

# USING BALUNS

Baluns have been around for nearly 60 years but only in the last five years have they been used in AV applications. Here's how to put them to work for cost-effective system wiring.

## Cat5 COMPATIBILITY

The key to baluns is Cat5. All Cat5 cabling conforms to an industry standard, so transmission is not dependent on the manufacturer, but on the cable itself.



Cat5: Four twisted pairs at 24AWG (twisted about three times per inch)  
Pair 1: blue  
Pair 2: orange  
Pair 3: green  
Pair 4: brown

## WHEN TO AVOID BALUNS

- When broadcast-quality signals are required.
- When original coaxial and twisted pair audio cabling is in place. Baluns can't enhance a signal, so there's no sense tearing out previous work.
- When other data is running on the cable. A Cat5 run carrying some data but with an unused pair should not be used.

## HOW TO USE BALUNS

**Definition:**  
**Balun** – A device having distributed electrical constants used to couple a balanced system or device to an unbalanced system or device. The term is derived from balance-to-unbalance transformer, or **BALanced, UNbalanced.** Sometimes called "broadband transmission line matching networks" to distinguish them from conventional transformers. They can be either passive or active (requiring a power supply).

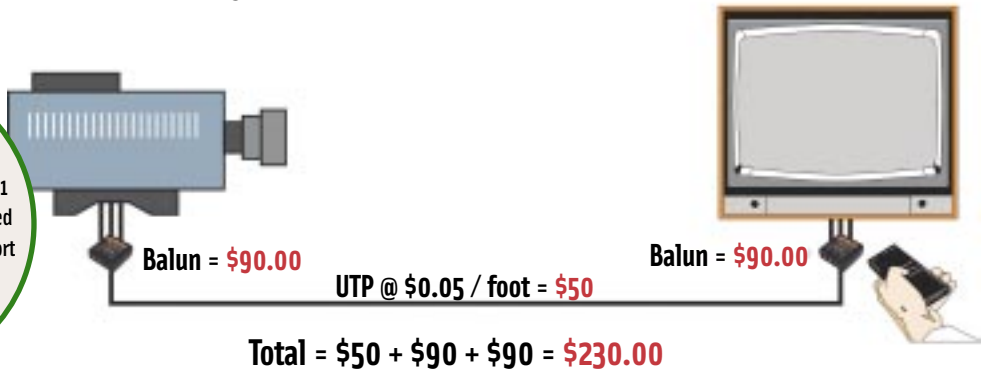
Used in pairs, baluns allow audio, video, and VGA signals to be transmitted via unshielded twisted pair (UTP) cabling, such as Cat5. Simply place matching baluns at each end of the UTP cable run and connect your AV devices.



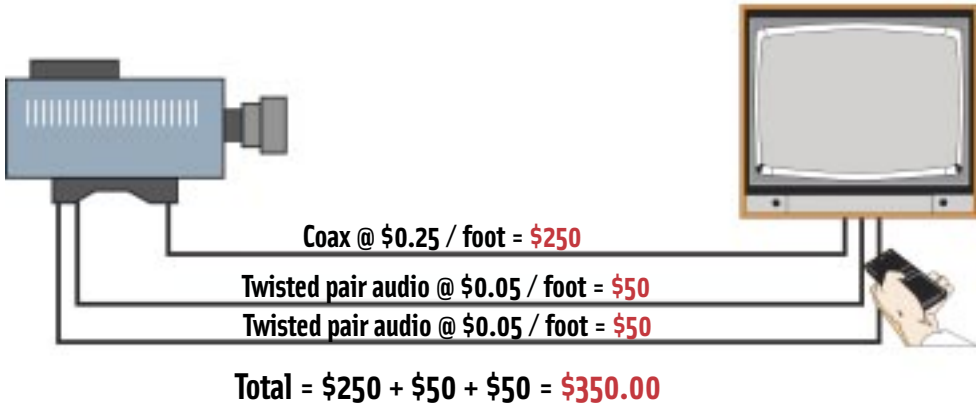
## THE BENEFITS OF BALUNS

- **Baluns extend transmission distances.** Using passive baluns, you can send video and audio signals up to 2,500 feet, and VGA signals up to 350 feet on average, although some suppliers offer repeaters or extenders that allow longer runs of Cat5 cabling.
- **Baluns can utilize existing wiring.** Many buildings already contain structured UTP cabling systems. If so, the hard work is already done for you; simply connect a balun at each end to transmit your signal.
- **Baluns reduce installation cost and increase installation efficiency.** Traditionally, a single cable could not transmit both audio and video – a cable run from a VCR to a TV 1,000 feet away requires both a coaxial line and two twisted pair audio lines. Using baluns, both audio and video signals can be transmitted via one inexpensive line of Cat5.

### Balun and UTP cabling cost over 1,000 feet



### Traditional cabling cost over 1,000 feet



## THREE LITTLE-KNOWN FACTS ABOUT BALUNS

1. The biggest fear when using baluns is signal degradation: "Won't the signal be reduced, or dulled, after being balanced and transmitted over numerous feet?" If recommended maximum distances are not exceeded, there should be no noticeable signal loss or signal degradation when using baluns. In a worst-case scenario where picture brightness must be maintained at all costs, active baluns with automatic gain control are available.
2. Because baluns act as isolation transformers, they eliminate ground loops that cause background hum and rolling interference, essentially filtering audio signals.
3. A common misconception is that baluns cannot effectively transmit through a common patch bay. In fact, they can, as long as the transmitting Cat5 run is a completely independent, straight-through path.

## UNIQUE APPLICATIONS

Baluns are useful in standard AV installations, but did you know they also work perfectly in:

- **CCTV/Security Applications** – Baluns have been used in CCTV and security applications for years. Some up-the-coax video baluns even transmit camera pan, tilt, and zoom commands.
- **Retail Kiosk Applications** – Baluns are an inexpensive solution for transmitting single-source audio and video signals to multiple destinations. Simply connect the source run to a balun distribution hub and you're in business.

## BALUN MANUFACTURERS

**AC&E Telecommunications** [www.acande.com](http://www.acande.com)  
**Black Box** [www.blackbox.com](http://www.blackbox.com)  
**Energy Transformation Systems** [www.etslan.com](http://www.etslan.com)  
**Extron** [www.extron.com](http://www.extron.com)  
**Intelix** [www.intelix.com](http://www.intelix.com)  
**Kramer** [www.kramerelectronics.com](http://www.kramerelectronics.com)  
**Network Video Technologies** [www.nvt.com](http://www.nvt.com)

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## ORIGINS

In 1944, Bell Labs engineer Geanelli Guanella invented a 16:1 matching transformer using coiled transmission lines. From this effort came the 1:1 and 4:1 baluns that we use today.