Hall Research Technologies, Inc.

UV-16X Family of Mini-Cat Senders for Transmission of 16 Independent PC or HD Video Plus Audio or RS232 or Power on Twisted Pair Cable (Cat5/5e/6 or Zero-Skew UTP)

MODEL	**UV1-S-16X**	**UTP VGA/POWER**	**16-PORT SENDER**
MODEL	**UVA-16X**	**UTP VGA/AUDIO**	**16-PORT SENDER**
MODEL	**UV232-16X**	**UTP VGA/RS232**	**16-PORT SENDER**

UMA1135, Rev 2

CUSTOMER SUPPORT INFORMATION

Order **toll-free** in the U.S. **800-959-6439**
FREE technical support, Call **714-641-6607** or fax **714-641-6698**
Mail order: **Hall Research Technologies**, 1163 Warner Ave, Tustin, CA 92780
Web site: **www.hallresearch.com** • E-mail: **info@ hallresearch.com**

TRADEMARKS USED IN THIS MANUAL

Hall Research, HRT, and HRT (logo) are trademarks of Hall Research Technologies, Inc. Any other trademarks mentioned in this manual are acknowledged to be the property of the trademark owners.

FCC & 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 designed 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 intended 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 their own expense will be required to take whatever measures may be necessary to correct the interference.

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 has been tested and shown to comply with the requirements of the European EMC directive 89/336/EEC

CE

Contents

1. Introduction

1.1 General

This User's Manual covers several models of Mini-Cat® Senders. The senders can be any of the following models: UV1-S-16X, UVA-16X or UV232-16X. For these units, the number after the dash represents the quantity of RJ45 outputs.

The transmission system is comprised of one Rack-Mount Sender unit and one or more Receiver units (Sold Separately). There are 3 variations of the basic sender which can transmit Video along with either Phantom Power (UV1-S-16X), Video along with Line-Level Audio (UVA-16X) or Video along with unidirectional (TX Only) RS232 (UV232-16X).

The senders convert the video inputs and either power, audio or RS232 signals into a format that can be transmitted using a single inexpensive and commonly available Unshielded Twisted Pair (UTP) cable with RJ45 connectors. Both UTP and STP (shielded) cables can be used. In addition you can use Cat5, 5e, 6, or higher. However, for runs of over 250 feet, HRT recommends using "Skew-free" or "Zero-skew" Cat5 cables for best performance.

At the receiving (remote) end, a compatible receiver (sold separately) is used to convert the UTP signal back to VGA and either power, audio or RS232.

The product is housed in a 2 RU, 19" Rack mount enclosure and has connectors for up to 16 video inputs and either Audio or RS232 depending on the model, as well as multiple RJ45 output connectors for connection to the remote systems.

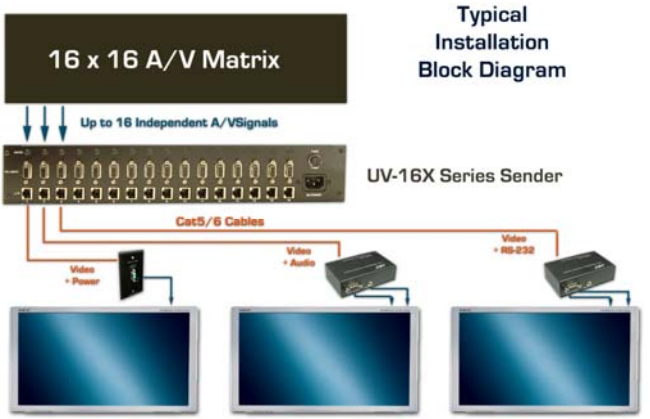
The RJ45 outputs on the Sender can drive CAT5 LAN cables to 1000 feet (305 meters) with little to no degradation of video quality (500 feet on some models) depending on resolution of the VGA signal (see table 3.2). The receiver can compensate for video signal losses in long cable runs.

1.2 Features

- Distribute 16 Video Sources in one easy to use rack mount unit to remote locations
- Supports resolutions up to 1920x1440 at 60Hz, and HD resolutions up to 1080p
- Amplifies the signal for clean and crisp transmission using HRT's proven technology
- Drives standard CAT5 cables up to 1000 feet (500 feet on some models)
- Transmit video and either Power, Audio or RS232 signals on one cable
- Built-In Universal Power Supply
- Model UV1-S-16X provides Phantom Power for Receivers up to 500 feet away so the receivers don't need a power connection
- 2RU, 19" Rack Mount Enclosure
- Perfect for Matrix Racks and Digital Signage

2. Installation

1. Connect the video source to the PC/HDTV connectors. For Model UVA-16X, connect the audio source to the AUDIO connectors. For Model UV232-16X, connect the RS232 source to the audio connectors using the supplied DB9 to 3.5 mm Cables.



