



KRAMER ELECTRONICS Ltd.

USER MANUAL

Twisted Pair Transmitters and Receivers

Models:

**TP-1xl, TP-2xl, TP-6, TP-11N,
TP-12N, TP-11xl, TP-12xl**

Kramer Tools

Models:

704, 705, 707, 708, 709, 710, 711(xl), 712(xl)

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



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1. INTRODUCTION

Congratulations on the purchase of this Kramer Electronics device. Since 1981 Kramer is dedicated to the development and manufacture of high quality video/audio equipment. Throughout this period the Kramer line has become an integral part of many of the best production and presentation facilities around the world. In recent years, Kramer has redesigned and upgraded most of its lines, rendering the products more efficient and "user-friendly". Kramer's line of professional video/audio electronics is one of the most versatile and complete available and is a true leader in terms of quality, workmanship, price/performance ratio and innovation. In addition to the devices presented here, Kramer offers a vast range of high quality distribution amplifiers, switchers, processors, interfaces, controllers and computer-related products.

2. UNPACKING and CONTENTS

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

- A Kramer "twisted pair" receiver / transmitter
- AC power cable (where applicable)
- User Manual
- Kramer concise product catalog
- 4 rubber feet

3. GETTING STARTED

The fastest way to get started is to slow down and do everything right the first time. Taking 15 minutes to read the manual may save a few hours later, and usually there is no need to read the *whole* manual. Since each section opens with an overview of the section, users may determine its necessity for their particular needs.

3.1 Factors Affecting Quality of Results

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

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

3.2 Optional Accessories

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

- **RK-50R/RK-80 Rack Mechanical Adapters** - Used to adapt non-standard size machines to a standard 1U rack. One or more machines may be installed on each adapter.
- **BNC "Y" Connector** - Used for looping purposes and splits the incoming signal to enable connection of an additional machine.
- **Termination Plug** - Used to terminate the line to 75ohm for proper matching.

- **SP-11** is a studio quality video processor with a unique combination of switching, distributing, and transcoding capabilities. It can be serially connected between a receiver and an acceptor for video/audio processing. It is designed primarily to control video properties such as hue, color, black level, brightness etc. The **SP-11** has a total of four inputs (two composite video, and two s-Video), and the selection is via a simple front-panel. The desired input is then processed and routed to all four outputs simultaneously via internal composite/s-Video transcoding. Eight independent adjustments are provided including VIDEO GAIN down to full fade, log or linear DEFINITION, log or linear CONTRAST, COLOR saturation, BLACK level, and separate RED, GREEN, and BLUE level controls. The screen SPLITTER provides “before and after” comparison on one monitor. Audio inputs are switched with their respective video inputs in an “Audio-follow-Video” order. The **SP-11** is dependable, rugged, and fits in one vertical space of a standard 19” rack.
- **VM-5S** (1:5 Video Stereo Audio Distribution Amplifier) is an exceptionally high performance 1:5 distribution amplifier for video and stereo audio signals that can be serially connected between a receiver and an acceptor for video/audio distribution purposes. It accepts one input signal, (composite, single component, or serial digital video), and distributes it to five identical outputs using BNC connectors for video, and RCA connectors for audio. The **VM-5S** is typically used for composite video sources such as VCR’s, cameras, etc., but its wide video bandwidth, exceeding 350MHz, also allows it to be used for high-resolution video signals, SDI (serial digital) video, and other specialized analog and digital signals. Video output signals can be AC or DC coupled and inputs can be looped using an external termination switch to create larger systems. The machine can handle either unbalanced stereo, or it can be easily adapted to handle balanced mono audio signals. The **VM-5S** is rugged, and is housed in a convenient half-rack sized enclosure for desktop use. It can also be rack mounted using the **RK-80** kit, which holds two units in one vertical space of a standard 19” rack.
- **VM-10ARII** - is a video/audio distribution amplifier designed for studio and other demanding applications, and it can be serially connected between a receiver and acceptor(s) for video/audio distribution purposes. The **VM-10ARII** has looping video and stereo audio inputs, each splitting to 10 outputs. The user may choose unbalanced stereo or balanced mono audio on the front panel switches. The output audio and video levels, as well as video cable EQ, may be adjusted via trimmers, accessible from the front panel. The video outputs are in two blocks of 5 outputs each, where each block may be individually trimmed for level and cable EQ., thereby achieving different compensations for different cable lengths. Several **VM-10ARII** units may be chained through the looping inputs. Output video signals are DC or AC coupled (user selectable) for maximum flexibility.
- **VS-1201xl** – is a Vertical Interval Switcher, that can be serially connected between a receiver and an acceptor for video switching purposes. It provides effortless switching from twelve composite video/stereo audio inputs to one output (video and audio). The glitch-free switching is performed during the vertical interval, either of source no. 1, or of the external sync socket. The switcher may be controlled in four ways: Touch buttons, RS-232, RS-485 and contact closure via a remote socket on the back of the machine. The machine can be interconnected and cascaded, (2 **VS-1201xl** machines become 24x1, etc.) or operated in parallel (3 **VS-1201xl** machines become a 12x1 video component switcher). Video signal bandwidth is 250MHz, thus meeting the requirements of the most demanding applications, and ensuring that the machine remains transparent even in the most critical production, presentation, or broadcast applications. The **VS-1201xl** family is dependable, rugged, and each fits in one vertical space of a standard 19” rack.
- **VIDEO TESTER** - A unique, patented, indispensable tool for the video professional, the **Video Tester** is used to examine a video path leading to/from a machine. By pressing only one touch switch it can trace missing signals, distinguish between good and jittery (VCR sourced) signals, and identify the presence of good signals. Whenever a video signal is missing, because of bad connections, cable breaks or faulty sources, the **Video Tester** is sufficient to trace the source of the problem. There is no need for oscilloscopes, waveform monitors or vectorscopes to trace and rectify such common problems. Indispensable for fieldwork, the Tester checks for sync and odd/even data in the signal and is not triggered by noise, hum or even by a 15kHz non-video source. The **Video Tester** is compact (not much bigger than a cigarette box); resides in a sturdy plastic housing with pocket clip, and will typically operate for several months from a single 9-Volt battery.

4. TWISTED PAIR INTERFACES AND KRAMER TOOLS

This manual includes information about configuration, operation, maintenance and optional accessories for the following Twisted Pair Interfaces and Kramer Tools (please note that machines from the same family have several features in common):

- **TP-1xl - Video Line Transmitter**
- **TP-2xl - Video Line Receiver**
- **TP-6 - Twisted Pair Line Amplifier**
- **TP-11N - Video/Audio Line Transmitter**
- **TP-12N - Video/Audio Line Receiver**
- **TP-11xl - Video/Audio Line Transmitter**
- **TP-12xl - Video/Audio Line Receiver**
- **704, 705 - Video Line Transmitter/Receiver**
- **707, 708 - Video/Audio Line Transmitter/Receiver**
- **709, 710 - Y/C Line Transmitter/Receiver**
- **711(xl), 712(xl) - AV Line Transmitter/Receiver**

5. A WORD ON BALANCED LINE TECHNOLOGY AND TWISTED PAIR INTERFACES

Video/Audio Balanced Line systems allow transmission of high quality (high signal/noise ratio) video and audio signals on low quality twisted-pair cables thanks to a procedure of noise reduction. The process principally consists of two main manipulative phases; in the first, the signal is electrically inverted in the transmitter. The inverted and non-inverted signals are then transmitted together on a twisted-pair line, accumulating noise along the way. At the receiver, the inverted signal is subtracted from the non-inverted one, resulting in a signal of twice the amplitude ($A - (-A) = 2A$). Since the two inverted signals pick up the same noise (with equal polarity) the subtraction eliminates the noise.

By using twisted-pair technology, simplification of studio and industrial wiring is easily achieved. The price of Twisted Pair wires is far lower than that of coaxial cables, so it is an attractive alternative for an extensive array of applications. Some of the twisted pair machines are fed by a 12VDC source, and are therefore suitable for fieldwork. The DC fed machines can power one another using a 4-wire setup.

The Twisted Pair interfaces are divided into three families as follows:

- **Twisted Pair Transmitters** - Used to convert video and audio signals to a twisted-pair signal format (balanced line). Some of the machines convert only video, while some convert video and also two channels of audio to a single twisted-pair compatible signal, thus sparing the use of three coaxial cables. User-accessible trimmers are sometimes used for signal level and cable compensation.
- **Twisted Pair Receivers** - Used to convert a twisted-pair format signal back to video and audio signals. Receivers having a looping capability allow receivers to be chained together. Some have a polarity switch, allowing the user to connect the wire using any polarity.
- **Twisted Pair Amplifiers** - used to extend the operating distance of the twisted-pair system by adding amplification and cable compensation along the twisted-pair wire. Machines which feed the power via a 4-wire system eliminate the need to forward a power source to a remote location where the line amplifier is installed.



6. TWISTED-PAIR INTERFACES

This section describes the controls and connections of the Twisted Pair Interfaces. Getting acquainted with all of them helps understanding the full potential of the machine.

6.1 TECHNICAL SPECIFICATIONS (TP-1xl, TP-2xl, TP-6, TP-11N, TP-12N, TP-11xl, TP-12xl)

	TP-1xl	TP-2xl	TP-6	TP-11N / TP-11xl	TP-12N / TP-12xl
Input	1 composite video on BNC connector 1Vpp/75ohm	1 looping balanced video on 6/4 standard telephone sockets, with termination switch (Balanced signal from TP-1xl)	1 balanced signal on 6/4 standard telephone socket 1Vpp/150ohm	1 composite video on BNC connector 1Vpp/75ohm. 1 stereo audio on an RCA connector 1Vpp/10kΩ.	1 balanced signal on 6/4 standard telephone sockets, with termination switch (Balanced signal from TP-11N / TP-11xl)
Output	Balanced 6/4 standard telephone socket (Balanced signal to TP-2xl)	1 composite video on BNC connector 1Vpp/75ohm	Balanced 6/4 standard telephone socket 1Vpp/150ohm	Balanced 6/4 standard telephone socket (Balanced signal to TP-12N / TP-12xl)	1 composite video on BNC connector 1Vpp/75ohm 1 stereo audio (L, R) on RCA connector 1Vpp/100ohm
Video S/N ratio	53dB at 300 meters		72.5dB (measured with the 704/705)	73dB at 100 meters	
Bandwidth	13.6MHz at 300 meters		12MHz. -3dB at 100m, 4MHz -3dB at 600m	6 MHz. -3dB at 100 meters, 5MHz -3dB at 600 meters	
Differential Gain	6.1% at 300 meters		1.17% (measured with the 704/705)	0.9%	
Differential Phase	4.3 degrees at 300 meters		0.28 Deg. (measured with the 704/705)	0.55 degrees	
Non Linearity	Less than 1% at 300 meters		0.3% (measured with the 704/705)	Less than 1% at 100 meters	
System Delay	1 microsecond typical at 100 meters				
Compensation Controls	Gain and HF above 2.5MHz +/- 6dB, by rear panel accessible trimmers.			Gain and HF above 2.5MHz +/- 6dB. (internal)	
Dimensions (W, D, H)	16.5cm x 12cm x 4.5cm (6.5" x 4.7" x 1.8")		11.7cm x 6cm x 3.2cm (4.6" x 2.4" x 1.3")	16.5cm x 12cm x 4.5cm (6.5" x 4.7" x 1.8")	
Weight	0.7 kg. (1.6 lbs.) Approx		0.24 kg. (0.53 lbs.) Approx.	0.8 kg. (1.8 lbs.) Approx.	
Power consumption	2.3 VA	3.5 VA	0.48VA	4.6 VA	3.4 VA
Power Source	230VAC, 50/60 Hz, (115VAC, U.S.A.)		12VDC, 30mA	230VAC, 50/60 Hz, (115VAC, U.S.A.)	

