



Hall Research Technologies, Inc.

Model DVS-4A

4-Port DVI Switch with Audio, Serial Control & Long Cable Equalization



UMA1129
Rev B

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Federal Communications Commission Statement

This equipment generates uses and radiates radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. This equipment has been tested and found to comply with the limits for a Class A computing device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference, in which case the user, at their own expense; will be required to take whatever measures are necessary to correct the interference.

European Union Declaration of Conformity

This product has been tested and shown to comply with the requirements of the European EMC directive 89/336/EEC.



Table of Contents

1.0 General	3
2.0 Features.....	4
3.0 Installation	5
. Required Cables.....	5
. Inputs & Outputs	5
. Connecting the DVS-4A.....	5
. Connection Diagram.....	6
4.0 Operation	7
. Manually Switched Output.....	7
. Modes of Operation.....	7
. Priority Selection in Auto Mode.....	8
. Long Cable Equalization	8
. Scan Mode.....	8
. RS-232 Control Port Usage	9
. To configure HyperTerminal.....	9
. Serial Port Control Codes.....	10
5.0 Troubleshooting.....	16
6.0 Specifications.....	17

1.0 General

Thank you for purchasing Hall Research Technologies' DVS-4A 4-Port DVI Switch with Audio & Serial Control.

This unit provides both a video and audio output that can be switched between four video and audio sources. This allows routing of multiple DVI equipped devices (such as PC's) to a single DVI display (such as a plasma or LCD screen). The switcher supports single-link, DVI-D video signals at resolutions up to 1920x1200 and HDTV up to 1080p.

The DVS-4A unit provides all the A/V and control connections on the rear panel; the front panel has a push-button switch with corresponding LED indicator for the selection of video source.

This unit can be controlled by either manually using the front panel switch, automatically based on video detection, or remotely through an RS232 serial port.

The unit can be configured to operate in three different modes, which are the Auto, Scan and Manual modes.

The unit also has EEPROM (internal non-volatile flash memory) to store the last operating mode when power is off.

2.0 Features

- ✓ Clear and sharp images at resolutions up to 1920x1200 including HDTV up to 1080p
- ✓ Hot pluggable
- ✓ Supports the DDC2 standard for all input ports
- ✓ HDCP & HDMI 1.3 Compatible
- ✓ Allows one video with stereo audio to be switched between four video and audio sources
- ✓ Can be manually controlled by push-button switches, remotely by a RS232 communication port
- ✓ Provides an Auto mode to automatically select input source
- ✓ Auto Mode priority can be set for any input or no-priority
- ✓ Scan Mode shows each output for a programmable time period
- ✓ Switched output can be blanked and un-blanked
- ✓ Video Cable Equalization available for long cabling
- ✓ Stores the last selection and mode in EEPROM
- ✓ Compatible with the Universal Mounting Bracket
- ✓ Ships with universal (100~240 VAC) power supply
- ✓ Compact, Rugged, Reliable, and Economical
- ✓ Made in USA

3.0 Installation

. Required Cables

The video input cables are generally DVI male to male (customer furnished). The Audio inputs are 3.5 mm mini-stereo (customer furnished). To connect to the unit to a Serial port (such as PC's COM1) you would need a Male/Female DB9 Serial Cable (customer furnished).

All of these items are available for purchase upon request.

. Inputs & Outputs

The DVS-4A has 4 video and audio inputs labeled 'Video 1' through 'Video 4'. The unit has 1 video and audio output labeled 'Video Output'.

. Connecting the DVS-4A

Connect your video and audio sources such as computer or notebook PC to 'Video 1', 'Video 2', 'Video 3' and/or 'Video 4' connector(s).

Connect the display device such as a monitor (or a video projector) to the switched video and audio output connectors.

Connect the included power supply to the DVS-4A.

Select the desired mode of operation (Auto, Scan or Manual) using the front panel switched buttons. (Auto = SEL 1 & SEL 2, Scan = SEL 3 & SEL 4)

If preferred, the above selections (and more) can also be done through RS-232 serial commands by connecting a DB9 RS-232 Serial cable to your PC and the DVS-4A.

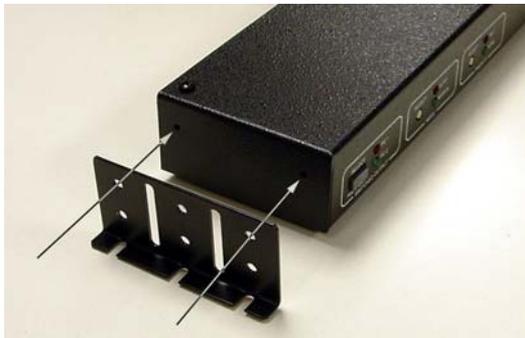
The device can be mounted via a Universal Mounting Bracket (sold separately) if desired.

