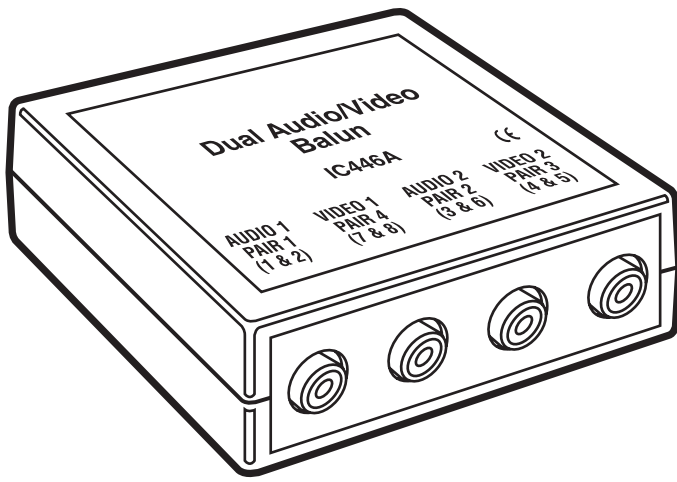




Dual Audio/Video Balun



**CUSTOMER
SUPPORT
INFORMATION**

Order toll-free in the U.S.: Call **877-877-BBOX** (outside U.S. call **724-746-5500**)
FREE technical support 24 hours a day, 7 days a week: Call **724-746-5500** or fax **724-746-0746**
Mailing address: **Black Box Corporation**, 1000 Park Drive, Lawrence, PA 15055-1018
Web site: www.blackbox.com • E-mail: info@blackbox.com

**FEDERAL COMMUNICATIONS COMMISSION AND INDUSTRY CANADA
RADIO-FREQUENCY INTERFERENCE STATEMENTS**

Class B Digital Device. This equipment has been tested and found to comply with the limits for a Class B computing device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or telephone reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an experienced radio/TV technician for help.

Caution: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

To meet FCC requirements, shielded cables are required to connect this device to other Class B certified devices.

This digital apparatus does not exceed the Class B limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe B prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

TRADEMARKS USED IN THIS MANUAL

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VELCRO® is a registered trademark of Velcro USA Inc.

Any other trademarks mentioned in this manual are acknowledged to be the property of the trademark owners.

**NORMAS OFICIALES MEXICANAS (NOM)
ELECTRICAL SAFETY STATEMENT**

INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
 - A: El cable de poder o el contacto ha sido dañado; u
 - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
 - C: El aparato ha sido expuesto a la lluvia; o
 - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
 - E: El aparato ha sido tirado o su cubierta ha sido dañada.

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1. Specifications

Cable Required:	<p>Between balun pairs: Unshielded twisted pair (UTP): Construction standard: Category 3 or higher; Gauge: 24 AWG or lower; Core: Solid; Termination: RJ-45 plugs; Pairs: Four (eight wires used) to carry all video and audio channels; Impedance: 100 ohms at 1 MHz; Maximum capacitance: 20 pF/ft. (6.1 pF/m); Maximum attenuation: 6.6 dB/1000 ft. (2 dB/km) at 1 MHz;</p> <p>To attached devices: (4) Standard RCA phono cables: (2) for video, (2) for audio</p>
Compliance:	FCC Class B, IC Class/classe B; CISPR Pub. 22 Class B
Standard:	Composite (baseband) video: NTSC, PAL, or SECAM
Transmission:	Transparent to users (automatic, no delay)
Impedance:	Phono side: 75 ohms; UTP side: 100 ohms
Bandwidth:	Video: DC to 8 MHz; Audio: 20 Hz to 22 kHz
Maximum RF Input:	1.1 volts at 60 Hz
Insertion Loss:	Less than 2 dB over the DC-to-8-MHz frequency range
Return Loss:	Greater than 15 dB over the DC-to-8-MHz frequency range
Common-Mode Rejection:	Greater than 40 dB at 8 MHz
Maximum Distance:	<p>With Category 3 cable: 1500 ft. (457.2 m) for color video, 2000 ft. (609.6 m) for black & white video;</p> <p>With Category 5 cable: 2000 ft. (609.6 m) for color video, 2500 ft. (762 m) for black & white video</p>