6.2 Getting to Know the TP-1x/ Video Line Transmitter

The Kramer **TP-1x/** is a high performance composite video to twisted pair transmitter, designed to transmit video signals over long distances using common twisted-pair cable. Combined with the **TP-2x/**, this set of machines is an upgrade of the **TP-1N/TP-2N** pair (now discontinued). Using good quality cable, the system can maintain the bandwidth of an industrial color video signal up to 4000 ft. (1.3km) vs. 1000ft of the old version, and broadcast quality (up to 12 MHz) for as much as 750 ft. (250 meters). At shorter distances, bandwidth of 100 MHz is easily achieved. The set provides gain and high frequency compensation controls to optimize levels in extremely long runs. Kramer twisted-pair adapters solve remote monitoring requirements without using more costly fiber or wireless transmission systems. Using the **RK-50R** kit, a set of **TP-1x/TP-2x/** can be mounted in a standard 19" rack.

NOTE

For Installation, operation, maintenance and troubleshooting instructions please refer to sections 8-13.

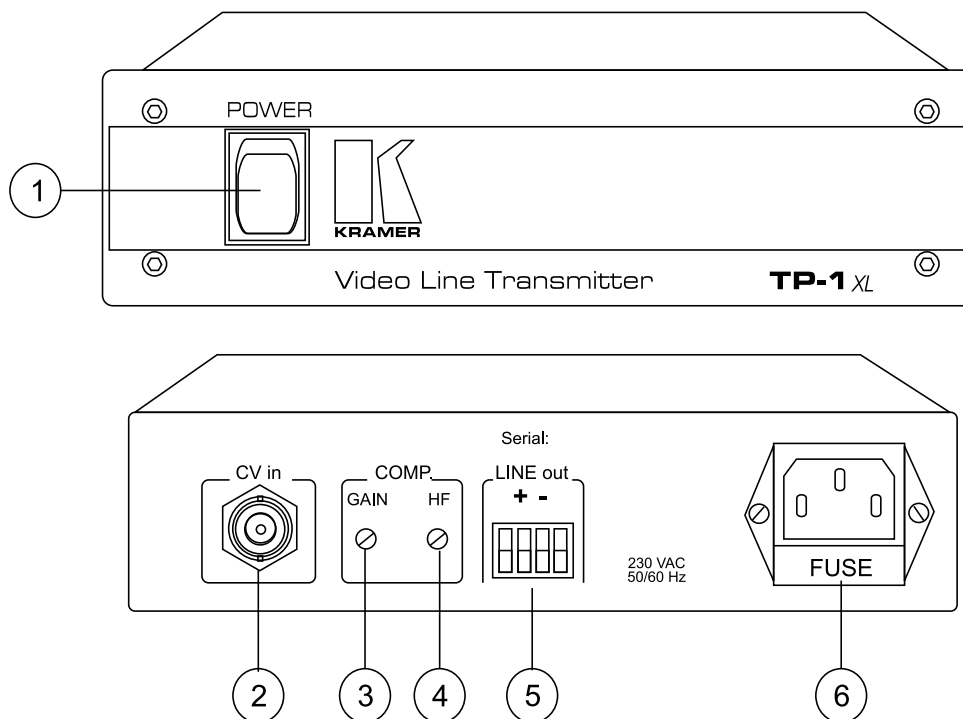


Figure 1: TP-1x/ Front/Rear Panel Features

Table 1: TP-1x/ Front/Rear Panel Features

No.	Feature	Function
1.	Illuminated power switch	Supplies power to the unit.
2.	CV in BNC connector	Video input.
3.	GAIN trimmer	Controls video level of output.
4.	HF trimmer	Controls cable equalization of the video output.
5.	LINE out terminal block	Amplified and buffered balanced video output.
6.	Power Connector	A 3-prong AC connector allows power to be supplied to the unit. Directly underneath this connector, a fuse holder houses the appropriate fuse.



6.3 Getting to Know the TP-2x/ Video Line Receiver

The Kramer **TP-2x/** is a high performance composite video to twisted pair receiver, designed to receive video signals over long distances using common twisted pair cable. Combined with the **TP-1x/** this set of machines is an upgrade of the **TP-1N/TP-2N** pair (now discontinued). Using good quality cable, the system can maintain the bandwidth of an industrial color video signal up to 4000 ft. (1.3km) vs. 1000ft of the old version, and broadcast quality (up to 12 MHz) for as much as 750 ft. (250 meters.) At shorter distances, bandwidth of 100 MHz is easily achieved. The set provides gain and high frequency compensation controls to optimize levels in extremely long runs. Kramer twisted pair adapters solve remote monitoring requirements without using more costly fiber or wireless transmission systems. Using the **RK-50R** kit, a set of **TP-1x/TP-2x/** can be mounted in a standard 19" rack.

NOTE

For Installation, operation, maintenance and troubleshooting instructions please refer to sections 8-13.

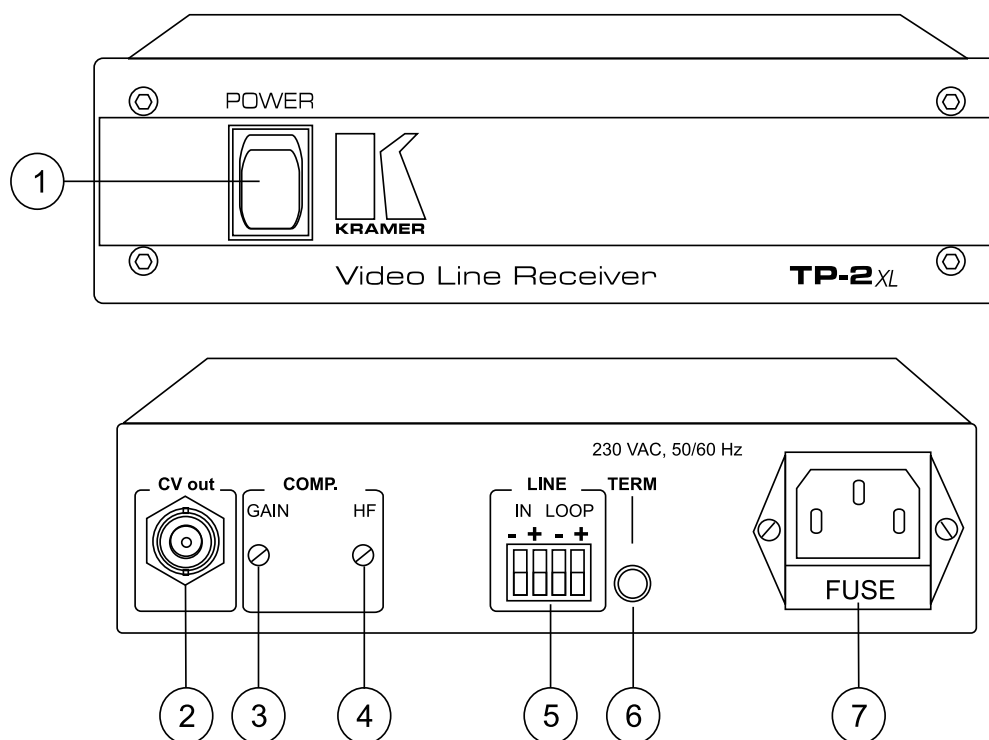


Figure 2: TP-2x/ Front/Rear Panel Features

Table 2: TP-2x/ Front/Rear Panel Features

No.	Feature	Function
1.	Illuminated power switch	Supplies power to the unit.
2.	CV out BNC connector	Amplified and buffered video output.
3.	GAIN trimmer	Controls video level of output.
4.	HF trimmer	Controls cable equalization of the video output.
5.	LINE in terminal block	Balanced input.
6.	“Term” Switch	Pressed to “Term” position when the machine is the last on the line and not looped.
7.	Power Connector	A 3-prong AC connector allows power to be supplied to the unit. Directly underneath this connector, a fuse holder houses the appropriate fuse.

6.4 Getting to Know the TP-6, Twisted-Pair Line Amplifier

The KRAMER **TP-6**, Twisted-Pair Line Amplifier, extends the range of the KRAMER TP (twisted-pair transmitter-receivers) series, to almost any desired distance. The **TP-6** may receive its power source through the twisted-pair wire (in a 4-wire setup) and, due to its very small power consumption, several units may be cascaded and fed from one standard 12V DC feed. Basically, any number of **TP-6** units may be used in cascade operation. Via rear-accessible trimmer controls, video and HF gain may be easily tuned to achieve best performance.

NOTE

For Installation, operation, maintenance and troubleshooting instructions please refer to sections 8-13.

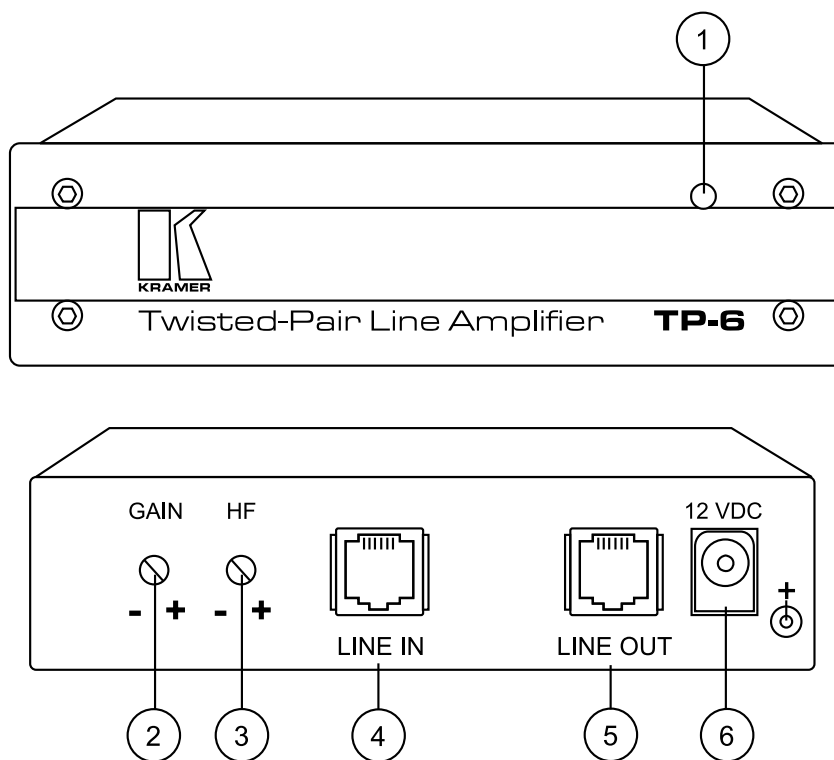


Figure 3: TP-6 Front/Rear Panel Features

Table 3: TP-6 Front/Rear Panel Features

No.	Feature	Function
1.	LED (on front panel)	When turned on, indicates that the machine is powered
2.	GAIN trimmer	Controls level of output.
3.	HF trimmer	Controls cable equalization of the output.
4.	LINE IN telephone socket	Balanced input.
5.	LINE OUT telephone socket	Amplified and buffered balanced output.
6.	12VDC feed connector	A DC connector that allows power to be supplied to the unit.



