

# Installation and Operation Manual Videohub

Blackmagicdesign 



Mac OS X™  
Windows™  
April 2014



## Welcome

Thank you for purchasing Videohub!

We hope you share our dream for the television industry to become truly creative by allowing anyone to have access to the highest quality video.

Previously, high end television and post production required investing in millions of dollars of hardware, and professional SDI routers have always been way too costly for most people to afford. HD-SDI is even more expensive and, until now, only the largest post production and television facilities could afford HD-SDI routing. Videohub changes all that, even enabling you to pipe 2K film around your studio just like video.

This instruction manual contains all the information you'll need to install your Videohub, although it's always a good idea to ask a technical assistant for help if you are not sure what IP addresses are, or if you don't know much about computer networks. Videohub is easy to install, however there are a few slightly technical preferences you will need to set after you install it.

Please check our web site at [www.blackmagicdesign.com](http://www.blackmagicdesign.com) and click the support page to download the latest updates to this manual and Videohub software. Lastly, please register your Videohub when downloading software updates so we can keep you updated when new software is released. We are constantly working on new features and improvements, so we would love to hear from you!

We hope you get years of use from your Videohub and have lots of fun connecting everyone in your facility together!

A handwritten signature in black ink that reads "Grant Petty".

**Grant Petty**  
CEO Blackmagic Design

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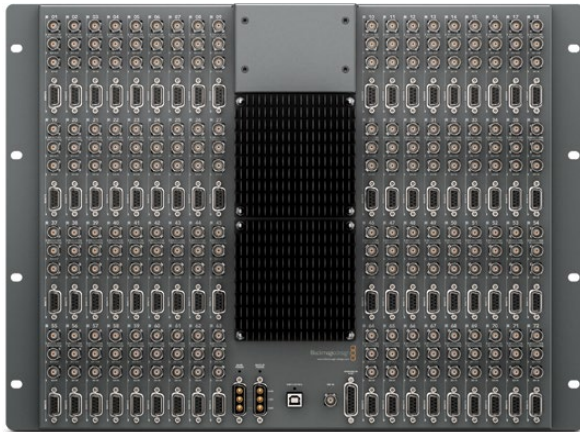
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## 5 Getting Started with Videohub Routers



Broadcast Videohub



Studio Videohub



Compact Videohub



Smart Videohub 20x20



Smart Videohub 12x12

### Introducing Videohub Routers

Videohub gives you freedom to customize your routing solution as you need and covers a range of needs for different facilities.

#### Universal Videohub Modular Routers

These routers are for larger facilities and ship as empty rack frames into which you can install whichever interface cards you need, depending on how many devices you want to connect. Universal Videohub 288 can route video over SDI and Optical interface cards to up to 288 destinations as well as control up to 72 devices remotely. Universal Videohub 72 also supports SDI and Optical interface cards and can route from 72 sources to up to 72 destinations while only taking up 9 rack units of space.

#### Videohub All-In-One Routers

Our all-in-one routers offer a solution for facilities that use only SDI equipment and come prebuilt so you don't have to do any installing of crosspoint cards or interface cards. Some models have RS-422 deck control ports, but if you don't need deck control then you might opt for one of the Smart Videohubs which operate as both a router and a control panel.

Every Videohub needs to be networked so it can be controlled by computers and pushbutton hardware control panels. Our software is customizable to make it as easy to operate as possible for whichever computer screen you are using. You can even set up your router to be controlled with an iPad!

If your Videohub has previously been set up, you can jump straight to Controlling Videohub with Software or Controlling Videohub with Hardware. These sections provide detailed information on how to change routes with a computer or pushbutton controllers.

## 6 Getting Started with Videohub Routers



Universal Videohub 72



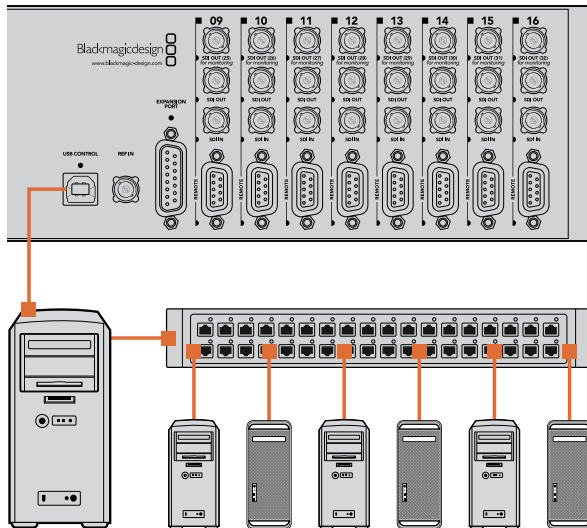
Universal Videohub 288

### Choosing a Videohub Router

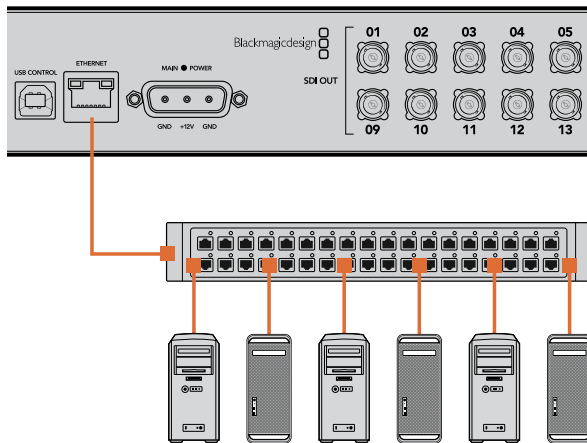
Check this table for an overview of each Videohub's capabilities to help you decide which model you will need. You can plan how to set it up so there are no nasty surprises. For example, it will tell you how many connections your Videohub has, how much rack space will be required and which connection options are available for controlling your Videohub.

Videohub Router	SDI Inputs	SDI Outputs	Optical IN/OUT	RS-422 Deck Control Ports	Software Control			Maximum Rack Units Required
					Ethernet	USB	RS-422	
Universal Videohub 288	288	288	✓	288	✓		✓	25
Universal Videohub 72	72	72	✓	72	✓		✓	9
Broadcast Videohub	72	144		72		✓		8
Studio Videohub	16	32		16		✓		2
Compact Videohub	40	40			✓	✓	✓	2
Smart Videohub 20x20 Features pushbuttons and LCD for local control	20	20			✓		✓	1
Micro Videohub	16	16			✓	✓	✓	1
Smart Videohub Features 32 pushbuttons for local control	16	16			✓	✓	✓	1
Smart Videohub 12x12 Features pushbuttons and LCD for local control	12	12			✓		✓	1

## 7 Getting Started with Videohub Routers



Studio Videohub connecting to a server via USB.



Micro Videohub connecting to an Ethernet Network

### Connect to a Videohub Server with USB

All-in-one Videohubs can connect to any computer on your local area IP based network via USB. One "server" computer on your network connects to Videohub via the plug and play USB connection, and shares the Videohub with other computers and iPads on your network in a similar way to USB printer sharing. You don't need a dedicated or powerful computer for this task.

The Videohub Server can be any computer running Mac OS X, Windows and any number of Mac OS X and Windows clients can connect to the server via USB.

To connect Videohub to the local area IP based network:

- Step 1.** Securely connect and power on all of the power supplies included with your Videohub.
- Step 2.** Connect the Videohub router to the Videohub Server computer with a standard USB 2.0 type A-B male cable.
- Step 3.** Connect the Videohub Server computer to your network switch. We strongly recommend connecting the Videohub Server computer with reliable Ethernet cables in preference to wireless networking. Wireless networking may be affected by interference from appliances and other wireless devices.

### Connect to an Ethernet Network

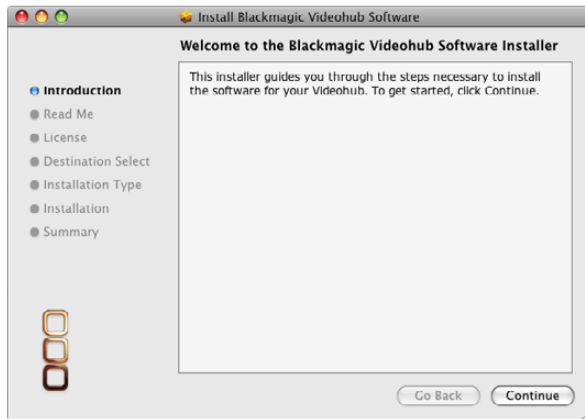
Many Videohub models have an Ethernet port and can connect directly to your Ethernet network switch and then to any computer on your local area IP based network. An integrated "Videohub Server" is used when router control is performed via Ethernet. This means you don't need a separate computer to act as the Videohub Server.

To connect Videohub to the local area IP based network:

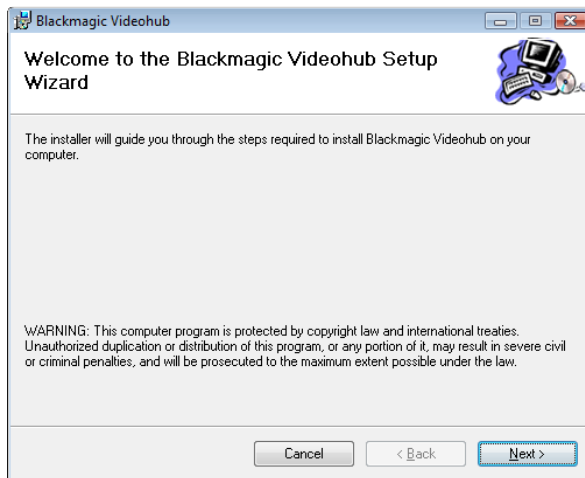
- Step 1.** Securely connect and power on all of the power supplies included with your Videohub.
- Step 2.** Connect your Videohub router to the network switch with a standard RJ45 Ethernet cable.

If you have a Universal Videohub 288 populated with two Crosspoint Cards, connect Ethernet cables to both for network failover redundancy. Your Universal Videohub 288 will have a single IP address, despite having two Ethernet connections to the network switch.

## 8 Getting Started with Videohub Routers



Mac OS X installation: Follow install prompts.



Windows installation: Follow install prompts.

### Plugging in Video

All SDI connections support auto detection of SD, HD or 3G-SDI, and relocking on all SDI outputs. Additionally, both the Smart Videohub 20x20 and Smart Videohub 12x12 also support 6G-SDI for UltraHD 4K video. All Videohub models feature regular-sized BNC ports which make it easy to connect to other SDI equipment using regular SDI cables. If you're connecting Videohub to SDI equipment which has miniature SDI connectors, such as DIN 1.0/2.3, we recommend using SDI cables which are terminated with a miniature connector at one end and a regular BNC at the other.

### Installing the Videohub Software

The Videohub software is used to control your router and can be installed on a Mac OS X computer, Windows computer or even an iPad!

Videohub software runs on the latest Mountain Lion and Mavericks versions of Mac OS X. On the Windows platform, the software runs on both 32 and 64-bit versions of Windows 7 and Windows 8.

#### Mac OS X installation

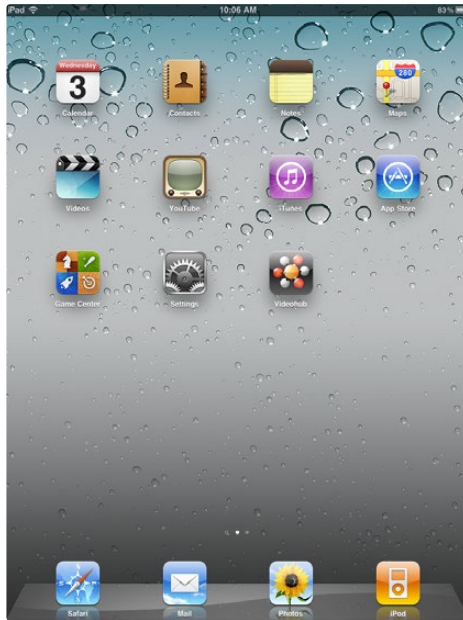
- Step 1:** Double click the installer file from the supplied CD or from your downloads folder if you downloaded the software from the Blackmagic Design website.
- Step 2:** Mac OS X will automatically install the required drivers without user interaction.

#### Windows installation

- Step 1.** Double click the installer file from the supplied CD or from your downloads folder if you downloaded the software from the Blackmagic Design website. The Hardware Wizard will detect the new hardware.
- Step 2.** Select "Install the Software Automatically". Windows will find the Videohub drivers for you.
- Step 3.** A warning message saying "This software has not passed logo certification" or "The publisher could not be verified" may appear during this process. Choose "Continue Anyway" or "Run".



## 9 Getting Started with Videohub Routers



Download the Videohub app to your iPad



Videohub settings on iPad

### Installing the Videohub Software on iPad

The Videohub app for iPad can be downloaded using your iTunes Store account.

#### To download on your computer:

- Step 1.** Launch iTunes on your Mac OS X or Windows computer and click on iTunes Store button.
- Step 2.** Click in the Search Store field at the top-right of the window and enter "Videohub".
- Step 3.** Click on the Blackmagic Videohub iPad App to download the app to the iTunes library on your computer.
- Step 4.** Connect your iPad and use iTunes to sync applications to it.

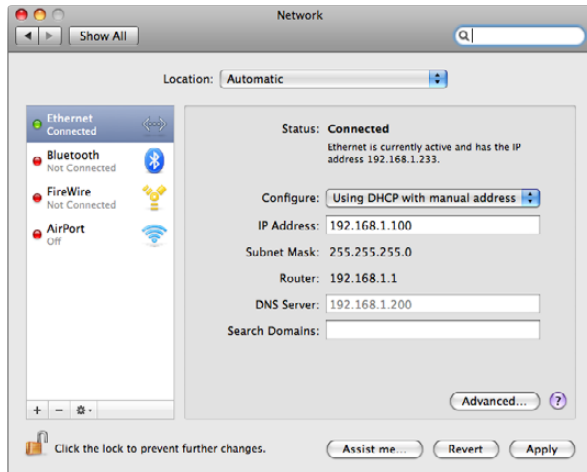
#### To download on your iPad:

- Step 1.** Tap the App Store icon.
- Step 2.** Tap the search field at the top of the screen and enter "Videohub".
- Step 3.** Click on the Free App button and then tap "Install App".

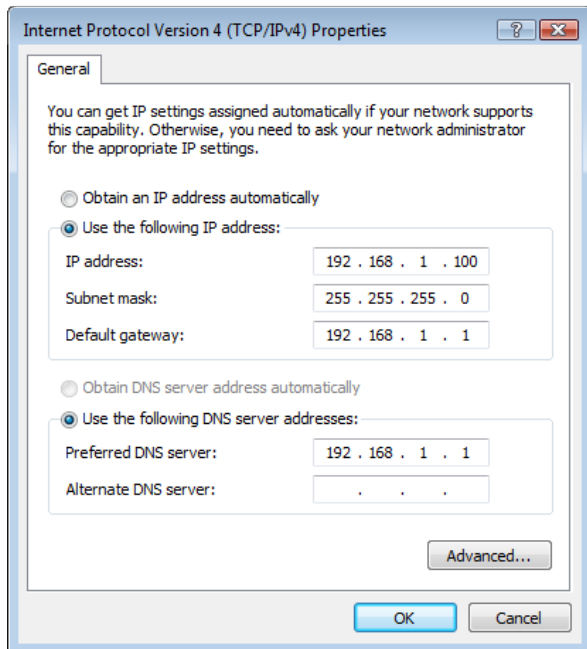
### Updating the Software in your Videohub

Programmable firmware can provide new features, compatibility with new hardware and support for new formats. The Update Videohub Firmware utility is included in the installation package. The utility runs on the Videohub Server computer and uses the USB 2.0 connection to update the Videohub.

# 10 Getting Started with Videohub Routers



Network Preferences in Mac OS X set to "Using DHCP with manual address" to provide a static IP address.



Network control panel in Windows set to "Use the following IP address" to provide a static IP address.

## Configuring your Videohub

### Videohub Server Computer Settings

A Videohub Server will need a static IP address so that the other Videohub clients on the network can always find it. Your network administrator will probably want to configure this for you. When using a Videohub Server computer, note its static IP address as you will need to enter this into the Videohub Server Preferences on each of the client computers running Videohub software.

#### Mac OS X

- Step 1.** Go to System Preferences
- Step 2.** Click on Network
- Step 3.** Check the IP address in the configuration information for your Ethernet or AirPort network.
- Step 4.** Set the network configuration to either Using DHCP with manual address or Manually.

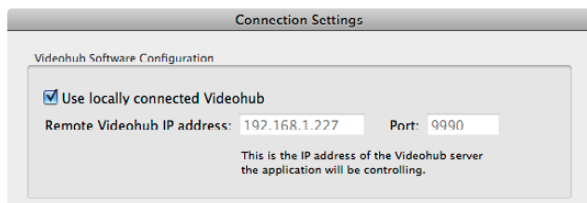
#### Windows 7

- Step 1.** Open Control Panel
- Step 2.** Click on the Network and Sharing Center.
- Step 3.** Next to your connection, click Local Area Connection for Windows 7.
- Step 4.** Click on Properties and Select Internet Protocol Version 4 (TCP/IPv4).
- Step 5.** Click on Properties. Ensure "Use the following IP address" has been selected.

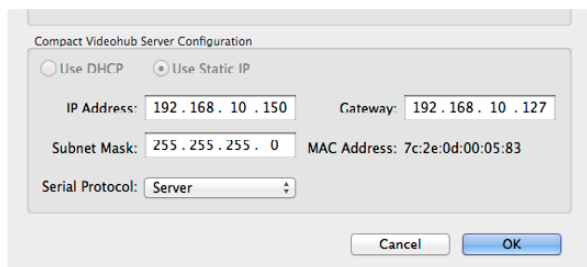
#### Windows 8

- Step 1.** From the desktop, hover over the right corner to bring up the charms bar.
- Step 2.** Click on Settings, then Control Panel.
- Step 3.** Click on the Network and Sharing Center.
- Step 4.** In the Network and Sharing Center, click on Change Adapter Settings on the left menu pane.
- Step 5.** Right click on your Ethernet connection and select Properties.
- Step 6.** Select Internet Protocol Version 4 (TCP/IPv4).
- Step 7.** Click the Properties button. Ensure "Use the following IP address" has been selected.

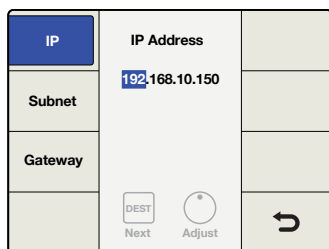
# 11 Getting Started with Videohub Routers



Select the "Use locally connected Videohub" checkbox on a Videohub Server computer.



The Videohub Server Configuration options will only become active when an Ethernet-equipped Videohub is connected via USB.



Press the MENU button to enter the network configuration page and use the TAKE button and the rotary knob to set the fields of the IP address.

The Videohub Server connection settings are used to specify the address of the Videohub Server. This can be accessed through the Connection Settings window in Mac OS X and Windows. If you are configuring these settings on a Videohub Server computer, enable the option to Use Locally Connected Videohub. This will automatically enable the correct network settings, on the server computer.

When the Videohub Client is first started, the Remote Videohub IP address field will be set to "localhost". All clients will need to specify the address of the server before they can connect and control Videohub. Ask your network administrator for this information and then enter the IP address into this field.

Once each client computer and iPad has the address of the server, the software interface will become active and it will be able to control Videohub.

## Integrated Videohub Server Settings

Some Videohub models feature an Ethernet port and contain an integrated Videohub Server. The default IP address is: 192.168.10.150. To set a different IP address, connect the Videohub to your computer via USB and follow these steps:

- Step 1.** Launch the Videohub software.
- Step 2.** Open the "Videohub Server Preferences..." menu.
- Step 3.** Enter the IP address and click OK.

If controlling Videohub via RS-422, set the "Serial Protocol" switch to:

- "Server" if the Videohub is to be controlled from an automation system or third party router control system.
- "Client" if the Videohub is to act as a client of a connected control panel and to listen and respond to the control panel button presses.

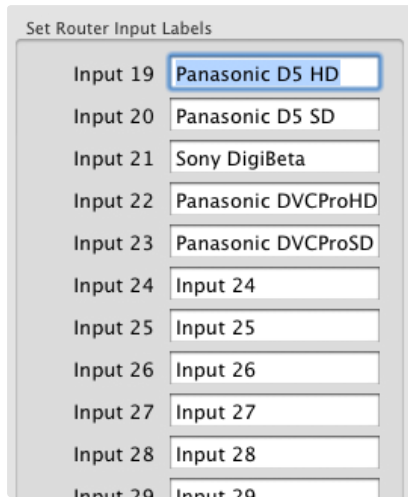
## Smart Videohub 20x20 and 12x12

You can use Smart Videohub's integrated control panel to set the unit's IP address. To set a static IP address:

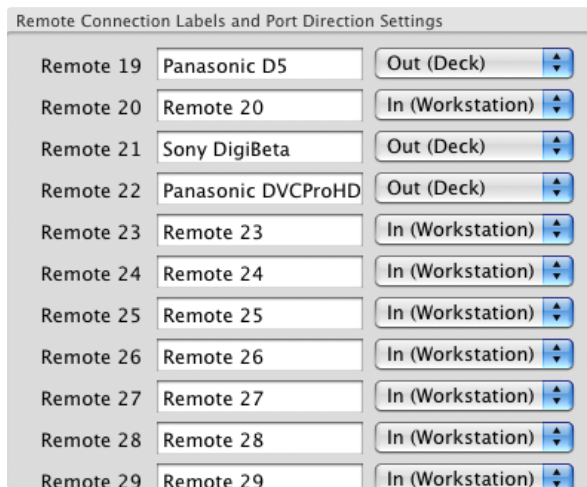
- Step 1.** Press the MENU button to enter the network configuration page.
- Step 2.** If not already selected, use the rotary knob to select the "IP" tab.
- Step 3.** Press the TAKE button to highlight the first field and use the rotary knob to adjust this value.
- Step 4.** Repeat the process until you have set the desired IP address.
- Step 5.** Press the MENU button to exit the network configuration page.

The Subnet and Gateway addresses can also be set in the same way.

## 12 Getting Started with Videohub Routers



Customize Input Labels



Customize RS-422 Labels

### Customizing Labels

#### Router Input, Output and Monitoring

Customize Labels is where you enter labels for each device you connect to the Videohub. These labels are saved on the Videohub server and will be seen by all clients. Launch the Blackmagic Videohub application and select "Customize Labels..." from the "Blackmagic Videohub" menu.

You might have a Digital Betacam™ deck connected to 'Input 21' and 'Output 21' of the Videohub, in which case you could change the label to Sony DigiBeta.

If you're working in non-Roman character set languages such as Japanese, Chinese, Korean or Middle Eastern languages, then you can enter double byte unicode labels.

#### Router Deck Control

If your Videohub features RS-422 deck control ports, Customize Labels is also used to specify the labels and directions assigned to these ports.

You can connect any deck or workstation, acting as slave or master, to any port on the Videohub. When two RS-422 ports are routed to each other and the port directions are set to "Automatic", Videohub will automatically change the direction of the serial port communication, determining which are the slave and master devices. Videohub will detect any change in the master and slave devices and will automatically change the direction of RS-422 control as required.

Automatic port direction simplifies configuration and works well with most editing systems. However it can take up to half a minute to automatically detect and apply a change in port direction. If you need to make instant port direction changes, you can set the port direction manually. Users of AVID Media Composer should also set the port direction manually to ensure reliable RS-422 communication.

Set a port to "In (Workstation)" when it is connected to a workstation that will send commands to decks and other devices. For example, a capture card in a Mac or Windows computer may be used to capture clips from in and out points on a tape deck. The capture card should be connected to an "In (Workstation)" port so it can control decks.

Set a port to "Out (Deck)" when it is connected to a deck that you want to control. For deck to deck editing, the deck with which you're setting the in and out points and should be connected to an "In (Workstation)" port. The deck being controlled should be connected to an "Out (Deck)" port.

# 13 Getting Started with Videohub Controllers



Videohub Master Control



Videohub Smart Control



GPI and Tally Interface

## Introducing Videohub Controllers

### Videohub Master Control

Videohub Master Control is a rack-mountable control panel with 30 backlit pushbuttons, LCD, scroll wheel and Ethernet connectivity designed to perform Videohub crosspoint switching without using a computer. Videohub Master Control can control all sources and destinations for any size of Videohub router, as well as RS-422 deck control.

Videohub Master Control uses port labels to aid in fast selection of equipment using software. 15 buttons can be configured and labeled to provide fast selection of common equipment types, e.g., cameras, decks and monitors. It also includes a loop through Ethernet port for connecting to additional control panels, Videohub routers or other network devices.

Only 1 rack unit high and less than an inch thick, you can rack-mount Videohub Master Control at the front or at the rear of the rack to leave space for other equipment.

### Videohub Smart Control

Videohub Smart Control is a rack-mountable control panel with 40 backlit pushbuttons and Ethernet connectivity, which works with all models of Videohub. It can be configured to work with one or many SDI destination devices. Once configured for your SDI equipment and Videohub router, Videohub Smart Control no longer requires a computer and can immediately change SDI routes as desired.

When configured for a single SDI destination, such as a monitor or deck, the pushbuttons can instantly switch between 40 different SDI sources on the same Videohub router. When configured for multiple SDI destinations, destination buttons become gold, source buttons become white and the lower right button can be configured as a take button and illuminates red. Macro buttons illuminate green when enabled and each one can be configured to perform up to 16 simultaneous crosspoint switches.

