VideoEase S-Video Balun Family

500016

500017

500038

Application Guide

Version 1.07

June 2008t

Purpose

The purpose of this document is to explain how to apply the S-Video Balun under different operating conditions and to discuss issues not covered in the Product Installation Guide. There are three models; S-Video Balun (500016), S-Video/Audio Balun (500017) and S-Video Hi-Fi Balun (500039). The 500016 supports S-Video only and the 500017/500039) support S-Video and two audio channels. Both products are compatible with MuxLab's Audio-Video Distribution Hub (Part#500200).

Function of the S-Video Balun

The function of the S-Video Balun is to allow traditional S-Video coaxial cable to be replaced by Category 5 (or better) twisted pair cable for more cost-effective cabling. Used in pairs, the S-Video Balun allows S-Video display equipment to be located **up to 1000 feet (305m) from the S-Video source**, thus exceeding standard S-Video cable distance limitations which is approximately 300 feet (90m).

Due to the lower cost and ease of installation of Category 5 cable, significant material and installation savings may be achieved. Furthermore, due to the excellent crosstalk immunity, multiple S-Video signals may be transmitted adjacent to one another under a multipair (4, 25, 50, 100, etc) Cat 5 cable, thereby optimizing the cable and further reducing the material cost per foot of cabling. The S-Video Balun may be applied in the following areas:

Multi-media Projector Systems: Allows a multi-media projector to be placed at extended distances from a laptop or PC in a conference room or training room environment. Allows the presenter to stand at a distance from the projector so as not to obstruct the view of its audience.

Classroom Instruction: Allows an S-Video monitors to be connected to an audio-video source (i.e.; PC, DVD, VCR) via pre-installed Cat 5 twisted pair cable.

Video Information Systems: Allows display monitors or flat-screens to be distributed throughout a complex via pre-installed Cat 5 twisted pair cable.

Industrial Process Monitoring: Allows CRT monitors or flat-screen displays to be located at a remote distance from the central processor via pre-installed Cat 5 twisted pair.

Consumer Audio-Video Systems: Allows residential S-Video equipment to be connected using pre-existing Cat 5 cabling.

Equipment Supported By The S-Video Balun

The S-Video Balun works with any equipment that has an S-Video interface such as:

- S-Video TVs and monitors
- Plasma screens
- PC S-Video cards
- DVD players
- Video cassette recorders
- Camcorders
- Satellite receivers
- MPEG video players
- LCD projectors
- Scan converters
- Video scalers
- Matrix switchers
- Digital video players
- Digital video recorders

The following photos show the S-Video-Only Balun (500016) connected to the back of an LCD Projector and a DVD player respectively.

Photo 1: S-Video Balun (500016) Connected to LCD Projector and DVD Player

Pin Configuration

The cable between the two S-Video Baluns must respect the pin configuration of the baluns. The twisted pairs must correspond to the correct pins and the polarity must be respected. That is, Pin 1 on one end must connect to Pin 1 at the other, and so on for the other seven pins. Each of the following pin-pairs constitutes a twisted pair; Pins 1&2, Pins 7&8, Pins 4&5, Pins 3&6 as shown in the following diagram. Pins 7&8 carry the Luma (Y) signal and pins 4&5 carry the Chroma (C) signal.

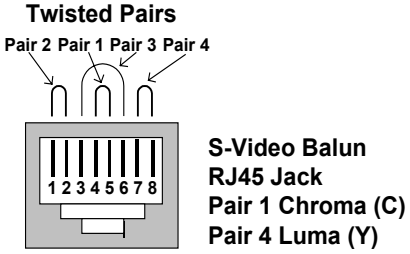


Figure 1: S-Video Balun Pin Configuration

Picture Problems

During the installation of the S-Video Balun various picture problems may result. It is important to know what is causing these problems and how to correct them.

Smearing

Smearing occurs when the edge of an image leaves trail traces similar to smudging a line of ink on a piece of paper. This may occur as the length of twisted pair cable increases. As the maximum distance specification is neared, the physical properties of the cable and baluns begin to show this effect. Smearing is due to the effects of propagation delay and attenuation. Aside from using an active device with built-in tilt-amplifier to correct the problem, other possible solutions are; a) to shorten the cable length or b) adjust contrast and brightness of the monitor.

Flutter

Flutter occurs when the background fluctuates between light and dark. This symptom may be due to problems with the grounding between the S-Video equipment and/or the connection may be picking up some external interference from a nearby power transformer. One way of minimizing this effect is to adjust the monitor's contrast and brightness

Ghosting

Ghosting is characterized by a second video image being received after the main image, resulting in a double image that is skewed in relation to the first. This is usually due to a problem with the UTP cable connection itself. Poor crimping, untwisted pairs, some of the twisted pairs may be longer than others, poor quality cable, exceptionally high crosstalk between the CPU and the monitor are all some of the causes. In these cases it is best to replace the existing cable with a new one.

