



HSM-04-04



HSM-04-02

Genesis Digital™ HDMI 1.3 / DVI Matrix Switch Series

HSM-04-04	4x4 HDMI Matrix Switch with RS-232
HSM-I-04-04	4x4 HDMI Matrix Switch with RS-232 & IP
HSM-04-02	4x2 HDMI Matrix Switch with RS-232
HSM-I-04-02	4x2 HDMI Matrix Switch with RS-232 & IP

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**
Address: **Hall Research**, 1163 Warner Ave. Tustin, CA 92780
Web site: www.hallresearch.com E-mail: info@hallresearch.com

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Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.



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1. Introduction

1.1 General

Thank you for purchasing this professional quality and compact Genesis™ Matrix Switch from Hall Research. This User's Manual applies to both 4x4 and 4x2 HDMI 1.3 Matrix Switchers.

As members of Hall's Genesis™ series these matrices are synonymous with high performance, intuitive and powerful user interface, easy to use control command set, and unsurpassed reliability.

The Matrix switches are HDMI 1.3 compliant, support HDCP, deep color, multi-channel digital audio (up to 7.1 channels), and may be used with any combination of DVI (PC) or HDMI (HDTV) sources and displays.

The Matrix uses Silicon Image 1.3 chipsets capable of color depth conversion independently for each output. This assures that the highest number of colors possible are displayed on each output. In other words if some outputs are connected to displays that only support HDMI 1.2 and others to 1.3, the unit will report as supporting HDMI 1.3 to each input source in order to receive the deepest color depth possible.

EDID management, fast switching, low profile (only 1 RU), PRESET Save and Recall functions, IR remote, and comprehensive front panel controls, make the Genesis Digital matrices ideal for home theater, conference room, multimedia presentation systems, and other similar settings.

The Matrix Switchers are optionally available with IP (LAN) port that allows control from any browser via HTTP web server (including web enabled smart phones) for control through other web appliances.

The web interface allows the user to assign custom names for each input, output, and preset pattern, making control over IP a snap.

1.2 Features

- Compatible with HDMI version 1.3, HDCP, and DVI inputs
- Supports a wide range of HDTV (HDMI) and PC (DVI) resolutions from 480i to 1080p and VGA to WUXGA
- Supports digital video formats in Deep Color 12bit
- Supports lossless digital audio: both 5.1 and 7.1 Dolby TrueHD, Dolby Digital Plus and DTS-HD Master Audio
- Powerful and intuitive front panel controls
- Preset Save and Recall of commonly used routing patterns
- EDID management prioritizes the highest capable displays (HDMI 1.3 takes precedence over 1.2 , and HDMI support supersedes DVI)
- Internal EDID emulation user selection option
- Output video signals are de-skewed and recreated with perfect timing and are jitter free.
- Includes IR remote control
- Front panel IR sensor and rear panel connector for optional IR detector cable (for instances where the unit is not in line of sight)
- Supports HDMI cables up to 15 meters (50 feet) long on its input, and drive cables to 15 meters on the outputs.
- Includes RS-232 port with Hall Research's Genesis Control Command Set (GCCS)
- Optional IP (LAN) port for browser
- Optional IP (LAN) versions includes web-server with easy to use controls (customizable with user definable names for each input and output)
- 1RU high compact & rugged rack mountable metal enclosure
- Uses Silicon Image (founding member of HDMI) Chipsets
- Assembled in USA

2. Installation

2.1 Package Contents

Your package should contain the 1RU Matrix Switcher, a Universal power supply (5v DC @ 6A), an IEC320 Power Cord, an IR remote control, and a User's Manual.



Figure 1 – Power Supply and IR Remote



Notice

Use only regulated 5v DC supply (center positive) as supplied with the unit. Use of any other voltage will cause damage to the unit and **void the warranty**.

2.2 Input and Output Connections

The matrix is housed in a 1RU 19" wide rack mountable enclosure. All of I/O, control, and the power connections are on the rear of the unit.

