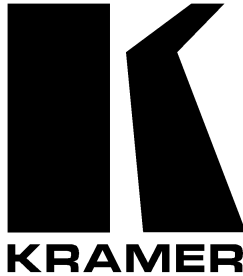


Kramer Electronics, Ltd.



USER MANUAL

Models:

TR-1, *Video Isolation Transformer*

TR-1A, *Audio Isolation Transformer*

TR-2A, *Audio Isolation Transformers*

TR-3, *Video / Audio Isolation Transformers*

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1 Introduction

Welcome to Kramer Electronics (since 1981): a world of unique, creative and affordable solutions to the infinite range of problems that confront the video, audio and presentation professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 500-plus different models now appear in 8 Groups¹, which are clearly defined by function.

Congratulations on purchasing your Kramer **TR-1** *Video Isolation Transformer*, **TR-1A** *Audio Isolation Transformer*², **TR-2A** *Audio Isolation Transformers*³ or **TR-3** *Video / Audio Isolation Transformers*³.

This product is ideal for:

- Broadcast and production audio/video studios
- Audio/video duplication studios
- Staging and fieldwork

The package includes the following items:

- **TR-1** or **TR-1A** or **TR-2A** or **TR-3**
- This user manual⁴

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

1 GROUP 1: Distribution Amplifiers; GROUP 2: Video and Audio Switchers, Matrix Switchers and Controllers; GROUP 3: Video, Audio, VGA/XGA Processors; GROUP 4: Interfaces and Sync Processors; GROUP 5: Twisted Pair Interfaces; GROUP 6: Accessories and Rack Adapters; GROUP 7: Scan Converters and Scalers; and GROUP 8: Cables and Connectors

2 Mono

3 Stereo

4 Download up-to-date Kramer user manuals from our Web site at <http://www.kramerelectronics.com>

3 Overview

In many applications, the connection between video and/or audio sources and acceptors induces 50Hz or 60Hz ground loops, with an undesirable effect such as hum bars¹ and audio hum.

The Kramer **Isolation Transformers** break the ground connection in audio/video transmission lines eliminating the hum caused by ground loops².

The high-performance Kramer **Isolation Transformers** are designed for applications in which interference problems—due to improper grounding and different ground potentials—affect the quality of the audio/video signal. It can also be used to remove DC potentials, as well as for removal of common mode noise (for example, induced on long cable runs). The **Isolation Transformers** are purely passive units and are ideal for fieldwork.

The **Isolation Transformers**:

- Include a video bandwidth of 5.8MHz and an audio bandwidth from 20Hz to 20kHz
- Have excellent linearity
- Offer total galvanic isolation between input and output

Table 1 describes the unique characteristics of each unit:

Table 1: TR-1, TR-1A, TR-2A and TR-3 Characteristics

Machine Name	Isolates and Transforms
TR-1	One video channel
TR-1A	One audio channel (mono)
TR-2A	Two audio channels (stereo)
TR-3	One video channel and two audio channels (Stereo)

To achieve the best performance:

- Connect only good quality connection cables, thus avoiding interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Avoid interference from neighboring electrical and magnetic appliances that may adversely influence signal quality and position your Kramer **Isolation Transformer** away from moisture, excessive sunlight and dust

¹ May show as a dark or light horizontal bar which slowly scrolls up or down the screen

² Differences in ground potential

4 Your Isolation Transformers

This section defines each of the **Isolation Transformer** units:

- Figure 1 and Table 2 define the **TR-1 Video Isolation Transformer**
- Figure 2 and Table 3 define the **TR-1A Audio Isolation Transformer**
- Figure 3 and Table 4 define the **TR-2A Audio Isolation Transformers**
- Figure 4 and Table 5 define the **TR-3 Video / Audio Isolation Transformers**

