

HR HALL RESEARCH

Model U97-ULTRA

All-in-One UTP Console Extender

Dual Video, Audio, RS-232, with

General Purpose USB, and up to 2 Direct USB Extensions



Model U97-ULTRA-2

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INFORMATION**

Order **toll-free** in the U.S. **800-959-6439**
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This equipment is CE, FCC and CSA certified.

Hall Research

100-240VAC, 0.2A
50-60 Hz



CSA Certified file # 246552

(Complies with UL 60950-1, Second Edition U.S. Standards)



**Product Designed and Tested to Support Microsoft Windows
2000/XP/Vista/7**

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CAUTION:
CONTAINS HAZARDOUS VOLTAGES
NO USER SERVICEABLE PARTS INSIDE.

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About this User's Manual

This User's Manual pertains to the Model U97-ULTRA-2 console extender kit. Please refer to the Block Diagram on the following page. This device is used to extend Dual PC Video (VGA), Audio (amplified or line level), full-duplex RS-232, one general purpose USB port (STD) with a 2-port hub at the sender and a 4-port hub at the receiver, and two additional direct-link (hubless) USB extensions (DR1 & DR2).

The product is commonly sold as a kit which includes a rack-mountable sender unit plus a wall-mountable Receiver (and I/O hood cover), packaged together. However they can also be sold separately.

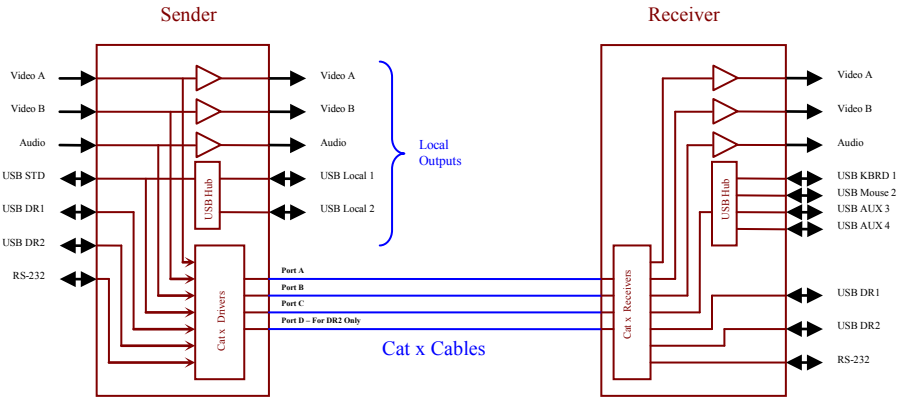
The table below lists the various configurations and part numbers.

Model Number	Description
U97-ULTRA-2	Kit for 1 general purpose USB (STD) and 2 direct (DR1 and DR2) USB Extensions, plus Dual Video, Audio, and RS-232 Kit includes one Receiver and one Sender per below part numbers
▶ U97-ULTRA-2R	<i>Receiver (Remote) Unit - Peripheral Extender with 2 direct USB Ports (DR1 & DR2)</i>
▶ U97-ULTRA-2S	<i>Sender (Local) Unit - Peripheral Extender with 2 direct USB Ports (DR1 & DR2)</i>

These products are manufactured by Hall Research to highest quality control standards. All units are fully tested (including Hi-Pot leakage), undergone 24 to 48 hours of burn-in, and re-tested prior to delivery.

1.0 General

U97-ULTRA-2 kit is used to extend Dual Display PC Video, Stereo Audio, RS-232, and up to 3 independent USB ports to a remote location up to 400 feet away on any Category Cable (CAT5e/6 etc). A block diagram of the system is shown below.



Block Diagram (see Specifications for a full-page image)

1.1 Catx Cable Requirements

Depending on the model or application from 2 to 4 UTP (CATx) cables are needed to connect the sender to the receiver.

Extension Requirement	Number of CATx Cable and Connector Position
Dual Head Video Audio, RS232 USB: Std (Hub), DR1, DR2	4 UTP : A, B, C, D
Dual Head Video Audio, RS232 USB: Std (Hub), DR1	3 UTP : A, B, C, D
Single Video Audio USB: Std (Hub), DR1	2 UTP : A, C

It is recommended to use CAT6 UTP or STP since it offers the maximum extension capabilities. The unit is capable of extending all the signals to over 400 feet (approx. 450 feet using Cat6 UTP Cables). Zero or low-skew cables are not needed since the device incorporates skew correction on both video channels.