Loss of Image Detail

Loss of image detail may occur as the length of twisted pair cable increases or nears maximum specified distance. This is due to the effects of propagation delay and attenuation. Other than using an S-Video Amplifier such as the one from Milestek (Part#90-10125), one can improve the image by shortening the length of twisted pair. Another way to improve the image is to adjust the contrast and brightness of the monitor.

Herringbone Pattern

If there is a "herringbone" pattern in the image, this is due to interference from a strong electromagnetic (EMI) source. The source may be a local radio or mobile telephone transmitter, wireless LAN or noisy switching power supplies. In order to isolate the problem it is suggested to power down potential noise sources in the vicinity. The use of shielded twisted pair may help block the interference. The following image shows a typical herringbone pattern.

To view the pattern, zoom in on the image at 500%.

Cable on the Reel

Frequently it may be necessary to pre-test an S-Video Balun installation with some spare twisted pair cable. It is important to note that when the cable is on the reel, the picture will be inferior. This is due to the increased magnetic induction created by the spool of cable. In order to properly pre-test a configuration, it is recommended to un-coil the cable and lay it out flat on the floor or in a cable farm structure.

Solutions

The following sections describe some real applications using MuxLab's S-Video Balun. Whether the application is for the residential or commercial market, the S-Video Balun provides a smart, fast and cost-effective way to distribute S-Video via Category 5 wiring systems without compromise to picture quality.

Laptop Presentation System

The S-Video Balun (500016) can be used to provide a simple point-to-point connection between a laptop and any S-Video display device for use in presentations where S-Video cables are too bulky or costly to install.

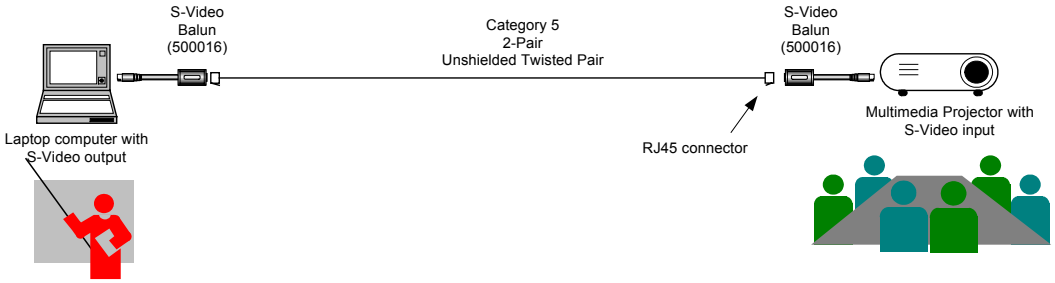


Figure 2: Connecting a laptop or notebook computer to an S-Video Monitor

DVD Player S-Video Connection

In an audio-video environment, the S-Video/Audio Balun (500017) provides a neat and efficient means of connecting an audio-video source such as a DVD player to an S-Video monitor. Please note that most DVD players come with an S-Video output.

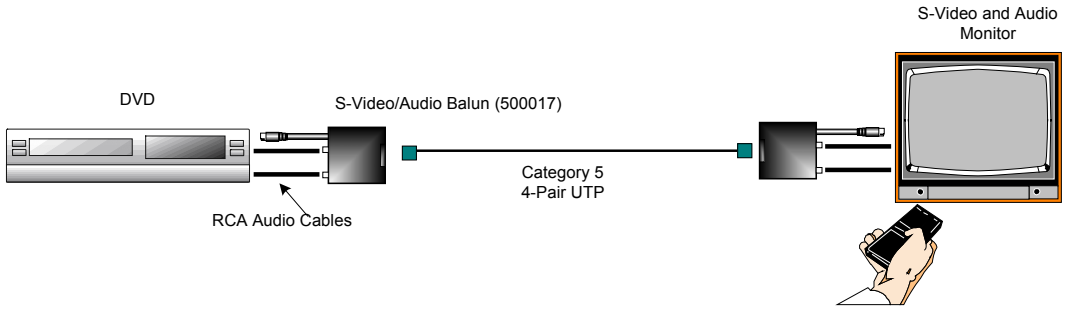
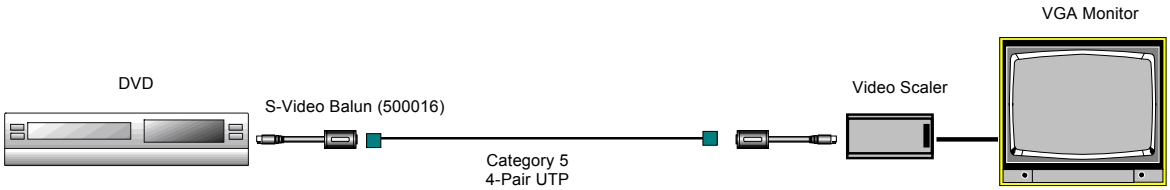


