



Installation and Operation Manual

ATEM Television Studio Switchers

June 2020

English, 日本語, Français, Deutsch, Español, 中文,
한국어, Русский, Italiano, Português and Türkçe.



Welcome

Thank you for purchasing an ATEM switcher for your live production work!

If you're new to live production switchers, then you're about to become involved in the most exciting part of the television industry and that's live production! There is nothing like live production and it's so easy to become addicted to the adrenaline rush of editing in real time while the live event unfolds before your eyes. It's real television the way it should be!

Previously, broadcast quality live production has always been way too high in cost for most people to afford, while affordable switchers lacked broadcast features and quality. The new ATEM switchers change this, and you can use them for the most amazing professional live production results. We hope you get years of use from them and have lots of fun with your live production!

This instruction manual should contain all the information you'll need for installing your ATEM Production Switcher. The ATEM switcher includes a software control panel which you can run on your computer or you can purchase a hardware based broadcast control panel separately. The computer and control panels connect to your ATEM switcher via a network cable and you can directly connect them together without any extra equipment!

Please check the support page on our web site at www.blackmagicdesign.com for the latest version of software for your ATEM switcher. Simply connect your computer to the ATEM switcher and the ATEM hardware control panel via USB to update software so you get all the latest features! When downloading software, please register with your information 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!

A handwritten signature in black ink that reads "Grant Petty". The signature is fluid and cursive, with a large, stylized "P" and "e".

Grant Petty

CEO Blackmagic Design

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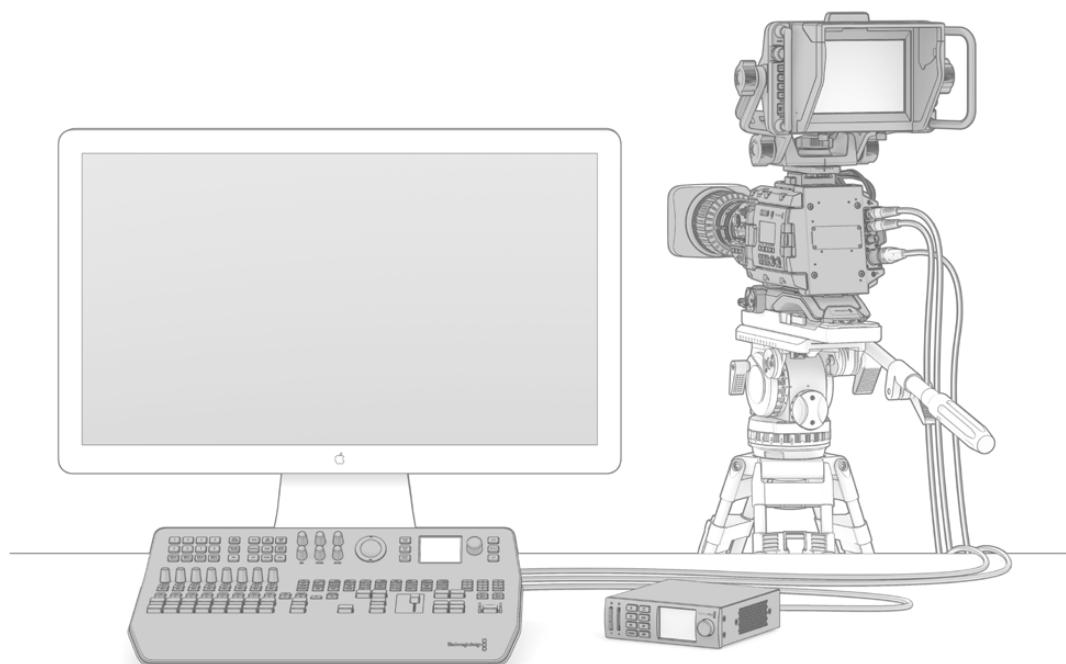
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Getting Started

Introducing ATEM

ATEM switchers are professional broadcast grade digital production switchers capable of switching and processing a variety of video sources in live video production and broadcast environments. The switcher uses the current and familiar M/E (Mix Effects) based design with software and hardware control options that provides an intuitive, fast and easy to use workflow for program/preview switching! If you're used to the older A/B direct switcher style, ATEM switchers also support A/B direct switching which makes it easy to get started!

You only need your ATEM switcher to get started as it has a built in control panel so you can switch your live production using just the switcher. However, if you want to add more control flexibility, you can also use ATEM Software Control, or even add one or more hardware control panels if you need a more advanced solution.



Setting up your ATEM switcher can be as simple as plugging the multi view output into a monitor, plugging in a camera and then connecting the program output to a recording deck

What is an M/E Switcher?

If you have used low cost switchers before, then these might not have used the mix effects style of operation that's commonly called an M/E style of operation. If you have used an M/E style switcher, then you might want to skip ahead to install and get working with your new ATEM switcher!

When you're starting out with a switcher for the first time, the ATEM can look a little intimidating with all its buttons and knobs, however it's all very logically laid out so it's very simple to use!

ATEM is a true high-end broadcast switcher that operates using the M/E workflow standards used in the broadcast industry. This means once you get familiar with how it works, you will feel instantly at home on virtually any switcher used in broadcast today.

The M/E style of operation has been developed over decades to help eliminate errors when switching live events and is a broadcast standard. It's extremely easy to see what's going on at any time so you don't get confused and make mistakes. The M/E style of operation lets you check the sources you are about to switch on air, as well as try effects before using them on air. You can see buttons for each keyer and transition, so you instantly know what's going on and what's about to happen.

The best way to learn about how your ATEM works is to grab your switcher and play with it while referencing this manual! You might want to jump ahead and install your switcher before reading the rest of this section!

To start, the most visible part of an M/E based control panel is the transition fader, which typically appears as a T bar or slider on a control panel, and the program and preview rows of source buttons!

TIP On ATEM Television Studio HD, the program and preview rows are combined into one row of buttons. Refer to the 'Using the ATEM Television Studio HD Front Panel' section for information on how to use ATEM Television Studio HD's control panel for M/E style switching.

The program bus source select buttons are used to hot switch sources to the program output. The source currently on air is indicated by a button that is illuminated red. Be careful when selecting sources on this row, as they will instantly be switched on air!

A safer and more orderly way to do transitions is to select them on the preview row, and then use a transition to cut or transition them on air.

The bottom row of buttons is the preview bus source selection. This is where you will spend most of your time selecting sources about to go on air. This selected source is sent to the program output when the next transition occurs. The next transition can be triggered by pushing the cut button, the auto button, or by moving the transition fader up or down. You can select between a mix, dip, wipe, DVE or other transition depending on what you have selected in the transition control section.

This is a very powerful way to use a switcher, because you can select your source on the preview row, and see it on the preview video output to confirm that you have the correct source before you select the transition you want. You can see what's happening at all stages so it's hard to make mistakes. Only the M/E style of operation allows you to keep track of what's going on.

You might also notice that once your transition is complete, the sources selected on the preview and program rows swap over. This is because the source you selected on the preview row is now the new on air source, so it becomes selected on the program row once the transition is complete. Remember the program row always shows what's on air.

You will also see both the program and preview buttons illuminate red when doing an auto transition, as for a short time, they are both on air while the transition occurs.

There are multiple types of transitions available, and they can be selected in the LCD menu, or by pressing the specific transition pattern buttons on ATEM Television Studio Pro HD's control panel. You can choose from a wide range of wipe patterns and DVE effects, plus use the LCD menu to adjust the transition rate and other transition settings.

The other concept that is important to know about M/E style switchers, including ATEM, is the video on the program and preview rows is technically called the background video. This is because the upstream (effects) keyers and downstream keyers will overlay on top of this source. So you can load graphics into the keyers and see them with the preview video and when keys are turned on, you will see the overlay on top of the program video. This is very powerful and allows multiple layers to be built up.

Another great advantage of the ATEM M/E style of operation is you can tie keyers to the transition. This means when you do a mix transition, you can also fade on or off keyers at the same time. This allows you to build up a composition, and then bring the whole lot on air at the same time. This is what the next transition buttons do, and you can select background for normal transitions, or select one or more keyers to transition them on air.

You can even press multiple buttons on ATEM Television Studio Pro HD's control panel to tie multiple keys and the background at the same time. There are also dedicated downstream key tie buttons to tie downstream keyers to the transition. Downstream keys also have dedicated cut and mix buttons and so are very flexible. Downstream keyers are always layered over the top of everything including the transition, so are a great place to key bugs and logos!

Finally, when your live production is finishing, it's nice to have a dedicated fade to black (FTB) control to fade everything to black! You can see the dedicated fade to black control on the right side of the keyboard. This lets you fade everything to black, and helps make sure you don't miss a layer. Fade to black is at the extreme end of the processing chain so you get a clean fade of all sources.

The last part of an M/E style switcher is the select bus. This is above the program row, and simply allows sources to be selected for effects processing and other purposes, and there is a label above this to show what you're switching. The select bus is commonly used to select key inputs, and can also be used to run macros directly from the control panel.

As you can see by this quick overview, M/E style of operation allows confident live production with good feedback on what's going on and the state of your switcher and programming at any point in your production. Once you learn the M/E style of operation, you can move between models of production switchers with little retraining as they all work the same!

What is an A/B Direct Switcher?

If you have been using video switchers for a long time, then you might be used to older-style A/B direct switchers.

A/B direct switchers have an A bus and a B bus. One bus is the program bus which shows a red button for the current program output. The other is the preview bus which has a green button for the preview video. As you move the fader bar up and down, the buses switch so that the red program button follows the fader handle. This is where A/B direct switching is really easy to use as the buttons stay lit in the same positions and just switch color between green and red.

A/B direct switching becomes a little more confusing when the fader control is not used to make the switch. If you use a cut or auto transition button to bring your preview source on air, or if you use more than one control panel connected to your switcher, the fader control won't have moved on the control panel that you are using. The red program output always follows the fader control and, as you haven't moved it, the red program light has to move to another button on the same row and the green preview light has to move to another button in its row.

This can become quite confusing when sometimes using the fader control to make switches, and sometimes not, as the rows containing your preview and program buttons will sometimes switch and sometimes stay where they are which has the potential to lead to mistakes.

This is why modern M/E style switching is preferable because you'll always find your green preview button in the preview row, and the red program button in the program row. It's always consistent and there are no surprises with M/E style switching.

Understanding the ATEM Switcher

The ATEM switcher provides all the video processing, as well as all video input and output connectors and power connectors.

ATEM Television Studio HD is a portable switcher with a compact built in control panel. This model lets you control your switcher from the front panel using the buttons, rotary knob and LCD menus. ATEM Television Studio HD Supports SD and HD video from HD-SDI and HDMI connections with 8 external inputs, 1 auxiliary output, 2 media players, 1 chroma keyer, and more.



ATEM Television Studio HD

The ATEM Television Studio Pro HD model switcher is the same as the ATEM Television Studio HD model with a console style control panel built in plus extra camera controls.



ATEM Television Studio Pro HD

The ATEM Television Studio Pro 4K model includes all the benefits of the HD models and now adds Ultra HD capability and more SDI inputs. It features 8 independent 12G-SDI inputs supporting all popular HD and Ultra HD formats up to 2160p60. Each input features re-sync as well as a full low latency standards converter so input is automatically adapted to the

switcher's format. That means you can even have 8 inputs, all running different video formats. The upgraded Fairlight audio mixer features dynamics, 6 band parametric EQ, dual mono channel split and stereo simulator with audio delay on the analog inputs. The ATEM Television Studio Pro 4K model also features the ATEM Advanced Chroma Key, Ultra HD support for the multi-view output and motion clips in the media pool.



ATEM Television Studio Pro 4K

Plugging in Multi View Monitoring

To get started with your ATEM switcher, the first step is to plug in power and a monitor and see it working! When power is connected, you will see the LCD and several buttons on the control panel illuminated.

A convenient way to check that your ATEM is powered on and working correctly is to plug an HDMI television or SDI monitor into the multi view output on the rear panel.

Looking at the multi view, you should see 8 video boxes at the bottom, and two larger boxes at the top, all bound by white borders. Each box will have a label.

If you see this video output, then your ATEM is powered on and running fine! All you need to do now is plug in some video sources so you can start using your switcher!