DUAL AUDIO/VIDEO BALUN

Connectors:	(1) RJ-45 female and (4) RCA female
RJ-45 Pins Used:	All: Pin 1 is audio 1 ring, Pin 2 is audio 1 tip, Pin 3 is audio 2 ring, Pin 4 is video 2 ring, Pin 5 is video 2 tip, Pin 6 is audio 2 tip, Pin 7 is video 1 ring, and Pin 8 is video 1 tip
Temperature Tolerance:	Operating: 32 to 131°F (0 to 55°C); Storage: -4 to +185°F (-20 to +85°C)
Humidity Tolerance:	Up to 95% noncondensing
Enclosure:	Fire-retardant plastic with included optional VELCRO® mounting material
Size:	2.3"H x 2.4"W x 1"D (5.8 x 6.1 x 2.5 cm)
Weight:	2.8 oz. (79.4 g)

2. Introduction

With the Dual Audio/Video Balun, you can take two pairs of composite baseband video and audio signals from phono cables and transmit them across Category 3 or better unshielded twisted-pair (UTP) cable, which is already wired into most commercial sites. Use pairs of baluns to transmit composite video and/or audio: In a two-way (full-duplex) application, the balun on each end takes a single composite baseband video signal and a monaural audio signal from RCA type phono cables, converts the signals, and transmits them over UTP cable to the other balun, which converts them back and sends them to their destination. Or you can send both sets of signals, or one video signal plus stereo audio, in the same direction.

Connect the Dual Audio/Video Balun to a site's structured cabling through a modular wall jack in the work area. Each balun has four RCA connectors at one end and an RJ-45 jack at the other end.

The Dual Audio/Video Balun is designed for use with CCTV cameras and monitors, videocassette recorders, camcorders, PC-based teleconferencing equipment, and other baseband audiovisual devices, but is especially useful in two-way videoconferencing applications.

These baluns must be used in pairs.

3. Installation

To install a pair of Dual Audio/Video Baluns, follow the steps below.

CAUTION!

Do not attempt to open the housing. There are no user-serviceable parts inside the Dual Audio/Video Balun.

Connect two baluns in a point-to-point configuration only. Do not attempt to connect them in a multipoint configuration; this will degrade your signal quality.

To avoid electrical interference, keep your equipment, baluns, and cables away from neon or fluorescent lights, generators, electric motors, high-voltage lines, and other sources of high-voltage or high-frequency electromagnetic signals.

Keep in mind that video and audio 1 form one set of signals, while video and audio 2 form another set.

1. Make sure that the video devices at either end are not too far away from each other (refer to the **Maximum Distance** specification in **Chapter 1**). If either device is beyond the reach of the balun at the other end, the signals the device receives will be weak or nonexistent.
2. Follow the manufacturer's instructions for (a) turning off power to the video and audio equipment you will be attaching and (b) disconnecting that equipment from AC power and from all other devices.
3. Make certain that the telecommunications outlets and cross-connects to which you will connect the baluns are configured properly and are labeled so that the circuit can be identified.

CAUTION!

Do not connect the Dual Audio/Video Balun to a telecommunication outlet wired to unrelated equipment. Making such a connection may damage the equipment and/or the balun. Make sure that all wiring is straight-through-pinned.

4. Verify that the twisted-pair circuit you want to use is not already being used for other LAN or telephone equipment.

5. *Optional:* Each balun comes with VELCRO® mounting pads. To mount a balun to a surface, first make sure that that surface is free of dust, oil, etc., so the VELCRO will adhere to it. Then peel off the adhesive backing, attach one side of the pads to the balun, and attach the other side to the surface.

CAUTION!

Do *not* mount the balun over equipment-ventilation openings. Doing so might damage the balun or cause the equipment to overheat.