6.5 Getting to Know the TP-11N, Video/Audio Twisted-Pair Line Transmitter

The KRAMER **TP-11N** Video Line Transmitter sends a color video signal and a stereo audio signal over long distances using a telephone wire or any other twisted-pair wire. The **TP-11N** maintains the bandwidth of an industrial color video signal up to several hundred meters and broadcast quality (over 6 MHz) signals up to 100 meters. All three signals, video and the two audio channels, are transmitted simultaneously on the same wire in real-time. By using the KRAMER **TP-11N** together with the **TP-12N** (Video/Audio Line Receiver) coax wiring in a studio can be completely eliminated.

NOTE

For Installation, operation, maintenance and troubleshooting instructions please refer to sections 8-13.

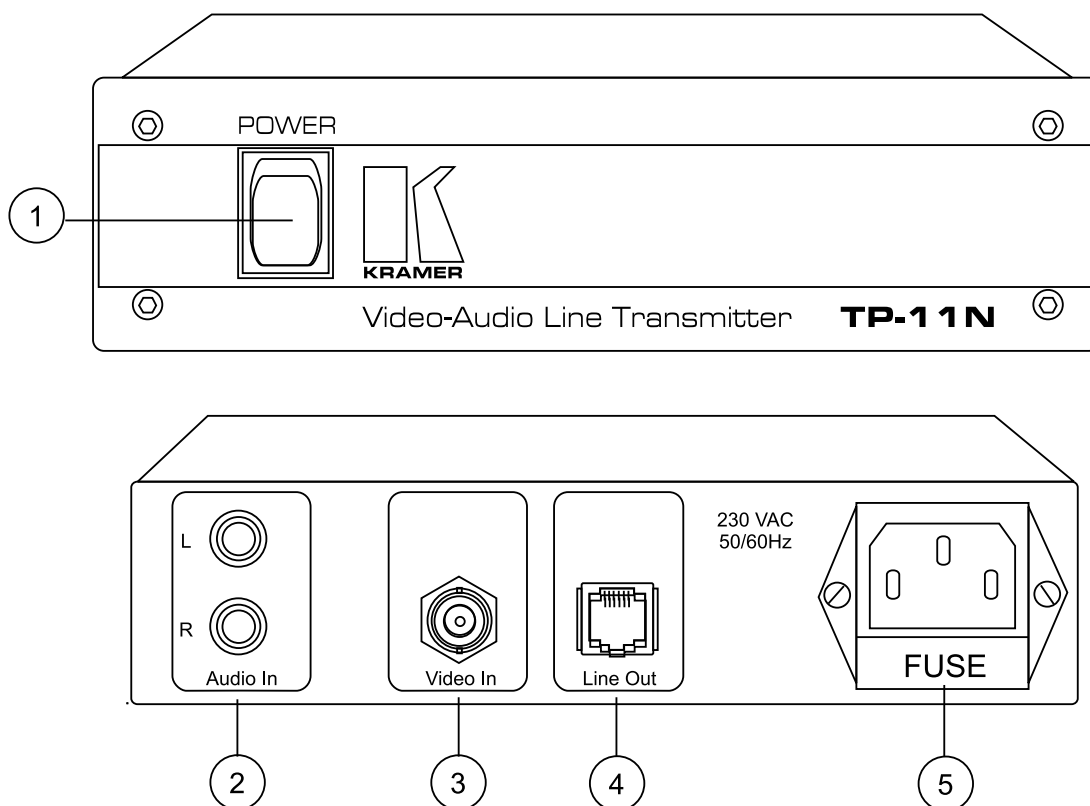


Figure 4: TP-11N Front/Rear Panel Features

Table 4: TP-11N Front/Rear Panel Features

No.	Feature	Function
1.	Illuminated power switch	Supplies power to the unit.
2.	RCA Audio in connectors	Audio input.
3.	BNC Video in connector	Video input.
4.	LINE OUT telephone socket	Amplified and buffered balanced output.
5.	Power Connector	A 3-prong AC connector allows power to be supplied to the unit. Directly underneath this connector, a fuse holder houses the appropriate fuse.

6.6 Getting to Know the TP-12N Video/Audio Twisted-Pair Line Receiver

The KRAMER **TP-12N** Video/Audio Line Receiver works in conjunction with the **TP-11N** Video/Audio Line Transmitter. The **TP-12N** allows parallel connection of several units on the same line (one transmitter/multiple receivers), that can be tapped at any point without affecting image quality. When connecting several units, all the termination switches on the rear panel of the **TP-12N** machines, except for the last on the line, should be toggled to the Hi-Z position. The frequency response of the **TP-12N** matches that of the **TP-11N** transmitter, and it provides polarity switching on the rear panel.

NOTE

For Installation, operation, maintenance and troubleshooting instructions please refer to sections 8-13.

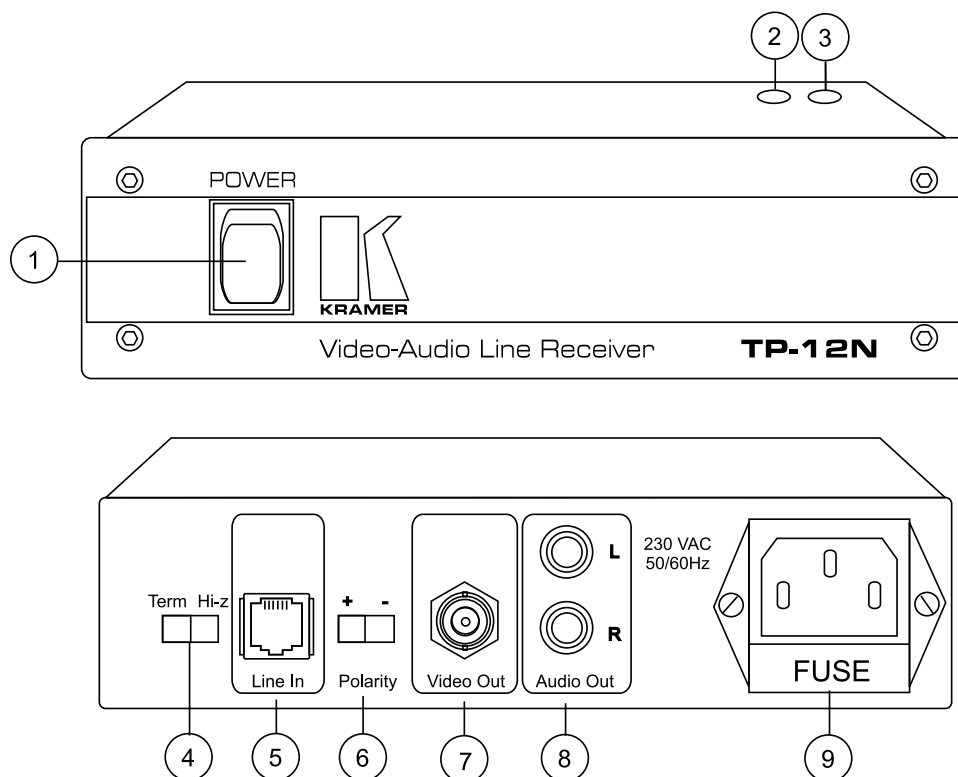


Figure 5: TP-12N Front/Rear Panel Features

Table 5: TP-12N Front/Rear Panel Features

No.	Feature	Function
1.	Illuminated power switch	Supplies power to the unit.
2.	GAIN trimmer	Controls video level of output (accessible from bottom).
3.	HF trimmer	Controls cable equalization of the video output (accessible from bottom).
4.	Term/Hi-Z switch	Selects " Term " or " Hi-Z " impedance (for looping select " Hi-Z ").
5.	LINE in telephone socket	Balanced input.
6.	Polarity switch	Inverts the incoming balanced signal.
7.	BNC Video out connector	Amplified and buffered video output.
8.	RCA Audio out connectors	Amplified and buffered audio output.
9.	Power Connector	A 3-prong AC connector allows power to be supplied to the unit. Directly underneath this connector, a fuse holder houses the appropriate fuse.



6.7 Getting to Know the TP-11xl, Video/Audio Twisted-Pair Line Transmitter

The KRAMER **TP-11xl** Video Line Transmitter, which is based on the latest technology, sends a color video signal and a stereo audio signal over long distances using a telephone wire or any other twisted-pair wire. The **TP-11xl** maintains the bandwidth of an industrial color video signal up to several hundred meters and broadcast quality (over 6 MHz) signals up to 100 meters. All three signals, video and the two audio channels, are transmitted simultaneously on the same wire in real-time. By using the KRAMER **TP-11xl** together with the **TP-12xl** (Video/Audio Line Receiver) coax wiring in a studio can be completely eliminated.

NOTE

For Installation, operation, maintenance and troubleshooting instructions please refer to sections 8-13.

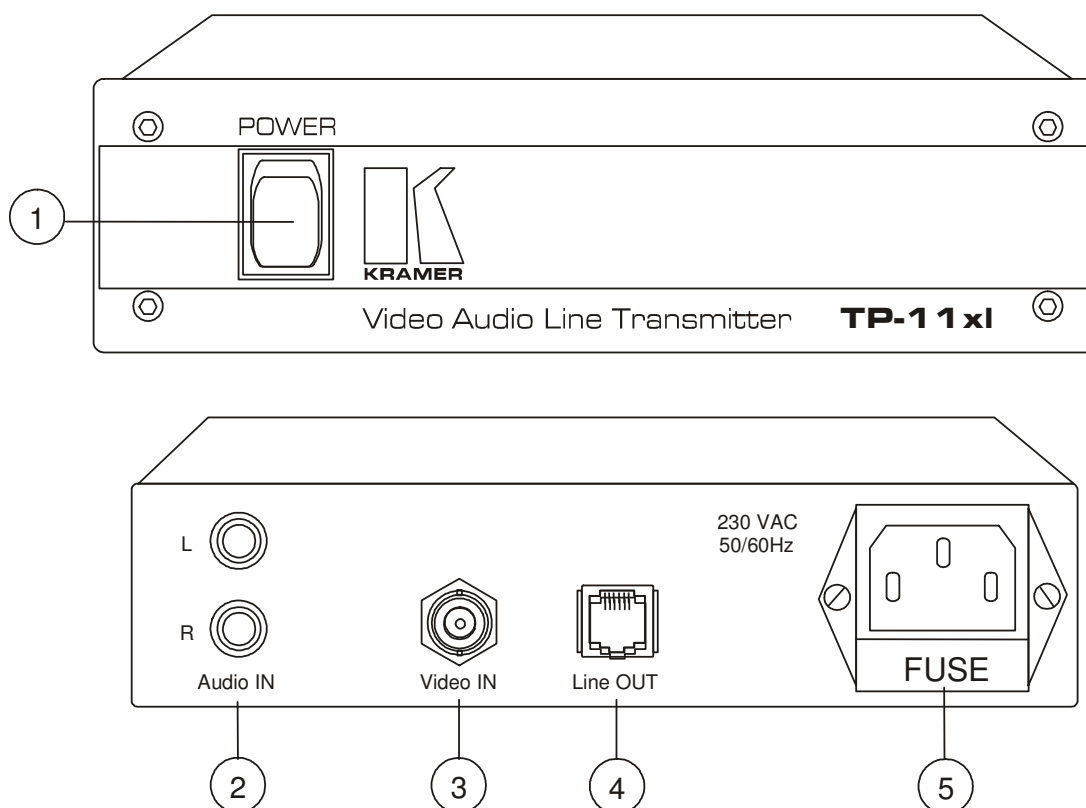


Figure 6: TP-11xl Front/Rear Panel Features

Table 6: TP-11xl Front/Rear Panel Features

No.	Feature	Function
1	Illuminated power switch	Supplies power to the unit.
2	RCA Audio in connectors	Audio input.
3	BNC Video in connector	Video input.
4	LINE OUT telephone socket	Amplified and buffered balanced output.
5	Power Connector	A 3-prong AC connector allows power to be supplied to the unit. Directly underneath this connector, a fuse holder houses the appropriate fuse.