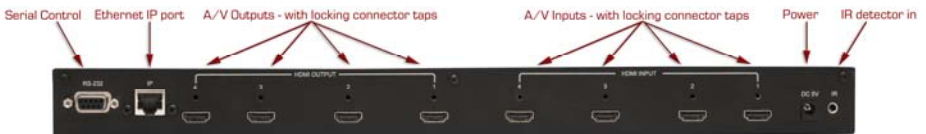


Figure 2 – Rear Panel Connections (for HSM-I-04-04)

- ❑ Using quality HDMI cables connect the inputs to video sources.
- ❑ If the sources are DVI (PC) then you will need either a DVI to HDMI adapter, or preferably, a DVI to HDMI Cable



Figure 3 –
Model C-HDMI-DVI-xM ($x = 2, 3$ or 5 meters)

- ❑ For a professional installation, we recommend using locking HDMI cables. The Matrix Switch has a tapped hole above each HDMI connector and the locking cables available from Hall Research come with screws and stand-offs for securing the cables in place so they don't accidentally get unplugged



Figure 4 –
Model C-HDMI-L-x
($x = 1.5, 3, 6, 10, 15, 25, 35$ or 50 ft)

- ❑ Next, connect the HDMI outputs to the displays.
- ❑ Plug the power supply to the unit. **Use only the supply that came with the unit**
- ❑ There is an IR remote detector (eye) on the front panel of the unit, however, if the unit is to be situated in a closet or enclosure, it may be necessary to use an IR detector cable and locate the eye somewhere more convenient. Hall Research can provide such a cable that will plug into a jack on the rear of the HSM matrix



Figure 5 -
Model CIR-DET-D1

- ❑ If the matrix needs to be controlled via RS-232, plug the controller (or PC) to the DB9 Female port on the rear of the matrix. Connection to PC's DB9 Male is made using a straight through DB9 Male-to-Female cable (as shown below).

HSM Matrix			Remote Control Console	
PIN	Definition		PIN	Definition
1	NC		1	NC
2	Tx	→	2	Rx
3	Rx	←	3	Tx
4	NC		4	NC
5	GND		5	GND
6	NC		6	NC
7	NC		7	NC
8	NC		8 <td NC	
9	NC		9	NC

Table 1 – RS-232 Control Port Pinout

- ❑ The HSM matrices are available with IP port (HSM-I- ...). On these units there is an RJ45 (10/100 Base-T) for connection to your Local Area Network (LAN). These units feature a user friendly and powerful built-in web-server that allows control of the matrix via any browser for control using web enabled controllers.

2.2 Connection Block Diagram



Figure 6 – Connection Block Diagram

3. Configuration & Operation

3.1 Front-Panel Buttons and Indicators

An image of the front panel for the 4x4 matrix is shown below. The 4x2 units have fewer OUTPUT buttons, but otherwise are the same.

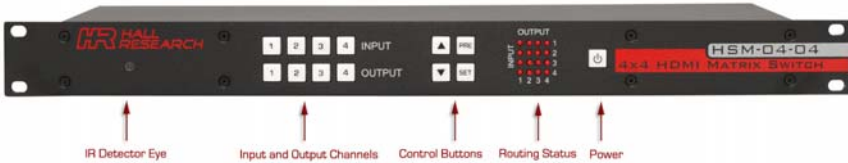


Figure 7 – HSM-04-04 front panel controls & indicators

The front panel can be used for the following purposes:

- Monitor & Control Power On/Off status
- View current Input/output routings (ties) on Routing Status LED Grid on the front panel
- Make new ties either starting from input or from output
- Recall preset patterns
- Save preset patterns

All of the front panel switches have built-in LEDs that help in the operation. Front panel functions are designed for maximum intuitiveness. With just a little practice, one can easily learn to monitor and control the matrix.

3.2 Turning the unit on and off

To turn the unit on, press the power button. The unit will do a LED test where all buttons and LED's are turned on for a few seconds. Then the matrix will recall the last routing pattern prior to being shut -down and update the Routing Status LED Grid.

To turn the Matrix off, press and hold the power button for 5 seconds. This is done as a precaution, so that if the power button is accidentally touched, it will not turn off the matrix!

3.3 Making AV Routings or “Ties” from Front Panel

To make the unit as convenient and intuitive as possible the HSM matrix allows you to make ties starting from the input channel’s point of view or from the output.

3.3.1 Making a tie starting from the output

This is the most natural way of making connections since each output gets its signal from only one input.

- ❑ Press one of the output channel buttons. That button will light up and the inputs routed from that output will light up.
- ❑ At this point if you change your mind, and do not want to make any changes, just hit SET. If you want to change to another output channel, use either the up and down (▲▼) buttons to walk through other outputs; or just select another output channel.
- ❑ To route the output to a different input than the one currently connected to, hit the “candidate” input channel number. This does not actually make the connection; the new input channel will be blinking. Again if you change your mind, either hit the same blinking button (it will stop blinking), or hit another input channel. When you are sure you have selected the input channel you desire, hit SET.
- ❑ Note that once you enter the channel routing mode from the front panel, if you do not hit any buttons for approximately 10 seconds, the system will exit this mode without any user interaction.

