

## User's Manual

**CAUTION** Do not connect this device to a computer data or telecommunications network



## TP Receivers Family

High Resolution Video, Composite Video, and Stereo Audio  
Twisted Pair Cable Transmission Products

68-547-02 Rev. G  
Printed in the USA  
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# Precautions

## Safety Instructions • English



This symbol is intended to alert the user of important operating and maintenance (servicing) instructions in the literature provided with the equipment.



This symbol is intended to alert the user of the presence of uninsulated dangerous voltage within the product's enclosure that may present a risk of electric shock.

## Caution

**Read Instructions** • Read and understand all safety and operating instructions before using the equipment.

**Retain Instructions** • The safety instructions should be kept for future reference.

**Follow Warnings** • Follow all warnings and instructions marked on the equipment or in the user information.

**Avoid Attachments** • Do not use tools or attachments that are not recommended by the equipment manufacturer because they may be hazardous.

## Consignes de Sécurité • Français



Ce symbole sert à avertir l'utilisateur que la documentation fournie avec le matériel contient des instructions importantes concernant l'exploitation et la maintenance (réparation).



Ce symbole sert à avertir l'utilisateur de la présence dans le boîtier de l'appareil de tensions dangereuses non isolées posant des risques d'électrocution.

## Attention

**Lire les instructions** • Prendre connaissance de toutes les consignes de sécurité et d'exploitation avant d'utiliser le matériel.

**Conservier les instructions** • Ranger les consignes de sécurité afin de pouvoir les consulter à l'avenir.

**Respecter les avertissements** • Observer tous les avertissements et consignes marqués sur le matériel ou présentés dans la documentation utilisateur.

**Eviter les pièces de fixation** • Ne pas utiliser de pièces de fixation ni d'outils non recommandés par le fabricant du matériel car cela risquerait de poser certains dangers.

## Sicherheitsanleitungen • Deutsch



Dieses Symbol soll dem Benutzer in der im Lieferumfang enthaltenen Dokumentation besonders wichtige Hinweise zur Bedienung und Wartung (Instandhaltung) geben.



Dieses Symbol soll den Benutzer darauf aufmerksam machen, daß im Inneren des Gehäuses dieses Produktes gefährliche Spannungen, die nicht isoliert sind und die einen elektrischen Schock verursachen können, herrschen.

## Achtung

**Lesen der Anleitungen** • Bevor Sie das Gerät zum ersten Mal verwenden, sollten Sie alle Sicherheits- und Bedienungsanleitungen genau durchlesen und verstehen.

**Aufbewahren der Anleitungen** • Die Hinweise zur elektrischen Sicherheit des Produktes sollten Sie aufbewahren, damit Sie im Bedarfsfall darauf zurückgreifen können.

**Befolgen der Warnhinweise** • Befolgen Sie alle Warnhinweise und Anleitungen auf dem Gerät oder in der Benutzerdokumentation.

**Keine Zusatzgeräte** • Verwenden Sie keine Werkzeuge oder Zusatzgeräte, die nicht ausdrücklich vom Hersteller empfohlen wurden, da diese eine Gefahrenquelle darstellen können.

## Instrucciones de seguridad • Español



Este símbolo se utiliza para advertir al usuario sobre instrucciones importantes de operación y mantenimiento (o cambio de partes) que se desean destacar en el contenido de la documentación suministrada con los equipos.



Este símbolo se utiliza para advertir al usuario sobre la presencia de elementos con voltaje peligroso sin protección aislante, que puedan encontrarse dentro de la caja o alojamiento del producto, y que puedan representar riesgo de electrocución.

## Precaución

**Leer las instrucciones** • Leer y analizar todas las instrucciones de operación y seguridad, antes de usar el equipo.

**Conservar las instrucciones** • Conservar las instrucciones de seguridad para futura consulta.

**Obedecer las advertencias** • Todas las advertencias e instrucciones marcadas en el equipo o en la documentación del usuario, deben ser obedecidas.

**Evitar el uso de accesorios** • No usar herramientas o accesorios que no sean específicamente recomendados por el fabricante, ya que podrían implicar riesgos.

## Warning

**Power sources** • This equipment should be operated only from the power source indicated on the product. This equipment is intended to be used with a main power system with a grounded (neutral) conductor. The third (grounding) pin is a safety feature, do not attempt to bypass or disable it.

**Power disconnection** • To remove power from the equipment safely, remove all power cords from the rear of the equipment, or the desktop power module (if detachable), or from the power source receptacle (wall plug).

**Power cord protection** • Power cords should be routed so that they are not likely to be stepped on or pinched by items placed upon or against them.

**Servicing** • Refer all servicing to qualified service personnel. There are no user-serviceable parts inside. To prevent the risk of shock, do not attempt to service this equipment yourself because opening or removing covers may expose you to dangerous voltage or other hazards.

**Slots and openings** • If the equipment has slots or holes in the enclosure, these are provided to prevent overheating of sensitive components inside. These openings must never be blocked by other objects.

**Lithium battery** • There is a danger of explosion if battery is incorrectly replaced. Replace it only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

## Avertissement

**Alimentations** • Ne faire fonctionner ce matériel qu'avec la source d'alimentation indiquée sur l'appareil. Ce matériel doit être utilisé avec une alimentation principale comportant un fil de terre (neutre). Le troisième contact (de mise à la terre) constitue un dispositif de sécurité: n'essayez pas de le contourner ni de la désactiver.

**Déconnexion de l'alimentation** • Pour mettre le matériel hors tension sans danger, déconnectez tous les cordons d'alimentation de l'arrière de l'appareil ou du module d'alimentation de bureau (s'il est amovible) ou encore de la prise secteur.

**Protection du cordon d'alimentation** • Acheminer les cordons d'alimentation de manière à ce que personne ne risque de marcher dessus et à ce qu'ils ne soient pas écrasés ou pincés par des objets.

**Réparation-maintenance** • Faire exécuter toutes les interventions de réparation-maintenance par un technicien qualifié. Aucun des éléments internes ne peut être réparé par l'utilisateur. Afin d'éviter tout danger d'électrocution, l'utilisateur ne doit pas essayer de procéder lui-même à des opérations car l'ouverture ou le retrait des couvercles risquent de l'exposer à de hautes tensions et autres dangers.

**Fentes et orifices** • Si le boîtier de l'appareil comporte des fentes ou des orifices, ceux-ci servent à empêcher les composants internes sensibles de surchauffer. Ces ouvertures ne doivent jamais être bloquées par des objets.

**Lithium Batterie** • Il a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d'un type équivalent recommandé par le constructeur. Mettre au reut les batteries usagées conformément aux instructions du fabricant.

## Vorsicht

**Stromquellen** • Dieses Gerät sollte nur über die auf dem Produkt angegebene Stromquelle betrieben werden. Dieses Gerät wurde für eine Verwendung mit einer Hauptstromleitung mit einem geerdeten (neutralen) Leiter konzipiert. Der dritte Kontakt ist für einen Erdschluß, und stellt eine Sicherheitsfunktion dar. Diese sollte nicht umgangen oder außer Betrieb gesetzt werden.

**Stromunterbrechung** • Um das Gerät auf sichere Weise vom Netz zu trennen, sollten Sie alle Netzkabel aus der Rückseite des Gerätes, aus der externen Stromversorgung (falls dies möglich ist) oder aus der Wandsteckdose ziehen.

**Schutz des Netzkabels** • Netzkabel sollten stets so verlegt werden, daß sie nicht im Weg liegen und niemand darauf treten kann oder Objekte darauf- oder unmittelbar dagegestellt werden können.

**Wartung** • Alle Wartungsmaßnahmen sollten nur von qualifiziertem Servicepersonal durchgeführt werden. Die internen Komponenten des Gerätes sind wartungsfrei. Zur Vermeidung eines elektrischen Schocks versuchen Sie in keinem Fall, dieses Gerät selbst öffnen, da beim Entfernen der Abdeckungen die Gefahr eines elektrischen Schlags und/oder andere Gefahren bestehen.

**Schlitze und Öffnungen** • Wenn das Gerät Schlitze oder Löcher im Gehäuse aufweist, dienen diese zur Vermeidung einer Überhitzung der empfindlichen Teile im Inneren. Diese Öffnungen dürfen niemals von anderen Objekten blockiert werden.

