KRAMER ELECTRONICS LTD.

USER MANUAL

MODEL:

TP-578H
DGKat to HDMI Receiver

P/N: 2900-300189 Rev 2

TP-578H DGKat to HDMI Receiver

This guide helps you install and use your product for the first time. For more detailed information, go to http://bit.ly/k-prod-downloads to download the latest manual or scan the QR code on the left.

Step 1: Check what's in the box

☑ **TP-578H** DGKat™ to HDMI Receiver
☑ Power adapter (12V DC)
☑ 4 Rubber feet

☑ 1 Quick start guide
☑ 1 User Manual
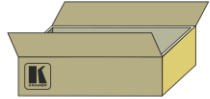
Save the original box and packaging materials in case your Kramer product needs to be returned to the factory for service.

Step 2: Install the TP-578H

Mount the device in a rack (using the optional RK-3T rack adapter available for purchase) or place it on a shelf.

Step 3: Connect the input and outputs

Always switch off the power to all devices before connecting them to your **TP-578H**.
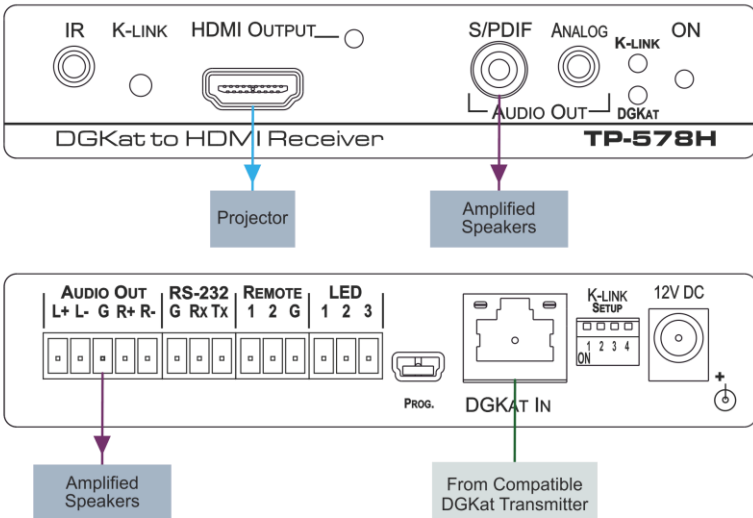
For best results, we recommend that you always use Kramer DGKat cables when connecting AV equipment to the **TP-578H**.

Step 4: Set the DIP-switches

#	Feature	Function	Switch State
1	Lock EDID	Locks the current EDID in memory	On—Lock EDID (down) Off—Normal EDID mode (default, up)
2	Output timeout	Turns off the output after 5 minutes when there is no input signal	On—Timeout enabled Off—Timeout disabled. Output always on
3	For future use		
4	For future use		

Step 5: Connect the power

Connect the power adapter to the **TP-578H** and plug the adapter into the mains electricity.

Contents

Figures

1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront video, audio, presentation, and broadcasting professionals on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better!

Our 1,000-plus different models now appear in 14 groups that are clearly defined by function: GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Routers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters and GROUP 11: Sierra Video Products; GROUP 12: Digital Signage; and GROUP 13: Audio, and GROUP 14: Collaboration.

Congratulations on purchasing your Kramer DigiTOOLS® **TP-578H** *DGKat to HDMI Receiver*, which is ideal for the following typical applications:

- Boardrooms and classrooms
- Multimedia applications

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

> Go to http://www.kramerelectronics.com/support/product_downloads.asp to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

2.1 Achieving the Best Performance

To achieve the best performance:

- Use only good quality connection cables (we recommend Kramer DGKat, high-performance, high-resolution cables) to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)

- Do not secure the cables in tight bundles or roll the slack into tight coils

- Avoid interference from neighboring electrical appliances that may adversely influence signal quality

- Position your Kramer **TP-578H** *DGKat to HDMI Receiver* away from moisture, excessive sunlight and dust

> This equipment is to be used only inside a building. It may be connected only to other equipment that is installed inside a building.

2.2 Safety Instructions

> **Caution:** No operator serviceable parts inside the unit
>
> **Warning:** Use only the Kramer Electronics input power wall adapter that is provided with the unit.
>
> **Warning:** Disconnect the power and unplug the unit from the wall before installing

2.3 Recycling Kramer Products

The Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC aims to reduce the amount of WEEE sent for disposal to landfill or incineration by requiring it to be collected and recycled. To comply with the WEEE Directive, Kramer Electronics has made arrangements with the European Advanced Recycling Network (EARN) and will cover any costs of treatment, recycling and recovery of waste Kramer Electronics branded equipment on arrival at the EARN facility. For details of Kramer's recycling arrangements in your particular country go to our recycling pages at *http://www.kramerelectronics.com/support/recycling/*.

3   Overview

The high quality **TP-578H** *DGKat to HDMI Receiver* accepts a DGKat TP (Twisted Pair) signal from a compatible Kramer DGKat transmitter and decodes it into the following signals:

- HDMI

- IR

- S/PDIF digital audio

- Balanced and unbalanced audio

- RS-232

The device is designed to be used in conjunction with any Kramer DGKat switcher or transmitter, (for example, the **WP-577VH**).

The **TP-578H** features:

- HDCP support

- HDTV compatibility

- A system range of up to 70m (230ft) at 1080p and 1600 x 1200 on shielded **BC-DGKat623** cable (see Section 3.1)

- HPD—Hot Plug Detect signals from the display device to the source

- Equalization and reclocking of the data

- K-LINK compatibility

- Up to 4.95Gbps data rate (1.65Gbps per graphics channel)

- A DigiTOOLS® sized enclosure. Three devices can be mounted in a 1U rack space using the optional **RK-3T** adapter

- Lockable EDID

- PowerConnectPlus—A single connection to the transmitter or the receiver powers both units. The higher voltage PowerConnectPlus also powers regular PowerConnect devices via auto-negotiation

Note: The **TP-578H** can supply power to PowerConnect devices but can only be powered by PowerConnectPlus devices.

