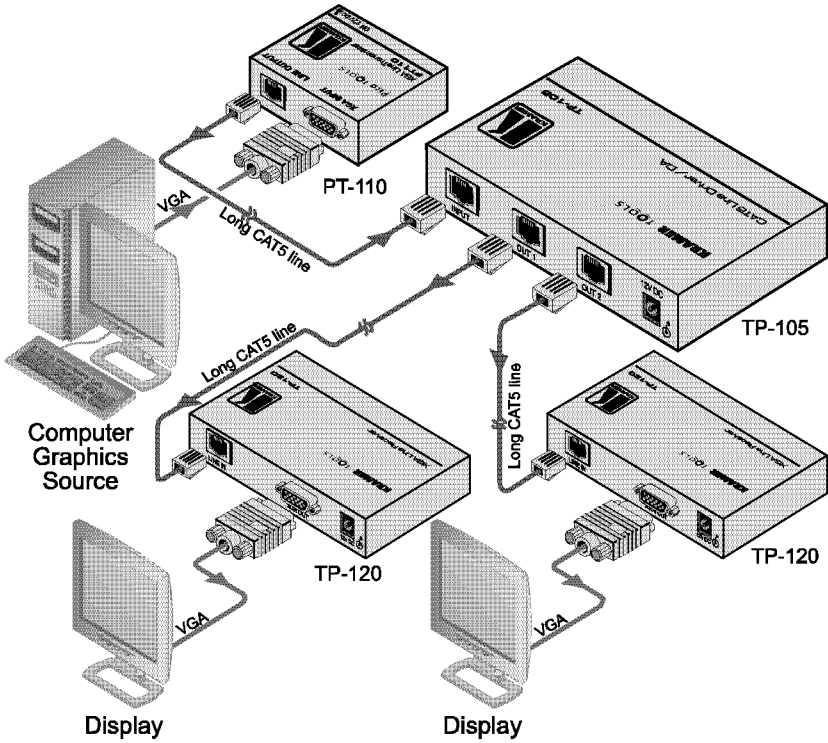


Figure 18: Configuring a TP-105 CAT 5 Line Driver / DA

12 Technical Specifications¹

Table 14 includes the technical specifications of the **TP-104**, Table 15 includes the technical specifications of the **TP-105**, and Table 16 includes the technical specifications of the **TP-121**, **TP-122**, **TP-123**, and **TP-124**:

Table 14: Technical Specifications of the TP-104² and the TP-104HD

TP-104	
INPUTS:	1 VGA / UXGA on a 15-pin HD connector
OUTPUTS:	4 RJ-45 OUT connectors
MAX. OUTPUT LEVEL:	1.4Vpp
BANDWIDTH (-3dB) ³ :	>150MHz, up to 1080p ⁴
DIFF. GAIN ³ :	3.2%
DIFF. PHASE ³ :	0.5Deg
K-FACTOR ³ :	<0.05%
S/N RATIO ³ :	80dB
CONTROLS ³ :	EQ.: 0 to 33dB; LEVEL: -7.5dB to 4.4dB
COUPLING ³ :	AC
POWER SOURCE:	12V DC 180mA
DIMENSIONS:	12.1cm x 7.18cm x 2.42cm (4.76" x 2.83" x 0.95") W, D, H
WEIGHT:	0.3kg (0.67lbs) approx.
ACCESSORIES:	Power supply

Table 15: Technical Specifications of the TP-105² and the TP-105(HD)

TP-105	
INPUTS:	1 RJ-45 OUT connector
OUTPUTS:	2 RJ-45 OUT connectors
MAX. OUTPUT LEVEL:	1.6Vpp
BANDWIDTH (-3dB) ⁵ :	Appropriate for VGA-UXGA, up to 1080p ⁴
DIFF. GAIN ⁵ :	3.7%
DIFF. PHASE ⁵ :	0.5Deg
K-FACTOR ⁵ :	<0.05%
S/N RATIO ⁵ :	69dB
CONTROLS ⁵ :	EQ.: 0 to 4.4dB @ 50MHz; LEVEL: -5.5dB to 1.4dB
COUPLING ⁵ :	AC
POWER SOURCE:	12V DC 220mA
DIMENSIONS:	12.1cm x 7.18cm x 2.42cm (4.76" x 2.83" x 0.95") W, D, H
WEIGHT:	0.3kg (0.67lbs) approx.
ACCESSORIES:	Power supply

1 Specifications are subject to change without notice

2 With 60m CAT 5 cable

3 For the TP-104 Transmitter/ TP-120 Receiver SETUP

4 The HD resolutions apply to the HD version of the machine

5 For the PT-110 to TP-105 to TP-120 Receiver SETUP

Technical Specifications52F

Table 16: Technical Specifications of the TP-121 / TP-122 / TP-123 / TP-124

	TP-121	TP-122	TP-123	TP-124
INPUTS:	VIDEO: 1 VGA / UXGA on a 15-pin HD connector AUDIO: 1 audio ANALOG 3.5mm mini jack	1 RJ-45 LINE IN connector	VIDEO: 1 VGA / UXGA on a 15-pin HD connector AUDIO: 1 audio ANALOG 3.5mm mini jack	1 RJ-45 LINE IN connector
OUTPUTS:	1 RJ-45 OUT connector	VIDEO: 1 VGA / UXGA on a 15-pin HD connector AUDIO: 1 audio S/PDIF RCA connector 1 audio ANALOG 3.5mm mini jack	1 RJ-45 OUT connector	VIDEO: 1 VGA / UXGA on a 15-pin HD connector AUDIO: 1 audio S/PDIF RCA connector 1 audio ANALOG 3.5mm mini jack
MAX. OUTPUT LEVEL:		VIDEO: 1V AUDIO: 2.5V		VIDEO: 1V AUDIO: 2.5V
CONTROLS:		Level: -7.5dB to +4.4dB, EQ.: 0dB to +33dBm (130m) @ 50MHz	RS-232 2 PIN Terminal Block	RS-232 2 PIN Terminal Block Level: -7.5dB to +4.4dB, EQ.: 0dB to +33dBm (130m) @ 50MHz
BANDWIDTH (-3dB) ¹ :	AUDIO: 20Hz – 20kHz@0.5dB			
S/N RATIO:	VIDEO: 58dB unweighted, 68.3dB @5MHz weighted AUDIO: <-80dB			
TOTAL GAIN:	AUDIO: Analog/analog: 0dB; Analog/SPDIF: -12dBFS			
COUPLING:	AC			
TND+N:	AUDIO: <0.01%			
POWER SOURCE:	12V DC 60mA			
DIMENSIONS:	12.1cm x 7.18cm x 2.42cm (4.76" x 2.83" x 0.95") W, D, H			
WEIGHT:	0.3kg (0.67lbs) approx.			
ACCESSORIES:	Power supply			
OPTIONS:	19" rack mount			

¹ For the Transmitter/Receiver pair

LIMITED WARRANTY

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

HOW LONG IS THE WARRANTY

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

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

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

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

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

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

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

HOW YOU CAN GET WARRANTY SERVICE

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

LIMITATION OF IMPLIED WARRANTIES

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

EXCLUSION OF DAMAGES

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

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

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

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

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

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

CAUTION!

- Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- Use the supplied DC power supply to feed power to the machine.
- Please use recommended interconnection cables to connect the machine to other components.
* FCC and CE approved using STP cable (for twisted pair products)



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



Caution

Safety Warning:

Disconnect the unit from the power supply before opening/servicing.



Kramer Electronics, Ltd.

Web site: www.kramerelectronics.com

E-mail: info@kramerelect.com

P/N: 2900-000037 REV 8