**Litium-Batterie** • Explosionsgefahr, falls die Batterie nicht richtig ersetzt wird. Ersetzen Sie verbrauchte Batterien nur durch den gleichen oder einen vergleichbaren Batterietyp, der auch vom Hersteller empfohlen wird. Entsorgen Sie verbrauchte Batterien bitte gemäß den Herstelleranweisungen.

## Advertencia

**Alimentación eléctrica** • Este equipo debe conectarse únicamente a la fuente/tipo de alimentación eléctrica indicada en el mismo. La alimentación eléctrica de este equipo debe provenir de un sistema de distribución general con conductor neutro a tierra. La tercera pata (puesta a tierra) es una medida de seguridad, no puentearia ni eliminaria.

**Desconexión de alimentación eléctrica** • Para desconectar con seguridad la acometida de alimentación eléctrica al equipo, desenchufar todos los cables de alimentación en el panel trasero del equipo, o desenchufar el módulo de alimentación (si fuera independiente), o desenchufar el cable del receptáculo de la pared.

**Protección del cables de alimentación** • Los cables de alimentación eléctrica se deben instalar en lugares donde no sean pisados ni apretados por objetos que se puedan apoyar sobre ellos.

**Reparaciones/mantenimiento** • Solicitar siempre los servicios técnicos de personal calificado. En el interior no hay partes a las que el usuario deba acceder. Para evitar riesgo de electrocución, no intentar personalmente la reparación/mantenimiento de este equipo, ya que al abrir o extraer las tapas puede quedar expuesto a voltajes peligrosos u otros riesgos.

**Ranuras y aberturas** • Si el equipo posee ranuras o orificios en su caja/alojamiento, es para evitar el sobrecalentamiento de componentes internos sensibles. Estas aberturas nunca se deben obstruir con otros objetos.

**Batería de litio** • Existe riesgo de explosión si esta batería se coloca en la posición incorrecta. Cambiar esta batería únicamente con el mismo tipo (o su equivalente) recomendado por el fabricante. Desachar las baterías usadas siguiendo las instrucciones del fabricante.

# FCC Class A Notice

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Note: This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to ensure compliance.

# Extron's Warranty

Extron Electronics warrants this product against defects in materials and workmanship for a period of three years from the date of purchase. In the event of malfunction during the warranty period attributable directly to faulty workmanship and/or materials, Extron Electronics will, at its option, repair or replace said products or components, to whatever extent it shall deem necessary to restore said product to proper operating condition, provided that it is returned within the warranty period, with proof of purchase and description of malfunction to:

**USA, Canada, South America, and Central America:**

Extron Electronics  
1230 South Lewis Street  
Anaheim, CA 92805, USA

**Asia:**

Extron Electronics, Asia  
135 Joo Seng Road, #04-01  
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Singapore 368363

**Europe, Africa, and the Middle East:**

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3821 AH Amersfoort  
The Netherlands

**Japan:**

Extron Electronics, Japan  
Daisan DMJ Bldg. 6F,  
3-9-1 Kudan Minami  
Chiyoda-ku, Tokyo 102-0074  
Japan

This Limited Warranty does not apply if the fault has been caused by misuse, improper handling care, electrical or mechanical abuse, abnormal operating conditions or non-Extron authorized modification to the product.

*If it has been determined that the product is defective, please call Extron and ask for an Applications Engineer at (714) 491-1500 (USA), 31.33.453.4040 (Europe), 65.6383.4400 (Asia), or 81.3.3511.7655 (Japan) to receive an RA# (Return Authorization number). This will begin the repair process as quickly as possible.*

Units must be returned insured, with shipping charges prepaid. If not insured, you assume the risk of loss or damage during shipment. Returned units must include the serial number and a description of the problem, as well as the name of the person to contact in case there are any questions.

Extron Electronics makes no further warranties either expressed or implied with respect to the product and its quality, performance, merchantability, or fitness for any particular use. In no event will Extron Electronics be liable for direct, indirect, or consequential damages resulting from any defect in this product even if Extron Electronics has been advised of such damage.

Please note that laws vary from state to state and country to country, and that some provisions of this warranty may not apply to you.

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## TP Receivers

# Chapter One

## Introduction

About the TP Receivers

Features

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*All trademarks mentioned in this manual are the properties of their respective owners.*

## About the TP Receivers

The Extron Twisted Pair (TP) receivers receive transmissions of RGB video, component video, S-video, composite video, and stereo audio over Extron's Skew-Free™ A/V UTP cable or standard Category (CAT) 5 unshielded twisted pair (UTP), shielded twisted pair (STP), or foil shielded twisted pair (FTP) cable. The TP R BNC A, TP R BNC AV, and TP R AV receivers are designed for longer transmission distances (200 to 1000 feet) and the TP R 15HD A is designed for shorter transmission distances (100 to 800 feet).

The minimum reliable transmission distance for the TP R BNC A, TP R BNC AV, and TP R AV is 50 feet. The TP R 15HD A provides reliable reception and high quality video output without the minimum distance limitation.

The maximum distance is determined by the output frequency and resolution. The following table specifies the recommended maximum transmission distances using Extron skew-free A/V UTP cable or UTP CAT 5 cable, terminated with CAT 6, or at least CAT 5e, rated connectors.

**NOTE** *Extron recommends using the highest quality cable available and affordable. We also recommend the use of pre-terminated and tested cables. Cables terminated on site should be tested before use to ensure that they comply with Category 5e specifications.*

### Recommended transmission ranges at 60 Hz, TP R 15HD A

Video format	Maximum range
Composite video and audio	800 feet
Component video and S-video	800 feet
640 x 480	500 feet
800 x 600	400 feet
1024 x 768	300 feet
1280 x 1024	200 feet
1600 x 1280	100 feet

### Recommended transmission ranges at 60 Hz, all others

Video format	Maximum range
Composite video and audio	1000 feet
Component video and S-video	1000 feet
640 x 480	1000 feet
800 x 600	800 feet
1024 x 768	600 feet
1280 x 1024	400 feet
1600 x 1280	200 feet

**NOTE** *It is possible to exceed the recommended distances, however, image quality may be reduced.*

The TP receivers can only receive and output signals transmitted by Extron TP transmitters. This user's manual documents the installation, features, and operation of the TP receivers only. For information about the TP transmitters, refer to the *TP Transmitters Family User's Manual*, which accompanies the transmitters.

## Features

All Extron TP receivers provide the following features:

**Audio output** — Provides unbalanced (left/right) audio on RCA connectors, and balanced or unbalanced audio on 3.5 mm, 5-pole captive screw connectors.

**Level control** — Allows you to manually control the image brightness.

**Peaking control** — Allows you to manually control the image sharpness.

### TP R BNC A receiver

The TP R BNC A receiver has the following features:

**Video output** — Provides RGBHV, RGBS, or RGsB video on 5 BNC connectors.

**RJ-45 connector** — Allows attachment to an Extron TP transmitter.

**Cable length compensation** — Allows you to select whether to compensate for long cable runs automatically or manually.

**Mounting** —

Mounts in a rack with Extron's 1U rack shelf (part #60-190-01) or 1U Basic Rack Shelf (part #60-604-01).

Mounts to a projector mounting bracket with Extron's Projector Mounting Kit (part #70-077-04).

Mounts under or through furniture with Extron's Under Desk Mounting Kit (part #70-077-01) or Through Desk Mounting Kit (part #70-077-02).

### TP R BNC AV receiver

The TP R BNC AV receiver has the following features:

**Video output** — Provides RGBHV, RGBS, or RGsB video on 5 BNC connectors, and composite video on 1 BNC connector.

**RJ-45 connector** — Allows attachment to an Extron TP transmitter. One connector is for computer input, and one is for A/V input.

**Cable length compensation** — Allows you to select whether to compensate for long cable runs automatically or manually.

#### Mounting —

Mounts in a rack with Extron's 1U rack shelf (part #60-190-01) or 1U Basic Rack Shelf (part #60-604-01).

Mounts to a projector mounting bracket with Extron's Projector Mounting Kit (part #70-077-04).