> ⚠️ **Warning:** Using a TP cable that is incorrectly wired may cause permanent damage to the device

The **TP-578H** supports a range of:

- Up to 90m (295ft) at 1080i, or up to 30m (98ft) at 1080p on shielded **BC-DGKat524** cable

- Up to 90m (295ft) at 1080i, or up to 70m (230ft) at 1080p on shielded **BC-DGKat623** cable

- Up to 100m (330ft) at 1080i or up to 90m (295ft) at 1080p on shielded **BC-DGKat7a23** cable

Note: The transmission range depends on the signal resolution, the graphics card and the display used. The distance using non-Kramer CAT 6 and CAT 7a cables may not reach these ranges.

3.1 Using TP cables

Kramer engineers have developed special twisted pair cables to best match our digital twisted pair products; the Kramer **BC-DGKat524** (CAT 5 24 AWG), the Kramer **BC-DGKat623** (CAT 6 23 AWG), and the Kramer **BC-DGKat7a23** (CAT 7a 23 AWG) cables. These specially built cables significantly outperform regular CAT 5/CAT 6/CAT 7a cables.
Note: The **TP-578H** cannot work with unshielded cables.

4   Defining the TP-578H DGKat to HDMI Receiver

Figure 1 defines the front panel of the **TP-578H**.
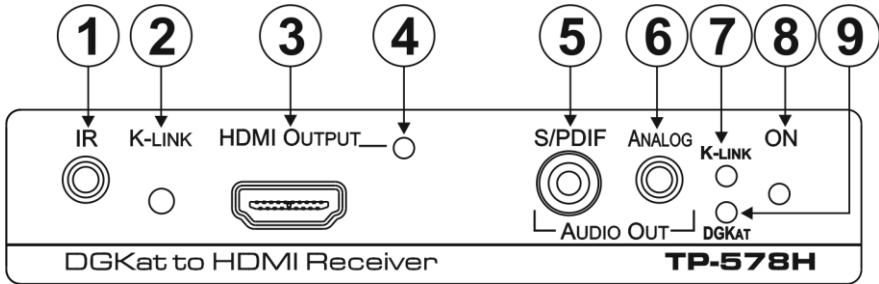
Figure 1: TP-578H DGKat to HDMI Receiver Front Panel

#	Feature		Function
1	*IR* 3.5mm Mini Jack		Connect to the IR blaster or sensor
2	*K-LINK* Mode Button		Press to toggle between the active and passive data modes, (see Section 6.4). The current data mode is indicated by the K-LINK LED, (see K-LINK LED)
3	*HDMI OUTPUT* Connector		Connect to the HDMI acceptor, (see Section 5)
4	*HDMI OUTPUT* LED		Lights green when there is a video acceptor present, (see Section 6.5.1)
5	*AUDIO OUT*	*S/PDIF* Digital Audio RCA Connector	Connect to the digital, stereo audio acceptor
6		*ANALOG* Audio 3.5mm Mini Jack	Connect to the unbalanced, stereo audio acceptor
7	*K-LINK* LED		The LED indicates the current K-LINK data mode: • Lights green when the device is in active data mode • Lights red when the device is in passive data mode To toggle the K-Link data mode, press the K-Link button, (see K-LINK Mode Button)
8	*ON* LED		The LED indicates the power supply status: • Lights green when the device receives adequate power • Flashes red/green if there is not adequate power, (see Section 6.5.2)
9	*DGKat* LED		Lights green when the DGKat link to the transmitter is valid

Figure 2 defines the rear panel of the **TP-578H**.
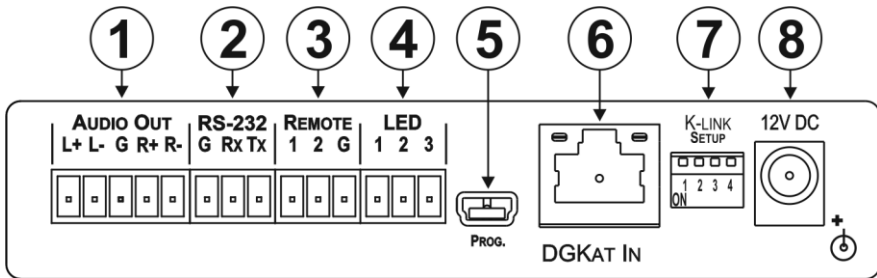
Figure 2: TP-578H DGKat to HDMI Receiver Rear Panel

#	Feature	Function
1	*AUDIO OUT* 5-way Terminal Block	Connect to the balanced, stereo audio acceptor (see Section 5.2)
2	*RS-232* 3-way Serial Terminal Block	Connect to the RS-232 serial transmitter or receiver. **Note**: Data is transmitted even in the absence of a video or audio signal (see Section 6.4)
3	*REMOTE* 3-way Terminal Block	For future use
4	*LED* 3-way Terminal Block	For future use
5	*PROG.* Mini USB Connector	For the use of Kramer service personnel only
6	*DGKat IN* RJ-45 TP Connector	Connect to a compatible DGKat TP switcher/transmitter (for example, the WP-577VH)
7	*K-Link SETUP* 4-way DIP-switch	For setting device functions, (see Section 6.1)
8	*12V DC* Connector	Connect to the power adapter, center pin positive

