Kramer Electronics, Ltd.

USER MANUAL

Model:

TP-185

8 Channel UXGA/Audio/RS-232 to CAT 5 Transmitter

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KRAMER: SIMPLE CREATIVE TECHNOLOGY

1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 1,000-plus different models now appear in 11 groups[1] that are clearly defined by function.

Congratulations on purchasing your **TP-185,** *8 Channel UXGA/Audio/RS-232 to CAT 5 Transmitter*, which is ideal for the following typical applications:

- Transmission of video, audio and RS-232 signals for extended distances over standard STP/UTP cables
- Multimedia and presentation source and acceptor selection

The package includes the following items:

- **TP-185,** *8 Channel UXGA/Audio/RS-232 to CAT 5 Transmitter*
- Power cord[2], rack "ears" and this user manual[3]

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 cables[4]

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1 GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Matrix Switchers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters; GROUP 11: Sierra Products
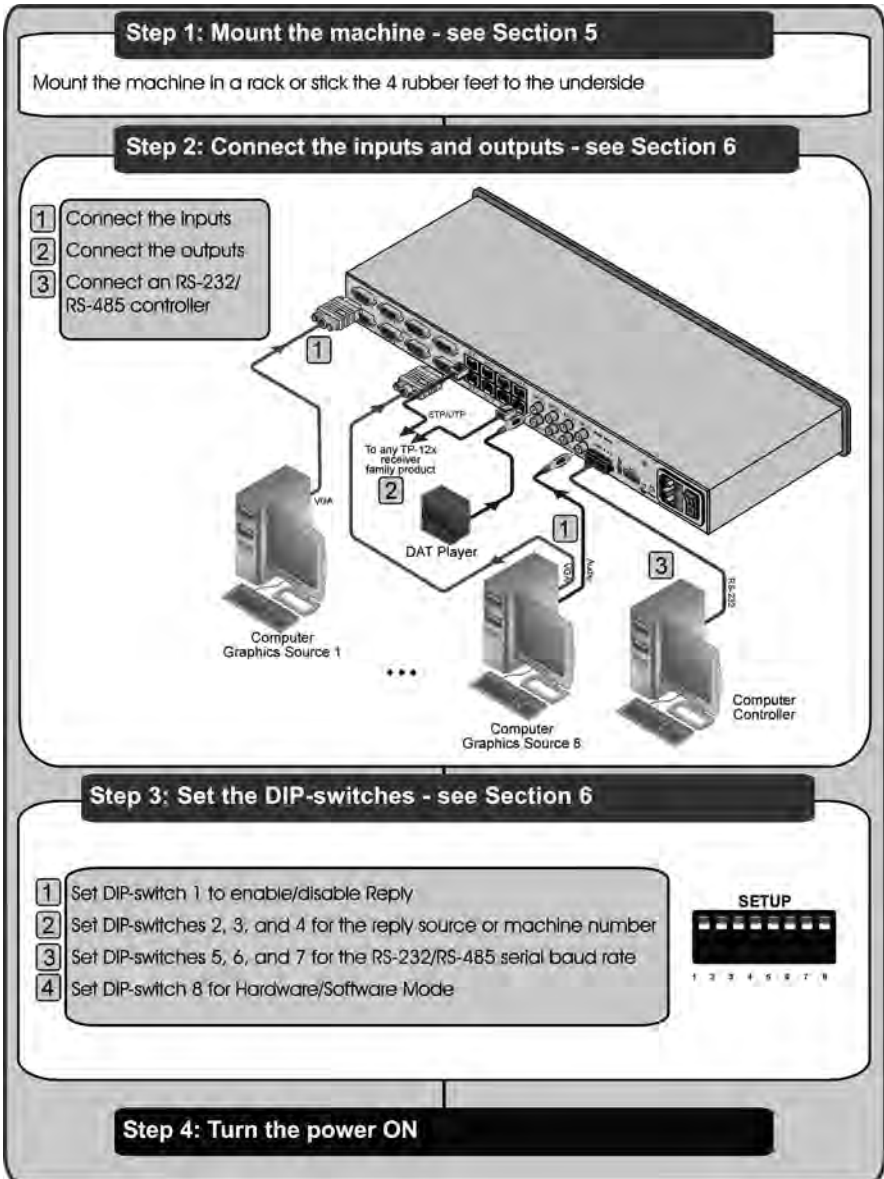
2 We recommend that you use only the power cord that is supplied with this machine

3 Download up-to-date Kramer user manuals from http://www.kramerelectronics.com

4 The complete list of Kramer cables is available from http://www.kramerelectronics.com

2.1 Quick Start

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

3 Overview

The **TP-185** is a high performance, 8 channel VGA/UXGA[1], audio and RS-232 to CAT 5 transmitter for high resolution video, stereo unbalanced audio and RS-232 signals. The CAT 5 outputs can be connected to any Kramer compatible TP receiver, for example, the **TP-126**. The **TP-185** can also route data from the RS-232 or RS-485 port to any of the CAT 5 outputs.

