UV232A-4S

UV232A-8S

UV232A-4S & UV232A-8S
4 or 8 Channel Splitter
PC Video, Audio & RS232 over Twisted-Pair

UMA1176 Rev. A

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RADIO FREQUENCY INTERFERENCE STATEMENT

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in strict accordance with the manufacturer's instructions, may cause interference to radio communication. This equipment is designed 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. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Contents

1. Introduction

1.1 General

This User Manual applies to the Hall Research Models UV232A-4S and UV232A-8S.

These devices are four (4) or eight (8) Channel Splitters for PC Video, Audio & RS232 over Twisted-Pair cabling.

In a typical application, they are located at the AV/RS-232 source and connected to one or more compatible receiver units that connect the audio, video and RS-232 source signal to the receiving devices.

Below is a list of capabilities & features of each receiver model:

	Uni-Directional RS-232	Daisy Chain Output	RGB Skew Correction	Monauaral Stereo Audio	Equalization to 1000 ft	Cable Requirements
URA				●	●	**Low Skew UTP Cable**
URA-SKU			●	●	●	**Any UTP or STP Cable**
URA-XT		●	●	●	●	**Any UTP or STP Cable**
URA-232	●		●	●	●	**Any UTP or STP Cable**
URA-232-XT	●	●	●	●	●	**Any UTP or STP Cable**

Table 1 – Model Number Differences

Low-skew UTP cable (such as Hall Research's Zero-skew™ CAT5 cable) is recommended with the Model URA particularly if cable lengths are 200 feet or longer. The Models URA-232 and URA-232-XT do not have any special cable requirements since they are capable of correcting the RGB color skew induced in typical CATx cable installations.

The Model URA-232-XT allows downstream receiver units to daisy chain connections using UTP cables. This eliminates the need for running separate cables from every receiver back to the sender (in a star or home-run fashion) – this is a very useful feature when several receivers are located in a line going away from the sender.

Depending on the application, the URA-232-XT's downstream RJ45 port can connect to more receivers (URA-232-XT or URA-232). The constructed daisy chain may have:

- Up to 3750 feet maximum cable from source to last URA-232
- A maximum of 5 URA-232-XT devices in any chain
- 750 feet maximum distance between units in a chain

1.2 Features

- 4 channel (UV232A-4S) or 8 channel (UV232A-8S) splitter versions
- Transmits audio, video and uni-directional RS-232 on a single CATx cable
- Supports resolutions up to 1920x1200 at any refresh rate
- Compact & rugged metal enclosure with mounting holes
- Easily expandable by daisy-chaining receivers (URA-232-XT)
- Each URA-232-XT within the chain can send transmit RS232 or be remotely triggered.

2. Installation

2.1 Package Contents

Your package should contain the following items:

(1) UV232A – 4S or UV232A-8S

(1) Universal power supply (6 VDC @ 1.5A) with IEC320 Power Cord

(1) 6 ft HD15-M-M VGA cable

(1) 6 ft 3.5mm – MM Audio cable

(1) User manual.

2.2 Connection to Compatible Receivers

The UVA-232-4S and UVA-232-8S units have a single UTP cable connection to any of Hall Research's compatible URA receiver product line.

Some compatible receivers are:

PART NUMBER	
UV232A-R	
URA URA-SKU URA-XT	
URA-232	
URA-232-XT	

Table 2 – Compatible Receivers

- ❑ Connect the UTP cable from the compatible URA receivers to the "UTP OUT" connectors of the UVA-232-4S or UVA-232-8S.
- ❑ Connect the HD15 - "PC/HDTV IN" connector to the video source. For YPbPr video sources, use a 3-RCA to HD15 cable (Hall Research P/N CHD15-RGB).
- ❑ Connect the 3.5mm - "AUDIO IN" connector to the audio source or other sound equipment.
- ❑ Connect the DB9 RS232 cable to the RS-232 source equipment
- ❑ Connect the included power supply to the 2.5mm – center positive +6 VDC power input connector on the unit.
- ❑ **Never use any other supply as this may damage the device.**

2.3 Trigger Button Operation

The UV232A-4S and UV232A-8S splitters have a front panel "REMOTE TRIGGER" button used to tell each remote URA-232 or URA-232-XT receivers to send a pre-configured serial string that is stored in the receiver.