If you don't see the multi view output on your television, check the connections and cables are correct. You need to plug into the multi view connector on the rear of the ATEM. Next, check if your television is compatible with the video standard set in the ATEM. If your television is not compatible with the set standard, don't worry, because you can quickly change the switcher's video standard using the 'settings' LCD menu on the control panel. Simply press the 'menu' button to open the menu and use the settings knob and 'set' button to navigate through the menu items and change settings.



Use the switcher's multi view output to monitor all the video inputs you are switching, plus the preview and program output

Plugging in Cameras and Other Video Sources

Now you're ready to plug in cameras! All you need to do is connect a cable from the camera video output, either HDMI or SDI depending on which ATEM switcher you are using, and then connect it to an input on the ATEM switcher.

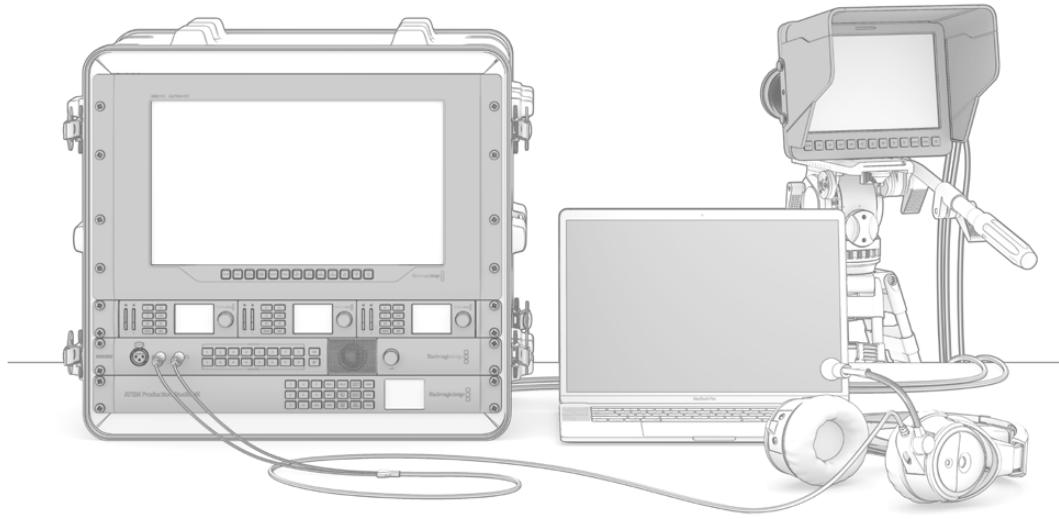
You can even plug in up to 4 Blackmagic HyperDeck Studio model disk recorders and control them using the ATEM software control panel. This is a very powerful feature that effectively gives you an entire videotape department at your fingertips. HyperDecks are connected to your switcher via SDI or HDMI video inputs and controlled via Ethernet. For detailed information about how to connect HyperDecks to your ATEM switcher and control them using ATEM Software Control or an ATEM hardware panel, refer to the 'HyperDeck control' section of this manual.

Each connector on the switcher has an input label so you can see what camera or source is what input when viewed on the multi view and the control panel. If all your cameras and sources are using the same video standard as set in your switcher, you will see each of them appear as you plug them in.

NOTE If you are using ATEM Television Studio Pro 4K, then you can plug in any HD or Ultra HD video format and the switcher will automatically convert that format to the HD or Ultra HD video standard set in the switcher settings. This makes it faster and easier for you to connect different video formats, however, it's still a good practice to match them to your project format if possible.

You don't need to worry about genlock for your cameras and sources, because each input of your ATEM switcher has a full frame resynchronizer. If your ATEM switcher detects that a video source is out of sync, it will automatically enable the frame sync so the input is clean for use. The frame sync function also allows consumer cameras to be connected to your ATEM,

and using consumer cameras is a great way to get started because the latest HDMI based consumer cameras are now very affordable and give quite acceptable HD and Ultra HD video. This lets you spend your money on more cameras, and then as you grow, you can start adding professional SDI based cameras.



You can control Blackmagic Studio Cameras and URSA Mini cameras from your ATEM switcher via the SDI return feed

If you're plugging a computer's HDMI output into an ATEM Television Studio HD, or ATEM Television Studio Pro HD, then be sure that the monitor settings on the computer are set to the correct resolution and frame rate. For example, if you are using 1080i video, then set your monitor to 1920 x 1080. Alternatively, if you are using HD 720p video, then set your monitor to 1280 x 720. NTSC should be set to 720 x 486, and PAL needs to be set to 720 x 576. The frame rates also need to match.

You can also plug in an HDMI output into ATEM Television Studio Pro 4K by using an HDMI to SDI converter, for example a Blackmagic Mini Converter or Micro Converter HDMI to SDI. When plugging an HD or Ultra HD resolution output from your computer to the 4K model switcher, the switcher will automatically convert the signal to the HD or Ultra HD format set in the switcher settings.

NOTE It's important to know that HDMI cable quality can vary, so we recommend buying good quality cables, and high end video resellers will stock a range of high quality cables. Good quality cables will help eliminate unwanted sparkle or glitches in HDMI video inputs.

If you don't see video on a HDMI video input, even though you have a device connected, then you might want to check if the HDMI device you have connected uses HDCP content protection. This content protection actually encrypts the video data in the HDMI video cable, so the manufacturer does not allow the content to be seen on anything other than a television. You won't be able to see images from these devices. Devices with HDCP content protection include DVD players, and set top boxes.

In general, cameras and computers don't have content protection, so you should not have any problems connecting these devices. Some gaming consoles don't include HDCP content protection, however generally these are only the developer versions of these gaming consoles. Using the analog component input of a Mini Converter Analog to SDI to connect devices is a good work around in these situations.

Always be sure you have copyright ownership before using or displaying content publicly.

NOTE On ATEM Television Studio Pro 4K, you don't need to worry about setting the monitor settings to match your switcher's video standard as the switcher will automatically convert the signal for you. However, as the 4K model has SDI inputs only, you will need an HDMI to SDI converter, such as a Blackmagic Mini Converter HDMI to SDI to plug your computer's HDMI video output into the switcher's SDI input.

Using PTZ Cameras

On ATEM Television Studio Pro model switchers you can connect a remote camera head and control it using pan, tilt and zoom controls with the control panel trackball, or via the joystick on a built in or external ATEM hardware control panel. Refer to the 'Using ATEM Television Studio Pro Switchers/Camera Control' section for more information.

Plugging in Audio

Your ATEM switcher includes a built in audio mixer which allows the use of embedded HDMI and SDI audio from your cameras as well as external audio from the dedicated audio inputs. These audio inputs can be used for other audio sources such as camera microphones and pre-recorded audio.

See Using Audio for more on connecting additional audio sources.

Plugging in your Computer

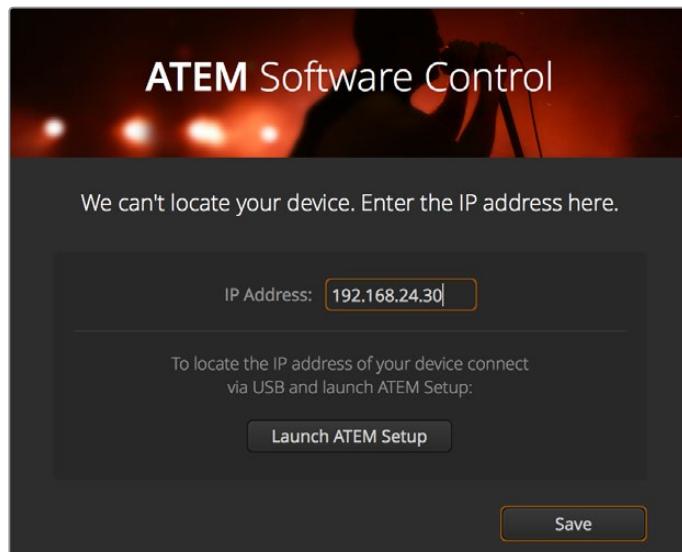
You can plug your computer directly into the ATEM switcher so you can control the switcher, load the media pool with graphics and clips, and change switcher settings.

Connecting your computer is easy and after installing the ATEM switcher software simply follow the directions below:

- 1 Connect an Ethernet cable from the switcher Ethernet port labeled 'Control' to the Ethernet port of your computer.

TIP If you have an additional ATEM hardware panel installed, and already have this connected to your ATEM, then plug your computer into the second Ethernet port on your hardware panel instead. Now the computer will talk via your panel to the switcher, and both the hardware panel and the software control panel can be operated in parallel.

- 2 Ensure your ATEM switcher is powered on.
- 3 Launch ATEM Software Control.



The setup dialog box will help you if you need to manually add your switcher's IP address when launching ATEM Software Control.

When running ATEM Software Control for the first time after installation, you will be prompted by a setup dialog box to set the language for the software plus choose between 'program/preview' or 'A/B direct' transition control. On ATEM Television Studio HD you can also select Cut Bus mode. You can learn more about these transition controls earlier in the 'Getting Started' section, under 'What is an M/E Switcher?' and 'What is an A/B Direct Switcher?'.

After you have made your selection, click 'continue'. ATEM Software Control will remember these settings the next time it is launched. The software will now automatically search for your ATEM switcher. If an earlier version of your switcher's internal software is detected, you will be prompted to update. Simply follow the prompts, or refer to the 'updating the software' section for more information.

After updating, or if the internal software is already up to date, the setup dialog box will disappear and the switcher page will be enabled so you can start using your ATEM switcher immediately!

If the setup dialog box remains visible, you will need to enter your switcher's IP address. The dialog box provides a button to open Blackmagic ATEM Setup where you can quickly locate your ATEM switcher's IP address. Copy the IP address from Blackmagic ATEM Setup, paste it into the dialog box's 'IP address' setting, then click 'save'.

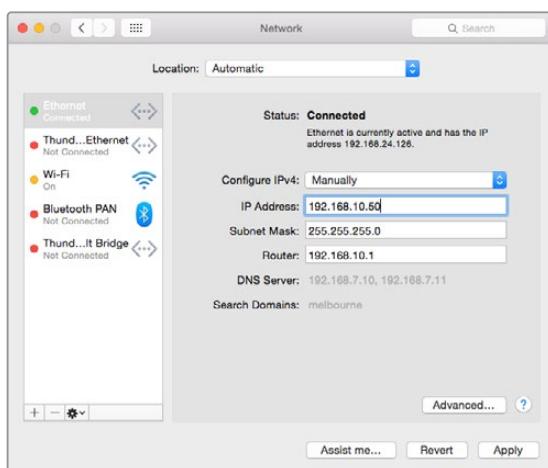
In the rare case your ATEM switcher is still not found, don't be concerned. The solution is likely a network setting on your computer. Changing network settings is fast and will only take a moment.

To change network settings:

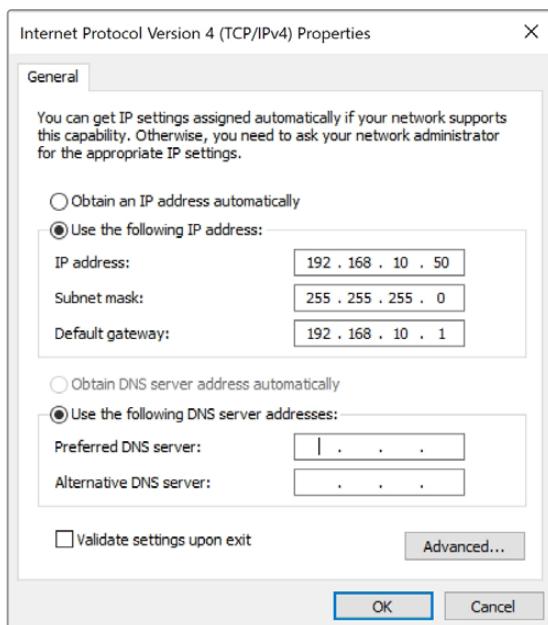
- 1 Open your computer's network settings using the control panel in Windows, or via 'preferences' on Mac OS. Select the Ethernet connection for your switcher and set it to 'manual'.
- 2 In your computer's network settings, set the 'IP Address' to 192.168.10.50 and confirm the new setting. If you don't see the switcher software enabled, try changing the last two digits of the new IP address to another number, such as 51, and click 'apply'.