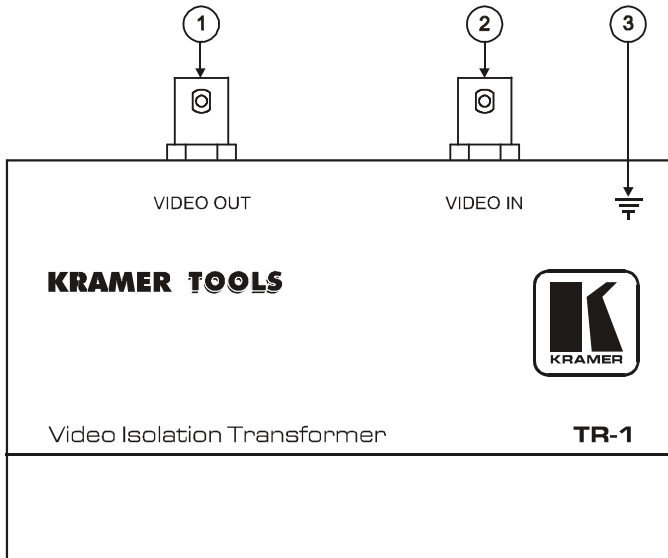


Figure 1: TR-1 Video Isolation Transformer

Table 2: Features and Functions of the TR-1 Video Isolation Transformer

#	Feature	Function
1	VIDEO OUT BNC Connector	Connects to the video output
2	VIDEO IN BNC Connector	Connects to the video input
3	Ground	In the case that you want to connect the unit to an external ground

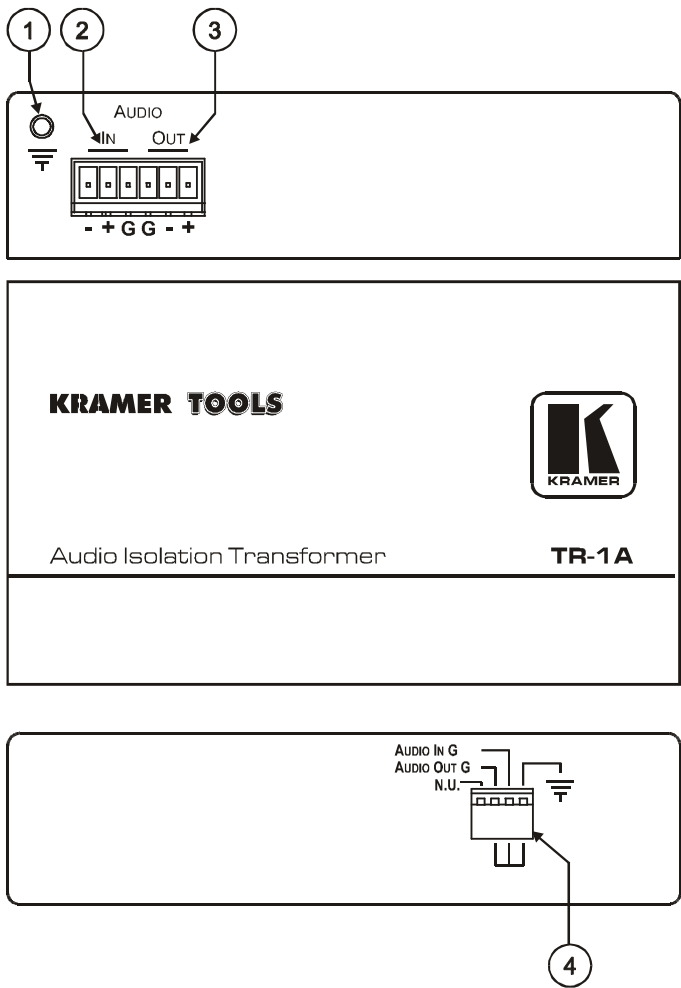


Figure 2: TR-1A Audio Isolation Transformer

Table 3: Features and Functions of the TR-1A Audio Isolation Transformer

#	Feature		Function
1	Ground		In the case that you want to connect the unit to an external ground
2	AUDIO Terminal	IN	Connects to the balanced ¹ audio input
3	Block Connector	OUT	Connects to the balanced ¹ audio output
4	Dipswitches		See section 5.2