Only 1 rack unit high and less than an inch thick, you can rack-mount Videohub Smart Control at the front or at the rear of the rack to leave space for other equipment. If you don't have a rack, then you can leave it in a safe place on the floor!

### GPI and Tally Interface

GPI and Tally Interface is a low cost alternative for multi-camera productions where a Camera Control Unit (CCU) operator needs to switch video from one of several cameras being controlled to a single monitor.

It features 8 configurable GPIs and 8 configurable GPOs. The GPIs send commands to your Videohub by ethernet to switch the selected camera to the operator's monitor under certain crosspoint conditions. The GPOs send a tally signal to your cameras or other devices under certain crosspoint conditions.

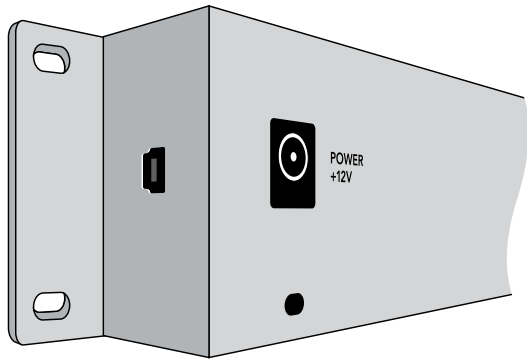
# 14 Getting Started with Videohub Controllers

## Choosing a Videohub Controller

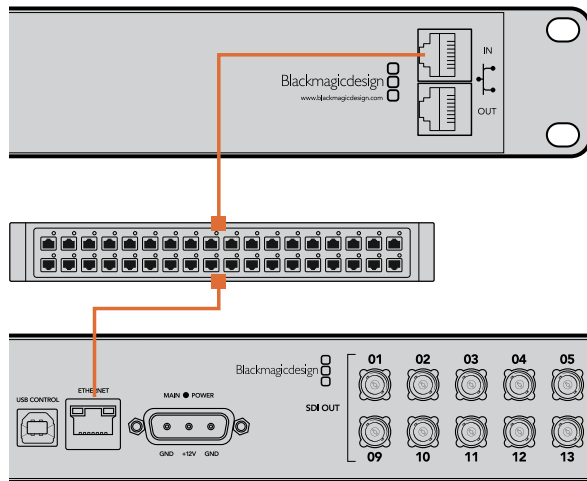
Check this table for an overview of each Videohub controller's capabilities to help you decide which model you will need. You can plan how to set it up so there are no nasty surprises.

Videohub Control Panel	Power Source	Configuration	Maximum Sources	Maximum Destinations	Control Style	Macros	Hardware Control	Rack Space	Depth
Videohub Master Control	Power over Ethernet or international AC adapter	Mac OS X or Windows software via USB type B port	288	288	Direct button selection and/or scroll wheel		15 assignable buttons with scroll wheel and LCD	1 RU	< 1 inch
Videohub Smart Control	Power over Ethernet or international AC adapter	Mac OS X or Windows software via USB type mini B port	40 sources with 1 destination	20 sources with 20 destinations	X-Y or Cut Bus	Up to 10 buttons can each change up to 16 crosspoint routes simultaneously	40 programmable buttons	1 RU	< 1 inch
GPI and Tally Interface	International DC adapter	Mac OS X or Windows software via USB type mini B port	8 GPIs	8 GPOs	CCU controlled over serial or ethernet	-	-	-	-

# 15 Getting Started with Videohub Controllers



Side view of Videohub Smart Control showing the mini-B type USB port



Videohub Smart Control connecting to a Micro Videohub via an Ethernet Network Switch.

## Plugging in USB

A USB 2.0 connection to a computer is used to configure the network settings of the Videohub Controller.

Be aware that the USB port of the Videohub Smart Control is inaccessible once it is installed in a rack. If you are likely to reconfigure Videohub Smart Control network settings periodically, then it may be convenient to permanently connect a USB cable to the unit before installing Videohub Smart Control in a rack.

## Plugging into an Ethernet Network

In most facilities, Videohub is usually shared via an Ethernet network switch so it can be controlled by computers on the network as well as by Videohub control panels.

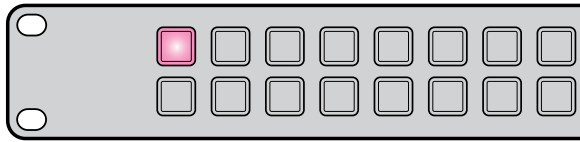
## Videohub Master Control and Videohub Smart Control

Videohub Master Control and Videohub Smart Control connect to any Videohub via standard Ethernet networking and can be powered over Ethernet or with an external power supply. If your Ethernet switch does not provide power over Ethernet, use the included universal power supply.

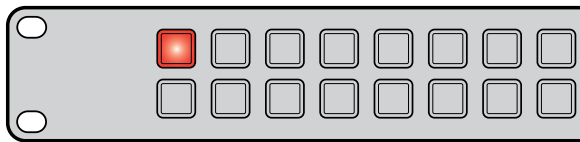
To connect a Videohub control panel to the local area IP based network:

- Step 1.** Connect the included power supply to your Videohub control panel. You can skip this step if your network switch provides power over Ethernet. No problem will be caused by connecting the power supply and power over Ethernet at the same time.
- Step 2.** Use the network In port on your Videohub control panel to connect to your network switch with a standard RJ45 Ethernet cable.
- Step 3.** You might also wish to connect another network device to the network Out port on your Videohub control panel, such as a Videohub router, another Videohub control panel or other network devices such as a computer or VoIP phone. The Out port does not provide power over Ethernet and any network device connected to this port will require its own power supply.

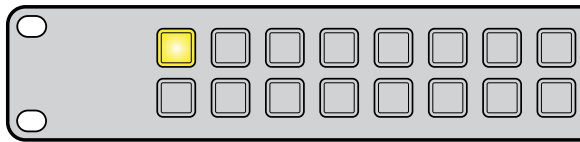
# 16 Getting Started with Videohub Controllers



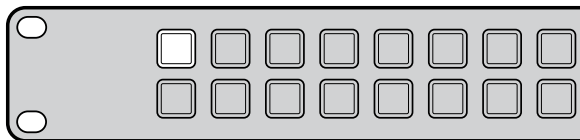
Videohub control panel is attempting to acquire an IP address



IP address has been acquired and control panel is attempting to connect to the Videohub Server.



Videohub Server is running an incompatible software or firmware version.



Control panel has successfully connected to the Videohub Server

## Control Panel Button Diagnostics

When power is first connected to a Videohub control panel, all the buttons will display their test lights in the following sequence: red, green, blue and white.

The top left button of a Videohub control panel indicates its network status, using the following diagnostic display:

**Pink flashing light** - unit is attempting to acquire an IP address. The button should quickly become red if the unit is set to use a static IP address, or if the unit successfully acquires an IP address from the DHCP server.

**Red flashing light** - unit has acquired an IP address and is attempting to connect to the Videohub Server. Make sure the Videohub Server computer is powered on and connected via Ethernet.

**Yellow flashing light** - unit has connected to a Videohub Server computer but the Videohub Server is running an incompatible software or firmware version. Update Videohub with the latest version of the Videohub software and firmware and then power cycle the Videohub control panel.

**No flashing light** - unit has successfully connected to the Videohub Server and is ready to control the Videohub if solid white, or solid white and gold, lights can be seen.

If the top left button took several minutes to turn red, the unit has failed to acquire an IP address and has eventually provided itself with a self-assigned AutoIP address in the 169.254.xxx.xxx format. Unless you wish to use an AutoIP address, disconnect and firmly reconnect the network cables to ensure they are properly connected, check for faulty network cables and make sure the DHCP server has spare IP addresses available. Unplug and reconnect all power sources from the Videohub control panel so it will request a new IP address from the DHCP server. The button should quickly become red.

The unit will only perform these diagnostics when it is not selected in the Videohub Control Utility software.



# 17 Getting Started with Videohub Controllers



Mac OS X installation: Drag the Blackmagic Videohub Control Utility to the Applications folder



This message will appear if a internal software update is required.

## Installing the Videohub Control Utility Software

The Blackmagic Videohub Control Utility software is used to configure settings in Videohub Master Control, Videohub Smart Control and the GPI and Tally Interface. Videohub Control Utility runs on the latest Lion and Mountain Lion versions of Mac OS X, 32 and 64-bit versions of Windows 7 and Windows 8. The Blackmagic Videohub Control Utility software only needs to be installed on a single computer.

On Mac OS X, open the supplied CD, or downloaded disk image, and drag the Blackmagic Videohub Control Utility to your Applications folder.

The Videohub software installer for Windows also installs the Blackmagic Videohub Control Utility and there is nothing more you need to install.

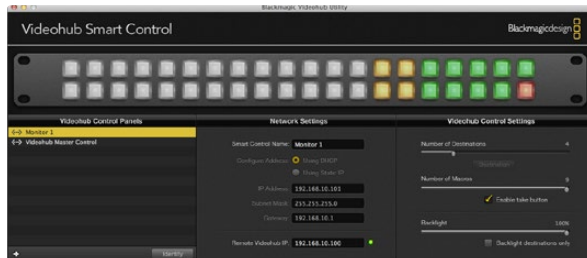
## Updating the Software in your Videohub Controller

Once the software installation has been completed and your Videohub control panel is powered on, it is a good idea to check that the internal software is up to date.

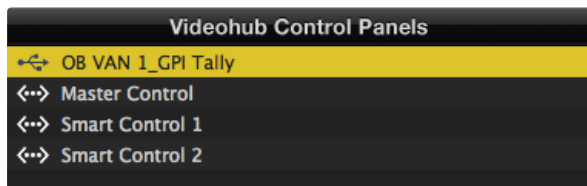
- Step 1.** Connect your Videohub control panel to the computer via USB 2.0.
- Step 2.** Launch the Blackmagic Videohub Control Utility.
- Step 3.** If a software update is required, the following message will appear: "Software Update Required. The software on this Videohub Control is out of date. Would you like to update it now?" Click Yes. The update will take about 2 minutes to complete.
- Step 4.** The message "Software Update Complete" should appear at completion of the update. Click OK to dismiss the message. Settings can be changed now if desired and this is a good opportunity to give each Videohub control panel a unique name.
- Step 5.** You can now unplug the USB cable from your Videohub control panel.

Congratulations! You are now ready to configure your Videohub control panel with the Videohub Control Utility software.

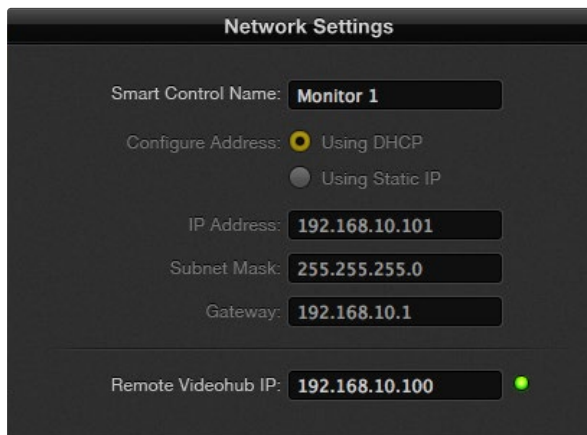
# 18 Getting Started with Videohub Controllers



The Blackmagic Videohub Control Utility automatically searches your network for any Videohub control panels.



Any Ethernet or USB connected control units will be listed in the Videohub Control Panels pane with a corresponding icon.



Blackmagic Videohub Control Utility network settings

## Setting up your Videohub Controller

### Configuring the Videohub Control Utility

When you launch Blackmagic Videohub Control Utility, any Videohub control panels discovered on the network will be listed in the Videohub Control Panels pane next to an Ethernet network icon. If several Videohub control panels are listed, but you don't know which one is which, select one of them and then press Identify. This will cause all the buttons of the selected Videohub control panel to flash white.

Select the desired Videohub control panel and you will be able to change its name and control settings. Network settings will remain grayed out and can only be changed via USB.

If the desired Videohub control panel is not found on the network, the unit might not have received an IP address via DHCP. To manually configure the unit with appropriate network settings:

- Step 1.** Connect the Videohub control panel to your computer via a USB 2.0 cable.
- Step 2.** Launch Blackmagic Videohub Control Utility. If the utility prompts you to update the software, follow the prompts to complete the update.
- Step 3.** The USB-connected panel will be automatically selected in the Videohub Control Panels pane and will display a USB icon next to its name. You can change all name, network and control settings for the USB-connected unit. When you are finished, the USB cable can be removed.

If your Videohub control panel is selected in the control utility, the pushbuttons on the unit will light up to match what is displayed in the software interface.

### Network Settings

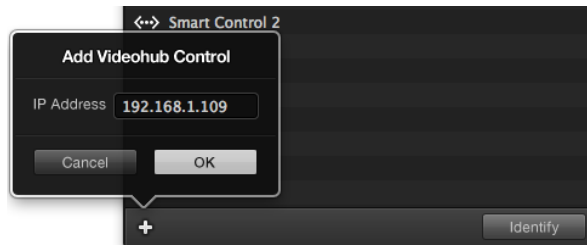
Each Videohub control panel requires an IP address to communicate with Videohub via your IP network.

When configuring a Videohub control panel via USB, you can choose DHCP or Static IP. DHCP automatically obtains all the network settings for your Videohub control panel and is the easier choice.

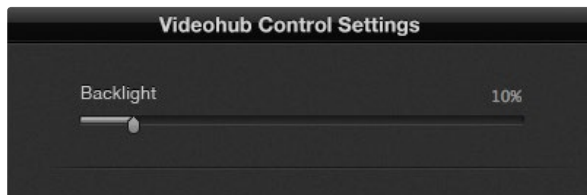
If you decide to use a static IP address, please ask your system administrator for a spare IP address to avoid creating a conflict on your network. You will then need to complete the IP address, subnet mask and gateway details for your Videohub control panel. You must use a static IP address if you are connecting directly to an Ethernet-equipped Videohub, such as Compact Videohub, without using a network switch.

You will also need to complete the IP details for the remote Videohub that you wish to control with your Videohub control panel. The remote Videohub is the Videohub Server. This could refer to a Videohub Server computer or an integrated Videohub Server onboard a Videohub model such as Universal Videohub 72.

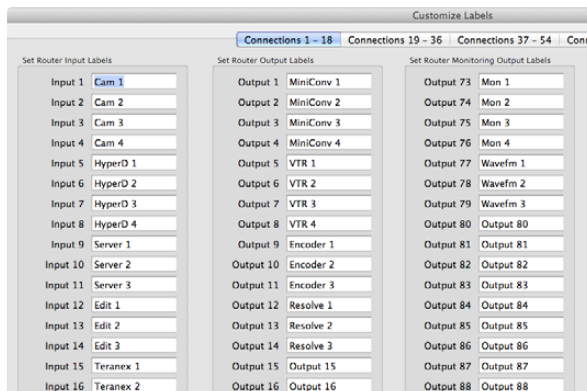
# 19 Getting Started with Videohub Controllers



You can manually add a Videohub control panel, by IP address, to the list of Videohub Control Panels



You can adjust the brightness of all backlit buttons in Videohub Master Control



Groups of equipment have been created by standardizing labels.

## Add Videohub Control

If you already know the IP address of a Videohub control panel but it hasn't automatically appeared in the Videohub Control Panels pane, you can add the unit manually.

- Step 1.** Press the + (add device) button at the bottom of the Videohub Control Panels pane.
- Step 2.** Type in the IP address of the Videohub Control Panel and press OK.
- Step 3.** The Videohub Control Panel will appear in the list with any other devices that are connected to the Videohub.

If the Blackmagic Videohub Control Utility does not find a Videohub control panel at the specified address, you can use the Utility to manually add a Videohub control panel when connected via Ethernet or USB.

## Load/Save Settings

You can apply settings from an already configured Videohub control panel to other units. Once you have set up your Videohub Control Panel's settings, choose File>Save Settings. This is useful if you want to set up several units the same way, or keep a back up of your settings. After loading pre-configured settings on another control panel, you only need to update network settings, including the control panel name.

## Configuring Videohub Master Control

Videohub Control Utility software lets you customize the hardware features of each Videohub control panel.

### Backlight

Adjust the backlight slider as desired to vary the brightness of all backlit buttons.

### Creating Button Labels

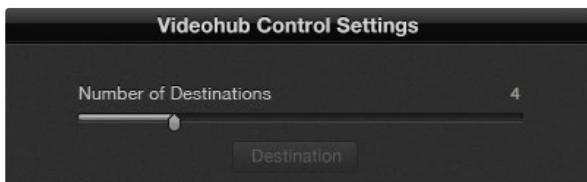
15 of the buttons can be labeled within the control utility to provide fast selection of common equipment types such as cameras, VTRs and monitors. If you haven't done so already, you should standardize the port labels on your Videohub router before labeling any buttons on your Videohub control unit. To do this:

- Step 1.** Launch the Blackmagic Videohub software and choose Customize Labels.
- Step 2.** You can now enter names into the port labels to help identify groups of equipment. Deck 1, Deck 2, Camera 1, Camera 2 etc. Alternatively you might want to list equipment by location. All the equipment in Studio 3 could be named VTR 3, Cam 3A, Cam 3B, Mon 3A and Mon 3B etc. If you have an RS-422 deck control connection to any of these decks, make sure the label for the RS-422 remote port is the same as the corresponding label for the deck's input and/or output.
- Step 3.** Once you have finished standardizing port labels, click OK.

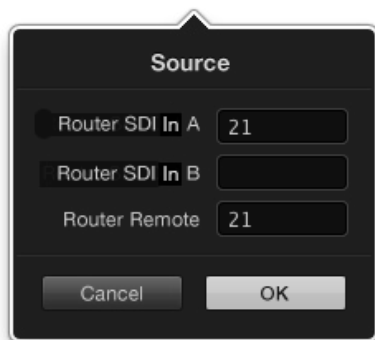
## 20 Getting Started with Videohub Controllers



Click on the desired button to edit its label.



Blackmagic Videohub Smart Control configured with multiple destinations.



Enter the number of the Videohub port to which the SDI device is connected.

You are now ready to label the Videohub Master Control buttons.

- Step 1.** Launch the Videohub Control Utility and select your Videohub Master Control from the Panels pane.
- Step 2.** Click one of the 15 buttons in the picture of the panel. Enter a text label so it partially matches the labels of SDI and deck control ports that you previously entered for your router.
- Step 3.** Click OK and continue labeling the other buttons as desired.
- Step 4.** You can immediately test the buttons as you program them and verify the SDI routes are valid.

You can refer to page 23 for instructions on how to label the physical pushbuttons.

### Configuring Videohub Smart Control

Videohub Control Utility software lets you customize the hardware features of each Videohub control panel.

#### Number of Destinations

Videohub Smart Control can be configured as a Cut-Bus controller or as an XY controller. When configured as a Cut-Bus controller, every button represents an SDI source and there is only one destination.

When configured as an XY controller, Videohub Smart Control can work with up to 20 destinations. The source buttons will illuminate white and the destination buttons will illuminate gold. Use this configuration if you don't intend to dedicate a Videohub Smart Control unit to each destination device.

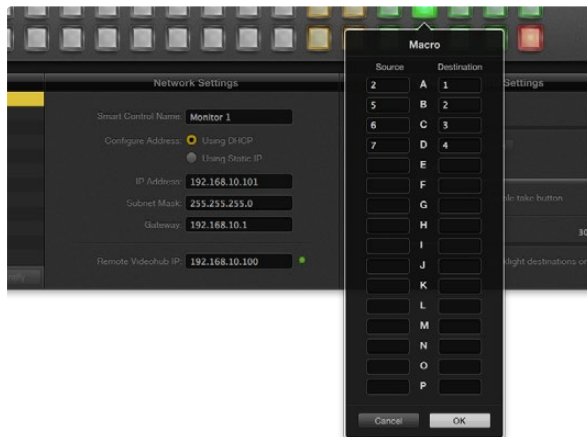
#### Cut-Bus Configuration

- Step 1.** Drag the Number of Destinations slider to 1.
- Step 2.** Click on the Destination button. In the Router SDI Out A field, enter the number of the Videohub output port to which the destination device is connected. If your destination device is receiving dual link HD-SDI or dual stream 3D, you will also need to enter an output port number into the Router SDI Out B field. There is a Router Remote field if your Videohub is also routing RS-422 deck control to the destination device.
- Step 3.** Click OK to confirm. All the buttons will become white, indicating that they are all sources.
- Step 4.** Click on each white button in the software interface to configure the source buttons.
- Step 5.** In the Router SDI In A field, enter the number of the Videohub input port to which the source device is connected. If your destination device is receiving dual link HD-SDI or dual stream 3D, you will also need to enter an input port number into the Router SDI In B field. There is a Router Remote field if your Videohub is also routing RS-422 deck control from the source device.
- Step 6.** Click OK to confirm.

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Click on the desired Destination button to configure it.



Up to 16 crosspoint routes can be changed by a single macro.



The Take button illuminates red in the lower right corner

## XY Controller Configuration

- Step 1.** Drag the Number of Destinations slider to the desired number.
- Step 2.** You can now configure the destination buttons by clicking on each gold button in the software interface. In the Router SDI Out A field, enter the number of the Videohub output port to which the destination device is connected. If your destination device is receiving dual link HD-SDI or dual stream 3D, you will also need to enter an output port number in to the Router SDI Out B field. There is also a Router Remote field if your Videohub is also routing RS-422 deck control to the destination device.
- Step 3.** Click OK to confirm. If you increase the number of destination buttons, there will be a matching decrease in the number of available source buttons.
- Step 4.** Click on each white button in the software interface to configure the source buttons.
- Step 5.** In the Router SDI In A field, enter the number of the Videohub input port to which the source device is connected. If your destination device is receiving dual link HD-SDI or dual stream 3D, you will also need to enter an input port number into the Router SDI In B field. There is also a Router Remote field if your Videohub is also routing RS-422 deck control from the source device.
- Step 6.** Click OK to confirm.

## Number of Macros

Macros allow you to make up to 16 crosspoint routing changes simultaneously with a single button press.

- Step 1.** Drag the Number of Macros slider to enable up to 10 macro buttons. As you increase the number of macro buttons, there will be a matching decrease in the number of available source buttons.
- Step 2.** Click a green macro button to reveal the corresponding Macro window and enter up to 16 pairs of sources and destinations.
- Step 3.** When finished, click OK to save the routes and close the window.

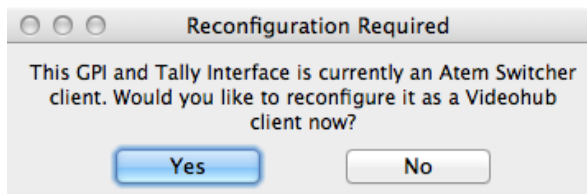
## Take Button

When the Enable Take Button checkbox is active, the lower right button on the control interface turns red. Use this if you want a confirmation option to come up before your route change takes place. Press the red take button to confirm your route change. The take button can be used with both Cut-Bus and XY controller configurations and can also be used with macros.

## Backlight

Adjust the backlight slider to vary the brightness of the backlit buttons as desired. Enable Backlight Destinations Only if you wish to disable the backlighting of the white source buttons.

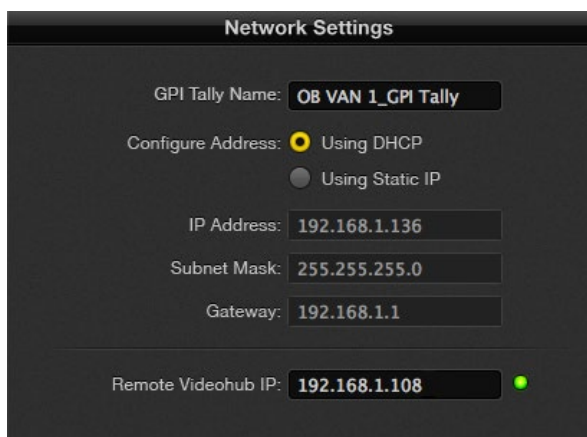
## 22 Getting Started with Videohub Controllers



You will need to reconfigure your GPI and Tally Interface to work with Videohub.



GPI and Tally Interface connected via USB



Enter a GPI and Tally Name and the IP address of the Videohub you want to connect to.

### Setting up the GPI and Tally Interface

The GPI and Tally Interface is configured using the Videohub Control Utility software. Before you can use the GPI and Tally Interface, you may need to install the latest version of the Videohub Control Utility.

- Step 1.** Connect the power adapter to the GPI and Tally Interface.
- Step 2.** Connect the GPI and Tally Interface to your computer with a USB Type A to B cable.
- Step 3.** Open the Videohub Control Utility. The software will detect whether your GPI and Tally Interface has been configured for a Videohub before. If it has the software will open without any need for changes. Otherwise a message will tell you your GPI and Tally Interface has been configured for use with an ATEM Switcher and will need to be reconfigured for use with Videohub. Click Yes. After a few moments the GPI and Tally Interface will be reconfigured as a Videohub client.