6.8 Getting to Know the TP-12xl Video/Audio Twisted-Pair Line Receiver

The KRAMER **TP-12xl** Video/Audio Line Receiver, which is based on the latest technology, works in conjunction with the **TP-11xl** Video/Audio Line Transmitter. The **TP-12xl** allows parallel connection of several units on the same line (one transmitter/multiple receivers) that can be tapped at any point without affecting image quality. When connecting several units, all the termination switches on the rear panel of the **TP-12xl** machines, except for the last on the line, should be toggled to the Hi-Z position. The frequency response of the **TP-12xl** matches that of the **TP-11xl** transmitter, and it provides polarity switching on the rear panel.

NOTE

For Installation, operation, maintenance and troubleshooting instructions please refer to sections 8-13.

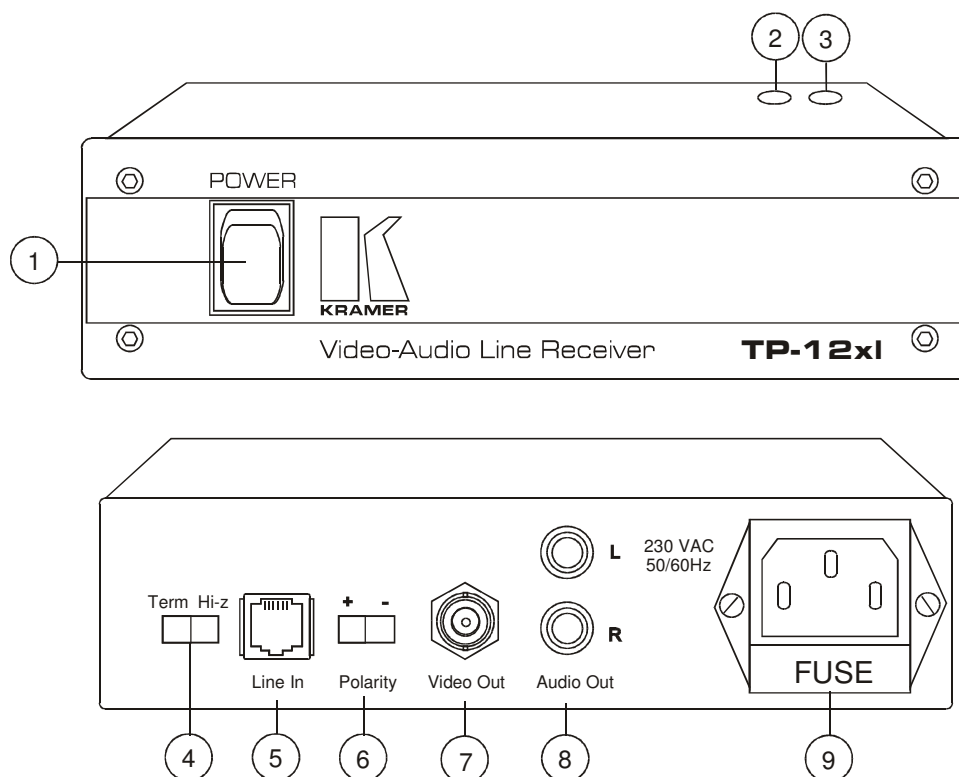


Figure 7: TP-12xl Front/Rear Panel Features

Table 7: TP-12xl Front/Rear Panel Features

No.	Feature	Function
1	Illuminated power switch	Supplies power to the unit.
2	GAIN trimmer	Controls video level of output (accessible from bottom).
3	HF trimmer	Controls cable equalization of the video output (accessible from bottom).
4	Term/Hi-Z switch	Selects "Term" or "Hi-Z" impedance (for looping select "Hi-Z").
5	LINE in telephone socket	Balanced input.
6	Polarity switch	Inverts the incoming balanced signal.
7	BNC Video out connector	Amplified and buffered video output.
8	RCA Audio out connectors	Amplified and buffered audio output.
9	Power Connector	A 3-prong AC connector allows power to be supplied to the unit. Directly underneath this connector, a fuse holder houses the appropriate fuse.



7. KRAMER TOOLS

This section describes the controls and connections of the Kramer Tools. Getting acquainted with all of them helps to understand the full potential of the machines.

7.1 TECHNICAL SPECIFICATIONS (704, 705, 707, 708, 709, 710, 711, 712)

	704, 705	707, 708	709, 710	711(xl), 712(xl)
Input	705: 1 composite video on BNC connector 1Vpp/75ohm 704: 6/4 telephone sockets	707 video: 1 composite video on BNC connector 1Vpp/75ohm 707 audio: 1 mono on RCA connector 1mV at maximum gain 0.5V for mid. gain setting 708: 6/4 telephone sockets	709: super video (YC) on 4P connector 1Vpp/75ohm (Y), 0.3Vpp/75ohm (C) 710: 4-pin terminal block connector	711 video: 1 composite video on BNC connector 1Vpp/75ohm 711 audio: audio stereo on RCA connectors 1Vpp/33kohm 712: RJ-45 connector 712xl: 6 pole terminal block
Output	704: 1 composite video on BNC connector 1Vpp/75ohm; telephone socket (loop) 705: 6/4 telephone socket	707: 6/4 standard telephone socket 707 video: 1 composite video on BNC connector 1Vpp/75ohm 708 audio: 1 mono on RCA connector line level up to 4.6Vpp/330ohm 708 loop: 6/4 telephone socket	709: 4-pin terminal block 710: super video (YC) on 4P connector 1Vpp/75ohm (Y), 0.3Vpp/75ohm (C)	711: RJ-45 connector 711xl: 6 pole terminal block 712 video: 1 composite video on BNC connector 1Vpp/75ohm 712 audio: stereo audio on RCA connectors line level up to 4.2Vpp/150ohm
Video/Audio S/N ratio	74dB	Video: 72dB Audio: 60dB	Better than 60dB	Video: Better than 75dB Audio: 73dB
Bandwidth	50MHz -3dB at 30m, 6.3MHz -3dB at 400m	Video: 50MHz. -3dB Audio: 30 kHz -3dB at 30m (without lightning arrestors).	8.4MHz -3dB, (Y) at 100m	Video: 64MHz -3dB Audio: 100kHz -3dB
Differential Gain (pair)	0.43%	0.41%	0.04%	1.4%
Differential Phase (pair)	0.32 degrees	0.3 degrees	0.07 degrees	0.63 degrees
K-Factor	1.6 % (400m)	0.1 % (20m)	1.4% (100m)	0.1 % (100m)
Non Linearity	<0.2% (100 m)	<0.2% at short distances	0.8% (100m)	1.2% (100m)
Gain Range	LEVEL: 705: -1.6 to 5.1dB 704: -1.9 to 1.6dB EQ.: 705: 0 to 9.5dB 704: 0 to 9.3dB	VIDEO: -1.8 to 2.3dB (level) 0 to 16dB (EQ.) Audio: -30 to 53dB(level)	LUMA (Y): 705: -2.4 to 6.5dB HI-FREQ.: -2.7 to 15.6dB CHROMA (C): 705: -5.8 to 7.8dB	Video gain control: -0.7 to +4.1dB (level), -0.6 to +7.3dB (EQ.) Audio: fixed gain=(0dB)
Audio 2nd Harmonic	N.A	0.093%	N.A	0.002%
Audio THD +Noise		0.097%		0.033%
Controls	Level and EQ. by accessible trimmers. Loop termination switch. Signal invert switch (704 only).	708: Level and EQ. by accessible trimmers, loop termination switch, signal invert switch 707: Condenser Mic power switch, accessible trimmer for audio.	Luma Level, Hi-Freq. and Chroma by accessible trimmers. Loop termination switch (710 only)	Level and EQ. for composite video (712 only) by accessible trimmers
Switches	704: Termination, polarity inverter	708: Termination/Hi-Z pushbutton, polarity inverter	710: Termination/Hi-Z	N.A
Dimensions (W, D, H)	12cm x 7.5cm x 2.5cm 4.7" x 2.95" x 0.98"			
Weight	0.28kg. (0.62lbs.) Approx.		0.26 kg. (0.58lbs.) Approx.	0.28kg. (0.62lbs.) Approx.
Power consumption	705: 0.5W 704: 0.4W	0.4W (pair)	0.5W (pair)	711: 0.96W 712: 0.48W
Power Source	12VDC 40mA			711: 12VDC, 80mA 712: 12VDC, 40mA

7.2 Getting to Know the 705/704 Video Line Transmitter/Receiver

The KRAMER 705 Video Line Transmitter and the 704 Video Line Receiver, part of the KRAMER TOOLS family, are used as a pair for transmitting video over long distances using a twisted-pair wire. A termination switch allows several 704 receivers to be looped-through on the same line (one transmitter-multiple receivers.) The frequency response of the pair is well over 6.7MHz, even at 400m. At shorter distances, they provide close to broadcast level performance. The machines offer user controlled Gain and HF compensation.

NOTE

For Installation, operation, maintenance and troubleshooting instructions please refer to sections 8-13.

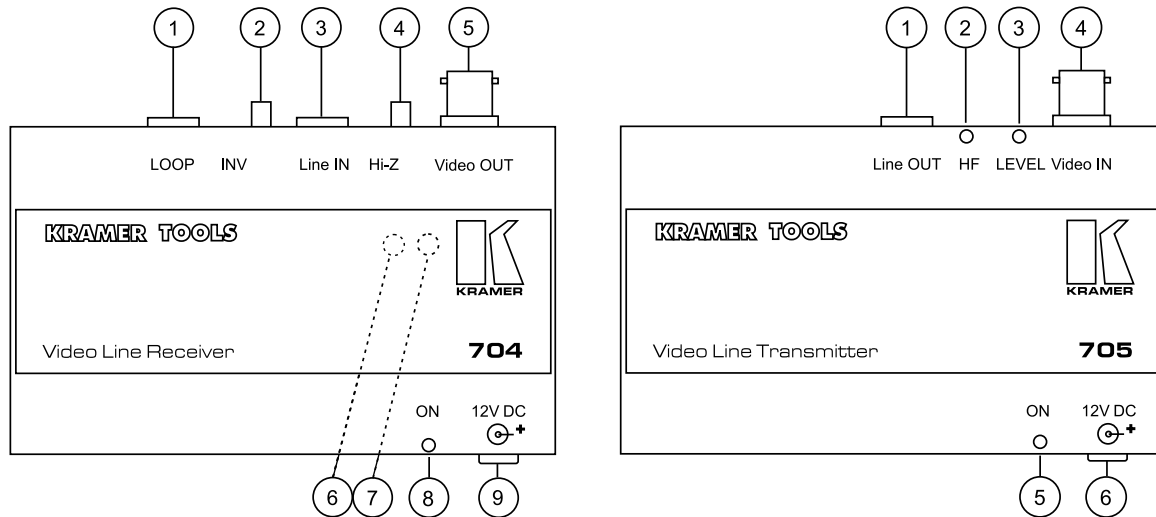


Figure 8: 705/704 Front/Rear Panel Features

Table 8: 704 Front/Rear Panel Features

No.	Feature	Function
1.	LOOP telephone socket	Provides video looping capability to increase number of outputs.
2.	INV switch	Inverts the incoming balanced signal.
3.	Line IN telephone socket	Balanced input.
4.	Hi-Z switch	Selects "Term" or "Hi-Z" impedance (pressed= Term ; for end of line). For looping select " Hi-Z ".
5.	Video OUT BNC connector	Amplified and buffered video output.
6.	LEVEL trimmer	Adjusts the video level output (accessible from bottom).
7.	HF trimmer	Controls cable equalization of the video output (accessible from bottom).
8.	ON LED	Illuminates when the machine is powered.
9.	12VDC feed connector	A DC connector that allows power to be supplied to the unit.