4-Port DVI Switch with Audio & Serial Control

Connection Diagram



MODEL DVS-4A REAR PANEL



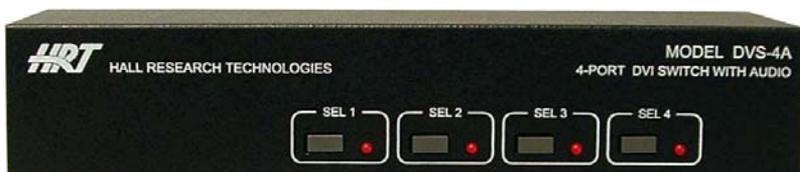
Universal Mounting Bracket

4.0 Operation

. Manually Switched Output

The SEL1 through SEL 4 buttons are used to select between video & audio input sources of Video 1 through Video 4. A solid-on LED is used to indicate which input is selected.

Holding down any of the SEL buttons for 3 seconds will blank that selected input source (and mute the audio output). The LED for that selected input will start blinking to indicate the blanking mode. Pressing that SEL button again will un-blank the output and un-mute the audio on the Video Output rear connector.



MODEL DVS-4A FRONT PANEL

. Modes of Operation

The unit can operate in either Auto or Manual mode. Pressing the SEL 1 and SEL 2 buttons simultaneously for 3 seconds will select AUTO mode. Pressing any SEL button selects MANUAL mode.

When in Auto mode, the SEL 1 and SEL 2 LEDs will flash to indicate the mode is active.

In Auto mode, the DVS-4A will automatically select the input with active video and audio. The presence of video is determined by examining the V. Sync signal or optionally the +5 VDC signal from DVI input connectors. The front panel SEL buttons cannot be used to switch between 'Video 1' through 'Video 4' sources in this mode. Pressing any of the SEL buttons will take the unit out of AUTO mode.

In Manual mode, the output of the DVS-4A will depend on the selection of the SEL buttons.

. Priority Selection in Auto Mode

The priority of the Video 1 through Video 4 inputs can only be selected by a command through the RS232 port.

This priority selection only applies to Auto mode. If a video priority is selected, the DVS-4A will automatically select that 'Video' input whenever it detects the presence of a video signal at that 'Video' connector, regardless of what is happening at the other 'Video' connectors. A priority value can be set for all four 'Video' input connectors.

For example, the priority has been set for 'Video 2', 'Video 4', 'Video 1' and then 'Video 3'. If the 'Output' is playing the video & audio from 'Video 3' and video from 'Video 1' is detected, the output of the DVS-4A will change to select 'Video 1' video immediately. Video detection on either 'Video 2' or 'Video 4' would take precedence over the 'Video 3' signal.

. Long Cable Equalization

The use of long DVI cables can cause the 'Video' image to degrade to unacceptable levels. Enabling the 'BOOST' signal, can sometimes compensate for the cable length and produce an acceptable picture.

The 'BOOST' setting can only be selected by a command through the RS232 port.

. Scan Mode

The unit can operate in Scan Mode by pressing the SEL 3 and SEL 4 buttons simultaneously for 3 seconds.

When in Scan mode, the SEL 3 and SEL 4 LEDs will flash to indicate the mode is active.

In scanning mode, the unit will display each of the video and audio input signals for a pre-determined time period from 1 to 60 seconds.

The unit can also be programmed (via the RS232 port) to scan only active video inputs or even inputs without a video signal.

. RS-232 Control Port Usage

The DVS-4A can also be controlled via a serial device. The unit operates at a baud rate of 4800 bps. From the serial port, you have full control over the operation of the switched output, mode, and priority buttons.

Note on the RS-232 port availability on your PC

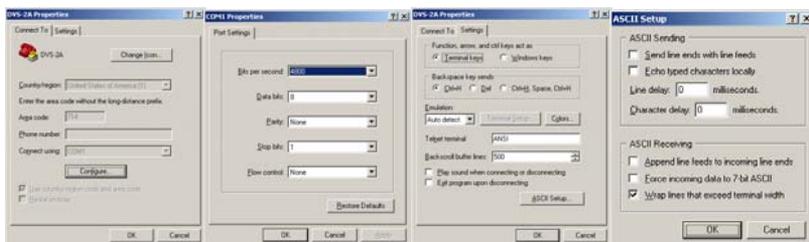
Most PCs and notebooks do not have a serial port. So to program the Switch you may need a USB to RS-232 Serial converter. These are available from Hall Research Technologies (Model USB-RS232-1).



