User Guide

HDMI & DVI Extenders

DTP HDMI 230

HDMI Twisted Pair Extender

Extron Electronics
INTERFACING, SWITCHING AND CONTROL

68-2244-01 Rev. B
06 13

Contents

Introduction

About this Guide

This guide describes the Extron DTP HDMI 230 Long Distance High Definition Multimedia Interface (HDMI) Twisted Pair Extender, which consists of a DTP HDMI 230 Tx transmitter and a DTP HDMI 230 Rx receiver. This guide describes how to install, operate, and configure the transmitter and receiver.

About the DTP HDMI 230 Tx/Rx Transmitter and Receiver

The Extron DTP HDMI 230 Tx/Rx transmitter and receiver pair (see figure 1) extends the usable distance of HDMI digital video, optional analog audio, and bidirectional RS-232 and infrared (IR) control signals over one Extron XTP DTP 24 shielded twisted pair (STP) cable (recommended) or Category (CAT) 5e, CAT 6, or CAT 6a STP or unshielded twisted pair (UTP) cable. The DTP HDMI 230 can also extend DVI video, which may include embedded audio, with the appropriate adapters. The video, audio, and control signals can be transmitted up to 230 feet (70 m).

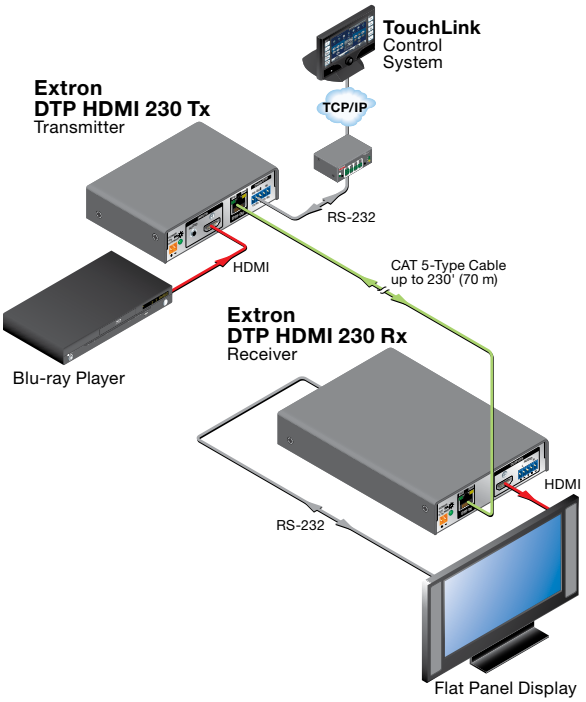


Figure 1. Typical Transmitter and Receiver Application

The DTP HDMI 230 Tx/Rx units are housed in quarter rack width metal enclosures. They can be set on a tabletop or mounted in a rack, under or through furniture. The receiver can also be mounted on a projector bracket.

The transmitter is shipped with a single external desktop 12 VDC power supply that accepts 100 to 240 VAC, 50-60 Hz input. A single power supply connected to either the transmitter or the receiver can power both units through the TP cable that carries HDMI video.

TP Cable Advantages

Twisted pair cable is much smaller, lighter, more flexible, and less expensive than coaxial or HDMI cable. These transmitter and receiver twisted pair (TP) products make cable runs simpler and less cumbersome. Termination of the cable with RJ-45 connectors is simple, quick, and economical.

NOTE: Do **not** use Extron UTP23SF-4 Enhanced Skew-Free AV UTP cable or STP201 cable to link the transmitter and receiver. The DTP HDMI 230 Tx/Rx does not work properly with these cables.

Control Communications

The RS-232 and IR communications are a passive pass-through only. The transmitter and receiver do not generate or respond to the RS-232 and IR communication signals.

Features

Transmits single link HDMI signals over a single STP or UTP cable — Standard twisted pair cables provide an economical, easily installed cable solution.