1.2 RJ45 Port Functions

The RJ45 connectors are labeled Port A through Port D, functions carried via each port is listed below. This chart is useful for trouble shooting purposes.

Port	Signals Extended	Comments
A	Video A, Audio, Calibration Switch state	Required in all applications
B	Video B, RS-232	May be omitted if Video B or RS-232 extension is not needed.
C	General Purpose USB and DR1 USB	Required in all applications
D	DR2	Only present on -2K with DR2. May be omitted if DR2 is not used

1.3 User I/O Connector Descriptions

The Sender provides connectors for connection to the PC source and features local outputs at of both video ports, audio signals (with amplified audio pass-through), and General Purpose USB port (for connection to local keyboard or pointing devices). Please refer to the block diagram.

- ❑ VGA A IN & VGA B IN – These are PC's video input signals (VGA thru UXGA) with local loop outputs at the sender. They are extended to a remote unit through RJ45 Port A and Port B. High Frequency (HF) and RGB skew compensation is incorporated at the receiver to provide a brilliant image for these video signals.
- ❑ Audio – DB15 connector (with 2 rows of pins) for audio input and a loop output at the sender. The audio is extended to a remote receiver which has both line as well as Powered outputs (for driving passive speakers). The DB15 audio I/O allows interface with not only line-level 3.5 mm mini-stereo audio sources (using adapter cable available from Hall Research), but it also provides a more reliable and secure means for the audio connection through use of gold-plated D-Sub connector with jack screws. The audio input level supports a wide range of standards; it could be amplified (for driving passive speakers), +4dBu (Pro-Audio), or -10dBv (consumer line-level).
- ❑ USB STD – This is a general-purpose USB Port, which goes through a hub in the sender and provides 2 USB local output ports. It is also extended to the remote receiver, in which another hub provides the user 4 USB ports. These USB ports are labeled as KBRD 1, MOUSE 2, AUX 3, and AUX 4. These

general-purpose USB ports support any type of low-speed or high-speed USB devices. AUX 3 and AUX 4 are typically used for touch screen displays, but support all other USB devices as well.

- ❑ DR1 & DR2 – These are two “Direct” extension USB ports. The corresponding USB port on the PC is directly extended to a remote receiver with no hubs or other functions in the path. The PC’s USB port that is extended via DR1 or DR2 behaves exactly as if it were connected directly to the target device at the remote. These “Direct” USB port extensions are perfect for high data rate devices, such as video cameras, storage media, printers and chart recorders. They do not support low-speed “Human Interface” devices, such as keyboard or mouse. Having a dedicated path from the target device to the PC ensures full channel bandwidth availability in the interface (as opposed to several devices sharing one port on the PC via a hub).
- ❑ Serial RS-232 – Bi-directional extension of RS-232 data.

Both the sender and the receiver have built-in power supplies with standard IEC320 jacks (no external power bricks). The sender includes 6 ft cables for connection to the PC (3x USB, 2x VGA, 1x DB15 audio). The sender also includes rack-mount front panel. The receiver includes a metal guard that covers all the connections, thereby eliminating the need for a separate utility box.

Both the sender and the receiver have DB15 output connectors for the sound so that standard 4 or 8-Ohm passive speakers can be directly connected at both ends.

1.4 Features

- Combines the functions of Hall Research Models U97-H2, UU2X4-P1, two SKU-RGB, DVC-3 video test pattern generator, and more
- Eliminates the need for Utility Box (Receiver includes a guard plate that goes over all the connectors with tie-down provisions for strain relief)
- Does not require external power supply (built-in supply with standard 110~240 VAC IEC320 jack)
- Includes 2 "Direct" USB ports (DR1 & DR2), and a Standard with Hub at both ends.
- DB15 connector for audio input and loop output at the sender as well as DB15 output at the receiver. Receiver features a DB15 Male output with amplified output to drive passive speakers directly, as well as line level 3.5mm jack for powered speakers.
- Built-in video Skew Correction on both video channels. This corrects the lack of RGB convergence when long Cat6 cables are used. Eliminates the need to use special low-skew UTP cables for long runs.
- Built-in Test pattern generator for long cable compensation (High Frequency Gain) and Skew correction.
- Built-in EDID (Extended display ID), allows PC to detect LCD's even if none is connected at the sender or the receiver.
- Local USB outputs at the sender for connection of local keyboard and mouse.
- Supports hot-unplug and hot-plug of USB Peripherals (General Purpose USB ports, as well as DR1 and DR2)

2. Installation

2.1 Connecting the Sender to the PC

Using the supplied cables; connect the sender to the PC.