Mounts under or through furniture with Extron's Under Desk Mounting Kit (part #70-077-01) or Through Desk Mounting Kit (part #70-077-02).

### TP R AV receiver

The TP R AV receiver has the following features:

**Video output** — Provides composite video on one BNC connector.

**RJ-45 connector** — Allows attachment to an Extron TP transmitter.

**Cable length compensation** — Allows you to select whether to compensate for long cable runs automatically or manually.

#### Mounting —

Mounts to a projector mounting bracket with Extron's Projector Mounting Kit (part #70-077-04).

Mounts under or through furniture with Extron's Under Desk Mounting Kit (part #70-077-01) or Through Desk Mounting Kit (part #70-077-02).

### TP R 15HD A receiver

The TP R 15HD A receiver has the following features:

**Video output** — Provides RGBHV, RGBS, and RGsB on a 15-pin HD connector. With an optional SY 15 HD-RGBHV cable, the receiver can output component video, S-video, or composite video.

**RJ-45 connector** — Allows attachment to an Extron TP transmitter.

#### Mounting —

Mounts in an Extron VersaTools™ 19" 1U Rack Shelf (part #60-190-20), VersaTools 1U Basic Rack Shelf (part #60-604-20), a standard Universal 1U Rack Shelf (part #60-190-01), or a 1U Basic Rack Shelf (part #60-604-01).

Mounts under furniture or to a projector bracket with Extron's optional mounting kits (part #70-212-01, furniture, or 70-217-01, projector).



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# Chapter Two

## Installation and Operation

Installation Overview

Front Panel Controls and Indicators

Troubleshooting

### Installation Overview

To install and set up a TP receiver and the associated TP transmitter(s) for operation, perform the following steps:

- 1 Disconnect power from all of the equipment, including the video source(s) (such as computers or DVD players), the transmitter, the receiver, and the output display(s).
- 2 For component, S-video, or composite video, ensure that the internal jumpers (TP R BNC A and TP R BNC AV) or external DIP switch (TP R 15HD A) are in the correct position. See *Video jumpers* or *Video DIP switch* in this chapter.
- 3 **TP R BNC AV and TP R AV only — If desired**, configure the audio jumpers to make the receiver compatible with unmodified TP transmitters. See *Audio jumpers* in this chapter.  
**NOTE** *The TP R BNC AV and TP R AV are redesigned (modified) receivers. The audio jumpers configure the audio portion of the composite video TP link to work with either similarly redesigned TP T 15HD AV and TP T AV transmitters or with older, unmodified transmitters. Redesigned receivers and transmitters have an identifying label.*
- 4 Mount the receiver in a rack (all except TP R AV) (the TP R 15HD A can be mounted in a standard rack or in a VersaTools rack), under a desk or podium, in a desk or table (all except TP R 15HD A), or on a projector bracket. See *Mounting the receiver* in this chapter.
- 5 Connect the cable(s) between the TP transmitter(s) and the receiver. See *Transmitted signal cabling* in this chapter and refer to the *TP Transmitters Family User's Manual*, part #68-546-01.
- 6 Connect the output cables. See *Output cabling* in this chapter.
- 7 Configure the TP transmitter(s). Refer to the *TP Transmitters Family User's Manual*, part #68-546-01.
- 8 Connect power cords to the TP receiver, the TP transmitter, and turn on the video source(s) and the output display(s).

**NOTE** *All TP transmitters include a 15V external power supply. The transmitters also receive power from the associated Extron TP receiver(s) (with the exception of the TP R 15HD A) via the TP cable. Extron recommends using the local power supply; however, the power supply may not be necessary in some applications. Use the following guidelines:*

- *The TP T 15HD A, TP T 15HD AV, and TP T BNC may not require a local power supply for cable lengths of 300 feet or less.*
- *The TP T AV may not require a local power supply for cable lengths of 800 feet or less.*
- *The TP T BNC DA4 and any transmitter connected to a TP R 15HD A always require the local power supply.*

*If problems are encountered, use the local power supply.*

- 9 Adjust the picture controls on the transmitter(s) and the receiver. See *Controls and Indicators* in this chapter and refer to the *TP Transmitters Family User's Manual*, part #68-546-01.

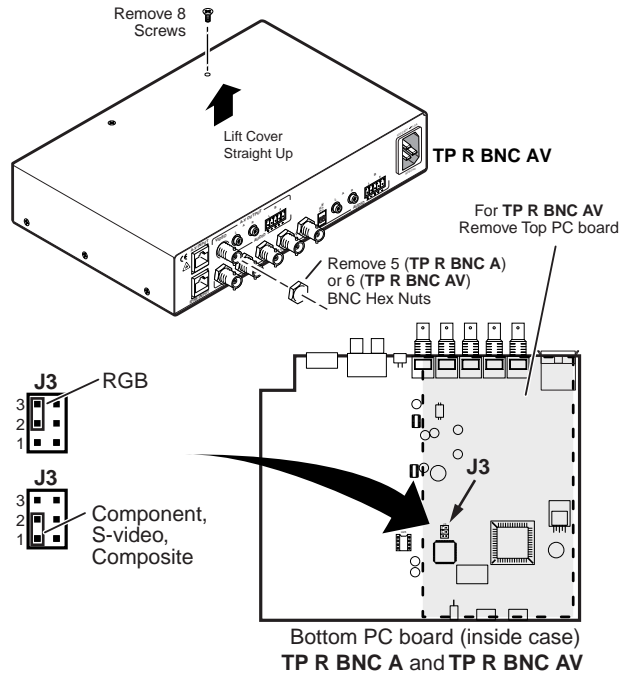
### Video jumpers

The TP R BNC A and TP R BNC AV receivers can be configured to receive component video, S-video, or composite video.

**NOTE** *The receivers are factory configured for RGB video. To receive any other type of video, reconfigure the jumpers.*



1. Remove the three screws on each side and the two screws on top of the cover (figure 2-1).

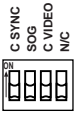


**Figure 2-1 — Video jumper configuration**

2. Using an Extron BNC extraction tool (part #100-096-01) or a 14 mm, deep well socket with thin walls, remove the five or six hex nuts securing the BNC connectors to the rear panel.
3. Slide the cover forward until the cover clears the BNC connectors and then lift the cover off.
4. **TP R BNC AV only:** Remove the four screws securing the video board to the RGB board and lift the video board out of the way.
5. Locate J3 on the RGB video printed circuit board. See figure 2-1.
  - a. **For RGB video,** ensure that pin 2 is jumpered to pin 3.
  - b. **For any other video format,** ensure that pin 1 is jumpered to pin 2.
6. Reinstall the video board, replace the cover, and reinstall the screws and BNC connector hex nuts.

### Video DIP switch

The TP R 15HD A receiver can be configured to receive component video, S-video, or composite video. To configure the receiver for RGB video, set DIP switch 3 (C video) on the back of the transmitter to off (down). For any other video format set the switch on (up).



### Audio jumpers

**NOTE** Older (unmodified) receivers and transmitters are fully compatible with each other **but not** with the TPX 88 A twisted pair matrix switcher.

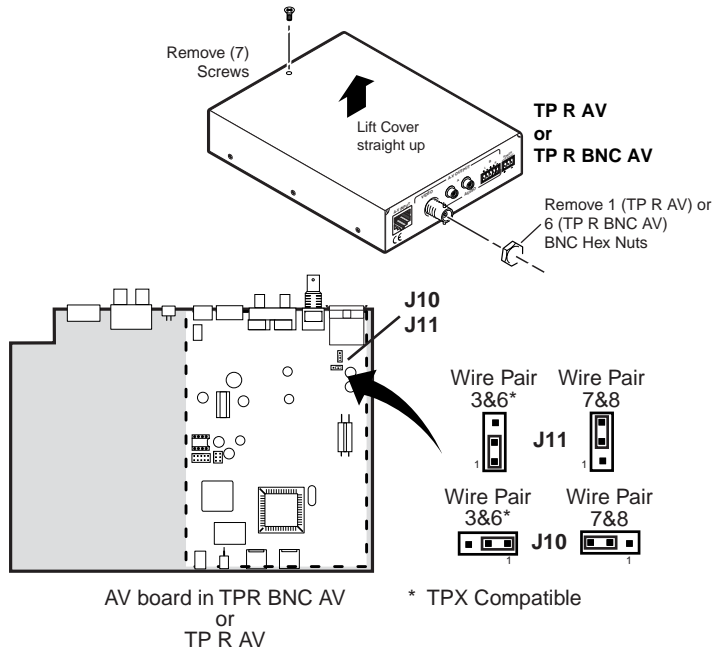
Redesigned (modified) receivers and transmitters are fully compatible with each other **and with** the TPX 88 A. They can also be jumpered to be compatible with the older (unmodified) transmitters and receivers **but not** the TPX 88 A.

