# SC-3H
## MULTI-FORMAT
## PRESENTATION SWITCHER
## &
## RS-232 CONTROLLER

UMA1256 Rev 3

# Table of Contents

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**FCC RADIO FREQUENCY INTERFERENCE STATEMENT**

This equipment can radiate radio frequency energy and if not installed and used properly, may cause interference to radio communication.  This model 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, 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 necessary to correct the interference.
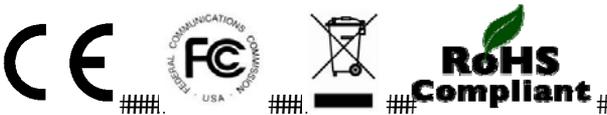
## 1.0 Introduction

The SC-3H is a multi-format switcher with 2 HDMI and 1 VGA (with audio) inputs. The SC-3H provides an HDMI video output together with stereo analog audio output. HDMI inputs support virtually all PC and TV resolutions including 4K @ 30 and 4K @ 60 (4:2:0). The VGA and its associated audio input are converted to HDMI and scaled to 720p or 1080p for maximum compatibility with HDMI TV's.

Affordably priced, the SC-3H provides a powerful and cost effective way to add AV switching and control to any classroom, huddle room, or conference room.

The device manually or automatically switches between the various video inputs. In AUTO input mode, the device scans the inputs in order to detect video on its inputs and automatically switches to the active input. If more than one input has video, the SC-3H can choose among them based on a user defined priority tree.

The device can also act as a controller to send serial RS232 commands that can turn displays on and off. Users can upload RS-232 commands for their display and when the SC-3H turns on and off, it will send the "on command" or "off command" to the display.

The power commands can also function automatically. In Auto Power Command Mode, the unit will send out a power on command if there is video or +5vDC received on an input, and if there is no video or +5vDC received, it will send a power off command to the display after a predefined delay.

Normally the RS-232 port on this model acts as a "master" issuing commands to external devices, but this port can also be used to control the SC-3H. Please see Section 5.0 below for more details.

To use the unit in manual mode, where power and inputs are manually controlled, the front panel buttons are used.

An optional external single-gang wall-plate controller (Models SW3-UI and SW3-UI-VOL) can also control the SC-3H. These controllers also have MUTE and VOLUME buttons for extra functionality.

The HDMI inputs have full EDID management capability. By default, the connected display's EDID is used for the HDMI inputs, but users have the ability to upload, emulate read, or download the EDID. A mini-USB port on the front panel configures the device via a free Windows™ GUI available from the SC-3H product webpage.
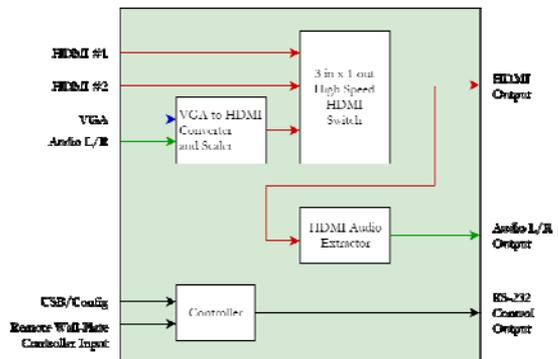


Figure 1 - Internal Block Diagram

## 2.0 Features

- Two HDMI inputs and 1 VGA input with 3.5mm Audio
- Manual or automatic input selection based on video detection
- Control via front panel buttons, optional external keypad, or RS-232
- RS-232 port can control auxiliary devices (such as projector power on/off)
- Manual or Automatic power control command
- EDID management
- Supports VGA, HDMI, MHL (on HDMI #1), and DVI
- Locking power supply input connector
- Compact, Rugged, Reliable, and Economical

### 2.1 Package Contents

Qty (1) SC-3H
Qty (1) 5V DC Universal DC Power Adapter
Qty (1) User's Manual
Qty (1) Type A to Mini-B USB cable