After a brief pause, the setup dialog box should disappear and ATEM Software Control will enable the ‘switcher’ page with buttons illuminated. You’re now ready to start using your ATEM switcher and your setup settings will be remembered the next time you launch ATEM Software Control.

If you’re more technically minded and want to connect your ATEM switcher to your existing network, then you will need to change the network settings on your ATEM switcher and control panel. Information on how to do this is available in the next section. You will need to manually set the IP address for the switcher as well as all control panels to match your network IP address range. Your ATEM switcher defaults to a fixed IP address of 192.168.10.240 when shipped and, by using the Blackmagic ATEM Setup, you can customize the IP address for your custom network configuration.



Manually setting the IP address for your Mac OS computer.



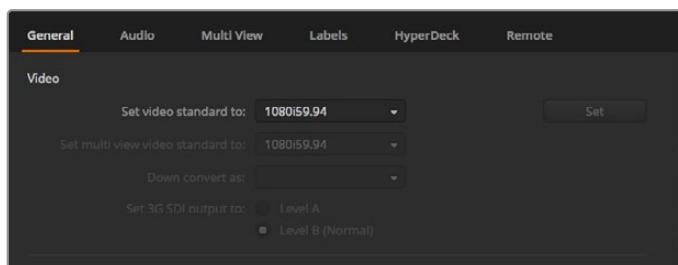
Manually setting the IP address for your Windows computer.

Switcher Settings

Now you have the software control working, you can change switcher settings, such as the video standard, changing the window layout of the multi view, renaming source labels and more. For information on how to change settings, refer to the ‘using ATEM software control/ changing switcher settings’ section in this manual.

Set the switcher video standard

You can set the video standard to suit the region in which you are broadcasting, such as 2160p29.97, 1080i59.94, 720p59.94 or 525i59.94 NTSC if you are broadcasting in NTSC based countries. If you are broadcasting in PAL based countries, you can set your video standard to formats such as 1080i50, 720p50 or 625i50 PAL.



Set the video standard to suit the broadcast requirements for your region

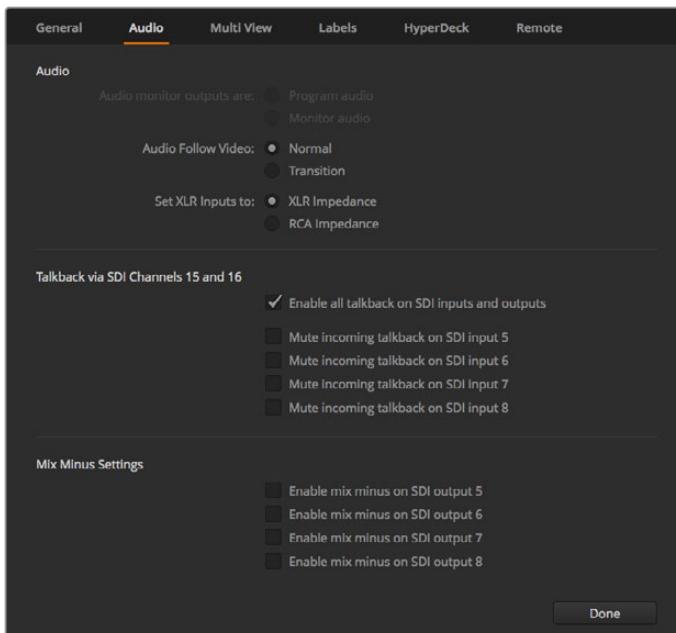
If you’re working with standard definition video equipment in the widescreen anamorphic 16:9 video format, select 525i59.94 NTSC 16:9 for anamorphic NTSC, or 625i50 PAL 16:9 for anamorphic PAL.

On ATEM Television Studio HD models, make sure all your cameras and any connected HDMI devices are also set to the same video standard, or they won’t be visible on the switcher video inputs. This is generally quite easy, as countries have standards for their HD broadcasts and all equipment sold in these countries matches this standard or at the very least can be switched between standards. When all video standards are matched, you should see connected devices show up in the multi view video input windows.

On ATEM Television Studio 4K, all HD and Ultra HD inputs are automatically converted to your switcher’s HD or Ultra HD video standard so you can plug in any video format and it will appear on the multi view straight away.

Set Audio Preferences

The ‘audio’ tab lets you choose the transition behavior for the audio follow video feature, enable mix minus settings, and mute incoming talkback on SDI inputs to prevent a potential feedback loop in the talkback channels.



Mix minus settings in the audio tab let you mute the corresponding input from its program return output on some ATEM switcher models

The mix minus settings on SDI outputs let you mute the corresponding input from its program return output. For more information, refer to the section titled, ‘Changing Switcher Settings/Setting the Audio Output Behavior’.

The audio follow video settings let you set the switcher to use a default short crossfade when switching sources with AFV enabled, or use a duration set by your transition rate setting. For more information refer to the ‘Using ATEM Software Control/changing switcher settings’ section.

Label the Video Inputs

When setting up your project, you may want to change the input labels. These labels appear on the multi view and any connected ATEM hardware panels. There are two labels to change, including a long label used in software, and the short label that’s limited to 4 digits and used in external ATEM hardware panels.

Input		Name	Label	Input	Name	Label
1	HDMI	Camera 1	Cam1	5	SDI	Camera 5
2	HDMI	Camera 2	Cam2	6	SDI	HyperDeck 1
3	HDMI	Camera 3	Cam3	7	SDI	HyperDeck 2
4	HDMI	Camera 4	Cam4	8	SDI	HyperDeck 3

Set Video Input and Labels

Connecting Video Outputs

Video Outputs

There are multiple video outputs on your ATEM switcher which can be used to connect to a wide range of video equipment. Descriptions of each output connection are listed in this section.

SDI Program Output

This SDI output switches between HD and SD. It outputs the main program video output of your ATEM switcher and can be connected to any SDI based video device. The audio on this output can use embedded HDMI and SDI audio from your cameras as well as external audio via the switcher's XLR inputs.

Multi View SDI and HDMI Output

The multi view outputs are HD.

Tally is included with red for sources on air, and green for preview. You can connect this output to televisions and computer monitors with SDI or HDMI connections.

Auxiliary SDI Output

Your ATEM switcher has an auxiliary SDI connection that outputs the same video format in use.

The auxiliary output can use any internal and external video sources. For example, a program feed if you need another program output, or a clean feed without down stream keying, or even a specific video input. The aux output is perfect for driving video screens on stage, or a feed where you can independently control what the viewers see. The aux output switches cleanly and can be used as a cut only switcher independent of the main program output. The audio on the auxiliary output is embedded SDI program audio.

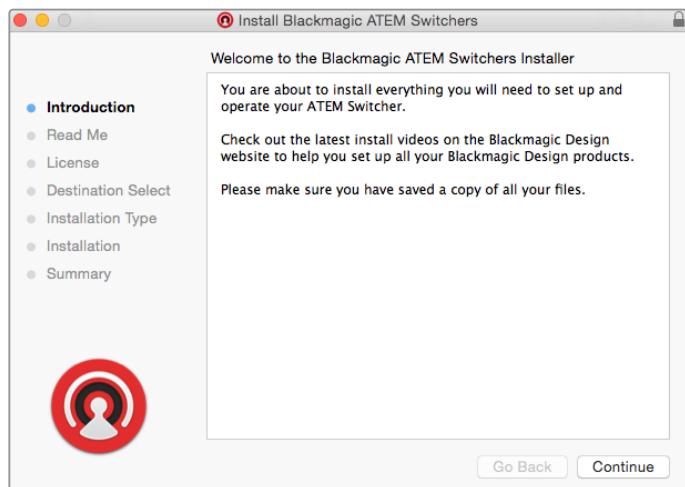
Installing Software

Installing Blackmagic ATEM Software on Mac OS

You don't need ATEM Software Control to run your ATEM Switcher, but it is helpful if you want to record new macros, or upload graphics to the media pool, including using the Adobe Photoshop plugin to upload new or constantly changing graphics. With ATEM Software Control installed, it also gives you more options to control your switcher. For example, the flexibility of having multiple operators mixing audio and handling the media pool, while you are switching live production using the switcher's control panel.

Before installing any software, you will need administrator privileges. It is also a good idea to uninstall any previous versions of ATEM software present on your computer.

- 1** Ensure you have the very latest driver. Visit www.blackmagicdesign.com/support
- 2** Open the "Blackmagic ATEM Switchers" folder from the disc or downloaded disk image and launch the "Blackmagic ATEM Switchers Installer Software".
- 3** Click Continue, Agree and Install buttons and the software will be installed on your system.
- 4** Now restart your computer to enable the new software drivers.

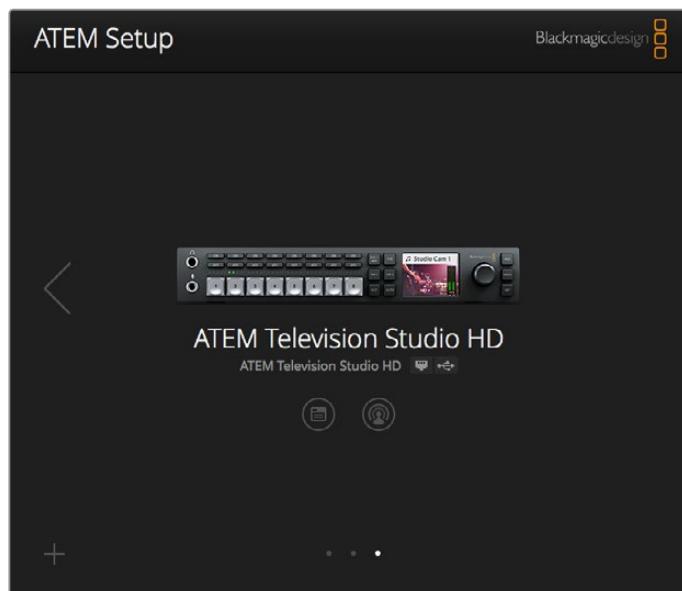


Follow install prompts

Plugins and Applications that are Installed

The ATEM switchers software installs the following components which are used by ATEM switchers:

- ATEM Software Control
- Blackmagic ATEM Setup



Blackmagic ATEM Setup is used to configure network settings including IP address, plus lets you update your ATEM switcher's internal software

On Mac OS, all the files needed to run your ATEM switcher will be installed into a folder called Blackmagic ATEM Switchers in the Applications folder.

In the Blackmagic ATEM Switchers folder, you will see ATEM Software Control and Blackmagic ATEM Setup. ATEM Software Control is the software control panel for your switcher, which also allows loading graphics into the switcher media pool, changing settings, mixing audio, recording macros and controlling Blackmagic cameras, including Blackmagic Studio Cameras, Micro Studio Cameras and URSA Broadcast.

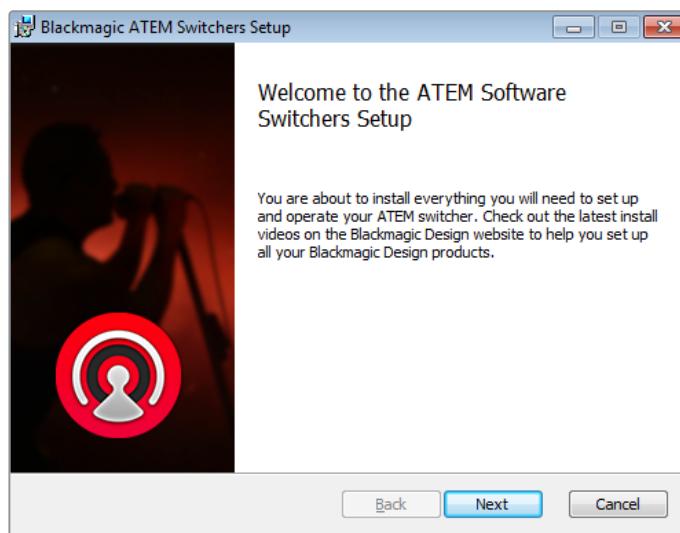
Blackmagic ATEM Setup is the setup utility that allows you to browse connected switchers, add additional switchers that are not automatically detected via their IP address, change your switcher IP address, and update the switcher and panel software.

Also included in this folder is the instruction manual and some example graphics. Use the example graphics to explore the internal media pool and keying functionality.

Installing Blackmagic ATEM Software on Windows

It is a good idea to uninstall any previous version of ATEM software present on your Windows PC before installing the latest software.

