SW-HD-4

HDMI Fast Switch with IP, RS-232 and IR Control

Supports 4Kx2K

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FCC RADIO FREQUENCY INTERFERENCE STATEMENT

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 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.

1.0 Introduction

The SW-HD-4 is a 4 input HDMI Switcher with InstaPort™ Technology from Silicon Image enabling fast switching of four HDMI sources to a single HDMI output. The switcher supports 4K (UHD), 3D, and 36-bit Deep Color video. Control switching via front panel button, using IR remote control, RS-232, Telnet, or the web GUI is built in the unit.

Auto-Switching mode is also available. In this mode the switch checks for video connection on the inputs and switches to the first input detected.

EDID control is provided, whereby you can select the EDID content for each input from a list of standard EDIDs or to copy the EDID from the connected display to any input. This can be done using the web GUI or by sending RS-232 commands.

The SW-HD-4 provides a USB type A port on the back for connection of USB flash devices for firmware upgrade. This USB connector provides 500 ma of power and can be used to power external devices such as Google's Chromecast or Amazon's Fire TV.

2.0 Features

- Fast Switch technology reduces switching times to a couple of seconds
- Front panel LED indicators for status monitoring
- Supports resolutions to 4Kx2K
- Supports 3D and deep color
- Control via Front Panel, IR, RS232, Telnet and WebGUI
- Includes Remote Control
- Plug and play installation – takes minutes to setup
- HDMI 1.4, HDCP 1.1, and DVI 1.0 Compliant
- High Definition audio pass-through
- EDID emulation or pass-through
- Compatible with Apple™ devices
- Supports HDMI Cable Locking
- USB port can power devices such as audio extractors or video players

2.1 Package Contents

Qty (1) SW-HD-4 Switcher enclosure
Qty (1) Locking 5V DC Universal Power Supply
Qty (1) IR Remote Control
Qty (1) IR Remote Detector cable
Qty (1) User's Manual

All packages are carefully inspected prior to shipment. However if you think that you are missing an accessory, please contact Hall Research Support for further assistance.

3.0 Installation

The following diagram illustrates a typical setup.
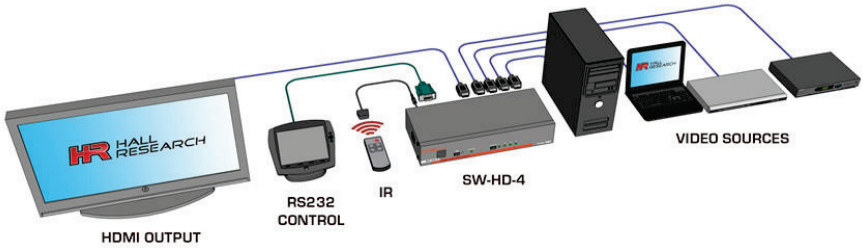
Installation diagram showing all possible connections
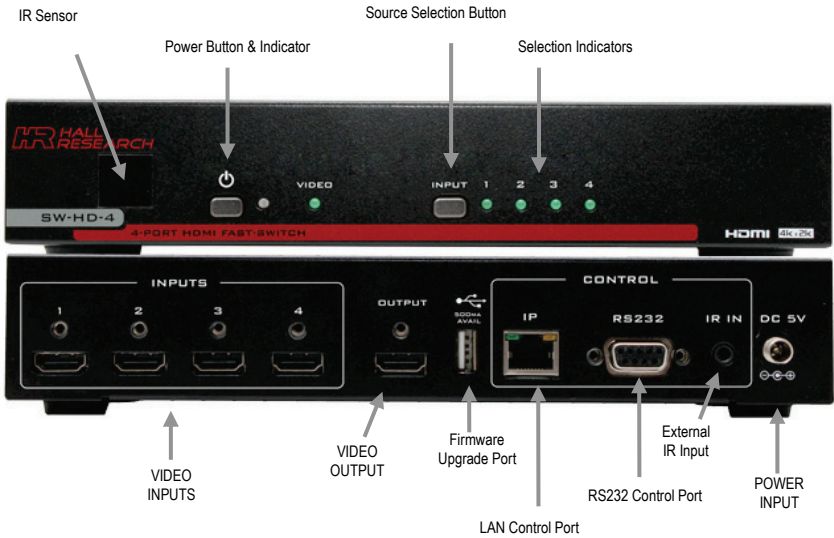
If the SW-HD-4 needs to be installed in a standard 19" rack, Hall Research offers a rack mount kit specifically for this purpose (part number F10511-Kit)