Figure 3: Connecting a DVD player to an S-Video/Audio monitor

Connecting an S-Video Source to a Video Scaler

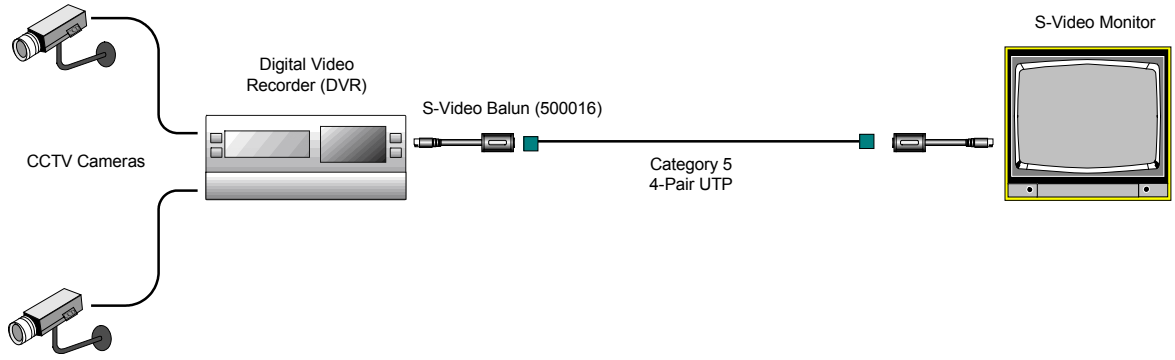
In some applications, an S-Video source (i.e. DVD, VCR) needs to be connected to a VGA screen (plasma screen, LCD projector) via a video scaler. The video scaler typically supports S-Video at the input. In order to provide a more cost-effective and neater connection, the S-Video Balun (500016) can be used with Cat 5 twisted pair to provide the connection, as shown in the following diagram.



For more information about video scalers, the reader is recommended to go to the following link: [http://www.commspecial.com/products.htm - vidscaler](http://www.commspecial.com/products.htm)

Connecting a DVR to an S-Video Monitor

In professional CCTV applications, digital video recorders or CCTV multiplexers are used to process the input camera signals. The DVR may provide an S-Video output, yielding better picture quality than a single composite video. If the DVR is located far from the S-Video monitor, then Category 5 twisted pair cable may be more practical and cost-effective to use instead of coaxial cable. The following diagram shows the application:



Podium Presentation Systems

The typical presentation system comprises a speaker's podium and a projector. Instead of installing complex and expensive switching systems, videobaluns and the appropriate cable harnesses can provide a neater and more cost-effective cabling structure, that can

be set-up and taken down quickly and without damaging the furnishings in the presentation hall. The following diagram illustrates a typical presentation setup using MuxLab video baluns, including the S-Video Balun (500016) and S-Video/Audio Balun (500017).