2. Connect the included power cord to the power input connector on the unit.
3. Using Category-5 or higher UTP cable, connect one or more compatible receivers to the sender's RJ45 outputs.
4. Connect the remote display/projector and possibly speakers or RS232 to the receiver unit.

   If using the Model UV1-S-16X, the receivers can be powered from the CAT5 cabling if desired and the cables are less than 500 feet from the sending unit.

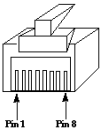
CAUTION

Before plugging in the remote monitor, verify that the AC line is properly wired and that a protective ground (green) wire is established with NO potential difference between both the sender and receiver locations. The splitter can tolerate up to 5 v peak-to-peak ground potential between the two locations. Failure to ensure good grounding can result in erratic operation and possible shock hazards or damage to your equipment.

NOTICE

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

EIA/TIA 568B WIRING STANDARD	
PIN	Wire Color
1	White w/ Orange Stripe
2	Orange
3	White w/Green Stripe
4	Blue
5	White w/Blue Stripe
6	Green
7	White w/Brown Stripe
8	Brown



3. Configuration & Operation

3.1 Sender

At the sending end the video signal from the source is fully terminated. On the UVA-16X, the transmitted audio in the CAT5 cable to the remote receiver is monaural. The audio output on the receiver is "line-level" (powered speakers are required).

3.2 Receivers

Several receiver types are available that are compatible with this family of products (See table for compatible receivers). All Receivers have a single COMPENSATION potentiometer (pot) adjustment to recover high frequency signal loss for long runs of the cable.

Model #	Compatible Receivers
UV1-S-16X *	UV1-R UV1-R-WP (Wall Plate) UVB1-CP-R
UVA-16X	URA URA-X2
UV232-16X	UR232 UR232-X2

*** IMPORTANT**

The UV1-S-16X sends 9 vDC via the CAT5 cable and is only compatible with the UV1-R, UV1-R-WP and UVB1-CP-R.

Other types of receivers (Such as a URA) can sustain damage if connected to the UV1-S-16X

3.2.1 Adjusting the video quality for long cable runs

The video quality at the remote station depends on: (1) the length of the CAT5 cable, (2) video resolution setting, (3) refresh rate setting and the model of the receiver.

In general, at low and mid resolutions, excellent image reproduction is provided at up to 1000 feet for UVA-16X and UV232-16X models (500 feet for model UV1-S-16X). At high resolution and refresh rates perfect image reproduction can be achieved at shorter distances (see table below). Using longer cables or higher resolution rates will still produce an image, but the reproduction quality will be reduced.

Maximum Recommended Cable Lengths For URA & UR-232 Receivers

		Refresh Rate		
		60 Hz	75 Hz	85 Hz
Resolution	800x600	1000 ft	1000 ft	1000 ft
	1024x768	1000 ft	800 ft	750 ft
	1280x1024	750 ft	650 ft	600 ft
	1600x1200	650 ft	600 ft	500 ft

Maximum Recommended Cable Lengths For UV1 & UVB1 Receivers

		Refresh Rate		
		60 Hz	75 Hz	85 Hz
Resolution	800x600	500 ft	500 ft	500 ft
	1024x768	500 ft	450 ft	400 ft
	1280x1024	400 ft	350 ft	300 ft
	1600x1200	300 ft	300 ft	300 ft

Table 3.2

3.2.2 UTP Cable Recommendations

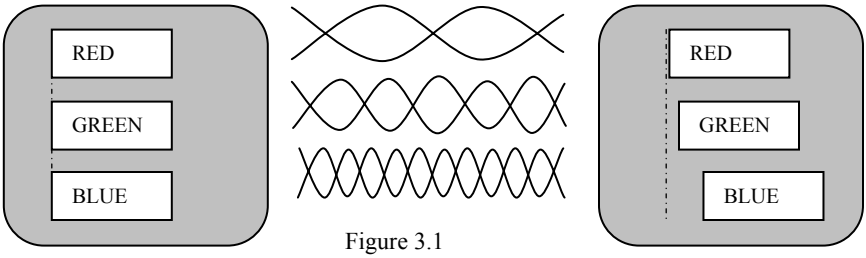


Figure 3.1

UTP cables have 4 twisted pairs inside. The video transmission over UTP uses 3 individual pairs for each color (Red, Green, & Blue). As shown in figure 3.1 above, a characteristic of Category-5/5e/6 cable is that the pairs of wires are twisted at different rates. Therefore, for a given length of Cat-5 cable the total length of a particular pair could be longer than others. Since the signals travel in the cable at a fixed speed, the arrival times of signals can be skewed in a long cable (those that have to travel farther arrive later and the corresponding color shifts to the right).

This is seen on the monitor as separation, or lack of convergence in colors. For example a vertical white line on the screen may look to have a red tinge on the left edge and blue tinge on the right edge.