## 3.0 Setup
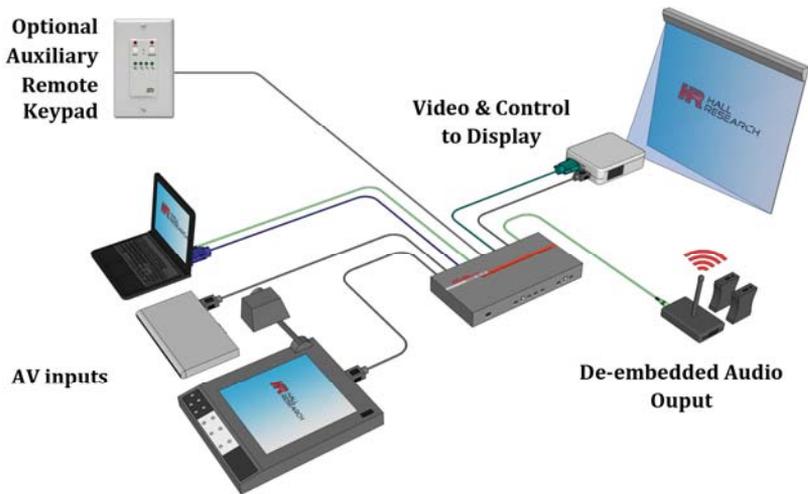


Figure 2 - Typical Installation Diagram

## 3.1 Installation

- Connect HDMI compatible source signals to the HDMI 1 and/or HDMI 2 IN connectors. Connect a VGA compatible source signal to the VGA connector. If VGA source has separate analog audio, connect it to the audio input.
- Connect the HDMI display device to the HDMI OUT connector.
- **Optionally**, connect a compatible line-level audio output device to the L/R OUT connector. (e.g., headphones, amps, assistive listening devices).
- **Optionally**, connect a compatible device to be controlled to the RS-232 connector. (e.g., Projector)
- **Optionally**, connect a Model SW3-UI or SW3-UI-VOL to the Aux Ctrl connector. (e.g., For control of unit from a remote location)

# 4.0 Operation
## 4.1 Front Panel



Figure 3 - Front Panel

## ON/OFF LED
This LED shows the power status of the unit.

## POWER Button
Press this button to turn the system on or off. When the unit is on, the ON/OFF LED illuminates.
If you have defined ON and/or OFF commands for external devices (buttons with POWER FUNCTION), the RS-232 port will send those commands as the unit turns on/off.
To enter or exit Auto Power Command Mode, with the system on, press and hold the button for ~7 seconds.
On the Model SW3-UI or SW3-UI-VOL keypads, press and hold the PWR button for ~4 seconds.

## POWER AUTO LED
This LED shows the status of Auto Power Command Mode.
When the LED off, pressing the power button will turn the unit on and off.

When the LED is on, the unit stays on all the time (the power button is disabled).
If you have defined ON/OFF commands for external devices (buttons with AUTO FUNCTION), the RS-232 port will send those commands based on detecting Video or +5vDC on the selected input(s). See section 5.2 below for more details.

### VGA, HDMI1 and HDMI2 LEDs

These LED's show the currently selected video input.

### INPUT Button

Press this button to select the different inputs available: VGA, HDMI1 or HDMI2.
Each press selects the next available input.

To enter or exit Auto Input Mode, press and hold the button for 7 seconds.
On the Model SW3-UI or SW3-UI-VOL keypads, press and hold the SOURCE button for ~4 seconds.

If you have defined ON/OFF commands for external devices (buttons with ISx FUNCTION), the RS-232 port will send those commands when the selected inputs changed. See section 5.3 below for more details.

### INPUT AUTO LED

This LED shows whether the unit will automatically select an input based on the 'last plugged' input or the priorities configured.

On the Model SW3-UI or SW3-UI-VOL keypads, the AUTO source LED illuminates solid with priority switching selected.

The LED will blink when 'last plugged' switching selected.

### CONFIG

Connect the supplied USB cable to a compatible Windows™ PC running the software GUI available for download from the product's webpage.

### 4.2 Rear Panel



Figure 4 – Rear Panel

### DC 5V

Connect to the power supply shipped with the unit. See Section 4.4 below for more details.

### HDMI/MHL 1 IN and HDMI 2 IN

Connect the HDMI connector to a compatible video source.

### VGA/HD IN

Connect the VGA connector to a compatible video source.

### L/R IN

Connect the 3.5mm jack to compatible line level audio source. This signal is only available when using the VGA source signal.