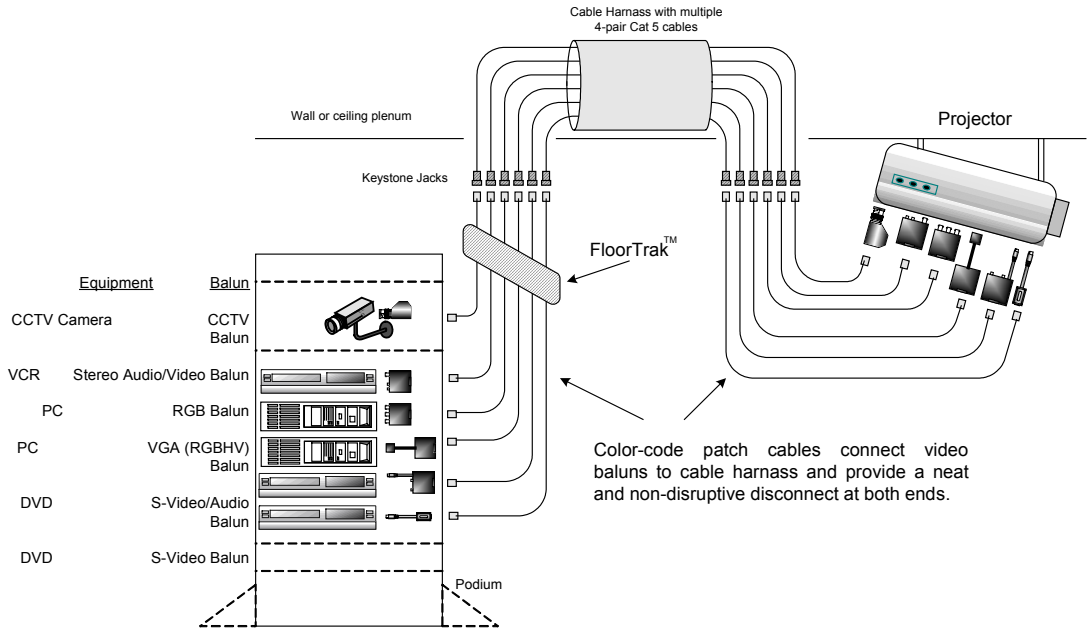


Figure 4: Podium Presentation System Cabling Using Cat 5 and Video Baluns

A primary cable harness provides the options to connect a variety of audio and video signals to the projector and may be hidden under a raised floor or in the ceiling plenum. Keystone jacks at either end provide an versatile means to connect or disconnect audio-video equipment via Cat 5 patch cables. This is particularly valuable in situations where the equipment must be set up and torn down quickly. The keystone jacks may be color-coded according the type of audio/video signal being connected. MuxLab's wide range of video baluns allows different audio/video formats to be supported. Since Cat 5 cables are used, the diameter of the cable harness is much smaller than if coaxial cables were bundled together.

Classroom Video Distribution

In a classroom environment, S-Video is a cost-effective way to achieve higher picture resolution without migrating to more expensive VGA or RGB video equipment. The S-Video Baluns (500016 or 500017) are compatible with third party S-Video splitters and with MuxLab's Audio-Video Distribution Hub (500200), allowing multiple displays to be connected in a star-configuration. There are two models; S-Video Balun (500016) and S-Video/Audio Balun (500017). The 500016 supports S-Video only and the 500017 supports S-Video and two audio channels. The following diagram shows eight (8) S-Video/Audio monitors connected in a star-configuration using the 500017 and Audio-

Video Distribution Hub (500200). The 500016 may be used instead of the 500017 when only video is required.

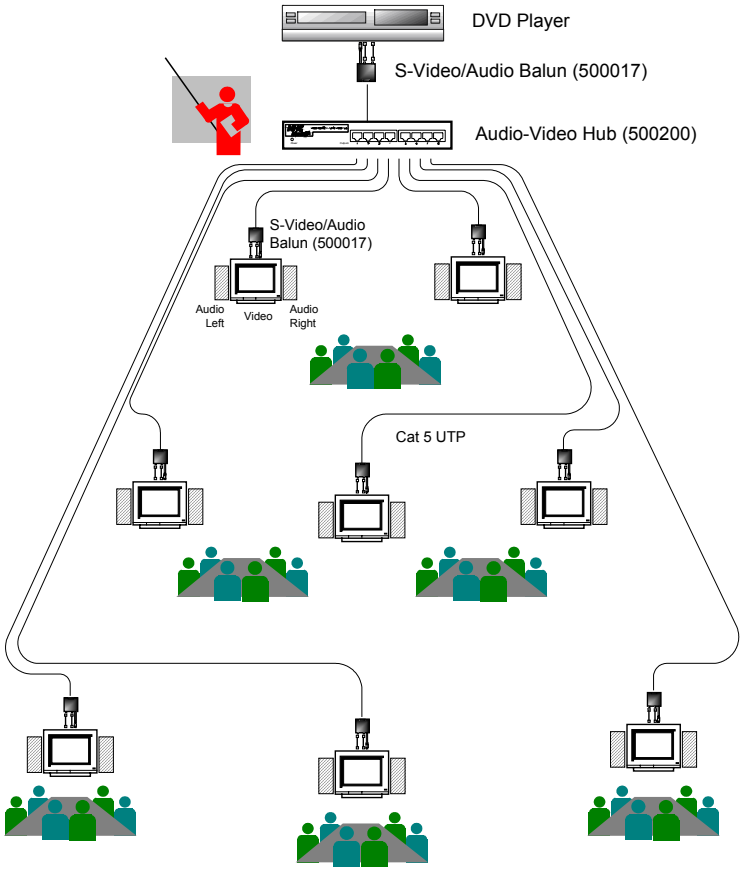


Figure 5: S-Video Distribution within a Classroom Environment

Digital Signage

Multi-media broadcast systems allow video programming to be distributed in digital format over the worldwide data and telecom network. Video transmission is received via satellite or terrestrial receivers and converted to a format that can be displayed on local monitors or PC networks. S-Video is one of the preferred video display formats because of its cost-effectiveness and excellent picture quality. Digital signage is one example where this would be applied.