¹ An unbalanced audio can also be used

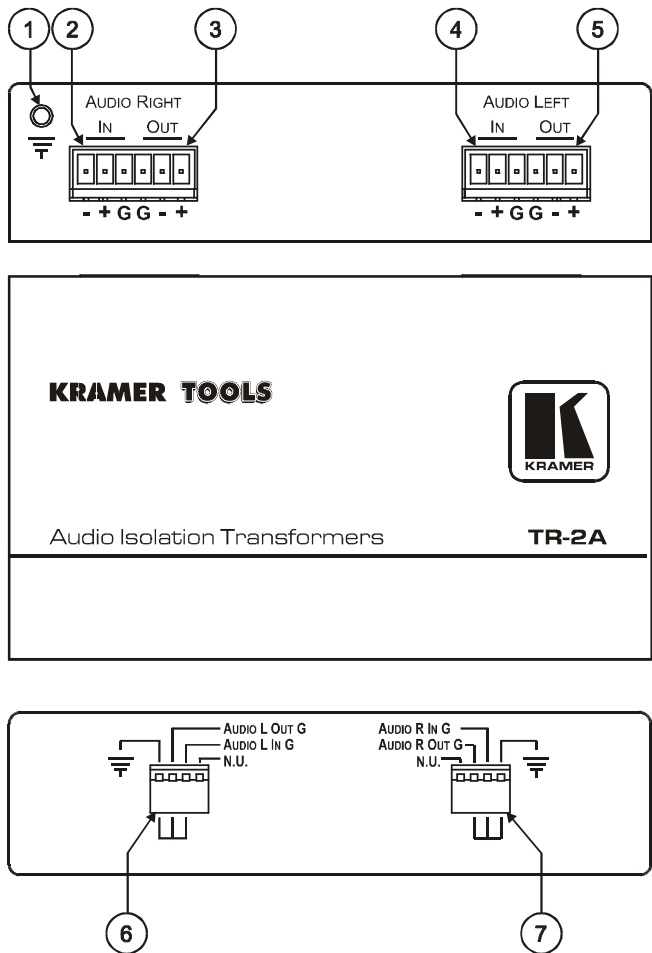


Figure 3: TR-2A Audio Isolation Transformers

Table 4: Features and Functions of the TR-2A Audio Isolation Transformers

#	Feature		Function
1	Ground		In the case that you want to connect the unit to an external ground
2	AUDIO RIGHT Terminal	IN	Connects to the right balanced ¹ audio input
3	Block Connector	OUT	Connects to the right balanced ¹ audio output
4	AUDIO LEFT Terminal	IN	Connects to the left balanced ¹ audio input
5	Block Connector	OUT	Connects to the left balanced ¹ audio output
6	Dipswitches for AUDIO L (Left)		See section 5.2
7	Dipswitches for AUDIO R (Right)		