- 6A. *If your application is two-way (that is, one video-and-monaural-audio signal pair going in one direction and one pair going the other direction):* Run four RCA phono cables from one of the baluns to the devices you want to attach:

- one from the balun's VIDEO 1 port to a device's VIDEO AUX IN port;
- one from the balun's VIDEO 2 port to a device's VIDEO AUX OUT port;
- one from the balun's AUDIO 1 port to a device's AUDIO IN port; and
- one from the balun's AUDIO 2 port to a device's AUDIO OUT port.

Run another four cables from the other balun to the devices at the other end:

- one from the balun's VIDEO 1 port to a device's VIDEO AUX OUT port;
- one from the balun's VIDEO 2 port to a device's VIDEO AUX IN port;
- one from the balun's AUDIO 1 port to a device's AUDIO OUT port; and
- one from the balun's AUDIO 2 port to a device's AUDIO IN port.

(These cables must all have RCA male connectors on the balun end.) Make sure that the VIDEO IN and AUDIO IN ports of the device(s) on one end of the link are connected to the VIDEO OUT and AUDIO OUT ports of the appropriate device(s) on the other end. Refer to Figure 3-1 on the next page.

- 6B. *If your application is one-way with dual video and mono audio (that is, two video-and-monaural-audio signal pairs going the same direction):* Run four RCA phono cables from each balun to the attached devices:

- On the source end, these cables should go from the balun's VIDEO and AUDIO ports to the device(s)' VIDEO AUX OUT and AUDIO OUT ports.
- On the destination end, these cables should go from the balun's VIDEO and AUDIO ports to the device(s)' VIDEO AUX IN and AUDIO IN ports.

(These cables must have RCA male connectors on the balun end.) Refer to Figure 3-1.

6C. *If your application is one-way with stereo audio (that is, one or two video signals and one left/right pair of stereo audio signals going the same direction):* Run three or four RCA phono cables from each balun to the attached devices.

- On the source end, these cables should go from one of the balun's VIDEO ports to a (primary) video-source device's VIDEO AUX OUT port, from the balun's other VIDEO port to any secondary video-source device's VIDEO AUX OUT port, from the balun's AUDIO 1 port to the audio-source device's AUDIO LEFT OUT port, and from the balun's AUDIO 2 port to the audio-source device's AUDIO RIGHT OUT port.
- On the destination end, these cables should go from one of the balun's VIDEO ports to a (primary) video-destination device's VIDEO AUX IN port, from the balun's other VIDEO port to any secondary video-destination device's VIDEO AUX IN port, from the balun's AUDIO 1 port to the audio-destination device's AUDIO LEFT IN port, and from the balun's AUDIO 2 port to the audio-destination device's AUDIO RIGHT IN port.

(These cables must have RCA male connectors on the balun end.) Refer to Figure 3-1.

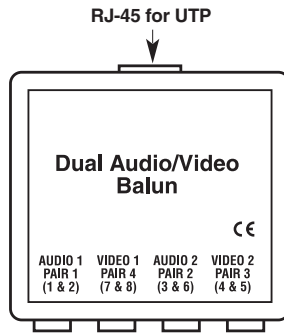


Figure 3-1. The balun and its connectors.

7. Connect one end of a UTP cable into each balun's RJ-45 modular jack. To carry the first video signal, these cables must carry a wire pair pinned to RJ-45 Pins 7 and 8. To carry the second video signal, the cables must carry a pair pinned to Pins 4 and 5. To carry the first audio signal, the cables must carry a pair pinned to Pins 1 and 2. To carry the second audio signal, the cables must carry a pair pinned to Pins 3 and 6.

- Plug the other end of each UTP cable into the appropriate video wall outlet or patch panel. When this is done, a complete cabling circuit should run between the two baluns, as shown in Figure 3-2.