F10511-Kit (required for rack mounting)

3.1 Configuration

- Connect all the video sources to the INPUT connectors on the back
- Connect the display device to the OUTPUT connector on the back
- Connect the Power Supply to the power input on the back
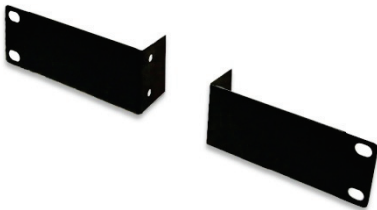- Connect an external controller or PC to the RS232 port, if required.
- Connect IP port to compatible LAN network, if required.
- Connect IR detector to IR port, if required.

4.0 Operation

The unit can be controlled via front panel and external control options like RS232, Telnet and the WebGUI.

- Press the POWER button on the front of the unit to turn the unit on. The LED next to the button will always display the power status.
- Press the INPUT button to cycle through the available video inputs connected. The input selection LED's will show which input is directed to the OUTPUT connector.
- The Video LED illuminates when video is detected for the selected input.
- Press and hold the INPUT button for 3 seconds to enable and disable the auto switching mode (in AUTO mode the input LEDs will blink).
- Press the POWER and INPUT button simultaneously for 3 seconds to factory reset the unit.
- The USB port can be used for firmware upgrade.

4.1 RS232 and Telnet Commands

- 9600 baud, No Parity, 1 Stop Bit
- Telnet operation via specified port # (Def=23)
- In the table below, <CR> represents 1 character (0x0D) and <LF> represents 1 character (0x0A)
- Each response is terminated by a 2 character sequence (<CR><LF>)
- Spaces between the COMMAND and 1st parameter are ignored
- **Invalid Command!!<CR><LF>** returned as an error message.
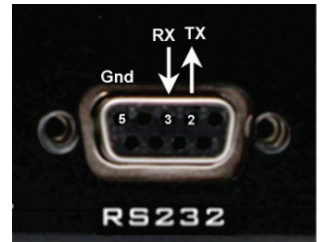
Command	Response	Function
PWn<CR>	n=0 means POWER OFF n=1 means POWER ON Response=PWn as described above	Set Power Status
PW<CR>	Response= PWn n=0 means POWER OFF n=1 means POWER ON	Query Power Status