Long distance transmission — Extends video, audio, and control signals up to 230 feet (70 m).

Supports Display Data Channel (DDC) transmission — The transmitter and receiver pair fully supports long distance transmission of the DDC signals.

Control communications pass-through — Bidirectional RS-232 and IR control signals can be transmitted alongside the HDMI signal, so that the remote display can be controlled without the need for additional cabling.

Supports Consumer Electronics Control (CEC) signal transmission

1-inch high, quarter rack width, metal enclosures — With low profile enclosures, the transmitter and receiver can be discreetly installed in locations such as behind a plasma or LCD flat-panel display.

External 100 VAC to 240 VAC, 50-60 Hz, international power supply — One power supply is included with the transmitter.

Remote powering of transmitter or receiver — Only one power supply is normally necessary to power both devices.

Installation and Operation

This section describes the installation and the operation of the DTP HDMI 230 Tx/Rx Extender, including:

- **Mounting the Units**
- **Connections**
- **Operation**

Mounting the Units

Mounting instructions can be found in **Mounting the Transmitter or Receiver** on page 10. Compatible optional hardware is listed on the Extron website (**www.extron.com**).

ATTENTION:

- Installation and service must be performed by authorized personnel only.
- Avoid ground potential differences between the transmitter and receiver installation sites, which can lead to **equipment damage** or a missing or unstable picture. If a potential difference cannot be avoided, remove the ground connection between the units and locally power both units (see **Disconnecting the Ground** on page 11). In this configuration, the DTP HDMI 230 **cannot** extend analog audio and each unit requires a local power supply.

Connections

Transmitter Connections

DTP HDMI 230 Tx Rear Panel

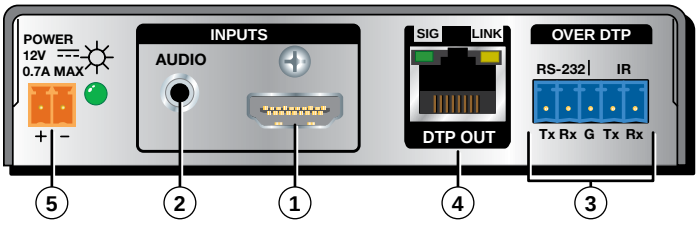
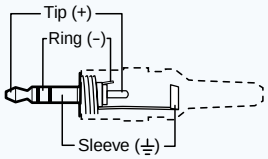


Figure 2. DTP HDMI 230 Tx Connectors

① **HDMI input connector** — Connect an HDMI cable between this port and the HDMI output port (or DVI port, with an appropriate adapter) of the digital video source.

② **Audio input connector** — If desired, plug an analog audio input into the transmitter via this stereo mini jack connector.

NOTE: The analog audio input on this connector is in addition to the digital audio that may be embedded in the HDMI input. See the figure at right to identify the connector tip, ring, and sleeve when you are making connections for the transmitter from existing audio cables. A mono audio connector consists of the tip and sleeve. A stereo audio connector consists of the tip, ring, and sleeve.



3.5 mm Stereo Plug Connector
(balanced)

③ **RS-232 and IR connector** — Connect a serial RS-232 signal, a modulated IR signal, or both to this 3.5 mm, 5-pole captive screw connector for bidirectional RS-232 and IR communication (see **RS-232 and IR connector wiring** on page 9 to wire the connector).

④ **DTP Output RJ-45 connector** — Connect one end of a TP cable to this RJ-45 female connector on the transmitter. Ensure the opposite end of this cable is connected to the receiver DTP Input RJ-45 connector (see **item** ⑥ on the next page).

ATTENTION: Do not connect this device to a telecommunications or computer data network.

NOTE: See **TP cable termination and recommendations** on page 7 to properly wire the RJ-45 connectors and for detailed **NOTES**.

Signal LED — Indicates the unit is receiving a TMDS clock signal on the HDMI input.