5 Connecting the TP-578H

> Always disconnect/switch off the power to all devices before connecting them to your **TP-578H**. After connecting your **TP-578H**, connect its power and then reconnect/switch on the power to the other devices.
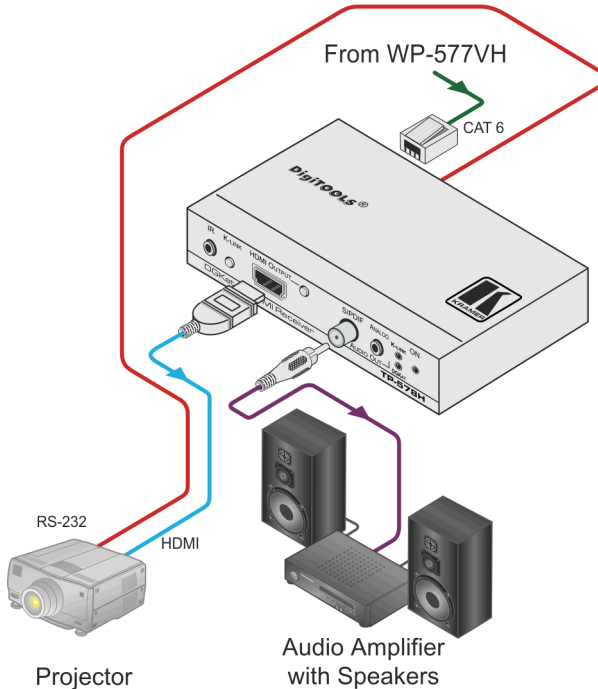
Figure 3: Connecting the TP-578H DGKat to HDMI Receiver

To connect the TP-578H as illustrated in the example in Figure 3:

1. Connect the DGKat Out RJ-45 connector on the **WP-577VH** to the DGKat In RJ-45 connector on the **TP-578H** using STP cable (see Section 3.1).

2. Connect the HDMI Output on the **TP-578H** to the HDMI acceptor, (for example, a projector).

3. Connect the RS-232 3-way terminal block on the **TP-578H** to the RS-232 controlled device, (for example, a projector).

4. Connect the Audio Out S/PDIF digital, RCA audio connector on the **TP-578H** to the audio acceptor, (for example, an audio amplifier with speakers).

5. Connect the power adapter to the **TP-578H** and to the mains electricity (not shown in <u>Figure 3</u>).

5.1 Connecting a Serial Controller to the TP-578H via RS-232

To connect a serial controller to the TP-578H:

- From the RS-232 9-pin D-sub serial port on the serial controller connect:
  - Pin 5 to the GND pin on the **TP-578H** RS-232 terminal block
  - Pin 3 to the RX pin on the **TP-578H** RS-232 terminal block
  - Pin 2 to the TX pin on the **TP-578H** RS-232 terminal block

5.2 Connecting a Balanced/Unbalanced Stereo Audio Device

<u>Figure 4</u> and <u>Figure 5</u> illustrate how to connect a balanced and unbalanced stereo audio device to the Audio Out 5-way terminal block.
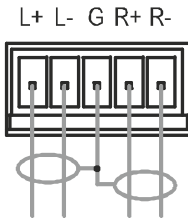
Figure 4: Balanced Stereo Audio Connection
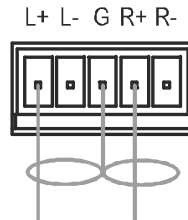
Figure 5: Unbalanced Stereo Audio Output Connection

6 Operating the TP-578H

6.1 The K-Link Setup 4-way DIP-switch

The Setup 4-way dip-switch lets you lock the EDID and set the output timeout.
When a switch is down it is on and when it is up it is off.

Switch #	Feature	Function	Switch State
1	Lock EDID	Locks the current EDID in memory	On—Lock EDID (down) Off—Normal EDID mode (Default, up)
2	Output timeout	Turns off the output after 300 seconds when there is no input signal	On—Timeout enabled Off—Timeout disabled. Output always on
3	For future use		
4			

6.2 Locking the EDID

You can lock the current EDID to prevent the EDID from being updated
automatically when a new display device is plugged in.

To lock the current EDID:

- Set DIP-switch 1 to ON

Note: You can only modify the EDID using Protocol 3000 commands or the EDID
Designer when DIP-switch 1 is on.

6.3 Setting the Output Timeout

You can set the output to be disabled when there is no input detected for 5
minutes or to be always on.

To enable the timeout:

- Set DIP-switch 2 to ON

6.4 Setting the Active or Passive Data K-Link Mode

Note: Data is transmitted even in the absence of video and audio signals.

The **TP-578H** treats RS-232 data in either of the following manners:

- Active—The data are treated as Kramer Protocol 3000 commands and are processed by the microcontroller of the **TP-578H**

- Passive—The data is treated as raw data and is transmitted over the DGKat link with no processing

To select the active or passive data mode:

- Press the K-Link mode button to toggle between the active and passive data modes.
  When the K-Link LED on the front panel lights green, the device is in the active mode. When the K-Link LED lights red, the device is in the passive mode.

6.5 LED Operation

The LEDs on the front panel provide status information as detailed below.

6.5.1 HDMI Output LED

HDMI Output LED Color	HDMI Signal State
Solid green	There is a video acceptor
Flashes green for a few seconds, then lights solid green	There is an acceptor connected but it does not support HDCP
Off	No video acceptor connected

6.5.2 DGKat LED

DGKat LED Color	DGKat State
Solid green	Valid DGKat link with a video signal
Flashing green	There is a DGKat link but no video signal
Off	The DGKat link is not valid

6.5.1   K-Link LED

K-Link LED Color	K-Link Mode
Red	Passive mode
Green	Active mode

6.5.2   On LED

On LED Color	Power Status
Green	Power is connected
Flashes green/red	The device is negotiating the power requirement

7   Wiring the TP RJ-45 Ethernet Connector

Connect/solder the cable shield to the RJ-45 connector shield at both ends of the cable.

> ⚠️ **Do not use a crossed TP cable with this product**.
> Using a TP cable that is incorrectly wired may cause permanent damage to the device.
>
> **Do not** use unshielded TP cables with this product.

Figure 6 defines the TP pinout using a straight pin-to-pin cable with RJ-45 connectors.

