

Kramer Electronics, Ltd.



USER MANUAL

Model:

7408

SDI to Analog Converter

Contents

1	Introduction	1
2	Getting Started	1
3	Overview	1
4	Your 7408 SDI to Analog Converter	2
5	Using Your 7408 SDI to Analog Converter	3
5.1	Connecting Your 7408 SDI to Analog Converter	3
5.2	Connecting a PC	5
5.3	Setting the Dipswitches	6
6	Technical Specifications	7
7	Communication Protocol	8

Figures

Figure 1:	7408 SDI to Analog Converter	2
Figure 2:	Connecting a 7408 SDI to Analog Converter	4
Figure 3:	Connecting a PC without using a Null-modem Adapter	5

Tables

Table 1:	7408 SDI to Analog Converter	3
Table 2:	Setting the Dipswitches	6
Table 3:	Dipswitch Settings (AUTO, PAL, and NTSC)	6
Table 4:	Technical specifications of the 7408 SDI to Analog Converter	7
Table 5:	Structure of the Protocol	8
Table 6:	Instruction Set for the 7408	8

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 350-plus different models now appear in 8 Groups¹, which are clearly defined by function.

Congratulations on purchasing your Kramer DigiTOOLS **7408 SDI to Analog Converter**, which is ideal for broadcast and production video studios, postproduction and duplication studios, and non-linear editing. The package includes the following items:

- **7408 SDI to Analog Converter**
- Power supply
- Null-modem adapter and Windows®-based Kramer control software²
- 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

3 Overview

The Kramer DigiTOOLS **7408 SDI to Analog Converter** is a high quality, full 10-bit SDI to Analog video converter in a Kramer Tool housing. The **7408 SDI to Analog Converter** is a multi-standard unit, converting 525-line SDI to NTSC or NTSC4.43, and 625-line SDI to PAL-B/D/G/H/I/N. Despite its small size, the converter has many features, including:

- Reclocked and equalized SDI output (loop)
- 4 times digital over sampling to minimize digital artifacts

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

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

- Output configuration to Composite Video and s-Video (Y/C), or component video (YUV)
- User-friendly Windows PC software, provided for ProcAmp control via RS-232 for adjusting parameters such as contrast, hue, saturation and sharpness
- NTSC encoding with or without a 7.5IRE setup
- Perforated cover to prevent chip overheating

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 appliances that may adversely influence signal quality and position your Kramer **7408** away from moisture, excessive sunlight and dust

4 Your 7408 SDI to Analog Converter

Figure 1 and Table 1 define the **7408 SDI to Analog Converter**:

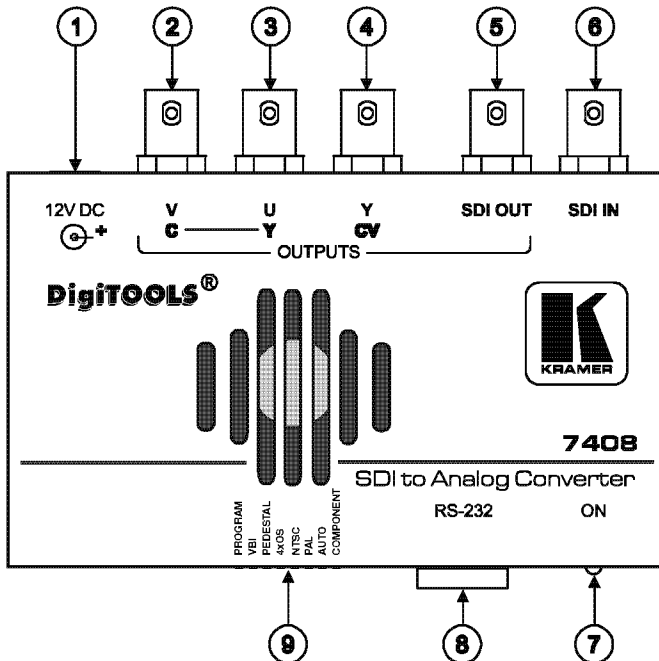


Figure 1: 7408 SDI to Analog Converter

Table 1: 7408 SDI to Analog Converter

#	Feature	Function
1	12V DC	+12V DC connector for powering the unit
2	V / C BNC connector	Connect to: component video or composite video and/or s-Video acceptors (according to dipswitch selection – see Table 3)
3	U / Y BNC connector	
4	Y / CV	
5	SDI OUT BNC Connector	Connects to the reclocked and equalized SDI acceptor
6	SDI IN BNC Connector	Connects to the SDI source
7	ON LED	Illuminates when receiving power
8	RS-232 Port	Connects to the PC or the Remote Controller
9	Dipswitches	To setup the unit (see section 5.3)

5 Using Your 7408 SDI to Analog Converter

You can use your **7408 SDI to Analog Converter** to convert SDI video to professional analog video: composite video and s-Video, or component video (as the example in Figure 2 illustrates).