Command	Response		Function
FR<CR>	Response= FR		Unit settings are reset to factory default Power is ON Output is routed to Input 1
FRETH<CR>	MAC: XX-XX-XX-XX-XX-XX AD: DD IP: XXX.XXX.XXX.XXX SN: XXX.XXX.XXX.XXX GW: XXX.XXX.XXX.XXX HP: HH TP: TT	XX-XX-XX-XX-XX-XX = MAC ADR DD = DHCP XXX = 0-255 HH = 0-65535 TT = 0-65535	Reset LAN parameters to factory default
FB<CR>	Response= FB		Reboot device and Power On with Output 1 routed to last selected Input
FP<CR>	Response=FPn n=0 means front panel unlocked n=1 means front panel locked		Query Front Panel Lock Status
FPn<CR>	Response=FPn<CR> as described above		Set Front Panel Lock Status
COn,m<CR>	n = output # , m = input # n=1 (Always a 1, as there is only 1 OUTPUT) m=0 thru 4 where: m=0 means blank output m=1 to 4 means route that INPUT to OUTPUT		Connect Output to Input or Blank Output If AUTO Switching is Active (AUTO1), setting an INPUT directly will turn off the AUTO Switch Mode
CO1<CR>	Response=CO1<CR> as described above		Connection Status Query
ST<CR>	Responds with PWn and COn,m Query information		Status Query
IPCONFIG<CR>	MAC: XX-XX-XX-XX-XX-XX AD: DD IP: XXX.XXX.XXX.XXX SN: XXX.XXX.XXX.XXX GW: XXX.XXX.XXX.XXX HP: HH TP: TT	XX-XX-XX-XX-XX-XX = MAC ADR DD = DHCP XXX = 0-255 HH = 0-65535 for HTTP TT = 0-65535	Shows IP Configuration settings
IP XXX.XXX.XXX<CR>	IP XXX.XXX.XXX.XXX Where XXX = 0-255		Set IP Address
SB XXX.XXX.XXX<CR>	SB XXX.XXX.XXX.XXX Where XXX = 0-255		Set Subnet Mask
GW XXX.XXX.XXX<CR>	GW XXX.XXX.XXX.XXX Where XXX = 0-255		Set Gateway Address
HPn<CR>	HPn Where n = 0 to 65535		Set HTTP Port (Default = 80)
TPn<CR>	TPn Where n = 0 to 65535		Set Telnet Port (Default = 23)
ADn<CR>	ADn Where n = 0 for STATIC Where n = 1 for DHCP		Set IP configuration
EDn<CR>	EDn Where n = 0 for APPOINT Where n = 1 for ALL		Set EDID Mode for ALL Inputs Configures device for which EDID the source INPUTS
EDA<CR>	EDI1,n EDI2,n EDI3,n EDI4,n Where n = 1 through 9 1 = SINK EDID 6 = 8/2d/PCM/4K2K 2 = 8/2D/PCM/720p 7 = 8/2d/PCM/AC3/4K2K		Query EDID MODE Setting for ALL Inputs

Command	Response	Function
	3 = 8/2d/PCM/AC3/720p 8 = 8/2d/PCM/Y420 4 = 8/2d/PCM/1080p 9 = 8/2d/PCM/Y420 5 = 8/2d/PCM/AC3/1080p	
EDAn<CR>	EDI1,n EDI2,n EDI3,n EDI4,n Where n = 1 through 9 1 = SINK EDID 6 = 8/2d/PCM/4K2K 2 = 8/2D/PCM/720p 7 = 8/2d/PCM/AC3/4K2K 3 = 8/2d/PCM/AC3/720p 8 = 8/2d/PCM/Y420 4 = 8/2d/PCM/1080p 9 = 8/2d/PCM/Y420 5 = 8/2d/PCM/AC3/1080p	Set EDID Setting for ALL Inputs (DEFAULT = 1 for SINK EDID)
EDn,m<CR>	EDI1,n EDI2,n EDI3,n EDI4,n Where n = 1 through 4 for the Input # Where m = 1 through 9 1 = SINK EDID 6 = 8/2d/PCM/4K2K 2 = 8/2D/PCM/720p 7 = 8/2d/PCM/AC3/4K2K 3 = 8/2d/PCM/AC3/720p 8 = 8/2d/PCM/Y420 4 = 8/2d/PCM/1080p 9 = 8/2d/PCM/Y420 5 = 8/2d/PCM/AC3/1080p	Set EDID Setting for a specific Input # (DEFAULT = 1 for SINK EDID)
HDCP<CR>	HDCP1,m HDCP2,m HDCP3,m HDCP4,m Where m = 0 means HDCP Processing is DISABLED Where m = 1 means HDCP Processing is ENABLED	Query HDCP Setting for ALL Inputs
HDCPn,m<CR>	HDCPn,m Where n = 1 through 4 and represents the Input # Where m = 0 means HDCP Processing is DISABLED Where m = 1 means HDCP Processing is ENABLED	Set HDCP Setting for a specific Input # If HDCP is disabled and the video content actually has HDCP information, the OUTPUT video will be blanked.
HD<CR>	HD1,m HD2,m HD3,m HD4,m 1 through 4 and represents the Input # m=0 for OFF or 1 for ON	Query all inputs for presence of HDMI +5v (if source is connected and turned on there will be +5v on HDMI pin 18).
HDn<CR>	HDn,m Where n = 1 through 4 and represents the Input # Where m = 0 for OFF or 1 for ON	Query Specific input for presence of HDMI +5v
SI<CR>	**IF NO SINK DEVICE or DEVICE POWERED OFF:** SI0 **IF SINK CONNECTED and DEVICE POWERED ON** TYPE: AAAAA NAME: BBBBB RESOLUTION: CCCCC COLOR: DDDDD 3D: EEEEE 4K2K: FFFFF Audio Format: GGGGG	Query Connected SINK information