Table 9: 705 Front/Rear Panel Features

No.	Feature	Function
1.	Line OUT telephone socket	Amplified and buffered balanced output.
2.	HF trimmer	Controls cable equalization of the output.
3.	LEVEL trimmer	Controls level of output.
4.	Video IN BNC connector	Video input.
5.	ON LED	Illuminates when the machine is powered.
6.	12VDC feed connector	A DC connector that allows power to be supplied to the unit.

7.3 Getting to Know the 707/708 Video/Audio Line Transmitter/Receiver

The KRAMER **707** Video/Audio Line Transmitter and the **708** Video/Audio Line Receiver, of the KRAMER TOOLS family, are used as a pair for transmitting video and mono audio over long distances using twisted-pair wire. A termination switch allows several **708** receivers to be looped-through on the same line (one transmitter - multiple receivers). This pair of machines is best at distances of up to 200 meters. At shorter distances, they provide close to broadcast level performance. They also provide user controlled Gain and HF compensation.

NOTE

For Installation, operation, maintenance and troubleshooting instructions please refer to sections 8-13.

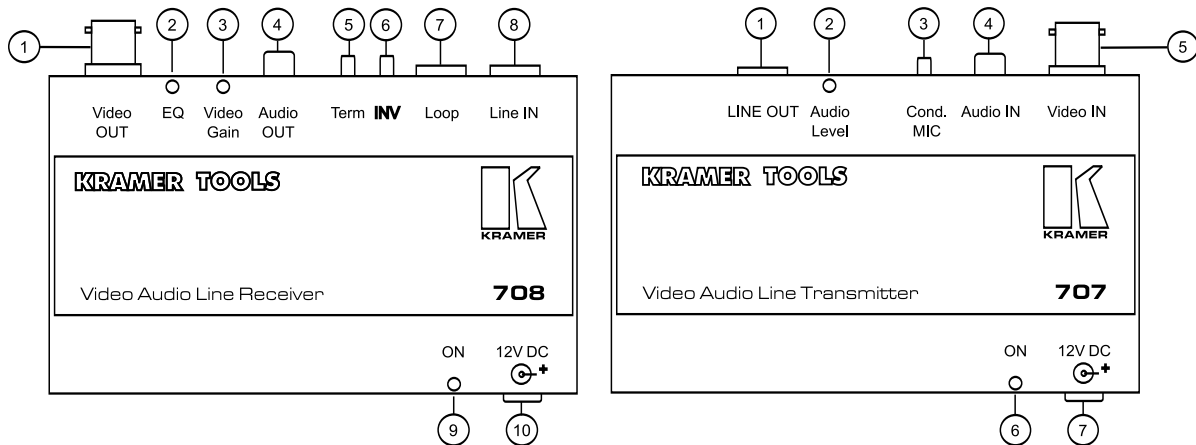


Figure 9: 707/708 Front/Rear Panel Features

Table 10: 708 Front/Rear Panel Features

No.	Feature	Function
1.	Video OUT BNC connector	Amplified and buffered video output.
2.	EQ. trimmer	Controls cable equalization.
3.	Video Gain trimmer	Controls video level of the outputs.
4.	Audio OUT RCA connector	Amplified and buffered audio output.
5.	Term pushbutton	Selects "Term" or "Hi-Z" impedance (pressed= Term). For looping select " Hi-Z ".
6.	INV pushbutton	Inverts the incoming video signal when pressed.
7.	LOOP telephone socket	Provides looping capability to increase number of outputs (to connect additional receivers).
8.	Line IN telephone socket	Balanced input.
9.	ON Led	Illuminates when the machine is powered.
10.	12VDC feed connector	A DC connector that allows power to be supplied to the unit.

Table 11: 707 Front/Rear Panel Features

No.	Feature	Function
1.	LINE OUT telephone socket	Balanced output.
2.	Audio Level trimmer	Adjusts the audio level output.
3.	Cond. MIC switch	Provides operation voltage to the microphone when pressed. WARNING! <i>Only press the COND MIC switch when a condenser microphone is used with the 707! For all other audio sources, the switch must <u>not</u> be pressed!</i>
4.	Audio IN RCA connector	Audio input
5.	Video IN BNC connector	Video input.
6.	ON Led	Illuminates when the machine is powered.
7.	12VDC feed connector	A DC connector that allows power to be supplied to the unit.

7.4 Getting to Know the 709/710 Y/C Line Transmitter/Receiver

The KRAMER **709** Y/C Line Transmitter and the **710** Y/C Line Receiver, part of the KRAMER TOOLS family, are used as a pair for transmitting s-Video (Y/C) over long distances using 2 twisted-pair sets of wires. The frequency response of the pair is well over 8.4MHz, even at 200 meters. At shorter distances, they provide close to broadcast level performance. The machines offer user controlled Y Gain, Y EQ. and Chroma Gain on both transmitter and receiver. A termination switch allows several **710** receivers to be looped-through on the same line (one transmitter - multiple receivers.)

NOTE

For Installation, operation, maintenance and troubleshooting instructions please refer to sections 8-13.

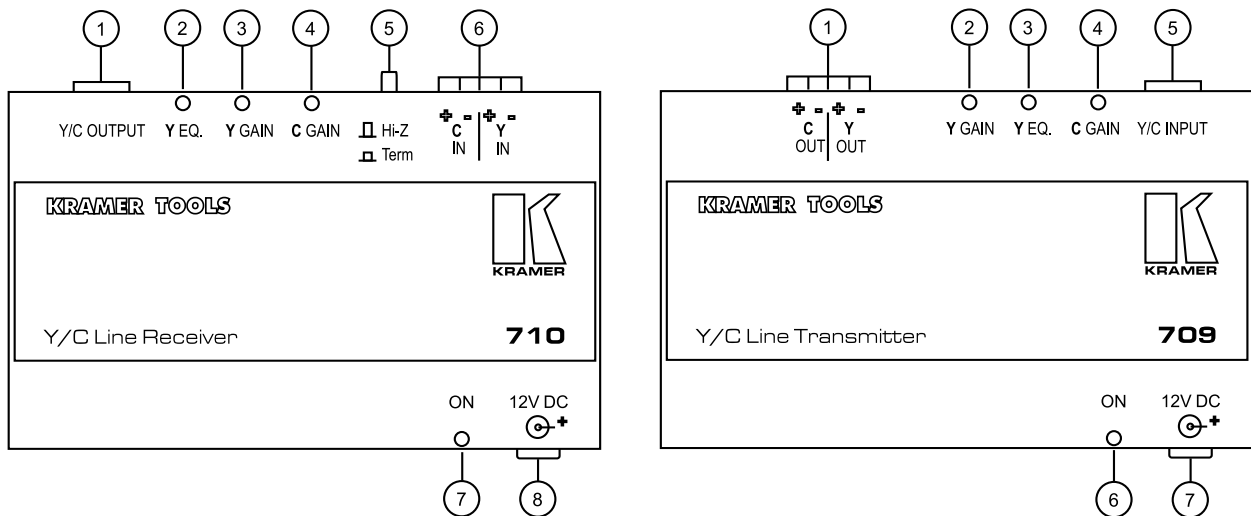


Figure 10: 709/710 Y/C Front/Rear Panel Features

Table 12: 710 Front/Rear Panel Features

No.	Feature	Function
1.	Y/C OUTPUT 4p connector	Amplified and buffered Y/C output.
2.	Y EQ. trimmer	Controls Y cable equalization.
3.	Y GAIN trimmer	Controls the Y gain.
4.	C GAIN trimmer	Controls the Chroma gain.
5.	Hi-Z/Term pushbutton	Selects "Term" or "Hi-Z" impedance (pressed= Term). For looping select "Hi-Z".
6.	IN C & Y terminal block connector	Twisted pair wire input.
7.	ON Led	Illuminates when the machine is powered.
8.	12VDC feed connector	A DC connector that allows power to be supplied to the unit.

Table 13: 709 Front/Rear Panel Features

No.	Feature	Function
1.	OUT C & Y terminal block connector	Twisted pair wire output.
2.	Y GAIN trimmer	Controls the Y gain.
3.	Y EQ. trimmer	Controls Y cable equalization.
4.	C GAIN trimmer	Controls the Chroma gain.
5.	Y/C INPUT 4p connector	Y/C input.
6.	ON led	Illuminates when the machine is powered.
7.	12VDC feed connector	A DC connector that allows power to be supplied to the unit.

7.5 Getting to Know the 711/712 (xl) AV Line Transmitter/Receiver

The KRAMER **711 (xl)** Video/Audio Line Transmitter and the **712 (xl)** Video/Audio Line Receiver, part of the KRAMER TOOLS family, are used as a pair for transmitting video and stereo audio over long distances using 3 pairs of wires (6 wires). The frequency response of the system is well over 64 MHz. The machines offer user controlled Video Gain and Video EQ. The system uses the standard RJ-45 connector and wire system (8 wires, 4 pairs), often used for computer network and telephone installation.

NOTE

For Installation, operation, maintenance and troubleshooting instructions please refer to sections 8-13.

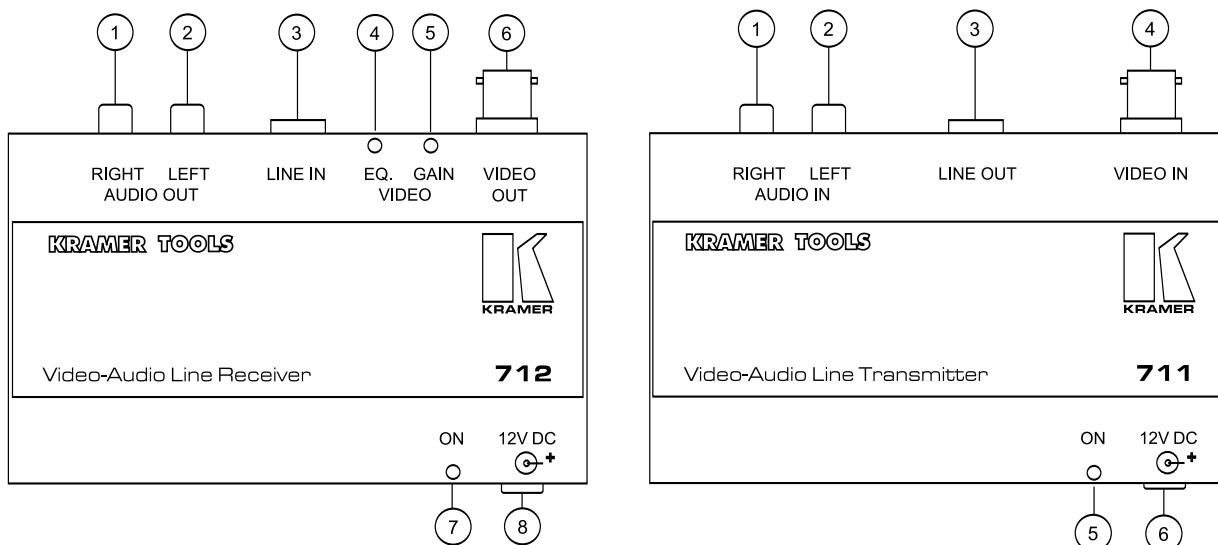


Figure 11: 711/712 Y/C Front/Rear Panel Features

Table 14: 712 Front/Rear Panel Features

No.	Feature	Function
1.	RIGHT AUDIO OUT	Right channel audio output.
2.	LEFT AUDIO OUT	Left channel audio output.
3.	LINE in RJ-45 connector or 6 pole terminal block (712xl)	Twisted pair wire input.
4.	EQ. VIDEO trimmer	Controls cable equalization.
5.	GAIN VIDEO trimmer	Controls video level of the outputs.
6.	VIDEO OUT BNC connector	Amplified and buffered video output.
7.	ON Led	Illuminates when the machine is powered.
8.	12VDC feed connector	A DC connector that allows power to be supplied to the unit.