In particular, the **TP-185,** *8 Channel UXGA/Audio/RS-232 to CAT 5 Transmitter* features:

- Eight UXGA video inputs supporting HDTV and Component (YPbPr) signals
- Eight stereo unbalanced audio inputs on 3.5mm mini jacks
- Eight RJ-45 STP/UTP outputs
- Transmission of RS232/RS-485 data from one input to any or all of the eight CAT 5 outputs, and one reply from the selected output

The **TP-185** can differentiate between RS-232/RS-485 commands that control the unit itself and commands that are destined for end-user equipment (see Section 7.1.5.2).

The **TP-185** is dependable, rugged, and fits into one vertical space (1U) of a standard 19" professional rack.

To achieve the best performance:

- Use only good quality connection cables[2] to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables).
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality, and position your Kramer **TP-185** away from moisture, excessive sunlight and dust

3.1 Shielded Twisted Pair/Unshielded Twisted Pair

We recommend that you use Shielded Twisted Pair (STP) cable. There are different levels of STP cable available, and we advise you to use the best quality STP cable that you can afford. Our non-skew-free cable, Kramer **BC-STP** is intended for analog signals where skewing is not an issue. For cases where there is skewing, our UTP skew-free cable Kramer **BC-XTP**, may be used. Bear in mind though, that we advise using STP cables where possible, since the compliance to electromagnetic interference was tested using those cables.

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

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1 Up to and including WUXGA 1920 x 1200 resolution

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

4   Defining the TP-185 8 Channel UXGA/Audio/RS-232 to CAT 5 Transmitter

Figure 1 and Table 1 define the front and rear panels of the **TP-185,** *8 Channel UXGA/Audio/RS-232 to CAT 5 Transmitter.*
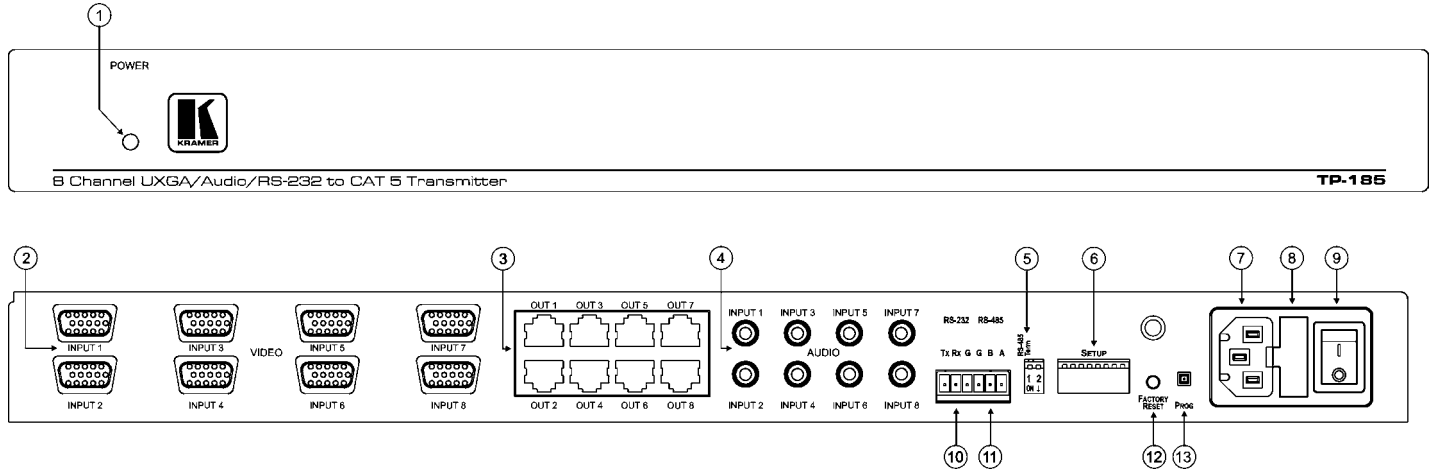

