



## VGA-to-CAT5 Video Splitters and Receiver



AC600A (Shown) & AC601A  
2 & 4 Channel VGA to Cat5 Splitter / Extender



AC602A  
VGA over Cat5 Receiver



## TRADEMARKS USED IN THIS MANUAL

BLACK BOX and its logo  are registered trademarks of Black Box Corporation.

Apple and Macintosh are registered trademarks of Apple Computer, Inc.

IBM is a registered trademark of International Business Machines Corporation.

SGI is a registered trademark of Silicon Graphics, Inc.

Sun and Sun Microsystems are registered trademarks of Sun Microsystems, Inc. in the United States and other countries.

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

**FEDERAL COMMUNICATIONS COMMISSION  
AND CANADIAN DEPARTMENT OF COMMUNICATIONS  
RADIO FREQUENCY INTERFERENCE STATEMENTS**

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

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

*This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of the Canadian Department of Communications.*

*Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par le ministère des Communications du Canada.*

**EUROPEAN UNION DECLARATION OF CONFORMITY**

This product complies with the requirements of the European EMC directive 89/336/EEC



## 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 debe 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.

# Contents

1. Introduction .....	page 5
1.1 General .....	page 5
1.2 Features .....	page 5
2. Installation .....	page 6
3. Configuration & Operation.....	page 8
4. Troubleshooting.....	page 9
5. Specifications.....	page 10

# 1. Introduction

## 1.1 General

This manual describes the features, setup, and operation of the Black Box 2 and 4 channel VGA-to-CAT5 Video Splitters/Extenders and their corresponding Receiver.

The splitters convert a PC's VGA signal into a format that can be transmitted using inexpensive and commonly available Category-5/5e/6 Unshielded Twisted Pair (UTP) cable to 500 feet away.

At the receiving (remote) ends the Cat5 signal is converted back to VGA for connection to monitors, projector or other display devices.

Besides the 2 or 4 RJ45 outputs, the splitters feature a VGA connector for connection to a local monitor or for daisy-chaining to other splitters.

Furthermore, the splitters include a power supply that is capable of powering itself and all the AC602A Receivers (phantom power) which makes for a clean and easy setup (*note that if the length of Cat5 cable is longer than 300 feet to a particular receiver, the receiver may require its own power supply*).

The system can also transmit Component Video (Y Pb Pr at resolutions to 1080i) instead of VGA with the purchase of HD15-to-3RCA break-out cable for each end. Therefore you can use these devices to send Standard TV and HDTV component video to multiple locations.

## 1.2 Features

- Send PC or Component Video at full-resolution to multiple locations using Category-5 cable.
- Buffered video for connection to local monitor at sender
- Supports resolutions up to 1600x1200 including 1080i
- Rugged, Reliable, Compact size
- Drive standard CAT5 cables to 500 feet
- Transmits video and Power on one Cat5 cable
- Easily expandable by daisy-chaining using local VGA port

## 2. Installation



Figure 1 – AC600A Front



Figure 2 – AC600 Rear

1. Connect the VGA IN of the AC600A or AC601A to the computer's video port using the supplied cable
2. If desired, connect a local display to the VGA out port of the Transmitter unit.
3. Using Category 5 cables connect the RJ45 ports of the Transmitter to the Model AC602A Receiver.
4. Connect the Remote displays to the VGA output port of the AC602 Receivers.
5. Plug in the supplied Power supply to the Power Input jack of the Transmitter unit.
6. Turn on the local and remote displays, then the PC