**NOTE** Redesigned (modified) receivers and transmitters have an identifying label.

The TP R BNC AV and TP R AV receivers are factory configured to receive the audio that is associated with the composite video link on wire pair 3 and 6. This configuration is compatible with redesigned TP transmitters and the TPX 88 A.

If you intend to match this receiver with an older, unmodified TP transmitter, and do not plan to include a TPX 88 A in your system, you can set the receiver to receive the audio on wire pair 7 and 8, to be compatible with an older TP transmitter, by shifting internal jumpers as follows:

1. Remove the three screws on each side and the one or two screws on top of the cover (figure 2-2).



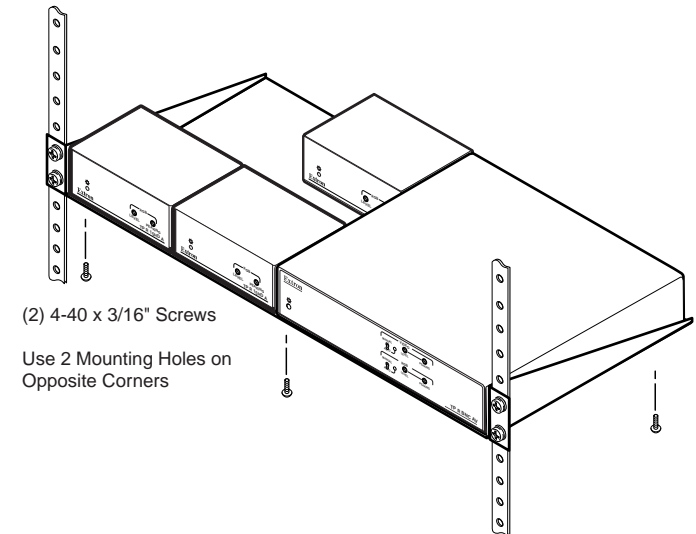
**Figure 2-2 — Audio jumper configuration**

2. Using an Extron BNC extraction tool (part #100-096-01) or a 14 mm, deep well socket with thin walls, remove the one or six hex nuts securing the BNC connectors to the rear panel.
3. Slide the cover forward until the cover clears the BNC connectors and then lift the cover off.
4. Locate J10 and J11 on the composite video printed circuit board. See figure 2-2.
  - a. For compatibility with redesigned (modified) receivers and the TPX 88 A, ensure that pin 1 is jumpered to pin 2 on both jumper locations.
  - b. For compatibility with older (unmodified) receivers, ensure that pin 2 is jumpered to pin 3 on both jumper locations.
5. Replace the cover, and reinstall the screws and BNC connector hex nut(s).

## Mounting the receiver

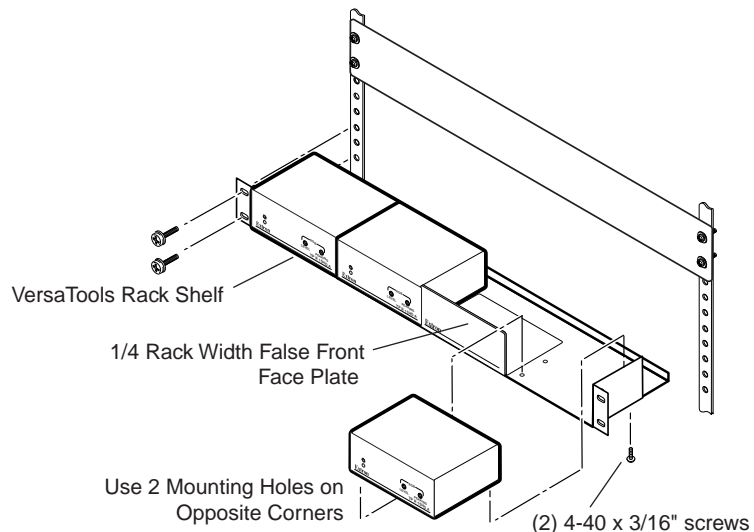
### Rack mounting (TP R BNC A, TP R BNC AV, TP R 15HD A)

TP R BNC A, TP R BNC AV, or TP R 15HD AV — For optional rack mounting, mount the receiver on a 19" 1U Universal Rack Shelf (Extron part #60-190-01) (figure 2-3). The TP R BNC A and TP R BNC AV mount on the left or right side of the rack. The TP R 15HD A mounts in one of eight locations on the rack.



**Figure 2-3 — Rack mounting the TP R 15HD A and TP R BNC AV**

**TP R 15HD A only** — For optional rack mounting, mount the receiver on a VersaTools 19" 1U Rack Shelf (Extron part #60-190-20) (figure 2-4). The TP R 15HD A mounts in one of four locations on the rack.



**Figure 2-4 — VersaTools rack mounting the TP R 15HD A**

1. If feet were previously installed on the bottom of the receiver, remove them.
2. Mount the receiver on the rack shelf, using two 4-40 x 3/16 screws in opposite (diagonal) corners to secure the receiver to the shelf.
3. Install blank panel(s) (included in the 1U universal and VersaTools rack kits, optional for the 1U basic rack kit) or other unit(s) to the rack shelf.

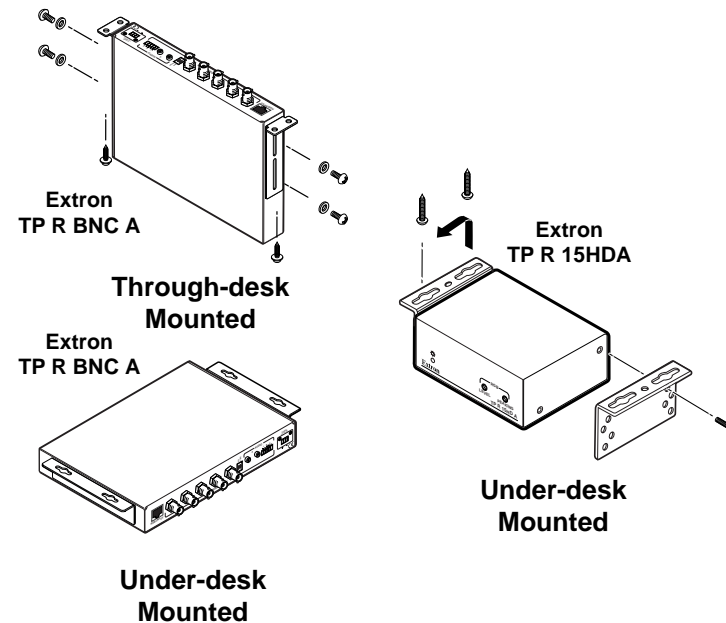
**NOTE** Only the TP R 15HD A and products in the Extron VersaTools line can be mounted on a VersaTools shelf. Any 1U rack-mountable Extron product can be mounted on the standard shelf.

### Furniture mounting

All of the receiver models can be mounted under furniture such as a table or podium surface using the appropriate optional mounting bracket, Extron's Mini Under-Desk Mounting Kit (part #70-212-01) (TP R 15 HD A) or Under-Desk Mounting Kit (part #70-077-01) (all other models).

All models except the TP R 15HD A can be mounted through a table or podium using Extron's Through-Desk Mounting Kit (part #70-077-02). Furniture mount the receiver as follows:

1. Attach the mounting brackets to the receiver with the machine screws provided (figure 2-5).



**Figure 2-5 — Under-desk or through-desk mounting**

2. For through-surface mounting (all except TP R 15HD A), cut the proper sized hole in the mounting surface.
3. Hold the receiver with the attached brackets against the underside of the table or other furniture. Mark the location of the screw holes of the bracket on the mounting surface.
4. Drill 3/32" (2 mm) diameter pilot holes, 1/4" (6.3 mm) deep in the mounting surface at the marked screw locations.