| Command	Response	Function
	Where AAAAA = HDMI or DVI Where BBBBB = ISA PNPIP from SINK EDID Where CCCCC = Current video resolution Where DDDDD = Current Color Depth Where EEEEE = 3D Supported YES or NO Where FFFFF = 4K2K Supported YES or NO Where GGGGG = Current Audio Format	
NI<CR>	NI1,m NI2,m NI3,m NI4,m Where m = max 8 character name for input	Query WEBGUI Input Names
NIn,m<CR>	NI1,m Where n = 1 thru 4 and represents the Input # Where m = max 8 character name for input	Set WEBGUI Input Names (DEFAULT = INPUT#)
NO<CR>	NO1,m Where m = max 8 character name for output	Query WEBGUI Output Name (DEFAULT = OutputA)
NOn,m<CR>	NO1,m Where m = max 8 character name for output	Set WEBGUI Output Name (DEFAULT = OutputA)
FW<CR>	FWx.y Where x is the major version # Where y is the minor version #	Query Firmware Version
AUTO<CR>	AUTOn Where n = 0 means Auto Switching is DISABLED Where n = 1 means Auto Switching is ENABLED	Query Auto Switching Status
AUTOn<CR>	AUTOn Where n = 0 means Auto Switching is DISABLED Where n = 1 means Auto Switching is ENABLED	Set Auto Switching Mode

4.2 WebGUI Operation

As shipped from the factory (or after factory default reset), the SW-HD-4 IP address is set for DHCP, meaning that it does not have an assigned static IP address and when connected to a router on a LAN, the router will assign an IP address to the device. This can speed up the setup process in most instances, the device will get a valid IP address that matches your network, and the last octet will be unique so it does not conflict with any other existing IP address on the network. A user can find the IP address using the following method, and once access is established, the IP address can be changed to STATIC (rather than DHCP) if desired.

Finding the SW-HD-4 on the compatible LAN network
- o The "HRDF" (Hall Research Device Finder) Windows™ GUI is available free from the Hall Research website's product webpage. This program can locate the SW-HD-4 on the network.
- o Selecting any device displayed; opens a window where certain fields are modifiable.

- Click the "Save" button after making any changes.
- Click the "Reboot" button to reboot the device.
-
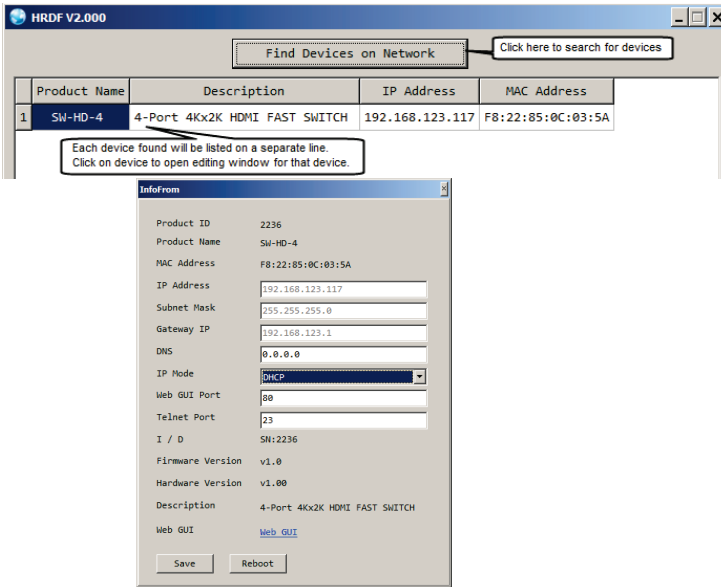
SW-HD-4 internal Web pages (WebGUI)

o Access the SW-HD-4 Webpage with any compatible browser at the IP address found above. The browser will open with the devices STATUS tab displayed. Click the tabs at the bottom of the screen to access the other tabs.

