Active VGA/Audio Balun Kit
500145 (kit), 500146 (TX), 500147 (RX)

Installation Guide

P/N: 94-000661-A SE-000661-A

MuxLab

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1. Overview

1.1. Description

The Active VGA/Audio Balun Kit allows VGA or component video, analog stereo audio and/or digital audio, one IR-emitter signal, and one RS232 signal to be transmitted via a cost-effective unshielded copper twisted cable in a point-to-point configuration.

The product supports remote power pass-thru and is DDC compliant with all "plug-and-play" laptops, PCs and displays. The product supports up to 1920 x 1200 pixels and 1080p resolution, and features manual gain adjustment and local monitor output for added versatility.

The product supports simultaneous stereo audio and digital audio transmission. The product provides IR-emitter pass-through connectivity, supports up to 1080p resolution, and features manual brightness and sharpness adjustments.

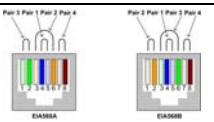
The product converts the VGA signal from an unbalanced to balanced signal, and amplifies and equalizes the signal at the receiving end. It provides excellent image quality and minimizes distortions due to smearing, propagation delay, and phase deviation. The transmitter and receiver are shown on page 9.

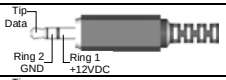
Applications include digital signage, residential, boardroom, classroom, and home theater video systems.

1.2. Features

- Up to 500 ft (152 m) via Cat 5e/6 @ 720p/1080i and 1080p
- Up to 1,000 ft (305 m) via Cat 5e/6 @ 480i/p
- Supports stereo audio or digital audio
- Supports IR-Emitter and Sensor or RS-232 communication
- Manual brightness compensation
- Manual sharpness compensation
- Manual skew compensation

2. Technical Specifications

Environment	VGA, VESA VP&D 1.0, VIP ver 2.0. DDC1 and DDC2 with Analog Stereo and/or Digital Audio, IR-Emitter Pass-Through, and RS232 control			
Devices	PCs, laptops, CRT monitors, LCD monitors, plasma screens, DLP projectors			
Transmission	Transparent to the user			
Bandwidth	Up to 220 MHz (1920 x 1200 resolution), 1080p			
Input Impedance	DB15HD: 75 ohms		Stereo Audio: 2.2 Kohms	
Output Impedance	Cat 5e/6: 100 ohms			
Connectors: Transmitter	VGA/Component Input (PC): VGA/Component Output (Local Monitor): Stereo Audio Input and output: Digital Audio Input: IR-Emitter: RS232: Transmitter Output (Cat 5e/6):		DB15HD-F DB15HD-F 2 x 3.5mm jack female RCA 3.5mm Mono jack DB9 RJ45 shielded	
Connectors: Receiver	Receiver Input (Cat 5e/6): VGA/Component Output (PC): Stereo Audio output: Digital Audio output: IR-Sensor: RS232:		RJ45 shielded DB15HD-F 3.5mm jack female RCA 3.5mm Stereo jack DB9	
Maximum Distance: **VGA via Cat 5e/6 UTP** **Cable (or better)**	640 x 480 (VGA): 800 x 600 (SVGA): 1024 x 768 (XGA): 1280 x 1024 (SXGA):	1,000 ft (305 m) 1,000 ft (305 m) 1,000 ft (305 m) 850 ft (260 m)	1600 x 1200 (UXGA): 1366 x 768 (WXGA): 1680x1050 (WSXGA): 1920 x 1200 (WUXGA):	800 ft (245 m) 850 ft (260 m) 850 ft (260 m) 600 ft (180 m)
Maximum Distance: **Audio via Cat 5e/6 UTP** **Cable (or better)**	Analog Stereo Audio: Digital Audio:	1,000 ft (305 m) 1,000 ft (305 m)		
RJ45 Pin Configuration **Reverse Polarity Sensitive** ***Use EIA/TIA 568A or 568B straight-through wiring***	Green (Y): Blue (Pb): Red (Pr): IR-Emitter, IR-Sensor, RS-232:	Pin 4 (R) Pin 5 (T) Pin 1 (R) Pin 2 (T) Pin 7 (R) Pin 8 (T) Pin 3 (R) Pin 6 (T)		
Brightness Adjustment	Brightness control via rotary switch on the receiver (Factory default setting: "None")			
Sharpness Adjustment	Sharpness control via potentiometer on the receiver (Factory default setting: Completely rotated counterclockwise)			
Skew Adjustment	Skew control via 3 potentiometers (R, G, B) on the receiver (Factory default setting: Completely rotated counterclockwise)			
LED Indicators	Tx Balun: Power: One (1) green LED Sync: One (1) green LED Rx Balun: Power: One (1) green LED			
Cable	Cat 5e/6 unshielded twisted pair (or better)			
Power Supplies	110-240V/12VDC/0.5A, 12VDC power jacks Removable AC blades included for North America, Continental Europe & UK			
Temperature	Operating: 0°C to 40°C Storage: -10°C to 70°C Humidity: Up to 95% non-condensing			
Enclosure	Black. ABS fire retardant plastic			
Dimensions	6.00" x 4.25" x 1.50" (15.3 cm x 10.8 cm x 3.8 cm)			
Weight	2 lbs (0.9 kg)			
Regulatory	FCC/CE, RoHS			
Warranty	Two (2) years			
Order Information	500145: Active VGA/Audio Balun Kit 500146: Active VGA/Audio Balun, TX, incl PSU 500147 Active VGA/Audio Balun, RX, incl PSU			