Link LED — Indicates a valid link is established between the units on the DTP input and output cable.

⑤ **Power input connector** — Plug the included external 12 VDC power supply into either this 2-pole connector **or** the power input connector on the receiver (**item** ⑩ on page 6). See **Power supply wiring** on page 8 to wire the connector.

NOTES:

- One power supply is included with the transmitter and **normally** can power both units.
- If you have removed the ground jumpers (see **Disconnecting the Ground** on page 11) because of ground potential differences, one DTP HDMI 230 unit **cannot** remotely power the other unit. Each unit **requires** a local power supply.

Receiver Connections

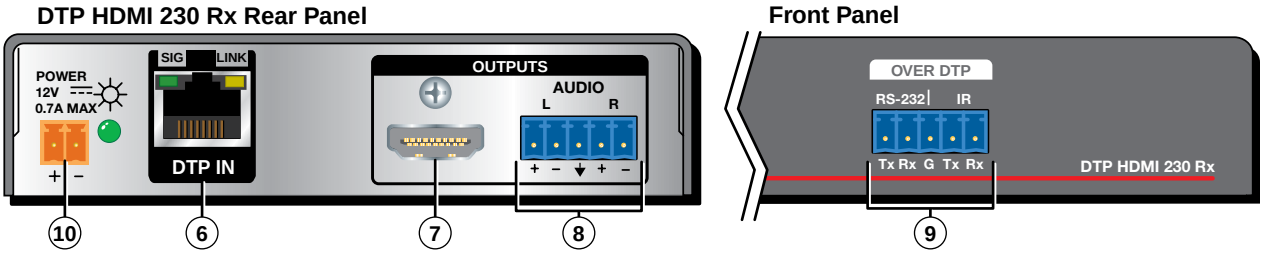


Figure 3. DTP HDMI 230 Rx Connectors

⑥ **DTP Input RJ-45 connector** — Connect one end of the TP cable from the transmitter output connector to this RJ-45 female connector. Ensure the opposite end of this cable is connected to the transmitter DTP Output RJ-45 connector (see **item** ④ on the previous page).

ATTENTION: Do not connect this device to a telecommunications or computer data network.

NOTE: See **TP cable termination and recommendations** on page 7 to properly wire the RJ-45 connectors and for detailed **NOTES**.

Signal LED — Indicates the unit is receiving a valid signal on the DTP In connector.

Link LED — Indicates a valid link is established between the units on the DTP input and output cable.

⑦ **HDMI output connector** — Connect a display with an HDMI input port (or DVI input port, with an appropriate adapter) to display the transmitted direct digital image.

⑧ **Audio output connector** — This 5-pole, 3.5 mm captive screw connector outputs the transmitted, unamplified, line level analog audio. Connect an audio device, such as an audio amplifier or powered speakers.

See figure 4 to properly wire a captive screw output connector. Use the supplied tie-wrap to strap the audio cable to the extended tail of the connector.

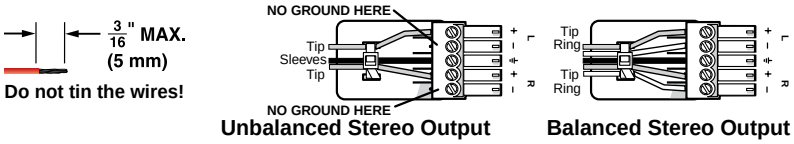


Figure 4. Captive Screw Connector Wiring for Stereo Audio Output

ATTENTION: For unbalanced audio, connect the sleeves to the ground contact. **Do not** connect the sleeves to the negative (-) contacts.