### Configuring the GPI and Tally Interface

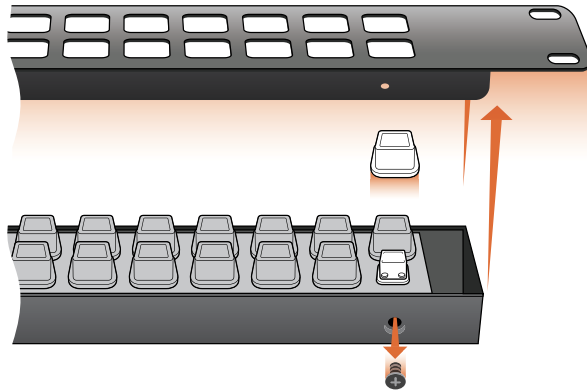
If your Videohub does not have an ethernet port, or if it is only accessible over a network:

- Step 1.** Connect a USB type A to B cable from your GPI and Tally Interface to your computer.
- Step 2.** Connect an ethernet cable from the ethernet IN port on your GPI and Tally Interface to your ethernet switcher.
- Step 3.** Open the Videohub Control Utility.
- Step 4.** You should see your GPI and Tally Interface with a USB icon next to it in the Videohub Control Panels pane. Give your GPI and Tally Interface a unique name so it can be easily recognized. To do so, click inside the GPI and Tally Name field and type a name.
- Step 5.** Check the option to configure your IP address either Using DHCP or a Static IP. Depending on your setup, you may choose either so it's probably a good idea to check with your network administrator to see which is the better option.
- Step 6.** In the Remote Videohub IP field, enter the IP address of the Videohub you want to connect to. A red light next to the field will turn green and the LED on the GPI and Tally interface will illuminate when a connection has been established.

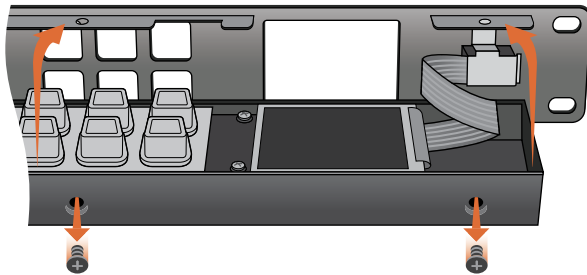
If you do not know the IP address of your Videohub:

- Step 1.** Connect the Videohub to your computer via USB.
- Step 2.** Launch the Videohub software and click on Videohub Server Preferences.
- Step 3.** Note down the IP address in the Remote Videohub IP address field.

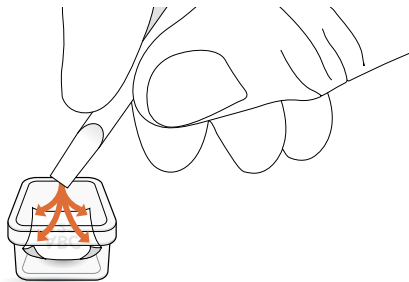
## 23 Getting Started with Videohub Controllers



For Videohub Smart Control and Smart Videohub, remove the 8 screws, lift off the face plate and then the button caps.



For Videohub Master Control, remove the 8 screws, lift off the face plate and carefully allow the face plate to lie down next to the rest of the unit. Then remove the button caps.



Lightly press the four corners of the square label into the rounded corners of the clear cap

### Labeling Pushbuttons

Videohub Master Control and Videohub Smart Control have removable face plates, which provide access to the pushbuttons for labeling.

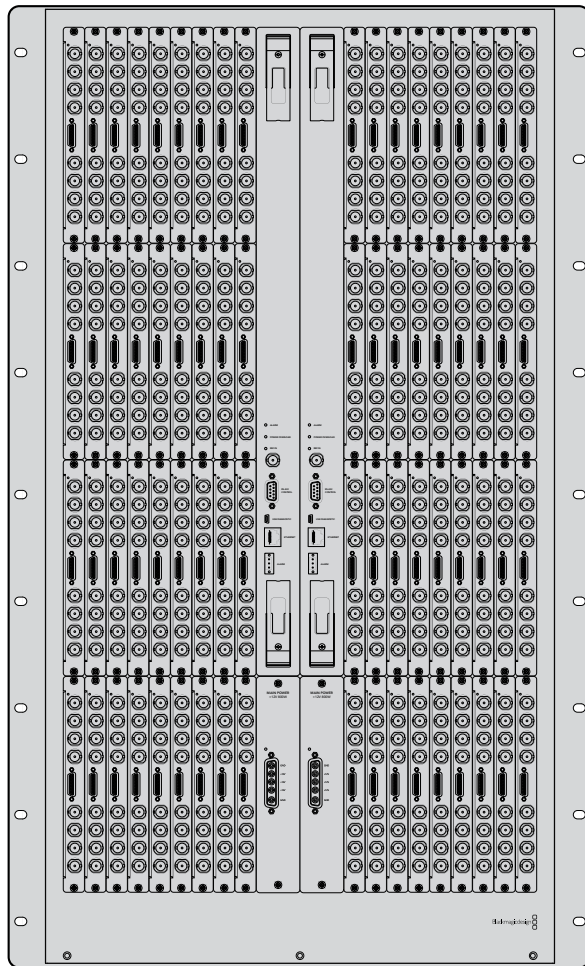
Included with the software installer is a Videohub Control Labels folder containing both PDF and Adobe Illustrator template files. You can print and use either of these files for labeling the buttons. The Illustrator file contains text boxes so you can add your text labels before printing them out. If you don't have Adobe Illustrator, you can just fill out and print the PDF file labels. Then cut out the square labels so they are ready to be inserted into the buttons.

To remove the face plate:

- Step 1.** Power off the unit, disconnect all cables and lay it flat with the buttons facing upwards.
- Step 2.** Using a No. 2 Phillips head screwdriver, remove the 8 screws found on the top and bottom sides of the faceplate.
- Step 3.** Gently lift the face plate off the unit. If you have a Videohub Master Control, take care not to pull on the data cable that connects the scroll wheel to the rest of the unit.
- Step 4.** The button caps can be easily lifted off with your fingers. Remove the clear cap from a button that you wish to label, while taking care to avoid lifting the silicon button membrane.
- Step 5.** Loosely place the printed label into the upturned clear cap.
- Step 6.** Use a pointy device, such as the tip of a screwdriver, to lightly press the four corners of the square paper label into the four rounded corners of the clear cap.
- Step 7.** Reinstall the clear cap containing the printed label. As the clear cap is pressed down onto its silicon button, the paper label will be pushed forward, and neatly held flat against the window of the clear cap. Repeat for as many buttons as you wish to label.
- Step 8.** Lower the face plate back into position, making sure the Blackmagic Design logo is the correct way up. If you have a Videohub Master Control, make sure the data cable tucks neatly into place.
- Step 9.** Reinstall the eight screws.

Congratulations! Your Videohub control unit is now ready to use!

## 24 Using Videohub Routers



### Universal Videohub 288

#### What you need to get started

Universal Videohub 288 is a large, modular router ideally suited to very large facilities and broadcasters. It features a 72 card rack frame that can be filled with any combination of BNC SDI or optical fiber SDI interface cards.

When fully populated with two Universal Videohub 288 Crosspoint cards, two power cards, 72 interface cards and 72 deck control cables, Universal Videohub 288 provides 288 SDI inputs, 288 SDI outputs, 288 bidirectional RS-422 deck control ports, reference input, redundant crosspoint processor, redundant Ethernet networking, redundant power and powerful Videohub routing control software for Mac OS X and Windows.

Occasional firmware updates can be downloaded from the Blackmagic Design website. Programmable firmware can provide new features, compatibility with new hardware and support for new formats.

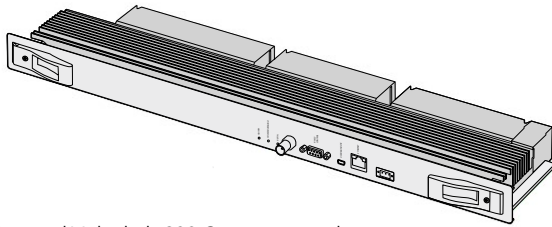
The Videohub firmware update utility runs on Mac OS X and Windows computers and uses a USB 2.0 connection to Universal Videohub 288. You will need to provide a USB 2.0 type A to mini B male cable.

Universal Videohub 288 ships as an empty rack frame, except for a removable fan tray and fans. All other hardware components, such as SDI interface cards and power supplies, must be purchased and installed separately. Read the following section to help you decide which components you will need before you build your Universal Videohub 288.

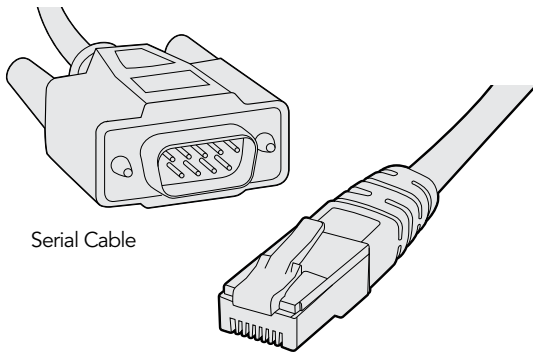
Pages 36-37 provide information on the different interface cards available for your Universal Videohub.



## 25 Using Videohub Routers

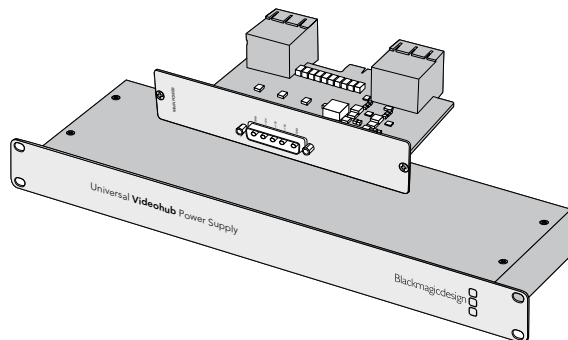


Universal Videohub 288 Crosspoint card



Serial Cable

Standard RJ45 Ethernet Cable



Universal Videohub Power Supply includes a power card, 1 RU chassis and connecting power cable

### Universal Videohub 288 Crosspoint Card

This module contains the crosspoint processor for switching video routes and changing deck control ports. Ethernet, USB and serial ports are located on the card for router control.

A Reference input is located on the card for connection to a tri-level sync or blackburst genlock signal.

An Alarm light will illuminate on the card if user intervention is required, e.g., if inadequate cooling has caused Videohub to overheat. Alarm notification is supplied by the GPI (General Purpose Interface) output to other devices.

A Power Overload light will illuminate on the card if inadequate power is being supplied to the unit for the number of cards installed.

You will need a number 01 size Pozidriv screwdriver to install the Universal Videohub 288 Crosspoint card.

### Router Control Cable

Remote router control is performed via 10/100Base-T Ethernet or serial. If router control is performed via Ethernet, the integrated Videohub Server is used. This means you only need to provide an Ethernet cable to connect Universal Videohub 288 to your Ethernet network switch.

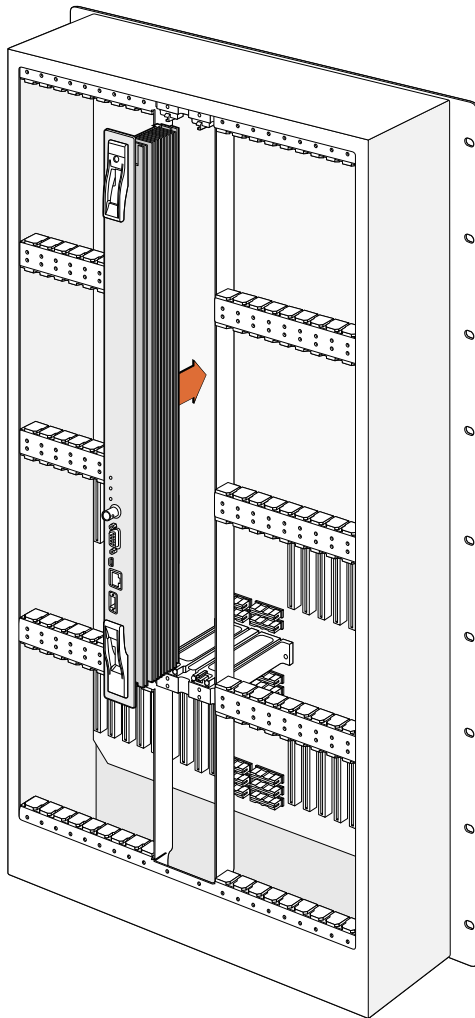
Third party router controllers can control Universal Videohub 288 via Ethernet, or as an RS-422 slave device, for router crosspoint switching. Please refer to the Developer Information section of this manual for Videohub and RS-422 protocols.

### Power Supply

When fully populated and running at maximum power consumption, Universal Videohub 288 can be powered by a single Universal Videohub Power Supply.

The Universal Videohub Power Supply package includes a power card with a single connection to a 1 RU size rack mount chassis which contains the power supply.

The Universal Videohub Power Supply chassis contains a universal power supply for use in all countries. You will need to provide a standard IEC cord with a C13 connector.



### Building Universal Videohub 288

25 rack units of space should be reserved for the installation of Universal Videohub 288 and two rack mount power supply chassis, allowing free space for heat dissipation. Only 23 RU is required if Universal Videohub 288 is mounted at the top of an open rack as heat can be dissipated from the top.

Universal Videohub 288 is 18 RU high and 6 inches thick. You can rack mount Universal Videohub 288 facing forwards or reversed, or even mount it in the rear of the rack to leave space for other equipment.

Universal Videohub 288 contains electrostatic sensitive devices. It is essential to discharge yourself of static electricity before handling any of these devices, just as you would when installing devices into a computer. We recommend the use of an antistatic wrist strap when handling any of these devices.

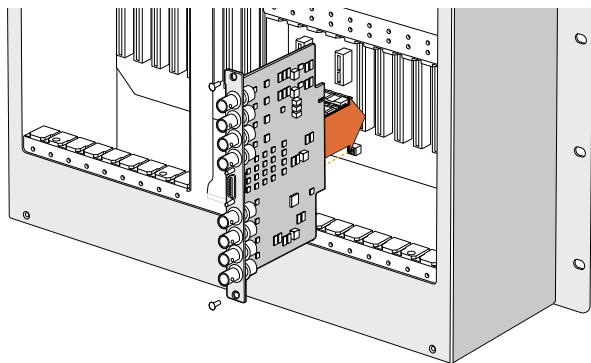
### Installing a Universal Videohub 288 Crosspoint Card

Now that your Universal Videohub 288 has been mounted in a rack, it needs to be fitted with a crosspoint card. The crosspoint card is the brains of Universal Videohub and performs video route and deck control switching. Universal Videohub 288 Crosspoint cards are hot-swappable, meaning they are designed to be installed and removed while the Universal Videohub is running.

- Step 1:** Hold the crosspoint card in a vertical orientation by its two levers. The BNC, Ethernet and other ports should be towards the bottom end of the card.
- Step 2:** Gently insert the card into its slot, ensuring the top and bottom edges follow the black guides.
- Step 3:** Firmly push both levers flat to fully engage the multi-pin connectors with the motherboard. Mating pins ensure that the card precisely engages with the motherboard without damaging the multi-pin connectors.
- Step 4:** Use a number 01 size Pozidriv screwdriver to secure the two levers on the crosspoint card.

It is common to install a second crosspoint card for failover redundancy and we recommend doing this. If two crosspoint cards are installed, all video routes and port labels will be safely retained even if one card becomes faulty and has to be replaced. To remove the blanking plate from the right crosspoint card slot, you will need to use a number 02 size Pozidriv screwdriver.

## 27 Using Videohub Routers

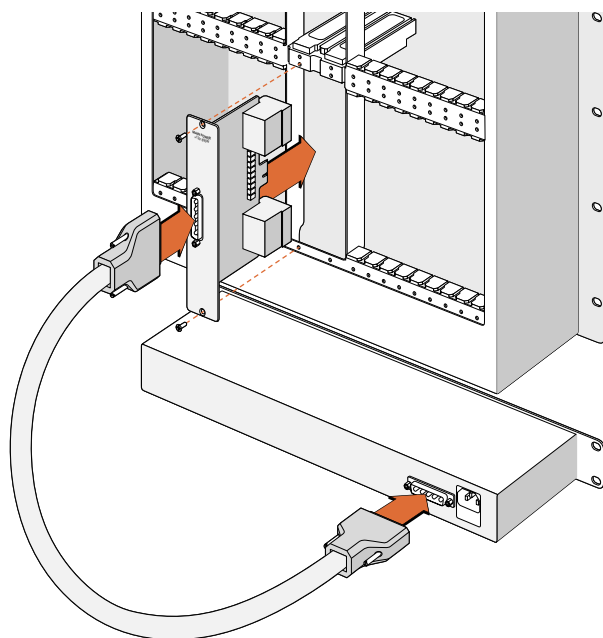


Installing a Universal Videohub SDI Interface Card.

### Installing Interface cards

Installing a Universal Videohub SDI Interface or Universal Videohub Optical Interface is easy and the steps are the same for installing each type of interface card.

- Step 1:** Hold the card in a vertical orientation with the identification LED at the top of the card. The identification LED looks like a pin hole near the top left of the top connector.
- Step 2:** Gently insert the card along its guides until it plugs firmly into the PCI slot on the motherboard.
- Step 3:** Use a number 02 size Pozidriv screwdriver to secure the card to the Universal Videohub frame. Pages 36-37 provide information on the different interface cards available for your Universal Videohub.



The Universal Videohub Power Supply consists of a power card which is inserted into the Universal Videohub 288 and then connected to a 1 RU chassis located under the Universal Videohub 288.

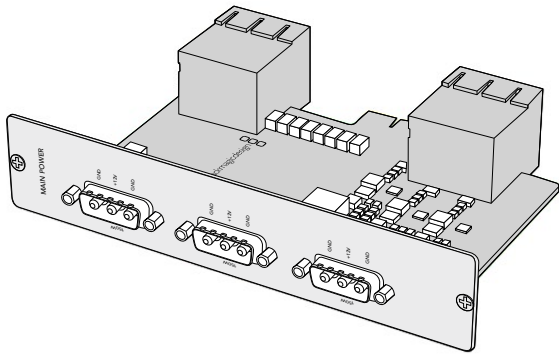
### Installing a Universal Videohub Power Supply

The Universal Videohub Power Supply package consists of a power card, a power cable and a 1 RU chassis containing the power supply. A second Universal Videohub Power Supply can be installed under the first power supply for failover redundancy. You will need to provide a standard IEC cord with a C13 connector for each power supply.

- Step 1:** Ensure that any new power supplies are disconnected from any electrical source. Orient the power card so that the MAIN POWER label appears at the top of the card.
- Step 2:** Insert the power card into either of the two power card slots.
- Step 3:** Use a number 02 size Pozidriv screwdriver to secure the power card with its two screws. If you have a second power card, install it now into the spare power card slot.
- Step 4:** Connect the power cable from the power card to the power supply. Tighten the thumb screws on both power connectors. Repeat this step if you have a second power card and second power supply. It does not matter which power card connects to which power supply.
- Step 5:** Connect an IEC cord from each power supply to a mains wall socket and turn on the power.

Congratulations! Your Universal Videohub 288 is now ready to start routing video!

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Universal Videohub 450W Power Card can be connected to three 150W power bricks

### Installing a Universal Videohub 450W Power Card

While designed for the Universal Videohub 72, the lower cost Universal Videohub 450W Power Card can be used as a low power supply option for Universal Videohub 288.

The Universal Videohub 450W Power Card requires three 150W brick power supplies, which are sold separately. This power option may be considered due to its lower cost but is slightly underpowered and will not power a fully populated Universal Videohub 288 under all card combinations. This power supply should only be considered if attempting to minimize the cost of purchasing a Universal Videohub 288.

A second Universal Videohub 450W Power Card with three power bricks can be connected to the Universal Videohub 288 to ensure continued operation should the first power card fail.

- Step 1.** Orient the power card so that the MAIN POWER label appears at the top of the card.
- Step 2.** Insert the power card into its slot on the motherboard. Use a number 02 size Pozidriv screwdriver to secure the power card with its two screws.
- Step 3.** Check the Power Overload light on the crosspoint card. If the Power Overload light is on, you will have to remove some cards to ensure that all installed cards are receiving power. If the Power Overload light continues to illuminate even after verifying that all three brick power supplies are working, Universal Videohub 288 has been populated with too many cards. You will need to discard your low power supply and upgrade to a Universal Videohub Power Supply.

### Installing a Universal Videohub 150W Power Supply

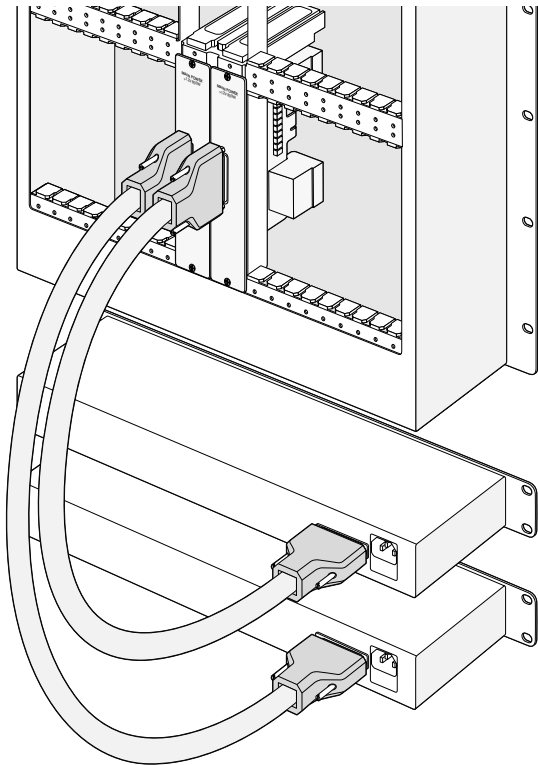
The Universal Videohub 150W Power Supply is a brick style power supply which connects to a Universal Videohub 450W Power Card. You will need to connect 3 power supplies for each Universal Videohub 450W Power Card you install in a Universal Videohub 288. You will need to provide a standard IEC cord with a C13 connector for each power supply.

#### Adding a Universal Videohub 150W Power Supply

- Step 1.** Ensure that any new brick power supplies are disconnected from any electrical source.
- Step 2.** Connect each new power supply to the Universal Videohub 450W Power Card.
- Step 3.** Tighten the thumb screws on all power connectors.
- Step 4.** Connect an IEC cord from each new power supply to the wall socket and turn on the power.

If you need to remove or replace a power brick while Universal Videohub 288 is still running from a second power card and set of power supplies, power off the brick while being careful to avoid switching off power to the remaining power supplies. Unplug the IEC cord and then unscrew and disconnect the power supply from the Universal Videohub 450W Power Card.

## 29 Using Videohub Routers



Two Universal Videohub Power Supplies can be installed for power redundancy with the Universal Videohub 288

### Installing a second Power Supply while Universal Videohub 288 is running

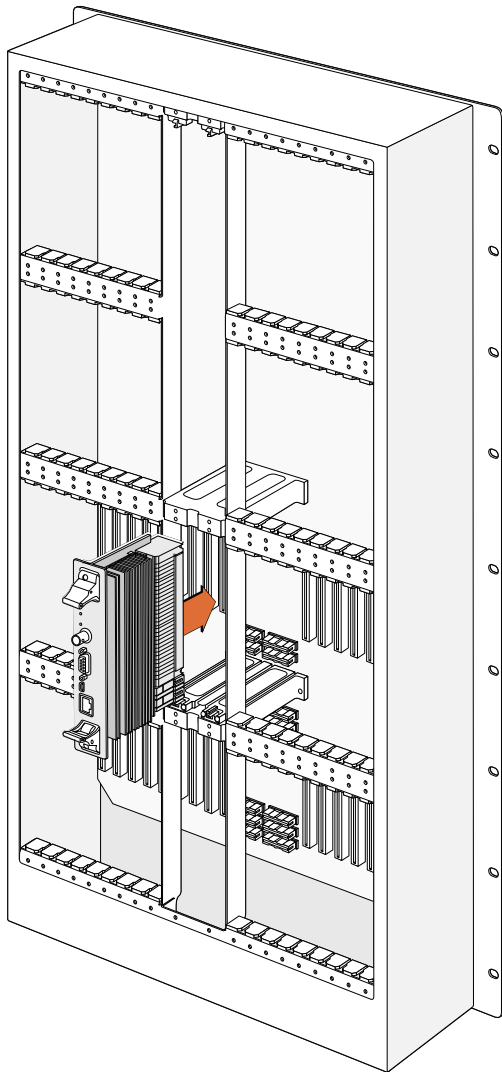
If you wish to install a redundant or replacement power supply while Universal Videohub 288 is already running from a power supply, please carry out the installation procedure in the following order:

- Step 1.** Ensure that the new power supply is disconnected from any electrical source.
- Step 2.** Orient the new power card so that the MAIN POWER label appears at the top of the card. Now insert the power card into the spare power card slot.
- Step 3.** Use a number 02 size Pozidriv screwdriver to secure the power card with its two screws.
- Step 4.** If you are installing a redundant power supply for the first time, install the 1 RU chassis below the first power supply, leaving 1 RU of clearance between the two power supplies for heat dissipation. If you are installing a replacement power supply, install the replacement 1 RU chassis where the faulty unit was previously located.
- Step 5.** Connect the new power cable between the connectors on the new power card and the new power supply. Tighten the thumb screws on both power connectors.
- Step 6.** Connect an IEC cord from the new power supply to the wall socket and turn on the power.