MuxLab's S-Video Balun is an integral part of the cabling solution because it allows the expensive S-Video cable to be replaced by Cat 5 UTP. Furthermore the performance of the S-Video Balun allows it to be used for extended distances beyond conventional S-Video cable distance limitations (typically a maximum of 300 feet). When used in conjunction with S-Video splitters or distribution hubs such as MuxLab's 500200; S-Video can be distributed economically via a structured cabling system (SCS).

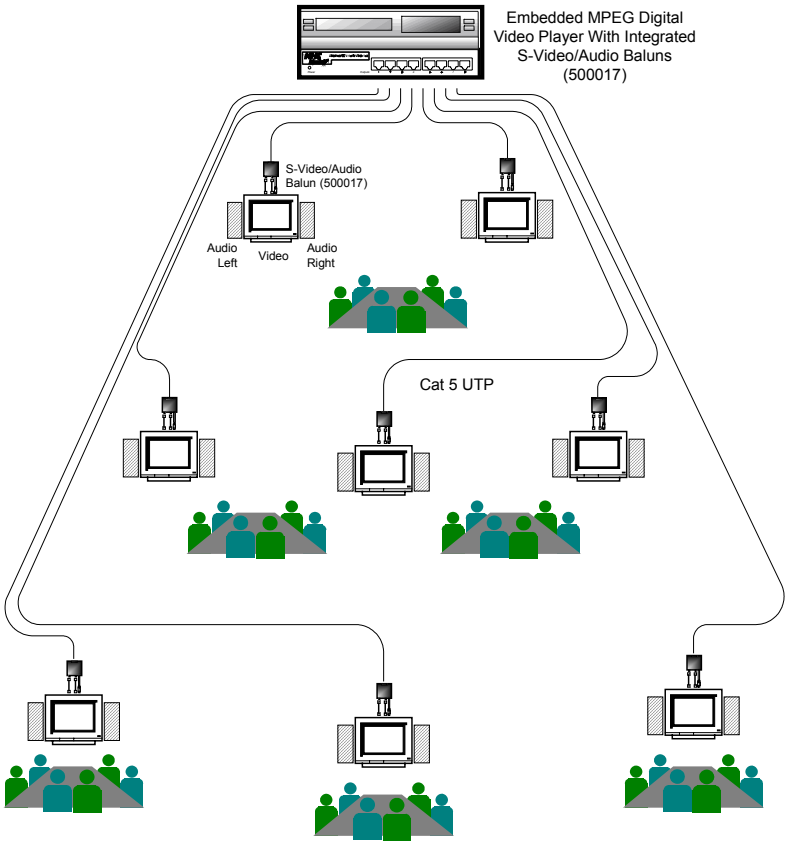


Figure 6: Digital Video Distribution Using S-Video Display Screens

Companies Offering Digital Video Distribution

The S-Video Baluns will work with equipment designed for digital video distribution in the multi-media broadcast market, providing the equipment supports S-Video. The following are some of the companies that offer digital video distribution solutions for this market.

Adtec Digital Inc.

Adtec Digital Inc. (Nashville, TN) offers an MPEG video player that incorporates MuxLab balun technology and works in conjunction with the S-Video Balun, allowing S-Video to be distributed to multiple display devices via cost-effective twisted pair cable. More information please contact Adtec at 615-256-6619 or at www.adtecinc.com.

Fujitsu Australia Software Technologies

Fujitsu Australia Software Technologies offers a multi-media broadcasting system (m-Cast) that in some instances could require S-Video distribution at the point of display. Once again, the S-Video Balun and the Audio-Video hub could be used to streamline the S-Video cabling between the video server and the multiple display screens. The following link from Fujitsu provides additional information about their m-Cast system.

http://www.fastware.com.au/mcast.html

Home Theatre

In an age of smart homes, the trend is to migrate toward a unified cabling system that is based solely on Category 5 cable. Where S-Video is the preferred source for audio-video equipment, the S-Video Balun allows the homeowner to take advantage of pre-installed twisted pair to connect an S-Video source to an S-Video display anywhere in the home.

For example the S-Video output from a DVD player could be connected to an S-Video display monitor in another room. This balun provides the essential link between the S-Video equipment and the Cat 5 cabling. No additional S-Video cable is needed and the picture quality is as good as any S-Video cable can provide. The following diagram shows how the S-Video Balun and Audio-Video Hub are used to distribute video in a residence.