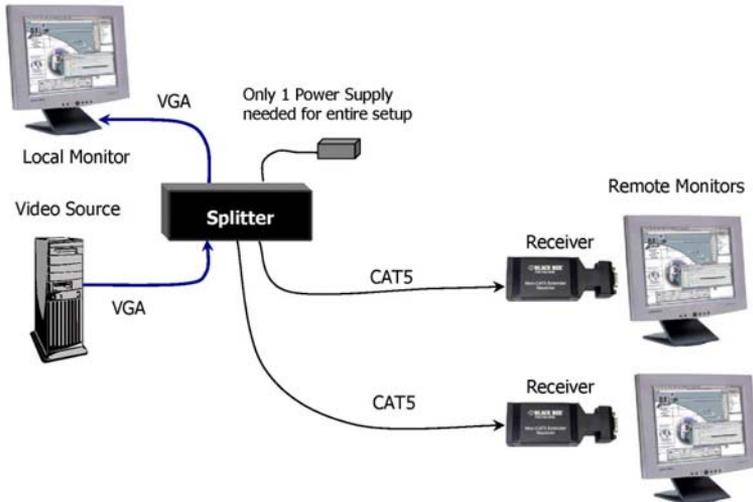


Figure 3 – Setup Block Diagram

## NOTES

 If the length of Cat5 Cable is longer than 300 feet you may need to attach a power supply to the receiver unit. The power supply will need to be the same as the sending unit (i.e. 9VDC regulated, Center Positive with 2.5mm connector). If there is no image at the remote or the image is intermittent, you may need a power supply at the receiver, please contact Black Box to purchase one. Generally if the remote display device is referenced to ground (i.e. the VGA connector ground or case, is connected to power line ground) you should not need an additional power supply to the specified maximum length of 500 feet

 Do not connect this unit to any LAN device such as network cards or hubs as this may damage the AC155A and/or the LAN device. Use EIA/TIA 568B standard straight-through patch wiring. Do not use crossover cables.

 For cable runs of 300 feet or longer it is recommended that you use a UTP cable that is optimized for video (low skew cable). We recommend Belden Cable's "Brilliance® VideoTwist(tm)" Category 5 Cable for best results.

 If you want to transmit component video, then contact Black Box to purchase HD15-to-3 RCA adapter cables for the inputs and outputs.



Figure 4 – HD15-to-3 RCA adapter Cable

### 3. Configuration & Operation

The Model AC602A Mini-CAT5 Receivers are equipped with an adjustment to improve image quality when using long cables. The adjustment is made via a single turn trim-pot located next to the power connector on the side.

When using a long cable, with no compensation, any solid horizontal line, tends to smear to the right. For example in the image shown on the right, observe the dark black line at the bottom of the window and see how it is smearing to the right (not changing to white abruptly as it should). This is the effect of long cable on the signal.

You can turn the trim-pot to eliminate these streaks as shown on the 2nd picture. If you add too much compensation to the signal, then an opposite effect may be observed, i.e. black lines smear to the right as white lines or vice-versa. The 3rd picture shows the case where too much compensation is added.

When using long cables, the image quality is a function of resolution and refresh rate. Lower resolution or refresh rate, result in best picture. Therefore it is best to set the refresh rate to 60 Hz at any resolution.

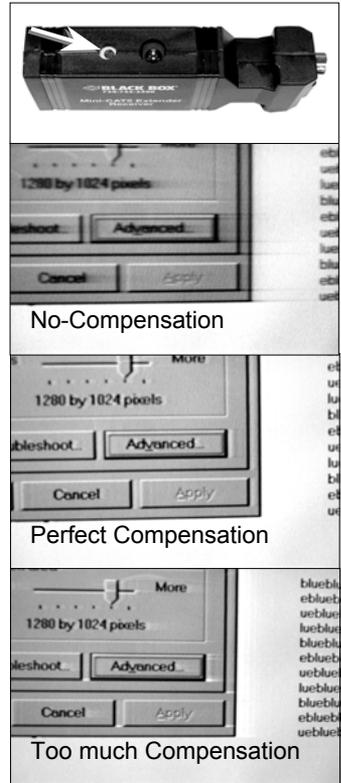


Figure 5

## 4. Troubleshooting

### 1. Fuzzy, blurry, or ghosting image at remote location

If you have a stable image but it looks too blurry (object or character edges are smearing), try to adjust the compensation first. See Section 3. If you still have a fuzzy image, try reducing the refresh rate and/or the resolution of the PC. For Best results use either low-skew cable (such as Belden Brilliance® VideoTwist), or Cat5 (instead of Cat6).

### 2. Shaking image or periodically blanking monitor

The employs CAT5 cable's twisted pairs to differentially transmit the signals, however, a strong electromagnetic noise field can cause instability in the signal. Usual sources of this form of noise coupling are high current AC lines or other high-density data and/or control cables that run adjacent to and parallel with a substantial length of the CAT5 cable.

To eliminate this, either separate the Cat 5 cable of Mini-CAT5 Extender from the interfering source or use shielded CAT5 cables. Note that separating the CAT5 cable from the EMI source by a few inches is often sufficient to eliminate this problem.

If the length of Cat5 run exceeds 300 feet you may need an additional power supply at the receiver (see first note in Section 2)

### Contacting Black Box

If you determine that your extender is malfunctioning, do not attempt to repair the unit. Contact Black Box at 724-746-5500. Before you do, make a record of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description.