Figure 1: TP-185 Front and Rear Panels

Table 1: TP-185 Front and Rear Panel Features

#	Feature	Function	
1	*POWER* LED	Lights green when the unit is turned on[1]	
2	*VIDEO INPUT* 15-pin HD Connectors	Connect to the VGA/UXGA video sources (from 1 to 8)	
3	*OUT* STP/UTP RJ-45 Connectors	Connect to the TP receivers (from 1 to 8)	
4	*AUDIO INPUT* 3 5mm Mini Jacks	Connect to the unbalanced stereo audio sources (from 1 to 8)	
5	*RS-485 TERM* DIP-switch	Sets the termination of he RS-485 bus[2]: ON for RS-485 bus termina ion with 120Ω (default), OFF for no RS-485 bus termination (see Sec ion 7.1.1)	
6	*SETUP* DIP-switch	Reply DIP-switch 1	Enables and disables the Reply feature (see Section 7.1.2)
		Address DIP-switches 2, 3 and 4	Determines the reply source (hardware mode) or machine number (software mode) see Sec ion 7.1.3
		Baud Rate DIP-switches 5, 6 and 7	Determines the serial port baud rate (see Section 7.1.4)
		Hardware/Software DIP-switch 8	Determines whe her he data transmission path is set by software or hardware (see Sec ion 7.1.5)
7	AC Mains Connector	Connect to the AC mains power	
8	AC Mains Fuse	AC mains power fuse	
9	AC Mains Power Switch	Turns the unit power ON or OFF	
10	*RS-232* Terminal Block	Connect to a PC or remote controller (see Section 6.4)	
11	*RS-485* Terminal Block	Pins B (–) and A (+) are for RS-485; Pin G (Ground) may be connected to he shield of he cable if required (see Sec ion 6 3)	
12	*FACTORY RESET* Button	Press and hold while powering up the unit to reset the data transmission setup to its factory default value[3] (see Section 10)	
13	*PROG* Button	For service use only	

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1 See item 9

2 The first and the last units on the RS-485 line should be terminated (ON) Other units should be unterminated (OFF), see Section 7 1 1

3 Turn the unit off using the power switch and then turn it on while pressing the Factory Reset button The unit will power up and load its memory with the factory default definitions

5   Installing the TP-185 in a Rack

This section describes what to do before installing in a rack and how to rack mount the **TP-185**.

Before Installing in a Rack

Before installing in a rack, be sure that the environment is within the recommended range:

| Operating temperature range	+5° to +45° C (41° to 113° F)
Operating humidity range	10 to 90% RHL, non-condensing
Storage temperature range	-20° to +70° C (-4° to 158° F)
Storage humidity range	5 to 95% RHL, non-condensing

CAUTION!

When installing on a 19" rack, avoid hazards by taking care that:

1. It is located within the recommended environmental conditions, as the operating ambient temperature of a closed or multi unit rack assembly may exceed the room ambient temperature.
2. Once rack mounted, enough air will still flow around the machine.
3. The machine is placed straight in the correct horizontal position.
4. You do not overload the circuit(s). When connecting the machine to the supply circuit, overloading the circuits might have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.
5. The machine is earthed (grounded) in a reliable way and is connected only to an electricity socket with grounding. Pay particular attention to situations where electricity is supplied indirectly (when the power cord is not plugged directly into the socket in the wall), for example, when using an extension cable or a power strip, and that you use only the power cord that is supplied with the machine.

How to Rack Mount

To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.
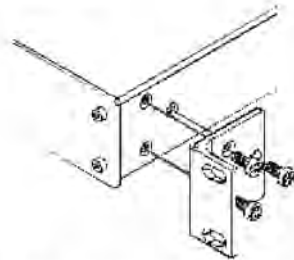
2. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

Note:
• In some models, the front panel may feature built-in rack ears
• Detachable rack ears can be removed for desktop use
• Always mount the machine in the rack before you attach any cables or connect the machine to the power
• If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions available from:
http://www.kramerelectronics.com

6 Connecting and Configuring the TP-185

This section comprises connecting:

- The **TP-185** (see Section 6.1)
- To the **TP-185** via RS-232 (see Section 6.2)
- To the **TP-185** via RS-485 (see Section 6.3)
- Multiple **TP-185** units via RS-485 (see Section 6.4)