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

Figure 6: TP Pinout Wiring
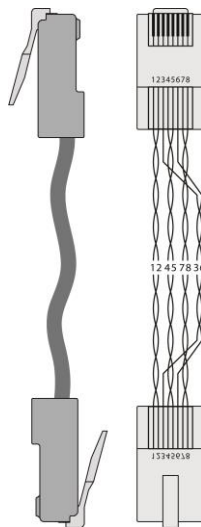
8   Technical Specifications

INPUTS:	1 DGKat TP on an RJ-45 connector
OUTPUTS:	1 HDMI on an HDMI connector 1 S/PDIF digital audio on an RCA connector 1 Analog unbalanced stereo audio on a 3.5mm mini jack 1 Analog balanced stereo audio on a 5-way terminal block
PORTS:	1 RS-232 serial port on a 3-way terminal block 1 IR port on a 3.5mm mini jack
BANDWIDTH:	Up to 4.95Gbps data rate (1.65Gbps per graphics channel)
COMPLIANCE WITH HDCP STANDARD:	Supports HDCP
INDICATOR LEDs:	HDMI OUTPUT, K-LINK, DGKAT, Power
POWER CONSUMPTION:	12V DC, 900mA
OPERATING TEMPERATURE:	0° to +40°C (32° to 104°F)
STORAGE TEMPERATURE:	–40° to +70°C (–40° to 158°F)
HUMIDITY:	10% to 90%, RHL non-condensing
DIMENSIONS:	12.1cm x 6.99cm x 2.47cm (4.76" x 2.75" x 0.97") W, D, H
WEIGHT:	0.35kg (0.77lbs) approx.
INCLUDED ACCESSORIES:	Power supply
OPTIONS:	RK-3T 19" rack adapter
Specifications are subject to change without notice at http://www.kramerelectronics.com	

8.1   Default Communication Parameters

RS-232	
Protocol 3000	
Baud Rate:	115,200
Data Bits:	8
Stop Bits:	1
Parity:	None
Command Format:	ASCII

9   Default EDID

Monitor
  Model name............... TP-578H
  Manufacturer............. KMR
  Plug and Play ID......... KMR1200
  Serial number............ 505-709990100
  Manufacture date......... 2011, ISO week 255
  Filter driver............ None

  EDID revision............ 1.3
  Input signal type........ Digital
  Color bit depth.......... Undefined
  Display type............. RGB Color
  Screen size.............. 520 x 320 mm (24.0 in)
  Power management......... Standby, Suspend, Active off/sleep
  Extension blocs.......... 1 (CEA-EXT)

  DDC/CI................... n/a

Color characteristics
  Default color space...... Non-sRGB
  Display gamma............ 2.20
  Red chromaticity......... Rx 0.674 - Ry 0.319
  Green chromaticity....... Gx 0.188 - Gy 0.706
  Blue chromaticity........ Bx 0.148 - By 0.064
  White point (default).... Wx 0.313 - Wy 0.329
  Additional descriptors... None

Timing characteristics
  Horizontal scan range.... 30-83kHz
  Vertical scan range...... 56-76Hz
  Video bandwidth.......... 170MHz
  CVT standard............. Not supported
  GTF standard............. Not supported
  Additional descriptors... None
  Preferred timing......... Yes
  Native/preferred timing.. 1280x720p at 60Hz (16:10)
    Modeline............... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync

Standard timings supported
     720 x 400p at 70Hz - IBM VGA
     720 x 400p at 88Hz - IBM XGA2
     640 x 480p at 60Hz - IBM VGA
     640 x 480p at 67Hz - Apple Mac II
     640 x 480p at 72Hz - VESA
     640 x 480p at 75Hz - VESA
     800 x 600p at 56Hz - VESA
     800 x 600p at 60Hz - VESA
     800 x 600p at 72Hz - VESA
     800 x 600p at 75Hz - VESA
     832 x 624p at 75Hz - Apple Mac II
    1024 x 768i at 87Hz - IBM
    1024 x 768p at 60Hz - VESA
    1024 x 768p at 70Hz - VESA
    1024 x 768p at 75Hz - VESA
    1280 x 1024p at 75Hz - VESA
    1152 x 870p at 75Hz - Apple Mac II
    1280 x 1024p at 75Hz - VESA STD
    1280 x 1024p at 85Hz - VESA STD
    1600 x 1200p at 60Hz - VESA STD
    1024 x 768p at 85Hz - VESA STD
     800 x 600p at 85Hz - VESA STD
     640 x 480p at 85Hz - VESA STD
    1152 x 864p at 70Hz - VESA STD
    1280 x 960p at 60Hz - VESA STD

EIA/CEA-861 Information
  Revision number.......... 3

IT underscan............. Supported
Basic audio.............. Supported
YCbCr 4:4:4.............. Not supported
YCbCr 4:2:2.............. Not supported
Native formats........... 1
Detailed timing #1....... 1920x1080p at 60Hz (16:10)
  Modeline.............. "1920x1080" 148.500 1920 2008 2052 2200 1080 1084 1089 1125 +hsync +vsync
Detailed timing #2....... 1920x1080i at 60Hz (16:10)
  Modeline.............. "1920x1080" 74.250 1920 2008 2052 2200 1080 1084 1094 1124 interlace +hsync +vsync
Detailed timing #3....... 1280x720p at 60Hz (16:10)
  Modeline.............. "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync
Detailed timing #4....... 720x480p at 60Hz (16:10)
  Modeline.............. "720x480" 27.000 720 736 798 858 480 489 495 525 -hsync -vsync

CE audio data (formats supported)
  LPCM   2-channel, 16/20/24 bit depths at 32/44/48 kHz

CE video identifiers (VICs) - timing/formats supported
   1920 x 1080p at 60Hz - HDTV (16:9, 1:1)
   1920 x 1080i at 60Hz - HDTV (16:9, 1:1)
   1280 x 720p at 60Hz - HDTV (16:9, 1:1) [Native]
    720 x 480p at 60Hz - EDTV (16:9, 32:27)
    720 x 480p at 60Hz - EDTV (4:3, 8:9)
    720 x 480i at 60Hz - Doublescan (16:9, 32:27)
    720 x 576i at 50Hz - Doublescan (16:9, 64:45)
    640 x 480p at 60Hz - Default (4:3, 1:1)
    NB: NTSC refresh rate = (Hz*1000)/1001

CE vendor specific data (VSDB)
  IEEE registration number. 0x000C03
  CEC physical address..... 1.0.0.0
  Maximum TMDS clock....... 165MHz