Table 15: 711 Front/Rear Panel Features

No.	Feature	Function
1.	RIGHT AUDIO IN	Right channel audio input.
2.	LEFT AUDIO IN	Left channel audio input.
3.	LINE OUT RJ-45 connector or 6 pole terminal block (711xl)	Twisted pair wire outputs.
4.	Video IN BNC connector	Video input.
5.	ON Led	Illuminates when the machine is powered.
6.	12VDC feed connector	A DC connector that allows power to be supplied to the unit.



8. INSTALLATION

The Twisted-Pair Interfaces can be rack-mounted in a standard 19" EIA rack using a special adapter (see section 3.2 "optional accessories"). The adapters allow installation of up to 3 machines on each 1U adapter, and up to 8 units (tools only) on a 2U adaptor. To mount any of the amplifiers into the rack, follow the instructions in the installation guide enclosed with the adapter. The Twisted-Pair Interfaces can also be table mounted using four rubber feet (packed in a separate bag). Fit them to the bottom of the unit, place it on the table remote from heat generating sources and make the required connections.

8.1 How to Setup a Twisted-Pair System

Twisted-pair wire systems are very useful to transmit video and audio signals over long distances. If a new system is designed, low capacitance, high quality twisted-pair wires should be selected for the job. However, if using already installed twisted-pair wires, it is essential to verify the following:

- 1) The existing wires do not carry any voltage - direct or induced.
- 2) The existing wires, that go point-to-point, have no "junctions" and breaks.
- 3) The wires do not short each other, or link to "ground".
- 4) For long distance operations it is recommended to use STP (Shielded Twisted Pair) type cables or electric cables. Otherwise the UTP (Unshielded Twisted Pair wires) type can be used.
- 5) Install your cables as close as possible to the ground or to walls and far from antennas and electricity cables to avoid lightning and EMP (Electro Magnetic Pulse) etc.
- 6) All cables leading to and from the acceptors and sources should be precisely of the same length and structure. If cables lengths and cross-sections are not equal, undesirable effects such as color smear, delay problems (misregistration of the black and white content with the color) and others might appear.

9. CONNECTING to VIDEO DEVICES

9.1 Connecting Twisted-Pair Interfaces to Video Devices

Video sources and output devices (such as monitors, projectors or recorders) should be connected to the TP-1x/, TP-2x/, TP-11N, TP-12N, TP-11x/, TP-12x/ models through the BNC connector located on the back of the units. Please make sure that the output signal format matches that of the input signal format. (Example: If input is composite, then output should also be composite.) All signal connections that use more than one cable interconnecting between devices should be of equal length.

9.2 Connecting Kramer Tools to Video Devices

Video sources and output devices (such as monitors or recorders) are connected to the 704/705, 707/708 and 711/712 models through BNC connectors. The 709/710 models are connected by 4-pin type connectors.

10. CONNECTING to AUDIO DEVICES

10.1 Connecting Twisted-Pair Interfaces to Audio Devices

Audio sources and output devices (such as amplifiers or recorders) may be connected to the TP-11N and TP-12N models through the RCA type connectors located on the rear panel of the machine.

10.2 Connecting Kramer Tools to Audio Devices

Audio sources and output devices (such as amplifiers or recorders) may be connected to the 707/708 and 711/712 using RCA connectors.

11. USING the TWISTED-PAIR INTERFACES/KRAMER TOOLS

11.1 Powering on the Twisted-pair Interfaces/Kramer Tools

NOTES

1. *Twisted-Pair Interfaces/Kramer Tools should be powered on only after all connections are completed and all source devices have already been powered on. Do not attempt to connect or disconnect any video, audio or control signal to the Twisted-Pair Interface/Kramer Tool while it is powered on!*
2. *The AC outlet should be near the equipment and should be easily accessible. To fully disconnect equipment, remove power cord from its socket.*

➤ For the **TP-1xl, TP-2xl, TP-11N, TP-12N, TP-11xl, TP-12xl** perform the following:

- 1) When the machine's power cord is connected to the AC outlet, press the toggle switch on the far-left front panel to the up position, where it is illuminated.
- 2) Operate the acceptors.

➤ For the **TP-6** and the **Kramer Tools** perform the following:

- 1) Connect the Twisted-Pair Interface/Kramer Tool DC socket to an appropriate DC source. Observe proper polarity!
- 2) Make sure that the led on the front panel is illuminated.
- 3) Operate the acceptors.

11.2 Looping

(**TP-2xl 704,708 only**)

The looping function enables the operator to extend the number of receivers connected to the system. The following example describes looping performed by using 3 receivers. A balanced (twisted pair) signal from the transmitter reaches the input of the first machine. From the looping connector of this machine, a cable is connected to input socket of the second machine. The loop output of the second machine is then connected to the input socket of the third machine. In this way, all 3 receivers can output the transmitted signal. The operator must switch the termination switches of all the Twisted-Pair Interfaces/Kramer Tools except for the last to "**Hi-Z**" position. The **last** machine's termination switch should always be in the "**Term**" position in order to maintain a well-matched balanced line from the first to the last Twisted-Pair Interface/Kramer Tool. Note that if the looping function is not used, the termination switch should be set to "**Term**".

11.3 Polarity

(**704, 708 only**)

The Polarity function enables the operator to invert the incoming signal for the case where the polarity of the incoming signal is incorrect. If no video signal is present at the output, simply invert the incoming signal by switching the polarity switch.

11.4 Gain Control

(**TP-1xl, TP-2xl, TP-6, 704, 705 708, 712 only**)

The level control function enables the operator to control the video signal level or compensate for distortions caused for example, by too long or too short cables. The incoming signal could also be affected as a result of using a non-standard, or an uncalibrated video source. Too dark a picture is usually caused by a low video signal; however, excessive video level "burns" the picture. The sync signal (should be around -0.3V) may be used to check the conformity of the whole video signal; if sync level is too low or too high, the incoming video signal is not within the standard level. To correct the incoming video signal, an oscilloscope is connected to the Twisted-Pair Interface/Kramer Tool output and the operator adjusts the GAIN/LEVEL trimmer until a satisfactory sync level, and hence a proper picture, is achieved.



WARNING!

- 1. The Twisted-Pair Interface/Kramer Tool is calibrated at the factory for transparent operation at 1 meter. Any re-tuning will upset the machine's transparency.*
- 2. Do not attempt to adjust the GAIN/LEVEL trimmers without using accompanying standard calibrated oscilloscope or waveform monitor!*

11.5 HF/EQ. Control

(TP-1xl, TP-2xl, TP-6, 704, 705, 708, 712 Only)

HF Control function enables the operator to compensate for degradation of the video signal due to too long or non-standard cables. Degradation and loss of video signal are mainly the result of stray capacitance that occurs in long cables. As longer cables are used, the problem is aggravated, resulting in fine detail loss as well as in color degradation. Hence, it is necessary to compensate for the loss by using the Twisted Pair/Kramer Tool **HF/EQ.** control trimmer; equalization is performed by first connecting a Color Bar Generator to a Twisted Pair Interface/Kramer Tool transmitter input. A waveform-monitor (or an Oscilloscope with 75ohm termination) is then connected to the long cable output. A known color bar signal is applied to the Twisted Pair Interface/Kramer Tool input and compared to the signal monitored at the far end. The operator adjusts the **HF/EQ.** trimmer until the measured output chrominance signal matches that of the input signal.

WARNING!

- 3. The Twisted Pair Interface/Kramer Tool is calibrated at the factory for transparent operation at 1 meter. Any re-tuning will upset machine's transparency.*
- 4. Do not attempt to adjust the EQ./HF trimmers without using accompanying standard calibrated oscilloscope or waveform monitor!*

11.6 Y/C Control

(709, 710 Only)

The Y/C system (Luminance and Chrominance) is a complex division of the video signal that is operated in systems such as S-VHS, where the Luminance signal (with the sync) and Chrominance signal (with the color burst) are transmitted separately. The result is very high quality pictures; however, to cope with the complexity of Y/C, special devices such as processors, switchers, amplifiers, etc. are needed during serious video editing. The connector used in this system is a 4-p type with two coaxial wires.

11.6.1 Y Gain Control

The **Y Gain** (Luminance) trimmer is utilized whenever a need arises to control the Y component of the Y/C video. The operator adjusts the trimmer with an appropriate screwdriver until a satisfactory level of luminance is achieved.

11.6.2 C Gain Control

The **C Gain** (Chrominance) trimmer is utilized whenever a need arises to control the C component of the Y/C video. The operator adjusts the trimmer with an appropriate screwdriver until a satisfactory level of chrominance is achieved.

11.6.3 Y EQ. Control

All the cables leading to and from acceptors and sources should have precisely the same length. If cables' lengths are not equal (for example, the "Y" cable is shorter than the "C" cable) undesirable effects such as color smear, delay problems (misregistration of the black and white content with the color) and others might appear. When small details of the picture fade or disappear or loss of sharpness and resolution occurs, gently adjust the **Y EQ.** trimmer until a satisfactory display is achieved. For more details concerning the effects of cables length on high frequency video signals, refer to section 11.5 "HF Control".

11.7 Audio Control

(707 only)

The balanced audio system (more details in section 5) is employed either when very low signals are transmitted over long distances (as is the case with high quality microphones in live shows), or in broadcast audio studios for highest quality signal creation. To produce a satisfactory audio level output, use an appropriate screwdriver to adjust the **Audio Level** trimmer located on the rear panel of the machine.

11.7.1 Using a Microphone

A microphone is a device that converts sound waves to electrical pulses. High quality microphones usually generate a very low signal level. As a result, low noise/high fidelity pre-amplification is required to boost the output of a microphone before the signal reaches the main audio amplifier, where it is processed as a regular audio signal. When a microphone is used, perform the following steps:

- 1) Press the **Cond.Mic** push-button, located on the rear panel of the machine, in order to switch to “**Mic**” position, in which the microphone is provided with an operation voltage coming from the machine.
- 2) Connect a condenser microphone to the **Audio IN** connector.

When a microphone is not used, the push-button should be released to the “**Audio in**” position. **In this case it is recommended that Cond.Mic push-button should not be pressed!**

11.8 Typical Video/Stereo Audio Twisted Pair Link

It is sometimes necessary to transfer video and/or audio signals over long distances in order to distribute them to remotely located users. In many cases, coax wiring is impossible, impractical or costly, or only simple wiring is available. In such cases, and for distances of several hundred meters, twisted-pair video transmission is suitable. The system may be used effectively in schools, hospitals, airports, security applications and the like. Good quality video and audio signals can be obtained using twisted- pair wires, telephone or electric wires (not carrying signals or voltages) and any other practical setup made of two similar wires running in parallel. Figure 12 illustrates a typical application of the twisted pair devices described in this manual; an incoming color video signal from a source (VCR) is sent over long distance by the TP-11N, using a telephone wire or any other twisted pair wire. The TP-12N (Video Line Receiver) at the other end of the wire receives the signal and transfers it to an acceptor.

Figure 13 illustrates a case where an extension of range requires fine-tuning video and HF gain. The TP-6, Twisted Pair Line Amplifier is then installed on the line between the TP-11N and the TP-12N and is used to amplify and control the video signal traveling on it.