- 1 Ensure you have the very latest driver. Visit www.blackmagicdesign.com/support
- 2 Open the “Blackmagic ATEM Switchers” folder and launch the “Blackmagic ATEM Switchers Installer”.
- 3 The software will now be installed on your system. An alert will appear: “Do you want to allow the following program to install software on this computer?” Click Yes to continue.
- 4 You will see a dialog bubble saying “found new hardware” and the hardware wizard will appear. Select “install automatically” and the system will find the required Desktop Video drivers. You will then receive another dialog bubble saying “your new hardware is ready for use.”
- 5 Now restart your computer to enable the new software drivers.

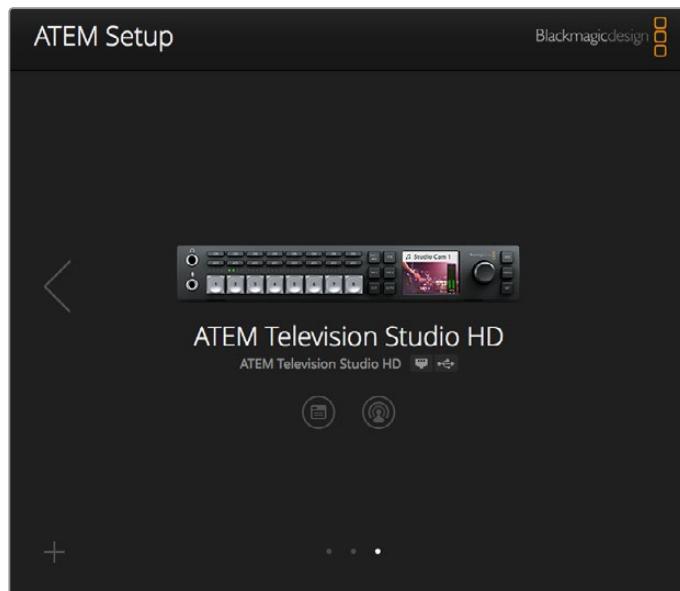


Follow install prompts

Plugins and Applications that are Installed

The ATEM Switchers software installs the following components which are used by ATEM Switchers:

- ATEM Software Control
- Blackmagic ATEM Setup



Blackmagic ATEM Setup

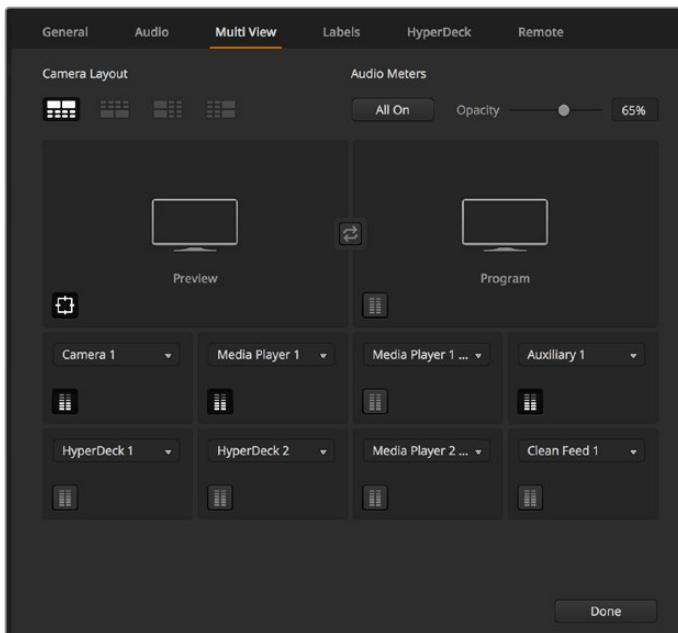
Once the computer has restarted, all the ATEM software applications will be installed and can be accessed from Start > Programs > Blackmagic Design.

Blackmagic ATEM Setup is the setup utility that allows you to browse connected switchers, add additional switchers that are not automatically detected via their IP address, change your switcher IP address, and update the switcher and panel software.

Also included in this folder is the instruction manual and some example graphics. Use the example graphics to explore the internal media pool and keying functionality.

Customize the Multi View

There are 8 input views in the multi view, and you can select from a range of external and internal sources to display on these views. Simply click the menus to select what you want on each view. If you don't have 8 cameras on your job, then you can even select media players, color generators, or the aux output on these views. It's extremely flexible, and you can also change the multi view layout to suit your preference.



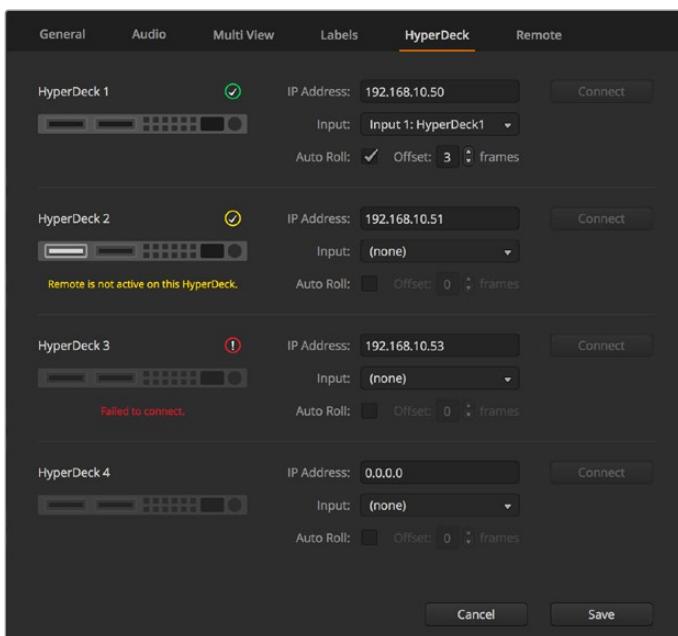
Customize the multi view

Audio meters can be turned on or off within each source view, or all at once, by clicking on the respective icons in each view or the 'all on' button, respectively.

You can also turn the safe area guides in the preview window on or off by clicking the respective icon.

Connect Hyperdecks

You can connect up to four HyperDeck disk recorders to your ATEM switcher. This lets you easily use HyperDecks as a high capacity media pool or record your switcher's output. Refer to the 'HyperDeck Control' section in this manual for more information.



Connect HyperDecks

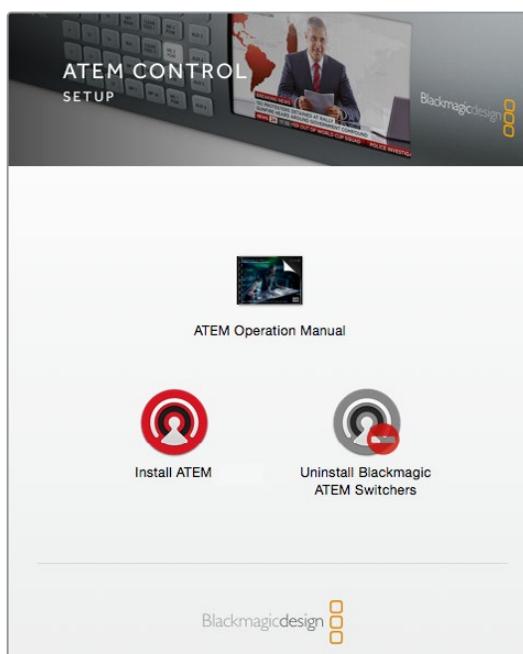
Updating the Software

How to update the ATEM Software

From time to time Blackmagic Design will release new software for your ATEM switcher, with new features, bug fixes, and increased compatibility with third party software and video devices.

To update your ATEM switcher with new software, you need to use Blackmagic ATEM Setup to connect to the ATEM switcher and panels. Blackmagic ATEM Setup will check your switcher's internal software and will ask if you wish to update if you have a newer version installed on your computer.

Always update all your equipment at the same time so it's all running the same version of software.



ATEM software installer

To perform an update, connect your ATEM switcher to the computer via USB.

Alternatively, if you already have your switcher connected to your computer via Ethernet, you can simply update via the Ethernet connection.

First, download the latest Blackmagic ATEM Switcher software and install it on your Mac or PC using the instructions listed previously in the 'getting started' section of this manual.

Once installed, the new software for your ATEM switcher and hardware panel will be included in the ATEM setup utility.

Updating the Switcher Software

- 1 Connect the switcher via the USB port or Ethernet.

When upgrading software via USB, make sure the switcher is the only ATEM device connected via USB to the computer running the setup utility software. If more than one ATEM device is connected, the switcher may not be recognized.

- 2 Launch Blackmagic ATEM Setup.
- 3 If the switcher software requires updating, you will be prompted by a window asking if you would like to update the software. Click 'update' to initiate the update process, which may take a few minutes. It's important you don't unplug the power from the switcher during the software update.
- 4 Once the software update is complete, a window will prompt you to power cycle the switcher. Turn your switcher off and on, then 'close' the dialog box.

Updating an ATEM Hardware Panel

- 1 Connect the ATEM hardware panel to your computer via USB. If you already have your panel connected to your computer via Ethernet, you can simply update via the Ethernet connection.

NOTE When upgrading software via USB, make sure the advanced panel is the only ATEM device connected via USB to the computer running the setup utility software. If more than one ATEM device is connected, the panel may not be recognized.

- 2 Launch Blackmagic ATEM Setup.
- 3 If the panel requires updating, you will be prompted by a window asking if you would like to update the software. Click 'update' to initiate the update process. It's important you don't unplug the power from the panel during the software update.
- 4 Once the software update is complete, a window will prompt you to power cycle your hardware panel. Turn your panel off and on, then click 'close' in the dialog box. If you are updating an ATEM Advanced Panel, the panel will power cycle automatically.

Updating via Ethernet

Updating your ATEM switcher or hardware panel via Ethernet is generally faster and easier, however there are some instances, such as those below, where it may not be possible and you will need to update via USB:

- Updating the internal software for the first time.
- Your ATEM network settings are already configured to work straight away, however if you are connecting to a network with other video equipment, there may be potential IP address conflicts which may prevent communication between your computer and your switcher. Network settings can only be set via USB.

Connecting to a Network

If you want to connect your ATEM switcher to a larger Ethernet network, then you will most likely need to change the network settings on your ATEM switcher. Most people simply plug their computer and control panel direct to the switcher, however in some situations it can be very powerful to connect via your network!

Your ATEM ships from the factory with settings to allow hardware control panels to simply be connected directly with an Ethernet cable. However your ATEM supports full Ethernet IP protocols so you can place your switcher and panel on your network or anywhere on the planet using the internet. Connecting to a network means you have enormous flexibility with how you control your switcher. For example, you can connect an ATEM Advanced Panel on the same network to ATEM Television Studio HD and have two operators switching content. In addition, you also have the software panel on your computer so you can even have a third operator handling audio, or controlling cameras from the software panel.

However, it's worth noting that if you use your ATEM on a network, then you're also increasing the complexity of the connection between your control panel and the switcher, so there is possibly a greater chance of something going wrong. ATEM can also be used when plugged into a switch, and even via most VPNs and over the internet.



To allow communication over Ethernet, the IP addresses of the switcher and any computer running ATEM Software Control needs to be configured correctly. The IP address used for each will depend on the IP address range of the network you're plugging into.

NOTE If you are using an additional ATEM hardware control panel, your ATEM switcher always needs a fixed IP address so the control panel has a stable location to connect to. This means you need to find a free fixed IP address in the range of your network that you can use.

ATEM hardware control panels can be set to DHCP or fixed IP addresses. Generally when used on a network, the control panel would be selected to DHCP, so it is automatically assigned an IP address when connected to the network.

For all devices to communicate, they must share the same IP address subnet, which typically means the first 3 fields in the IP address need to be the same. Each device must also use a unique IP address.

Please remember to set all devices to the correct IP address so they can all communicate. You will need to set the IP address of the switcher via the LCD menu settings.

NOTE If setting up an additional ATEM hardware panel, you will need to set the DHCP or fixed IP mode. If using a fixed IP address on the panel, set the IP address on the panel. You will also need to set the switcher address on the panel itself so the panel can identify your switcher on the network.