CE speaker allocation data
  Channel configuration.... 2.0
  Front left/right......... Yes
  Front LFE................ No
  Front center............. No
  Rear left/right.......... No
  Rear center.............. No
  Front left/right center.. No
  Rear left/right center... No
  Rear LFE................. No

Report information
  Date generated........... 23-Nov-14
  Software revision........ 2.70.0.989
  Data source.............. File
  Operating system......... 6.1.7601.2.Service Pack 1

Raw data

00,FF,FF,FF,FF,FF,FF,00,2D,B2,00,12,01,01,01,01,FF,15,01,03,80,34,20,78,E2,B3,25,AC,51,30,B4,26,
10,50,54,FF,FF,80,81,8F,81,99,A9,40,61,59,45,59,31,59,71,4A,81,40,01,1D,00,72,51,D0,1E,20,6E,28,
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50,2D,35,37,38,48,00,00,00,00,00,00,00,00,FD,00,38,4C,1E,53,11,00,0A,20,20,20,20,20,20,01,C5,
02,03,1B,C1,23,09,07,07,48,10,05,84,03,02,07,16,01,65,03,0C,00,10,00,83,01,00,00,02,3A,80,18,71,
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00,00,18,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,77

10 Protocol 3000

The **TP-578H** can be operated using serial commands from a PC, remote controller or touch screen using the Kramer Protocol 3000.

This section describes the:

- Kramer Protocol 3000 syntax (see Section 10.1)
- Kramer Protocol 3000 commands (see Section 10.2)

10.1 Kramer Protocol 3000 Syntax

10.1.1 Host Message Format

Start	Address (optional)	Body	Delimiter
#	*device_id@*	**Message**	CR

10.1.1.1 Simple Command

Command string with only one command without addressing:

Start	Body	Delimiter
#	**Command** SP *Parameter_1,Parameter_2,…*	CR

10.1.1.2 Command String

Formal syntax with command concatenation and addressing:

Start	Address	Body	Delimiter
#	*device_id@*	**Command_1** *Parameter1_1,Parameter1_2,…*| **Command_2** *Parameter2_1,Parameter2_2,…*| **Command_3** *Parameter3_1,Parameter3_2,…*|…	CR

10.1.2 Device Message Format

Start	Address (optional)	Body	delimiter
~	*device_id@*	**Message**	CR LF

10.1.2.1 Device Long Response

Echoing command:

Start	Address (optional)	Body	Delimiter
~	*device_id@*	**Command** SP *[Param1 ,Param2 …]* result	CR LF

CR = Carriage return (ASCII 13 = 0x0D)
LF = Line feed (ASCII 10 = 0x0A)
SP = Space (ASCII 32 = 0x20)

10.1.3   Command Terms

Command

A sequence of ASCII letters ('A'-'Z', 'a'-'z' and '-').

Command and parameters must be separated by at least one space.

Parameters

A sequence of alphanumeric ASCII characters ('0'-'9','A'-'Z','a'-'z' and some special characters for specific commands). Parameters are separated by commas.

Message string

Every command entered as part of a message string begins with a **message starting character** and ends with a **message closing character**.

Note: A string can contain more than one command. Commands are separated by a pipe ('|') character.

Message starting character

'#' – For host command/query

'~' – For device response

Device ID (Optional, for K-NET)

K-NET Device ID followed by '@'

Query sign

'?' follows some commands to define a query request.

Message closing character

CR – For host messages; carriage return (ASCII 13)

CRLF – For device messages; carriage return (ASCII 13) + line-feed (ASCII 10)

Command chain separator character

When a message string contains more than one command, a pipe ('|') character separates each command.

Spaces between parameters or command terms are ignored.

10.1.4 Entering Commands

You can directly enter all commands using a terminal with ASCII communications software, such as HyperTerminal, Hercules, etc. Connect the terminal to the serial or Ethernet port on the Kramer device. To enter `CR` press the Enter key. (`LF` is also sent but is ignored by command parser).

For commands sent from some non-Kramer controllers like Crestron, some characters require special coding (such as, /X##). Refer to the controller manual.

10.1.5 Command Forms

Some commands have short name syntax in addition to long name syntax to allow faster typing. The response is always in long syntax.

10.1.6 Chaining Commands

Multiple commands can be chained in the same string. Each command is delimited by a pipe character ("|"). When chaining commands, enter the **message starting character** and the **message closing character** only once, at the beginning of the string and at the end.

Commands in the string do not execute until the closing character is entered.

A separate response is sent for every command in the chain.

10.1.7 Maximum String Length

64 characters

10.2 Kramer Protocol 3000 Commands

Command	Description
#	Protocol handshaking
BUILD-DATE?	Read device build date
CPEDID	Copy EDID data from the output to the input EEPROM
DEF-RES?	Assign custom defined scaled video output resolution to "vic" index
DISPLAY?	Read if output is valid
GEDID	Read EDID data
HDCP-STAT?	Get HDCP signal status
HELP	List of commands
KLINK_INF	Set K-Link MCU direct mode
KLINK_CLS	Set K-Link data mode
LDEDID	Load EDID data
LDFW	Load new firmware
MODEL?	Read device model
NAME?	Get machine (DNS) name
PROT-VER?	Read device protocol version
RESET	Reset device
SIGNAL?	Read if input is valid
SN?	Read device serial number
UPGRADE	Execute firmware upgrade
VERSION?	Read device firmware version

Command - **#**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**#**	End User	Public
Get:	**-**	-	-
Description		**Syntax**	
Set:	Protocol handshaking	**#** `CR`	
Get:	-	-	
Response			
~`nn`@`SP`**OK**`CR LF`			
Parameters			
Response Triggers			
Notes			
Use to validate the Protocol 3000 connection and get the machine number			