o Status Tab
- The tab shows status of the device along with output information. POWER and ROUTING are controllable.
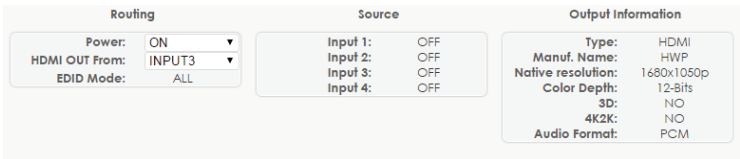
o EDID Control Tab
- This tab shows the EDID routing status. Each INPUT can have a unique EDID or the EDID from the connected SINK.

- o Settings
  - ▪ This tab shows the current HDCP Control settings, WEBGUI Input and Output names as well as buttons for Reboot, Factory Reset, Panel Lock and Auto Switching. If the Panel Lock is enabled, the button is highlighted and the AUTO SWITCH button is disabled.

> **Notice** *The Switcher can disable HDCP support for any input forcing the source to send unencrypted content when allowed (some sources add HDCP even if the content shown is not protected). When the input does not have HDCP, the output will not have HDCP. This is a useful feature for connecting the output to devices that do not support HDCP such as video conferencing gear.*

- o Network Configuration
  - ▪ This tab shows the current network settings. To save any changes made, click the "Save" button. The browser may prompt the user to confirm the settings.
  - ▪

4.3 Auto Switching

Auto switching with priority is another important feature of the switcher.

In Auto mode, the SW-HD-4 scans all inputs and automatically selects the active input.

Priority is based on position with #1 input having the highest priority (so if more than one input has video, in Auto mode, the input with lowest port number will be selected).

Auto Switching Mode can be enabled and disabled by external command (RS-232, Telnet, or WebGUI), or via the front panel pushbuttons. Auto mode cannot be changed using the IR remote.

- To enable, Press and hold the INPUT button for 3 seconds. After releasing the INPUT button, the front panel INPUT LEDs blink to indicate that AUTO mode switching is active.

- To Disable, Press and hold the input button for 3 seconds. After releasing the INPUT button, one of the front panel INPUT LEDs will be illuminated solid showing the selected input.

Notice *When Auto Switching mode is ENABLED, just clicking the front panel INPUT button or the IR remote buttons will have no effect (i.e. the unit will remain in Auto mode), However Selecting inputs via WebGUI, RS232, or Telnet commands will cancel the Auto Switching mode and the unit will select the desired input.*

4.4 Front Panel and IR Remote Lock

Front panel buttons of SW-HD-4 can be locked via WebGUI, RS232, or Telnet to prevent users from switching or changing modes. When enabled, attempts to change the auto mode, input selection, or power status will be ignored. The only way to re-enable the IR Remote and the front panel buttons is to send an unlock command from WebGUI, RS232, or Telnet (factory default also unlocks the front panel).

4.5 Factory Default

If the POWER and INPUT button is pressed simultaneously for 3 seconds when the unit is operational with the power already applied, the IP parameters are reset to the FACTORY DEFAULT values which results in Power light blinking once.

The default IP address is set to DHCP. The Hall Research Device Finder (HRDF) can be used to find the SW-HD-4 on the network.

Notice *The IP address can be changed from DHCP to Static using the HRDF software or using external control commands (WebGUI, RS232, or Telnet).*

4.6 EDID Settings

EDID Modes can be selected by choosing ALL option (a set of 9 EDID predefined settings for all the inputs) or APPOINT option (Each Input with unique EDID) from the WebGUI, RS232 or Telnet commands.