3.3.2 Making a tie starting from the input

The procedure is similar to the above but a particular input can be routed to more than one output or none at all!

- ❑ Press one of the input channel buttons. That button will light up and ALL the outputs routed from that input will light up.
- ❑ If you want to change to another input channel, use either the up and down (▲▼) buttons to walk through other inputs; or just select another input channel.
- ❑ To route the selected input to single or multiple outputs, press the output buttons. Again, these new outputs are only “candidates” (will be blinking) and will not be routed until you hit SET.

3.4 Making AV Routings or “Ties” Using IR Remote

The remote control is very simple; outputs are labeled as A-D and they correspond to 1-4 on the rear of the box. Press the input channel you want the output connected too.

Note that the IR remote makes connections as soon as you hit the button!

It takes about 1 to 2 seconds for the matrix to do the routing (HDCP handshake requires a little time), so if you are going to change more than one output, pause for moment between pressing the buttons!

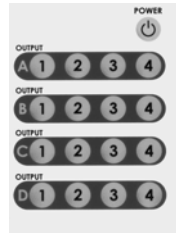


Figure 8 - IR

3.5 Saving Presets (routing patterns)

The number of presets accessible from the front panel is the same as the total # of input and output buttons. Therefore, each front panel button can memorize a pattern. For a 4x4 matrix, you can recall 8 presets and for a 4x2 you can recall 6 presets. However, through the IP or Serial port, the unit can store and recall 8 presets regardless of matrix configuration.

Current tie configurations can be saved as presets (1 through 8) for later recall.

To save the current AV routing pattern, press and hold the PRE button for 3 sec, the backlit LED will start flashing (this means that save function is activated). Press the desired input button to save the preset then press the SET button to complete the operation.

3.6 Recalling Presets (routing patterns)

Press and release the PRE (preset) button. The button will light up solid. Then press and release one of the channel buttons and hit SET.

4. Control Commands (RS-232 and IP)

The Genesis™ Matrices can be controlled via an external control system by using either the standard RS-232 or the optional IP port. Any program capable of standard serial communication in ASCII format is capable of working with the matrix. Most PCs with Windows™ OS have HyperTerminal™ or equivalent. There are also many free Terminal Emulator software programs available for download on the internet.

Note on RS-232 port availability on PC

Most PCs and notebooks do not come equipped with a serial RS-232 port. Therefore, for serial control from a PC you may need a USB to RS-232 converter. These are available from Hall Research (Model USB-RS232-1).
Figure 9 – USB to RS-232 Adapter



Use a DB9 Male-to-Female cable per Table 1 to connect the unit to the PC's serial port.

Use 9600 Baud, 8 bits, No Parity, 1 Stop bit, No flow control.

Upon power up, the Matrix will output a screen similar to the figure below through its serial port.

COMMAND	MEANING
PW0«	POWER IS OFF
CO1,1«	INPUT 1 ROUTED TO OUTPUT 1
CO2,2«	INPUT 2 ROUTED TO OUTPUT 2
CO3,3«	INPUT 3 ROUTED TO OUTPUT 3
CO4,4«	INPUT 4 ROUTED TO OUTPUT 4
HD1,0«	NO VIDEO INPUT ON OUTPUT 1
HD2,0«	NO VIDEO INPUT ON OUTPUT 2
HD3,0«	NO VIDEO INPUT ON OUTPUT 3
HD4,0«	NO VIDEO INPUT ON OUTPUT 4

4.1 Routing Functions

NOTE: HDMI Video and Audio always routed together.

Video routing commands specified are from the point of view of the output. The wildcard character "*" is acceptable for output (but not input). In addition, these commands can be used to monitor or query the status of system ties. Omitting the input channel will result in a response of the current routing for that output.

Important Note on Control Commands

Almost all commands issued to the Matrix will elicit a response from the Matrix once the command is accepted and execution completed. After issuing any command, you must wait for the matrix's response prior to sending another command. If you send another command prior to completion of the previous one, the matrix might ignore the command.