IR Sensor Configuration	Tip: Data Ring 1: +12 VDC Ring 2: GND	
IR Emitter Configuration	Tip: Data Ring: GND	
IR Sensor Specifications (500999)	IR Wavelength: Carrier frequency: Receiving Distance: Power requirements:	940 nm 38 KHz 15 m 12 VDC @ 2 mA
IR Emitter Specifications (500998)	IR Wavelength:	940 nm

3. Installation Procedure

3.1. Parts List

The Active VGA/Audio Balun Kit (500145) comes with the following parts:

- Transmitter
- Receiver
- Two (2) External Power Supplies (12 VDC, 0.5 A)
- Blades for North America, Continental Europe & UK
- Installation Guide

Please verify that all pieces are present before proceeding.

VGA & audio jumper cables and Cat 5e/6 cable are not included.

RS232 DB9 to DB9 cable are not included.

IR Sensor (P/N 500999) and IR Emitter (P/N 500998) are not included and can be ordered separately.

3.2. Product Overview

The external connections and diagnostic indicators of the Active VGA/Audio Balun are described on the following pages. Please familiarize yourself with them before proceeding with the installation.

Figure 1: Transmitter and Receiver

3.3. Pre-Installation Checklist

There are two (2) components that must be verified before installation can begin: The transmitter and the receiver.

1. The transmitter is connected to the VGA video source, usually a PC or Laptop computer, via VGA video & audio cables (not included).

2. The transmitter is connected to the receiver by a Cat 5e/6 (or higher) unshielded twisted pair cable (not included).

3. The receiver is connected to the display equipment, usually a projector or screen, via VGA video & audio cables (not included).

4. Verify that the desired image resolution is within the specifications of the Active VGA/Audio Balun Kit.

3.4. Installation Procedure

Verify that the distance between the Active VGA/Audio Balun transmitter and receiver are within MuxLab specifications (see Technical Specifications). In order to install the transmitter, please follow the steps below:

1. Connect the transmitter to the audio-video source with the appropriate VGA video & audio cables.
2. If the Analog Audio (AA) interface is used (Stereo 3.5 mm), toggle the Audio switch to the "AA" position. If the Digital Audio (DA) interface is used (RCA), toggle the Audio switch to the "DA" position.

Figure 2: Position of the Audio Switch on the Transmitter

3. (Optional) Connect an infrared transmitter to the 3.5 mm connector.
4. (Optional) Connect the RS232 to the control source with the appropriate DB9 to DB9 cables. Note: If the infrared 3.5 mm connector is plugged, the RS232 interface is disabled.

5. Connect a length of Cat 5e/6 (or higher) UTP cable to the transmitter. Ensure that the wiring is in accordance with EIA-568A or EIA-568B standards and is straight-through.