5.1 Connecting Your 7408 SDI to Analog Converter

To connect the **7408**, do the following¹:

1. Connect the SDI source (for example, a digital camera) to the SDI IN BNC connector. You may also connect the SDI OUT BNC connector to an SDI acceptor (such as an SDI monitor).
2. Connect the following:
 - An s-video acceptor (such as an s-video monitor) to the C–Y output BNC connectors; and/or,
 - A composite video acceptor, such as a composite video monitor to the CV output BNC connector; or,
 - A component video acceptor, such as a BETACAM VCR, to the YUV BNC connectors
3. Connect a PC (if required) to the RS-232 port (see section 5.2).
4. Set the dipswitches, as section 5.3 describes.
5. Connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity.

¹ Switch OFF the power on each device before connecting it to your 7408. After connecting your 7408, switch on its power and then switch on the power on each device

Warning:
Do not cover the 7408

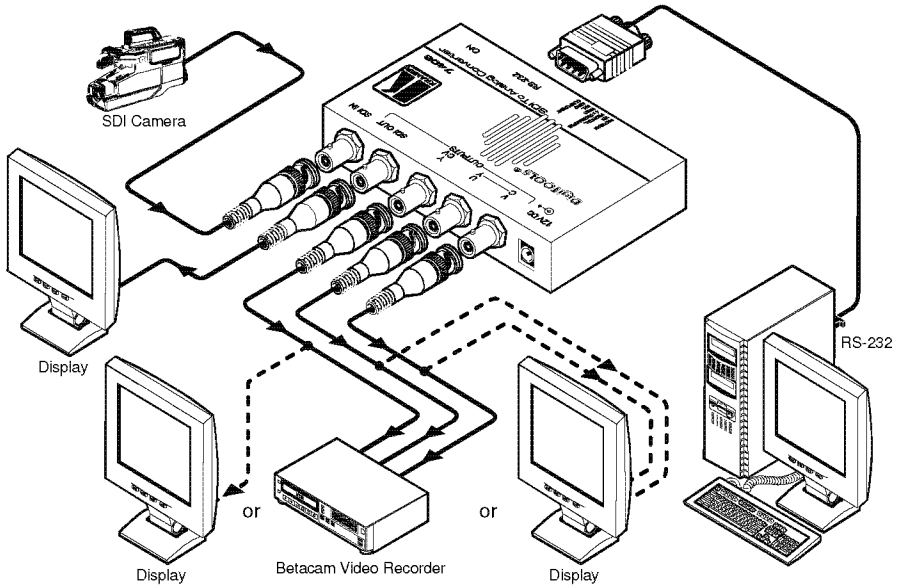


Figure 2: Connecting a 7408 SDI to Analog Converter

5.2 Connecting a PC

To connect a PC to the **7408** unit, using the Null-modem adapter provided with the machine (recommended):

- Connect the RS-232 DB9 rear panel port on the **7408** unit to the Null-modem adapter and connect the Null-modem adapter with a 9-wire flat cable to the RS-232 DB9 port on your PC

To connect a PC to the **7408** unit, without using a Null-modem adapter:

- Connect the RS-232 DB9 port on your PC to the RS-232 DB9 rear panel port on the **7408** unit, as Figure 3 illustrates (depending on whether the PC has a 9-pin or 25-pin connector)