### Removing a Power Supply while Universal Videohub 288 is running

If you need to remove a faulty power supply while Universal Videohub 288 is running from another power supply, please carry out the removal procedure in the following order:

- Step 1.** Switch off the power to the faulty power supply and unplug its IEC cord.
- Step 2.** Disconnect the power cable between the power card and the faulty power supply.
- Step 3.** Remove the faulty 1 RU chassis and associated power card. Ensure all components from the faulty unit are placed somewhere where they will not be confused with a new replacement unit.



### Installing a Universal Videohub 72 Crosspoint Card

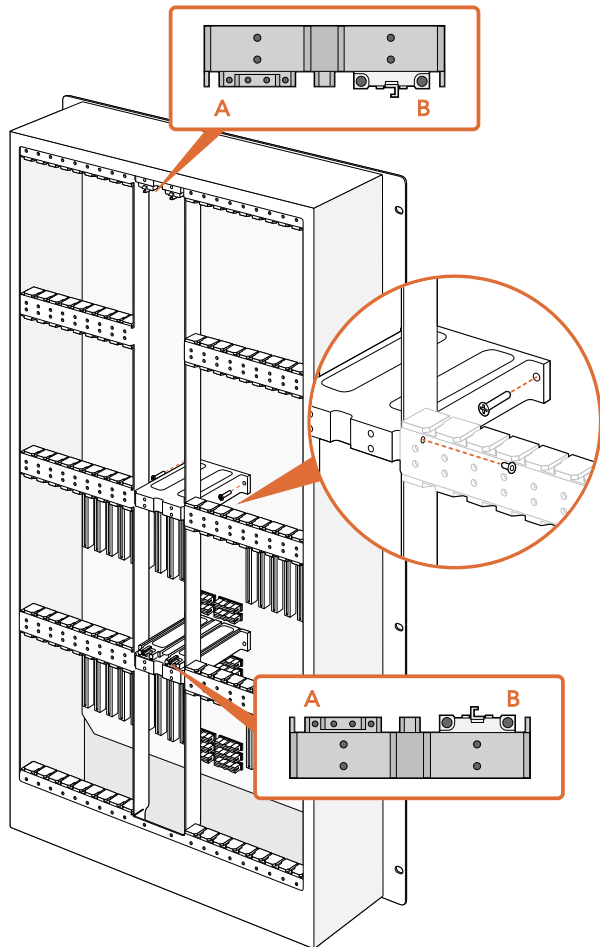
A single Universal Videohub 72 Crosspoint card can be installed in the left crosspoint card slot of a Universal Videohub 288. The Universal Videohub 72 Crosspoint card is limited to supporting 18 interface cards and does not support crosspoint redundancy. This card should only be considered if attempting to minimize the initial cost of purchasing a Universal Videohub 288. When using a Universal Videohub 72 Crosspoint card, only the bottom row of 18 interface cards can be used. A Universal Videohub 288 Crosspoint card must be used if you want to install more than 18 interface cards.

The short length of the Universal Videohub 72 Crosspoint card, compared with the Universal Videohub 288 Crosspoint card, requires the installation of an additional supporting bridge in the center of the Universal Videohub 288. When upgrading to a Universal Videohub 288 Crosspoint card at a later time, the additional supporting bridge must be removed.

The additional supporting bridge, short blanking plate and associated screws are available as a separate package from your Videohub dealer. Torx T8, Torx T10, number 01 and number 02 size Pozidriv screwdrivers are required to install the additional supporting bridge and the Universal Videohub 72 Crosspoint card.

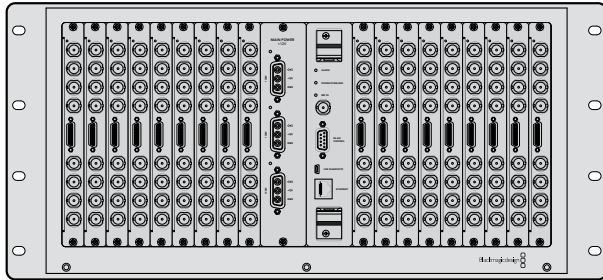
- Step 1.** Ensure power is switched off and disconnected from Universal Videohub 288.
- Step 2.** Use a number 02 size Pozidriv screwdriver to remove the blanking plate from the right crosspoint card slot.
- Step 3.** Use a number 02 size Pozidriv screwdriver to remove the blanking plates from the interface card slots for SDI ports 73-216.
- Step 4.** Maneuver the supporting bridge through the crosspoint card slots and rest it flat on the motherboard, with the card guides facing up, while taking great care to avoid damaging the multi-pin connectors on the motherboard.
- Step 5.** Stand the supporting bridge so the holes in its left and right feet are positioned over the corresponding mounting holes on the motherboard standoffs. The card guides should face the lower supporting bridge at the bottom of the crosspoint slots.
- Step 6.** Secure the left and right feet of the supporting bridge with the number 02 size Pozidriv screws.
- Step 7.** Secure the left and right legs of the supporting bridge with the two Torx T10 screws as shown in the accompanying illustration. These screws are installed horizontally.

## 31 Using Videohub Routers



- Step 8.** Use a Torx T8 screwdriver to remove the silver catches from the two supporting bridges at the top and bottom of the left crosspoint slot. In the accompanying illustration, the letter "A" indicates the location on the left side of the supporting bridges where the silver catches have been removed. When upgrading to a Universal Videohub 288 Crosspoint card at a later time, you will need to reinstate the silver catches, so make sure you keep them in a safe place. The silver catches shown at "B" should not be removed. They will be required if installing a Universal Videohub 288 Crosspoint card in the right crosspoint card slot in the future.
- Step 9.** To install the Universal Videohub 72 Crosspoint card, hold the card in a vertical orientation by its two levers. The BNC, Ethernet and other ports should be towards the bottom end of the card. Gently insert the unit into its slot, below the additional supporting bridge, and ensure the top and bottom edges of the card follow the black guides. Now firmly push both levers flat to fully engage the multi-pin connectors with the motherboard. Mating pins ensure that the card precisely engages with the motherboard without damaging the multi-pin connectors. Use a number 01 size Pozidriv screwdriver to secure the screws on the two levers of the crosspoint card.
- Step 10.** The short length of the Universal Videohub 72 Crosspoint card means that a short blanking plate should also be installed to cover the rest of the long crosspoint slot. The short blanking plate can be secured with a number 02 size Pozidriv screwdriver.
- Step 11.** Use a number 02 size Pozidriv screwdriver to reinstate the blanking plate for the right crosspoint card slot.
- Step 12.** Reinstate the blanking plates for the interface card slots for SDI ports 73-216. Interface cards must only be installed in the bottom row, for SDI ports 1-72, when a Universal Videohub 72 Crosspoint card is used.

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### Universal Videohub 72

#### What you need to get started

Universal Videohub 72 is a medium-sized modular router ideal for growing facilities. It features an 18 card rack frame that can be filled with any combination of BNC SDI or optical fiber SDI interface cards. When fully populated with a crosspoint card, a power card, 18 SDI interface cards and 18 deck control cables, Universal Videohub 72 provides 72 SDI inputs, 72 SDI outputs, 72 bidirectional RS-422 deck control ports, reference input, redundant power supply options and powerful Videohub routing control software for Mac OS X and Windows.

Occasional firmware updates can be downloaded from the Blackmagic Design website. Programmable firmware can provide new features, compatibility with new hardware and support for new formats.

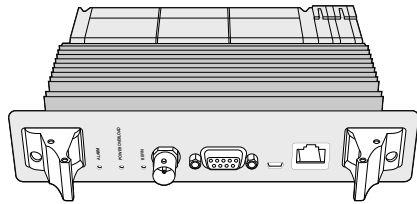
The Videohub firmware update utility runs on Mac OS X and Windows computers and uses a USB 2.0 connection to Universal Videohub 72. You will need to provide a USB 2.0 type A to mini B male cable.

Universal Videohub 72 ships as an empty rack frame, except for a removable fan tray and fans. All other hardware components, including SDI interface cards, deck control cables, crosspoint card and power supplies must be purchased and installed separately. SDI interface cards can be purchased as your facility grows and don't need to be installed all at once. This section is designed to help you decide which components you will need before you build your Universal Videohub 72.

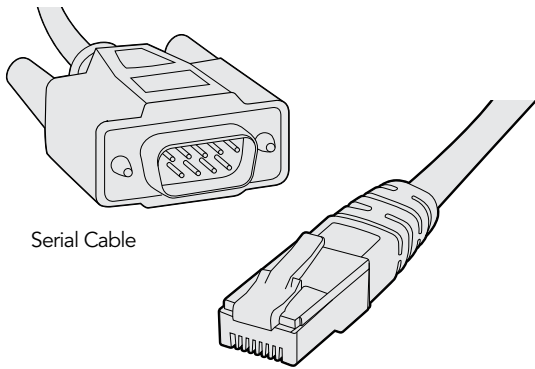
Pages 36-37 provide information on the different interface cards available for your Universal Videohub.



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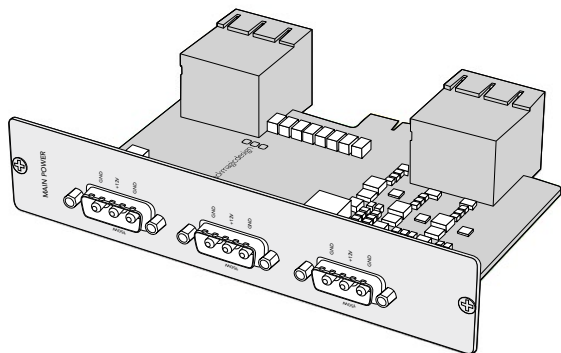


Universal Videohub 72 Crosspoint card



Serial Cable

Standard RJ45 Ethernet Cable



Universal Videohub 450W Power Card can be connected to three 150W power bricks

### Universal Videohub 72 Crosspoint Card

This module contains the crosspoint processor for switching video routes and changing deck control ports. Ethernet, USB and serial ports are located on the card for router control.

A Reference input is located on the card for connection to a tri-level sync or blackburst genlock signal.

An Alarm light will illuminate on the card if user intervention is required, e.g., if inadequate cooling has caused Videohub to overheat. Alarm notification is supplied by the GPI (General Purpose Interface) output to other devices.

A Power Overload light will illuminate on the card if inadequate power is being supplied to the unit for the number of cards installed.

### Router Control Cable

Remote router control is performed via 10/100Base-T Ethernet or serial. If router control is performed via Ethernet, the integrated Videohub Server is used. This means you only need to provide an Ethernet cable to connect Universal Videohub 72 to your Ethernet network switch.

Third party router controllers can control Universal Videohub 72 via Ethernet, or as an RS-422 slave device, for router crosspoint switching. Please refer to the Developer Information section of this manual for Videohub and RS-422 protocols.

### Power Supply

The Universal Videohub 450W Power Card provides connections for up to three 150W brick-style power supplies, which must be purchased separately.

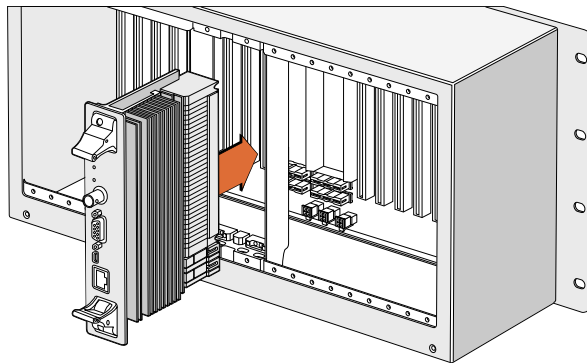
When fully populated and running at maximum power consumption, Universal Videohub 72 can be powered by two 150W brick power supplies. A third power supply can be connected to ensure continued operation should one power supply fail. The 150W power supplies are universal power supplies for use in all countries. You will need to provide a standard IEC cord with a C13 connector for each power supply. When fully populated with three power supplies, three mains power sockets will be required.

The high power supply designed for Universal Videohub 288 is ill-suited to Universal Videohub 72 because it doesn't provide power redundancy to Universal Videohub 72, is more expensive and requires an additional 1 RU of space below Universal Videohub 72.

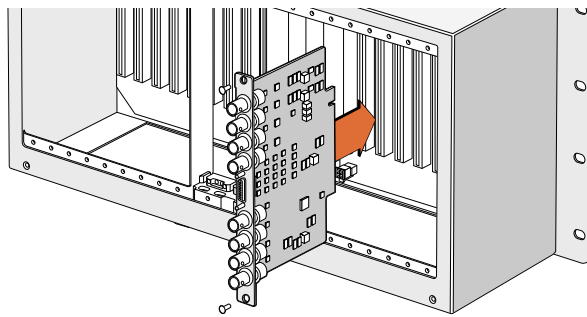
### Building Videohub 72

9 rack units of space should be reserved for the installation of Universal Videohub 72 including access space for the drop-down fan tray as well as free space for heat dissipation. Only 7 RU is required if Universal Videohub 72 is mounted at the top of an open rack. Universal Videohub 72 is 5 rack units high and 6 inches thick. You can rack-mount Universal Videohub 72 facing forwards or reversed, or even mount it in the rear of the rack to leave space for other equipment. 2 RU of space should be left above Universal Videohub 72 for heat dissipation unless mounted at the top of an open rack where there is no obstruction to airflow above.

Universal Videohub 72 contains electrostatic sensitive devices. It is essential to discharge yourself of static electricity before handling any of these devices, just as you would when installing devices into a computer. We recommend the use of an antistatic wrist strap when handling any of these devices.



Installing a Universal Videohub 72 Crosspoint Card



Installing a Universal Videohub SDI Interface

#### Installing a Universal 72 Crosspoint Card

Now that your Universal Videohub 72 has been mounted in a rack, it needs to be fitted with a crosspoint card. The crosspoint card is the brains of any Universal Videohub and performs video route and deck control switching. Universal Videohub 72 Crosspoint cards are hot-swappable, meaning they are designed to be installed and removed while the Universal Videohub is running.

- Step 1:** Hold the crosspoint card in a vertical orientation by its two levers. The BNC, Ethernet and other ports should be towards the bottom end of the card.
- Step 2:** Gently insert the card into its slot, ensuring the top and bottom edges follow the black guides.
- Step 3:** Firmly push both levers flat to fully engage the multi-pin connectors with the motherboard. Mating pins ensure that the card precisely engages with the motherboard without damaging the multi-pin connectors.
- Step 4:** Use a number 01 size Pozidriv screwdriver to secure the two levers on the crosspoint card.

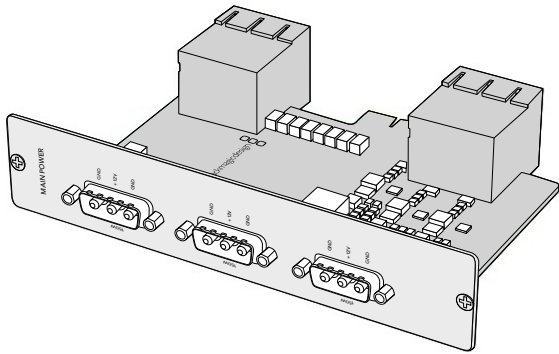
#### Installing Interface cards

Installing a Universal Videohub SDI Interface or Universal Videohub Optical Interface is easy and the steps are the same for installing each type of interface card.

- Step 1:** Hold the card in a vertical orientation with the identification LED at the top of the card. The identification LED looks like a pin hole near the top left of the top connector.
- Step 2:** Gently but firmly insert the card so that it follows its guides and plugs into the PCI slot in the motherboard. Use a number 02 size Pozidriv screwdriver to secure the interface card to the Universal Videohub frame.

Pages 36-37 provide information on the different interface cards available for your Universal Videohub.

## 35 Using Videohub Routers



Universal Videohub 450W Power Card can be connected to three 150W power bricks

### Installing a Universal Videohub 450W Power Card

The Universal Videohub 450W Power Card features three power connectors, which can be connected to 150W power supply bricks for up to 450W of power. This power card is suitable for powering a fully populated Universal Videohub 72 with two power supplies connected. A third connected power supply provides failover redundancy should one power supply fail.

- Step 1:** Ensure that the power supply is disconnected from any electrical source.
- Step 2:** Orient the power card so that the MAIN POWER label appears at the top of the card.
- Step 3:** Insert the power card into its slot on the motherboard. Use a number 02 size Pozidriv screwdriver to secure the power card with its two screws.
- Step 4:** Connect three Universal Videohub 150W Power Supplies.

If you need to remove or replace the power card, power off and disconnect all connected power supplies before removing the power card.

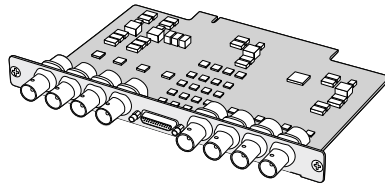
If you have only partially populated your Universal Videohub 72 with interface cards, you might be able to power it with a single 150W power supply and preferably use a second power supply for failover redundancy. If you choose this option:

- Step 1:** Temporarily disconnect the second power supply and then check the Power Overload light on the crosspoint card after installing any cards.
- Step 2:** If the Power Overload light illuminates, you will have to add a 150W brick power supply or remove some cards to ensure that all cards are receiving power.
- Step 3:** Reconnect the second power supply when you have finished checking the Power Overload light.

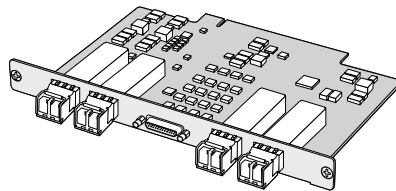
For peace of mind, we recommend connecting and powering the three power supplies at all times to ensure sufficient power, and power redundancy, with all card combinations.

If you need to remove or replace a 150W Power Supply while Universal Videohub 72 is still running, power off the brick while being careful to avoid switching off power to the remaining power supplies. Unplug the IEC cord and then unscrew and disconnect the power supply from the Universal Videohub 450W Power Card.

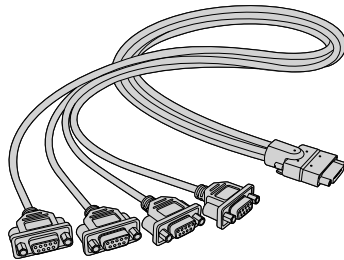
Congratulations! Your Universal Videohub 72 is now ready to start routing video!



Universal Videohub SDI Interface card



Universal Videohub Optical Interface card



Universal Videohub Deck Control Cable

### SDI Interface Card

SDI interface cards feature 4 SDI inputs, 4 SDI outputs and a connector for a Universal Videohub Deck Control Cable. All SDI connections support auto detection of SD, HD or 3G-SDI, and relocking on all SDI outputs. Simultaneous routing of 2K, HD, SD video and DVB-ASI are supported with Universal Videohub. SDI interface cards are designed to be installed while Videohub is running and become active immediately. They do not require Videohub to be power cycled. You will need a number 01 and a number 02 size Pozidriv screwdriver to install the various cards.

There are two models of SDI interface cards that can be used with Universal Videohub:

- Universal Videohub SDI Interface card with BNC connectors.
- Universal Videohub Optical Interface card has standard SFP transceiver modules with 1310 nm laser drivers and receivers. Each module includes an LC connector port to be used with single-mode optical fiber cables.

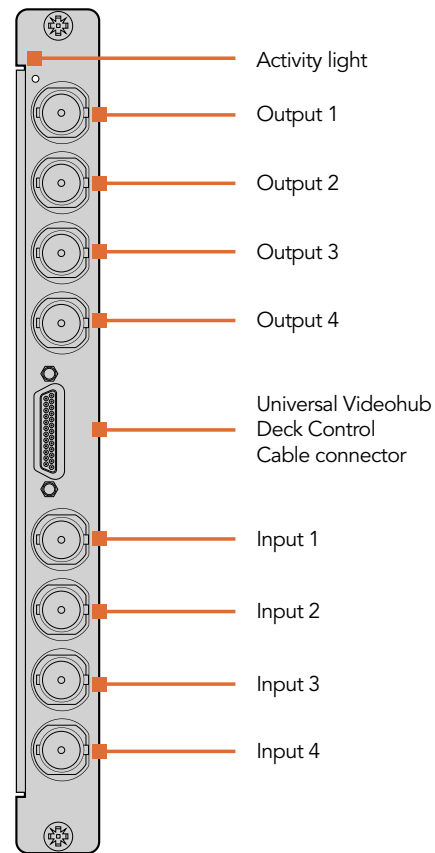
### Universal Videohub Deck Control Cable

This cable features a single serial port at one end, for connection to both types of SDI interface cards, and four RS-422 deck control ports at the other end.

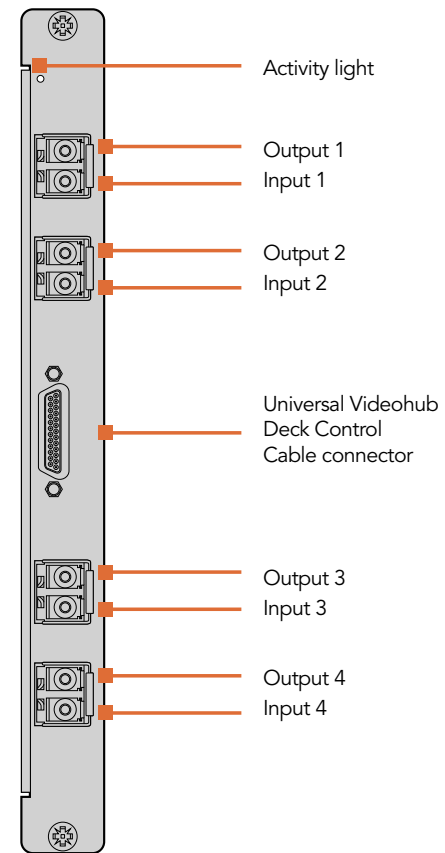
# 37 Using Videohub Routers

## Universal Videohub Interface Cards

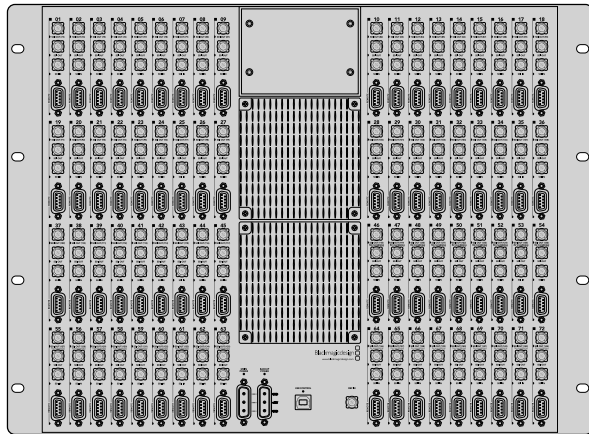
Universal Videohub  
SDI Interface



Universal Videohub  
Optical Interface



## 38 Using Videohub Routers



### Broadcast Videohub

Broadcast Videohub is perfect for large facilities. It features 72 SDI inputs, 144 SDI outputs, 72 bidirectional RS-422 deck control ports, reference input, redundant power supplies and powerful Videohub routing control software for Mac OS X and Windows.

All SDI connections support auto detection of SD, HD or 3G-SDI, and reclocking on all SDI inputs. Simultaneous routing of 2K, HD, SD video and DVB-ASI are supported with Broadcast Videohub.

Remote router control is performed via USB 2.0 and then shared over an IP network in much the same way as USB printer sharing. Prior to connecting any devices to Broadcast Videohub, you must nominate a computer to be the Videohub "Server" and to perform Videohub sharing via USB. You can use almost any computer for the Videohub Server, such as an editing workstation, and you don't need a dedicated or powerful computer for this task. However the Videohub Server computer must remain powered on at all times so that Videohub settings can be modified. You will need to provide a standard USB 2.0 type A-B male cable to connect Broadcast Videohub to the server computer.

This same USB cable can be used for applying occasional firmware updates downloaded from the Blackmagic Design website. Programmable firmware can provide new features, compatibility with new hardware and support for new formats. The Videohub firmware update utility runs on the Videohub Server computer and uses the USB 2.0 connection to update Broadcast Videohub.

Third party router controllers can control Broadcast Videohub via Ethernet for router crosspoint switching. The Videohub Ethernet protocol is documented in the Developer Information section of this manual.

Broadcast Videohub is 8 rack units high and less than 3 inches deep, including power connector and cable. You will need to leave enough space in your equipment rack to install the Broadcast Videohub hardware. You can rack-mount Broadcast Videohub facing forwards or reversed, or even mount it in the rear of the rack to leave space for other equipment.

The Broadcast Videohub requires one power supply but includes two so continued operation is ensured if one happens to fail. The included power supplies are universal power supplies for use in all countries. You will need to provide a standard IEC cord with a C13 connector for each power supply. We recommend connecting and powering the two power supplies at all times, which means two mains power sockets will be required. A third power socket will be required if you decide to use a dedicated server computer.

If you need to learn how to integrate your router into an existing network, turn to page 7.

## 39 Using Videohub Routers



### Studio Videohub

Studio Videohub is perfect for smaller workgroups. It features 16 SDI inputs, 32 SDI outputs, 16 bidirectional RS-422 deck control ports, reference input, a universal power supply and powerful Videohub routing control software for Mac OS X and Windows.

All SDI connections support auto detection of SD, HD or 3G-SDI, and reclocking on all SDI inputs. Simultaneous routing of 2K, HD, SD video and DVB-ASI are supported with Studio Videohub.