Note
Ensure that all receivers connected to the splitter are setup for "**Remote Button Trigger**" operation using the software GUI for proper operation.

2.4 Remote Trigger Command Operation

The UV232A-4S and UV232A-8S splitters can be remotely triggered from the RS-232 source via specific serial commands. Upon receiving the appropriate command, each receiver will send a pre-configured serial string that is stored in the receiver.

Note
Ensure that all receivers connected to the splitter are setup for "**Remote Command Trigger**" operation using the software GUI for proper operation.

2.5 Rear DIP Switch Setting

The rear of the splitter has a DIP Switch with the following functions:

LEFT DIP SW	FUNCTION	RIGHT DIP SW	FUNCTION
TRIG	REMOTE BUTTON TRIGGER MODE	CAL	OUTPUT TEST PATTERN
232	BYPASS OR REMOTE COMMAND MODE	RUN	OUTPUT VIDEO INPUT

If the left rear DIP switch is in the TRIG Position, then NO serial data received by the splitter is sent to ANY of the receiver units. The receivers must be configured for "Remote Button Trigger" mode.

If the left rear DIP switch is in the 232 Position, then all serial data received by the splitter is sent to ALL of the receiver units.

If the right rear DIP switch is in the CAL Position, then a VIDEO TEST Pattern is sent to all the receiver units. This is useful when adjusting the high frequency compensation and skew. This DIP switch should be returned to the RUN Position when the receiver video adjustments have been completed.

If the right rear DIP switch is in the RUN Position, then the AV signal connected to the splitter is sent to all the receiver units. This is the normal position for this DIP switch.

2.6 Cable Requirements

All units can use with CAT5/5e/6 or Zero-Skew™ UTP or STP (unshielded or shielded twisted pair) cables.

All units provide high-frequency compensation (to account for the losses in the CATx cable). The URA-232 and URA-232-XT units also provide RGB skew correction.

2.7 Daisy-Chain Limitations

The Model URA-232-XT allows downstream receiver units to be daisy chained using UTP cables. This eliminates the need for running separate cables from every receiver back to the sender.

Depending on the application, the URA-232-XT's downstream RJ45 port can connect to more receivers (URA-232-XT or URA-232). The constructed daisy chain may have:

- Up to 3750 feet maximum cable from source to last URA-232
- A maximum of 5 URA-232-XT devices in any chain
- 750 feet maximum distance between units in a chain

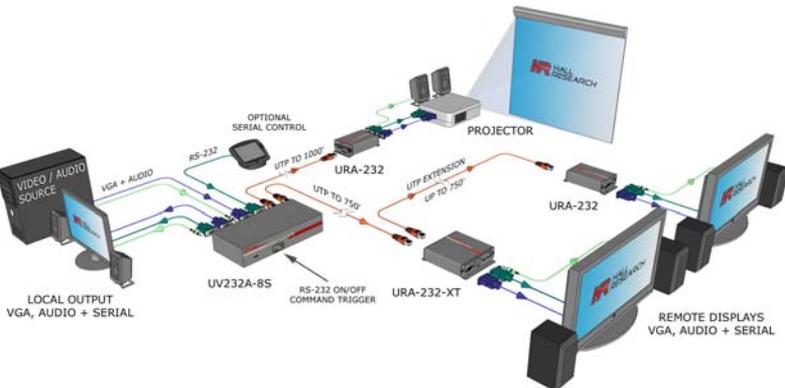## 2.8 Typical Block Diagram for UV232A-4S or UV232A-8S

Figure 2 – UV232A-4S & UV232A-8S Application Diagram

3. Configuration & Operation

3.1 Why Cable Compensation?

All cables attenuate (reduce) the high-frequency components of the video signal that is being transmitted. The longer the cable, the more signal loss. If not compensated for, this signal loss will result in blurry and smeared images being displayed.