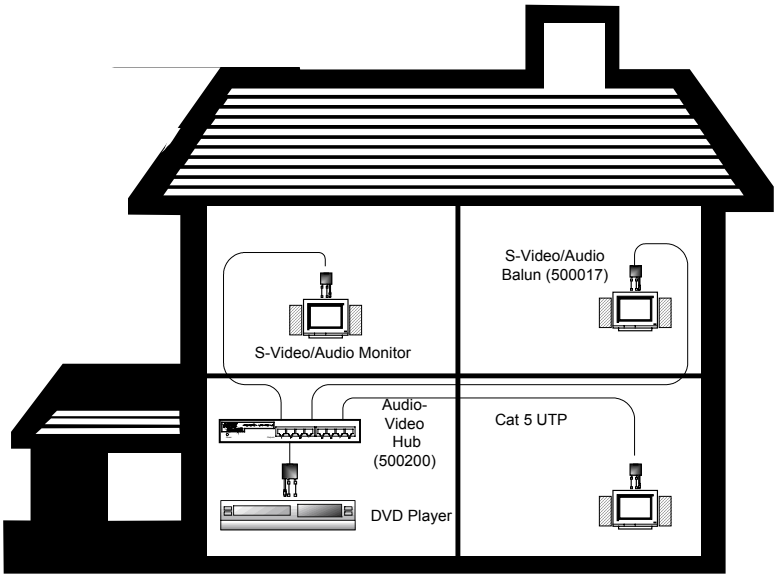


Figure 7: S-Video Distribution in a Residence

Connecting a PowerBook G3/G4 to an S-Video Monitor

The S-Video Balun works with computers that are equipped with S-Video output such as the Apple PowerBook G3/G4. Although the PowerBook has a 7-pin mini DIN and the S-Video Balun has a 4-pin mini DIN, the connection is secure and pin-compatible. The S-Video Balun will allow the S-Video cable to be replaced by Category 5 twisted pair when the PowerBook is connected to any S-Video display or projection device. In classroom or conference room presentation systems, the result is cost-effective and neater cabling.

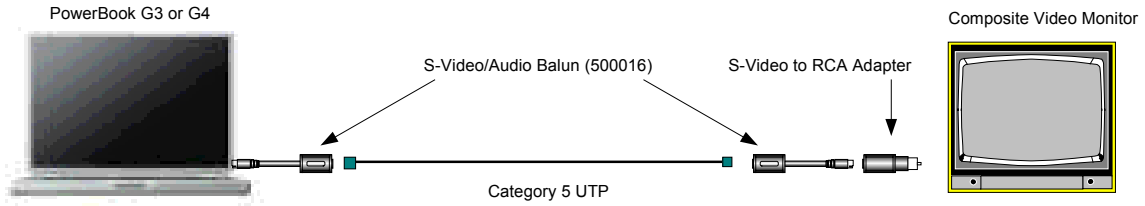


Figure 8: Connecting an Apple Powerbook to an S-Video Monitor

The following link from the Apple website describes how their PowerBook is connected to an S-Video display monitor.

http://docs.info.apple.com/article.html?artnum=28504

These photographs show the S-Video Balun (500016) connected to the External Video port of the PowerBook G4.

Photo 2: Close-up of S-Video Balun Connected to the Powerbook G4

When connecting the S-Video Balun to the S-Video output of the PowerBook, make sure that the balun is fully inserted into the receptacle, thereby ensuring a reliable contact. Other laptops and notebooks that support S-Video include; HP-OmniBook 7100/7150, IBM Thinkpad A, T and I Series, Dell Latitude C840 & CPt, Sager NP2280, Sony GR (with PCGA-PRGI option).

S-Video to Composite Video via Cat 5 Cable

The S-Video Balun will allow an S-Video source to be connected to a composite video display via Category 5 twisted pair, providing an S-Video-to-Composite Adapter is used at the composite display input. Examples of an S-Video to composite video cable assemblies can be viewed at the following links:

http://www.svideo.com/fsvideorca.html
http://www.svideo.com/svideorcapro93.html
http://www.svideo.com/scart.html
http://www.partsexpress.com/pe/pshowdetl.cfm?DID=7&PartNumber=180-140

The following diagram illustrates a typical application whereby an S-Video source, in this case a PowerBook, is connected to a composite video monitor with RCA input.

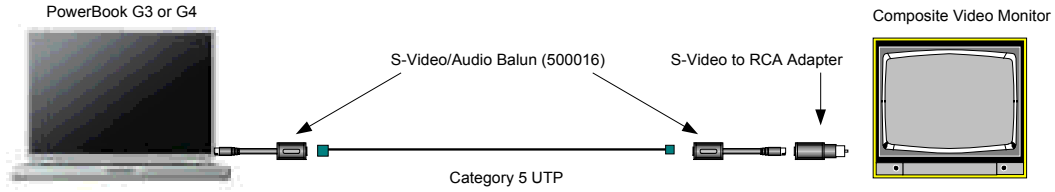


Figure 9: Connecting an S-Video source to a composite video monitor

It should be noted that due to the fact that the S-Video signal is being converted to composite video at the display input, the image quality may not be as sharp as when a true S-Video monitor is used.