¹ An unbalanced audio can also be used

Your Isolation Transformers

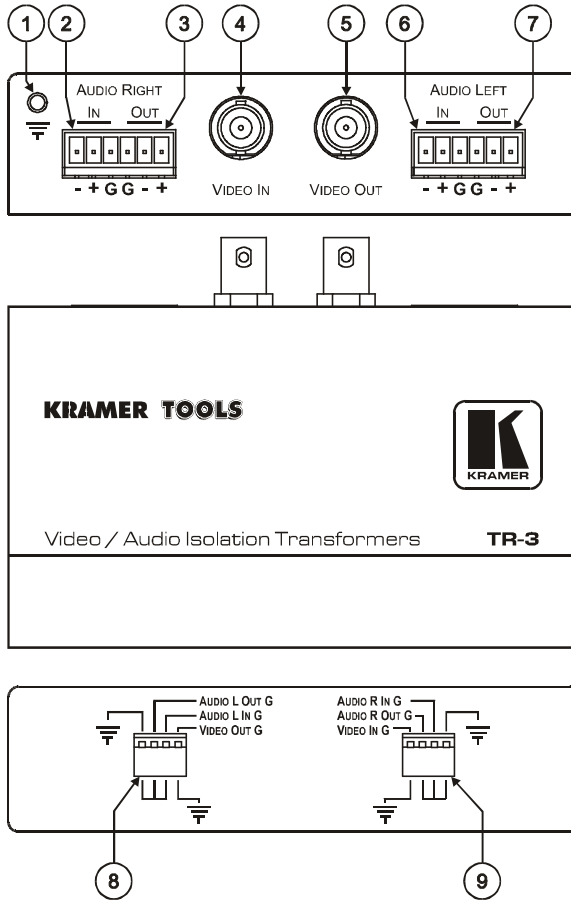


Figure 4: TR-3 Video / Audio Isolation Transformers

Table 5: Features and Functions of the TR-3 Video / Audio Isolation Transformers

#	Feature		Function
1	Ground		In the case that you want to connect the unit to an external ground
2	AUDIO RIGHT Terminal	IN	Connects to the right balanced ¹ audio input
3	Block Connector	OUT	Connects to the right balanced ¹ audio output
4	VIDEO IN BNC Connector		Connects to the video input
5	VIDEO OUT BNC Connector		Connects to the video output
6	AUDIO LEFT Terminal	IN	Connects to the left balanced ¹ audio input
7	Block Connector	OUT	Connects to the left balanced ¹ audio output
8	Dipswitches for AUDIO L (Left)		See section 5.2
9	Dipswitches for AUDIO R (Right)		

¹ An unbalanced audio can also be used

5 Using the Isolation Transformer

The **Isolation Transformers** are used for video signals (**TR-1**); video and balanced¹ stereo audio signals (**TR-3**); balanced¹ mono audio signals (**TR-1A**); and balanced¹ stereo audio signals (**TR-2A**).

There are no general rules as to how and where to connect the **Isolation Transformers**. This depends on many factors, which relate to the setup of the studio, improper grounding and so on.

The best method is to disconnect all the equipment and then connect it one by one, checking for hum, as each piece of equipment is connected. When hum is detected, the appropriate **Isolation Transformer** is connected at that point to break the ground loop.

The **Isolation Transformers** also provide different grounding combinations, which are set via the dipswitches for optimum operation.

This section describes how to connect an **Isolation Transformer** (see section 5.1), and set the dipswitches for optimum performance (see section 5.2).

5.1 Connecting the Isolation Transformer

When installing an **Isolation Transformer**, you just connect it somewhere on the line between the source and the acceptor. The particular example in

Figure 5 shows how to connect the **TR-3 Video /Audio Isolation Transformers**. However, this is not a specific recommendation, as there are many different configuration options.

To connect the **TR-3**, do the following²:

1. Connect a video source (for example, a composite video player) to the VIDEO IN BNC connector.
2. Connect the VIDEO OUT BNC connector to a video acceptor (for example, a composite video display).
3. Connect a balanced³ audio stereo signal source (for example, a balanced stereo audio player) to the AUDIO RIGHT IN terminal block connector and the AUDIO LEFT IN terminal block connector.
4. Connect the AUDIO RIGHT OUT and the AUDIO LEFT OUT terminal block connectors to a balanced audio stereo acceptor (for example, a power amplifier).
5. Turn the power ON on the audio/video sources and acceptors.