Remote router control is performed via USB 2.0 and then shared over an IP network in much the same way as USB printer sharing. Prior to connecting any devices to Studio Videohub, you must nominate a computer to be the Videohub "Server" and to perform Videohub sharing via USB. You can use almost any computer for the Videohub Server, such as an editing workstation, and you don't need a dedicated or powerful computer for this task. However the Videohub Server computer must remain powered on at all times so that Videohub settings can be modified. You will need to provide a standard USB 2.0 type A-B male cable to connect Studio Videohub to the server computer.

This same USB cable can be used for applying occasional firmware updates downloaded from the Blackmagic Design website. Programmable firmware can provide new features, compatibility with new hardware and support for new formats. The Videohub firmware update utility runs on the Videohub Server computer and uses the USB 2.0 connection to update Studio Videohub.

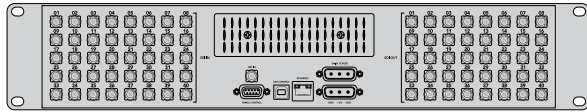
Third party router controllers can control Studio Videohub via Ethernet for router crosspoint switching. The Videohub Ethernet protocol is documented in the Developer Information section of this manual.

Studio Videohub is 2 rack units high and less than an inch thick. You will need to leave enough space in your equipment rack to install the Studio Videohub hardware. You can rack-mount Studio Videohub facing forwards or reversed, or even mount it in the rear of the rack to leave space for other equipment. If you don't have a rack, then you can leave it in a safe place on the floor!

The Studio Videohub includes a universal power supply for use in all countries. You will need to provide a standard IEC cord with a C13 connector and a mains power socket. A second power socket will be required if you decide to use a dedicated server computer.

If you need to learn how to integrate your router into an existing network, turn to page 7.

## 40 Using Videohub Routers



### Compact Videohub

Compact Videohub is a small router and is perfect when you need a bigger router in a small size, such as in creative post facilities and broadcast trucks. It features 40 SDI inputs, 40 SDI outputs, reference input, redundant power supply connections and powerful Videohub routing control software.

All SDI connections support auto detection of SD, HD or 3G-SDI, and reclocking on all SDI inputs. Simultaneous routing of 2K, HD, SD video and DVB-ASI are supported with Compact Videohub.

Remote router control is performed via 10/100Base-T Ethernet, serial or USB 2.0 and then shared over an IP network in much the same way as USB printer sharing. If router control is performed via Ethernet, the integrated "Videohub Server" is used and you need only provide an Ethernet cable to connect Compact Videohub to your Ethernet network switch.

If router control is performed via USB 2.0, you must nominate a computer to be the "Videohub Server" and to perform Videohub sharing via USB. You can use almost any computer for the Videohub Server and you don't need a dedicated or powerful computer for this task. However the Videohub Server computer must remain powered on at all times so that Videohub settings can be modified. You will need to provide a standard USB 2.0 type A-B male cable to connect Compact Videohub to the server computer.

Third party router controllers can control Compact Videohub via Ethernet, or as an RS-422 slave device, for router crosspoint switching. The Videohub Ethernet protocol, RS-422 protocol and RS-422 pinout diagram are documented in the Developer Information section of this manual.

Occasional firmware updates can be downloaded from the Blackmagic Design website. Programmable firmware can provide new features, compatibility with new hardware and support for new formats. The Videohub firmware update utility runs on Mac OS X and Windows computers and uses a USB 2.0 connection to Compact Videohub. You will need to provide a standard USB 2.0 type A-B male cable.

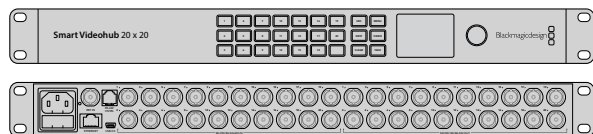
Compact Videohub is 2 rack units high and less than an inch thick. You will need to leave enough space in your equipment rack to install the Compact Videohub hardware. You can rack-mount Compact Videohub facing forwards or reversed, or even mount it in the rear of the rack to leave space for other equipment. If you don't have a rack, then you can leave it in a safe place on the floor!

The Compact Videohub includes one universal power supply for use in all countries. A second power supply can be purchased to ensure continued operation should one fail. You will need to provide a standard IEC cord with a C13 connector for each power supply. We recommend connecting and powering two power supplies at all times, which means two mains power sockets will be required. A third power socket will be required if you decide to use a dedicated server computer.

If you need to learn how to integrate your router into an existing network, turn to page 7.



## 41 Using Videohub Routers



### Smart Videohub 20x20

Smart Videohub 20x20 is a tiny router with a built in control panel and LCD and is perfect for locations where minimal space is available, such as outside broadcast trucks. It features 20 SDI inputs, 20 SDI outputs, reference input, a universal power supply and powerful Videohub routing control software.

All SDI connections support auto detection of SD, HD, 3G-SDI and 6G-SDI, and reclocking on all SDI inputs. Simultaneous routing of UltraHD 4K, HD, SD video and DVB-ASI are supported with Smart Videohub 20x20.

Local router control is easy and intuitive using the built in control panel and LCD, and requires no configuration and no computer. The LCD allows you preview source and destination video without an external monitor.

Remote router control can also be performed via 10/100Base-T Ethernet or serial connections. If router control is performed via Ethernet, the integrated "Videohub Server" is used and you need only provide an Ethernet cable to connect Smart Videohub 20x20 to your Ethernet network switch.

Third party router controllers can control Smart Videohub 20x20 via Ethernet, or as an RS-422 slave device, for router crosspoint switching.

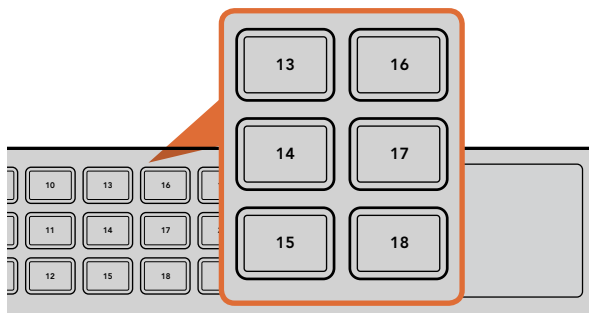
Occasional firmware updates can be downloaded from the Blackmagic Design website. The Videohub firmware update utility runs on Mac OS X and Windows computers and uses a USB 2.0 connection to Smart Videohub 20x20. You will need to provide a USB 2.0 type A Male to Mini B cable.

Smart Videohub 20x20 is 1 rack unit high and features a shallow form factor. You will need to leave enough space in your equipment rack to install the Smart Videohub hardware. You can rack-mount Smart Videohub 20x20 at the front or at the rear of the rack to leave space for other equipment.

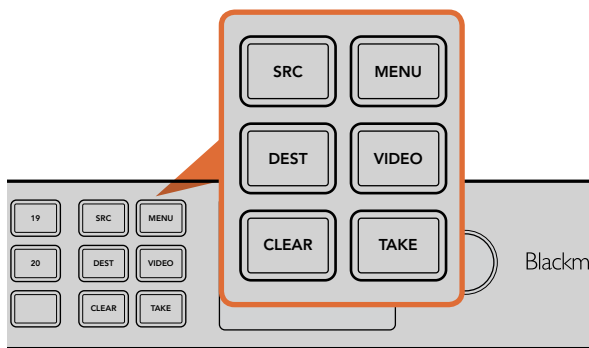
Smart Videohub 20x20 includes a universal power supply for use in all countries. You will need to provide a standard IEC cord with a C13 connector and a mains power socket. A second power socket will be required if you decide to use a dedicated server computer.

Turn the page for instructions on how to make route changes with the control panel and LCD. Alternatively, if you need to learn how to integrate your router into an existing network, turn to page 7.

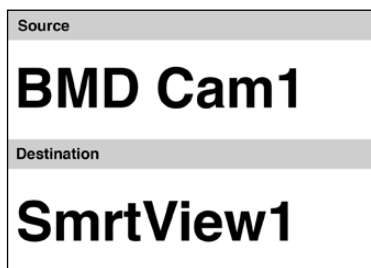
## 42 Using Videohub Routers



The numbered pushbuttons correspond to either the SDI inputs (sources) or SDI outputs (destinations).



Menu buttons allow for simple and quick route changes.



The LCD provides instant feedback of route selections and changes and allows you preview source and destination video without an external monitor.

### Using Smart Videohub 20x20 Control Panel and LCD

Smart Videohub 20x20 features a built in control panel and LCD. Routing changes can be made without needing a computer by simply using the numbered pushbuttons. Remote router control can also be used.

#### Menu Buttons Explained

##### SRC

Press this button and then a numbered pushbutton to select your Source.

##### DEST

Press this button and then a numbered pushbutton to select your Destination.

##### CLEAR

Press this button to discard a route change.

##### MENU

Toggles between the routing display and the network configuration page.

##### VIDEO

Use this button in conjunction with the SRC and DEST buttons to display either the Source or Destination video on the LCD.

##### TAKE

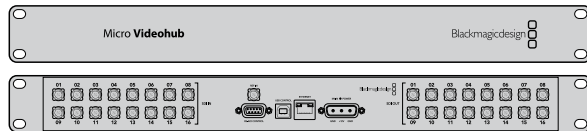
Press this button to confirm a route change.

#### Changing Routes

- Step 1.** Select the DEST button and then a numbered pushbutton. Alternatively, you can use the rotary knob to scroll through the Destination numbers. The lower half of the LCD displays the Destination and will change accordingly. If you have already customised your labels, the device name eg: "SmartView1" will be displayed.
- Step 2.** Select the SRC button and then a numbered pushbutton. Alternatively, you can use the rotary knob to scroll through the Source numbers. The numbers will scroll in alphabetical order and not the numerical order. The top half of the LCD displays the Sources and will change accordingly. If you have already customised your labels, the device name will be displayed. The CLEAR button will flash white and the TAKE button will flash red. Press the TAKE button to confirm the route change. Or, you can press the CLEAR button to discard the route change.

The pushbuttons override any existing routes, including destinations locked with Videohub software.

## 43 Using Videohub Routers



### Micro Videohub

Micro Videohub is a tiny router and is perfect for locations where minimal space is available, such as outside broadcast trucks. It features 16 SDI inputs, 16 SDI outputs, reference input, a universal power supply and powerful Videohub routing control software for Mac OS X and Windows.

All SDI connections support auto detection of SD, HD or 3G-SDI, and reclocking on all SDI inputs. Simultaneous routing of 2K, HD, SD video and DVB-ASI are supported with Micro Videohub.

Remote router control is performed via 10/100Base-T Ethernet, serial or USB 2.0 and then shared over an IP network in much the same way as USB printer sharing.

If router control is performed via Ethernet, the integrated "Videohub Server" is used and you need only provide an Ethernet cable to connect Micro Videohub to your Ethernet network switch.

If router control is performed via USB 2.0, you must nominate a computer to be the "Videohub Server" and to perform Videohub sharing via USB. You can use almost any computer for the Videohub Server, such as an editing workstation, and you don't need a dedicated or powerful computer for this task. However the Videohub Server computer must remain powered on at all times so that Videohub settings can be modified. You will need to provide a standard USB 2.0 type A-B male cable to connect Micro Videohub to the server computer.

Third party router controllers can control Micro Videohub via Ethernet, or as an RS-422 slave device, for router crosspoint switching. The Videohub Ethernet protocol, RS-422 protocol and RS-422 pinout diagram are documented in the Developer Information section of this manual.

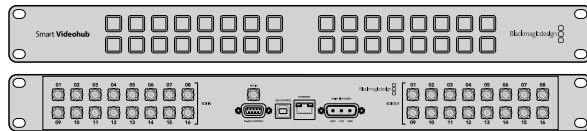
Occasional firmware updates can be downloaded from the Blackmagic Design website. Programmable firmware can provide new features, compatibility with new hardware and support for new formats. The Videohub firmware update utility runs on Mac OS X and Windows computers and uses a USB 2.0 connection to Micro Videohub. You will need to provide a standard USB 2.0 type A-B male cable.

Micro Videohub is 1 rack unit high and less than an inch thick. You will need to leave enough space in your equipment rack to install the Micro Videohub hardware. You can rack-mount Micro Videohub facing forwards or reversed, or even mount it in the rear of the rack to leave space for other equipment. If you don't have a rack, then you can leave it in a safe place on the floor!

The Micro Videohub includes a universal power supply for use in all countries. You will need to provide a standard IEC cord with a C13 connector and a mains power socket. A second power socket will be required if you decide to use a dedicated server computer.

If you need to learn how to integrate your router into an existing network, turn to page 7.

## 44 Using Videohub Routers



### Smart Videohub

Smart Videohub is a tiny router with a built in control panel for changing routes and is perfect for locations where minimal space is available, such as outside broadcast trucks. It features 16 SDI inputs, 16 SDI outputs, reference input, a universal power supply and powerful Videohub routing control software.

All SDI connections support auto detection of SD, HD or 3G-SDI, and reclocking on all SDI inputs. Simultaneous routing of 2K, HD, SD video and DVB-ASI are supported with Smart Videohub.

Local router control is easy and intuitive using the built in 32 pushbutton control panel, and requires no configuration and no computer. The front panel can be removed to allow insertion of labels under the buttons. All buttons can be variably backlit to ensure the labels can be easily read, even in dark rooms.

Remote router control can also be performed via 10/100Base-T Ethernet, serial or USB 2.0 and then shared over an IP network in much the same way as USB printer sharing. If router control is performed via Ethernet, the integrated "Videohub Server" is used and you need only provide an Ethernet cable to connect Smart Videohub to your Ethernet network switch.

If remote router control is performed via USB 2.0, you must nominate a computer to be the "Videohub Server" and to perform Videohub sharing via USB. You can use almost any computer for the Videohub Server and you don't need a dedicated or powerful computer for this task. However the Videohub Server computer must remain powered on at all times so that Videohub settings can be modified. You will need to provide a standard USB 2.0 type A-B male cable to connect Smart Videohub to the server computer.

Third party router controllers can control Smart Videohub via Ethernet, or as an RS-422 slave device, for router crosspoint switching.

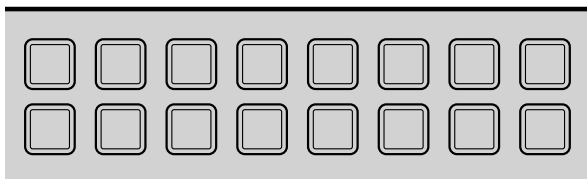
Occasional firmware updates can be downloaded from the Blackmagic Design website. The Videohub firmware update utility runs on Mac OS X and Windows computers and uses a USB 2.0 connection to Smart Videohub. You will need to provide a standard USB 2.0 type A-B male cable.

Smart Videohub is 1 rack unit high and just over an inch thick. You will need to leave enough space in your equipment rack to install the Smart Videohub hardware. You can rack-mount Smart Videohub at the front or at the rear of the rack to leave space for other equipment.

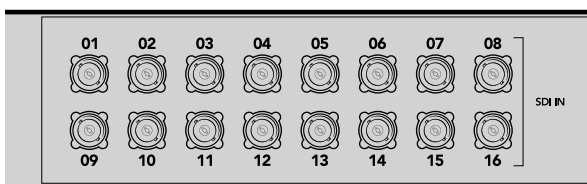
The Smart Videohub includes a universal power supply for use in all countries. You will need to provide a standard IEC cord with a C13 connector and a mains power socket. A second power socket will be required if you decide to use a dedicated server computer.

Turn the page to Using Smart Videohub's Control Panel for instructions on how to make route changes with the 32 pushbutton control panel. Alternatively, if you need to learn how to integrate your router into an existing network, turn to page 7.

## 45 Using Videohub Routers



The built in pushbutton control panel allows routing changes to be made without the need for a computer.



Every pushbutton on the front panel of Smart Videohub has a matching SDI input or output on the rear panel.

### Using Smart Videohub's Control Panel

Smart Videohub features a built in 32 pushbutton control panel on the front of the router. Routing changes can be made without needing a computer as there is a pushbutton for each SDI input and output on Smart Videohub. Remote router control can also be used with Smart Videohub.

The pushbuttons on the left of the control panel correspond with the 16 SDI inputs and the pushbuttons on the right correspond with the 16 SDI outputs.

When power is connected to Smart Videohub, the top-left destination button will illuminate white along with its corresponding source button.

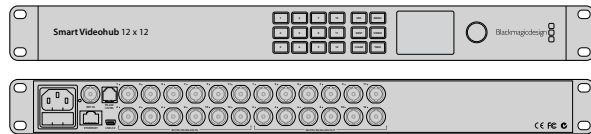
To change routes:

- Step 1.** Select a destination button and its corresponding source button will illuminate.
- Step 2.** Press the desired video source button to connect a new source to the destination. The original source button's LED will turn off and the new source button will light up. The new video source will immediately be connected and viewable on the destination device, such as an SDI monitor.
- Step 3.** To change another route, select another destination button and then select a new source button.

The pushbuttons on Smart Videohub directly control the integrated Videohub Server and override any existing routes, including destinations locked with Videohub software.

The illuminated pushbuttons display the last route made with the Smart Videohub control panel. However, if you select the same destination pushbutton as another remote user and they change the source to that destination, you will see the change reflected on your Smart Videohub.

## 46 Using Videohub Routers



### Smart Videohub 12x12

Smart Videohub 12x12 is a tiny router with a built in control panel and LCD and is perfect for locations where minimal space is available, such as outside broadcast trucks. It features 12 SDI inputs, 12 SDI outputs, reference input, a universal power supply and powerful Videohub routing control software.

All SDI connections support auto detection of SD, HD, 3G-SDI and 6G-SDI, and reclocking on all SDI inputs. Simultaneous routing of UltraHD 4K, HD, SD video and DVB-ASI are supported with Smart Videohub 12x12.

Local router control is easy and intuitive using the built in control panel and LCD, and requires no configuration and no computer. The LCD allows you preview source and destination video without an external monitor.

Remote router control can also be performed via 10/100Base-T Ethernet or serial connections. If router control is performed via Ethernet, the integrated "Videohub Server" is used and you need only provide an Ethernet cable to connect Smart Videohub 12x12 to your Ethernet network switch.

Third party router controllers can control Smart Videohub via Ethernet, or as an RS-422 slave device, for router crosspoint switching.

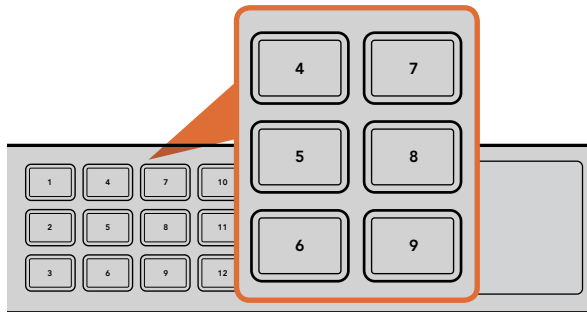
Occasional firmware updates can be downloaded from the Blackmagic Design website. The Videohub firmware update utility runs on Mac OS X and Windows computers and uses a USB 2.0 connection to Smart Videohub 12x12. You will need to provide a USB 2.0 type A Male to Mini B cable.

Smart Videohub 12x12 is 1 rack unit high and features a shallow form factor. You will need to leave enough space in your equipment rack to install the Smart Videohub hardware. You can rack-mount Smart Videohub at the front or at the rear of the rack to leave space for other equipment.

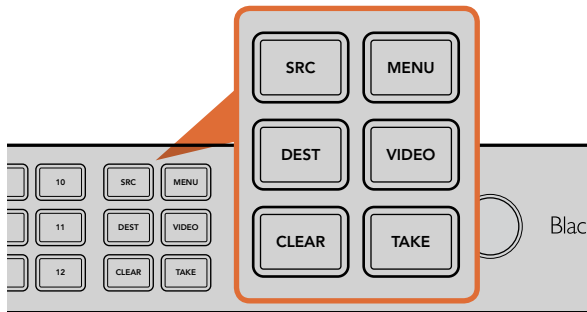
Smart Videohub 12x12 includes a universal power supply for use in all countries. You will need to provide a standard IEC cord with a C13 connector and a mains power socket. A second power socket will be required if you decide to use a dedicated server computer.

Turn to page for instructions on how to make route changes with the control panel and LCD. Alternatively, if you need to learn how to integrate your router into an existing network, turn to page 7.

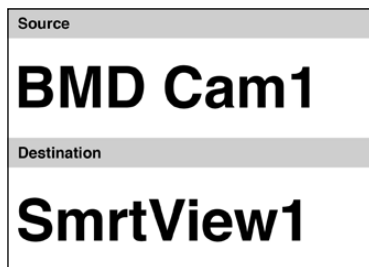
## 47 Using Videohub Routers



The numbered pushbuttons correspond to either the SDI inputs (sources) or SDI outputs (destinations).



Menu buttons allow for simple and quick route changes.



The LCD provides instant feedback of route selections and changes and allows you preview source and destination video without an external monitor.

### Using Smart Videohub 12x12 Control Panel and LCD

Smart Videohub 12x12 features a built in control panel and LCD. Routing changes can be made without needing a computer by simply using the numbered pushbuttons. Remote router control can also be used.

#### Menu Buttons Explained

##### SRC

Press the SRC button and then a numbered pushbutton to select your Source.

##### DEST

Press the DEST button and then a numbered pushbutton to select your Destination.

##### CLEAR

Press the CLEAR button to discard a route change.

##### MENU

Press the MENU button to toggle between the routing display and the network configuration page.

##### VIDEO

Press the VIDEO button and then either the SRC or DEST buttons to display the video on the LCD.

##### TAKE

Press this button to confirm a route change.

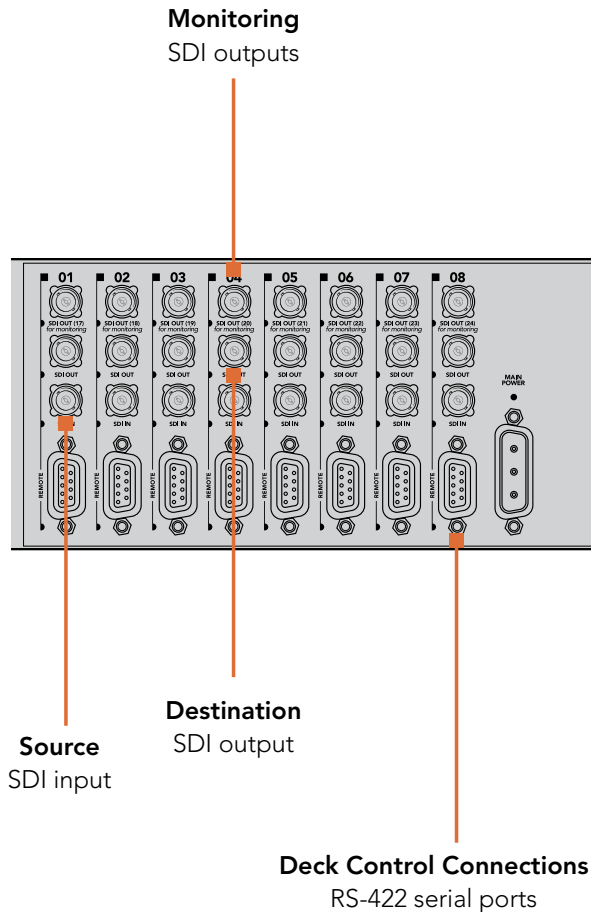
#### Switching Routes

**Step 1.** Select the DEST button and then a numbered pushbutton. Alternatively, you can use the rotary knob to scroll through the Destination numbers. The lower half of the LCD displays the Destination and will change accordingly. If you have already customised your labels, the device name eg: "SmartView1" will be displayed.

**Step 2.** Select the SRC button and then a numbered pushbutton. Alternatively, you can use the rotary knob to scroll through the Source numbers. The numbers will scroll in alphabetical order and not the numerical order. The top half of the LCD displays the Sources and will change accordingly. If you have already customised your labels, the device name will be displayed. The CLEAR button will flash white and the TAKE button will flash red. Press the TAKE button to confirm the route change. Or, you can press the CLEAR button to discard the route change.

The pushbuttons override any existing routes, including destinations locked with Videohub software.

# 48 Controlling Videohub with Software

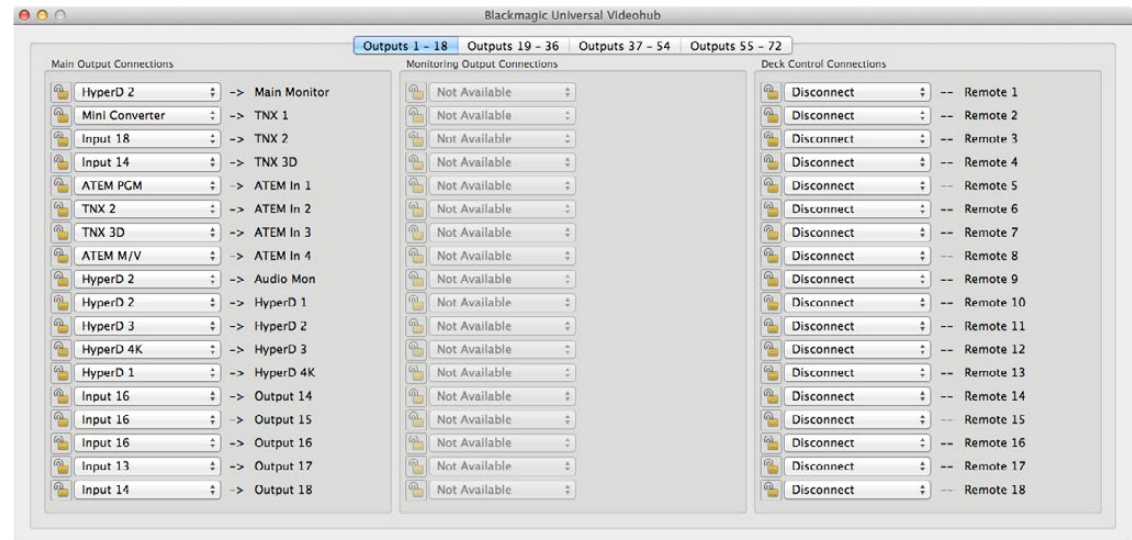


## Main Router Control

After launching the Videohub application, the Main Router Control window will be displayed. The window is split into three distinct areas:

- 1. Main Output Connections**  
Controls routing for the Destination SDI outputs.
- 2. Monitoring Output Connections**  
Controls routing for the Monitor SDI outputs.
- 3. Deck Control Connections**  
Controls routing for the RS-422 serial ports.