Lastly, you need to ensure your computer is connected and working on your network. Then when you launch the ATEM Software Control application, you will be prompted automatically to enter in an IP address for the switcher if ATEM Software Control cannot communicate with the ATEM switcher. Use the IP address you just entered for the switcher. Then the ATEM Software Control can find the switcher and communicate.

Changing the Switcher Network Settings

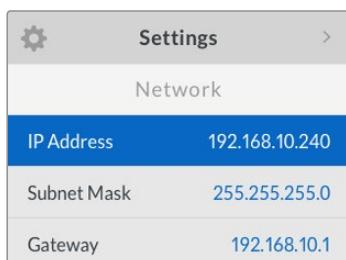
The switcher network settings are changed using the LCD menu settings, or you can use Blackmagic ATEM Setup via USB.

Please follow the steps below:

To change the network settings using the LCD menu:

- 1 Press the 'menu' button to open the LCD menu.
- 2 Rotate the settings knob and press 'set' to select the 'settings' menu.
- 3 Scroll through the menu items until you see the 'network' settings and press 'set' to select them.
- 4 Using the settings knob and 'set' button, select and adjust the number fields to change the network settings.
- 5 Select 'save' and press 'set' to confirm the changes.

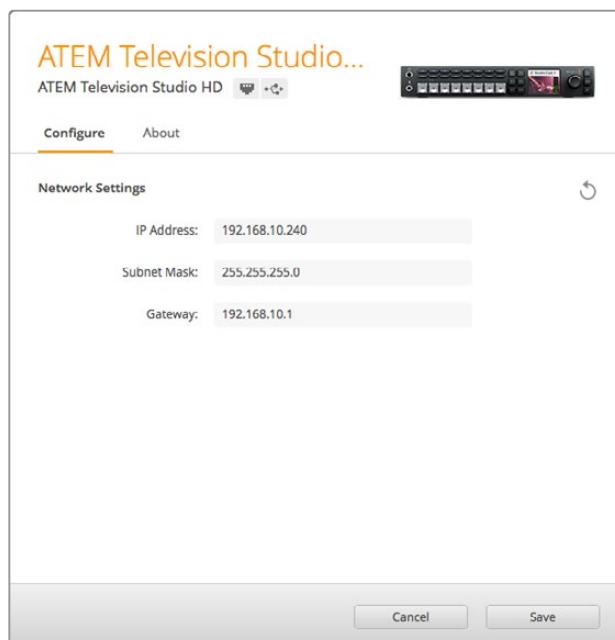
Your switcher will now ask to be power cycled. Press 'set' to confirm the change and then power cycle your switcher.



Network settings can be changed using the LCD menu

To change the network settings via Blackmagic ATEM Setup:

- 1 Connect the switcher via USB to the computer running the setup utility software.
- 2 Launch Blackmagic ATEM Setup and select your switcher or hardware panel.
- 3 The switcher's current IP address, subnet mask and gateway settings will be displayed in 'configure' window. If you only want to check the IP address and not change it, you can simply quit the setup utility by clicking 'cancel'.
- 4 To change the IP address or any other settings, simply edit the numbers and then click 'save'.
- 5 A dialog box will prompt you to power cycle your ATEM switcher. Turn the switcher's power off, turn it back on and then close the dialog box.



Change network settings using the 'configure' tab in Blackmagic ATEM Setup.

Understanding External Hardware Panel Network Settings

If you are using an external ATEM hardware panel, the hardware panel's network settings are configured from the network setup menu in the hardware panel's system control, or using the system control LCD menu on ATEM Advanced Panels. Along with its own IP address, the hardware panel also needs to be configured with the network location of the switcher, so that communication between the two devices can be established over the Ethernet connection. If the hardware panel's network settings are correctly configured, you will see the panel light up and buttons turn on so you can control the switcher.

If the hardware panel is displaying a message looking for the switcher, then you will need to set the hardware panel's network settings so that the panel and switcher share the same subnet, and the network location to which the hardware panel is trying to connect, matches the switcher's IP address. The following section shows you how to set the switcher IP location on your ATEM hardware control panel.

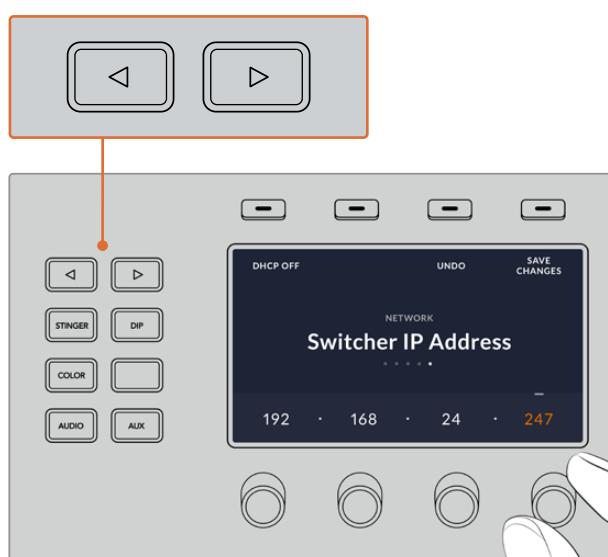
Setting the Switcher IP Location

To set the network location of the switcher on the hardware panel, so the panel can find the switcher and communicate, simply follow these steps:

Changing the IP location on an ATEM Advanced Panel

- 1 When there is no communication with the switcher, the LCD will say 'connecting' and notify you of the IP address it is searching for. If the panel can't find the switcher, the connection will time out and a notification will ask you to check the IP address. Press the 'network' soft button above the LCD to open the network settings.
- 2 In the network settings, press the right arrow in the system control buttons next to the LCD to move to the 'switcher IP address' setting.
- 3 Now use the corresponding LCD soft control knobs to set the correct IP address for your switcher.
- 4 Press the 'save changes' soft button to confirm the setting.

Your panel will now connect with your switcher.



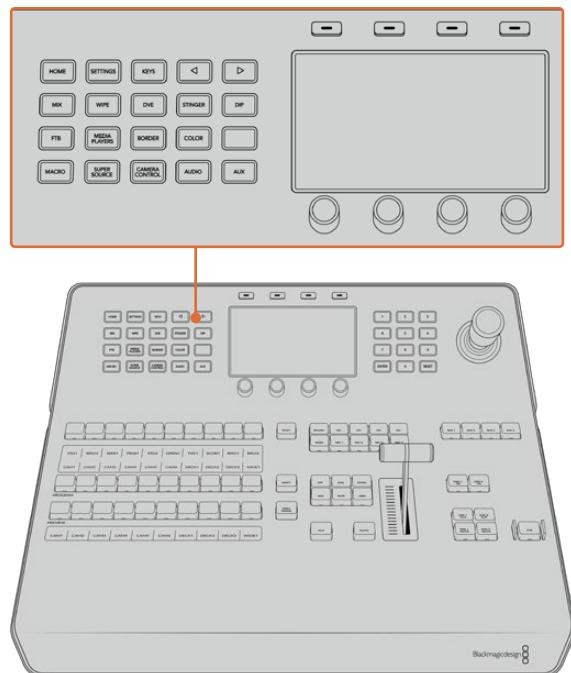
On ATEM Advanced Panels, press the 'network' LCD soft button to open the network settings on the LCD, then use the system control arrow buttons to navigate to the switcher IP address setting. Use the soft controls to set the network IP address for your switcher, and don't forget to save the changes.

NOTE Changing the switcher IP address on your panel does not change the IP address of the switcher itself. It just changes where the control panel is looking to find the switcher. If the control panel cannot find the switcher, then you might need to check the switcher to see if it's been set correctly. To change the IP address of the switcher, connect the switcher via USB to a computer and run Blackmagic ATEM Setup as described previously in this manual.

Changing the Hardware Panel Network Settings

Because the hardware panel is also on the network and communicating with the switcher, it also has network settings so it can connect to the network. These settings are different to the switcher IP address, which is just where the panel is looking to find the switcher. The panel network settings can be changed by following the steps below:

Changing Network Settings on an ATEM Advanced Panel



Change network settings using the system control buttons and LCD soft controls

- 1 Press the 'home' button in the system control buttons to open the LCD home menu.
- 2 In the home menu, press the 'network' soft button to open the network settings.
- 3 The next step is to decide if you want the panel to use a fixed IP address or to be automatically assigned an IP address from a DHCP server. Set DHCP on or off by pressing the corresponding DHCP ON/OFF soft button.

NOTE If you're connecting direct to a switcher without a network, then you won't have a DHCP server to assign an IP address automatically, so you will want to select 'DHCP off'. ATEM Advanced Panels are delivered with a fixed IP address set to 192.168.10.60 for a direct connection.

However, if your network has lots of computers that automatically assign IP addresses via DHCP, then you can also select 'DHCP on' so the panel can get its network information automatically. This is possible on the panel, and it's only the switcher itself that always requires a fixed IP, as the switcher needs to be found by the control panels at a known fixed address on your network.

If you select 'DHCP on', your network settings will be complete because the panel network settings will be obtained from the network automatically.

- 4** If you have elected to use a fixed IP address, you now need to set this IP address by adjusting the corresponding soft control knobs for each field of the IP address. You can also use the numeric keypad. Changing this IP address may cause the panel to lose communication.
- 5** If the subnet mask and gateway address need to be set, then press the right arrow button in the system control buttons to progress through each setting menu, and use the knobs or the numeric keypad to edit. If at any time you want to cancel the changes, press 'undo'.
- 6** When you are happy with your settings, press the 'save changes' soft button to confirm.



When you are happy with your network settings, press the 'save changes' button to confirm them

Using ATEM Software Control

ATEM Software Control is included with your ATEM switcher, and allows you to control your switcher in a similar way to a full hardware control panel. However instead of menu buttons, it uses a range of palettes on the right side that shows you all processing features of your ATEM switcher and allows settings to be easily made.



You can also use ATEM Software Control to configure your switcher settings as well as upload graphics and manage the media pool.

Preference Settings

The preferences settings are arranged as 'general' preferences and 'mapping' preferences. The general preferences contain network settings, transition control and language selection options.

General Preferences

ATEM Software Control can be set to display in English, German, Spanish, French, Italian, Japanese, Korean, Portuguese, Russian, Turkish and simplified Chinese languages.

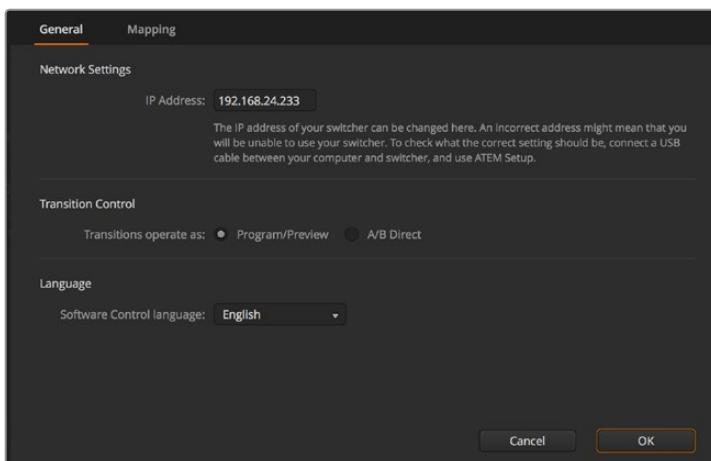
When running ATEM Software Control for the first time after installation, a setup dialog box will prompt you to set the language for the software, but you can change the language of the software at any time.

To change the language:

- 1 Go to the menu bar at the top of your screen, select 'ATEM Software Control' and open the 'preferences'.
- 2 Select your desired language from the drop down menu in the 'Software Control Language' in general settings.

A warning will appear asking you to confirm the action. Click 'change'.

ATEM Software control will now close and restart in your selected language.

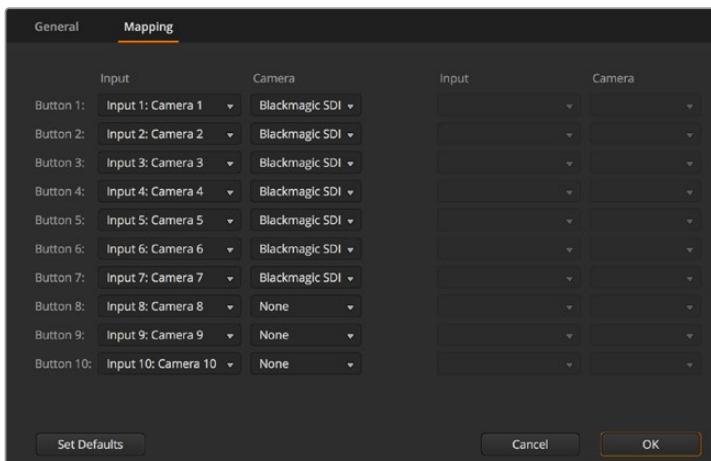


You can change the language for ATEM Software Control in the ATEM Software Control preferences.