¹ An unbalanced audio signal can also be used

² You do not need to connect all the inputs and outputs

³ Or an unbalanced audio signal

6. Set the dipswitches¹ for optimum performance (see section 5.2).

The same principles apply to the **TR-1**, **TR-1A** and **TR-2A**. Simply connect the units anywhere between the sources and acceptors, as Table 6 defines:

Table 6: Connecting the TR-1, TR-1A and TR-2A

	Connect the Source	Connect the Acceptor
TR-1	A video signal (for example, a composite video player)	A composite video acceptor (for example, a composite video display)
TR-1A	A balanced ² audio signal (for example, a balanced mono microphone)	A balanced ² audio acceptor (for example, a power amplifier)
TR-2A	A balanced ² stereo audio signal (for example, a balanced stereo audio player)	A balanced ² stereo audio acceptor (for example, a power amplifier)

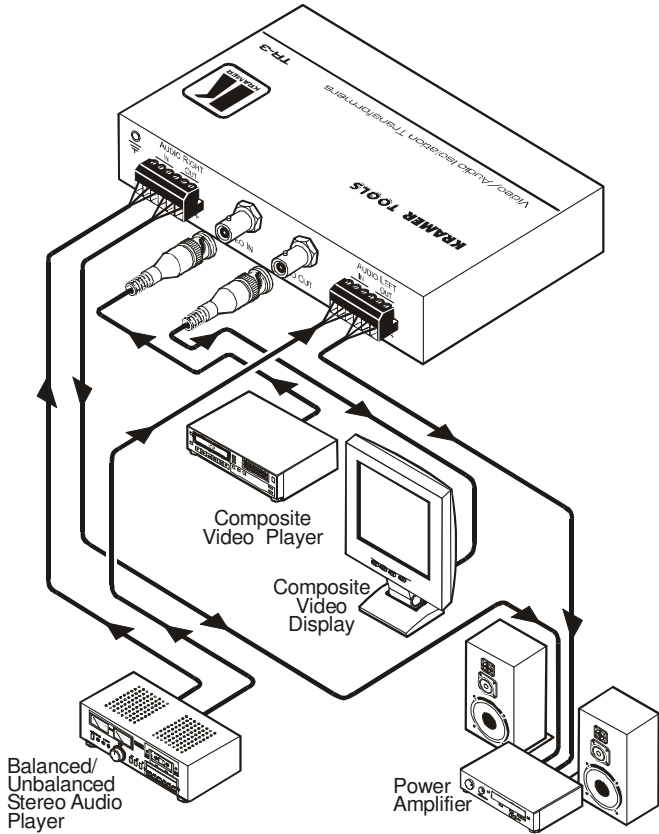


Figure 5: Connecting the TR-3 Video / Audio Isolation Transformer

1 The TR-1 includes internal jumpers instead of dipswitches
2 Or unbalanced audio

5.2 Setting the dipswitches

Figure 6 and Table 7 define¹ the factory default dipswitches:

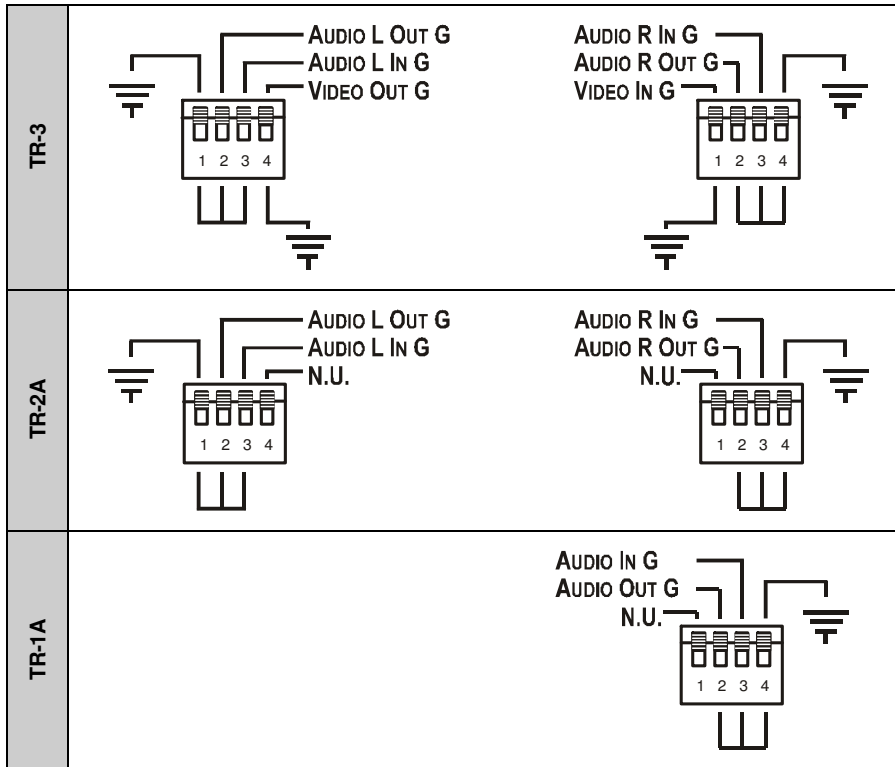


Figure 6: Dipswitch Settings for TR-3, TR-2A and TR-1A

Table 7: Dipswitch Settings

DIPS		Name	Description
AUDIO LEFT	1	Chassis ground	
	2	AUDIO L OUT G	The output audio signal ground
	3	AUDIO L IN G	The input audio signal ground
	4	VIDEO OUT G	
AUDIO RIGHT	1	VIDEO IN G	
	2	AUDIO R OUT G	The output audio signal ground
	3	AUDIO R IN G	The input audio signal ground
	4	Chassis ground	

¹ For TR-3, Table 7 is fully applicable. For TR-2A, the audio dipswitches in Table 7 are applicable. For TR-1A, the AUDIO RIGHT dipswitches (not including the video dipswitch) in Table 7 are applicable

The grounding conditions are set by trial and error. Check all the options to work out which option best suits your needs¹.

5.2.1 Audio Dipswitches

The dipswitches let you set the grounding conditions, as illustrated in Figure 7 and defined in Table 8 for the audio channels.

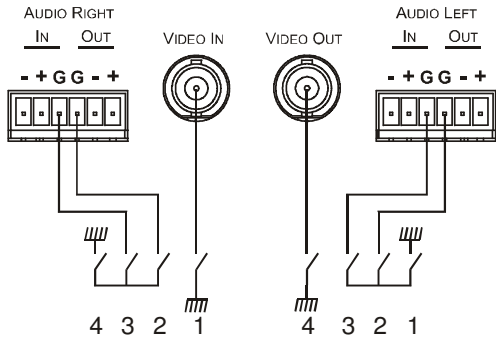


Figure 7: IN and OUT Grounding Options

Table 8: Audio Dipswitch Settings²

AUDIO LEFT			Description	AUDIO RIGHT		
1	2	3		2	3	4
ON	ON	ON	Audio IN and OUT are grounded to the chassis	ON	ON	ON
ON	ON	OFF	Audio OUT shield is connected to the common ground, audio IN shield is left open	ON	OFF	ON
ON	OFF	ON	Audio IN is connected to chassis, audio OUT is grounded to the shield	OFF	ON	ON
OFF	ON	ON	Audio IN and OUT are both grounded to the shield	ON	ON	OFF

Figure 8 and Figure 9 show the balanced and unbalanced audio grounding schematics respectively.