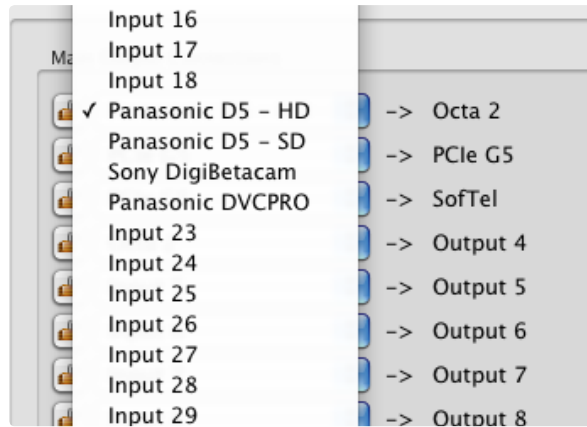
Connect a video input to a video output by selecting the menu of any destination outputs or monitoring outputs.



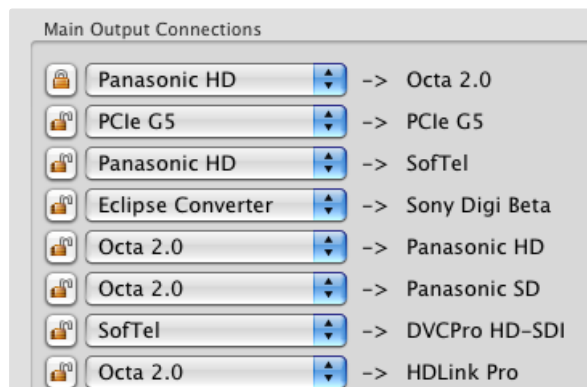
The Main Router Control window is split into three distinct areas.



## 49 Controlling Videohub with Software



Select your Source from the pulldown menu.



The top route is locked.

Videohub supports one to many routes. This means that any video input, such as a HD deck, can be sent to one or more monitoring outputs. On Studio Videohub, one input could be sent to as many as 16 monitoring outputs. On the Broadcast Videohub, one input could be sent to as many as 72 outputs, while on the Universal Videohub 288, one input could be sent to as many as 288 outputs!

RS-422 deck control can be routed on some Videohub models that feature RS-422 remote ports.

The RS-422 port on a deck can be routed to an RS-422 port on Videohub, for example when connecting a deck to an NLE workstation. Unlike video, which can be routed to dozens of outputs simultaneously, RS-422 control is point to point, meaning that when you connect two devices together, one will disable so it cannot be accidentally connected to another port.

To change the control port connection, choose another port in the Videohub Software. Or, you can choose to Disconnect the RS-422 port completely.

Changing an RS-422 deck control route will affect other ports involved in the routing, i.e., if Port 1 and 2 are connected and you connect Port 3 to Port 2, Port 1 will become disconnected.

### Locking and Unlocking Routes

The Videohub software offers a lock function to prevent people on other workstations from changing your routes. This is important when outputting a master to tape and you don't want anyone changing the input of the deck from your setting.

Click the padlock button next to the port you wish to lock. The icon will now show the port as locked, meaning no changes can be made that will impact the port.

The interface on other clients will show the locked port as grayed out.

If ports on your interface appear grayed out it simply means that another user has locked those ports.

If you have locked a port it will become unlocked as soon as you change its route. You may then relock the port if you wish to prevent further changes by other users.

If you need to override a lock set by someone else, hold down the SHIFT key. Any grayed out lock buttons will become active and show a red warning icon to remind you that the lock was set by someone else.

Clicking the warning icon will break the lock. Remember to only do this if you are sure your action is not going to cause problems for people using the same Videohub. Breaking the lock can be useful if someone controlling Videohub from their notebook or iPad leaves the office with a destination locked!

Locking serial ports can have far-reaching effects as any new serial route involving your port will be disallowed for other users. For example, if Serial Port 1 is connected to Serial Port 2 and you lock Serial Port 1, no other users can establish a route to Serial Port 2, even though you locked Serial Port 1.



Pushbutton views provide an intuitive, icon-driven representation of the Videohub connections

## Pushbutton views

The Main Router Control view is the best place for a system administrator to configure and label all the connections on any Videohub. However most users do not need or want to see all connections all of the time. They may just want to see the connections which they use most of the time. Simple Router Control and Personal Router Control views are helpful because they reduce the number of visible connections to a single set of connections for immediate needs.

If a user frequently needs to switch between multiple sources and destinations, without the extra effort of using popup menus to change connections, then Pushbutton views are the natural choice. Pushbutton views provide the fastest and most intuitive way to view and switch between multiple sources and destinations without needing to see all Videohub connections at once.

Pushbutton views are easy to use because they operate on a single video output at a time. Selecting a destination (output) pushbutton shows which source (input) is connected to it by illuminating the source pushbutton. To change the video source, simply click on a different source pushbutton. It is that easy!

Pushbutton views are designed to be simple and intuitive and only provide basic configuration options compared with Router Control views. Accordingly it is advisable to have a system administrator use Main Router Control view to complete all labeling and configuration, of SDI connectors and RS-422 ports on the Videohub Server, before operators start using Pushbutton views.

Pushbutton views are not appropriate for system administrators, as they do not show all of the information that a system administrator would require.

Pushbutton views are not appropriate for users who need to view more than one video route at a time, e.g. all of the video destinations connected to a single video source.

Pushbutton views are not appropriate for users who need to determine the direction of RS-422 control for a particular video device. However once RS-422 is configured in a Router Control view, Pushbutton views can be used to route a video source to a video destination including RS-422 device control.

# 51 Using Software Control Panels

## Pushbutton View at a Glance

**Broadcast Videohub** Blackmagicdesign

**Sources**

Input 1 through Input 55

**Destinations**

Output 1 through Output 11

Highlighted icon denotes paired connections

The number of dots below the Sources and Destinations panels show the number of screens you have, and indicates which screen you're viewing.

Simple and easy to understand icons

Arrow buttons allow you to move through your Source screens

This button is reserved by Videohub for when a destination is connected to a source which does not appear in the sources panel.

Arrow buttons allow you to move through your Destination screens

Title Bar shows which type of Videohub you are using

Arrow buttons and dots make it easy to move through screens of Sources and Destinations when more than one screen is used. Multiple screens are available in Full Screen 24" Pushbutton view but not in smaller views.

## 52 Using Software Control Panels

Simple Router Control  
Personal Router Control  
Main Router Control

Personal Pushbutton  
Full Screen 20" Pushbutton  
✓ Full Screen 24" Pushbutton

The View menu in Videohub

There are several Pushbutton views available for displays of different resolutions:

- **Full Screen 24" Pushbutton** - requires a 1920 x 1200, or 1920 x 1080 widescreen display such as a typical 24" computer display or a large high definition display. This view can display up to 55 sources and 11 destinations in a single screen, or any number of sources and destinations by using the left and right arrow buttons to move through screens.
- **Full Screen 20" Pushbutton** - requires a 1680 x 1050 widescreen display, such as a typical 20" computer display. This view can display up to 50 sources and 10 destinations.
- **Personal Pushbutton** - By contrast to the Full Screen views, Personal Pushbutton view provides a window containing space for up to 8 sources and 4 destinations. It is perfect for personal use and smaller displays, especially on laptop computers. It requires an 800 x 600 or higher resolution display.

Full Screen Pushbutton views are designed to dominate displays so that no menu bar, system tray or dock are visible. Full Screen Pushbutton views are perfect when used on displays which match a supported resolution but will look poor on any other display. The Personal Pushbutton view is designed to work on any display with an 800 x 600 or higher resolution.

Pushbutton views and Router Control views can be chosen from the "Welcome to Videohub" startup screen, from the View menu or by using a keyboard shortcut. Keyboard shortcuts can be used if the View menu is not visible and are very similar on Mac and Windows platforms.

Mac OS X keyboard shortcuts	Windows keyboard shortcuts	Videohub View
Cmd 1	Ctrl 1	Simple Router Control
Cmd 2	Ctrl 2	Personal Router Control
Cmd 3	Ctrl 3	Main Router Control
Cmd 4	Ctrl 4	Full Screen 24" Pushbutton
Cmd 5	Ctrl 5	Full Screen 20" Pushbutton
Cmd 6	Ctrl 6	Personal Pushbutton

## 53 Using Software Control Panels

After installing Videohub software, launch the Blackmagic Videohub application and choose a Pushbutton view, to match the size of your computer display. This page of the Videohub manual shows the Full Screen 24" Pushbutton view being used with a Broadcast Videohub. All pushbuttons initially show the generic icon of a BNC connector which you can then replace from a selection of icons.



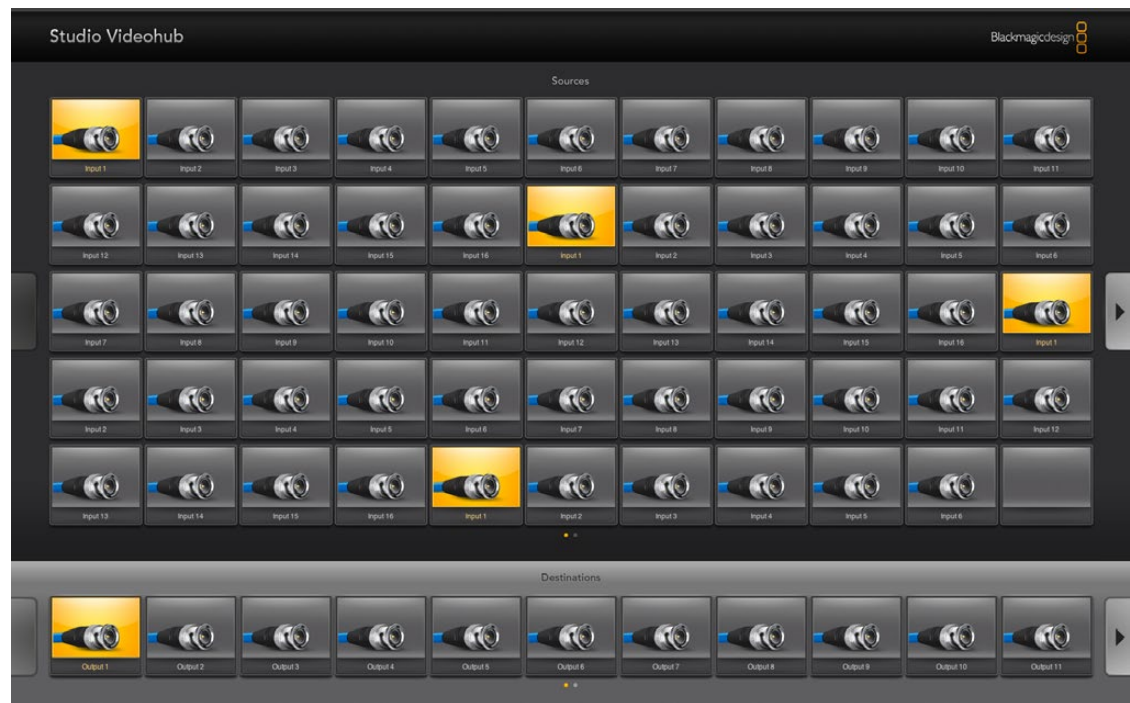
Each Pushbutton view is divided into an upper panel of buttons representing video sources, and a lower panel of buttons representing video destinations.

## 54 Using Software Control Panels

If the Input, Output and Remote connections have not yet been labeled in Main Router Control view, then the source pushbuttons will appear as Input 1 to Input 55 and the destination pushbuttons will appear as Output 1 to Output 11. These inputs and outputs correspond to the connector numbers on the Videohub. If the Input, Output and Remote connections have already been labeled in Main Router Control view, their names will appear under each of the respective pushbuttons in place of the connector numbers.

Pushbutton views reduce the number of visible connections to only those that you want to see, in contrast to Main Router Control view which displays all connections simultaneously.

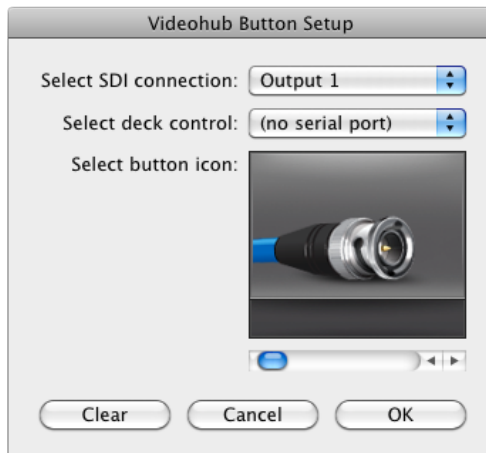
On smaller Videohubs, you may find that there are many more source pushbuttons, in a Full Screen Pushbutton view, than there are SDI input connectors on the Videohub itself. For example when using Studio Videohub with the Full Screen 24" Pushbutton view, the Sources panel will show Input 1 to Input 16 repeated several times until the pushbuttons fill the Sources panel.



## 55 Using Software Control Panels



The **i** icon is revealed when the mouse is moved to the top-right corner of any unlocked Videohub pushbutton.



Clicking on the **i** icon reveals the Videohub Button Setup window.

Configuring Pushbuttons is easy. Move the mouse to the top-right corner of any Videohub pushbutton to reveal an **i** icon. Clicking the **i** icon will open the Videohub Button Setup window which allows one to set the SDI input or output connection, RS-422 deck control and the icon for the pushbutton. The Clear button will delete all settings for the pushbutton and the icon will be replaced with black. In most cases, deck control is grouped with the associated SDI connections and so an SDI connection named Input 1 would usually be associated with the corresponding Remote 1.

The bottom-right source button, in each Pushbutton view, is reserved by the Videohub application itself and cannot be configured. If a destination pushbutton is connected to a source which does not appear in the sources panel, the source will automatically appear in the bottom-right pushbutton of the sources panel.



The Pushbutton view on this page shows a Studio Videohub with button icons configured to represent SDI video devices. The black buttons have been cleared.

## 56 Using Software Control Panels

The smaller Pushbutton views show the top-left portion of the largest Pushbutton view to ensure that button layouts will not change when switched between Pushbutton views. Users who regularly switch between Full Screen and Personal Pushbutton views should group the most commonly used video sources in the top left of the Full Screen Pushbutton view so they will be visible in Personal Pushbutton view. The most commonly used destinations should be located in the first few destination buttons on the left side of the Pushbutton view.



The Personal Pushbutton view shows only those pushbuttons which appear in the top-left portion of the largest Pushbutton view.



## 57 Using Software Control Panels

When using a Full Screen Pushbutton view, you may choose to show multiple instances of a source or destination pushbutton. The example pictured on this page shows a Studio Videohub with all of its inputs configured in the first rows of the Pushbutton view. Some of the same inputs have been duplicated and then grouped together, with devices of the same type, enabling them to be quickly located, e.g. a camera group, a deck group, etc. Destinations can also be duplicated if desired.

If a destination pushbutton is routed from a source, which appears multiple times in the Sources panel, selecting the destination pushbutton will illuminate all instances of the source pushbutton, regardless of how deck control has been configured for each source pushbutton. Similarly if multiple instances of an output pushbutton appear in the Destinations panel, they will illuminate together when any one has been selected.



Full Screen 24" Pushbutton view showing an example of duplication and grouping of inputs. Two, illuminated instances of Input 1 can be seen in this example. Grouping of inputs can enable quick identification and location of video sources of the same type, e.g. all available cameras.

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This destination is unlocked and is available to any Videohub user on the network. The associated video source will be illuminated in the Sources panel and can be changed by pressing another source pushbutton.

In order to see which video source has been routed to a video destination, such as a video monitor, press the video monitor button in the destinations panel to make the button illuminate. Simultaneously the associated video source button will illuminate in the sources panel, making it immediately obvious which video source is connected to the video monitor, e.g. a tape deck.

In order to change the video source from a tape deck to a video camera, press a camera pushbutton in the sources panel to immediately illuminate the camera pushbutton and route video to the video monitor. The tape deck button will no longer be illuminated and will be disconnected from the video monitor.

When configuring pushbuttons, only select a deck control connection for those devices which have RS-422 deck control. For example, it makes no sense to assign a deck control connection to a video monitor, camera or satellite-receiving dish.

While all icons are available to any pushbutton, it usually doesn't make such sense to choose the icon of a video monitor or transmitter for a source pushbutton unless the source device happens to have a loop-through output. Similarly it would not usually make sense to assign the icon of a camera or satellite-receiving dish to a destination pushbutton.

## 59 Using Software Control Panels



Locally locked destinations display a yellow padlock icon.



Remotely locked destinations display a gray padlock icon.

### Locking and Unlocking Routes

Locking a destination will avoid accidentally changing the video source which is routed to that destination. To lock a route between an input and an output, double-click the destination pushbutton. A yellow padlock icon will appear in the top-left corner of the destination pushbutton and will prevent anyone else from using the destination device until it is unlocked from your computer. Double-click the destination pushbutton again to unlock. Locking a destination still leaves the associated video source available for routing to multiple destinations simultaneously.

Locking a route between an input and an output also locks the RS-422 deck control connection between the two devices to avoid other users accidentally seizing the deck control belonging to the video source. The RS-422 connection between the video source and video destination will remain locked until the destination pushbutton is unlocked.

A gray padlock icon will appear on any destination pushbuttons which other users have locked. The video destination devices will not be available to you until the destination pushbuttons have been unlocked from the other users' computers and iPads.

If you need to override a lock set by someone else, hold down the SHIFT key on a computer keyboard. Any grayed out lock buttons will become active and show a red warning icon to remind you that the lock was set by someone else. Only double-click on the pushbutton, to break the lock, if you are sure your action is not going to cause problems for people using the same Videohub. Breaking the lock is useful if someone is controlling the Videohub from their notebook or iPad and then leaves the office with a destination locked! When a route is unlocked, the padlock icon will instantly disappear.



### Touchscreen Computers

The Pushbutton views are designed to be easy to use and look beautiful on a large, touchscreen display. Dedicating a touchscreen computer to the Videohub Pushbutton interface makes it incredibly easy for users to switch connections between multiple SDI devices without having to see every connected device all of the time. Using a touchscreen computer, in conjunction with Videohub Pushbutton views, provides the fastest way to switch connections which is perfect for a master control room. Touchscreen desktop and touchscreen laptop computers can be used. It is a good idea to check the resolution of your touchscreen display before deciding upon which Pushbutton view to use.

The Pushbutton interface to Videohub was introduced at the NAB 2009 trade show and displayed on HP TouchSmart IQ800 computers. This computer model had a 25" display and a resolution of 1920 x 1200 which was perfect for Full Screen Pushbutton view. Many other brands and models of touchscreen computers and displays exist and you just need to choose one that provides a resolution matching one of the Pushbutton views.

Touchscreens are perfect for rapidly selecting and routing inputs and outputs but they are cumbersome for configuring pushbuttons. The width of a human fingertip is much wider than a mouse pointer and is less accurate when tapping on menu options and small icons. For this reason, we recommend configuration of Videohub pushbuttons be performed with a mouse. Once the Videohub pushbuttons have been configured, it will be easy to use a finger to select and route, inputs and outputs, by tapping on Videohub pushbuttons.

When a computer mouse is moved to the top-right corner of any Videohub pushbutton, an *i* icon appears and clicking the icon opens the Videohub Button Setup window. By contrast, a touchscreen cannot detect a hovering finger and so the *i* icon will not be revealed. Tapping a finger in the top-right corner of any Videohub pushbutton will open the Videohub Button Setup window on a touchscreen even though the *i* icon will not have been revealed.

When a computer mouse is moved to the top of a Full Screen Pushbutton view, the Videohub menu bar will be revealed. When the mouse is moved away from the menu bar, the menu bar will hide again. As with the *i* icon, a touchscreen cannot detect a finger hovering towards the top of the display and so the Videohub menu bar will not be revealed automatically. Tapping a finger anywhere above the top row of source pushbuttons will reveal the Videohub menu bar on a touchscreen. To hide the Videohub menu bar, simply tap again in the same area.

Touchscreens work a little differently to a computer mouse but provide the fastest and easiest way to work with the Videohub Pushbutton interface and so are highly recommended. When using a touchscreen computer, we recommend enabling the Take Confirmation option to help avoid unintentional changes to video routes.

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### Apple iPad

The Videohub Pushbutton controller interface looks stunning on the high resolution Apple iPad display. Aside from looking great, it also provides the convenience of portable router control anywhere in your facility or even over the Internet via a wireless or cellular connection! If you are already familiar with the Videohub Pushbutton interface on a computer, then there is almost nothing new you need to learn and you'll only notice slight differences between computer mouse control and touchscreen control on the iPad.

Up to 40 sources and 8 destinations can be displayed in a single Videohub Pushbutton screen on the iPad. Even more sources and destinations can be displayed by flicking the iPad left or right, or tapping to the left or right of the row of dots, to move through multiple Pushbutton screens.

### The initial Pushbutton interface

Upon launching the Videohub app on your iPad for the first time, all pushbuttons initially show the generic BNC connector icon, which you can then replace from a selection of icons. If the connections have not yet been labeled from a computer using the Main Router Control, then the source pushbuttons will appear as Input 1 to Input 40 and the destination pushbuttons will appear as Output 1 to Output 8.

If the connections have already been labeled in Main Router Control view on a computer, their names will appear under each of the respective pushbuttons in place of the connector numbers.

### Configuring Videohub Pushbuttons on the iPad

Configuring Videohub Pushbuttons on the iPad is easy. Press and hold any Videohub pushbutton to open the Videohub Button Setup window. This window allows you to set the SDI input or output connection, RS-422 deck control and the icon for the pushbutton.

The Clear button will delete all settings for the pushbutton. In most cases, deck control is grouped with the associated SDI connections, meaning an SDI connection named Input 1 would usually be associated with the corresponding Remote 1.

The bottom-right source button is reserved by the Videohub app itself and cannot be configured.

If a destination pushbutton is connected to a source that does not appear in the sources panel, the source will automatically appear in the bottom-right pushbutton of the sources panel.

When configuring pushbuttons, only select a deck control connection for those devices that have RS-422 deck control. It makes no sense to assign a deck control connection to a video monitor or camera.

While all icons are available to any pushbutton, it doesn't make sense to choose the icon of a video monitor or transmitter for a source pushbutton unless the source device happens to have a loop-through output.



The Videohub Button Setup window allows you to set the SDI input or output connection, RS-422 deck control and the icon for the pushbutton.

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In order to see which video source has been routed to a video destination, tap a destination button and the associated video source button will illuminate.



A yellow padlock icon will appear in the top-left corner of the destination pushbutton and will prevent anyone else from using the destination device until it is unlocked from your iPad. A gray padlock icon will appear on any destination pushbuttons that other users have locked.

You may choose to show a particular source or destination pushbutton several times within the one Pushbutton screen or on multiple Pushbutton screens. If a destination pushbutton is routed from a source that appears multiple times in the Sources panel, selecting the destination pushbutton will illuminate all instances of the source pushbutton, regardless of how deck control has been configured for each source pushbutton. Similarly if multiple instances of an output pushbutton appear in the Destinations panel, they will illuminate together when any one has been selected.

### Viewing and Changing Routes

In order to see which video source has been routed to a particular destination, such as a monitor, press the monitor's pushbutton in the destinations panel. The monitor button and the associated video source button will simultaneously illuminate, making it immediately obvious which video source is connected to the video monitor, e.g., a HyperDeck Studio Pro.

In order to change the video source from a HyperDeck Studio Pro to a video camera, press a camera pushbutton in the sources panel to immediately illuminate the camera pushbutton and route video to the video monitor. The HyperDeck Studio Pro pushbutton will no longer be illuminated and will be disconnected from the video monitor.

### Locking and Unlocking Routes

Locking a destination avoids accidental changes of the video source being routed to that destination. To lock a route between an input and an output, double-tap the destination pushbutton. A yellow padlock icon will appear in the top-left corner of the destination pushbutton and will prevent anyone else from using the destination device until it is unlocked from your iPad. Double-tap the destination pushbutton again to unlock. Locking a destination still leaves the associated video source available for routing to multiple destinations simultaneously.

Locking a route between an input and an output also locks the RS-422 deck control connection between the two devices. This is to avoid other users accidentally seizing the deck control belonging to the video source. The RS-422 connection between the video source and video destination will remain locked until the destination pushbutton is unlocked.