Button Mapping

In the mapping preferences, you can assign inputs to specific buttons on the preview and program rows. The camera drop down menu lets you select a 'Blackmagic SDI' camera for each input, or you can select 'none' if you don't have a camera connected to the input.

ATEM software and hardware control panels support button mapping so you can assign your most important sources, especially cameras, to the most accessible buttons in the program and preview rows. Occasional sources can be assigned to less prominent buttons. Button mapping is set independently for each control panel so button mapping set on a software control panel will not affect the button mapping set on a hardware control panel.



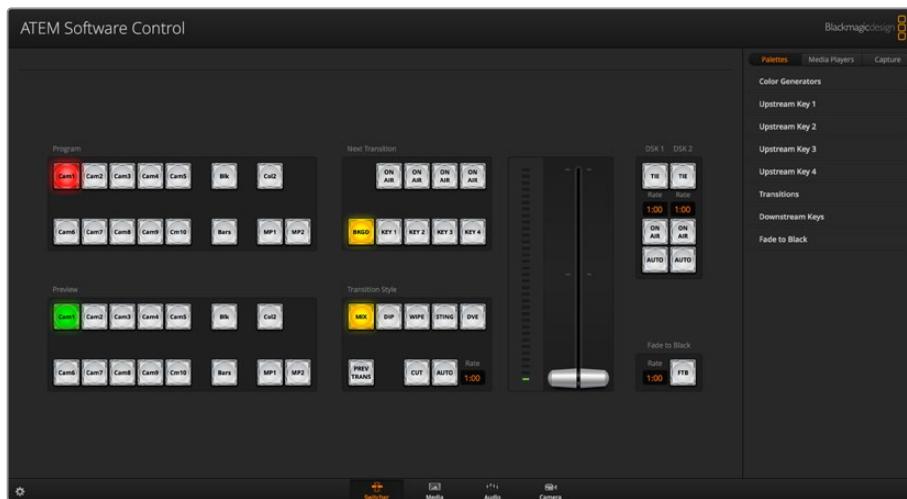
You can assign a camera from the 'camera' drop down menu

Switcher Control Panel

The software control panel has four main control windows: Switcher, Media, Audio and Camera. You can open these windows by selecting the buttons at the bottom of the interface or by pressing the Shift and left/right arrow hot keys. A general settings window can be opened by selecting the gear icon at the lower left of the interface.

Switcher Panel

When first launched, the switcher screen is selected, which is the main control interface for the switcher. The software control panel must be connected to a switcher to run.



Mouse or Trackpad Operation

The virtual buttons, sliders and fader bar on the software control panel are operated using your computer mouse or a trackpad if you're using a laptop.

To activate a button, click once with the left mouse button. To activate a slider, click and hold down the left mouse button while dragging. Similarly, to control the fader bar, click and hold down the left mouse button on the fader bar handle and drag up or down.

Using Keyboard Hot Keys

Hot keys can be used allowing convenient control of some switcher functions using a standard QWERTY keyboard as shown in the following table:

Hot Keys	Function
<1> - <0>	Previews source on switcher Inputs 1 - 10. 0 = input 10.
<Shift> <1> - <0>	Previews source on switcher Inputs 11 - 20. Shift 0 = input 20.
<Control> <1> - <0>	Hot switches source on switcher Inputs 1 - 10 to Program output
Press and release <Control>, then <1> - <0>	Hot switches source on switcher Inputs 1 - 10 to Program output. Hot switching remains on and the CUT button is lit red.
<Control> <Shift> <1> - <0>	Hot switches source on switcher Inputs 11 - 20 to Program output
Press and release <Control>, then <Shift> <1> - <0>	Hot switches source on switcher Inputs 11 - 20 to Program output. Hot switching remains on and the CUT button is lit red.
<Control>	Turns off hot switching if currently on. The CUT button is lit white.

Hot Keys	Function
<Space>	CUT
<Return> or <Enter>	AUTO

More information on how to use the switcher control panel is included in the next sections.

Media Manager

The media manager allows you to upload graphics to the media pool in the ATEM switcher. Your ATEM switcher has memory for graphics that's called the media pool and holds up to 20 still graphics with alpha channel that can be assigned to a media player for use in your production.

So, for example, you could have the maximum 20 still graphics loaded that will be used on your live production and then assign each of the media players to various stills as you work. As you take a graphic off air, you can change the media player graphic to the next graphic you want, and then you can put that media player back on air with the new graphic.

When a still is loaded into the media pool, the alpha channel is loaded automatically if one is included in the image. When a still is loaded into a media player, the output of the media player will include both key and fill outputs. If you select a media player as a key source, for example Media Player 1, both the fill and the key are automatically selected so you don't have to select them separately. However the key can still be routed separately so you can use a different key source if you wish.

Audio Mixer

The audio tab in ATEM Software Control contains a powerful audio mixer interface which becomes active when controlling your ATEM switcher.



ATEM switchers include a built-in audio mixer that lets you use the embedded HDMI and SDI audio from your cameras, media servers and other inputs without the need for an external audio mixer. This is perfect when using your ATEM switcher on location or in small spaces within modern OB vehicles as you don't have to find room for an external audio mixer. The audio is mixed in the audio tab of ATEM Software Control and output via the SDI program output.

Your ATEM switcher also features built in XLR inputs for mixing external audio.

If you prefer to use an external audio mixer, it's easy to disable the audio for all inputs and you only need to leave the external audio active in the audio mixer interface. More information on how to use the audio mixer is included in the next sections.

Camera Control

The 'camera' tab in the software is where you can control cameras remotely, in a similar way to how traditional external camera control units can control cameras, however with ATEM switchers, this functionality is built into the software so it's always available.

Settings such as iris, gain, focus, detail and zoom control are easily adjusted using compatible lenses, plus you can color balance cameras and create unique looks using the DaVinci Resolve primary color corrector that's built into the Blackmagic cameras.

For detailed information on how to use the powerful camera control features, refer to 'using camera control' in this section of this manual.



The ATEM camera control lets you control Blackmagic Design cameras

Switcher Settings

Click on the settings cog icon to open the settings window which allows you to change the video input selections and labels. Setting labels is important, and they are visible in the multi view output as on screen labels and on ATEM advanced panels in the source names row.



In the settings window, you can also set the switcher video standard. This is the master video standard that the whole switcher operates at, and it's very important you set this to the same video standard as your video inputs. More details on setting the video standards are included later in this manual.

The switcher settings also let you customize your multi view. The arrangement of the multi view screen can be changed by clicking on the camera layout presets. The arrangement for the 8 smaller video views are fully routable allowing you to view any source in the switcher. This lets you monitor cameras, internal sources, media players and even aux outputs on a single monitor. Multiview saves space when doing portable location based events because you only need a single monitor.

If you are connecting Blackmagic HyperDeck disk recorders to your switcher, you can use the switcher settings to enter their IP address, view their connection status, and change the frame offset and auto roll settings so you can switch cleanly to a HyperDeck video source. For more information about using HyperDeck disk recorders with your ATEM switcher, refer to the 'HyperDeck control' section of this manual.

You can also set your switcher's remote behavior using the 'remote' tab. This allows you to use the RS-422 port on your switcher to control pan, tilt, zoom heads or legacy GVG100 hardware such as linear edit suites.

Switcher settings are explained in detail in 'Changing Switcher Settings' within this section of this manual.

Using the Software Control Panel

The switcher window is the main control interface for the switcher. During live production, the switcher window can be used to select sources and take them to air.

You can select the transition style, manage upstream/downstream keyers and turn on/off the fade to black. The palettes on the right hand side of the interface are where you adjust transition settings including transition rates, adjust color generators, control media players, and adjust the upstream and downstream keyers as well as control fade to black rate.

Mix Effects

The Mix Effects block of the switcher tab contains all the source select buttons for the program and preview buses, allowing external inputs or internal sources to be selected for next transition previewing or switching to air.



ATEM mix effects

Program Bus Source Select Buttons

The program bus source select buttons are used to hot switch background sources to the program output. The source currently on air is indicated by a button that is illuminated red.

Preview Bus Source Select Buttons

The preview bus source select buttons are used to select a background source on the preview output, this source is sent to the program bus when the next transition occurs. The currently selected preview source is indicated by a button that is illuminated green.

The source select buttons for the program bus match the preview bus.

INPUTS	Input buttons match the number of external switcher inputs.
BLACK	Color black source internally generated by the switcher.
BARS	Color bars source internally generated by the switcher. This is a dedicated button when using single Mix Effects switchers.
COLOR 1	Color sources internally generated by the switcher. Shift select for Color 2.
MEDIA 1 and 2	Internal media players that display stills or clips stored in the switcher. When using an ATEM switcher with more than 2 media players, hold the shift button down on your keyboard to reveal the additional media player buttons on the preview and program rows.

Transition Control and Upstream Keyers

CUT

The CUT button performs an immediate transition of the program and preview outputs, overriding the selected transition style.



Transition control

AUTO/RATE

The AUTO button will perform the selected transition at the rate specified in the 'rate' display. The transition rate for each transition style is set in the transition palette for that style and is displayed in the 'rate' window of the transition control block when the corresponding transition style button is selected.

The AUTO button illuminates red for the duration of the transition and the 'rate' display updates to indicate the number of frames remaining as the transition progresses. When you perform a transition using the transition slider on ATEM Television Studio Pro HD's built in control panel, the fader bar indicator on the software panel updates to provide visual feedback on the progress of the transition.

Fader Bar

The fader bar is used as an alternative to the AUTO button and allows the operator to manually control the transition with a mouse. The AUTO button illuminates red for the duration of the transition and the 'rate' display updates to indicate the number of frames remaining as the transition progresses. When you perform a transition using the transition slider on ATEM Television Studio Pro HD's built in control panel, the fader bar indicator on the software panel updates to provide visual feedback on the progress of the transition.

Transition Style

The transition style buttons allow the operator to select one of four types of transitions; mix, dip, wipe and DVE. The selected transition style is indicated by a yellow illuminated button. Selection of these buttons will be reflected by the corresponding tab in the 'transitions' processing palette. For example, when you have the transitions processing palette open and click on a transition style button, the transitions palette will match your selection so you can quickly adjust the settings.

PREV TRANS

The PREV TRANS button enables the preview transition mode, allowing the operator to verify a mix, dip, wipe or DVE transition by performing it on the preview output using the fader bar. When the PREV TRANS is selected you will see the preview output match the program output, and then it's simple to practice your selected transition with the fader bar to confirm you are going to get what you want. This is a very helpful feature to avoid mistakes on air!

Next Transition

The BKGD and KEY 1 buttons are used to select the elements which will transition on air or off air with the next transition. More upstream keyers are available on 4K model ATEM switchers and that is why other upstream keyers appear greyed out. The key can be faded on and off when the main transition occurs, or you can select just the key to transition individually, so the main transition control can be used to fade the key on and off.

When selecting the elements of the next transition, the switcher operator should look at the preview video output because it provides an accurate representation of what the program output will look like after the transition is completed. When only the BKGD button is selected, a transition from the current source on the program bus to the source selected on the preview bus will occur without the keyer. You can also select only keyer to transition, leaving the current background live throughout the transition.

ON AIR

The ON AIR indicator button indicates when the key is currently on air and can also be used to immediately cut the key on or off air.

Downstream Keyers

TIE

The TIE button will enable the DSK on the preview output, along with the next transition effects, and tie it to the main transition control so that the DSK can be taken to air with the next transition.

The DSK will transition at the rate specified in the 'rate' display of the transition control block. If the DSK is tied, the signal routing to the clean feed 1 is unaffected.

ON AIR

The ON AIR button is used to cut the DSK on or off air and indicates whether the DSK is currently on or off air. The button is illuminated if the DSK is currently on air.