Command - **BUILD-DATE**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	-	-	-
Get:	**BUILD-DATE?**	End User	Public
Description		**Syntax**	
Set:	Get device build date	#**BUILD-DATE**[CR]	
Get:	-	-	
Response			
~[nn]@**BUILD-DATE**[SP]*date*[SP]*time*[CR LF]			
Parameters			
date - Format: YYYY/MM/DD where YYYY = Year, MM = Month, DD = Day *time* - Format: hh:mm:ss where hh = hours, mm = minutes, ss = seconds			
Response Triggers			
Notes			

Command - **CPEDID**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**CPEDID**	End User	Public
Get:	-	-	-
Description		**Syntax**	
Set:	Copy EDID data from the output to the input EEPROM	#**CPEDID**[SP]*src_type, src_id, dst_type, dest_bitmap*[CR]	
Get:	-	-	
Response			
~[nn]@**CPEDID**[SP]*src_stg, src_id, dst_type, dest_bitmap*[CR LF]			
Parameters			
src_type - *EDID* source type (usually output) *src_id* - number of chosen source stage (1.. max number of inputs/outputs) *dst_type* - *EDID destination* type (usually input) (see <u>Section 10.2.12)</u> *dest_bitmap* - bitmap representing destination IDs. Format: XXXX…X, where X is hex digit. The binary form of every hex digit represents corresponding destinations. Setting '1' says that EDID data has to be copied to this destination			
Response Triggers			
Response is sent to the com port from which the Set was received (before execution)			
Notes			
Destination bitmap size depends on device properties (for 64 inputs it is a 64-bit word) Example: bitmap 0x0013 means inputs 1,2 and 5 are loaded with the new EDID			

Command - DEF-RES		Command Type - Video	
Command Name		**Permission**	**Transparency**
Set	**DEF-RES**	Administrator	Public
Get	**DEF-RES?**	End User	Public
Description		**Syntax**	
Set:	Set custom defined scaled video output resolution to "vic" index	#**DEF-RES**[SP] Table_id,Width,Height,Htotal,VTotal,HSyncW,HSyncBackPorch,VSyncW,VSyncBackPorch,FrRate,Interlaced[CR]	
Get:	Get custom defined video resolution	#**DEF-RES?**[SP]VIC_id, stage, stage_id [CR]	

Response
~ [nn]@**DEF-RES**[SP]
Table_id,Width,Height,Htotal,VTotal,HSyncW,HSyncBackPorch,VSyncW,VSyncBackPorch,FrRate,Interlaced[CR] [LF]

Parameters
Table_id - index in resolution table (see Section 10.2.3 Video Resolutions). Valid indexes for SET are 100-104 only
Custom resolution parameters - by name (self-explanatory), numeric value
Interlaced - interlaced/progressive according to Section 10.2.1 On/Off ("ON"- I, "OFF" - P)
Stage - input/output
Stage_id - number of chosen stage (1...max number of inputs/outputs)

Response Triggers
After execution, response is sent to the com port from which the Set/Get was received
After execution, response is sent to all com ports if DEF-RES was set by any other external control device (button press, device menu and similar)

Notes
If a requested custom resolution is not defined, yet is in the device, it returns ERR[SP]003 (out of range)
Only indexes 100-104 are valid for custom defined resolution
In Get command when sending:
index 0 - device replies with detailed info of native resolution
index 255 - device replies with detailed info of current resolution

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Command - **DISPLAY?**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	-	-	-
Get	**DISPLAY?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get output HPD status	#**DISPLAY?** `SP` *out_id* `CR`	
Response			
~ `nn` @**DISPLAY** `SP` *out_id,status* `CR LF`			
Parameters			
out_id - output number *status* - HPD status according to signal validation			
Response Triggers			
After execution, response is sent to the com port from which the Get was received Response is sent after every change in output HPD status ON to OFF Response is sent after every change in output HPD status OFF to ON and ALL parameters (new EDID, etc.) are stable and valid			
Notes			

Command - **GEDID**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**GEDID**	Administrator	Public
Get:	**GEDID?**	End User	Public
Description		**Syntax**	
Set:	Set EDID data from device	#**GEDID**[SP]*stage, stage_id*[CR]	
Get:	Get EDID support on certain input/output	#**GEDID?**[SP]*stage, stage_id*[CR]	
Response			
Set: Multi-line response: ~[nn]@**GEDID**[SP]*stage,stage_id,size*[CR LF] EDID_data[CR LF] ~[nn]@**GEDID**[SP]*stage,stage_id*[SP]**OK**[CR LF] Get: ~[nn]@**GEDID**[SP]*stage,stage_id,size*[CR LF]			
Parameters			
stage - input/output *stage_id* - number of chosen stage (1.. max number of inputs/outputs) *size* - EDID data size. For Set, size of data to be sent from device, for Get, 0 means no EDID support			
Response Triggers			
Response is sent to the com port from which the Set (before execution) / Get command was received			
Notes			
For Get, size=0 means EDID is not supported For old devices that do not support this command, ~[nn]@ ERR 002[CR LF] is received			

Command - **HDCP-STAT**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	-	-	-
Get:	**HDCP-STAT?**	End User	Public
Description		**Syntax**	
Set:	None	-	
Get:	Get HDCP signal status	**#HDCP-STAT?** [SP] *stage,stage_id* [CR]	
Response			
Set / Get: ~ [nn] **@HDCP-STAT** [SP] *stage,stage_id,mode* [CR LF]			
Parameters			
stage – input/output *stage_id* - number of chosen stage (1.. max number of inputs/outputs) *actual_status* - signal encryption status - valid values ON/OFF			
Response Triggers			
Response is sent to the com port from which the Set (before execution) / Get command was received Response is sent to all com ports after execution if HDCP-STAT was set by any other external control device (button press, device menu and similar) or HDCP mode changed			
Notes			

Command - **HELP**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**HELP**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get command list or help for specific command	2 options: 1. **#HELP** [CR] 2. **#HELP** [SP] *command_name* [CR]	
Response			
1. Multi-line: ~ [nn] **@Device available protocol 3000 commands :** [CR LF] *command,* [SP] *command…* [CR LF] **To get help for command use: HELP (COMMAND_NAME)** [CR LF] 2. Multi-line: ~ [nn] **@HELP** [SP] *command* **:** [CR LF] *description* [CR LF] **USAGE :** *usage* [CR LF]			
Parameters			
Response Triggers			
Notes			