6.1 Connecting the TP-185

To connect[1] the TP-185, as illustrated in the example[2] in Figure 2**:**
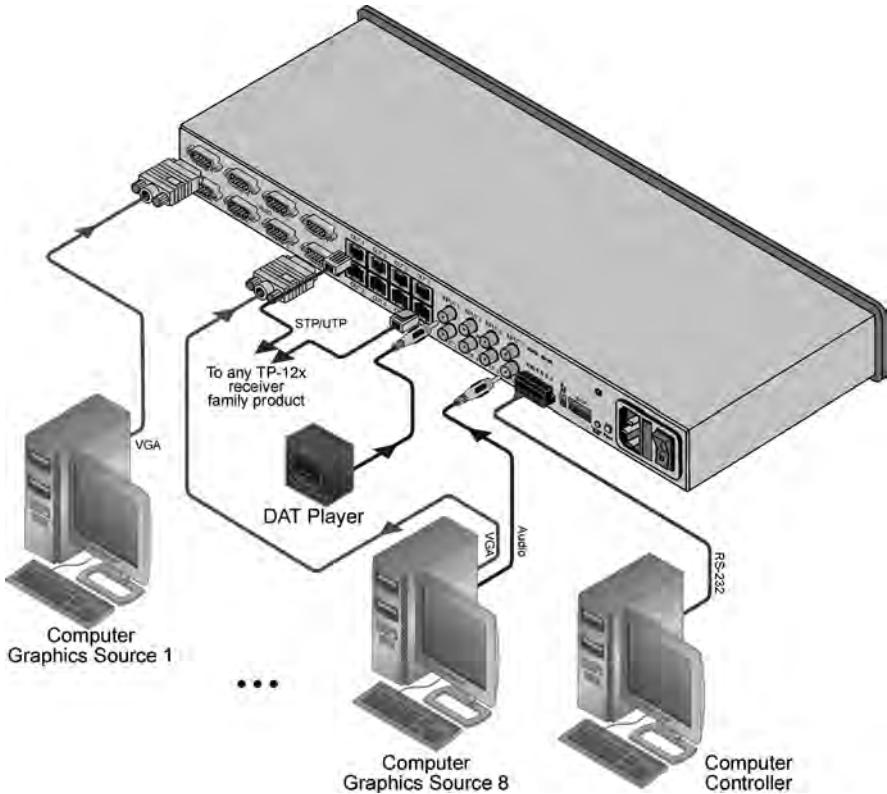
Figure 2: Connecting the TP-185, 8 Channel UXGA/Audio/RS-232 to CAT 5 Transmitter

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1 You do not need to connect all inputs and outputs

2 Switch OFF the power on each device before connecting it to your TP-185 After connecting your TP-185, switch on its power and then switch on the power on each device DO NOT push in the rear panel Flash Program "PROG" button , it is only used for upgrading to the latest Kramer firmware

1. Connect up to eight VGA/WUXGA computer graphics sources (for example, multimedia computers) to the Video INPUT 15-pin HD connectors.
2. Connect up to eight unbalanced stereo audio sources (for example, the audio source of the computer or a DAT player) to the eight AUDIO INPUT 3.5mm mini jacks.
3. Connect the eight OUT STP/UTP connectors to up to eight TP receivers.
4. If required, you can connect a PC and/or controller to the:
    - RS-232 terminal block (see Section 6.2)
    - RS-485 terminal block (see Section 6.3 and Section 6.4)
5. Connect the power cord[1] (not shown in Figure 2).

6.2 Connecting to the TP-185 via an RS-232 Connection

To connect the RS-232 port on the TP-185 to an RS-232 device:
1. Connect the RS-232 Tx pin on the **TP-185** to pin 2 (9-pin D-sub) on the RS-232 device
2. Connect the RS-232 Rx pin on the **TP-185** to pin 3 (9-pin D-sub) on the RS-232 device
3. Connect the RS-232 G pin on the **TP-185** to pin 5 (9-pin D-sub) on the RS-232 device

6.3 Connecting to the TP-185 via an RS-485 Connection

You can operate the **TP-185** via the RS-485 port from a distance of up to 1200m (3900ft) using a PC equipped with a card that provides an RS-485 port.

To connect a PC or controller to the RS-485 port on the unit:
1. Connect the pins on the following ports:
    - Connect the A(+) pin on the RS-485 port of the PC to the A pin on the RS-485 port on the rear panel of the **TP-185**
    - Connect the B(–) pin on the RS-485 port of the PC to the B pin on the RS-485 port on the rear panel of the **TP-185**
    - If required, connect the GND pin[2] on the RS-485 port of the PC to the G (ground) pin on the rear panel of the **TP-185**
2. If this is the only **TP-185** on the RS-485 bus, set the RS-485 TERM DIP-switch (see Section 7.1.1) to ON (for RS-485 line termination with 120Ω).