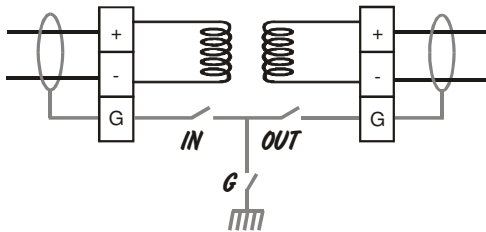


Figure 8: Balanced Audio Grounding Schematics

¹ In most applications the ground is not connected

² Only these combinations are applicable. Other dipswitch settings are insignificant

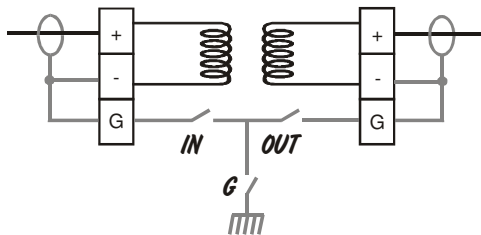


Figure 9: Unbalanced Audio Grounding Schematics

5.2.2 Video Dipswitches

Table 9 defines the video ground conditions that are set by DIP 4 on the left and DIP 1 on the right:

Table 9: Video Dipswitch Settings

VIDEO OUT G (DIP 4)	VIDEO IN G (DIP 1)	Description
ON	ON	Video IN and OUT are grounded to the chassis
ON	OFF	Video OUT is grounded to the chassis; video IN is not
OFF	ON	Video IN is grounded to the chassis; video OUT is not
OFF	OFF	Video IN and OUT are not grounded to the chassis

Figure 10 illustrates the video grounding schematics.

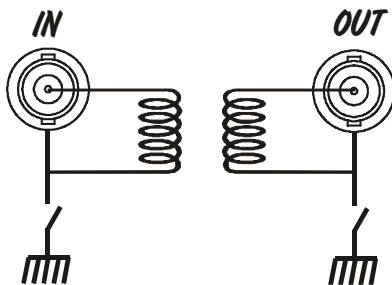


Figure 10: Video Grounding Schematics

6 Technical Specifications

Table 10: Technical Specifications¹ of the Isolation Transformers

INPUTS:	TR-3: 1 composite video, 1Vpp/75Ω on a BNC connector, 2 balanced audio +4dBu/600Ω on detachable terminal blocks; TR-2A: 2 balanced audio +4dBu/600Ω on detachable terminal blocks; TR-1A: 1 balanced audio +4dBu/600Ω on a detachable terminal block; TR-1: 1 composite video, 1Vpp/75Ω on a BNC connector	
OUTPUTS:	TR-3: 1 composite video, 1Vpp/75Ω on a BNC connector, 2 balanced audio +4dBu/600Ω on detachable terminal blocks; TR-2A: 2 balanced audio +4dBu/600Ω on detachable terminal blocks; TR-1A: 1 balanced audio +4dBu/600Ω on a detachable terminal block; TR-1: 1 composite video, 1Vpp/75Ω on a BNC connector	
MAX. OUTPUT LEVEL:	VIDEO: 4Vpp / 75Ω	AUDIO: +26dBu
BANDWIDTH (-3dB):	VIDEO: <10Hz to 5.8MHz; -3dB	AUDIO: 20Hz to 20kHz
DIFF. GAIN:	0.05%	
DIFF. PHASE:	0.05 Deg	
K-FACTOR:	<1.2%	
S/N RATIO:	VIDEO: 73dB	AUDIO: -83dBu @+4dBu/1000Hz
CONTROLS:	Dipswitches to connect to chassis	
VIDEO TILT:	0.1% @ Pulse & Bar	
VIDEO NON LINEARITY:	0.1%	
COUPLING:	VIDEO: Transformer	AUDIO: Transformer
AUDIO THD + NOISE:	≤ 0.025% @+4dBu/1000Hz	
DIMENSIONS:	TR-3, TR-2A, TR-1A: 12.1cm x 7.2cm x 3cm (4.77" x 2.85" x 1.2") W, D, H TR-1: 12cm x 7.3cm x 3cm (4.7" x 2.88" x 1.2") W, D, H	
WEIGHT:	0.34 kg. (0.75lbs.) approx.	
ACCESSORIES:	Mounting brackets	

¹ Specifications are subject to change without notice

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

LIMITATION OF IMPLIED WARRANTIES

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

EXCLUSION OF DAMAGES

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.





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.