Perform the following steps (if necessary):

- 1) Connect the output from your video/audio source to a twisted-pair transmitter (TP-1xI, for video only, TP-11N for video and stereo audio).
- 2) Connect the output of the twisted pair transmitter to a twisted-pair cable.
- 3) Tap off the line where necessary using a twisted pair line receiver (TP-2xI, TP-12N).
- 4) Connect a video/audio acceptor to the twisted-pair line receiver output.
- 5) Toggle all termination switches on the receivers except for the last to “Hi-Z” position. Toggle the last receiver's termination switch to “Term” position (see section 11.2 for more details).

If the high frequency response must be adjusted, first use the controls of the transmitter (TP-1xI, TP-6 only), then fine-tune the receiver (TP-2xI only) with its appropriate control, for optimal results.

Some useful tips:

- A twisted pair line amplifier (TP-6 for example) may be inserted along the line, to extend the range, or enhance a specific area where reception is not sufficient.
- Twisted pair transmission is affected by the quality of cables. Use high quality (low capacity) cables when possible.

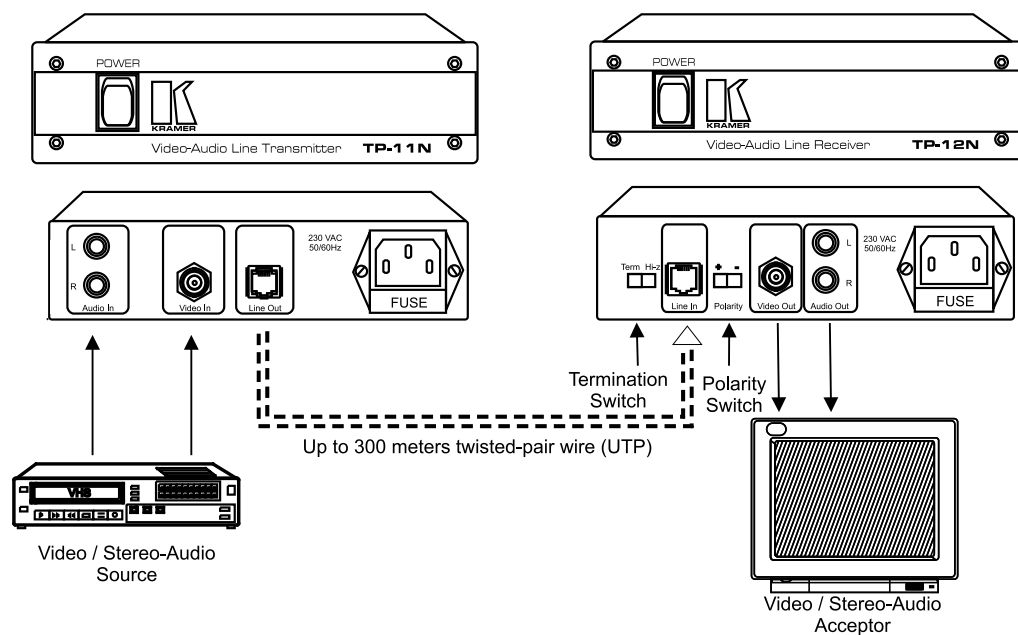


Figure 12: Typical Video/Stereo Audio Twisted Pair Link

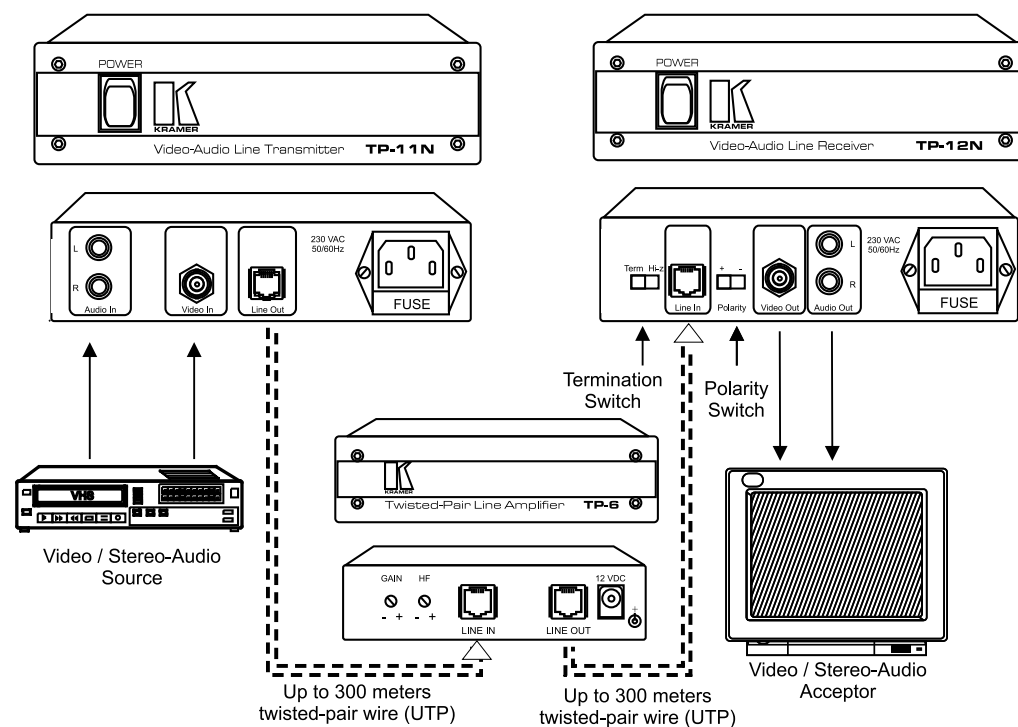


Figure 13: Extension of Range

11.9 Typical Video/Stereo Audio Kramer Tools Setup

Figure 14 illustrates a typical usage of the Kramer Tools described in this manual; an incoming color video signal and an audio signal are sent over a long distance by the 707 (Video/Audio Line Transmitter), using a telephone wire or any other twisted pair wire. The 708 (Video/Audio Line Receiver) at the other end of the wire, receives the signals and transfers them to video and audio acceptors.

Perform the following steps (if necessary):

- 1) Connect the output from your video/audio source to a transmitter (707 in this case).
- 2) Connect the line output of the transmitter to a twisted pair cable.
- 3) Tap off the line where necessary using a line receiver.
- 4) Use the looping function if necessary (see section 11.2 for details).
- 5) Connect video/audio acceptors to each twisted pair line receiver output.
- 6) Toggle all termination switches on all the receivers except for the last to "Hi-Z" position. Toggle the last receiver's termination switch to "Term" position (see section 11.2 for more details).

If the high frequency response must be adjusted, first use the controls of the transmitter, and then fine-tune each receiver with its appropriate control for optimal results.

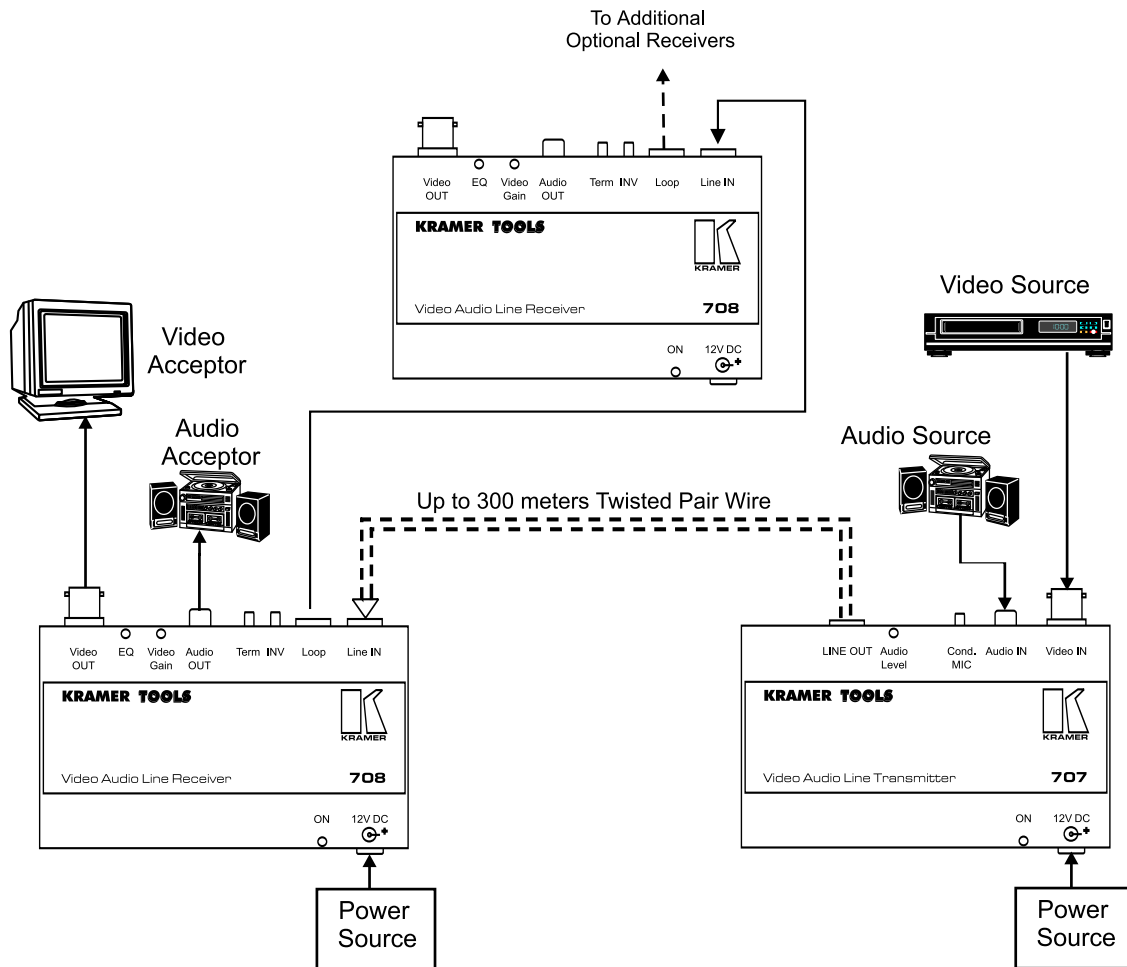


Figure 14: Typical Video/Stereo Audio Kramer Tools Setup

12. MAINTENANCE of the TWISTED PAIR INTERFACES/KRAMER TOOLS

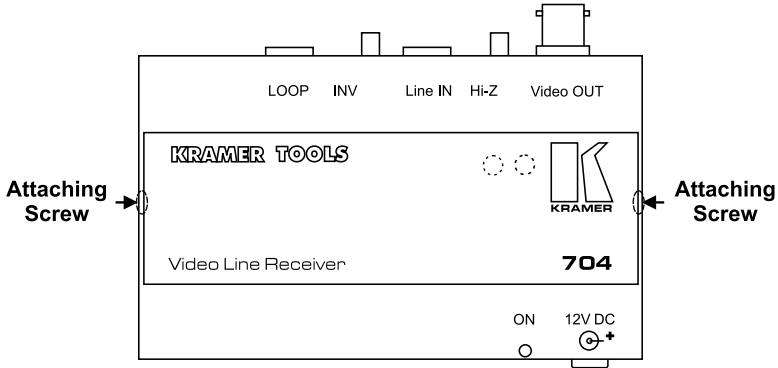
Do not locate your Twisted Pair Interface/Kramer Tool in an environment where it is susceptible to dust, excessive temperature and humidity. These conditions might damage the electronics, and cause erratic operation or failure. Do not clean your Twisted-Pair Interface/Kramer Tool with abrasives or strong cleaners. Doing so might remove or damage the finish, or allow moisture to build up. Take care not to allow dust or particles accumulate inside unused or open connectors.