### Shipping and Packaging

If you need to transport or ship your extender:

- Package it carefully. Use the original container if possible.
- Before you shipping the unit, contact us to get a Return Authorization (RA) number.

## 5. Specifications

### (a) Common Specs.

<b>Video Types</b>	RGBHV analog or YPbPr / YCbCr through HD15
<b>Resolution</b>	Up to 1600 x 1200 at up to 85 Hz
<b>Bandwidth</b>	DC to 250 MHz
<b>Max. Distance</b>	Up to 328 ft. (100 m) with Phantom Power, or 500 ft (150 m) with additional power supply at receiver
<b>Connectors</b>	HD15 female for video in and out; Shielded RJ45
<b>Interfaces</b>	Standard Analog VGA; Proprietary CAT5
<b>Compliance</b>	CE; FCC Part 15 Subpart B Class A, IC Class
<b>Max. Altitude</b>	10,000 ft. (3048 m)
<b>Temperature</b>	Operating: 32 to 122°F (0 to 50°C); Storage: -40 to +185°F (-40 to +85°C)
<b>Humidity</b>	Up to 95% non-condensing

### (b) Transmitter Specs.

<b>Enclosure</b>	Steel
<b>MTBF</b>	90,000 hours (calculated estimate)
<b>Power</b>	From utility-power (mains) outlet, through included Universal power adapter. Input Voltage: 100~240 VAC Output Voltage: 9v DC regulated Center-Positive at 1.7A Max
<b>Size &amp; Weight</b>	<b>AC600A</b> 1.22"H x 4.86"W x 2.60"D, 1.8 lbs <b>AC601A</b> 1.22"H x 8.20"W x 3.00"D, 2.4 lbs

(c) Receiver Specs. (Model AC602A)

<b>Enclosure</b>	Plastic ABS-94VO, UL File#56070
<b>MTBF</b>	200,000 hours (calculated estimate)
<b>Size</b>	0.8" H x 1.7" W x 4.5" L
<b>Weight</b>	1 lbs.







© Copyright 2007. Black Box Corporation. All rights reserved.

1000 Park Drive

Lawrence, PA 15055-1018

724-746-5500

Fax 724-746-0746

## Appendix: Resources

Do you have technical questions about this product or similar technology? Check out the Resources listed below or contact our [FREE Technical Support](#) at 724-746-5500 or [info@blackbox.com](mailto:info@blackbox.com).

White Papers: To download a white paper, click on the corresponding link listed below:

Whitepapers	
<p><b>Cabinets and Racks</b></p> <p>Retrofitting with passive water cooling at the rack level. <a href="#">Extending the Life of Your Data Center</a></p> <p>Selecting cooling systems for IT equipment cabinets is not always as simple as it might seem. <a href="#">Six Things to Know When Cooling IT Equipment Cabinets</a></p>	<p><b>Digital Signage and Multimedia (Continued)</b></p> <p>Deliver real-time communications—including emergency messaging—to students, teachers, and staff. <a href="#">Digital Signage for K-12</a></p> <p>Everything you need to ask when planning and evaluating digital signage. <a href="#">The Roadmap to Digital Signage Success</a></p> <p>Falling victim to these common mistakes can cost you both time and money. <a href="#">Seven Pitfalls to Avoid When Planning Digital Signage</a></p>
<p><b>Cables</b></p> <p>What's in the ANSI/TIA 1179 standard. <a href="#">ANSI/TIA 1179 Healthcare Infrastructure Standard</a></p> <p>Buyer beware: If the price seems too good to be true, it is. <a href="#">Counterfeit cable: The dangers, risks, and how to spot it.</a></p> <p>Using CAT 6A in 10-GBe networks. <a href="#">CAT 6A F/UTP vs. UTP: What You Need to Know</a></p> <p>When is fiber the ideal choice for your network? <a href="#">Fiber Optic Technology</a></p> <p>Key cabling infrastructure standards. <a href="#">Structured Cabling Organizations and Standards</a></p>	<p><b>Industrial</b></p> <p>Connect industrial equipment to your network by using USB. <a href="#">Bridging the Gap: USB Converters</a></p> <p>Learn about system configuration, cabling selection, transient protection, software, and device selection. <a href="#">The Elements of an RS-422 and RS-485 System</a></p> <p>When is fiber the ideal choice for your network? <a href="#">Fiber Optic Technology</a></p> <p>Understanding Power Needs for Industrial Control Devices <a href="#">Industrial Power Solutions</a></p> <p>Run wireless even in extreme environments. <a href="#">Industrial Wireless</a></p>
<p><b>Carts and Storage</b></p> <p>12 Questions to Ask When Choosing a Tablet and Laptop Cart <a href="#">E-Learning Device Storage</a></p>	<p><b>Interface and Protocol Converters</b></p> <p>Connect industrial equipment to your network by using USB. <a href="#">Bridging the Gap: USB Converters</a></p> <p>Learn about system configuration, cabling selection, transient protection, software, and device selection. <a href="#">The Elements of an RS-422 and RS-485 System</a></p> <p>Go beyond the five-meter USB distance limitation with USB extenders! Read How to extend USB and break the five-meter barrier. <a href="#">Extending the Benefits of USB</a></p>
<p><b>Communications Solutions</b></p> <p>10 Tips for Securing a Strong ROI. <a href="#">Voicemail to Unified Communications</a></p>	<p><b>KVM</b></p> <p>An overview of extension and switching technologies in high-performance KVM environments. <a href="#">HD Video and Peripheral Matrix Switching and Extension</a></p> <p>Get secure local KVM console access and secure remote IP server access. <a href="#">Security with the ServSwitch Wizard IP</a></p> <p>Use this transparent and reliable switching technology to avoid the limitations of traditional emulations. <a href="#">USB True Emulation for KVM Switches</a></p>
<p><b>Compliance Solutions</b></p> <p>The key to protecting data in motion. <a href="#">Group Encryption</a></p>	
<p><b>Digital Signage and Multimedia</b></p> <p>Deliver the right message at the right time. <a href="#">A Beginner's Guide to Digital Signage</a></p> <p>7 Questions You to Need to Ask when Choosing a Signage System. Deliver real-time communications, including emergency messaging, to students, faculty, and staff. <a href="#">Choosing the Right Digital Signage System</a></p> <p>Best practices for creating high-value, compelling content that delivers extraordinary results. <a href="#">Digital Signage Content 101</a></p> <p>Why your school or university needs digital signage and how to implement it. <a href="#">Digital Signage in Education</a></p>	