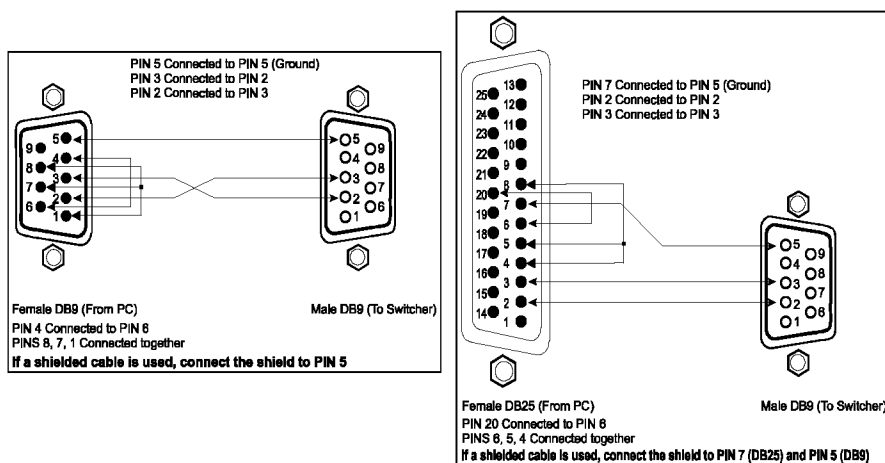


Figure 3: Connecting a PC without using a Null-modem Adapter

5.3 Setting the Dipswitches

Configure the **7408** unit by setting the dipswitches, as Table 2 defines:

Table 2: Setting the Dipswitches

DIPS	Function	Description
1	PROGRAM	ON for upgrading firmware; otherwise OFF
2	VBI	ON to enable Vertical Interval Blanking; OFF to disable
3	PEDESTAL ¹	ON for pedestal (7.5 IRE offset selection for NTSC); OFF for no pedestal
4	4XOS ²	ON to enable oversampling ³ ; OFF to disable oversampling
5	NTSC	ON for NTSC 3.58 (see Table 3)
6	PAL	ON for PAL (see Table 3)
7	AUTO	ON for multistandard; OFF for user selected (fixed) standard (see Table 3)
8	COMPONENT	ON for component video; OFF for composite video and/or s-video

Table 3: Dipswitch Settings (AUTO, PAL, and NTSC)

AUTO	PAL	NTSC	7408 Output Standard
OFF	OFF	OFF	NTSC 4.43
OFF	OFF	ON	NTSC 3.58
OFF	ON	OFF	PAL-B
OFF	ON	ON	PAL-N
ON	OFF	OFF	PAL-N for 625 line SDI input; NTSC 4.43 for 525 line SDI input
ON	OFF	ON	PAL-N for 625 line SDI input; NTSC 3.58 for 525 line SDI input
ON	ON	OFF	PAL-B for 625 line SDI input; NTSC 4.43 for 525 line SDI input
ON	ON	ON	PAL-B for 625 line SDI input; NTSC 3.58 for 525 line SDI input

¹ NTSC offsets the black level within the active video signal by 7.5 IRE when selected

² 4xOS is 4 x Oversample

³ When this method is used, the noise figure is improved

6 Technical Specifications

Table 4 includes the technical specifications:

Table 4: Technical specifications¹ of the 7408 SDI to Analog Converter

INPUT:	1 SDI: SMPTE-259M, ITU-R BT.601 on a BNC connector
OUTPUTS:	1 reclocked SDI: SMPTE-259M, ITU-R BT.601 on a BNC connector 1 composite video: 1Vpp / 75Ω on a BNC connector 1 s-Video: 1Vpp, 0.3Vpp / 75Ω on two BNC connectors 1 component video (Y, U and V) on three BNC connectors
BANDWIDTH (-3dB):	5.7MHz
DIFF. GAIN:	<1%
DIFF. PHASE:	<1%
K-FACTOR:	0.5% (CV, Y)
S/N RATIO:	>70db (Flat Field)
DIGITAL RESOLUTION:	10 bit
LUMA NON-LINEARITY:	0.9%
CHROMA/LUMA DELAY:	<15nsec
POWER SOURCE:	12 VDC, 320mA
DIMENSIONS:	12cm x 7.5cm x 2.5cm (4.7" x 0.98" x 2.95"), W, D, H
WEIGHT:	0.3kg. (0.66lbs.)
ACCESSORIES:	Power supply, Null-modem adapter

¹ Specifications are subject to change without notice

7 Communication Protocol¹

RS-232 communication between the **7408** and the PC is done using the following protocol. The protocol uses four bytes of information, and data is at 9600 baud, no parity, 8 data bits and 1 stop bit. The controller and machine should be connected via a null-modem connection, that is, if using a DB-9 port, connect as follows:

Connect pin 5 of the PC to pin 5 of the machine

Cross pins 2 and 3, i.e., connect pin 2 of the PC to pin 3 of the machine, and connect pin 3 of the PC to pin 2 of the machine

On the PC side, short pins 4 and 6

On the PC side, short pins 1, 7 and 8

Table 5: Structure of the Protocol

MSB		INSTRUCTION						LSB	
0	TO PC	I5	I4	I3	I2	I1	I0		
7	6	5	4	3	2	1	0		
1st byte									
		DATA							
1	D6	D5	D4	D3	D2	D1	D0		
7	6	5	4	3	2	1	0		
2nd byte									
		EXTENDED DATA							
1	E6	E5	E4	E3	E2	E1	E0		
7	6	5	4	3	2	1	0		
3rd byte									
		MSB's						ADDR	
1	E7	D7	0	1	1	1	0		
7	6	5	4	3	2	1	0		
4th byte ²									