The image quality depends on the resolution and level of detail in the image. The Hall Research URA series of receivers have one of the most precise and complex equalization techniques in the industry and allow full recovery of the original signal's bandwidth.

It is best to make this adjustment using a test pattern that is designed to depict and exaggerate this effect.

Some Hall Research senders may have a built-in test pattern generator. If your sender unit is equipped with this feature, simply activate it on the sender. Otherwise, you can connect a PC to the source and display a test pattern. A sample test pattern is available at http://www.hallresearch.com/skew.htm to assist in the adjustment of the compensation and to evaluate the amount of color skew in the installation.

The table below lists the recommended maximum distances from sender to the receiver depending on the resolution used.

		Refresh Rate	
		60 Hz	75 Hz
Resolution	800x600	1000 ft	1000 ft
	1024x768	1000 ft	850 ft
	1280x1024	850 ft	750 ft
	1920x1200	750 ft	700 ft

Table 3 -

Recommended maximum CATx cable length from sender to the receiver

3.2 Compensation Adjustment Procedure on URA Receivers

- When using a UV232A-4S or UV232A-8S splitter, place the right rear DIP switch in the **CAL** position to create the video test pattern on the receiver video outputs.
- Apply power to the receiver. Wait until all LED's are turned off
- Press the **SEL** button once to enter **Adjustment-mode**.
- In **Adjustment-mode**, all three (3) LEDs will be turned ON.
- The UP or DOWN buttons can now be used to adjust the high frequency (HF) compensation up or down until the video no longer looks smeared (see figure below).
- While using the UP and DOWN buttons, if an upper or lower limit of adjustment is reached, the LED's will blink for each continued press of the UP or DOWN button.
- Pressing both the UP & DOWN buttons together will reset the high frequency (HF) compensation back to zero.
- To exit the **Adjustment mode** at any time, press the **SEL** button until all LED's are OFF (the unit also has a built-in 1 minute timeout)
- When using a UV232A-4S or UV232A-8S splitter, return the right rear DIP switch in the **RUN** position to send the video input to the receiver..
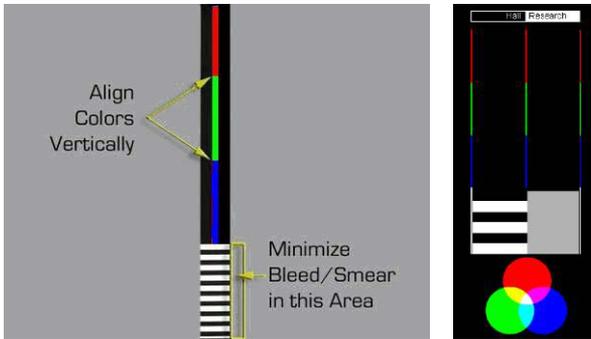

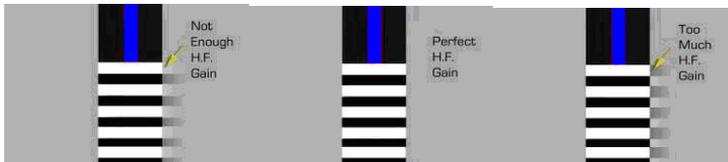Figure 4 - Typical test patterns used for adjusting compensation

Figure 5 - Effect of adjustment on the smearing

3.3 Advanced Adjustment (CATx AWG) on URA Receivers

The URA series of devices can equalize the brightness of the video by reducing smearing.