NOTES:

- If you have removed the ground jumpers (see **Disconnecting the Ground** on page 11) because of ground potential differences, the DTP HDMI 230 **cannot** extend analog audio. **No** analog audio is output.
- The length of exposed wires is critical. The ideal length is 3/16 inch (5 mm).
  - If the stripped section of wire is longer than 3/16 inch, the exposed wires may touch, causing a short circuit.
  - If the stripped section of wire is shorter than 3/16 inch, wires can be easily pulled out even if tightly fastened by the captive screws.
- Do not tin the power supply leads before installing them in the connector. Tinned wires are not as secure in the connector and could be pulled out.

⑨ **RS-232 and IR connector** — Connect a serial RS-232 signal, a modulated IR signal, or both to this 3.5 mm, 5-pole captive screw connector for bidirectional RS-232 and IR communication (see **RS-232 and IR connector wiring** on page 9 to wire the connector).

⑩ **Power input connector** — Plug the included external 12 VDC power supply into either this 2-pole connector **or** the power input connector on the transmitter (see **item** ⑤ on the previous page) (see **Power supply wiring** on page 8 to wire the connector).

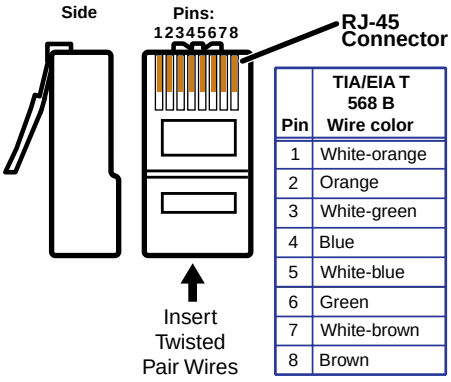
NOTES:

- One power supply is included with the transmitter and **normally** can power both units.
- If you have removed the ground jumpers (see **Disconnecting the Ground** on page 11) because of ground potential differences, one DTP HDMI 230 unit **cannot** remotely power the other unit. Each unit **requires** a local power supply.

Connector and Cable Details

TP cable termination and recommendations

Figure 5 details the **TIA/EIA T 568B** wiring standard. Use this standard to terminate TP cables with RJ-45 connectors.



Pin	TIA/EIA T 568 B Wire color
1	White-orange
2	Orange
3	White-green
4	Blue
5	White-blue
6	Green
7	White-brown
8	Brown

Figure 5. TP Cable Termination

NOTE: Do **not** use Extron UTP23SF-4 Enhanced Skew-Free AV UTP cable or STP201 cable to link the transmitter and receiver. The DTP HDMI 230 Tx/Rx does not work properly with these cables.

Supported cables —

The DTP HDMI 230 is compatible with CAT 5e, 6, 6a, and 7 shielded twisted pair (F/UTP, SF/UTP, and S/FTP) and unshielded twisted pair (U/UTP) cable.

Cable recommendations —

Extron recommends using the following practices to achieve full transmission distances up to 230 feet (70 m) and reduce transmission errors.

- Use the following Extron XTP DTP 24 SF/UTP cables and DTP 24 connectors for the best performance:
  - **XTP DTP 24/1000** Non-Plenum 1000’ (305 m) spool 22-236-03
  - **XTP DTP 24P/1000** Plenum 1000’ (305 m) spool 22-235-03
  - **XTP DTP 24 Plug** Package of 10 101-005-02
- If not using XTP DTP 24 cable, at a minimum, Extron recommends 24 AWG, solid conductor, STP cable with a minimum bandwidth of 400 MHz.
- Terminate cables with shielded connectors to the TIA/EIA T 568 B standard.
- Use no more than two pass-through points, which may include patch points, punch down connectors, couplers, and power injectors. If these pass-through points are required, use CAT 6 or 6a shielded couplers and punch down connectors.

NOTE: When using CAT5e and CAT6 cable in bundles or conduits, consider the following:

- Do not exceed 40% fill capacity in conduits.
- Do not comb the cable for the first 20 meters, where cables are straightened, aligned, and secured in tight bundles.
- Loosely place cables and limit the use of tie wraps or Velcro®.
- Separate twisted pair cables from AC power cables.