## Installation and Operation, cont'd

5. For through-surface mounting (all except TP R 15HD A), insert four #8 wood screws through the bracket and into the four pilot holes. Tighten all four screws to secure the receiver in place.
6. For under-surface mounting, insert #8 wood screws into the four pilot holes. Tighten each screw into the mounting surface until just less than 1/4" of the screw protrudes.
7. For under-surface mounting, align the mounting screws with the slots in the brackets and place the receiver against the surface, with the screws through the bracket slots.
8. For under-surface mounting, slide the receiver slightly forward or back, then tighten all four screws to secure the switcher in place.

### Projector mounting

All of the receiver models can be mounted on a projector bracket using the appropriate optional mounting bracket, Extron's Mini Projector Mounting Kit (part #70-217-01) (TP R 15 HD A) or Projector Mounting Kit (part #70-077-04) (all other models).

Secure the mounting bracket to the receiver using two machine screws in the side of the receiver (TP R 15HD A) or the three #8 machine screws provided (all other models). Secure the receiver to a projector mount or other surface by inserting the mounting bolt through the bracket's slotted hole (figure 2-6).

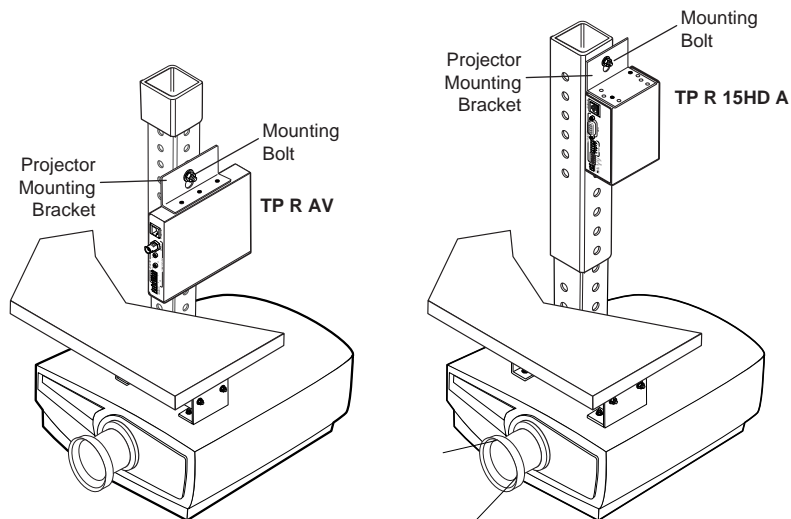


Figure 2-6 — Projector bracket mounting a receiver

### Rear panel features and cabling

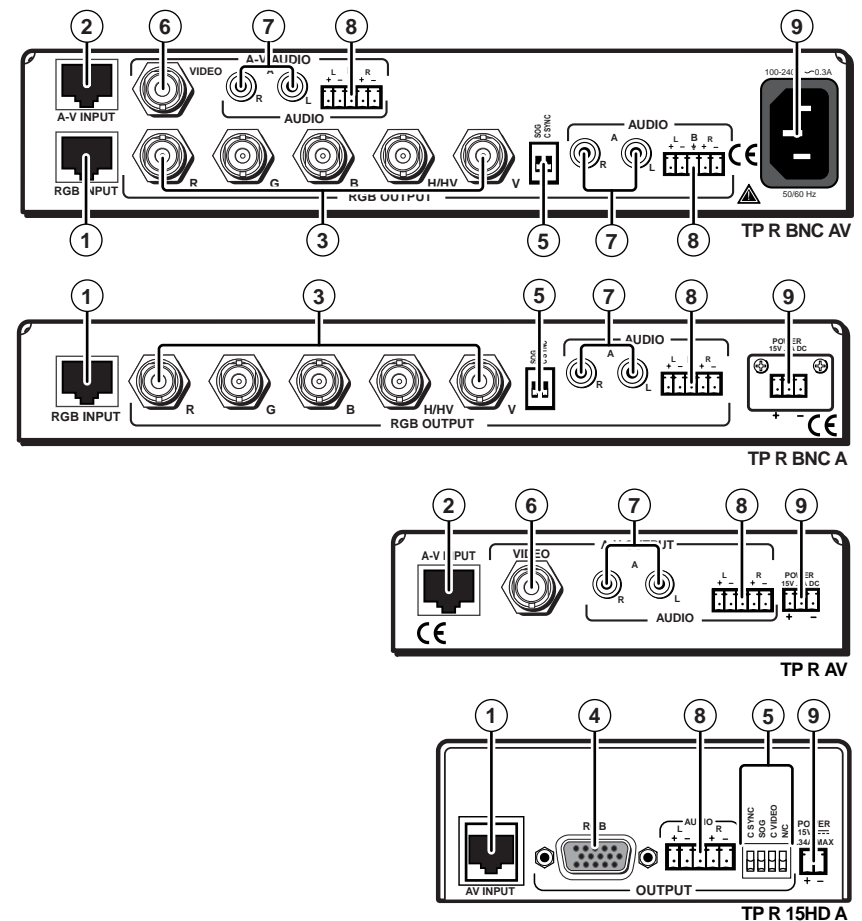


Figure 2-7 — Installation features, TP receivers

### Transmitted signal cabling

**CAUTION** Do not connect this device to a computer data or telecommunications network

**NOTE** RJ-45 termination must comply with the TIA/EIA T 568A wiring standards for all connections.

- ① **RGB video transmission connector** — Attach one end of a TP cable to this RJ-45 female connector (figure 2-7). Attach the other end to an Extron TP 15HD or BNC transmitter. See *Termination of TP cable* on page 2-15 for pin assignments.

- ② **Composite video transmission connector** — Attach one end of a TP cable to this RJ-45 female connector. Attach the other end to an Extron TP composite video transmitter. See *Termination of TP cable* on page 2-15 for pin assignments.

## Output cabling

### Computer video

The TP R BNC A, TP R BNC AV and TP R 15HD A receive and output RGB video. These receivers can also receive component video, S-video, or composite video and output them on the R, G, and B signal lines.

Reception of component video, S-video, or composite video requires that an internal jumper (TP R BNC AV and TP R BNC) or external DIP switch (TP R 15HD A) be repositioned. See *Video jumpers* or *Video DIP switch* in this chapter.

- ③ **RGB Output BNCs (TP R BNC A and TP R BNC AV)** — Connect the desired video output device to the rear panel output BNCs:

For RGBHV video, use the R, G, B, H/HV, and V BNCs.



For RGBS video, use the R, G, B, and H/HV BNCs.



For RGsB or component video, use the R (R-Y), G (Y), and B (B-Y) BNCs.



For S-video, use the R (C-chroma) and G (Y-luma) BNCs.

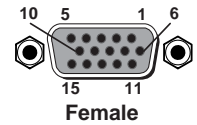


For composite video, use the R, G, and/or B BNC.



**NOTE** The H/HV and V BNCs only output sync, not video, signals.

- ④ **RGB Output 15HD (TP R 15HD A)** — Connect the desired video output device to the rear panel output 15HD connector.



**NOTE** At the TP transmitter, input only sync signals, no video signals, on the sync pins, 13 and 14.

For component video, use the R (R-Y) and R return pins (pins 1 and 6), G (Y) and G return pins (pins 2 and 7), and B (B-Y) and B return pins (pins 3 and 8).

For S-video, use the R, R return (C-chroma), G, and G return (Y-luma) pins.

For composite video, use the G pin and the associated return pin. For additional genlocked video signals, use the R, B, and associated return pins.

- ⑤ **DIP switches**

**SOG switch** — Set this rear panel switch up for RGsB video and down for RGBHV or RGsB video.



**C Sync switch** — Set this rear panel switch up for RGsB video and down for RGBHV or RGsB video.

**C video switch (TP R 15HD A only)** — Configures the transmitter for RGB or component/S-video/composite video. See *Video DIP switch* in this chapter.



**NOTE** Set all three DIP switches down for RGBHV video.

**N/C (TP R 15HD A only)** — No connection.

### Composite video

The TP R BNC AV and the TP R AV receive and output composite video.