Two S-Video Signals Under One 4-Pair Cat 5 Cable

Due to the excellent noise immunity of both the S-Video Balun and Cat 5 cable, multiple S-Video signals may be transmitted under the same multipair Cat 5 cable jacket. For example, since S-Video requires only two twisted pairs, two S-Video signals may be transmitted via one 4-pair Cat 5 cable. The following diagram illustrates this example where two laptop computers equipped with an S-Video output are connected individually to two S-Video monitors via one 4-pair Cat 5 cable. This allows the cabling to be optimized in cases where wiring is pre-installed or where budget constrains limit the number of cables that can be installed.

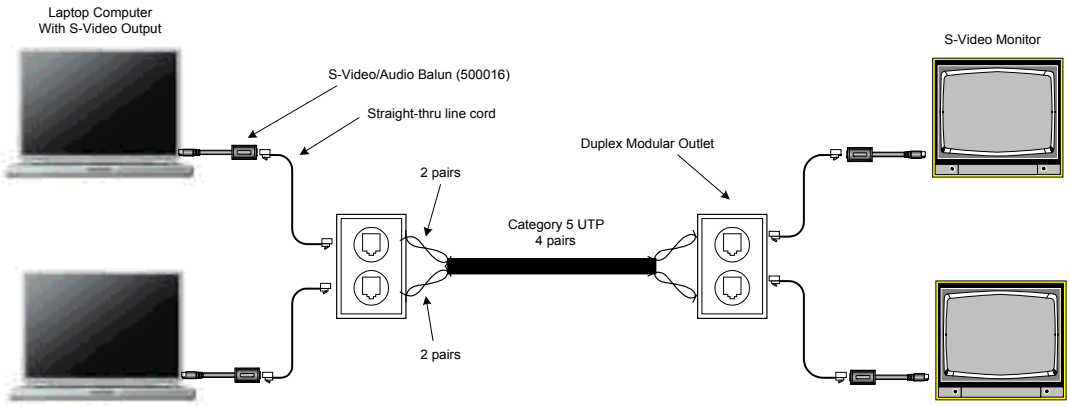


Figure 10: Establishing Two S-Video Connections Under One 4-Pair Cat 5 Cable

Digital Lighting Systems

The S-Video Balun has been recommended by High End Systems (http://www.highend.com) for use in their Digital Lighting System, D.L.2. The following is a link to their site: http://www.highend.com/support/digital_lighting/dl2supportguide/dl2livevideoprimer.asp#balun

In order to be able to assess the performance of the 500017 in audio applications, the following tables provide information about the bandwidth (3 dB) and insertion loss of the audio portion of the baluns when connected to either 600 Ω or 1,200 Ω loads.

Bandwidth	600 Ω			1200 Ω	
Distance, ft	Low Cut-Off	High Cut-Off		Low Cut-Off	High Cut-Off
250	69Hz	323KHz		124Hz	294KHz
500	70	230		124	180
1000	73	156		128	91
2000	80	107		127	44
3000	88	78		137	28
4000	93	50		138	20
5000	99	34		142	15.6
1 mile	103	29		142	13.5

Insertion Loss	Insertion Loss per pair @ 2 ft	Insertion Loss @ 1Khz per pair @ 1 mile
600 Ω	-3 dB	-10.3 dB
1,200 Ω	-1.87 dB	-6.7 dB

Product Selection Table

In order to help select the right S-Video product for your application, the following product selection table is provided:

Model	Point-to-Point	Distribution	S-Video Only	S-Video & Audio
500016	√	√	√	
500017	√	√		√
500038	√	√		√
500200		√	√	√

Architectural and Engineering Specification

In order to facilitate job quotations and contract preparations, the following architectural and engineering template (A&E) has been provided for convenience:

Architectural and Engineering Specification

VideoEase S-Video Balun (500016, 500017, 500038)

S-Video transmission via unshielded twisted pair cable shall be provided by utilizing pairs of MuxLab supplied S-Video Baluns, models 500016, 500017 and 500038. Model 500016 featuring a male S-Video connector shall be used when only video is required and shall be used on S-Video equipment that has a female S-Video connector. Model 500017 featuring a male S-Video connector shall be used when both video and audio is required and shall be used on S-Video equipment that has both female S-Video connector and RCA audio connectors. Model 500038 featuring a female S-Video connector shall be used when both video and audio is required and shall be used on S-Video equipment that has both male S-Video connector and RCA audio connectors. The S-Video Baluns shall be used in pairs and shall be capable of transmitting S-Video on Category 5 twisted pair cable.