Whitepapers

**Networking**

Eliminate the need to buy and install expensive network equipment by using wireless Ethernet extension.  
[5 Questions You Need to Ask When Choosing Wireless Ethernet Extenders](#)

Integrate fiber optic cabling to add speed, distance, and cost savings.  
[Media Converters](#)

Add low-voltage devices and network equipment in industrial environments without running power.  
[Power over Ethernet in Industrial Applications](#)

Is your network ready?  
[Tablets in Education](#)

Common network mistakes that cost money, cause downtime, and create frustration.  
[Top 10 Network Mistakes](#)

Take these ten steps to ensure wireless success: Ten Commandments of Wireless Communications white paper.  
[Wireless Communications](#)

Run wireless even in extreme environments.  
[Industrial Wireless](#)

Wireless Networking: wireless standards, architecture, security and more white paper. A basic overview of standards, installation, and security.  
[Wireless Networking](#)

**Network Security**

The key to protecting data in motion.  
[Group Encryption](#)

**Physical Security**

See why it's just as important as software-based security.  
[Physical Network Security](#)

**Power**

Understand the power needs for industrial control devices.  
[Industrial Power Solutions](#)

Understanding the risks to your network and how to choose the right solution.  
[Power Protection](#)

Add low-voltage devices and network equipment in industrial environments without running power.  
[Power over Ethernet in Industrial Applications](#)

**Testers and Tools**

See how industrial-strength Ethernet has come of age.  
[Ethernet in Harsh Environments](#)

Learn about the top three growth drivers for fiber networks: greater bandwidth needs, increased storage demands, and the transition to higher network speeds.  
[Improve the Quality of Fiber Installations with Extended Fiber Certification](#)

Meet the need for implementation speed without sacrificing accuracy.  
[Proven Techniques and Best Practices for Managing Infrastructure Changes](#)

Move your private networks in premises and campus environments towards high-speed applications.  
[Testing Today's High-Speed Multimode Fiber Infrastructure](#)

Use easy-to-install, standardized, plug-and-play technology.  
[Troubleshooting Your Industrial Network](#)

Be sure to complete this step when installing a new local area network segment.  
[Validate LAN Installations for Optimal Service Delivery](#)

**Wireless**

Ten Commandments of Wireless Communications white paper. Take these ten steps to ensure wireless success.  
[Wireless Communications](#)

Run wireless even in extreme environments.  
[Industrial Wireless](#)

Is your network ready?  
[Tablets in Education](#)

A basic overview of standards, installation, and security.  
[Wireless Networking](#)