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1 We recommend that you use only the power cord that is supplied with this machine

2 For RS-485 communication, the ground is usually not connected between the devices When using a shielded cable, the shield may be grounded on one side

6.4 Connecting Multiple TP-185 Units via the RS-485 Bus

You can connect up to 8 **TP-185** units via the RS-485 bus with control from a PC or serial controller.

To connect up to 8 TP-185 units via RS-485 (see <u>Figure 3</u>**):**

1. Connect the RS-485 terminal block of the first **TP-185** to the RS-485 terminal block of the second **TP-185**, and so on (see <u>Section 6.3</u>), connecting all the **TP-185** units via the RS-485 terminal blocks.
2. Set each **TP-185** Machine number to be a unique number (see <u>Section 7.1.3</u>).
3. On the first and last **TP-185** physical devices on the RS-485 bus, set the RS-485 TERM DIP-switch ON (terminating the RS-485 line at 120Ω, see <u>Section 7.1.1</u>).
4. On all other **TP-185** units, ensure that the RS-485 Term DIP-switch is OFF.
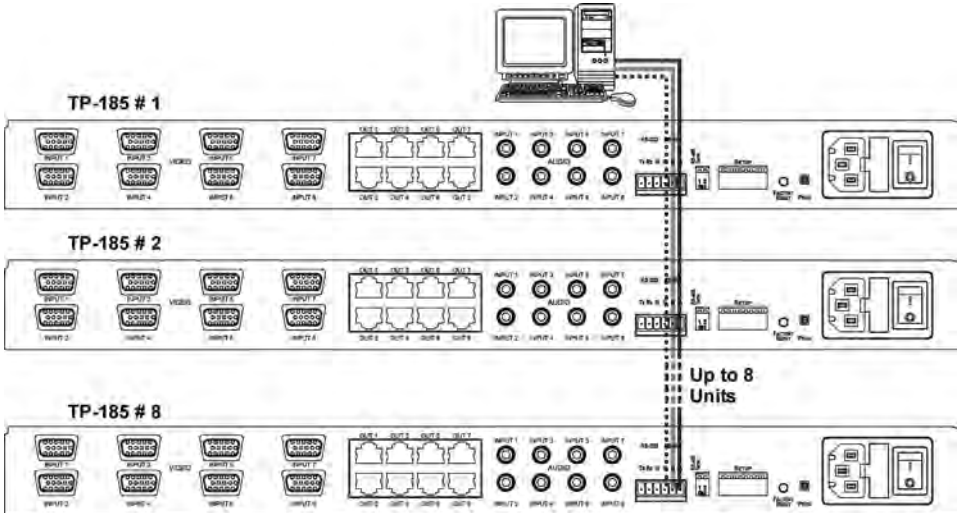
Figure 3: Connecting Multiple TP-185 Units via RS-485

7   Setting the DIP-switches on the TP-185

The DIP-switches on the **TP-185** perform the following functions:
- RS-485 termination
- Reply enable/disable
- Reply machine number
- Baud rate
- Hardware/software mode

Moving a DIP-switch down turns the switch on, moving it up turns the switch off.

> **Note**: Changing any DIP-switch requires that you cycle power on the **TP-185**

7.1.1   Setting the RS-485 Bus Termination

The DIP-switch sets the RS-485 bus termination. Only the first and last physical device on the RS-485 bus must be terminated, all other devices must be un-terminated.

Figure 4: TP-185 DIP-switch RS-485 Termination

When DIP-switch 1 is:
- OFF, the unit is un-terminated (default)
- ON, the unit is terminated

Note: DIP-switch 2 is not used.

7.1.2   Enabling and Disabling the Reply Feature

DIP-switch 1 enables and disables the Reply feature.

Figure 5: TP-185 Reply Enable and Disable DIP-switch

When DIP-switch 1 is:
- Up, Reply is disabled (default)
- Down (ON), Reply is enabled

7.1.3   Setting the Reply Source or Machine Number

DIP-switches 2, 3 and 4 set either the reply source (in Hardware mode Table 2) or machine number (in Software mode Table 3).