- ⑥ **Video connector** — Connect a composite video device to this rear panel BNC connector. Digital audio can also be connected to this connector.

## Audio

All Extron TP receivers receive and output stereo audio. All receivers except the TP R 15HD A output the audio on both left and right RCA connectors and on 3.5 mm, 5-pole captive screw connectors. The TP R 15HD A outputs audio on the captive screw connector only.

- ⑦ **Stereo audio output connectors** — Connect left and right stereo audio cables between these rear panel RCA connectors and the output device's stereo audio inputs.

**NOTE** Only analog, line level, unbalanced audio signals can be output on these connectors.

- ⑧ **Stereo audio 5-pole captive screw connector** — Connect audio devices, such as an audio amplifier or powered speakers, to these connectors. These 3.5 mm, 5-pole captive screw connectors output unamplified, line level audio. Figure 2-8 shows how to properly wire an output connector.

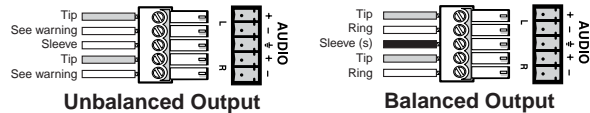


Figure 2-8 — Audio output connector wiring

**CAUTION** Connect the sleeve to ground (Gnd). Connecting the sleeve to a negative (-) terminal will damage the audio output circuits.

**NOTE** If only an audio signal, no video, is received, connect a ground wire between the chassis ground and an earth ground in the equipment rack or other grounded device. If the receiver is not grounded, a crackling sound may be heard in the audio output.

## Power connector

- ⑨ **Power**

**TP R BNC AV** — Plug a standard IEC power cord into this connector to connect the TP R BNC AV to a 100 to 240VAC, 50 Hz or 60 Hz power source.

**NOTE** If the distance between the transmitter and receiver is too great for the receiver to power the transmitter, the video image will be missing, distorted, or noisy, or the receiver's Manual/Auto LED will flash. The transmitter requires a local 15V power supply.

**TP R BNC A and TP R AV** — Wire the external 15V power supply into this 3-pole captive screw connector (figure 2-9) and plug the connector into the receiver. The power supply is included with the unit.

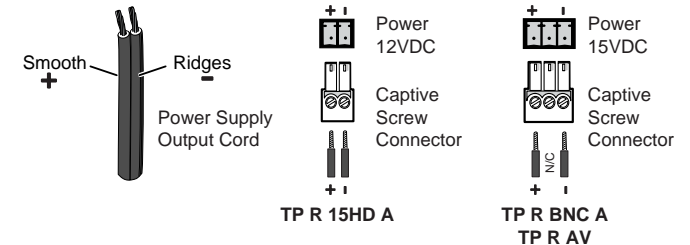


Figure 2-9 — Power connector wiring

**TP R 15HD A** — Wire the external 15V power supply into this 2-pole captive screw connector (figure 2-11) and plug the connector into the receiver. The power supply is included with the unit.

## Termination of TP cable

Figure 2-10 details the recommended termination of TP cables in accordance with the TIA/EIA T 568A wiring standards.

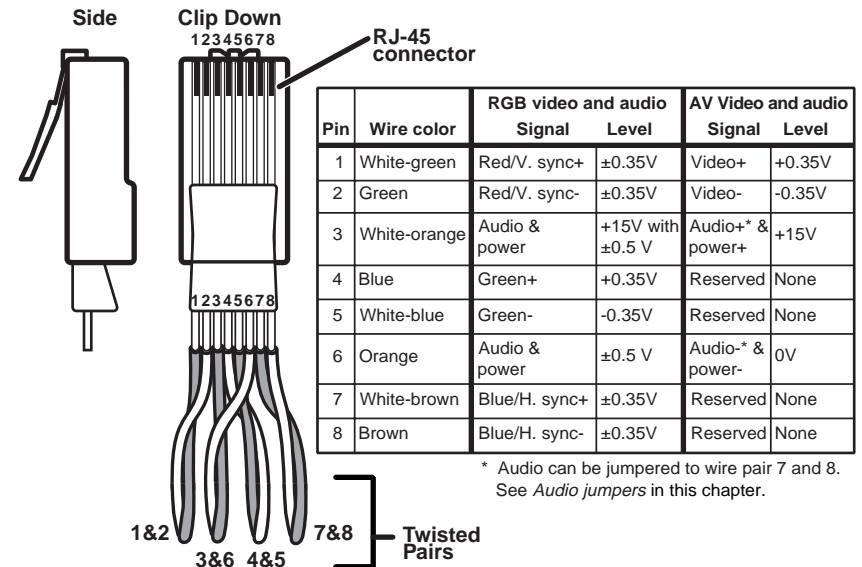


Figure 2-10 — TP cable termination

## Cable testing

To ensure proper cable termination, each transmission cable system that uses CAT 5e should be tested (Extron's Skew-Free UTP cable does not need to be tested). Testing the cable from the RJ-45 connections at the transmitter and receiver gives the most accurate indications of cable problems.

There are two varieties of cable runs: simple runs, in which a single cable is terminated only at the transmitter and receiver, and complex runs, which can include patch bays and multiple terminations and lengths of cable. In either case, the entire cabling system should be tested.

A complete test measures cable length and tests the wire map, attenuation, NEXT, PSNEXT, ELFEXT, PSELFEXT, return loss, ACR and PSACR. All of these tests are critical for digital data transfer. While all of these tests are important indicators of the quality of the cable termination, the most critical testing parameters for video transfer are wire map (T-568-A termination) and pair length measurements. The largest concern is equalization of skew between cable pairs. Cable systems of 300 feet or less should exhibit no transmission problems if they pass at least CAT 5e or preferably CAT 6-D5 channel certification testing.

The Microtest OMNI SCANNER 2 performs comprehensive certification testing to the proposed CAT 6 standards. Other manufacturers also make testing equipment. The tests include advanced diagnostics for troubleshooting the cause and location of many cable and termination problems. For simple installation testing, the Microtest MICRO SCANNER PRO tests wire map and cable length, including individual cable pair length.

## Equalizing pair skew

The manufacturing process for network (CAT 5e) UTP cable leads to a condition called pair skew. For best results, pair skew needs to be equalized when using the CAT 5e cable in A/V applications. The design of Extron's skew-free A/V UTP cable minimizes pair skew to the point that equalization is not required.

Skew exists between pairs when the physical length of one wire pair is different from another. As the transmission cable length increases, the amount of skew increases. Skew affects the displayed image when the differential length between wire pairs exceeds 2 feet, causing the timing of the red, green, and blue video signals to appear out of alignment (horizontal registration errors). A white vertical line on a black field can appear as individual red, green, and blue lines that are close

together; the signal transmitted on the shortest wire pair leads the other colors and appears to the left on the display.

UTP cable test equipment measures and reports wire pair length. The report on the various pair lengths can be used in equalizing pair skew. The nominal velocity of propagation (NVP — the speed at which the signal travels on the transmission line, measured as a percentage of the speed of light) of TP cable is very close to that of conventional coaxial cable. The similarity in NVP means that an additional length of coax equal to the length of pair skew, placed on the receiver's output, equalizes the effects of pair skew (figure 2-11).

If UTP cable test measurement cannot be done, pair skew can still be equalized by viewing a test pattern with a critical eye. Examine the test pattern for loss of horizontal registration and, through a process of trial and error, equalize any pair skew with coax extensions on the red, green, and/or blue outputs.