The DVS-4A will output a menu to the serial port on power-up. This menu can also be displayed when the appropriate command is sent to the DVS-4A via the serial port. To view the menu, an ASCII serial terminal or terminal emulator software is needed. An example is Microsoft Windows® HyperTerminal (generally found in the Accessories -> Communication folder)

. To configure HyperTerminal

- Connect direct to any available COM port
- 4800 Baud, 8 bits, No Parity, 1 Stop bit, No flow control
- Settings per following figures:



After power-up the unit will output the following menu in ASCII through its serial port:

```
MENU - Version 1.0
-----
1 = Video 1 Input | B = Blank
2 = Video 2 Input | U = Un-blank
3 = Video 3 Input | E = Enable boost
4 = Video 4 Input | D = Disable boost
A = Auto mode     | R = Report
S = Scan mode     | F = Factory defaults
P = Priority       | M = Menu
-----
```

. Serial Port Control Codes

Control codes are 1 byte commands from an external device to the Serial Port on the DVS-4A.

ASCII '1' (Hex 31 or Decimal 49)

Selects Video input #1 (immediately and unconditionally).
If the unit was in AUTO mode, then MANUAL mode is selected.

The device will respond with: **Video 1 selected**

ASCII '2' (Hex 32 or Decimal 50)

Selects Video input #2 (immediately and unconditionally).
If the unit was in AUTO mode, then MANUAL mode is selected.

The device will respond with: **Video 2 selected**

ASCII '3' (Hex 33 or Decimal 51)

Selects Video input #3 (immediately and unconditionally).
If the unit was in AUTO mode, then MANUAL mode is selected.

The device will respond with: **Video 3 selected**

ASCII '4' (Hex 34 or Decimal 52)

Selects Video input #4 (immediately and unconditionally).
If the unit was in AUTO mode, then MANUAL mode is selected.

The device will respond with: **Video 4 selected**

ASCII 'A' or 'a' (Hex 41/61 or Decimal 65/97)

Enters Auto mode.

If the unit was already in AUTO mode, the unit will respond with the message:

Auto mode already selected

If the unit was in MANUAL mode, the user must select the desired detection method by entering a number from 1 to 3 within 20 seconds. Values outside this range or delaying entry longer than 20 seconds will result in an error message: **Invalid entry! Current detection stays the same.**

The device will respond with:

Auto mode selected

Detection Method

1 = Vertical sync

2 = 5V Power

3 = Vertical sync & 5V power

Current detection is [3] (1-3)?

In Auto mode, the device automatically switches to the video & audio input source that is active.

“Active” means that video signal has sync signal, it does not mean there is a non-static screen!

ASCII 'P' or 'p' (Hex 50/70 or Decimal 80/112)

Selects the Video Input priority.

A message is displayed in the format of:

Video X priority is [Y] (1-4)?

Where 'X' is the video input (1-4) and 'Y' is the current priority (1-4).

The user must respond within 20 seconds and with values in the range of 1-4 or the error message:

Invalid input! Please select 'Priority' again
will be displayed.

If '0' is input, the message **No change was made** will be displayed.

If the priority values are set to equal values, the first input with an active Video signal will be displayed.

ASCII 'B' or 'b' (Hex 42/62 or Decimal 66/98)

Blanks the output.

The device will respond with: **Blank mode selected**

When the output is blanked, only the color intensities of the output are reduced to zero. The unit still operates in a normal fashion and sync signals are still routed to the output. The audio output is muted.

ASCII 'U' or 'u' (Hex 55/75 or Decimal 85/117)

Un-blanks the output.

The device will respond with: **Unblank mode selected**

ASCII 'E' or 'e' (Hex 45/65 or Decimal 69/101)

Causes the output signal equalization for long cabling to be enabled.

The device will respond with: **Boost enabled**

ASCII 'D' or 'd' (Hex 44/64 or Decimal 68/100)

Causes the output signal equalization for long cabling to be disabled.

The device will respond with: **Boost disabled**

ASCII 'R' or 'r' (Hex 52/72 or Decimal 82/114)

Request the status report. The device will respond with:

```
Report
-----
Input = Video 1                (or 2,3,4)
Output = No LCD                (or LCD Present)
Mode = Manual                  (or Auto)
Video 1 priority is [1]       (or 2,3,4)
Video 2 priority is [2]       (or 2,3,4)
Video 3 priority is [3]       (or 2,3,4)
Video 4 priority is [4]       (or 2,3,4)
Scan time (sec) = 5           (or 1 to 60)
Scan video = Active only      (or All)
Blank = Off                    (or On)
Boost = Disabled              (or Enabled)
Detection method = Vertical sync & 5V power
                              (or either one only)
```

This report displays the current settings of the Input, Output, Mode, Priority, Scan, Blanking and Video detection method.