SETUP
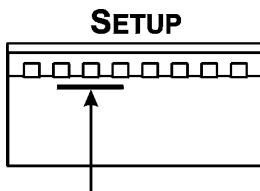
DIP-switches 2, 3 and 4

Figure 6: TP-185 Reply Source or Machine Number DIP-switches

Table 2: Hardware Mode Reply Source DIP-switch Setting
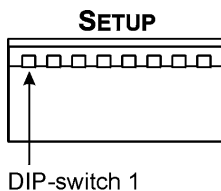
Reply Source	DIP-switch		
	2	3	4
Reply is taken from output 1 (default)	OFF	OFF	OFF
Reply is taken from output 2	ON	OFF	OFF
Reply is taken from output 3	OFF	ON	OFF
Reply is taken from output 4	ON	ON	OFF
Reply is taken from output 5	OFF	OFF	ON
Reply is taken from output 6	ON	OFF	ON
Reply is taken from output 7	OFF	ON	ON
Reply is taken from output 8	ON	ON	ON

Note: When there is more than one **TP-185** attached to the RS-485 bus only one unit can have a reply path set.

Table 3: Software Mode RS-485 Machine Number DIP-switch Setting

Machine Number	DIP-switch			Machine Number	DIP-switch		
	2	3	4		2	3	4
1	OFF	OFF	OFF	5	OFF	OFF	ON
2	ON	OFF	OFF	6	ON	OFF	ON
3	OFF	ON	OFF	7	OFF	ON	ON
4	ON	ON	OFF	8	ON	ON	ON

When there is more than one **TP-185** attached to the RS-485 bus each unit must have a unique machine number.

7.1.4 Setting the RS-232/RS-485 Baud Rate DIP-switches

DIP-switches 5, 6 and 7 set the serial port baud rate in both Hardware and Software modes according to Table 4.

Note: In a multiple device configuration, all devices must be set to the same baud rate.
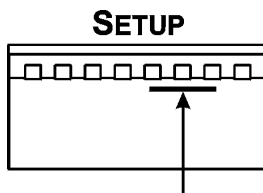
Figure 7: TP-185 Baud Rate DIP-switches

Table 4: Serial Port Baud Rate DIP-switch Setting

Baud Rate	DIP-switch			Baud Rate	DIP-switch		
	5	6	7		5	6	7
1200	OFF	OFF	OFF	19200	OFF	OFF	ON
2400	ON	OFF	OFF	38400	ON	OFF	ON
4800	OFF	ON	OFF	57600	OFF	ON	ON
9600 (default)	ON	ON	OFF	115200	ON	ON	ON

7.1.5 Selecting Hardware/Software Mode

DIP-switch 8 sets the operating mode to either Hardware or Software mode.
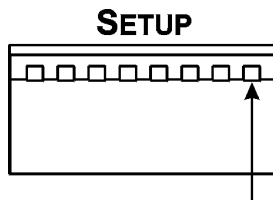
Figure 8: TP-185 Baud Rate Hardware/Software DIP-switch

When the DIP-switch is:

- OFF, the unit is set to Hardware mode (default)
- ON, the unit is set to Software mode

7.1.5.1 Hardware Mode

In Hardware mode, the:

- RS-232 data is passed from any input to all outputs
- **TP-185** routes the reply from the output port defined by the DIP-switches 2, 3 and 4 (see Section 7.1.2). For reliable operation, only one port can be defined

7.1.5.2 Software Mode

In Software mode, the **TP-185** routes the data and reply based on the Protocol 2000 commands received from the PC or other device connected to any of the inputs.

The following example illustrates a typical command sequence. The destination and return paths to and from the end-user device are set (**TP-185** control commands), then an end-user device command is sent to the defined destination. The **TP-185** differentiates between the two types of commands and acts accordingly.

The sequence is as follows:

1. Set destination path for command
2. Set return path
3. Send end-user command sequence

8   Wiring the Twisted Pair RJ-45 Connectors

Table 5 and Figure 9 define the TP pinout using a straight pin-to-pin cable with RJ-45 connectors. When using STP cable, connect/solder the cable shield to the RJ-45 connector shield.