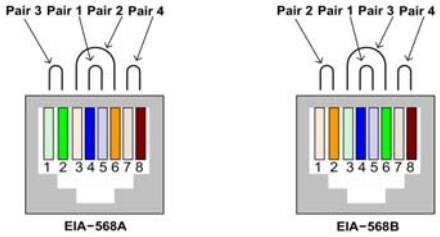


Figure 3: Wiring Configuration

6. Connect the 12 VDC power supply to the transmitter.

7. Plug the power supply into an AC power outlet. If power is present, the green power LED will be ON.

To install the receiver, please follow the steps below:

8. Connect the Active VGA/Audio Balun receiver to the display equipment with the appropriate VGA video & audio cables.

9. If the Analog Audio (AA) interface is used (Stereo 3.5 mm), toggle the Audio switch to the "AA" position. If the Digital Audio (DA) interface is used (RCA), toggle the Audio switch to the "DA" position.

Figure 4: Position of the Audio Switch on the receiver

10. (Optional) Connect an infrared receiver to the 3.5 mm connector.

11. (Optional) Connect the RS232 to the equipment with the appropriate DB9 to DB9 cables. Note: If the infrared 3.5 mm connector is plugged, the RS232 interface is disabled. Set the RS232 interface as follows:

    BAUD Rate: 9600
    Data bits: 8
    Stop bits: 1
    Parity: None
    Flow control: Hardware

12. Connect the UTP cable to the Video IN/UTP connector of the receiver.

13. Connect the second 12 VDC power supply to the receiver.

14. Plug the power supply into an AC power outlet. If power is present, the green power LED will be ON.

15. The brightness rotary switch adjusts the luminance level to compensate for low frequency signal loss due to the Cat 5e/6 cable.

16. The sharpness potentiometer adjusts the equalization to compensate for high frequency signal loss due to the Cat 5e/6 cable.

17. The skew (R G B potentiometers) adjust the delay between the red, green, and blue colors to compensate for the delay differences due to the Cat 5e/6 cable.

18. To adjust the picture quality, rotate the brightness rotary switch and/or sharpness and/or skew potentiometers on the rear panel of the Active VGA/Audio Balun receiver. The factory default position for the brightness (“Bright”) is “None,” and the factory default position for the sharpness (“Sharp”) and skew (R G B) is zero (rotated completely counterclockwise).

Figure 5: Brightness and Sharpness Adjustment

19. The following table provides suggested rotary switch settings for adjusting picture brightness.

Brightness Setting	Actual Gain
Less	-25%
None	0%
Medium	25%
High	50%

Table 1: Rotary Switch Settings for Brightness Adjustment

20. To adjust picture sharpness, begin with the sharpness potentiometer ("Sharp") rotated completely counterclockwise, and slowly rotate it in the clockwise direction until picture details become clear.

Note: For display equipment with automatic brightness control (for example, certain models of projectors), complete all installation procedures and ensure that the brightness rotary switch ("Bright") is set to "None" and the sharpness potentiometer ("Sharp") is rotated completely counterclockwise before turning the display equipment on. Otherwise, the display could override the brightness adjustment feature of the Active VGA/Audio Balun Kit.

21. After sharpness and brightness have been adjusted, adjust the skew in order to align the red green and blue bars. To do this, open the electronic version of this manual and look at the skew correction pattern on the screen (see Figure 6). The R G B potentiometers adjust the red, green and blue colors horizontally. Using the potentiometer, move the three colored lines so they align perfectly. To move a color to the right of the screen, turn the corresponding potentiometer clockwise.