Command – **KLINK_INF**		Command Type – System	
Command Name		**Permission**	**Transparency**
Set:	**KLINK_INF**	Admin	Internal
Get:	**-**	-	-
Description		**Syntax**	
Set:	Set K-Link MCU direct mode (DGKat only)	**#KLINK_INF**╷CR╵	
Get :	-	-	
Response			
~ ╷nn╵@**KLINK_INF**╷CR╵			
Parameters			
None			
Response Triggers			
After receiving KLINK_INF command over DGCat			

Command – **KLINK_CLS**		Command Type – System	
Command Name		**Permission**	**Transparency**
Set:	**KLINK_CLS**	Admin	Internal
Get:	**-**	-	-
Description		**Syntax**	
Set:	Set K-Link data mode (DGKat only)	**#KLINK_CLS**╷CR╵	
Get:	-	-	
Response			
KLNK_ACK╷CR LF╵			
Parameters			
None			
Response Triggers			
Under receiving KLINK_CLS command over DGKat/RS-232			
Notes			

Command - **LDEDID**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**LDEDID**	End User	Public
Get:	-	-	-
Description		**Syntax**	
Set:	Write EDID data from external application to device	Multi-step syntax (see following steps)	
Get:	None	None	
Communication Steps (Command and Response)			

Step 1: #**LDEDID**[SP]*dst_type, dest_bitmask, size, safe_mode*[CR]

Response 1: ~[nn]@**LDEDID**[SP]*dst_type, dest_bitmask, size, safe_mode*[SP]**READY**[CR LF] or

   ~[nn]@**LDEDID**[SP]**ERRnn**[CR LF]

Step 2: If **ready** was received, send [EDID_DATA]

Response 2: ~[nn]@**LDEDID**[SP]*dst_type, dest_bitmask, size, safe_mode*[SP]**OK**[CR LF] or

   ~[nn]@**LDEDID**[SP]**ERRnn**[CR LF]

Parameters

dst_type - EDID destination type (usually input)
dest_bitmask - bitmap representing destination IDs. Format: 0x********, where * is ASCII presentation of hex digit. The binary presentation of this number is a bit mask for destinations. Setting '1' means EDID data has to be copied to this destination
size - EDID data size
safe_mode - 0 - Device accepts the EDID as is without trying to adjust
        1 - Device tries to adjust the EDID
[EDID_DATA] - data in protocol packets

Response Triggers

Response is sent to the com port from which the **Set** (before execution)

Notes

When the unit receives the **LDEDID** command it replies with **READY** and enters the special EDID packet wait mode. In this mode the unit can receive only packets and not regular protocol commands.
If the unit does not receive correct packets for 30 seconds or is interrupted for more than 30 seconds before receiving all packets, it sends timeout error ~[nn]@**LDEDID**[SP]**ERR01**[CR LF] and returns to the regular protocol mode. If the unit received data that is not a correct packet, it sends the corresponding error and returns to the regular protocol mode.

Command - **LDFW**		System - Packets	
Command Name		**Permission**	**Transparency**
Set:	**LDFW**	Internal SW	Public
Get:	**-**	-	-
Description		**Syntax**	
Set:	Load new firmware file	Step 1: #**LDFW**_{SP} *size*_{CR} Step 2: If ready was received, send FIRMWARE_DATA	
Get:	-	-	
Response			
Response 1: ~nn@**LDFW**_{SP} *size*_{SP} **READY**_{CR LF} or ~nn@**LDFW**_{SP} **ERRnn**_{CR LF}			
Response 2: ~nn@**LDFW**_{SP} *size*_{SP} **OK**_{CR LF}			
Parameters			
size - size of firmware data that is sent FIRMWARE_DATA - HEX or KFW file in protocol packets, (see Section 10.2.14)			
Response Triggers			
Notes			
In most devices firmware data is saved to flash memory, but the memory does not update until receiving the "UPGRADE" command and is restarted, (See Section 10.2.6)			

Command - **MODEL?**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**MODEL?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get device model	#**MODEL?**_{CR}	
Response			
~nn@**MODEL**_{SP} *model_name*_{CR LF}			
Parameters			
model_name - String of up to 19 printable ASCII chars			
Response Triggers			
Notes			

Command – **NAME?**		Command Type - System (Ethernet)	
Command Name		**Permission**	**Transparency**
Get:	**NAME?**	End User	Public
Description		**Syntax**	
Set:	Set machine (DNS) name	#**NAME** `SP` *machine_name* `CR`	
Get:	Get machine (DNS) name	#**NAME?** `CR`	
Response			
Set: ~`nn`@**NAME** `SP` *machine_name* `SP` **OK** `CR LF`			
Get: ~`nn`@**NAME?** `SP` *machine_name* `CR LF`			
Parameters			
machine_name - String of up to 14 alpha-numeric chars (can include hyphen, not at the beginning or end)			
Response Triggers			
Notes			
The machine name is not the same as the model name. The machine name is used to identify a specific machine or a network in use (with DNS feature on)			

Command - **PROT-VER?**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**PROT-VER?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get device protocol version	#**PROT-VER?** `CR`	
Response			
~`nn`@**PROT-VER** `SP` 3000:*version* `CR LF`			
Parameters			
Version - XX.XX where X is a decimal digit			
Response Triggers			
Notes			

Command - **RESET**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**RESET**	Administrator	Public
Get:	**-**	-	-
Description		**Syntax**	
Set:	Reset device	#**RESET**CR	
Get:	-	-	
Response			
~nn@**RESET**SP**OK**CR LF			
Parameters			
Response Triggers			
Notes			
To avoid locking the port due to a USB bug in Windows, disconnect USB connections immediately after running this command. If the port was locked, disconnect and reconnect the cable to reopen the port.			