Table 5: UTP Connector Pinout

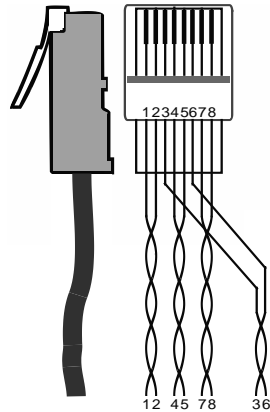| EIA /TIA 568A		EIA /TIA 568B	
PIN	**Wire Color**	**PIN**	**Wire Color**
1	Green/White	1	Orange/White
2	Green	2	Orange
3	Orange/White	3	Green/White
4	Blue	4	Blue
5	Blue/White	5	Blue/White
6	Orange	6	Green
7	Brown/White	7	Brown/White
8	Brown	8	Brown
Pair 1	4 and 5	Pair 1	4 and 5
Pair 2	3 and 6	Pair 2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

Figure 9: UTP Connector

9 Technical Specifications

Technical specifications of the **TP-185** are shown in <u>Table 6</u>.

Table 6: Technical Specifications[1] of the TP-185

INPUTS:	8 UXGA on 15-pin HD connectors (VGA through WUXGA, supporting HDTV and Component YPbPr signals) 8 unbalanced stereo audio 3.5mm mini jacks	
OUTPUTS:	8 TP on RJ-45 connectors	
RESOLUTION:	Up to WUXGA (1920 x 1200)	
RANGE:	Up to 100m (328ft)	
MAX. OUTPUT LEVEL:	VIDEO: 1.6Vpp	AUDIO: 2.3Vpp
CONTROLS:	RS-232 3 pin terminal block RS-485 3 pin terminal block	
SERIAL BAUD RATE:	Up to 19200kbps	
SERIAL MODE:	Full-duplex	
BANDWIDTH:	AUDIO: 20Hz to 20kHz @0.5dB	
S/N RATIO:	AUDIO: <-80dB	
TOTAL GAIN:	Audio: 0dB	
COUPLING:	Audio: AC	
AUDIO THD + NOISE:	Audio: <0.03%	
POWER SOURCE:	100-240V AC, 16VA	
DIMENSIONS:	48 26cm x 19.1cm x 1U (19" x 7 52" x 1U) W, D, H	
WEIGHT:	3.8kg (8.4lbs) approx	
ACCESSORIES:	Power cord, Windows®-based control software, rack "ears"	

10 Default Communication Parameters

<u>Table 7</u> lists the **TP-185** default communication parameters.

Table 7: TP-185 Communication Parameters

RS-232	
Protocol 2000	
Baud Rate:	9600
Data Bits:	8
Stop Bits:	1
Parity:	None
Command Format:	HEX
Example (Output 1 to Input 1):	0x01, 0x81, 0x81, 0x81

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1 Specifications are subject to change without notice

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10.1   **Kramer Communication Protocol 2000**

The RS-232/RS-485 Protocol 2000 uses four bytes of information as shown in
Table 8. The data rate is set by the DIP-switches (see Table 4), with no parity, 8 data
bits and 1 stop bit.

Table 8: Protocol Command Definition

MSB							LSB
	DESTI-NATION	INSTRUCTION					
0	D	N5	N4	N3	N2	N1	N0
7	6	5	4	3	2	1	0

1st byte

		INPUT					
1	6	I5	I4	I3	I2	I1	I0
7	6	5	4	3	2	1	0

2nd byte

		OUTPUT					
1	O6	O5	O4	O3	O2	O1	O0
7	6	5	4	3	2	1	0

3rd byte

			MACHINE NUMBER				
1	OVR	X	M4	M3	M2	M1	M0
7	6	5	4	3	2	1	0

4th byte

1st BYTE: Bit 7 – Defined as 0
D – "DESTINATION":   0 - for sending information to the switchers (from the PC);
1 - for sending to the PC (from the switcher)
N5   N0 – "INSTRUCTION"
The function that is to be performed by the switcher(s) is defined by the INSTRUCTION (6 bits) Similarly, if a function is performed
via the machine's keyboard, then these bits are set with the INSTRUCTION NO , which was performed The instruction codes are
defined according to the table below (INSTRUCTION NO is the value to be set for N5   N0)

2nd BYTE: Bit 7 – Defined as 1
            I6   I0 – "INPUT"
When switching (ie instruction codes 1 and 2), the INPUT (7 bits) is set as the input number which is to be switched Similarly, if
switching is done via the machine's front-panel, then these bits are set with the INPUT NUMBER which was switched For other
operations, these bits are defined according to the table

3rd BYTE: Bit 7 – Defined as 1
            O6   O0 – "OUTPUT"
When switching (ie instruction codes 1 and 2), the OUTPUT (7 bits) is set as the output number which is to be switched Similarly, if
switching is done via the machine's front-panel, then these bits are set with the OUTPUT NUMBER which was switched For other
operations, these bits are defined according to the table