13. TROUBLESHOOTING

NOTES

1. *Please note that if the output signal is interrupted by very strong external electromagnetic interference, it should re-stabilize when such interference ends. If not, reset the machine by turning the power switch off and then on.*
2. *If the recommended actions still do not result in satisfactory operation, please consult your KRAMER Dealer.*

13.1 Power And Indicators

Problem	Remedy
No Power	<p>➤ For models TP-1xl, TP-2xl, TP-11N, TP-12N, TP-11xl, TP-12xl, perform the following:</p> <ol style="list-style-type: none"> 1. Confirm that the switch is in the “ON” position, and that the switch is illuminated. 2. Confirm that power connections are secured at the machine and at the receptacle. Make sure the receptacle is active, outputting the proper mains voltage. 3. Remove power cord from AC outlet and from the machine and then using a flat head screwdriver, remove fuse holder, located directly below the power connector on your machine. Confirm that the fuse is functional by checking the completeness of the wire connected between its two poles. If the wire is broken, replace the fuse with another, bearing the same rating. <p>➤ For Kramer Tools perform the following:</p> <ol style="list-style-type: none"> 1. Confirm that the LED is illuminated. 2. Confirm that the power connections are secured at the machine and at the receptacle. Make sure the receptacle is active, outputting the appropriate voltage. 3. Using a Philips screwdriver, remove side Philips screws attaching the machine's cover. <div style="text-align: center;">  </div> <ol style="list-style-type: none"> 4. Locate the fuse holder inside your machine (see Figure 15 for fuse locations in Kramer Tools). Confirm that the fuse is functional by checking the completeness of the wire connected between its two poles. If the wire is broken, replace the fuse with another, bearing the same rating. <p style="text-align: center;">NOTE <i>The TP-6 model does not contain a fuse!</i></p> <ol style="list-style-type: none"> 5. Reinstall the cover by tightening the Philips screws.

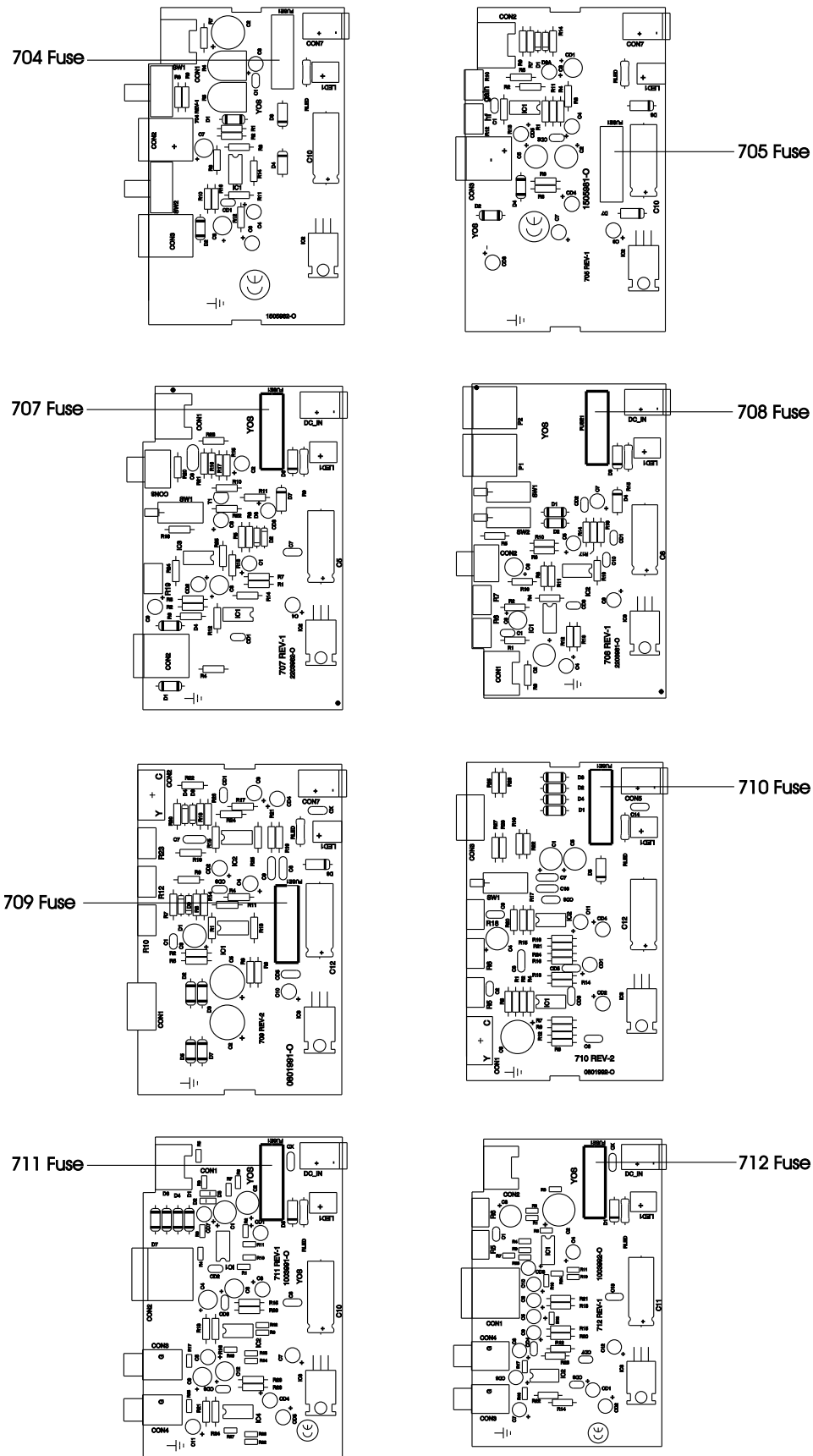


Figure 15: Locating the Internal Fuses



13.2 Video Signal

Problem	Remedy
No video at the output device	<ol style="list-style-type: none">1. Confirm that your sources and output devices are powered on and connected properly.2. Confirm that all devices in the signal path have the proper input and/or output selected.3. Try to invert polarity, using the polarity switch (TP-12N, 704, 708 Only).4. Use a Video Tester to examine the video path leading to/from your Twisted Pair Interface /Kramer Tool (see section 3.2 " Video Tester")
Video level is too high or too dim.	<ol style="list-style-type: none">1. The Twisted Pair Interfaces/Kramer Tools in this manual (except for the TP-1x/ TP-6, TP-11N, 705, 707, 709, 711, 712) offer termination switches on each input. Verify that the twisted line is well matched, otherwise it results in a video level that is too high or too dim when looping is performed and the termination switches are not in proper position (see section 11.2 for more details).2. Confirm that the input and output connecting cables are of high quality, properly built and terminated with 75 ohms.3. Check level controls located on your source input device, output display, or recorder.
Signal quality degradation: color is fading or smeared, quality of the picture is reduced, details of the picture are lost.	<p>Inappropriate cables usually have excessive built-in capacitance. When long shielded cables are used the capacitance grows, and the cable collects more interference from RF sources, such as transmitters, computers and other appliances creating RF fields. At the same time the cable also impedes the streaming of high frequency signals. As a result of this interference, and of the high frequency loss, signal quality degrades.</p> <p>To solve the problem perform the following:</p> <ol style="list-style-type: none">1. Use high quality, non- shielded cables (UTP type) for the longer distances (Multi Twisted Cable Wire is recommended).2. Use a line amplifier from the TP series (such as the TP-6) to pre-compensate for signal degradation. You may cascade several line amplifiers to extend the range. Connect the line amplifier as close as possible to the video source.

Problem	Remedy
Noise bars are "rolling" up or down in the output image or: Low frequency Hum in the output signal	<p>Hum bars (ground loop) are caused by a difference in the ground potential of any two or more devices connected to your signal path. This difference is compensated by routing that voltage difference through any available interconnection, including your video cables.</p> <p style="text-align: center;">WARNING! <i>Do Not disconnect the ground from any piece of video equipment in your signal path!</i></p> <p>Check the following to remove hum bars:</p> <ol style="list-style-type: none"> 1. Confirm that all interconnected equipment is connected to the same phase of power, if possible. 2. Remove equipment connected to that phase that might introduce noise, such as motors, generators, etc. 3. Disconnect all cables and reconnect them one at a time until the ground loop reappears. 4. Disconnect the affected cable and replace it, or insert an isolation device (opto isolator or transformer) in the signal path.

13.3 Audio Signal

Problem	Remedy
No audio at the output device, regardless of input selected	<ol style="list-style-type: none"> 1. Confirm that your sources and output devices are powered on and connected properly. Audio input of your Twisted Pair Interface should be properly wired to the output of your source. Audio output of your Twisted Pair Interface should be properly wired to the input of your line amplifier or output device (recorder, display, etc.) . 2. Confirm that all devices in the signal path have the proper input and/or output selected.
Audio level is too low	<ol style="list-style-type: none"> 1. Confirm that the connecting cables are of high quality and properly built. 2. Check level controls located on your source input device, output display or recorder.



LIMITED WARRANTY

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

DURATION OF WARRANTY

Labor and parts are warranted for three years from the date of the original customer purchase.

WHO IS PROTECTED

Only the original 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 not distributed by Kramer or not purchased from an authorized Kramer dealer. In order to check whether a dealer is authorized, customers may contact Kramer at one of the agencies listed in the web site **www.kramerelectronics.com**.
- 2) Any product, on which the serial number has been defaced, modified or removed.
- 3) Damage, deterioration or malfunction resulting from:
 - a) Accident, misuse, abuse, neglect, fire, water, lightning or other working of nature.
 - b) Unauthorized product modification, or failure to follow instructions supplied with the product.
 - c) Repair or attempted repair by anyone not authorized by Kramer.
 - d) Any shipment of the product (claims should be forwarded to the carrier).
 - e) Removal or installation of the product.
 - f) Any other cause, which does not relate to a product defect.
 - g) Cartons, equipment enclosures, cables or accessories used in conjunction with the product.

WHAT DOES KRAMER WARRANTY COVER IN CASE OF A JUSTIFIED CLAIM

Kramer pays labor and material expenses for covered items. Kramer does 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 TO OBTAIN WARRANTY SERVICE

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

LIMITATION OF IMPLIED WARRANTIES

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



EXCLUSION OF DAMAGES

Kramer's liability for any defective product is limited to the repair or replacement of the product (according to Kramer's decision). Kramer shall not be liable for:

- 1) Damage to other property caused by defects in this product, damages resulting from inconvenience, loss of use of the product, loss of time, commercial loss; or
- 2) Any other damage, whether incidental, consequential or otherwise. Some countries may not allow limitations on the period of an implied warranty and/or do not allow the exclusion or limitation of incidental or consequential damages, hence the above limitations and exclusions may not apply to all Kramer customers.

This warranty entitles the customer to specific legal rights, but customers may have additional rights, that vary according to the law in different countries.

NOTE: All products returned to Kramer for service must have prior approval that may be obtained from Kramer dealers.

NOTICE

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

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

CAUTION!

- ☒ Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- ☒ Use the supplied DC power supply to feed power to the machine.
- ☒ Please use recommended interconnection cables to connect the machine to other components.



**For the latest information on our products and a list of
Kramer distributors, visit our Web site:
www.kramerelectronics.com.
Updates to this user manual may be found at
<http://www.kramerelectronics.com/manuals.html>.
We welcome your questions, comments and feedback.**