This effect gets worse at high resolutions, high refresh rates, long cables (in excess of 200 feet), and depends on the cable construction itself. Hall Research highly recommends the use of UTP cables specifically constructed for video transmission. In these cables the all the twisted pairs are the same length. They are available from several sources including Hall Research (part numbers shown below).

Zero-Skew CAT5 Cable for use with Hall Research CAT5 Products

PART NUMBER
CUTP-Z-1000-BLK 1000 ft. Zero-Skew CAT5 cable. Bulk spool of 1000 ft
CUTP-ZP-1000-BLK 1000 ft. Zero-Skew CAT5 cable. Bulk spool of 1000 ft **Plenum Rated**

If you are going to use commercial grade UTP cable, then we recommend using Cat5 or Cat5e rather than Cat6, since the twist ratio match is better in Cat5 cable.

4. Troubleshooting

4.1 Problem Solving FAQ

1. Fuzzy, blurry, or ghosting image at remote location
If you have a stable image but it looks somewhat blurry (edges are not sharp), make sure that you have adjusted the receiver unit's compensation pot correctly. Also check to see that you have not exceeded the maximum recommended cable length. If you still have a fuzzy image, try reducing the refresh rate and/or resolution of the PC.

If you determine that you have excessive color skew, then you must either consider using Zero-Skew UTP cable, or if that is not possible, use a secondary device whose job is to correct the color skew (please contact HRT for details).

Your sender has multiple RJ45 output connectors. When a long CAT5 cable is plugged in any of the outputs, the unit expects a receiver unit at the far end for proper termination. Therefore unplug the un-terminated CAT5 cables from the splitter unit.

2. Image exhibits steady or rolling horizontal color "hum" bars
This is usually an indication of improper grounding either at the sending end, the receiving end, or both. Verify that the AC line is properly wired and that a protective ground (green) wire is established with NO potential difference between both the sender and receiver locations. The UTP sender can handle up to 5 v pp ground noise between the two locations, but no more.

3. Shaking image or periodically blanking monitor
Inherently, balanced signal transmission over twisted pair offers good immunity to EMI coupled noise from other external sources. However, a strong electromagnetic noise field can cause instability in the signal.

Usual sources are high power AC lines or data and/or control cables that run adjacent to and parallel with a substantial length of the CAT5 cable. To eliminate this, either place a distance between the CAT5 cables from the splitter and the interfering source, or use shielded twisted pair (STP) CAT5 cables.

4. The PC does not recognize a Plug-and-Play monitor
If the PC's Operating System is setup to detect a plug-and-play monitor (usually in Display Properties Advanced Settings), it may have trouble finding a monitor if no local monitor is hooked up to the splitter. Only the ID information of the local monitor is passed to the PC. If the PC does not produce an image due to this, either disable the plug-and-play monitor detection in the PC's operating system, or connect an EDID emulator to the PC's video card (please contact HRT for details).

5. Poor audio quality at the receiving end
Only use powered speakers with the splitter and receivers. It is also good practice to set the audio level (volume) output of the PC about 1/2 to 2/3 from the maximum and use the volume knob of the speakers to adjust the volume to the desired level. A low volume signal output from the PC reduces the signal-to-noise (S/N) ratio, whereas too high output amplitude can cause saturation and clipping to occur.

4.2 Calling Hall Research Technologies

If you determine that your splitter is malfunctioning, do not attempt to repair the unit. Contact the Hall Research Technologies' Technical Support Team at 714-641-6607. 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;
- The components involved in the problem—that is, what type of cable, makes and models of computers and monitors, etc.
- The results of any testing you've already done.

4.3 Shipping and Packaging

If you need to transport or ship your sender: Package it carefully (we recommend that you use the original container), and before you ship the unit back to Hall Research Technologies for repair or return, contact us to get a Return Material Authorization (RMA) number.

5. Specifications

Supported Video Types	VGA through UXGA, RGBS, or RGB and YPbPr
Resolution & Refresh Rate	PC Resolutions up to 1920 x 1440 at 60Hz HD resolutions up to 1080p
Dimensions	3.2 Inch (H) x 9.8" (D) x 15.5 Inch (W) with 19 Inch wide Front Panel
Weight	7 Lbs
Power Supply	Directly from 100-220 VAC
Max Distance	Up to 1000 feet on Models UVA-16X and UV232-16X Up to 500 feet on Model UV1-S-16X
Connectors	HD15 female for video input and output 3.5 mm Mini-Stereo for audio or RS232 input RJ45 for CAT5 A/V outputs
Maximum Altitude	10,000 ft. (3048 m)
Temperature Tolerance	Operating: 32 to 122°F (0 to 50°C); Storage: –40 to +185°F (–40 to +85°C)
Humidity	Up to 95% non-condensing
Enclosure	Steel
MTBF	100,000 hours (calculated estimate)

Products Designed and Made in the USA

CE

1163 Warner Ave. Tustin, CA USA, Ph: (714)641-6607, Fax -6698