AUTO

The AUTO button will mix the DSK on or off air at the rate specified in the DSK 'rate' window. This is similar to the main AUTO rate on the transition control block, however it's limited only to the specific downstream keyer. This can be used to fade up and down bugs and logos, such as live or replay bugs during production, without interfering with the main program production transitions.

Fade to Black

The FTB button will fade the whole program video output to black at the rate specified in the fade to black RATE window. Once the program output has been faded to black, the FTB button will flash red until it is pressed again. Doing so will fade up from black at the same rate, or you can enter a new rate in the fade to black palette in the 'switcher' window. Fade to black is mostly used at the start of your production, and at the end of your production, or when cutting to commercial breaks. It ensures all layers in the switcher are faded down together. A fade to black cannot be previewed. You can also set the audio mixer to fade the audio with your fade to black by selecting the Audio Follow Video checkbox in the fade to black palette, or by enabling the AFV button on the master audio output fader.



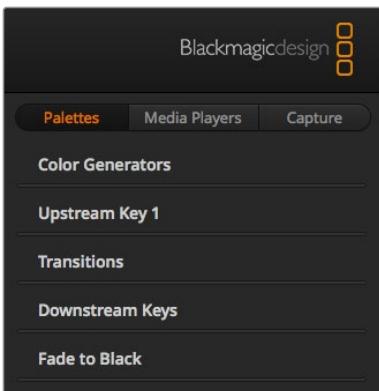
Downstream key and
fade to black

Processing Palettes

The software control panel features tabs for the processing palette, media player, and capture options. The capture option supports legacy model ATEM switchers with USB capture features.

The following processing palettes are available.

TIP The palettes also show the order of the processing in the switcher. You can expand and minimize palettes to save space and scroll them up and down to get the adjustments you need to set.



Processing palettes

Palettes Tab

The 'palettes' tab contains the following processing controls.

Color Generators

Your ATEM switcher has two color matte generators which can be configured from the color generators palette using a color picker or by setting hue, saturation, and luminance levels.

Upstream Key 1

The switcher's upstream keyer can be configured from the upstream key 1 palette. Within the keyer palette, the keyer can be configured as a luma key, chroma key, pattern key or DVE. The type of key available will also depend on if the DVE is available. The upstream key 1 palette will display all the parameters that are available to configure the keyer. More information on how to use upstream keyers is included later in this manual.

Transitions

The transitions palette is where you can configure the parameters of each transition style. For example, for the dip transition the palette has a drop down menu where you can select the dip source and for the wipe transition the palette displays all the available wipe patterns. There are lots of variations of transitions, and a large number of transitions can be created by combining settings and features in the transitions palette.

NOTE It's worth noting that simply selecting a specific style of transition in this palette will only adjust the settings for these transitions, and you still need to select the style of transition you want to perform in the transition control section on the software, your switcher's built in control panel, or an additional hardware panel. The software and hardware panels work together and mirror all settings, so you can use any combination you like!

Downstream Keys

The ATEM has two downstream keyers which can be configured from the downstream keys palette. The palette has drop down boxes for selecting the fill and key signals to the keyer, plus sliders to set the pre multiplied key clip and gain values, and mask settings.

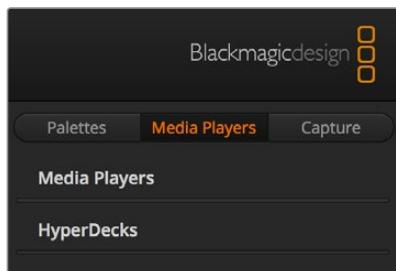
Fade to Black

The fade to black palette is where you can set the fade to black transition rate.

An 'Audio Follow Video' checkbox is also provided as a shortcut for the audio mixer's master fader AFV button. Selecting this feature lets you fade your audio with your fade to black.

Media Players Tab

The 'media players' tab contains controls for your ATEM Switcher's media players and connected HyperDecks.



Media Players

Your ATEM switcher has media players which play back the stills that are stored in the media pool memory built into the switcher. The drop down list is used to select the still that will be played or made available on the media player input to the switcher.

Hyperdecks

You can connect up to 4 Blackmagic HyperDeck Studio model disk recorders and control them using ATEM Software Control's HyperDecks palette. For more information refer to the 'HyperDeck Control' section of this manual.

Capture Tab

The capture tab supports the original ATEM production switchers that feature USB output recording.

Using the Audio Mixer

The audio tab is used to mix audio sources connected to any ATEM switcher via HDMI, SDI, and external audio.

Cameras, media players and external audio sources are listed along the top of the audio mixer along with the master audio output for the program outputs of the switcher.

Below each audio source is an audio level meter, a fader for setting the maximum audio level, and a knob for setting the left/right audio channel balance. The master fader on the right side of the audio mixer is used to set the gain on the audio level on the SDI program output and has its own audio level meter. Next to the master fader are mic and XLR faders which let you control the audio level for a microphone connected to the headset input, or external audio connected to the XLR inputs.

Underneath the master fader are sliders to adjust the mix of each monitor setting. For example, you can control the level of the master, talkback and sidetone levels, plus adjust the headphones level knob to increase or decrease the volume of the monitor audio mix.

The buttons below each audio level meter determine whether audio is always available for mixing or only when the source is on air.

The solo monitoring feature for each input is greyed out as it supports ATEM Production Studio and Broadcast Studio model switchers.



The audio mixer displays tally lights for any audio sources that are currently on air or when AFV is selected, as well as audio level, audio balance and buttons for selecting which audio should be used

Tally

Any source whose audio is on air is lit with a red tally light in the software. External audio is on air by default so the EXT tally light is usually lit red. In the example on this page, camera 7 and camera 8 are lit because their audio is set to be always on. The tally light will be illuminated dull yellow when AFV is selected and the channel's associated camera is off air. This also applies to the master fader tally light when the master fader AFV button is selected. When FTB is activated, the master fader tally light will blink red.

Audio Level

Drag the audio level fader to set the gain on the audio level for each camera and audio source. The numbers under each audio level meter shows the maximum audio level set by the fader. The numbers above the audio meter shows the peak audio level reached by the audio source. A green number represents low to medium audio levels.

If the audio meter is regularly showing red, and the red number above it is not changing, then you should reduce the audio level to avoid audio distortion. After adjusting the audio level, you may wish to reset the red number by clicking on it once. Observe the new number to make sure it changes for a while and does not immediately shoot up and become stuck on a red number. If it does, you may need to reduce the audio level even further.

Audio Balance

The audio mixer supports stereo audio from each audio source. If you wish to change the left and right audio channel balance for a camera or other audio source, adjust the knob to the desired balance point.



If you are operating a 2 M/E or 4 M/E ATEM switcher, and notice the solo and monitor settings are grayed out, you have program audio selected for the audio out setting in the settings window.



The audio meter for Cam1 is shown in gray to indicate that its audio will not be used as neither of its ON or AFV buttons are enabled. Cam2 has AFV selected but its audio is not currently being used as the camera is not on air as is indicated by its dull yellow tally light. Cam4 and Cam7 have their direct mix set to ON so their mixed audio is always used, and their tally lights remain lit, even if another camera is currently on air. The audio level meters for Cam3, Cam5, Cam6 and Cam8 show that no audio is present on these cameras.

Audio Source Selection

Below each audio level meter, you will find the ON and AFV buttons that select which audio sources are sent to the program output of the switcher.

ON	Selecting the direct mix to ON allows an audio input to be permanently mixed into the program output, even when the associated video source is not on air. The red tally light will always be lit because the audio is always on air. Selecting this option automatically disables AFV.
AFV	Audio-follow-video (AFV) allows audio to crossfade when inputs change. The audio will only be sent to the program output when the input is on air, lighting the red tally light above. When off air, the tally light is lit dull yellow. Selecting this option automatically disables the direct mix ON setting.
SOLO 	ATEM Production Studio switchers and ATEM Broadcast Studio switchers can use the XLR audio output via the switcher's rear panel. Selecting solo exclusively outputs that single audio source to the monitor output so you can listen clearly to any single input when required. This is an important feature which lets you confirm audio content before putting it to air and without affecting the program output audio. When solo is deselected the audio output will return to its original state.

Master Audio Level Output

The master fader on the right side of the audio mixer is used to set the gain on the audio level on the SDI program output and has its own audio level meter. Select the AFV button on the master audio output fader to enable the AFV fade to black feature. This lets you fade your master audio when you click on the fade to black button.

Audio Mixer Monitor

The monitor headphones knob and sliders appear below the master fader and control the monitoring audio output behavior. You can use these settings to set independent audio levels for monitoring the audio mix without affecting the program output audio. ATEM Television Studio model switchers feature built in control panels with built in talkback and this means it has headset connections for communicating with camera operators. However, the headset is not just limited to talkback use as you can also use the headset microphone for doing voice overs and you can use the headset headphones for program audio monitoring.



The monitor volume knob and sliders set the independent audio levels for monitoring the program audio together with talkback and sidetone, plus the overall volume of the mix.

Master	Adjust the master level slider to set the program audio level in the headset and if you don't want to listen to program audio, then slide this control fully to the left.
Talkback	The talkback level slider sets the audio level of camera operators who are talking to you and by setting the master and talkback sliders you can get your preferred balance of talkback and program audio into your headset.
Sidetone	The sidetone level slider lets you mix your voice from your headset mic into the monitor output. This is helpful when wearing a headset that supports noise canceling.

Shaping your Audio Mix using Advanced Fairlight Controls

ATEM Television Studio Pro 4K has advanced Fairlight audio controls that let you enhance and refine the quality of sound on each input and master output, including input level controls, a 6 band parametric equalizer and powerful dynamics settings. This section of the manual shows the different Fairlight audio controls you can use to shape and optimize the audio mix in your live production.



Input Level

Generally, when setting up your audio mix, the first step is to normalize all your inputs. This means adjusting the input level knob on each input so you can optimize all the levels to their highest strength without clipping.

This control is at the top of each track under the tally light. Change the level by clicking on the knob and dragging left to decrease the level, or right to increase. By setting the input control, it brings all the inputs up to a common signal strength so they are all at their strongest without clipping. Then you can start making advanced changes and refinements.

Delay Control

Sometimes when using analog audio via your switcher's XLR inputs, there may be a slight difference in the sync between analog audio and video. For example, the analog audio may sound slightly ahead of the video. This is because analog audio is independent of the video inputs and could be coming direct from a microphone, while the SDI inputs might have some delay depending on upstream equipment, such as some cameras and video processors. Setting the audio delay will ensure the analog audio input is perfectly AV synced to the video inputs from cameras.

To adjust the amount of delay on the selected input:

- 1 Click on the delay indicator beneath the input audio level control knob on the channel strip.



Click on the delay indicator below the level input knob to open the delay control

A small popup window will open containing the delay adjustment knob.

- 2 Click on the delay knob and drag left to decrease the amount of delay, or drag right to increase. The amount of delay is measured in frames. Close the window by clicking on the small 'x' in the top corner, or move the window to a safe place on your desktop if you need to make further adjustments later.



Click on the delay control and drag left or right to decrease or increase the amount of delay required for an analog input

Stereo Simulation

When you open the delay control, you will also notice a stereo simulation control in the same settings window. If you have a mono analog input, this feature lets you simulate a realistic stereo sound that you can mix into your stereo master output.

The setting is disabled by default. This is because you may already have a stereo signal plugged in and don't need to add simulated stereo. It is also because to enable stereo simulation you will first need to split the incoming analog mono signal into two separate mono tracks.

To split the mono input signal:

- 1 Click on the small 'cog' icon at the bottom left corner of the control panel to open the general switcher settings.
- 2 In the switcher settings, click on the 'audio' tab and select the XLR input you want to split.
- 3 Click 'done' to close the window.

You will now see the XLR input on the mixer is now split into two separate inputs for left and right channel audio.

To add a simulated stereo effect, all you need to do is click on the stereo simulation control knob and drag left or right to decrease or increase the amount required. While making changes, you will notice the stereo simulation indicator below the input knob changes to reflect how much of the effect you are adding.

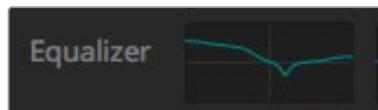
After you have normalized all your input levels and added delay and stereo simulation if needed, you can now begin optimizing and shaping the qualities in each audio input using the 6 band parametric equalizer and dynamics controls.