Power supply wiring

NOTES:

- One power supply is included with the transmitter and **normally** can power both units.
- If you have removed the ground jumpers (see **Disconnecting the Ground** on page 11) because of ground potential differences, one DTP HDMI 230 unit **cannot** remotely power the other unit. Each unit **requires** a local power supply.

Figure 6 shows how to wire the connector. Use the supplied tie-wrap to strap the power cord to the extended tail of the connector.

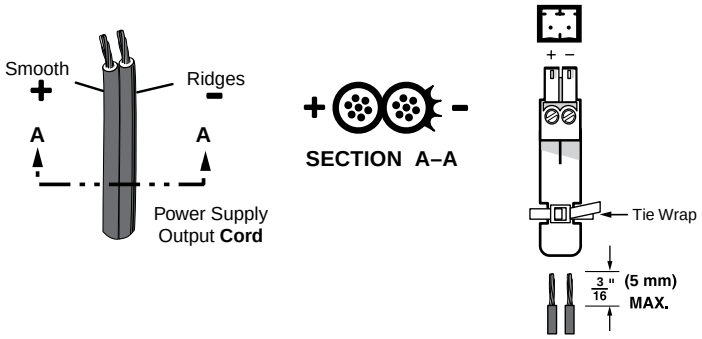


Figure 6. Power Connector Wiring

CAUTION: Electric shock hazard —

- The two power cord wires must be kept separate while the power supply is plugged in. Remove power before wiring.
- The length and preparation of exposed wires is important (see the second and third audio connector **NOTES** on page 6 for details).

ATTENTION:

- This product is intended to be supplied by a Listed Power Unit marked “Class 2” or “LPS,” rated 12 VDC, 1.0 A minimum. Always use a power supply supplied by or specified by Extron. Use of an unauthorized power supply voids all regulatory compliance certification and may cause damage to the supply and the end product.
- Unless otherwise stated, the AC/DC adapters are not suitable for use in air handling spaces or in wall cavities.
- The installation must always be in accordance with the applicable provisions of National Electrical Code ANSI/NFPA 70, article 75 and the Canadian Electrical Code part 1, section 16. The power supply shall not be permanently fixed to a building structure or similar structure.
- Power supply voltage polarity is critical. Incorrect voltage polarity can damage the power supply and the unit. The ridges on the side of the cord (see figure 6) identify the power cord negative lead.

To verify the polarity before connection, plug in the power supply with no load and check the output with a voltmeter.

RS-232 and IR connector wiring

Figure 7 shows how to wire the RS-232 connector.

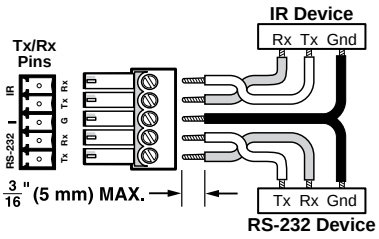


Figure 7. RS-232 Connector Wiring

NOTES:

- The IR Tx and Rx line pair and the RS-232 Tx and Rx line pair must each cross once between this connector and the source or destination.
- The length and preparation of exposed wires is important (see the second and third audio connector **NOTES** on page 6 for details).

Operation

Figure 8 shows the location of the power indicators on the front and rear panels of the transmitter and receiver.

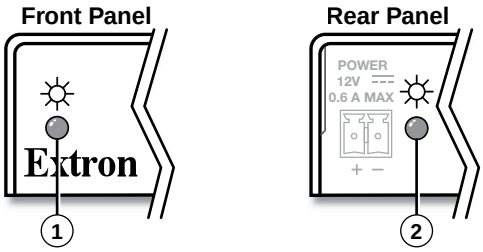


Figure 8. Power Indicators

① **Power (and signal) LED (front panel)** —

Amber — The unit is receiving power, either locally or remotely (on the DTP cable).