Note that the MSB's of the DATA (D7) and the EXTENDED DATA (E7) are in the fourth byte. Terminology:

TO PC is the "DESTINATION BIT"

I4..I0 is the "INSTRUCTION"

D7..D0 is the "DATA"

E7..E0 is the "EXTENDED DATA"

The destination bit, TO PC, is 0 when sending from the PC to the machine, or 1 when sending from the machine to the PC.

Table 6: Instruction Set for the 7408

INSTRUCTION			I7	I6	I5	I4	I3	I2	I1	I0
Dec	Hex									
0	0	Reset	0	0	0	0	0	0	0	0
3	3	Store machine settings	0	0	0	0	0	0	1	1
4	4	Recall machine settings	0	0	0	0	0	1	0	0
5	5	Set Video Parameter	0	0	0	0	0	1	0	1
6	6	Request Video Parameter	0	0	0	0	0	1	1	0
7	7	Read video encoder data	0	0	0	0	0	1	1	1
8	8	Write video encoder data	0	0	0	0	1	0	0	0
10	A	Write EEPROM data	0	0	0	0	1	0	1	0
11	B	Read EEPROM data	0	0	0	0	1	0	1	1
12	C	Write I ² C	0	0	0	0	1	1	0	0
13	D	Read I ² C	0	0	0	0	1	1	0	1
14	E	Read video standard	0	0	0	0	1	1	1	0
15	F	Is setup defined?	0	0	0	0	1	1	1	1
16	10	Error	0	0	0	1	0	0	0	0
30	1E	Lock Front Panel	0	0	0	1	1	1	1	0
31	1F	Request Bar	0	0	0	1	1	1	1	1
57	39	Enable "Power-down save"	0	0	1	1	1	0	0	1
61	3D	Identify machine	0	0	1	1	1	1	0	1

¹ VER-0.1

² Note that the MSB's of the DATA (D7) and the EXTENDED DATA (E7) are in the fourth byte

DESCRIPTION OF INSTRUCTIONS

INSTRUCTION 0 – RESET

DATA=0: initialize the machine.

When the machine is initialized, it will send the RESET code (DATA = 0). If the machine receives this code, it will reset to its “power-up” state.

DATA=1: configure the machine to its factory default state.

When the machine receives this code, all programmable parameters will be reset to their factory-default values.

EXTENDED DATA - set as 0.

INSTRUCTION 3 – STORE MACHINE SETTINGS

DATA = setup# (1 to 10) where present values of machine settings are saved.

EXTENDED DATA - set as 0.

- When the machine receives this instruction, its present settings (video parameters) are saved in non-volatile memory. The machine replies by sending the same 4 bytes (except for the Destination Bit) back to the PC.

- When the user saves the machine settings using the front-panel buttons, then this instruction is sent to the PC.

INSTRUCTION 4 – RECALL MACHINE SETTINGS

DATA = setup# (1 to 10) of machine settings which are to be recalled.

EXTENDED DATA - set as 0.

- When the machine receives this instruction, it recalls the settings which were previously saved in the setup#. The machine replies by sending the same 4 bytes (except for the Destination Bit) back to the PC.

- When the user recalls a setup using the front-panel buttons, then this instruction is sent to the PC.

INSTRUCTION 5dec – SET VIDEO PARAMETER

DATA = Video parameter #, defined as follows:

1 = Brightness

2 = Contrast

3 = Hue

4 = Sharpness

5 = Colour saturation

6 = R-Y saturation

7 = B-Y saturation

EXTENDED DATA - value for selected video parameter .

- When the machine receives this instruction, then, if valid, the selected video parameter is set and the machine replies by sending the same 4 bytes (except for the Destination Bit) back to the PC.

- When the user changes video parameters using the front-panel buttons, then this instruction is sent to the PC.

Note that the video parameter values range from 0 (minimum) up to 255dec (maximum), and do not necessarily correspond with the number displayed on the panel of the 7408. If a value outside the legal range of a particular parameter is sent, the error code will be returned.

INSTRUCTION 6 – REQUEST VIDEO PARAMETER

For sending to machine, DATA = VIDEO parameter #, defined as in INSTRUCTION 5; EXTENDED DATA=0;

When replying DATA = VIDEO parameter #, defined as in INSTRUCTION 5; EXTENDED DATA- value for selected VIDEO parameter.