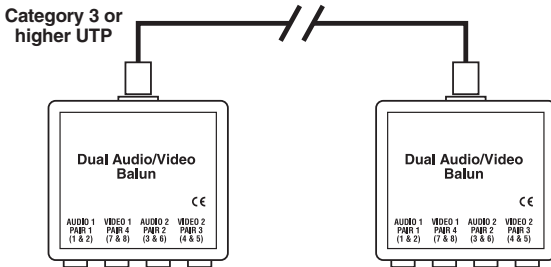


Figure 3-2. Two baluns cabled together.

- Reconnect and power up the video and audio equipment.

When you're finished installing the baluns and devices, the full system might resemble the one shown in Figure 3-3. Your Dual Audio/Video Balun system should be ready for continuous operation.

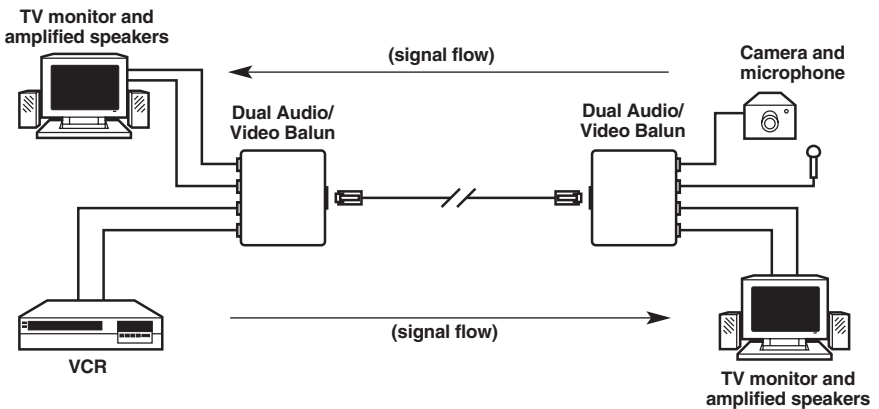


Figure 3-3. A hypothetical Dual Audio/Video Balun system.

4. Troubleshooting

4.1 Things to Try If Problems Occur

If at any time your Dual Audio/Video Balun system does not seem to be working properly, take these steps:

1. Following the manufacturer's instructions, perform diagnostics on your video and/or audio equipment, and verify that it works independently when the baluns are not involved.
2. If this doesn't solve the problem, check all cable connections and the integrity and pinning of your site wiring. Make sure video cables go to video devices, audio cables go to audio devices, and that inputs on one end are wired to outputs on the other. Also make sure that the patch cord you are running between each balun and your site's wiring system is the correct cable type and is properly pinned (see the **Cable Required** specification in **Chapter 1**). Fix any split-pair or polarity problems you find.
3. You might be trying to transmit the audio/video signals across too great a length of cable. The maximum distance over which the baluns can transmit and receive video signals depends on your cable and your video and audio equipment; refer to the **Maximum Distance** specification in **Chapter 1**.
4. Make sure that the baluns and all attached cables and equipment are well away from neon and fluorescent lights, generators, electric motors, high-voltage lines, and other sources of high-voltage or high-frequency electromagnetic signals.
5. If possible, replace the Dual Audio/Video Baluns involved in the problem with Dual Audio/Video Baluns that are known to be working, one at a time. If at any point the problem goes away, there is probably a defect in the balun you just replaced.
6. If you still cannot diagnose the problem, call Black Box for technical support as described in the next section.

4.2 Calling Black Box

If you determine that the Dual Audio/Video Balun is malfunctioning, *do not attempt to alter or repair the unit*. It contains no user-serviceable parts. Contact Black Box Technical Support at 724-746-5500.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- the nature and duration of the problem;
- when the problem occurs;
- the components involved in the problem;
- any particular application that, when used, appears to create the problem or make it worse; and
- the results of any testing you've already done.

4.3 Shipping and Packaging

If you need to transport or ship your Dual Audio/Video Balun:

- Package it carefully. We recommend that you use the original container.
- If you ever ship the balun back to us for any reason, contact Black Box to get a Return Authorization (RA) number.



Doc. No. 94-000339-A

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