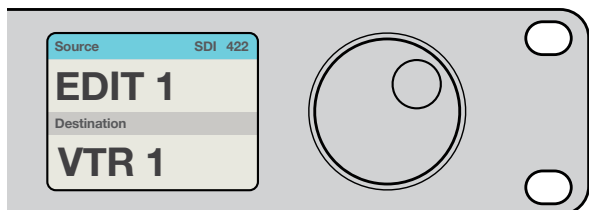
A gray padlock icon will appear on any destination pushbuttons that other users have locked. The video destination devices will not be available to you until the destination pushbuttons have been unlocked from the other users' computers and iPads.

If you encounter a gray padlock icon and do not know who locked the video device you can override the lock using the Videohub software on a Mac OS X or Windows computer. When a route is unlocked, the padlock icon will disappear.

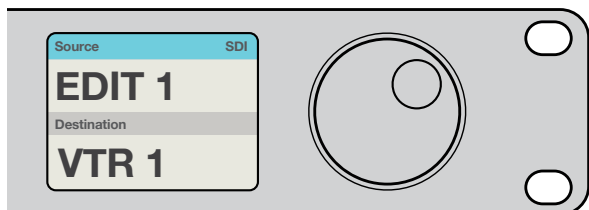
## 63 Controlling Videohub with Hardware



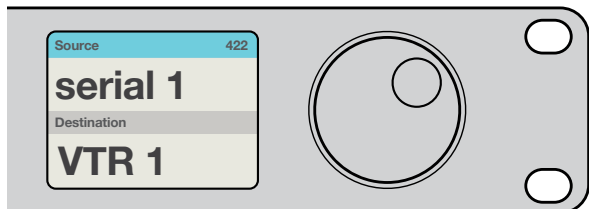
Front panel showing a new source has been selected.



Choose the SDI 422 routing level if you only want to see SDI video equipment with RS-422 deck control. In this example, the capture card (Edit 1) and the deck (VTR 1) are listed because they both have SDI and RS-422 ports.



Choose the SDI routing level if you want to see all SDI video equipment. In this example, the capture card (Edit 1) and the deck (VTR 1) are listed because they both have SDI ports.



Choose the 422 routing level if you want to see all equipment with RS-422 remote deck control, including equipment with mismatched labels and also remote controllers. In this example, the capture card (Edit 1) has a mismatched label for its remote port (serial 1) and is only listed when the routing level is set to 422.

### About Routing Levels

If your Videohub does not feature RS-422 remote deck control, Videohub Master Control will always show "SDI" on its LCD and you don't need to read anything more about routing levels.

If your Videohub does include RS-422 remote deck control ports, you can use the LEVEL button on Videohub Master Control to reduce the list of sources and destinations by routing level.

Start by pressing the DEST button. Now press the LEVEL button to cycle through the routing levels:

**SDI 422** - Choose this routing level to reduce the list of video equipment to devices with matching labels for their remote and SDI ports. This level is commonly used with SDI capture cards and VTR decks but cannot be used with cameras and monitors as they do not have RS-422 remote ports.

**SDI** - Lists all SDI sources and destinations. Choose this routing level if you want to see all SDI video equipment, i.e., cameras, monitors, capture cards and VTR decks, regardless of RS-422 connections.

**422** - Choose this routing level if you want to reduce the list of video equipment to all devices with RS-422 deck control. This will list sources and destinations by the names of their RS-422 remote ports, regardless of whether there are any associated SDI ports and regardless of whether any associated SDI ports have matching labels or not. This level is commonly used with SDI capture cards and VTR decks but also lists remote control panels and servers used to control decks.

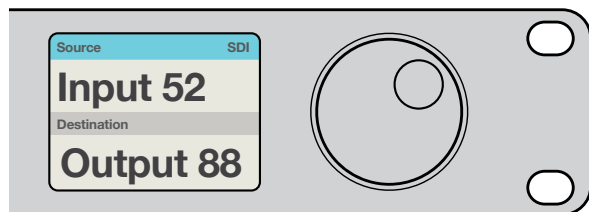
### How to Select Sources and Destinations

Videohub Master Control provides several ways to select and switch your destinations and sources quickly, depending upon whether you have customized the port labels on your Videohub router or if you just want to enter port numbers directly.

Videohub Master Control works in the same conceptual way as any other router control. These are the basic steps you will take, regardless of your method for selecting devices.

- Step 1.** Press the DEST button to display a destination on the LCD. Use the pushbuttons and/or the scroll wheel to find the desired destination.
- Step 2.** Press SRC and use the buttons and/or the scroll wheel to change the source connected to the destination.
- Step 3.** Press TAKE to confirm the route change.

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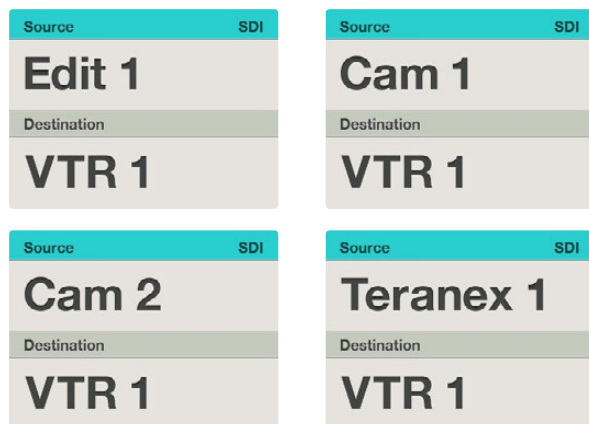


If you've chosen to keep the default labels for all Videohub SDI and remote ports, you can simply type the port numbers to make a routing change. In this example, press DEST and then type the port number 88. Then press SRC and type the port number 52. Press TAKE to confirm the route change.

### How to select devices by typing the Videohub port numbers

If you've chosen to keep the default labels for all Videohub SDI and remote ports, you can simply type the port numbers to make a routing change. This method is fast but requires that you remember port numbers or have devised a system for knowing what equipment is connected to each Videohub port.

- Step 1.** Press the DEST button. The destination field will be highlighted blue on the LCD.
- Step 2.** If your Videohub router has RS-422 remote control, press the LEVEL button until you have set the appropriate routing level for your equipment. Otherwise you can skip this step.
- Step 3.** Type in the destination port number using the numeric pushbuttons. Each button will flash gold once as you press it. The destination will be displayed on the LCD. If you make a mistake, press the white CLEAR button and retype the port number.
- Step 4.** Press the SRC button. The source field will be highlighted blue on the LCD.
- Step 5.** Type in the source port number using the numeric pushbuttons. Each button will flash white once as you press it. The source will be displayed on the LCD. If you make a mistake, press the white CLEAR button and retype the port number.
- Step 6.** The TAKE button will flash red, awaiting your confirmation of the route change. Press TAKE and the route will change immediately. Otherwise, press CLEAR and no route change will take place. Videohub Master Control returns to its idle state with the latest route displayed on the LCD.



In this example, the scroll wheel is being used to list all sources that can be routed to the destination VTR 1, based upon the SDI routing level. When the scroll wheel is rotated, the names of source equipment are progressively displayed to make it very easy to find the desired video source.

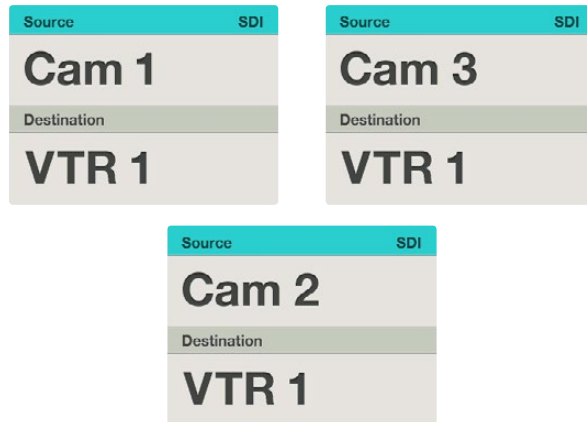
### How to select devices with the scroll wheel

Regardless of whether or not you've customized the Videohub port labels, you can always use the scroll wheel to browse through a list of sources and destinations. This is the slowest method but is useful if you want to see the list of all available equipment and ports.

- Step 1.** Press the DEST button. The destination field will be highlighted blue on the LCD.
- Step 2.** If your Videohub router has RS-422 remote control, press the LEVEL button until you have set the appropriate routing level for your equipment. Otherwise you can skip this step.
- Step 3.** Scroll the wheel forwards or backwards until the desired destination is found. The destination will be displayed on the LCD.
- Step 4.** Press the SRC button so it lights white. The source field will be highlighted blue on the LCD.
- Step 5.** Scroll the wheel until the desired source is found. The source will be displayed on the LCD.
- Step 6.** The TAKE button will flash red, awaiting your confirmation of the route change. Press TAKE and the route will change immediately. Or press CLEAR and no route change will take place. Videohub Master Control returns to its idle state with the latest route displayed on the LCD.



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In this example, a customized Cam button has been selected so only cameras will be listed as sources, on the LCD, when the scroll wheel is rotated. This provides a fast way to find a video source because you only have to scroll through a short list of equipment.

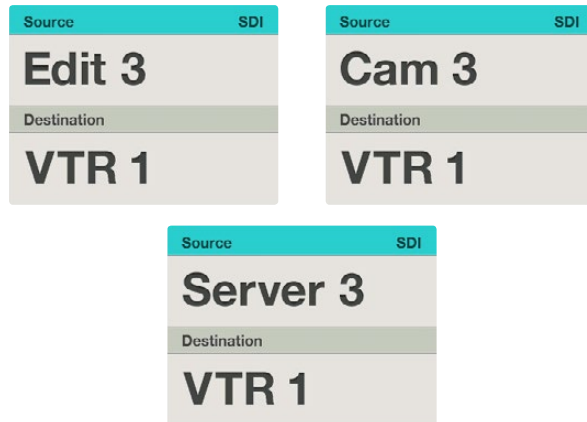
### How to select devices using the customizable buttons and scroll wheel

If you have customized the Videohub port labels, you can use the customizable buttons and scroll wheel together to find a short list of sources and destinations. This method is fast and intuitive because you only have to scroll through a short list of equipment and you don't have to remember any port numbers. This method is very helpful if you label types of equipment together by name, e.g., VTR, Cam and Mon.

- Step 1.** Press the DEST button. The destination field will be highlighted blue on the LCD.
- Step 2.** If your Videohub router has RS-422 remote control, press the LEVEL button until you have set the appropriate routing level for your equipment. Otherwise you can skip this step.
- Step 3.** Press a button you have customized for a type of destination equipment, e.g., VTR. The button should light up gold.
- Step 4.** Scroll the wheel forwards or backwards until the desired destination is found. In this example, the destination VTR will be displayed on the LCD. If you make a mistake, press the white CLEAR button and scroll until the correct destination is displayed.
- Step 5.** Press the SRC button. The source field will be highlighted blue on the LCD.
- Step 6.** Press a button you have customized for a type of source equipment, e.g., a capture card. The button should light up white.
- Step 7.** Scroll the wheel forwards or backwards until the desired source is found. In this example, the source capture card will be displayed on the LCD. If you make a mistake, press the white CLEAR button and scroll until the correct destination is displayed.
- Step 8.** The TAKE button will flash red, awaiting your confirmation of the route change. Press TAKE and the route will change immediately. Otherwise, press CLEAR and no route change will take place. Videohub Master Control will then return to its idle state with the latest route displayed on the LCD.

If any button you have customized for either a source or destination flashes but does not stay lit, Videohub Master Control is preventing you from selecting the button because the equipment type has not been labeled as a source or destination device or does not match the current routing level. For example, cameras should not usually be set as destination devices, monitors should not be set as source devices and won't match the RS-422 routing level. Refer back to Creating Button Labels in Setting Up Videohub Master Control for steps on how to change this.

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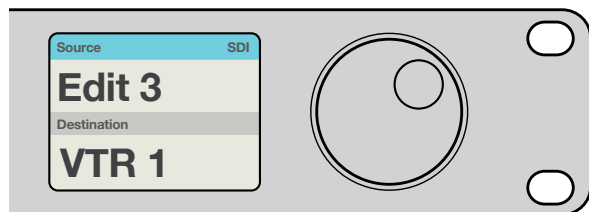
In this example, the numeric button "3" has been selected so only video sources with a "3" in their label will be listed, on the LCD, when the scroll wheel is rotated. This provides a fast way to find a video source because you only have to scroll through a short list of equipment based upon a group number, e.g. only list the equipment in Studio 3.

### How to select devices using the numeric buttons and scroll wheel

If you have customized the Videohub port labels with numbers, you can use the numeric buttons and scroll wheel together to find a short list of sources and destinations. This method is fast and intuitive because you only have to scroll through a short list of equipment and you don't have to remember any port numbers. This method is very helpful if you label groups of equipment together by numbers, perhaps to represent locations. For example, all the equipment in Studio 3 could be labeled VTR3, Edit 3, Cam 3A, Cam 3B, Mon 3A and Mon 3B etc.

- Step 1.** Press the DEST button. The destination field will be highlighted blue on the LCD.
- Step 2.** If your Videohub router has RS-422 remote control, press the LEVEL button until you have set the appropriate routing level for your equipment. Otherwise you can skip this step.
- Step 3.** Using the numeric pushbuttons, type the destination number, e.g., 3 for Studio 3. Each numeric button will flash gold as you press it.
- Step 4.** Scroll the wheel forwards or backwards until the desired destination is found. In this example, any of VTR 3, Edit 3, Mon 3A or Mon 3B could be displayed on the LCD. If you make a mistake, press the white CLEAR button and scroll until the correct destination is displayed.
- Step 5.** Press the SRC button. The source field will be highlighted blue on the LCD.
- Step 6.** Using the numeric pushbuttons, type the source number, e.g., 3 for Studio 3. Each numeric button will flash white as you press it.
- Step 7.** Scroll the wheel forwards or backwards until the desired source is found. In this example, any of VTR 3, Edit 3, Cam 3A or Cam 3B could be displayed on the LCD. If you make a mistake, press the white CLEAR button and scroll until the correct destination is displayed.
- Step 8.** The TAKE button will flash red, awaiting your confirmation of the route change. Press TAKE and the route will change immediately. Otherwise, press CLEAR and no route change will take place. Videohub Master Control will then return to its idle state with the latest route displayed on the LCD.

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If you know that you want Edit 3 as the source, and VTR 1 as the destination, you can select the route directly without any scrolling being necessary. In this example, press DEST, press the customized VTR button and then press 1. VTR 1 will be shown in the destination field. Now press SRC, press the customized Edit button and then press 3. "Edit 3" will be shown in the source field. Finally, press TAKE to confirm the route change.

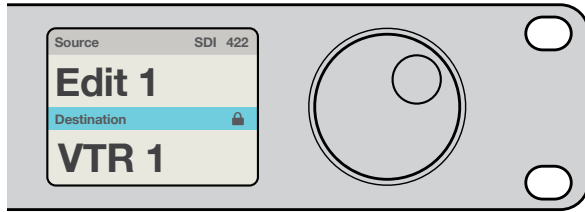
### How to select devices using the customizable and numeric buttons together

If you have customized the Videohub port labels with names and numbers, you can use the customizable buttons and numeric buttons together to directly select sources and destinations. This method is very fast and intuitive because you don't have to scroll through a list of equipment and you only have to remember how many of each type of equipment you have, e.g., two VTRs and four monitors. This method is very helpful if you label types of equipment by name and number, e.g., VTR 01, VTR 02, Cam 01, Cam 02, Cam 03, Mon 01, Mon 02, Mon 03 and Mon 04.

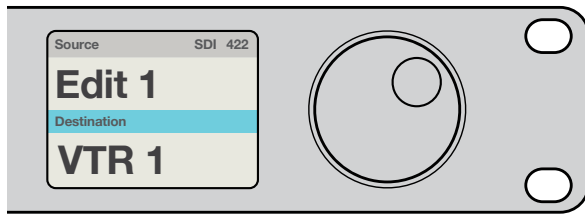
- Step 1.** Press the DEST button. The destination field will be highlighted blue on the LCD.
- Step 2.** If your Videohub router has RS-422 remote control, press the LEVEL button until you have set the appropriate routing level for your equipment. Otherwise you can skip this step.
- Step 3.** Press a button you have customized for a type of destination equipment, e.g., VTR. The button should light gold.
- Step 4.** Type in the destination equipment number using the numeric pushbuttons, e.g., 07 for VTR 07. Each numeric button will flash gold as you press it.
- Step 5.** Press the SRC button. The source field will be highlighted blue on the LCD.
- Step 6.** Press a button you have customized for a type of source equipment, e.g., a capture card. The button should light white.
- Step 7.** Type in the source equipment number using the numeric pushbuttons, e.g., 03 for the capture card Edit 03. Each numeric button will flash white as you press it.
- Step 8.** The TAKE button will flash red, awaiting your confirmation of the route change. Press TAKE and the route will change immediately. Otherwise, press CLEAR and no route change will take place. Videohub Master Control will then return to its idle state with the latest route displayed on the LCD.

If any button you have customized for either a source or destination flashes but does not stay lit, Videohub Master Control is preventing you from selecting the button because the equipment type has not been labeled as a source or destination device or does not match the current routing level. For example, cameras should not usually be set as destination devices, monitors should not be set as source devices and won't match the RS-422 routing level. Refer back to Creating Button Labels in Setting Up Videohub Master Control for steps on how to change this.

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The destination field shows a lock icon if the destination is locked.



The lock icon disappears from the destination field when the destination is unlocked.

### Locking and Unlocking Routes

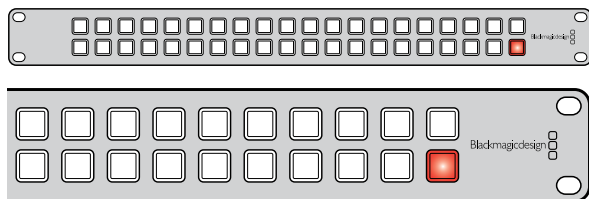
Videohub Master Control can lock and unlock any route on your Videohub. In contrast to Videohub Smart Control, Videohub Master Control can also unlock any destinations locked by other people using their computer, iPad or Videohub Smart Control.

To lock a destination using Videohub Master Control:

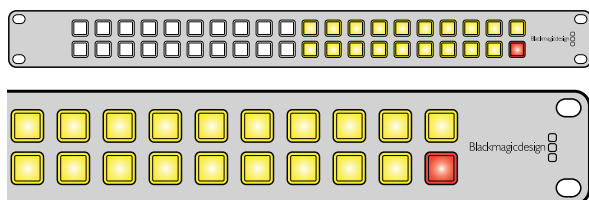
- Step 1.** Set the destination and source using whichever method you prefer. Once the route has been set, Videohub Master Control will return to its idle state.
- Step 2.** Press the DEST button. The destination field will be highlighted blue on the LCD.
- Step 3.** If the desired route is not already displayed on the LCD, use the pushbuttons and/or scroll wheel to find the destination to be locked.
- Step 4.** Press and hold the gold DEST button until a lock icon appears in the destination field of the LCD.
- Step 5.** Press DEST again to return Videohub Master Control to its idle state and the destination field will revert to gray.

To unlock a destination using Videohub Master Control:

- Step 1.** Press the DEST button. The destination field will be highlighted blue on the LCD.
- Step 2.** If the desired route is not already displayed on the LCD, use the pushbuttons and/or scroll wheel to find the destination to be unlocked. The destination field will show a lock icon for the locked destination.
- Step 3.** Press and hold the gold DEST button until the lock icon disappears from the destination field of the LCD.
- Step 4.** Press DEST again to return Videohub Master Control to its idle state and the destination field will revert to gray.



Videohub Smart Control configured as a Cut-Bus controller and with a Take button.



Videohub Smart Control configured as an XY controller and with a Take button.

## Using Videohub Smart Control as a Cut-Bus Controller

If Videohub Smart Control has been configured as a Cut-Bus controller, the destination device has already been chosen and you only need to choose a video source.

- Step 1.** Select a white video source button. The button will light up to distinguish it from the other sources. The video source will immediately connect and be viewable on the destination device.
- Step 2.** If the Take button has been enabled, the new source button and the Take button will flash. The route change will only take place when you confirm by pressing the Take button.

## Using Videohub Smart Control as an XY Controller

If Videohub Smart Control has been configured as an XY controller, destination buttons light up gold and source buttons light up white. When working with multiple destinations, always select a destination button before selecting a source button.

To change routes:

- Step 1.** Select a gold destination button and it will light up brightly to distinguish itself from the other destination buttons. If a video source has previously been connected to this destination, its button will light up white.
- Step 2.** To connect a new source to the destination, press the desired video source button. The video source will immediately be connected and viewable on the destination device. The new source button will be brightly lit and the previous source button will dim to normal. To change another route, select another destination button and then select a new source button.
- Step 3.** If the Take button has been enabled, the new source button and the Take button will flash. The route change will only take place when you confirm by pressing the Take button.

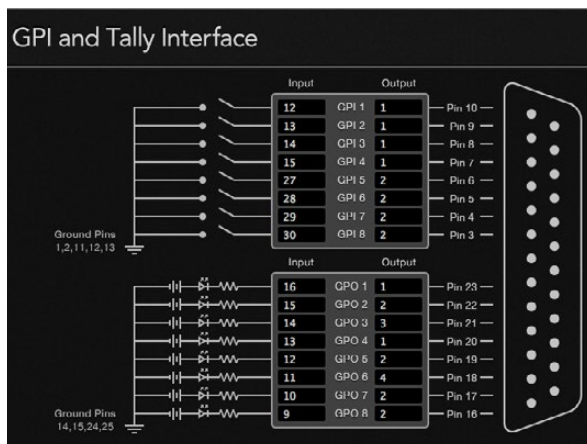
## Locking and Unlocking Routes

To lock a destination, press and hold the desired destination button until it turns blue. The corresponding source button will illuminate. If you attempt to change sources for a locked destination, the destination button will flash blue. To unlock a destination, press and hold the button until it returns to the standard gold color.

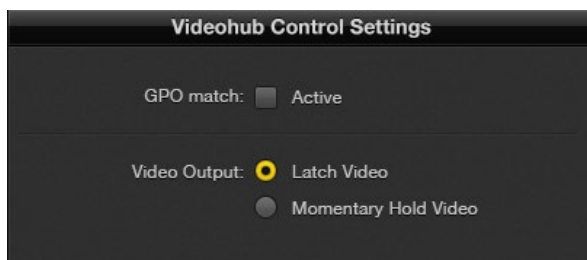
## Using Macros

If you press a green macro button, it will simultaneously make the crosspoint changes you have previously configured in the Videohub Control Utility software. Each button can be configured with up to 16 crosspoint routes. If you have the Take button enabled, the simultaneous change of routes will only take place when you confirm by pressing the Take button.

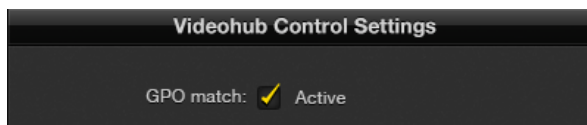
# 70 Controlling Videohub with Hardware



Click inside the diagram to change inputs and outputs for GPI crosspoint switching and Tally.



Select Latch Video if you want your preview to hold until another crosspoint is selected. Choose Momentary Hold Video if you want your preview to revert back to the previous crosspoint when you release the control switch.



Enable the GPO match checkbox to replicate the crosspoint configuration of your GPIs.

## Configuring GPIs

The GPI and Tally Interface has 8 GPIs that provide crosspoint switching. In the example on the left, if GPI 1 detects a contact closure it will switch Input 12 on your Videohub to Output 1. This means when you switch the joystick control on your CCU, video going to Input 12 of your Videohub will be previewed on your monitor.

The crosspoints can be configured in the Videohub Control Utility simply by clicking inside the Input and Output fields on the diagram and typing in the Input or Output number.

The Videohub Control Settings pane offers two ways to preview the output from your Videohub.

### Latch Video

If you want the output to stay as selected, choose Latch Video. This means you can press the switch once on your CCU and the input from the selected crosspoint will stay on your monitor until another crosspoint is selected.

### Momentary Hold Video

Select this option if you want the output to return to the previous input after you let go of the switch or joystick control on your CCU. For example, when you press and hold your switch, Input 13 might be previewed, but will return to displaying Input 12 on your monitor once you release the switch.

## Configuring Tally

Tally is usually a lamp on the front of a camera to indicate that it is on air, but its a useful visual indicator and can be used on any equipment to indicate activity and doesn't have to be used specifically with cameras.

The GPI and Tally Interface has 8 configurable GPOs, which send a tally signal to your cameras or other devices under certain crosspoint conditions. In the example on the left, GPO 1 is configured so that when Input 16 on the Videohub is routed to Output 1, GPO 1 will be activated.

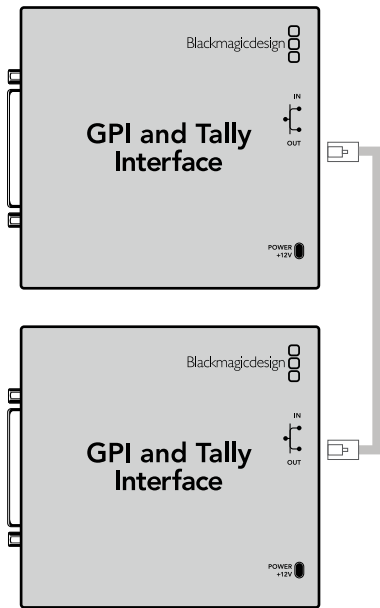
The crosspoints can be configured in the Videohub Control Utility simply by clicking inside the Input and Output fields on the diagram.