- Apply power to the receiver. Wait until all LED's are turned off
- Press the SEL button once to enter **Adjustment-mode**.
- In **Adjustment-mode**, all three (3) LEDs will be ON solid.
- Press and hold the SEL button for at least 3 seconds to enable the **Video Brightness Adjustment Mode** (previously called Wire Gauge Mode).
- In **Video Brightness Adjustment Mode**, the GREEN and BLUE LED's will be blinking.
- The UP button raises the video brightness level.
- The DOWN button lowers the video brightness level.
- Pressing BOTH the UP and DOWN buttons at the same time will reset the Video Brightness to the default setting.
- While using the UP and DOWN buttons, if an upper or lower limit of the adjustment is reached, the LED's will blink for each continued press of the UP or DOWN button.
- To exit the **Video Brightness Adjustment mode** at any time, press the SEL button until all LED's are ON solid. Press the SEL button once more until all LED's are OFF (The unit also has a built-in 1 minute timeout).

Note

The Video Brightness adjustment may not be noticeable when only using 1 device. When products are daisy-chained using the –XT version the adjustment is easier to observe.

3.4 Why Skew Adjustment?

UTP cables have 4 twisted pairs inside. The Hall Research UVA/URA video transmission on UTP uses 3 individual pairs for each color (Red, Green, & Blue).
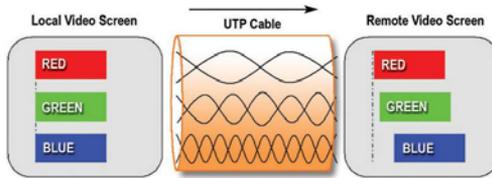

Figure 6 - skew mechanism, example

As shown in the figure above, a characteristic of CAT5/5e/6 cable is that the pairs of wires twist at different rates.

Therefore, for a given length of CAT6 cable the total length of any particular pair could be longer than other pairs in the same cable. Since the signals travel along the length of each pair at a fixed speed, the arrival times of signals will be skewed in a long cable (those that have to travel farther arrive later and the corresponding color shifts to the right). This is viewed 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.

If you are using special UTP cables that are specifically designed for video transmission (such as Hall Research Zero-Skew™), then there should be no shift in color alignment regardless of the cable length. However, in many applications standard and common CAT6 cables may be utilized, this will necessitate a receiver that can also move each color component to the left and right in order to realign them.

300 ft of CAT6 (1280x1024 source)
* actual zoomed photo of screen *

After skew adjustment

Figure 7 – Example of Skew manifested

3.5 Skew Adjustment Procedure on URA Receivers

- Apply power to the receiver. Wait until all LED's are turned off
- Press the SEL button once to enter **Adjustment-mode**.
- In **Adjustment-mode**, all three (3) LEDs will be turned ON.
- Press the SEL button once to enter the **Adjustment mode**. Press the SEL button again to light only one of the 3 Red, Green or Blue LEDs. As you press SEL the Red, Green, and Blue LEDs will light up one at a time.
- The **UP** and **DOWN** buttons are used to move the selected color component to the left and right. Pressing both buttons at the same time resets all skew adjustments.
- While using the UP and DOWN buttons, if an upper or lower limit of adjustment is reached, the LED's will blink for each continued press of the UP or DOWN button.
- To exit the **Adjustment mode** at any time, press the SEL button until all LED's are OFF (the unit also has a built-in 1 minute timeout).

3.6 Signal Adjustment for the Daisy Chain

There are no specific procedures for adjusting the URA-232-XT's other than the order of adjustment.

The URA-232-XT's RJ45 (CATx) output is the video signal AFTER IT HAS BEEN ADJUSTED.

<u>**The receiver unit closest to the sender must be adjusted first.**</u>

Set the high frequency compensation first and then adjust the skew. Since the effects in the daisy chain are cumulative, we recommend that you set the gauge of CATx cable used as well (see section 3.3 above).