Command - **SIGNAL**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	-	-	-
Get	**SIGNAL?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get input signal lock status	#**SIGNAL?**SP*inp_io*CR	
Response			
~ nn@**SIGNAL**SP *inp_id,status* CR LF			
Parameters			
inp_id - input number *status* - lock status according to signal validation, (see Section 10.2.5)			
Response Triggers			
After execution, a response is sent to the com port from which the Get was received Response is sent after every change in input signal status ON to OFF, or OFF to ON			
Notes			

Command - SN?		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**SN?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get device serial number	#SN?[CR]	
Response			
~[nn]@**SN**[SP]*serial_number*[CR LF]			
Parameters			
serial_number - 11 decimal digits, factory assigned			
Response Triggers			
Notes			
For new products with 14 digit serial numbers, use only the last 11 digits			

Command - UPGRADE		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**UPGRADE**	Administrator	Internal
Get:	**-**	-	-
Description		**Syntax**	
Set:	Perform firmware upgrade	#**UPGRADE**[CR]	
Get:	-	-	
Response			
~[nn]@UPGRADE[SP]OK[CR LF]			
Parameters			
Response Triggers			
Notes			
Not necessary for some devices Firmware usually uploads to a device via a command like LDFW Reset the device to complete the process			

Command - **VERSION?**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	-	-	-
Get:	**VERSION?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get firmware version number	#VERSION?⟨CR⟩	
Response			
~⟨nn⟩@VERSION⟨SP⟩*firmware_version*⟨CR LF⟩			
Parameters			
firmware_version - XX.XX.XXXX where the digit groups are: major.minor.build version			
Response Triggers			
Notes			

10.2.1   On/Off

Number	Value
0	Off
1	On

10.2.2   Stage

Number	Value
0	Input
1	Output
2	(Reserved)
3	(Reserved)

10.2.3 Video Resolutions

VIC Number	Resolution
0	No Signal (for input) / Native - EDID (for output)
1	640x480p @59.94Hz/60Hz
2	720x480p @59.94Hz/60Hz
3	720x480p @59.94Hz/60Hz
4	1280x720p @59.94Hz/60Hz
5	1920x1080i @59.94Hz/60Hz
6	720(1440)x480i @59.94Hz/60Hz
7	720(1440)x480i @59.94Hz/60Hz
8	720(1440)x240p @59.94Hz/60Hz
9	720(1440)x240p @59.94Hz/60Hz
10	2880x480i @59.94Hz/60Hz
11	2880x480i @59.94Hz/60Hz
12	2880x240p @59.94Hz/60Hz
13	2880x240p @59.94Hz/60Hz
14	1440x480p @59.94Hz/60Hz
15	1440x480p @59.94Hz/60Hz
16	1920x1080p @59.94Hz/60Hz
17	720x576p @50Hz
18	720x576p @50Hz
19	1280x720p @50Hz
20	1920x1080i @50Hz
21	720(1440)x576i @50Hz
22	720(1440)x576i @50Hz
23	720(1440)x288p @50Hz
24	720(1440)x288p @50Hz
25	2880x576i @50Hz
26	2880x576i @50Hz
27	2880x288p @50Hz
28	2880x288p @50Hz
29	1440x576p @50Hz
30	1440x576p @50Hz
31	1920x1080p @50Hz
32	1920x1080p @23.97Hz/24Hz
33	1920x1080p @25Hz
34	1920x1080p @29.97Hz/30Hz
35	2880x480p @59.94Hz/60Hz
36	2880x480p @59.94Hz/60Hz
37	2880x576p @50Hz
38	2880x576p @50Hz
39	1920x1080i @50Hz

VIC Number	Resolution
40	1920x1080i @100Hz
41	1280x720p @100Hz
42	720x576p @100Hz
43	720x576p @100Hz
44	720(1440)x576i @100Hz
45	720(1440)x576i @100Hz
46	1920x1080i @119.88/120Hz
47	1280x720p @119.88/120Hz
48	720x480p @119.88/120Hz
49	720x480p @119.88/120Hz
50	720(1440)x480i @119.88/120Hz
51	720(1440)x480i @119.88/120Hz
52	720x576p @200Hz
53	720x576p @200Hz
54	720(1440)x576i @200Hz
55	720(1440)x576i @200Hz
56	720x480p @239.76/240Hz
57	720x480p @239.76/240Hz
58	720(1440)x480i @239.76/240Hz
59	720(1440)x480i @239.76/240Hz
60	1280x720p @23.97Hz/24Hz
61	1280x720p @25Hz
62	1280x720p @29.97Hz/30Hz
63	1920x1080p @119.88/120Hz
64	1920x1080p @100Hz
65-100	(Reserved)
100	Custom resolution 1
101	Custom resolution 2
102	Custom resolution 3
103	Custom resolution 4
104	Custom resolution 5
104-254	(Reserved)

10.2.4   EDID Source

Number	Value
0	Input
1	Output
2	Default EDID

10.2.5   Signal Validation

Number	Value
0	Signal or sink is not valid
1	Signal or sink is valid
2	Sink and EDID is valid

10.2.6   Ethernet Port Types

Number	Value
0	TCP
1	UDP

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This limited warranty covers defects in materials and workmanship in this product.

What is Not Covered

This limited warranty does not cover any damage, deterioration or malfunction resulting from any alteration, modification, improper or unreasonable use or maintenance, misuse, abuse, accident, neglect, exposure to excess moisture, fire, improper packing and shipping (such claims must be presented to the carrier), lightning, power surges, or other acts of nature. This limited warranty does not cover any damage, deterioration or malfunction resulting from the installation or removal of this product from any installation, any unauthorized tampering with this product, any repairs attempted by anyone unauthorized by Kramer Electronics to make such repairs, or any other cause which does not relate directly to a defect in materials and/or workmanship of this product. This limited warranty does not cover cartons, equipment enclosures, cables or accessories used in conjunction with this product.

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3. Issue a refund of the original purchase price less depreciation to be determined based on the age of the product at the time remedy is sought under this limited warranty.

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