Command: `COn,m<cr>` *stands for Connect Output n to input m*
Response: `COn,m<cr>`

Variations:

Command: `COn <cr>` *stands for Connect Output n Query*
Response: `COn,m<cr>`

Command: `CO*,m<cr>` *stands for Connect All Outputs to input m*
Response: `CO1,m<cr>`
`CO2,m<cr>`
`CO3,m<cr>`
`CO4,m<cr>`

4.2 Preset Save and Recall Functions

Command: `PRx<cr>` *stands for Preset Recall. x = preset 1~ 8*
Response: `CO1, m1<cr>`
`CO2, m2<cr>`
`CO3, m3<cr>`
`CO4, m4<cr>`

Command: `PSx<cr>` *stands for Preset Save. x = preset 1~ 8*
Response: `None (the current tie pattern is saved in EEPROM)`

4.3 Power Functions

Command: `PW1<cr>` *stands for Power On*
Response: `PW1<cr>`
`CO1, m1<cr>`
`CO2, m2<cr>`
`CO3, m3<cr>`
`CO4, m4<cr>`

Important Note on Power ON Command

This command can take up to 10 seconds to complete. Upon powering up the unit will recall the previous state of each output prior to powering off and restore each connection.

Command: PW0<cr> *stands for Power Off*
 Response: PW0<cr>

Variation:

Command: PW<cr> *stands for Power Query*
 Response: PWx<cr> x=0 (off), or 1 (on)

4.4 Special Commands

Command: FB<cr> *stands for Firmware Boot*
 Response: Depends on power state when the command was issued. This command is equivalent to unplugging the power supply and reconnection it.

Command: HDm<cr> *stands for HDCP Status Query on input m*
 Response: HDm,x<cr> x=0 (no video detected on input), x=1 (video detected on input without HDCP), x=2 (video detected on input with HDCP). This command is useful for several purposes. For example, if you do not have HDCP compliant displays on all outputs and you try to send an input with HDCP to an output display that is not HDCP compliant, you will not get an image. This command enables you to check the status of each input and only route content that can be displayed to those outputs. In addition, since this command detects presence of video on inputs, you can use it to check status of inputs and reroute outputs if there is no video on the input currently routed.

Command: EDx<cr> *stands for EDID Emulation. x=1 (default HDTV), x=0 (Fully Emulated Hall Research DVI)*

Response: EDx<cr>
 This command is used to change the way EDID is reported to the sources. The default setting is 1. In this mode the EDID is algorithmically constructed based on the capabilities of all the LCD's connected at all outputs. The special setting is 0. In this mode, the first 128 bytes of EDID table correspond to Hall Research canned emulation, in which most standard PC (both 4x3 and 16x9) resolutions are reported to all the inputs. This mode should only be used if your inputs are from PC's DVI and you are having trouble getting the full complement of resolution choices in the PC. Please note that after changing the EDID emulation mode you must either unplug and reconnect the unit, or issue a FB (firmware boot) command.

Variation: ED<cr>
 This command is used to check the current setting of x

Command: ST<cr> *stands for Status Query*

Response: PW1<cr>
 CO1, m₁<cr>
 CO2, m₂<cr>
 CO3, m₃<cr>
 CO4, m₄<cr>
 HD1, x₁<cr>
 HD2, x₂<cr>

HD3, x3<cr>
HD4, x4<cr>

4.5 Invalid Commands

Any command other than those in above sections will get a response of INVALID COMMAND

5. IP Control Basics

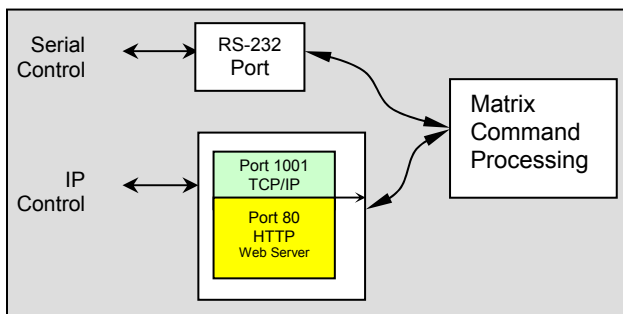


Figure 10 – IP Control Block Diagram

As shown in the figure above, the matrix can be controlled via RS232 Serial port or through an IP (Ethernet) port if equipped.

The IP interface incorporates two ports. Port 1001 is used for controlling the matrix and Port 80 has a built-in Web-server (see next section for more details).

The IP interface on every matrix shipped has a unique MAC-address, and must have a valid IP-address to function properly on the network.

As shipped from factory this IP is 192.168.123.180

5.1 Controlling the Matrix via Built-in Web Server

The Genesis Matrices with IP option have a powerful, yet easy to use web server built into the HTTP port.

Simply access it by typing

<http://192.168.123.180> on any browser connected on the same network as the Matrix.

The IP address shown above is the default address.

One of the major advantages of using this method is that it can be accessed from any browser including those built into smart phones and Tablets such as iPhone™ or Android™.