Green — The unit is receiving an active HDMI input, either on the HDMI input if a transmitter, or transmitted on the DTP cable if a receiver.

② **Power LED (rear panel)** —

Amber — The unit is receiving power remotely (on the DTP cable).

Green — The unit is receiving power locally.

After the transmitter, the receiver, and their connected devices are powered up, the system is fully operational. If any problems are encountered, ensure all cables are routed and connected properly.

NOTE: Ensure that the video source and display selected for the DDC are properly connected to the transmitter and receiver pair, and that the transmitter, the receiver, and the display have power applied **before** power is applied to the video source. If the other devices are not turned on before the video source, the image may not appear.

Reference Information

This section provides procedures for mounting the DTP HDMI 230 Tx/Rx transmitter and receiver and disconnecting the ground between them.

Mounting the Transmitter or Receiver

ATTENTION:

- Installation and service must be performed by authorized personnel only.
- Avoid ground potential differences between the transmitter and receiver installation sites, which can lead to **equipment damage** or a missing or unstable picture. If a potential difference cannot be avoided, remove the ground connection between the units and locally power both units (see **Disconnecting the Ground** on the next page).

The 1-inch high, quarter rack width DTP HDMI 230 transmitter or receiver can be placed on a table, mounted in a rack, or mounted under a desk or table. The receiver can also be mounted on a projector bracket.

Tabletop Use

Affix the included rubber feet to the bottom of the unit and place it in any convenient location.

Mounting kits

Mount the unit using any optional compatible mounting kit listed on the Extron website (**www.extron.com**), in accordance with the directions included with the kit. For rack mounting, see **UL Rack-Mounting Guidelines** on the next page.

UL Rack-Mounting Guidelines

The following Underwriters Laboratories (UL) requirements pertain to the installation of the unit into a rack.

- **Elevated operating ambient temperature** — If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consider installing the equipment in an environment compatible with the maximum ambient temperature (TMA = +122 °F, +50 °C) specified by Extron.
- **Reduced air flow** — Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
- **Mechanical loading** — Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
- **Circuit overloading** — Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- **Reliable earthing (grounding)** — Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (such as use of power strips).

Disconnecting the Ground

If you cannot resolve a ground potential difference between the transmitter and receiver installation sites (as suggested by a missing or unstable picture), remove the ground connection between the units as follows:

NOTE: Once you have removed the ground jumpers, the DTP HDMI 230 **cannot** extend analog audio and one unit **cannot** remotely power the other. **No** analog audio is output and each unit **requires** a local power supply.

1. Disconnect any cables and remove the transmitter and receiver from any rack or other installation option.
2. Remove and retain the screws securing the covers to the transmitter and receiver. Slide the covers forward slightly and lift them off both units (see figure 9).
   - **Transmitter** — Six screws, two on each side and two on top
   - **Receiver** — Eight screws, three on each side and two on top