ASCII 'S' or 's' (Hex 53/73 or Decimal 83/115)

Enters Scan Mode

If the unit was already in SCAN mode, the unit will respond with the message:

Scan mode already selected

The user must select the desired scan time by entering a number from 1 to 60 within 20 seconds. Entries outside this range or delaying entry longer than 20 seconds will result in a default setting of 5 seconds.

The device will respond with:

Scan mode selected

Please enter 'time between switching' (1-60 sec):

After the entry (or timeout), the device will respond with:

Scan non-active video? (y/n)'

Again the user must respond within 20 seconds.

Entries other than 'Y', 'y', 'N' or 'n' or delaying entry longer than 20 seconds will result in an error message corresponding to the last setting of the SCAN mode.

Invalid input! Scan only active video

Invalid input! Scan all video

In scan mode, the unit will display each of the video and audio inputs for the selected time period. If the device was told to scan non-active video inputs and no video is available on that input, a black screen will be displayed for the selected time period.

ASCII 'M' or 'm' (Hex 4D/6d or Decimal 77/109)

Displays the menu. The device will respond with:

```
MENU - Version 1.0
-----
1 = Video 1 Input | B = Blank
2 = Video 2 Input | U = Un-blank
3 = Video 3 Input | E = Enable boost
4 = Video 4 Input | D = Disable boost
A = Auto mode     | R = Report
S = Scan mode     | F = Factory defaults
P = Priority      | M = Menu
-----
```

ASCII 'F' or 'f' (Hex 46/66 or Decimal 70/102)

Causes the system to be reset to its DEFAULT factory settings.

The device will respond with: **Factory defaults restored**

ASCII 'v' (Hex 76 or Decimal 118)

Causes the system to display the firmware version number. The device will respond with:

Firmware Version: X.Y where 'X.Y' is the numeric version level of the firmware software.

5.0 Troubleshooting

Make sure that all your connections are solid, and check the state of the LED's on the front of the unit.

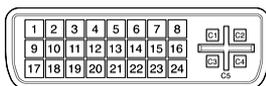
Do not open or try to repair the unit yourself. There is no customer repairable item in the unit and you will void your warranty. Contact HRT Support at 714-641-6607 or via email or web. If you need to ship your switch for repair, make sure to get a Return Material Authorization (RMA) number first.

Cable Length Limitations

The switcher cannot be used as an extender. Therefore it is best to plug the output of the switch directly to the display device and use input cables that are 5 meters (16 ft) maximum. In other words, try to keep the total length of cables from the video source to the box and from the box to the monitor should not exceed 16 feet. At longer distances you may experience video degradation. If you cannot use shorter cables, try to set the refresh rate and/or resolution of the video signal to a lower level.

6.0 Specifications

Video Inputs	DVI-D Single Link, HDCP & HDMI 1.3 Compliant
Resolutions	PC resolutions up to 1920x1200 @ 60 Hz and HDTV to 1080p
Audio Inputs	PC audio outputs
Temperature	Operating: 32 to 122°F (0 to 50°C); Storage: -40 to +185°F (-40 to +85°C)
Enclosure	Steel
MTBF	90,000 hours (calculated estimate)
Power	6V center positive via supplied Universal power supply
Size	1.66" High x 8.42" Wide x 2.61" Deep
Weight	2.0 pounds



DVI Connector pin out N/U = Not Used

Pin	Signal name	Pin	Signal name
1	TMDS Data2-	13	TMDS Data3+ (N/U)
2	TMDS Data2+	14	+5V Power
3	TMDS Data2/4 Shield	15	Ground for +5V Power
4	TMDS Data4- (N/U)	16	Hot Plug Detect
5	TMDS Data4+ (N/U)	17	TMDS Data0-
6	DDC Clock	18	TMDS Data0+
7	DDC Data	19	TMDS Data0/5 Shield
8	Analog vertical sync	20	TMDS Data5- (N/U)
9	TMDS Data1-	21	TMDS Data5+ (N/U)
10	TMDS Data1+	22	TMDS Clock Shield
11	TMDS Data1/3 Shield	23	TMDS Clock+
12	TMDS Data3- (N/U)	24	TMDS Clock-
C1	Analog red	C4	Analog horizontal sync
C2	Analog green	C5	Analog ground
C3	Analog blue		



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