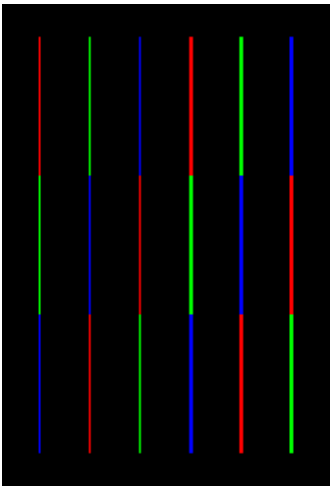


Figure 6: Pattern for Skew Correction

22. Shown below are three typical configurations.

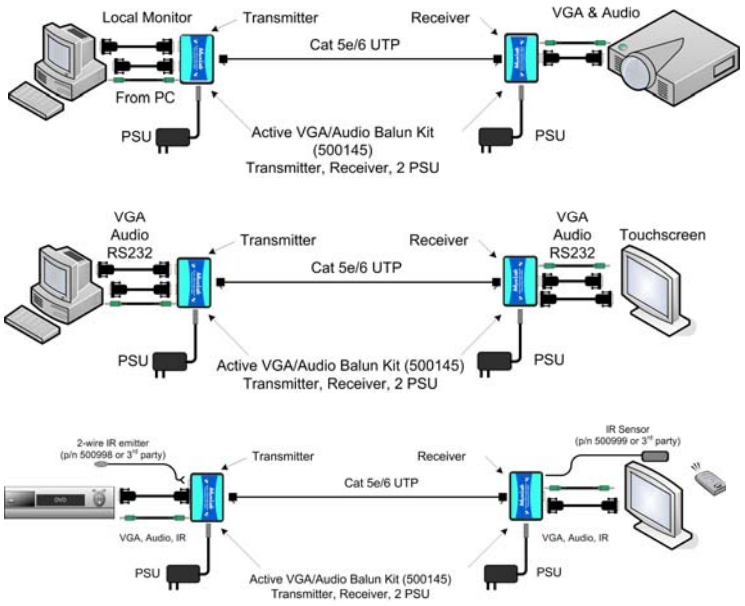


Figure 7: Typical Configurations

3.5. Cascadability

In order to distribute one (1) VGA/Audio source to more than one (1) display, up to three (3) transmitters may be cascaded via the Local Monitor port, as shown in the following diagram:

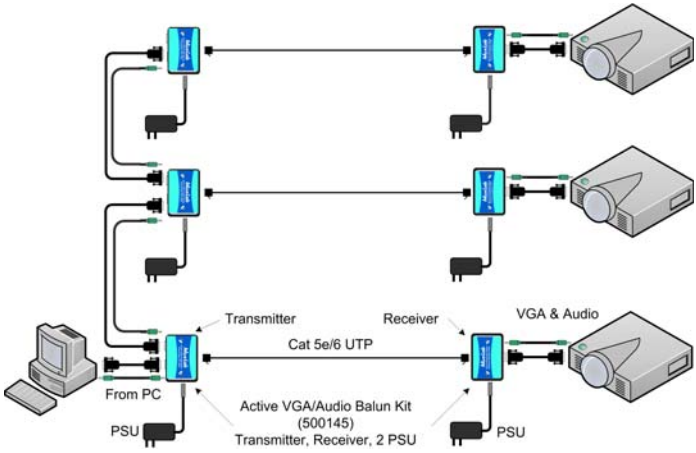


Figure 8: Cascading Illustration

4. Troubleshooting

The following table describes some of the problem symptoms, the probable causes and possible solutions. If the information below does not solve the problem, the technical support contact information can be found at the end of this section.

Problem	LED (Tx) Power	LED (Tx) Sync	LED (Rx) Power	Probable Cause	Possible Solutions
No Image No Sound No Data No IR	OFF	OFF	OFF	No power	• Check power connections
No Image	OFF	OFF	ON	No power at Transmitter	• Check power connections
No Image	ON	---	OFF	No power at receiver	• Check power connections
No Image	ON	OFF	ON	Source not present or cable problem	• Check VGA cable
No Image	ON	ON	ON	Cat 5e/6 cable	• Check continuity • Check correct wiring
Smearing	ON	ON	ON	Cable length exceeded	• Reduce cable length • Adjust Brightness, Sharpness & Skew
Ghosting	ON	ON	ON	Impedance mismatch	• Check cabling • Try different source or display
Wrong Colors	ON	ON	ON	Swapped pairs	• Check wiring
Loss of Detail	ON	ON	ON	Cable length exceeded	• Reduce cable length • Adjust Sharpness & Skew
Shaky Image	ON	ON	ON	Too much gain	• Reduce cable length • Adjust Brightness & Sharpness
No Sound (Analog Audio)	ON	---	ON	No connection or not selected	• Check continuity • Check correct wiring • Position selection switch (DA/AA) on position AA on transmitter & receiver.
No Sound (Digital Audio)	ON	---	ON	No connection or not selected	• Check continuity • Check correct wiring • Position selection switch (DA/AA) on position DA on transmitter & receiver.
Bad Sound	ON	---	ON	Cable length exceeded	• Reduce cable length
No RS-232	ON	---	ON	IR sensor or emitter connected	• Unplug the IR connectors
No IR	ON	---	ON	Wrong pin-out	• Check IR connection