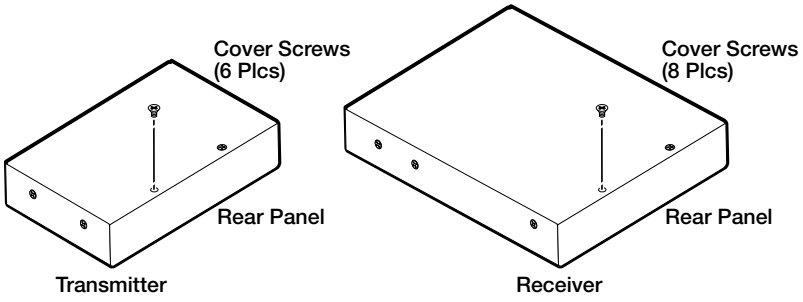


Figure 9. Opening the Transmitter and Receiver

3. Locate, **lift off**, and discard jumpers JMP2 and JMP3 from both units (see figure 10).

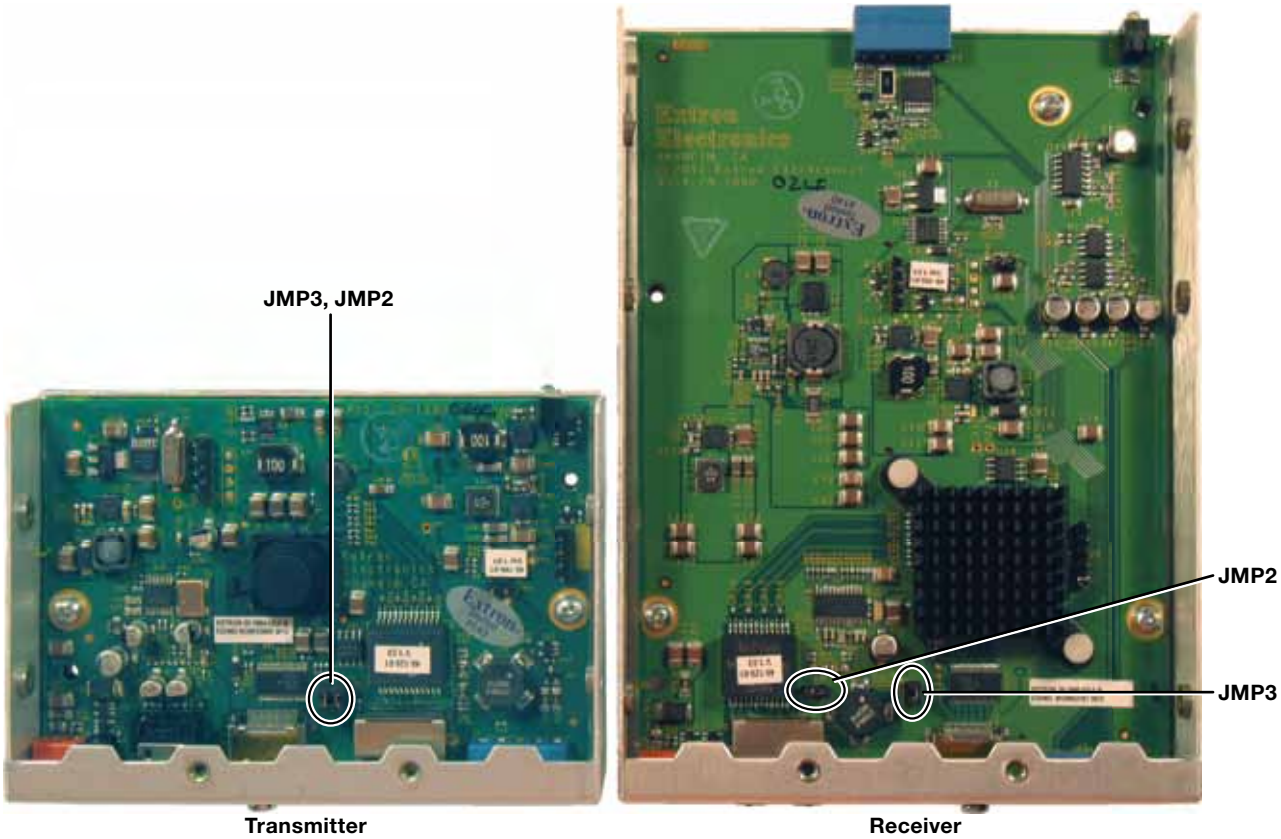


Figure 10. Jumper Locations

4. Reinstall the covers on both units, securing them in place with the screws removed in step 2.
5. Reinstall both units in their racks or other installation option (see **Mounting the Transmitter and Receiver** on page 10).
6. **If you are using shielded cable**, disconnect the cable shield from the connector at either end of the cable.
7. Obtain a second 12 V power supply (one supply is provided with the transmitter and normally powers both units), and locally power both units (see **Power supply wiring** on page 8).