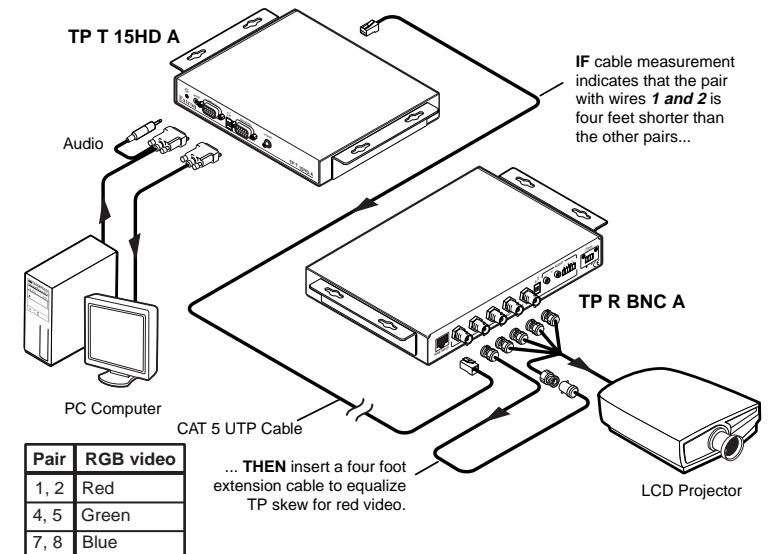


Figure 2-11 — Pair skew equalization

### Front Panel Controls and Indicators

The TP R BNC A and TP R BNC AV have similar controls and indicators (figure 2-12). The TP R 15HD A has a reduced set of controls (figure 2-13).

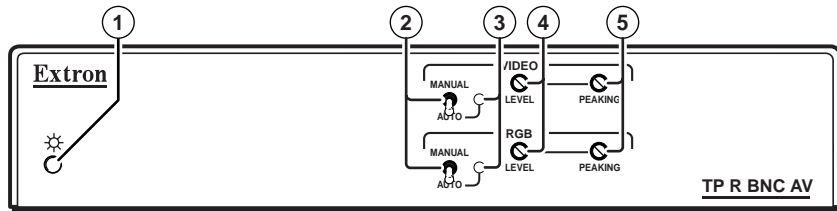


Figure 2-12 — TP R BNC AV control and indicators

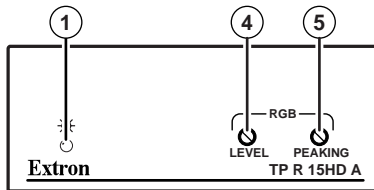


Figure 2-13 — TP R 15HD A control and indicators

#### ① Power LED

**Amber** — indicates that power is applied, but that the transmitter is not connected to a receiver.

**NOTE** On the TP R BNC AV only, and only if the composite video TP link is used and the RGB link is not used, this LED will only light amber.

**Green** — indicates that a transmitter is connected and any of the following grounding conditions exist:

- The transmitter is powered by a local power supply and the receiver's output is connected to a device that provides a reference ground.
- The transmitter is powered by the receiver, is locally grounded, and the receiver's output is connected to a device that provides a reference ground.
- The transmitter is receiving power from the receiver, a local monitor is connected to the transmitter, and the receiver's output is connected to a device that provides a reference ground.
- The receiver is connected to a TP switcher that is connected to a device that provides a reference ground.

- ② **Manual/Auto switch (TP R BNC A and TP R BNC AV)** — With this switch in the Auto position, the receiver automatically adjusts the level and peaking to compensate for long cable runs. In the Manual position, you can manually compensate for long cable runs using the level and peaking controls.
- ③ **Auto LED (TP R BNC A and TP R BNC AV)** — Indicates that the Manual/Auto switch is in the Auto position.
- ④ **Level control** — Adjusts the image brightness.
- ⑤ **Peaking control** — Adjusts the image sharpness.

**NOTE** For details on the SOG and C SYNC switches, see Computer video earlier in this chapter.

## Troubleshooting

### If the image does not appear

1. Ensure that all devices are receiving power. The transmitter's and receiver's front panel Power LEDs indicate that they are receiving power.
2. Ensure that the transmitter is receiving a video input.
3. Ensure that the TP cable(s) are properly terminated in accordance with TIA/EIA T 568A standards and that the RJ-45 connections are securely made. If the Power LEDs on the transmitter and the receiver are lit green, a transmitter is properly connected to a receiver.
4. For computer/RGB video, ensure that the receiver's SOG and C Sync switches are in the correct positions for the video output.
5. For computer video, ensure that the transmitter's ID bit switches are on.
6. For computer video on an LCD projector, ensure that the transmitter's DDSP switch is on.
7. The transmission distance may be too far for remote power. Try connecting the local 15V power supply to the transmitter.
8. The transmission distance may be too short. Ensure that the UTP cable is at least 50 feet long.
9. If the Manual/Auto switch is in the manual position, ensure that the receiver's level controls are not set too high. Too much level and peaking can cause display problems.



10. For computer video from a laptop or for ungrounded AC distribution systems, the transmitter may need to be grounded. See *Grounding the transmitter* in the *TP Transmitter Family User's Manual*, part #68-546-01.
11. Call the Extron S<sup>3</sup> Sales & Technical Support Hotline if necessary.

### If the image is not displayed correctly

1. For computer/RGB video, if the output image looks too green, ensure that the receiver's SOG switch is off.
2. For computer video, if the picture hangs off the edge of the screen, adjust the transmitter's H Shift control.

**NOTE** *DDSP disables the horizontal shift control.*

3. Place the receiver's Manual/Auto switch to manual and adjust the level and peaking controls for optimum quality.
4. The transmission distance may be too far for remote power. Try connecting the local 15V power supply to the transmitter.
5. For computer video from a laptop or for ungrounded AC distribution systems, the transmitter may need to be grounded. See *Grounding the transmitter* in the *TP Transmitters Family User's Manual*, part #68-546-01.
6. If the image still does not display properly, call the Extron S<sup>3</sup> Sales & Technical Support Hotline.

### If the receiver's Manual/Auto LED flashes

1. The transmission distance may be too far for remote power. Connect the local 15V power supply to the transmitter.
2. Check the RJ-45 connector for a loose connection.



## TP Receivers

# A

# Appendix

## Specifications, Accessories, and Part Numbers

Specifications

Included Parts

Accessories

Cables/Adapters

## Specifications, Accessories, and Part Numbers

### Video

Number/signal type .....	1 or 2 sets of proprietary analog signals
Connectors .....	1 or 2 shielded RJ-45 female

### Video input — refer to the TP Transmitters Family User's Manual, part #68-546-02

### Video output

Number/signal type	
TP R BNC A,	
TP R 15HD A .....	1 analog RGBHV, RGBS, RGsB, component video, or S-video; or 1 S-video and 1 NTSC/PAL/SECAM composite video from a single source; or 3 NTSC/PAL composite video from a single source
TP R BNC AV .....	1 analog RGBHV, RGBS, RGsB, component video, or S-video; or 1 S-video and 1 NTSC/PAL/SECAM composite video from a single source; or 3 NTSC/PAL/SECAM composite video from a single source <i>and</i> 1 NTSC/PAL/SECAM composite video
TP R AV .....	1 NTSC/PAL/SECAM composite video
Connectors	
TP R BNC A .....	5 BNC female
TP R BNC AV .....	6 BNC female
TP R 15HD A .....	(1) 15-pin HD female
TP R AV .....	1 BNC female
Nominal level .....	1V p-p for Y of component video and S-video, and for composite video 0.7V p-p for RGB 0.3V p-p for R-Y and B-Y of component video, and for C of S-video
Minimum/maximum levels .....	0.3V to 1.45V p-p
Impedance .....	75 ohms

### Audio

Number/signal type .....	1 or 2 sets of analog proprietary signals
Connectors .....	1 or 2 shielded RJ-45 female
Frequency response .....	20 Hz to 20 kHz, $\pm 0.05$ dB
THD + Noise .....	0.03% @ 1 kHz, 0.3% @ 20 kHz at rated maximum output drive

S/N .....	>63dB at nominal level
Crosstalk .....	<-80dB @ 1 kHz, fully loaded
Stereo channel separation .....	>80dB @ 1 kHz
CMRR .....	>33dB @ 20 Hz to 20 kHz

### Audio input — refer to the TP Transmitters Family User's Manual, part #68-546-02

### Audio output

Number/signal type	
TP R BNC A,	
TP R AV .....	1 stereo audio balanced/unbalanced, and 1 stereo audio unbalanced
TP R 15HD A .....	1 stereo audio balanced/unbalanced
TP R BNC AV .....	2 stereo audio balanced/unbalanced, and 2 stereo audio unbalanced
Connectors	
TP R 15HD A .....	(1) 3.5 mm, 5-pole captive screw connector per input
All other models .....	2 female RCA (left/right) per input (1) 3.5 mm, 5-pole captive screw connector per input
Impedance .....	50 ohms unbalanced, 100 ohms balanced
Gain error .....	$\pm 0.1$ dB channel to channel
Maximum level (600 ohm) .....	>+11.5dBm, balanced at stated %THD+N

### General

Power	
TP R BNC A, TP R AV ....	15VDC, 0.8 A, external power supply. Product requires 0.3 A (minimum).
TP R 15HD A .....	15VDC, 0.8 A, external power supply. Product requires 0.34 A (maximum).
TP R BNC AV .....	100VAC to 240VAC, 50/60 Hz, 40 watts, internal
Temperature/humidity .....	Storage -40° to +158°F (-40° to +70°C) / 10% to 90%, non-condensing Operating +32° to +122°F (0° to +50°C) / 10% to 90%, non-condensing
Rack mount	
TP R AV .....	No, but projector mountable with optional mounting kit (#70-077-04), furniture mountable with optional mounting brackets (#70-077-01 and #70-077-02).