Figure 12 – Control via web server



Figure 13 – Typical Web Control

The web server allows the user to assign names to each input and output as well as Preset patterns. These names are stored in the matrix. The webpage control has very easy interface. Simply use a drop down list and select the input you want displayed. You can also SAVE and RECALL presets from the web interface.

Since the web page is being continuously updated, your device's webpage may look slightly different than that shown above.

The internal web-server allows you to:

- ✓ Route outputs
- ✓ Recall Presets
- ✓ Save Presets
- ✓ Assign user defined Names to each input, output, and Preset
- ✓ Change IP parameters

6. Troubleshooting

There are no field serviceable parts or circuits in the device. Opening the device will void the warranty. If you think the device is malfunctioning, please contact Hall Research.

6.1 Contacting Hall Research

There are no user serviceable parts in the device. Opening the device will void the warranty.

If you determine that your Genesis™ Matrix 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.

6.2 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.

7. Specifications

Video

Standards	HDMI 1.3, DVI (single link)
Signal type	TMDS video, DDC EDID (0 to 5 v TTL)
Connectors	HDMI Type A (Female) with Locking
Video Data Rate	2.25 Gbps
Supported Colors	RGB, YCbCr 4:4:4, YCbCr 4:2:2, xvYCC
HDMI Cable Length	From source 15 m (50 ft) at any resolution or color depth, to display 15 m (50 ft) 1080p, or 7.5 m (25 ft) at deep color
HD Resolutions	480i, 480p, 576i, 576p, 720p, 1080i, 1080p 8 or 12 bits per channel (24 or 36 bits aggregate)
PC Resolutions	VGA through UXGA

Audio

Supported Formats	PCM2, PCM5.1, PCM7.1, Dolby5.1, DTS5.1, DD+, D-TrueHD, DTS-HD
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General

Power Supply	100 VAC to 240 VAC, 50-60 Hz, external; 5 VDC, 6 A, regulated
Nominal Power	Fully loaded, 17 watts max (3.4 amps @ 5v)
Temperature/humidity	Storage: -40 to +158 °F (-40 to +70 °C) / 10% to 90%, non-condensing Operating: +32 to +104 °F (0 to +40 °C) / 10% to 90%, non-condensing
Cooling	Convection
Mounting	Front panel 1RU 19" Rack mountable
Enclosure type	Metal
Dimensions	1.69" H x 17.3" W x 7.68" D - F/P Width is 19" (43 mm H x 440 mm W x 195 mm D)
Product weight	9 lb (4 kg)
Shipping weight	10 lb (4.5 kg)
Recommended cable	Locking High-Performance HDMI cables
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

Specifications are subject to change without notice

Appendix 1 – Front Panel Quick Reference Guide

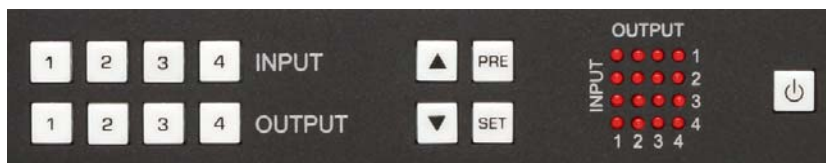


Figure 14 – Control buttons on the front panel

Function	Procedure
View ties or Make ties	<input type="checkbox"/> Hit any of the INPUT or OUTPUT Buttons
Recall Presets	<input type="checkbox"/> To change ties, hit any INPUT or OUTPUT then hit SET <input type="checkbox"/> Hit PRE (button lights up)
Save Presets	<input type="checkbox"/> Hit any INPUT or OUTPUT button <input type="checkbox"/> Hold PRE until it starts blinking
Power ON/OFF	<input type="checkbox"/> Hit any INPUT or OUTPUT button <input type="checkbox"/> To turn on hit power button <input type="checkbox"/> To turn off Press and hold power button

Appendix 2 – Command Summary

Command	Function
PWx	Power on/off x=0 power off, 1 power on Omitting x will show current power status
CO _{n,m}	Connect Output n = output, m= input <input type="checkbox"/> Omitting ,m will show current connections
PRx	Preset Recall... x = preset # can be 1 to 8
PSx	Preset Save ... x = preset # can be 1 to 8
HD _n	Read Input Status, n = Input # Returns: 0 No Video 1 Video
ED _n	EDID Management 0: DVI Emulated EDID 1: Computed HDTV (Default)
FB	Firmware Boot (Resets the entire system)
ST	Status Report



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