## L/R OUT
Connect the 3.5mm connector to compatible line level audio output devices. This is the audio embedded in the output HDMI.

> ### NOTE
>
> *The 3.5mm L/R IN and L/R OUT connectors are configured for Consumer Level signals (typical of MP3 players or wireless microphone receivers).*
>
> *These connectors are stereo (Tip=Left, Ring=Right).*
>
> *Care must be taken when connecting to balanced or mono signals.*

## HDMI OUT
Connect the HDMI connector to a compatible video sink (TV or Projector).

## RS-232
Connect RS-232 out to the controlled device such as a projector using the appropriate RS-232 cable.

In "slave mode", you can use the serial port to control the SC-3H, Please refer to Section 5.0 below for more details.

## AUX-CTRL
Connect an optional SW3-UI (or SW3-UI-VOL) keypad via CATx cabling.

## 4.3 Factory Default
Hold the 'POWER' and 'INPUT' buttons for more than 4 seconds to reset the unit to the 'FACTORY DEFAULT' state. Factory default can also be set via PC GUI or RS-232.

## 4.4 Power Connection
Connect the universal 5-vDC power supply provided.

## 4.5 L/R IN and L/R OUT Connections

NOTE   *The L/R IN connection expects a line level signal (maximum of ~0.9 vDC).*

*If you need an external preamp for low-level microphones, the Hall Research Model HR-101-S may work for your needs. In most classroom installations, the wireless microphone present may have a line-level output.*

*Use the following diagram for connection of external preamp (such as wireless microphone receiver) to the system.*

*Ground referenced means that the external preamp has a connection to ground (the AC cord has a ground prong).*

*If the preamp does not provide a balanced (differential) output, you should not tie the return of your source to the ground of the SC-3H. Doing so would create a ground loop that will most likely cause audio hum.*

*If you are sure that your external preamp is floating (its AC cord has no ground prong), then it may be advisable to connect the negative input signal to ground at the SC-3H.*

TIP, RING and SLEEVE refer to the **L/R IN and L/R OUT 3.5mm connectors**
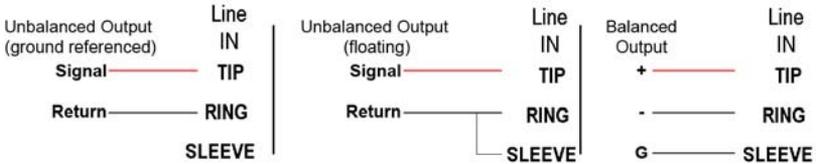


Figure 5 –L/R IN and L/R OUT Wiring Diagram

# 5.0 Using the RS-232 Serial Port

As shipped from the factory, the unit is an RS-232 master.

This means that this RS232 port controls external devices and any incoming commands received on the RS-232 port are ignored.

To control the SC-3H from the serial port, you must first put the unit in slave mode.

To turn on slave mode, you must send: "HRT-SC3H<CR>" to the serial port. The unit will remain in Slave Mode even after power cycle.

To exit Slave Mode send the command "OM0<CR>"

## 5.1 Serial Commands

The following table lists the RS-232 commands (in Slave Mode). A single carriage return character (0x0D) must terminate each command - shown as <CR> in table below. Invalid input, spaces and line feed characters (0x0A) are ignored.

RS-232 communication at the rear connector is configurable; factory default is 9600 bps, 8 Bit, No Parity, 1 Stop bit. The baud rate is changeable via Software GUI or via the "XBx" and "XPx" commands.

 "Error – Invalid Command" is output in response to invalid RS-232 commands

"Error" is output in response to invalid command parameters

- (1) DB9M - RS-232.
  PIN 2 = RX Input, PIN 3 = TX Output and PIN 5 = GND

| Command | Response | Function and Example |
|---------|----------|----------------------|
| FW | FWx.y<CR> | Current firmware version.<br>X and Y represent the firmware version numbers.<br>(e.g., FW1.1<CR>) |
| PWx | PWx<CR> | Controls power status.<br>PW?<CR> – Query current power setting<br>PW1<CR> -- Turn power on<br>PW0<CR> -- Turn power off (Factory Default) |
| MUTx | MUTx<CR> | Controls the MUTE status<br>MUT?<CR> – Query current Mute Setting<br>MUT1<CR> – Turn on Audio Muting<br>MUT0<CR> – Turn off Audio Muting  (Factory Default) |
| EDx | EDx<CR> | Controls EDID mode setting<br>ED?<CR> – Query current Mute Setting<br>ED1<CR> – Pass-Thru (Factory Default)<br>ED0<CR> – Emulated |
| FD | FD<CR> | Resets device to Factory Defaults<br>Unit will reboot |