## Specifications, Accessories, and Part Numbers cont'd

TP R 15HD A .....	Yes, with optional VersaTools 1U rack shelf, part #60-190-20 or optional standard size 1U rack shelf, part #60-190-01. Also, projector mountable with optional mounting kit, part #70-212-01 or under-furniture mountable with optional mounting brackets, part #70-217-01.
TP R BNC A, TP R BNC AV	Yes, with optional 1U rack shelf, part #60-190-01. Also, projector mountable with optional mounting kit, part #70-077-04 or furniture mountable with optional mounting brackets #70-077-01, 70-077-02.
Enclosure type .....	Metal
Enclosure dimensions	
TP R BNC A .....	1.3" H x 8.75" W x 7.0" D (<1U high, half-rack width) (3.3 cm H x 22.2 cm W x 17.8 cm D) (Depth excludes connectors.)
TP R BNC AV .....	1.7" H x 8.75" W x 7.0" D (1U high, half-rack width) (4.3 cm H x 22.2 cm W x 17.8 cm D) (Depth excludes connectors.)
TP R 15HD A .....	1.6" H x 4.25" W x 3.0" D (1U high, quarter-rack width) (4.1 cm H x 10.8 cm W x 7.6 cm D) (Depth excludes connectors.)
TP R AV .....	1.25" H x 4.75" W x 7.0" D (3.2 cm H x 12.1 cm W x 17.8 cm D) (Depth excludes connectors.)
Product weight	
TP R BNC A .....	1.6 lbs (0.7 kg)
TP R BNC AV .....	2.6 lbs (1.2 kg)
TP R 15HD A .....	0.4 lbs (0.2 kg)
TP R AV .....	0.9 lbs (0.4 kg)
Shipping weight	
TP R BNC A .....	4 lbs (1.8 kg)
TP R BNC AV .....	5 lbs (2.3 kg)
TP R 15HD A .....	2 lbs (0.9 kg)
TP R AV .....	3 lbs (1.4 kg)
Vibration .....	ISTA/NSTA 1A in carton (International Safe Transit Association)
Listings .....	UL, CUL

Compliances .....	CE, FCC Class A
MTBF .....	30,000 hours
Warranty .....	3 years parts and labor

**NOTE** Specifications are subject to change without notice.

## Included Parts

These items are included in each order for a specific TP receiver:

Included parts	Part number
<b>All</b>	
TP Receivers User's Manual	
Captive screw connector, 5 pole, 3.5 mm (1 or 2)	10-319-10
<b>TP R BNC A</b>	
Single output external power supply, 15V, 0.8A	70-057-01
Captive screw connector, 3 pole, 3.5 mm	10-265-03
<b>TP R 15HD A</b>	
Single output external power supply, 15V, 0.34A	70-160-01
<b>TP R AV</b>	
Single output external power supply, 15V, 0.8A	70-057-01
Captive screw connector, 3 pole, 3.5 mm	10-265-03
<b>TP R BNC AV</b>	
	60-350-03

**NOTE** The TP R AV and TP R BNC AV are redesigned receivers. The audio portion of the composite video TP link can be configured to work with either similarly redesigned TP T AV and TP T 15HD AV transmitters or with older, unmodified transmitters. See Audio jumpers in chapter 2, Installation and Operation. Redesigned receivers and transmitters have an identifying label.

## Specifications, Accessories, and Part Numbers cont'd

### Accessories

Accessories	Part number
P/S 150 Multiple output 15V power supply	60-432-01
Extron 19" 1U Universal Rack Shelf	60-190-01
Extron 19" 1U Basic Rack Shelf	60-604-01
Extron VersaTools 19" 1U Universal Rack Shelf	60-190-20
Extron VersaTools 19" 1U Basic Rack Shelf	60-604-20
Extron Under Desk Mounting Kit	70-077-01
Extron Thru-desk Mounting Kit	70-077-03
Extron Projector Mounting Kit	70-077-04

### Cables/Adapters

Skew-Free™ A/V cable, RJ-45 jacks	Part number
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**NOTE** *Skew-Free A/V UTP cables are **not** recommended for Ethernet/LAN applications.*

Skew-Free A/V UTP 1000' (Bulk) (non-plenum)	22-141-03
Skew-Free A/V UTP 1000' (Bulk) (plenum)	22-142-03
3' Skew-Free A/V UTP	26-569-01
6' Skew-Free A/V UTP	26-569-02
12' Skew-Free A/V UTP	26-569-03
25' Skew-Free A/V UTP	26-569-04
35' Skew-Free A/V UTP	26-569-05
50' Skew-Free A/V UTP	26-569-06
75' Skew-Free A/V UTP	26-569-07
100' Skew-Free A/V UTP	26-569-08
150' Skew-Free A/V UTP	26-569-09
200' Skew-Free A/V UTP	26-569-10
250' Skew-Free A/V UTP	26-569-11
300' Skew-Free A/V UTP	26-569-12
25' Skew-Free Plenum	26-570-04
35' Skew-Free Plenum	26-570-05
50' Skew-Free Plenum	26-570-06
75' Skew-Free Plenum	26-570-07
100' Skew-Free Plenum	26-570-08

Skew-Free A/V cable, RJ-45 jacks	Part number
----------------------------------	-------------

150' Skew-Free Plenum	26-570-09
200' Skew-Free Plenum	26-570-10
250' Skew-Free Plenum	26-570-11
300' Skew-Free Plenum	26-570-12
CAT 6 Jack (various colors)	10-463-xx

Video cables and adapters	Part number
---------------------------	-------------

BNC-5-3' MHR (3 feet/0.9 meters)	26-260-15
BNC-5-6' MHR (6 feet/1.8 meters)	26-260-01
BNC-5-12' MHR (12 feet/3.7 meters)	26-260-02
BNC-4-3' MHR (3 feet/0.9 meters)	26-210-01
BNC-4-6' MHR (6 feet/1.8 meters)	26-210-02
BNC-4-12' MHR (12 feet/3.7 meters)	26-210-03
SVHS 6' (6 feet/1.8 meters)	26-316-02
SVHS 12' (12 feet/3.7 meters)	26-316-03
S-video male to 2 BNC adapter, female, 8"	26-353-02
S-video female to 2 BNC, male, 8"	26-353-01
RG6/SHR 1-3' (3 feet/0.9 meters)	26-383-01
RG6/SHR 1-6' (6 feet/1.8 meters)	26-383-12
RG6/SHR 1-12' (12 feet/3.7 meters)	26-383-07

Skew compensation cable	Part number
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2' Skew Cable (red/green/blue)	26-524/525/526-01
4' Skew Cable (red/green/blue)	26-524/525/526-02
6' Skew Cable (red/green/blue)	26-524/525/526-03
8' Skew Cable (red/green/blue)	26-524/525/526-04
10' Skew Cable (red/green/blue)	26-524/525/526-05
12' Skew Cable (red/green/blue)	26-524/525/526-06
14' Skew Cable (red/green/blue)	26-524/525/526-07
16' Skew Cable (red/green/blue)	26-524/525/526-08
18' Skew Cable (red/green/blue)	26-524/525/526-09

## **Specifications, Accessories, and Part Numbers cont'd**

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