4th BYTE: Bit 7 – Defined as 1
            Bit 5 – Don't care
            OVR – Machine number override
            M4   M0 – MACHINE NUMBER
Used to address machines in a system via their machine numbers When several machines are controlled from a single serial port, they
are usually configured together with each machine having an individual machine number If the OVR bit is set, then all machine
numbers will accept (implement) the command, and the addressed machine will reply
For a single machine controlled via the serial port, always set M4   M0 = 1, and make sure that the machine itself is configured as
MACHINE NUMBER = 1

Table 9: Instruction Codes for the TP-185

	INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	**DESCRIPTION**	**INPUT**	**OUTPUT**		
2C	CONTROLS THE STATUS OF A PORT	0–close 1–open	Output bit: O0–O5 = output # or 0 for all outputs O6–0 = Tx 1 = Rx		1, 2, 4, 5
2D	READS THE STATUS OF A PORT	0–open	Output bit: O0–O5 = output # O6–0 = Tx; 1 = Rx		2, 3, 4, 5

Note: All values in the table are hexadecimal, unless otherwise stated

NOTES on Table 9:

NOTE 1 – When the PC sends this command, if the instruction is valid the unit replies by sending the PC the same 4 bytes that it was sent (except for the first byte where the Destination bit is set high)

NOTE 2 – If O6 = 0 (Tx) – This command defines/reads the definition of the output # (1, 2 or3) to pass the RS-232/Direct command from any input In this case the instruction does not modify previously set output numbers, allowing the setting of multiple outputs for the Direct command If O6 = 1 (Rx), the command defines/reads the definition of the output # (1, 2 or 3) to pass the reply from the output to inputs In this case, the instruction resets a previously set output number, preventing the setting of multiple outputs for the reply

NOTE 3 – The reply to this command is as follows: The same command and output codes as were sent are returned, and the input is assigned the value of the parameter that was read The reply is per the definitions in command 44

NOTE 4 – At initial power-on or on reception of command 44 or 45, any received bytes are analyzed to see whether it is a command 44 or 45 If not, it is transmitted to the output based on the existing setup If the analyzed bytes are a command 44 or 45, the unit waits for the other 3 bytes and interprets them as a Protocol 2000 command The command is executed if relevant to this machine number or discarded if not

NOTE 5 – This command works only when the unit is configured for Software mode

Table 10: Sample TP-185 Control Commands

Command	Description	Reply
2C 80 80 81	Close all output ports for direct command	6C 80 80 81
2C 80 C0 81	Close all output ports for reply command	6C 80 C0 81
2C 81 82 81	Open port 2 for direct command	6C 81 82 81
2C 81 C1 81	Open port 1 for reply command	6C 81 C1 81
2D 80 81 81	Check status of port 1 for direct command. Port is closed	6D 80 81 81
2D 80 82 81	Check status of port 2 for direct command. Port is open	6D 81 82 81
2D 80 C1 81	Check status of port 1 for reply command. Port is open	6D 81 C1 81
2D 80 C2 81	Check status of port 2 for reply command. Port is closed	6D 80 C2 81

KRAMER: SIMPLE CREATIVE TECHNOLOGY

LIMITED WARRANTY

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

HOW LONG IS THE WARRANTY

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

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty

WHAT IS COVERED AND WHAT IS NOT COVERED

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

1 Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the Web site www kramerelectronics com

2 Any product, on which the serial number has been defaced, modified or removed, or on which the WARRANTY VOID IF TAMPERED sticker has been torn, reattached, removed or otherwise interfered with

3 Damage, deterioration or malfunction resulting from:
   i)   Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
   ii) Product modification, or failure to follow instructions supplied with the product
   iii) Repair or attempted repair by anyone not authorized by Kramer
   iv) Any shipment of the product (claims must be presented to the carrier)
   v)   Removal or installation of the product
   vi) Any other cause, which does not relate to a product defect
   vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

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

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

1 Removal or installations charges

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

3 Shipping charges

HOW YOU CAN GET WARRANTY SERVICE

1 To obtain service on 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
   * FCC and CE approved using STP cable (for twisted pair products)

**For the latest information on our products and a list of
Kramer distributors visit** www.kramerelectronics.com
where updates to this user manual may be found.

We welcome your questions, comments, and feedback.

Caution	**Safety Warning:** Disconnect the unit from the power supply before opening/servicing.

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