When contacting your nearest MuxLab dealer or MuxLab Technical Support, please have the following information ready:

- Unit model number.
- Cabling layout. Include model of PC and display used, cable length and type.
- Description of problem.
- List of tests performed.

5. Product Warranty Policy

Items Under Warranty - Company Policy

MuxLab guarantees its products to be free of defects in manufacturing and workmanship for the warranty period from the date of purchase. If this product fails to give satisfactory performance during this warranty period, MuxLab will either repair or replace this product at no additional charge, except as set forth below. Repair and replacement parts will be furnished on an exchange basis and will be either reconditioned or new. All replaced parts and products become the property of MuxLab. This limited warranty does not include repair services for damage to the product resulting from accident, disaster, misuse, abuse, or unauthorized modifications or normal decay of battery driven devices. Batteries, if included with the product, are not covered under this warranty.

Limited warranty service can be obtained by delivering the product during the warranty period to the authorized MuxLab dealer from whom you purchased the product, or by sending it to MuxLab. MuxLab will not accept any such product for repair without a Return Material Authorization number (RMA#) issued by its Customer Service Department and a proof of purchase date. If this product is delivered to MuxLab by mail, you agree to assume risk of loss or damage in transit, to prepay shipping charges to the warranty service location, and to use the original shipping container or equivalent.

THE ABOVE LIMITED WARRANTY IS THE ONLY WARRANTY COVERING YOUR MUXLAB PRODUCT. THERE ARE NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SOME STATES DO NOT ALLOW LIMITATIONS ON IMPLIED WARRANTIES, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

IF THIS PRODUCT IS NOT IN GOOD WORKING ORDER, YOUR SOLE REMEDY SHALL BE REPAIR OR REPLACEMENT AS PROVIDED FOR ABOVE. IN NO EVENT SHALL MuxLab BE LIABLE TO YOU FOR ANY DAMAGES, INCLUDING ANY LOSS OF PROFITS, LOST SAVINGS, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF OR INABILITY TO USE THIS PRODUCT, EVEN IF MUXLAB OR AN AUTHORISED MuxLab DEALER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES; NOR WILL MUXLAB BE LIABLE FOR ANY CLAIM BY ANY OTHER PARTY. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR CONSUMER PRODUCTS, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS. YOU MAY ALSO HAVE OTHER RIGHTS WHICH MAY VARY FROM STATE TO STATE.

Warranty Periods

Any product found to be defective within three (3) months of invoice, including one (1) month shelf life, may be returned for replacement by a new unit or a satisfactory repair within one (1) month of receiving any returned product. The customer must provide MuxLab with the serial number and proof of purchase of the defective unit being returned. All R.M.A.'s issued are subject to inspection by MuxLab, and will be returned to customer if not properly package – units must be returned in original container or equivalent. MuxLab will not accept any such product for repair without an authorization for its Technical Support department and without a return authorization number issued by MuxLab Customer Service department. For credit & replace R.M.A., customer will be liable to pay replacement invoice if defective products are not returned.

Product more than six months old, including shelf life.

The defective unit must be returned prepaid to MuxLab and then the unit will be repaired or if repair is not possible, replaced by an equivalent unit and returned to the customer within one (1) month of receiving any returned product. There is no charge for repair (parts and labor) during the full warranty period.

Items Defective and not under Warranty

For products which are no longer under warranty the policy is repair and return. An amount of 25% of the products published list price at the time of purchase will be charged. Customer must issue a purchase order to cover the cost of repair.

Each unit will be returned to the customer within one (1) month from receipt of the unit by MuxLab. The defective unit must be returned prepaid to MuxLab. The repaired unit will be returned to the customer FOB MuxLab. The repaired unit has a 90 day warranty.

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