Sender Rear Panel



Close-up of Sender Input Connections



Close-up of Sender UTP Connections to the Remote Unit

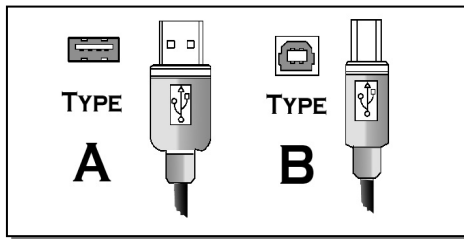
Connect PC's VGA outputs to VGA A IN and VGA B IN connectors using the supplied cables.

Connect the audio source to AUDIO connector using the furnished DB15 male-to-female cable. Below is a diagram of the sender's audio input connector and pass-through audio output. When connecting to a 3.5mm source use adapter part number CA10084 (sold separately see drawing below).

As seen in the attached schematic diagram, the unit only utilizes and passes through the amplified audio pins of the DB15 input connector. The audio input pins and corresponding return pins are kept isolated in the sender (high impedance).

If a serial communication is needed, connect a PC's serial port to RS232, a DB9 female connector. Usually a straight-thru DB9 M/F cable is required (not supplied).

Use the included USB cables to connect the PC to USB STD and DR1 connectors. These are Type 'B' connectors, which are used to attach the USB cable to a USB device. The opposite end of the USB cable uses Type 'A' connectors which connects a USB device to a PC or a USB hub. The figure below shows two different types of USB connector.



USB Port & Connector Types

2.2 Connecting the Sender local outputs

The sender has buffered outputs for connection of two LCD's, a passive speaker, and two USB devices (commonly keyboard and mouse or a KVM Switch).



Sender Local Output Connections

2.3 Connecting the Sender to the Receiver

Depending on the specific need you need from 2 to 4 UTP cables to connect the sender to the receiver, please refer to table on page 6.



Sender RJ45 outputs to Receiver

- Port A of the UTP carries VGA A and AUDIO signals
- Port B of the UTP carries VGA B and Bi-directional RS232 signals
- Port C of the UTP carries the Standard (STD) USB and the "Direct" USB port DR1.
- Port D of the UTP carries the "Direct" USB port DR2

2.4 Connecting the Receiver outputs

The receiver outputs are shown below.

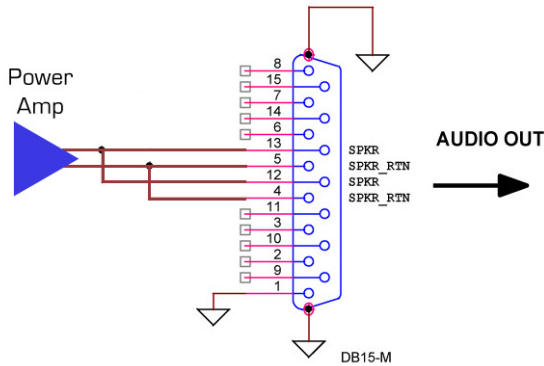


Receiver Rear Panel

Connect display devices such as two LCD's to the VIDEO 'A' & VIDEO 'B' connectors of the receiver.

Connect a LINE AUDIO OUT from the receiver to any standard PC external speakers (powered) using male to male 3.5mm audio patch cable.

If an amplified audio output level is desired, connect the receiver's PWR AUDIO OUT connector to the desired device. The pin diagram of the receiver's PWR AUDIO OUT is shown below. For reference also see CA10084 diagram above.



Receiver Audio Output Connector, DB15 – Female

If a serial communication is needed, connect a PC's serial port to RS232, a DB9 male connector

3. Configuration & Operation

3.1 Sender Front Panel Controls and indicators



Keep the **VIDEO ADJUST** switch in RUN mode for normal operation. Set it to CAL (calibrate) mode to adjust the video at the remote unit per the following descriptions

3.2 Receiver Front Panel Controls and indicators

The Console Extender-Remote unit can be operated in two different modes, which are run-mode and calibrate-mode.

In the run-mode, all LEDs and buttons for video adjust are off.

In the calibrate-mode, the unit should turn on the specific video adjust LEDs to indicate the previous selection in this mode, such as channel selection A or B, HF Gain or Align mode.