| Command | Response | Function and Example |
|---|---|---|
| FPx | FPx<CR> | Controls the Front Panel Lock Status<br>FP?<CR> – Query current Front Panel Lock Setting<br>FP1<CR> – Turn on Front Panel Lock<br>FP0<CR> – Turn off Front Panel Lock  (Factory Default) |
| ST | System status | Queries system status<br>ST<CR> – Query the current system status<br>Current Status for the commands below:<br>    FW?, PW?, MUT?, FP?, AU?, AT?, AP?, ED?, XB?<br>    and XP? |
| XBx | XBx<CR> | Controls the RS-232 Out Baud Rate<br>XB?<CR> – Query current Output Baud Rate Setting<br>XB4<CR> – Set Baud Rate to 9600 (Factory Default)<br>• The baud rate can be set to any of the following:<br>    XB1 = 1200, XB2 = 2400, XB3 = 4800<br>    XB4 = 9600, XB5 = 19200, XB6 = 38400<br>    XB7 = 57600, XB8 = 115200 |
| XPx | XPx<CR> | Controls the RS-232 Out Parity<br>XP?<CR> – Query current Output Parity Setting<br>XP0<CR> – Set Parity to 'NONE'  (Factory Default)<br>XP1<CR> – Set Parity to 'EVEN'<br>XP2<CR> – Set Parity to 'ODD' |
| XT | XT<CR> | Transmit from RS-232 OUT with specific baud and parity<br>Terminated with <0x17><0x0D> |
| SPx | SPx<CR> | Controls the Serial Data Pass-Thru Status<br>SP?<CR> – Query current Serial Pass-Thru Setting<br>SP1<CR> – Turn on Serial Pass-Thru<br>SP0<CR> – Turn off Serial Pass-Thru  (Factory Default) |
| BPx or<br>BPx,y | BPx<CR><br>BPx,y<CR> | Controls transmission of stored serial commands<br>'x' is from 0 to 7, 'y' is either 1 (on) or 0 (off)<br>BP?<CR> – Query current Button Press Status<br>BP0<CR> – Simulates pressing button #0<br>BP1,0<CR> – Simulates turning button #1 off |
| AUx | AUx<CR> | Controls AUTO DETECT Mode<br>AU?<CR> – Query current Auto Detect Mode Status<br>AU1<CR> – Auto Detect Mode Active<br>AU0<CR> – Auto Detect Mode In-Active (Factory Default) |
| ATx | ATx<CR> | Controls the Auto Detection Method Settings<br>AT?<CR> – Query current Auto Detection setting<br>AT0<CR> – Auto Detection Disabled (Factory Default)<br>AT1<CR> – +5VDC on HDMI INPUT<br>AT2<CR> – Video on HDMI INPUT<br>Auto Detect must be active (**AU1**) for a Trigger to occur.<br>Disabling Auto Detection will turn off Auto Detect (**AU0**). |

| Command | Response | Function and Example |
|---------|----------|---------------------|
| ISx | ISx<CR> | Input Selection<br>IS?<CR> – Query current input selection<br>IS0<CR> –<br>IS1<CR> – Select HDMI #1 Input (Factory Default)<br>IS2<CR> – Select HDMI #2 Input<br>IS3<CR> – Select VGA Input |
| UIx | UIx<CR> | SW3-UI Installed Selection<br>UI?<CR> – Query current SW3-UI Installed selection<br>UI1<CR> – SW3-UI Installed (Factory Default)<br>UI0<CR> – SW3-UI **NOT** Installed |
| APx | APx<CR> | Auto Detection Input Priority Selection<br>AP?<CR> – Query current Auto Detection Input Priority selection<br>AP0<CR> – Manual Controlled (Factory Default)<br>AP1<CR> – Priority Controlled<br>AP2<CR> – Last Plugged |

## 5.2 Auto Power Video Detection Methods

As mentioned earlier, when the power mode is set for <u>Auto</u>, the SC-3H will output the user programmed ON/OFF RS-232 strings based on sensing different parameters of the currently selected input source. These strings are for buttons configured with "AUTO" functionality.