### GPO Match

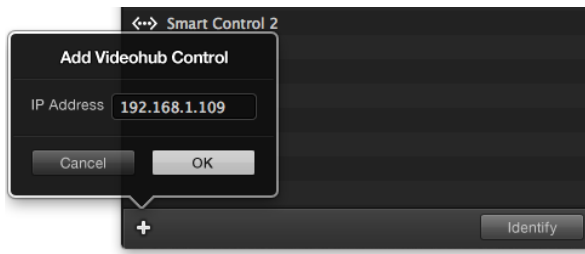
Enable the GPO match checkbox to replicate the configuration of your crosspoints from GPIs to GPOs. This can be useful if you want to see a tally light activate when changing routes for your GPIs.

When this checkbox is enabled, the GPO half of the diagram will be grayed out and cannot be edited until the GPO match checkbox is disabled.

# 71 Controlling Videohub with Hardware



Daisy chain multiple GPI and Tally Interfaces using ethernet. Power must be supplied to each individual unit in the chain.



Press the + (add device) button and enter the IP address of a GPI and Tally Device you want to add. Press the Identify button to activate the LED on a selected GPI and Tally Interface.

## Daisy Chaining Multiple GPI and Tally Interfaces

The GPI and Tally Interface supports 8 GPIs and 8 GPOs at a time, which should be enough for most live television situations. However, if you have more than 8 cameras then you may want to daisy chain a second or third GPI and Tally Interface.

The GPI and Tally Interface has two ethernet ports so that you can connect one port to a Videohub and use the other port to link other GPI and Tally Interfaces together.

- Step 1.** Connect power to the first GPI and Tally Interface.
- Step 2.** Connect a standard RJ45 ethernet cable from your Videohub or network to the ethernet IN port on the GPI and Tally Interface.
- Step 3.** Connect power to the second GPI and Tally Interface.
- Step 4.** Connect a standard RJ45 ethernet cable from the ethernet OUT of the first GPI and Tally Interface to the ethernet IN port on the second GPI and Tally Interface.

This can be repeated for as many GPI and Tally Interfaces as you need as long as power is supplied to all units in the chain.

Sometimes it can get confusing to know which GPI and Tally Interface you are working with when you have several connected. Select the GPI and Tally Interface in the Videohub Control Panels pane and click the Identify button. The LED next to the ethernet IN port on the selected device will light up.

## Adding a GPI and Tally Interface Over a Network

You may want to configure a second GPI and Tally Interface but it may be in another location and only accessible over a network. You can add it to your list manually by entering its IP address into the Videohub Control Utility.

If you do not know the IP address of the GPI and Tally Interface you want to add, connect it to a computer with USB, open the Videohub Control Utility and note down the IP address in the Network Settings tab.

If you do not have access to the unit because it is in another location, you can find it on the network using the Bonjour browser. This application will show you all the devices on your network and will give you the IP address of the GPI and Tally Interface you wish to add.

- Step 1.** Press the + (add device) button at the bottom of the Videohub Control Panels pane.
- Step 2.** Type in the IP address of the GPI and Tally Interface and press OK.
- Step 3.** The second GPI and Tally Interface will appear in the list with any other devices that are connected to the Videohub.

## Getting Help

The fastest way to obtain help is to go to the Blackmagic Design online support pages and check the latest support material available for your Blackmagic Design Videohub Software Control.

### Blackmagic Design online support pages

The latest manual, software and support notes can be found at the Blackmagic Support Center at [www.blackmagicdesign.com/support](http://www.blackmagicdesign.com/support).

### Contacting Blackmagic Design support

If you can't find the help you need in our support material, please use the "Send request" button, on the support page for your hardware model, to email a support request. Alternatively call your nearest Blackmagic Design support office at [www.blackmagicdesign.com/company](http://www.blackmagicdesign.com/company).

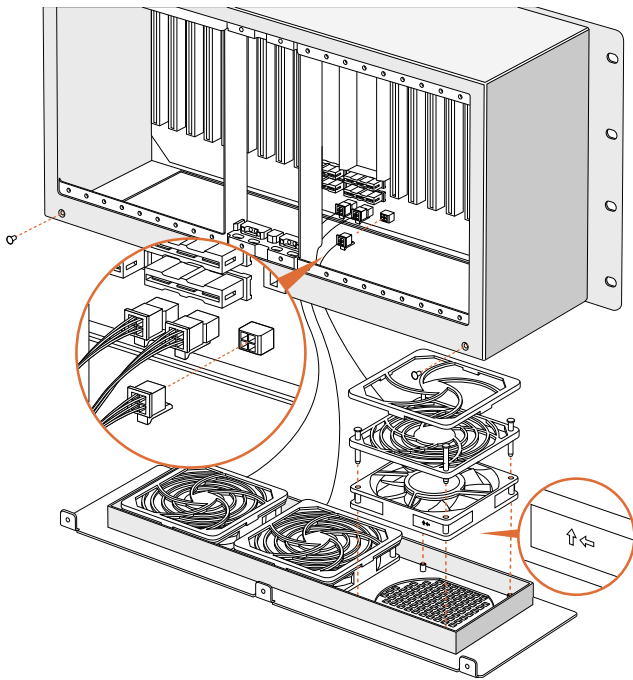
### Checking the version currently installed

To check which version of Videohub Software Control is installed on your computer, open the Blackmagic Videohub application. From the "Blackmagic Videohub" menu, select "About Videohub" and note the version number.

### How to get the latest updates

After checking the version of your Videohub Software Control on your computer, please visit the Blackmagic Support Center at [www.blackmagicdesign.com/support](http://www.blackmagicdesign.com/support) to check for the latest updates. While it is usually a good idea to run the latest updates, it is a wise practice to avoid updating any software if you are in the middle of an important project.

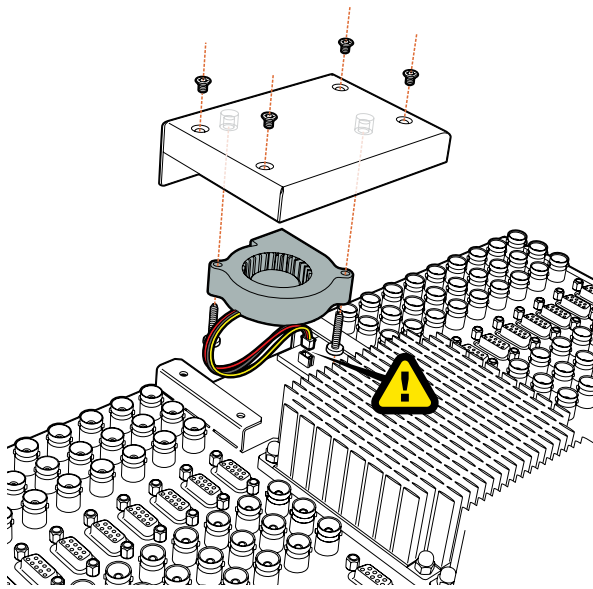




## Replacing a fan in Universal Videohub

Each fan is designed to be replaced without needing to switch off power to Videohub.

- Step 1.** Locate the fan tray at the base of the unit.
- Step 2.** Using a number 01 Phillips head screwdriver, remove the left and right screws from the fan tray.
- Step 3.** While supporting the tray, remove the center screw.
- Step 4.** Having removed all three screws, slowly allow the fan tray to swing open until you see the black plastic dust filter on top of each fan.
- Step 5.** Gently pull the tray towards you while continuing to swing it down until you feel the rear of the tray detach from the Universal Videohub chassis. Note which fan is faulty.
- Step 6.** You will see the colored power cables connected to each fan. Each fan power cable connects to the Videohub motherboard with a plastic connector. While supporting the fan tray, unplug the plastic power connectors of all three fans. The fan tray can now be fully removed.
- Step 7.** Place the fan tray on a flat surface and unclip the top of the dust-filter housing using the four clips.
- Step 8.** Remove the top of the housing and the filter. Four screws will be revealed. Remove the four screws around the faulty fan. Then remove the base of the dust filter housing and also the faulty fan.
- Step 9.** Replace the fan with a spare unit and then reinstate the base of the dust filter housing. Secure the housing and fan with the four screws and ensure the heads of the screws recess into the dust filter housing. If the screws fail to recess, flip over the housing and try again.
- Step 10.** Place the dust filter over the base of the housing and then snap on the top of the dust filter housing.
- Step 11.** Position the fan tray underneath the base of the Universal Videohub chassis and connect all three fan power cables to the motherboard. All three fans should immediately start running.
- Step 12.** Gently dock the rear of the fan tray with the Universal Videohub chassis. Swing up the front of the fan tray and simultaneously push the tray towards the Videohub motherboard until the rear of the fan tray slides into place and the front swings shut.
- Step 13.** Reinstall the three screws.



## Replacing the fan in Broadcast Videohub or Enterprise Videohub

The Broadcast Videohub and Enterprise Videohub packages include a spare fan in case the pre-installed fan stops working or becomes noisy. Videohub will continue to work even if the fan stops running. However, a working fan will help to extend the life of the Videohub for many years and we recommend the fan be replaced if it should ever stop running.

The fan is designed to be replaced without needing to switch off power to Videohub.

- Step 1.** Remove the four screws on the fan cover and lift up the cover gently.
- Step 2.** You will see the colored power cables connecting to a plug on Videohub. Gently remove the plastic plug.
- Step 3.** Remove the two screws that attach the faulty fan to the fan cover.
- Step 3.** Replace the faulty fan with the spare fan by following this process in reverse. The spare fan should immediately start running.

## Tips for Connecting SDI cables

The weight of copper-based SDI cables quickly adds up so it is advisable to use your rack to support the cables so that the full cable weight does not place undue stress on the BNC ports of your Videohub. This is particularly important with larger models of Videohub due to the weight of many SDI cables. Tying cable harnesses to the rack frame can provide support for large volumes of cabling.

It is also good practice to attach cables to the lowest BNC and optical fiber connectors first and then work upwards. This will avoid having to push lots of cables out of the way as you attach more cables in the future.

All Videohub models feature regular sized BNC ports, which make it easy to connect to other SDI equipment using regular SDI cables.

If you're connecting Videohub to SDI equipment that has miniature SDI connectors, such as DIN 1.0/2.3, we recommend using SDI cables that are terminated with a miniature connector at one end and a regular BNC at the other. Alternatively, an adapter cable can be connected to a regular SDI cable but this could prevent you from running long cables due to some loss of signal quality.

It's easy to connect and disconnect SDI cables to and from your Videohub. However as you attach more SDI cables, you might find it tricky to fit your fingers between the BNC connectors. You can use an inexpensive BNC removal tool, from third party vendors, to help make this task easy even when your Videohub has many cables connected.

## Blackmagic Videohub Ethernet Protocol v2.3

### Summary

The Blackmagic Videohub Ethernet Protocol is a text based protocol that is accessed by connecting to TCP port 9990 on a Videohub Server. Integrated Videohub Servers and Videohub Server computers are supported by the protocol.

The Videohub Server sends information in blocks which each have an identifying header in all-caps, followed by a full-colon. A block spans multiple lines and is terminated by a blank line. Each line in the protocol is terminated by a newline character.

Upon connection, the Videohub Server sends a complete dump of the state of the device. After the initial status dump, status updates are sent every time the Videohub status changes.

To be resilient to future protocol changes, clients should ignore blocks they do not recognize, up to the trailing blank line. Within existing blocks, clients should ignore lines they do not recognize.

### Protocol Preamble

The first block sent by the Videohub Server is always the protocol preamble:

```
PROTOCOL PREAMBLE:↵  
Version: 2.3 ↵  
↵
```

The version field indicates the protocol version. When the protocol is changed in a compatible way, the minor version number will be updated. If incompatible changes are made, the major version number will be updated.

### Device Information

The next block contains general information about the connected Videohub device. If a device is connected, the Videohub Server will report the attributes of the Videohub:

```
VIDEOHUB DEVICE:↵  
Device present: true↵  
Model name: Blackmagic Smart Videohub↵  
Video inputs: 16↵  
Video processing units: 0↵  
Video outputs: 16↵  
Video monitoring outputs: 0↵  
Serial ports: 0↵  
↵
```

This example is for the Smart Videohub which is a 16x16 router.

### Legend

↵ carriage return  
... and so on

Version 2.3 of the Blackmagic Videohub Ethernet Protocol was released with Videohub 4.9.1 software.

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If the Videohub Server has no device connected, the block will simply be:

```
VIDEOHUB DEVICE:↵  
Device present: false↵  
↵
```

If a device is present, but has an incompatible firmware, the status reported will be:

```
VIDEOHUB DEVICE:↵  
Device present: needs_update↵  
↵
```

In the last two situations, no further information will be sent, unless the situation is rectified.

If the Videohub Server detects a new Videohub attached, it will resend all blocks except the protocol preamble to indicate the device has changed, and allow the client to update its cache of server state.

### Initial Status Dump

The next four blocks enumerate the labels assigned to the input, output, monitoring and serial ports.

Videohubs that do not have monitoring or serial ports do not send the corresponding blocks.

```
INPUT LABELS:↵  
0 VTR 1↵  
1 VTR 2↵  
...  
↵  
OUTPUT LABELS:↵  
0 Output feed 1↵  
1 Output feed 2↵  
...  
↵  
MONITORING OUTPUT LABELS:↵  
0 Monitor feed 1↵  
1 Monitor feed 2↵  
...  
↵  
SERIAL PORT LABELS:↵  
0 Deck 1↵  
1 Deck 2↵  
↵
```

Note: Ports are always numbered starting at zero in the protocol which matches port one on the chassis.

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The next three blocks describe the routing of the output, monitoring and serial ports.

```
VIDEO OUTPUT ROUTING:↵
0 5↵
1 3↵
...
↵
VIDEO MONITORING OUTPUT ROUTING:↵
0 7↵
1 8↵
...
↵
SERIAL PORT ROUTING:↵
0 12↵
1 11↵
...
↵
```

Videohubs with processing units (only the Workgroup Videohub) send an extra routing block:

```
PROCESSING UNIT ROUTING:↵
0 5↵
1 3↵
...
↵
```

Videohubs with frame buffers (only the Workgroup Videohub) send two extra blocks:

```
FRAME LABELS:↵
0 Frame one↵
1 Frame two↵
...
↵
FRAME BUFFER ROUTING:↵
0 7↵
1 8↵
...
↵
```

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The next three blocks describe the locking status of the output, monitoring and serial ports. Each port has a lock status of "O" for ports that are owned by the current client (i.e., locked from the same IP address), "L" for ports that are locked from a different client, or "U" for unlocked. Note that Videohubs that do not have monitoring ports or serial ports do not send the corresponding blocks.

```
VIDEO OUTPUT LOCKS: ↵
0 U↵
1 U↵
...
↵
MONITORING OUTPUT LOCKS: ↵
0 U↵
1 U↵
...
↵
SERIAL PORT LOCKS: ↵
0 U↵
1 U↵
...
↵
```

Videohubs with processing units (only the Workgroup Videohub) send an extra lock block:

```
PROCESSING UNIT LOCKS: ↵
0 U↵
1 U↵
...
↵
```

Videohubs with frame buffers (only the Workgroup Videohub) send an extra lock block:

```
FRAME BUFFER LOCKS: ↵
0 U↵
1 U↵
...
↵
```

Videohubs with serial ports next send a block which describes the direction of each serial port. Each port has a direction of either "control" for the "In (Workstation)" setting, "slave" for "Out (Deck)", or "auto" for "Automatic".

```
SERIAL PORT DIRECTIONS:↵
0 control↵
1 slave↵
2 auto↵
...
↵
```

Videohubs with pluggable cards (only Universal Videohubs) send three more blocks that describe the hardware status of the ports. Missing video or serial ports have a status of "None"; input and output video ports will be "BNC" or "Optical" if they are present; serial ports will be "RS422" if they are present.

```
VIDEO INPUT STATUS:↵
0 BNC↵
1 BNC↵
...
↵
VIDEO OUTPUT STATUS:↵
0 BNC↵
1 BNC↵
...
↵
SERIAL PORT STATUS:↵
0 RS422↵
1 RS422↵
...
↵
```

**Status Updates**

When any route, label, or lock is changed on the Videohub Server by any client, the Videohub Server resends the applicable status block, containing only the items that have changed. For example, if serial port 6 has been unlocked, the following block will be sent:

```
SERIAL PORT LOCKS:↵
5 U↵
↵
```

If multiple items are changed, multiple items may be present in the update:

```
OUTPUT LABELS:↵
7 New output 8 label↵
10 New output 11 label↵
↵
```

If a card is plugged into or removed from the Universal Videohub, it will send hardware status blocks for the video inputs, video outputs, and serial ports on that card.

**Requesting Changes**

To update a label, lock or route, the client should send a block of the same form the Videohub Server sends when its status changes. For example, to change the route of output port 8 to input port 3, the client should send the following block:

```
VIDEO OUTPUT ROUTING:↵
7 2↵
↵
```

The block must be terminated by a blank line. On receipt of a blank line, the Videohub Server will either acknowledge the request by responding:

```
ACK↵
↵
```

or indicate that the request was not understood by responding:

```
NAK↵
↵
```

After a positive response, the client should expect to see a status update from the Videohub Server showing the status change. This is likely to be the same as the command that was sent, but if the request could not be performed, or other changes were made simultaneously by other clients, there may be more updates in the block, or more blocks. Simultaneous updates could cancel each other out, leading to a response that is different to that expected.



In the absence of simultaneous updates, the dialog expected for a simple label change is as follows:

```
OUTPUT LABELS:↵
6 new output label seven↵
↵
ACK↵
↵
OUTPUT LABELS:↵
6 new output label seven↵
↵
```

The asynchronous nature of the responses means that a client should never rely on the desired update actually occurring and must simply watch for status updates from the Videohub Server and use only these to update its local representation of the server state.

To lock a port, send an update to the port with the character "O" indicating that you wish to lock the port for example:

```
SERIAL PORT LOCKS:↵
7 O↵
↵
ACK↵
↵
SERIAL PORT LOCKS:↵
7 O↵
↵
```

To forcibly unlock a port that has been locked by another client, send an update to the port with the character "F" instead of using the usual unlock character "U". For example, to override a lock on port 7:

```
SERIAL PORT LOCKS:↵
7 F↵
↵
ACK↵
↵
SERIAL PORT LOCKS:↵
7 U↵
↵
```

Hardware status blocks can only be sent by the Videohub Server. If a client sends hardware status blocks, they will be ignored.

### Requesting a Status Dump

The client may request that the Videohub Server resend the complete state of any status block by sending the header of the block, followed by a blank line. In the following example, the client requests the Videohub Server resend the output labels:

```
OUTPUT LABELS: ↵  
↵  
ACK↵  
↵  
OUTPUT LABELS: ↵  
0 output label 1↵  
1 output label 2↵  
2 output label 3↵  
...  
↵
```

### Checking the Connection

While the connection to the Videohub Server is established, a client may send a special no-operation command to check that the Videohub Server is still responding:

```
PING: ↵  
↵
```

If the Videohub Server is responding, it will respond with an ACK message as for any other recognized command.

## Using Telnet to Save and Load Labels

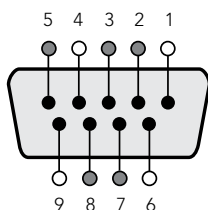
To enable Telnet command line utilities on Windows 7 and 8, click Start > Control Panel > Programs and Features and check the Telnet Client check box. When you click OK the system will install the appropriate files. Telnet is automatically installed with the Mac operating system.

### Saving Labels

- Step 1.** On Windows open a command prompt by typing "cmd" in the Search field of the Start menu. On Mac open the Terminal application which is within the Applications > Utilities folder.
- Step 2.** Type in "telnet" and a space followed by the IP of your Videohub, then another space and "9990", which is the default port number. For example: telnet 192.168.25.253 9990. A Protocol Preamble screen will appear.
- Step 3.** Copy the INPUT LABELS: and OUTPUT LABELS: text including the headings.
- Step 4.** Open a word processor or simple text editor and paste the clipboard information.
- Step 5.** Save this file to your favorite location.
- Step 6.** Close the telnet session by exiting the terminal or command prompt window.

### Loading Labels

- Step 1.** Install your new Videohub and set the IP address.
- Step 2.** On Windows open a command prompt by typing "cmd" in the Search field of the Start menu. On Mac open the Terminal application which is within the Applications > Utilities folder.
- Step 3.** Type in "telnet" and a space followed by the IP of your Videohub, then another space and "9990", which is the default port number. For example: telnet 192.168.25.253 9990. A Protocol Preamble screen will appear.
- Step 4.** Open the labels text file and Copy the INPUT LABELS: text.
- Step 5.** Paste this into the telnet session and press enter twice. Telnet will respond with "ACK" and then display the new input labels you just entered. The Videohub will also update the input labels..
- Step 6.** From the labels text file, copy the OUTPUT LABELS: text.
- Step 7.** Paste this into the telnet session and press enter twice. Telnet will respond with "ACK" and then display the new output labels you just entered. The Videohub will also update the output labels.
- Step 8.** Close the telnet session by exiting the terminal or command prompt window.



Videohub RS-422 Router Control

Pin	Function
1	Ground
2	Tx- (Data sent by router)
3	Rx+ (Data received by router)
4	Ground
5	NC (No connect)
6	Ground
7	Tx+ (Data sent by router)
8	Rx- (Data received by router)
9	Ground

Videohub RS-422 Router Control pin connections.

## Videohub RS-422 Protocol

### General

The RS-422 protocol can be used to control many Videohub models as RS-422 slave devices, for router crosspoint switching. This feature is available on any Videohub model with an "RS-422 Control" port.

In "server" mode, these Videohub models implement the router (server) side of the Leitch Serial Pass-Through Protocol as specified in section 4 of Leitch document SPR-MAN revision D. In "client" mode, the Videohub implements the controller (client) side of the Leitch terminal protocol.

This document describes the commands and parameters in the protocol that are relevant and supported by Videohub. Other commands and parameters specified in the Leitch protocol are accepted but ignored.

The RS-422 serial port is configured as 9600 N81.

The protocol is line-oriented, with a maximum length of 250 characters per command. Each command from the client should be terminated with a carriage-return (\r). Each response from the server will be terminated with a carriage-return and line-feed (\r\n).

Sources, destinations and levels are always specified in base-16, numbered from zero. Levels are always between 0 and 15 ("F"). Videohubs only have one valid level - level zero.

On connecting to the serial port, the client should send a carriage-return. The Videohub Server will respond with a > character prompt, which is not followed by a carriage-return or line-feed. Receiving the prompt indicates that a connection has been established. The same prompt will be issued after each command received by the Videohub Server.

In the following documentation, commands in orange and values in blue must be typed literally, including any spaces. In the following example of an immediate command using destination port 7 and source port 3, @ X:0/destination,source would be entered as: @ X:0/6,2

## Notifications

Once connected, if status reporting is enabled, the client will receive a notification message when a route changes on the Videohub Server. The notifications take one of two forms:

**S:0***destination,source* Routing change

This message indicates that the specified source port is now routed to the specified destination.

**V:0***destination,source* Preset routing notification

This message indicates that the current preset includes a route from the specified source to the specified destination.

## Global Commands

All pass-through commands are preceded by an @ symbol and a space.

The following client commands are supported:

@ !      disable status reporting  
          Status reporting is disabled by default.

@ ?      enable status reporting  
          Status reporting is enabled.

@ Z:     reset routing table

Routing is reset so that the first source is routed to all destinations.

## Immediate Commands

@ X:0/*destination,source* change route

@ X:0/*destination,source/destination-2,source-2...* change multiple routes  
          The specified source ports are routed to the specified destinations.  
          Any routing changes will trigger **S:** notifications

@ X?0*destination* request individual route status  
          The source routed to a the specified destination will be returned as an **S:** notification.

@ S?0 request all ports route status  
          Each source & destination port pair will be returned as **S:** notifications

### Salvo Commands

@ P:0/destination,source queue route change

@ P:0/destination,source/destination-2,source-2... queue multiple route changes  
The specified routing changes are added to the current salvo for later execution.

@ P?0destination request individual port status in salvo  
If a routing change for the specified destination port is queued, the route will be returned as a V: notification.

@ V?0 request all ports status in salvo  
Each queued routing change in the salvo is reported as a V: notification.

@ B:C clear salvo

@ B:R clear salvo  
Any queued changes are discarded and the salvo is reset.

@ B:E execute salvo  
Any queued changes are executed and each routing change will be returned as an S: notification.

## Limited Warranty

Blackmagic Design warrants that Videohub routers will be free from defects in materials and workmanship for a period of 36 months from the date of purchase excluding connectors, cables, cooling fans, fiber optic modules, fuses, keyboards and batteries which will be free from defects in materials and workmanship for a period of 12 months from the date of purchase. Blackmagic Design warrants that Videohub Master Control and Videohub Smart Control will be free from defects in materials and workmanship for a period of 12 months from the date of purchase. If a product proves to be defective during this warranty period, Blackmagic Design, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, you the Customer, must notify Blackmagic Design of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. The Customer shall be responsible for packaging and shipping the defective product to a designated service center nominated by Blackmagic Design, with shipping charges pre paid. Customer shall be responsible for paying all shipping charges, insurance, duties, taxes, and any other charges for products returned to us for any reason.

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