There are two ways to get into the calibrate-mode to adjust the video. The first and recommended method is to use the **VIDEO ADJUST** switch on the sender and set it to CAL, which puts the receiver in the calibrate mode and also activates a test pattern. The receiver stays in this calibrate-mode until the **VIDEO ADJUST** switch is set back to RUN. The other way to enter the calibrate-mode is to hold down the **SELECT** button for 3 seconds at the receiver, in this case the test pattern will not be displayed as output. If there is no user activity on the front panel for 1 minute, the receiver will time out and switch back to the run-mode.

Note

*The **VIDEO ADJUST** switch on the sender can be used to quickly put the receiver in the calibrate-mode (Video Adjust LED's on the Receiver front panel are lit). The sender also generates a test pattern that is specifically designed for Video Calibration.*

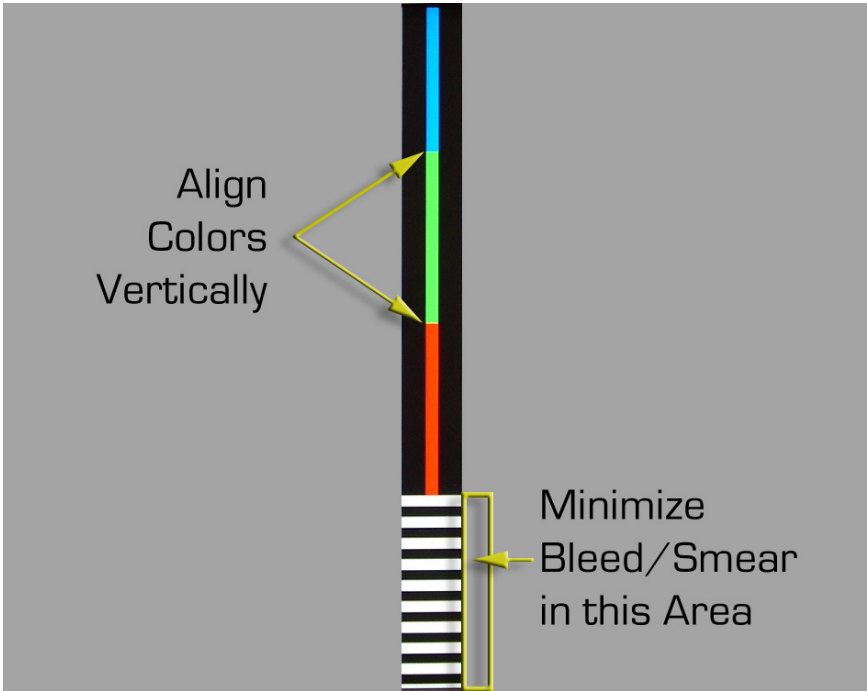
The **CHANNEL SELECT** button is used to select either video A or video B input source to adjust. The setting for Ch A and B are independent and hence the procedure must be repeated for each of the 2 video screens.



The **UP** and **DN** buttons are used to adjust either the High Frequency compensation (HF GAIN) or the red, green, and blue signal alignment (ALIGN). The **UP** or **DN** button can be pressed once to increment or decrement the gain level. When holding down either the **UP** or **DN** button, the unit will automatically increment or decrement the gain level until it reaches the max or the min gain level setting. The RED, GRN, & BLU LEDs will flash when the unit's gain level is at min or max. The **UP** and **DN** buttons can also be used to reset the HF Gain or the signal alignment. Just press them simultaneously.

The **SELECT** button is used to select either the signal alignment (ALIGN) or the high frequency gain (HF GAIN) adjustment.

The following figures show how an image can be adjusted to become perfect by using the receiver front panel controls.