INSTRUCTION 7 – READ VIDEO ENCODER DATA

For sending to machine, DATA = VIDEO ENCODER sub-address which is to be read.

When replying:- DATA = VIDEO ENCODER sub-address; EXTENDED DATA = requested data.

The PC sends this instruction to the machine. The machine replies by sending back the data assigned to this sub-address.

INSTRUCTION 8 – WRITE VIDEO ENCODER DATA

DATA = VIDEO ENCODER sub-address; EXTENDED DATA = data to be written to this sub-address.

The PC sends data directly to the encoder. The machine implements this new value, and replies by sending the same 4 bytes (except for the Destination Bit) back to the PC.

CAUTION – this function was designated for development and testing purposes. Improper use of this function may cause erratic behaviour of the machine.

INSTRUCTION 10dec – WRITE EEPROM DATA

DATA = EEPROM sub-address; EXTENDED DATA = data to be written to this sub-address.

The PC sends data directly to the EEPROM. The EEPROM stores this new value, and replies by sending the same data back to the PC.

CAUTION – this function was designated for development and testing purposes. Improper use of this function may cause erratic

behaviour of the machine.

INSTRUCTION 11dec – READ EEPROM DATA

For sending to machine, DATA = EEPROM sub-address which is to be read.

When replying:- DATA = EEPROM sub-address; EXTENDED DATA = requested data.

The PC sends this instruction to the machine. The machine replies by sending back the data stored in this sub-address.

INSTRUCTION 12dec – WRITE I²C

DATA = I²C sub-address; EXTENDED DATA = data to be written to this sub-address. The PC sends I²C data (to the I²C address which was last accessed via INSTRUCTION 13). The machine replies by sending the same data back to the PC.

CAUTION – this function was designated for development and testing purposes. Improper use of this function may cause erratic behavior of the machine.

INSTRUCTION 13dec – READ I²C

For sending to machine, DATA = I²C address; EXTENDED DATA = sub-address. When replying:- DATA = sub-address; EXTENDED DATA = data read.

The PC sends this instruction to the machine. The machine replies by sending back the data of this address and sub-address.

INSTRUCTION 14dec – READ VIDEO STANDARD

For sending to machine, set DATA = EXTENDED DATA = 0.

When replying:- DATA = 0; EXTENDED DATA = VIDEO STANDARD.

The PC sends this instruction to the machine. The machine replies by sending back the video standard, defined as follows:

0 = NTSC4.43

1 = NTSC

2 = PAL

3 = PAL-N

64dec (40hex)= Invalid or no input detected

Note that when the DIP-switches are set for a fixed standard, the 7408 will reply by sending the code for the fixed standard.

INSTRUCTION 16dec – ERROR

If the machine receives an invalid instruction, it replies by sending this error code.

INSTRUCTION 30dec – LOCK FRONT PANEL

DATA = 0: panel is unlocked.

DATA = 1: panel is locked.

EXTENDED DATA - set as 0.

- When the machine receives this instruction, it will lock or unlock the panel for control via the front-panel pushbutton switches (RS-232 control is unaffected).

- When the user changes the lock status using the front-panel button, then this instruction is sent to the PC.

INSTRUCTION 31dec – REQUEST BAR

For sending DATA = EXTENDED DATA = 0

When replying EXTENDED DATA = 1, if Bar

INSTRUCTION 57dec – ENABLE “POWER-DOWN SAVE”

DATA = 0 disables power-down saving; DATA = 1 enables saving. EXTENDED DATA - set to 0.

The PC sends this instruction to the machine. The power-down option is enabled or disabled according to the value of DATA. If the power-down option is enabled, then the machine will “remember” its state before being turned off, and revert to this state when turned on again. Note that whenever the machine is turned on, the power-down save option is enabled.

INSTRUCTION 61dec – IDENTIFY MACHINE

For sending, DATA = 1 to request machine name; DATA = 3 to request software version number. EXTENDED DATA - set to 0.

The PC sends this instruction to the machine. The machine replies as follows:

If the machine name is requested, the machine replies with DATA = 40 (hex), and EXTENDED DATA = 45 (hex).

If the software version is requested, the machine replies with DATA as the version number before the decimal point, and EXTENDED DATA is the value following the decimal point. For example, for version 3.4, the machine replies with DATA = 03 (hex), and EXTENDED DATA = 04 (hex).

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 three 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.



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