Mode	Selection	Description
EDID All	HDMI Output(TV)	Sink's EDID
	8/2D/PCM/720p	Built-In EDID with 8-bit color depth/ 2D3D/ PCM audio format/ 720p native resolution
	8/2D/PCM/AC3/720p	Built-In EDID with 8-bit color depth, 2D3D/ Dolby Digital audio format/ 720p native resolution
	8/2D/PCM/1080p	Built-In EDID with 8-bit color depth, 2D3D/ PCM audio format /1080p native resolution
	8/2D/PCM/AC3/1080p	Built-In EDID with 8-bit color depth, 2D3D/ PCM audio format/ 1080p native resolution
	8/2D/PCM/4K2K	Built-In EDID with 8-bit color depth, 2D3D/ PCM audio format / 4K video native resolution
	8/2D/PCM/AC3/4K2K	Built-In EDID with 8-bit color depth, 2D3D/ PCM audio format/ 4K video native resolution
	8/2D/PCM/Y420	Built-In EDID with Deep color, 2D3D/ PCM audio format / PC native resolution
	8/2D/PCM/AC3/Y420	Built-In EDID with Deep color, 2D3D/ PCM audio format/ PC native resolution
EDID Appoint	EDID IN1	Input 1's EDID
	EDID IN2	Input 2's EDID
	EDID IN3	Input 3's EDID
	EDID IN4	Input 4's EDID

5. Troubleshooting

There are no field serviceable parts or circuits in the device. Opening the unit will void the warranty.

5.1 Contacting Hall Research

If you determine that the SW-HD-4 is malfunctioning, do not attempt to repair the unit instead, contact Hall Research Technical Support at 714-641-6607 or support@hallresearch.com.

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.

5.2 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.

6.0 Specifications

Video Resolution	480i to 1080p@50/60, 1080p@24, 4K2K per following: 3840x2160@24/25/30, (or 50/60 with YUV 4:2:0) 4096x2160@24, (or 50/60 with YUV 4:2:0)
Video Bandwidth	Up to 3.00 Gbps (Single Link)
Audio Standards	LPCM 2/5.1/7.1CH, Dolby Digital 2~5.1CH, DTS 2~5.1CH, Dolby TrueHD and DTS-HD Master Audio
Input Ports	4 x HDMI Female with Locking Capability
Output Ports	1 x HDMI Female with Locking Capability
Power Supply	5 VDC @ 2.6aDC (US/EU Standard, CE/FCC/UL Certified)
ESD Protection	Human Body model: 8kV (air-gap discharge) 4kV (contact discharge)
Dimensions	9.75" (248mm) W x 4.5" (114mm) D x 2.0" (51) H All protrusions included
Weight	Product: 1.8 lbs (0.8 kg), Shipping: 2.8 lbs (1.27kg)
Enclosure	Metal
Operating Temperature	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
MTBF	90,000 estimated
Warranty	2 years parts and labor
IR Remote Protocol	NEC or NEC Extended
IR POWER Code	0x40, 0xAF, 0x0E, 0xF1
IR INPUT #1 Code	0x40, 0xAF, 0x01, 0xFE
IR INPUT #2 Code	0x40, 0xAF, 0x03, 0xFC
IR INPUT #3 Code	0x40, 0xAF, 0x02, 0xFD
IR INPUT #4 Code	0x40, 0xAF, 0x19, 0xE6

Appendix 1 – Complete list of Supported Video Resolutions

DVI and HDMI Supported Resolutions
640x480@60
640x480@72
640x480@75
720x480@60
720x576p@50
800x600@60
800x600@72
800x600@75
1024x768@60
1024x768@70
1024x768@75
1280x720@50
1280x720@60
1280x720p@60
1280x768@60
1280x800@60
1280x1024@60
1360x768@60
1600x1200@60
1920x1080i@50
1920x1080i@60
1920x1080p@24
1920x1080p@25
1920x1080p@30
1920x1080p@50
1920x1080p@60
1920x1200@60(RB)
3840x2160@24/25/30, 50/60 (4:2:0)
4096x2160@24/,50/60 (4:2:0)

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