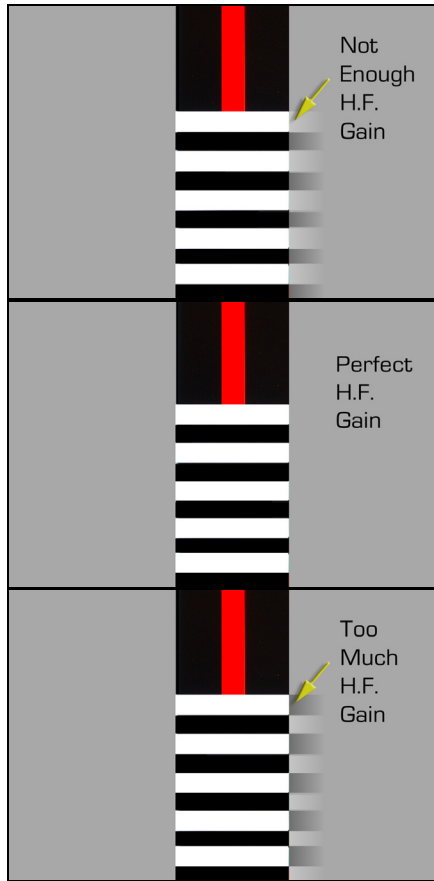


Test Pattern for HF Gain and Skew adjustments

Select the video channel that you are going to adjust. Start by adjusting HF gain (all 3 LED's on the Receiver lit). It is best to start at the min compensation setting. To do this either press the Down button repeatedly until the LED's blink (indicates you are at min), or simply press both Up and Down buttons simultaneously.

If the cable is long then the black and white horizontal lines tend to appear smeared (black smears as black, and white as white). Press the Up button one at a time paying particular attention just to the right of the horizontal lines. Your goal is to make the transition are between the horizontal black and white lines and the 50% grey background have as little smear as possible. Do not over adjust. If you do, some smear comes back particularly near the transition but in reverse sense (white lines smear into grey as black and vice versa).

The following images depict the adjustment results as seen on the screen:



HF gain adjustment (zoomed view)

Once you have adjusted the HF Gain, hit the select button to cycle through the Red, Green and Blue colors and use the Up and Down buttons to align the colors vertically.

When you are all done, if you had initiated the calibration by using the Calibration switch on the sender, you should go back to the sender and put the switch in the Run mode. The Receivers Calibration LED's will go out and the buttons will not be operative.

The output audio volume level can be manually adjusted by using a small flat-screw driver to turn a recessed pot clockwise for louder or counter-clockwise for softer. You cannot turn the volume all the way down. This means that even if the pot is turned fully CCW, you still have some audio output.

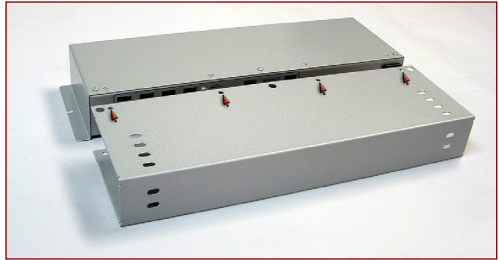
4. Receiver Cover

In the diagram below the location of holes where the cover screws to the receiver are shown with little arrows. All screws are provided with the unit. There are 4 screws on the top and 2 on the bottom (not shown).

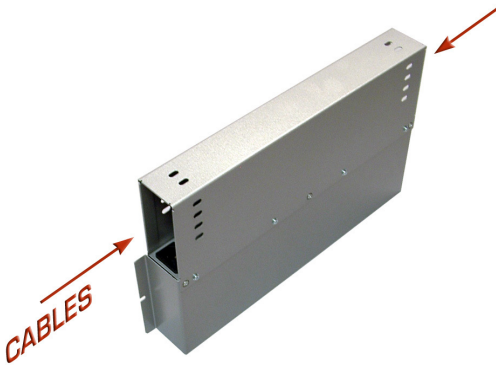
You can use the slotted holes at either end of the unit to zip-tie the cables in place.

Once the cover is firmly attached and cables zip-tied in place, you can screw the entire assembly to a suitable base using the L flanges on either side of the unit.

Make sure that the front panel is accessible for skew and or video adjustments as needed.



Locations of attachment holes for screws



Cables can enter and leave from either end

5. Troubleshooting

Make sure that all connections to the PC and peripheral equipment are solid. Reboot the PC if any of the connections were loose as this may have caused the PC to lock up.

If the problem is related to the video, check the function and calibration by placing the unit in Calibration mode using the switch on the sender. If the image on the display is not centered, use the LCD's on screen display to do an Auto Adjust Image.

If the problem is with the USB devices, check the state of the LED's on the front panel of the each unit. These LED's pertain to USB links. The General purpose USB (STD) link light should be on if proper connection is made between the sender and the receiver, Data light will light if connection to PC is made and a device is plugged to one of the STD USB ports on the remote unit. The DR1 and DR2 LEDs function when the sender is connected to the PC and the receiver at the remote is connected to a USB device (such as a printer) therefore link and data LEDs work together. If connection to the PC of DR1 or DR2 is verified, but the Link and Data LEDs are off, unplug the corresponding device from the remote, wait 5 seconds and plug it back in.