Remember, if the calibration is off on a URA-232-XT in the middle of a daisy chain and you adjust the device settings you must then check the rest of the downstream devices and if necessary; make additional adjustments on those devices as well.
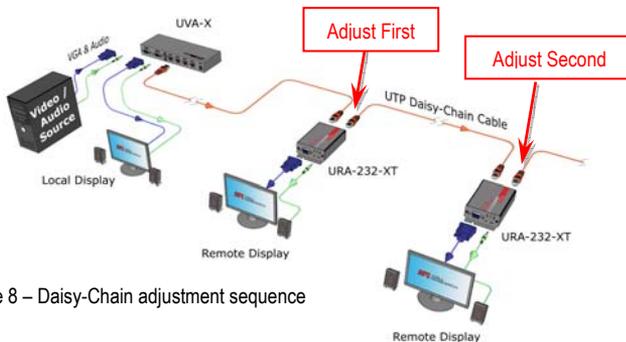

Figure 8 – Daisy-Chain adjustment sequence

4. Troubleshooting

There are no field serviceable parts or circuits in the device.

Opening the unit will void the warranty.

If you think the device is malfunctioning (or you have no picture output), please try to use the methods described in Section 4.3 below to obtain a picture first.

4.1 Contacting Hall Research

If you determine that the URA-232 or URA-232-XT is malfunctioning, do not attempt to repair the unit instead, contact Hall Research Technical Support 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.

4.2 Shipping and Packaging

If you need to transport or ship your unit:

- Package it carefully. We recommend that you use the original container.

- Before you ship the units back to Hall Research for repair or return, contact us to get a Return Authorization (RMA) number.

4.3 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 HF compensation correctly. In addition, check the recommended table of max distance vs. resolution to see that you have not exceeded the maximum recommended cable lengths. If you still have a fuzzy image, try reducing the refresh rate and/or resolution of the video source.

2. **Image exhibits steady or rolling horizontal color "hum" bars**
   This is usually an indication of improper grounding 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 splitter can handle up to 5 volts peak-to-peak of ground noise between the two locations, but ground potential differences more than this can show up on video.

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 sender and the interfering source, or use shielded twisted pair (STP) CAT5 cables.

4. **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.

5. Specifications

Video

Gain	Unity
Number/signal type	1 analog signal input. Standard VGA output RGBHV, RGBS, RGsB, RsGsBs, component video (bi-/tri-level sync)
Connectors	4 or 8 female RJ-45 output 1 HD15 local output
Nominal amplitude	1 V p-p for Y of component video 0.7 V p-p for RGB and for Pr and Pb of component video 4.0 V to 5.0 V p-p, for TTL Sync signals of RGBHV, RGBS
Impedance	75 ohms
Skew compensation	62 ns
Maximum resolution	Up to 1920x1200 and 1080p at 750 ft; 1280x1024 at 850 ft
Polarity	Positive or negative

Audio

Gain	Unbalanced output: 0 dB
Frequency response	20 Hz to 20 kHz, ±1 dB
Connector	(1) 3.5 mm connector input (1) 3.5 mm connector local output
Type	Monaural, Simulated Stereo
THD + Noise	0.2% @ 1 kHz, 0.3% @ 20 kHz at nominal level

General

Recommended cable	CAT 5/5e/6 (shielded or unshielded)
Power Supply	100 VAC to 240 VAC, 50-60 Hz, external; 6 VDC, 1.5 A, regulated; 2.1mm
Temperature/humidity	Storage: -40 to +158 °F (-40 to +70 °C) / 10% to 90%, non-condensing Operating: +32 to +122 °F (0 to +50 °C) / 10% to 90%, non-condensing
Enclosure type	Metal
Dimensions	1.66" H x 8.42" W x 2.60" D - Depth excludes connectors (42.2 mm H x 214 mm W x 66 mm D)
Product weight	1.5 lb (0.68 kg)
Shipping weight	3.0 lbs (1.36 kg)
Vibration	ISTA 1A in carton (International Safe Transit Association)
Safety	CE
EMI/EMC	CE, FCC Class A
MTBF	90,000 hours
Warranty	2 years parts and labor

RS-232

Connectors	1 DB9 Female Input (Pins 2, 3 and 5) 1 DB9 Male Output (Pins 2, 3 and 5)

Specifications are subject to change without notice

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