S-Video Versus Composite Video

S-Video is growing in popularity due to the higher picture resolution that can be achieved versus composite video. Another reason for its popularity is its relative simplicity and lower cost versus component video solutions. Many organizations that are looking for cost-effective alternatives to VGA and component video are turning to S-Video as a solution. When S-Video Baluns are used with Cat 5 cable, the savings are significant. The following link provides additional background information about the differences between S-Video and Composite Video: http://www.evga.com/articles/public.asp?AID=52

Connecting One S-Video Source to Two Screens

In order to distribute one S-Video source to two displays, it is recommended to actively split the signal first and then use the S-Video baluns to convert the signal to UTP. The following links show typical 1x2 S-Video splitters that provide buffered, unity gain amplification to each output port.

http://www.kramerelectronics.com/indexes/pic.asp?p=PT-102S

Connecting a S-Video/Audio Source to up to 4 Screens

In order to distribute one S-Video/Audio source to up to four (4) displays, it is recommended to actively split the signal first and then use the S-Video baluns (500017) to convert the signal to UTP. The following links show typical 1xx S-Video splitters that provide buffered, unity gain amplification to each output port.

http://www.vpi.us/vsplt-sva-8.html

http://www.hallresearch.com/products/splitters/tv_splitters/tv_splitters.htm - csv-3

PC Tuner Cards with S-Video Output

In regard to using a PC tuner card in conjunction with MuxLab's S-Video Baluns, the user should verify that the card is properly configured to output S-Video before completing the installation. In order to ensure this, the following steps should be performed:

1) The PC Video card must have an S-Video output (called also TV-Out).
2) Verify that the video software driver is from the PC card vendor and not the Windows default driver. If it isn't, install the appropriate video card driver. Most versions can be found on the web.
3) In order to view the video driver, go to Control Panel and select Display. On the display Properties, select "Settings". The advanced option will allow to the user to change the display between VGA and S-video output.

4) The VGA monitor and S-Video display can be permanently connected. However, only one of them may be active depending on the driver settings.

Compatibility with Crestron CNXRMC and CNXRMCLV

MuxLab's S-Video Balun (500016) may be used to send S-Video to the Crestron CNXRMC and CNXRMCLV room solution boxes. The pin out cross-references are as follows:

MuxLab p/n 500016	ML-SIG	ML-PIN #	C-PIN #	C-SIG	LEVEL
Chroma (C): Pin 4[R]	Chroma -	4	6	C-	Level 2 -
Chroma (C): Pin 5[T]	Chroma +	5	3	C+	Level 2 +
Luma (Y): Pin 7 [R]	Luma -	7	2	Y-	Level 1 -
Luma (Y): Pin 8 [T]	Luma +	8	1	Y+	Level 1 +

"ML-" = MuxLab "C-" = Crestron

The CNXRMC and CNXRMCLV have compensation adjustments for the video pairs that help to offset any level issues on long runs.

Ground Loop Isolation

In case of ground loop issues, the use of a ground loop isolator may be required. The following is a link to typical device.

http://jensentransformers.com/datashts/vbh1ss.pdf

S-Video Accessories Vendors

The following is a list of vendors that provide specialized S-Video cabling accessories.

Company	URL	Telephone	S-Video Products
Black Box	http://www.blackbox.com/	724-746-5500	Cables, connectors and splitters
BTX	http://www.btx.com/	914-592-1800	Cables & connectors
Video Ware	http://www.svideotorca.com/	877-742-1223	Cable conversion
Smarthome.com	http://search.smarthome.com/	800-762-7846	Cables, splitters,
Communications Specialties Inc.	http://www.commspecial.com/specsheets/ss-1802-1806.pdf	631-273-0404	Splitters
Hall Research	http://www.hallresearch.com/	800 959-6439	Splitters, cables

Other Useful S-Video Links

The following table provides a list of other useful S-Video links:

Topic	Link
S-Video Definition	http://www.webopedia.com/TERM/S/S_Video.html
S-Video Frequently Asked Questions	http://www.vidgames.com/ps/hints/svideo.html
S-Video-to-Composite Video	http://www.hut.fi/Misc/Electronics/circuits/svideo2cvideo.html
S-Video Versus Composite Video	http://www.netfact.com/crs/projects/syncomat/svideo/
S-Video Versus Other Video Formats	http://www.michaeldvd.com.au/Articles/VideoConnectors/VideoConnectors.asp

Conclusion

The S-Video Balun is ideally suited for many applications. Before using it, it is important to plan out the installation and verify that your cabling plan is within product specifications. For additional assistance about the S-Video Balun, please consult the Product Datasheet, Product Installation Guide or contact MuxLab Inside Sales or Customer Technical Support at 877-689-5228 or at videoease@muxlab.com. All documents are available on-line at www.muxlab.com.

MuxLab Inc.
8114 Trans Canada Hwy
St. Laurent, Quebec
Canada H4S 1M5

Telephone : 514-905-0588
Toll-free (North America) : 1-877-689-5228
Fax : 514-905-0589
E-mail: videoease@muxlab.com
URL: www.muxlab.com