**Source Video +5V** –
- +5V from source detected on the input(s) will cause the ON string to be output.
- +5V from source lost for more than the programmed OFF Delay will cause the OFF string to be output.
- The OFF Delay is programmable from 0 to 240 minutes. Factory default - 3 minutes

**Source Video** –
- TMDS Video Clock from source detected will cause the ON string to be output.
- TMDS Video Clock from source lost for more than the programmed OFF Delay will cause the OFF string to be output.

## 5.3 Auto Input Selection and Input Priority

This model can switch automatically to another input based on the following events.

**Manually Controlled** – (Factory Default)
> The user must select the desired input via button, RS-232 or PC GUI.

**Priority Controlled**
> The input selected based on the priorities configured and whether video is being received.

**Last Plugged**
> The input selected based on which input last plugged in and video received.

## 6.0 Troubleshooting

If you are experiencing problems getting the switcher to work properly, please use the following troubleshooting suggestions.

- Ensure that all connections are solid.
- Try resetting the system by unplugging the power supply, waiting 5 seconds and plugging it back.
- Try performing a factory default. Holding the Power Button and Input Buttons together for more than 4 seconds will reset the unit back to 'Factory Default'.

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NOTE *Ensure you backup any existing device configuration using the Windows™ GUI. Setting Factory Default will delete any user programmed RS-232 strings in the device.*

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- If you still are not able to get the system working properly, contact Hall Research support (preferably via email or via www.hallresearch.com) with a detailed description of the issue and the troubleshooting steps you have taken.

Do not open or try to repair the unit, this will void your warranty.

To ship the unit back for repair, always obtain a Return Material Authorization (RMA) number from the Hall Research Support Department at support@hallresearch.com.

# 7.0 Specifications

**Video**

| | |
|---|---|
| Connectors | (2) Locking HDMI INPUT |
| | (1) VGA INPUT |
| | (1) Locking HDMI OUTPUT |
| Standards | DVI (single link) |
| | HDMI up to 12 bit color depth, 3D video HDCP 1.2 |
| Signal type | TMDS |
| Resolutions | DVI or VGA signal    VGA (640x480) thru WUXGA (1920x1200) |
| | HDMI signal       480i through 4K@30 Hz 4:4:4 or 4K@60 4:2:0 |

**Audio**

| | |
|---|---|
| Formats | All HDMI Embedded Audio including: LPCM 7.1CH, Dolby TrueHD and DTS-HD Master Audio (32-192kHz sample rate). Analog audio output only supports two-channel format. |

**Other Signals**

| | |
|---|---|
| RS-232 | (1) DB9M |
| | RS-232 Baud Rate: 9600, N, 8, 1 <span style="color:red">(factory default)</span> |
| | Configurable at 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200 |
| USB | (1) Mini-B |

**General**

| | |
|---|---|
| Power Supply | 100 VAC to 240 VAC, 47-63 Hz, External; 5 VDC |
| Temp/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 |
| Typical DC Current Draw | 5 VDC, 2.0 A Power Supply |
| | ON: 650-750 mADC |
| | OFF: ~400 mADC |
| Cooling | Convection |
| Enclosure type | Metal (Steel) |
| Dimensions | 1.25" H x 9.00" W x 4.3" D |
| | (32mm H x 229mm W x 109mm D) |
| | Depth excludes connectors |
| Product weight | Model Only     1.3 lb |
| | Kit (shipping)   3.0 lb includes: SC-3H, power supply, power cord, USB cable, manual, and packaging |
| Vibration | ISTA 1A in carton (International Safe Transit Association) |
| Safety | CE |
| EMI/EMC | CE, FCC Class A |
| MTBF | 90,000 hours (Calculated Estimate) |
| Warranty | 3 years parts and labor |

*Specifications are subject to change without notice*

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