Check the RJ45 port connections (A to A, B to B, etc), make sure they are not crossed, loose, or disconnected. Use the following chart to narrow your attention depending on device you are having trouble with:

Port A of the UTP carries VGA A and AUDIO signals

Port B of the UTP carries VGA B and Bi-directional RS232 signals

Port C of the UTP carries the Standard (STD) USB and the "Direct" USB port DR1.

Port D of the UTP carries the "Direct" USB port DR2

If you cannot trouble shoot the setup, please note all pertinent symptoms and make a list of any other equipment used in the setup.

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NO USER SERVICEABLE PARTS INSIDE.**

**ATTENTION: TENSION DANGEREUSE, L'APPAREIL NE COMPORTE
AUCUN ÉLÉMENT QUE L'UTILISATEUR PUISSE RÉPARER**

Do not open or try to repair the unit yourself. There is no customer repairable item in the unit and you will void the warranty.

Contact Hall Research Technical Support Department at 714-641-6607 or via email or web. If you need to ship your switch for repair, make sure to get a Return Material Authorization (RMA) number first.

6. Specifications

Video

Video Inputs	PC outputs (VGA to UXGA)
Resolutions	PC resolutions up to 1920x1280 @ 60 Hz
Video Levels	0 to 0.7v p-p

Dimensions

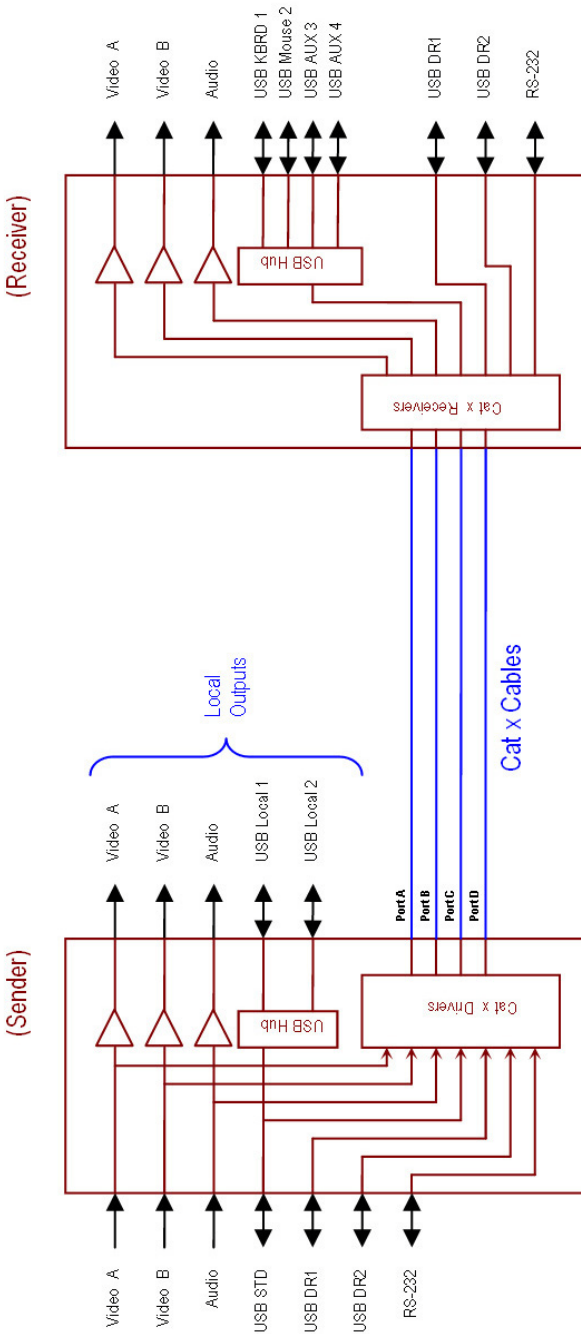
Sender	1.5" High x 19" Wide x 5.06" Deep
Receiver	1.75" High x 14" Wide x 4.06" Deep

Weight

Sender	4 lbs
Receiver	3 lbs

Others

USB Support	High Speed devices (12Mb/s) Low Speed devices (1.5Mb/s)
UTP Cable	Up to 400 feet using any Cat5e or 450 ft using Cat6
Temperature	Operating: 32 to 122°F (0 to 50°C); Storage: -40 to +185°F (-40 to +85°F)
Enclosure	Steel
MTBF	90,000 hours (calculated estimate)
Power	100VAC – 240VAC 50/60Hz



Block Diagram of the U97-ULTRA-2 Extender Kit



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