Using the 6 Band Parametric Equalizer

Each input, and the master output, has a 6 band parametric equalizer which can be used to control specific frequencies. This could include reducing low frequency hum or noise on a microphone input, or boosting the low frequencies on a thin sounding track, or even to add uniqueness to each input so they are more distinct in the final mix. You have many creative options.

Parametric Equalizer

To open the parametric equalizer for an input or the master output, click on the corresponding equalizer indicator.



Click on an input's equalizer indicator to open a 6 band parametric equalizer

The first item you will notice is the graph along the top of the window with numbered indicators from 1 to 6. These numbered indicators are adjustable handles that correspond to bands 1 to 6.

Each band of the 6 band parametric equalizer has a column of settings. These settings will differ based on which band you are controlling, and what filter type you are using.

TIP You can learn more about band filters later in this section.

If you want to make changes to a setting, you will first need to make sure the band is enabled. Click on a band label to enable it. When enabled, the button label is illuminated blue. Now you can change the settings for that band, or click and drag the handles to make fast adjustments.



Each audio input has its own 6 band parametric equalizer

Handles

Each band handle is positioned along the line curve displayed in the graph. You can click and drag each handle to choose the frequency you wish to adjust for that band, and the gain you want to set. When moving a handle with your mouse, both the frequency and gain settings are affected simultaneously, which gives you a fast way to make quick adjustments to each band across the entire range of frequencies.

NOTE To make changes using a handle, ensure the band is enabled. Simply click on the band you want to adjust. The band label will illuminate blue when enabled.

As you drag a handle left or right, you will notice the frequency and decibels update in the band settings. This will also be reflected by the frequency range preset buttons for low, medium low, medium high, and high.

Frequency Knobs

Alternatively, you can use the frequency knobs for each band to select a specific frequency to adjust.

Range Presets

The frequency range for each band is defined by the range preset buttons. For example, low is labeled 'L' and covers the frequency range from 30 to 395 Hz.

As a quick example of how the range presets define the frequency range, select a notch filter from the band filter dropdown list, and then click on each range preset. You will see the filter effect move to a position along the graph curve that corresponds to the range preset you choose. This lets you quickly define a specific range of frequencies you want the filter to affect.

Below is a table showing the range of frequencies for each range preset setting.

Range Preset	Frequency Range
Low	30 Hz to 395 Hz
Mid Low	100 Hz to 1.48 kHz
Mid High	450 Hz to 7.91 kHz
High	1.4 kHz to 21.7 kHz

Gain Knobs

Click and drag the gain knob left or right to decrease or increase the volume level for the selected frequency.

Q Factor

The Q factor control is available when the bell filter is applied to bands 2, 3, 4 and 5. This sets the range of frequencies the filter will affect. For example, setting the minimum will allow the filter to affect a wide range of surrounding frequencies and the maximum setting will narrow the effect down to a tiny point. This is important if you have sound qualities in surrounding frequencies that you want to either include or exclude from the change you are making.

As you adjust the Q factor, watch the shape of the effect on the line curve change from a broad, rounded edge to a sharp point. This is a visual representation showing how the regions of frequencies surrounding the target frequency are affected.

TIP Compare the audio with changes against the original unaltered audio by clicking on the bypass button at the very top of the equalizer window. This lets you turn the equalizer on or off.

Band Filters

There are six different types of band filters you can choose from. These filters include bell, high shelf, low shelf, notch, high pass, and low pass. These filters let you control specific zones within the frequency range. For example, a low shelf filter lets you increase or decrease the level of volume for lower frequencies on the graph, and a high shelf filter controls the higher frequencies.

Try setting a low shelf filter to band 3 and make changes to the gain setting. You will see the changes are weighted towards the low end frequencies on the graph.

A description for each filter type is provided below.

Bell	High Shelf	Low Shelf
		
This filter is used to increase or decrease a range of frequencies surrounding a defined frequency.	Lets you increase or decrease the level of volume for higher frequencies along the graph.	Lets you increase or decrease the level of volume for lower frequencies along the graph.
Notch	High Pass	Low Pass
		
This filter lets you remove, or cut, a defined frequency.	Smoothly removes extreme low end frequencies, allowing the high end frequencies to pass unaffected.	Smoothly removes extreme high end frequencies, allowing the low end frequencies to pass unaffected.

TIP It's not uncommon to have filters on each band overlapping on the graph curve with adjustments working together. For example, you may have a low shelf filter applied to band 4, and a notch filter on band 5 reducing a frequency within the same range.

Dynamics Controls

In addition to the 6 band parametric equalizer, you can also enhance and finesse the input and master output audio using dynamics controls. Where the equalizer lets you control the frequencies within a signal, dynamics controls let you set how various levels behave. Levels within the signal can be adjusted including expanding the dynamic range between low levels and high levels, gating an input so you can choose what is stronger or softer within a signal, or you can even use the compressor and limiter so that audio can be generally lifted and made stronger without clipping.

Combined with equalizer controls, these features are extremely powerful, giving you the ability to precisely shape and define the audio, and generally optimize the sound of the master output.

This section describes the expander, gate, compressor and limiter controls.



The dynamics controls can be opened for each input and the master output by clicking on its corresponding dynamics indicator

Common Dynamics Settings

The expander/gate, compressor and limiter share common settings that let you shape how each function affects the audio. For example the level at which the function initiates, how long the function is applied, the strength of the function, etc. The settings available differ depending on the dynamics control you are using.

Threshold	Sets the sound level at which the function activates. For example, setting the threshold for the compressor to -20dB tells your switcher to activate compression when the signal rises above -20dB. Alternatively, setting the expander to -40dB means the switcher will only initiate the expander once the signal level drops below -40dB.
Range	This setting defines the range of decibels affected by the function.
Ratio	Defines the maximum strength of the function once initiated.
Attack	Sets the smoothness of the function when it initiates. For example, a long attack will allow the function to fade into the signal, blending in better without drawing too much attention, whereas a short attack may be better for complex sound activity with many quick variations where a longer attack may cause artifacts.
Hold	Sustains the dynamics function over an adjustable period of time.
Release	Similar to attack but occurs at the end of the function activity. For example, lets the dynamics function ease out gradually, or fall away rapidly, once the level moves out of the threshold.

Expander/Gate

The first set of dynamics parameters can be switched between expansion and gating.

Expansion emphasizes differences in volume by lowering the level of soft parts of the signal relative to the level of louder parts. You can use an expander to emphasize the differences between quiet and loud parts of a track, or to increase the dynamic range of a signal and minimize unwanted noise.

Gating is like an exaggerated expander, reducing the level or even silencing parts of a signal that fall below a certain level in order to reduce or eliminate noise in quiet parts of a recording. For example, a range of 15 to 20 dB can reduce breathing in a vocal track but leaves just enough to sound natural.

Gating is extremely effective, but it's also very powerful so requires careful attention. If the gate threshold is set too high it can cause artifacts, such as cutting off the start of a syllable or the quiet end of a word. You can compensate by reducing the threshold slightly, or by increasing the attack or release time.

Compressor

Compression lets you reduce peaks in an audio signal, reducing the dynamic range of a signal, so you can boost the overall level without clipping. This is helpful when you want to make sure the loud elements in a signal don't diminish the strength of quieter sounds, or to smoothen changes in audio levels within the signal.

TIP It's a good idea to apply the compressor after you have set the EQ controls.

Make Up

The make up setting lets you increase the overall signal in combination with compression settings. With loud parts of the audio reduced using compression, you can now use the make up control to boost the overall sound without clipping.

Limiter

The limiter prevents peaks of the signal from exceeding a set maximum level. A limiter is helpful to prevent hard clipping. For example, if you set the limiter to -8 dB, the input signal will never exceed that level. Adjusting the attack, hold and release settings will set how gentle the limiter affects the signal.

Dynamics Controls Characteristics

Control	Minimum	Default	Maximum
Expander/Gate			
Expander Controls*			
Threshold	-50dB	-45dB**	0dB
Range	0dB	18dB	60dB
Ratio	1.0:1	1.1:1	10:1
Attack	0.5ms	1.4ms	30ms
Hold	0.0ms	0.0ms	4s
Release	50ms	93ms	4s
Gate Controls*			
Threshold	-50dB	-45dB**	0dB
Range	0dB	18dB	60dB
Attack	0.5ms	1.4ms	30ms
Hold	0.0ms	0.0ms	4s
Release	50ms	93ms	4s
Compressor			
Compressor Controls			
Threshold	-50dB	-35dB	0dB
Ratio	1.0:1	2.0:1	10:1
Attack	0.7ms	1.4ms	30ms
Hold	0.0ms	0.0ms	4s
Release	50ms	93ms	4s
Limiter			
Limiter Controls			
Threshold	-50dB	-12dB	0dB
Attack	0.7ms	0.7ms	30ms
Hold	0.0ms	0.0ms	4s
Release	50ms	93ms	4s

* Master Dynamics expander/gate controls are unused in Master Dynamics.

** Master Dynamics expander/gate threshold default is -35dB. Mic Dynamics and XLR Dynamics expander/gate threshold default is -45dB.

Fairlight Controls Workflow Guide

This section describes a basic workflow to help you get started using the Fairlight controls to refine and enhance your audio mix.

- 1 Generally, the first step to optimizing your mix is to normalize all the inputs so they are all at their maximum strength without clipping. This is normally done by increasing or decreasing the input gain level for each input so their signal peaks just below 0dB on the channel strip's level indicator.
- 2 If you want to split any mono inputs into two separate channels for stereo output, go to the general switcher settings and navigate to the audio tab. Enable the checkboxes for the mono inputs you want to change to stereo. Click 'done'.

TIP If you want to split mono inputs into two separate channels, it's best to do this before normalizing the input as described in step 1, so that you can normalize both channels after they have been split.

- 3 Now, click on the EQ indicators below input level controls and make equalization changes to each input. You can move the windows into a better position, or close them if needed.
- 4 After setting EQ, open the dynamics controls for each input by clicking on their respective dynamics indicator. Make the required dynamics changes to generally improve and refine the input audio.
- 5 With EQ and dynamics set for each input, you can now open the EQ controls for the master output and sweeten the final audio mix.
- 6 Now open the master output's dynamics controls and make any required changes to improve the final output.

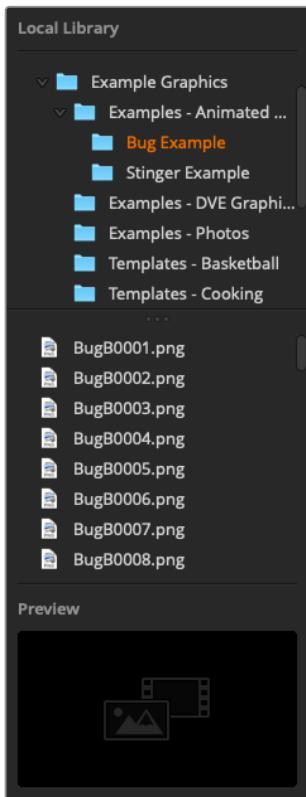
Once all the Fairlight controls are set, you can then increase or decrease the faders on the audio mixer to set them at their best levels for the live mix and make adjustments where necessary during the production. You can also go back to any of the settings and make further adjustments if needed, but it's best to follow the same order as described above to get the best results from each function. For example, it's important to set EQ controls before making dynamics changes as the processing chain in your switcher applies dynamics to the audio after equalization.

Most important of all is to apply the effects carefully so your audio still sounds natural but exciting too!

Navigating the Browse Window on the Media Page

The browse window is a simplified file browser that lets you navigate your computer to look for graphics files. All attached drives on your computer are displayed, and you can select folders from them. View sub folders by clicking on the arrows next to each folder.

The 'preview' window will show any selected graphics files.



Browse window

Browsing and loading files

Loading a still is as easy as dragging it from the browse window and dropping it into an empty slot in the media pool.

When dropping a still into a slot, a progress indicator will show the loading status. You can drop multiple files into the media pool, even if the first images have not yet completed loading, as they will continue to load one after the other. If a still is dropped into a window which already has content loaded, the existing content will be replaced.

The ATEM media pool supports PNG, TGA, BMP, GIF, JPEG and TIFF still image formats.

ATEM Television Studio Pro 4K supports image sequences which you can load as clips. The media page has two clip player slots.

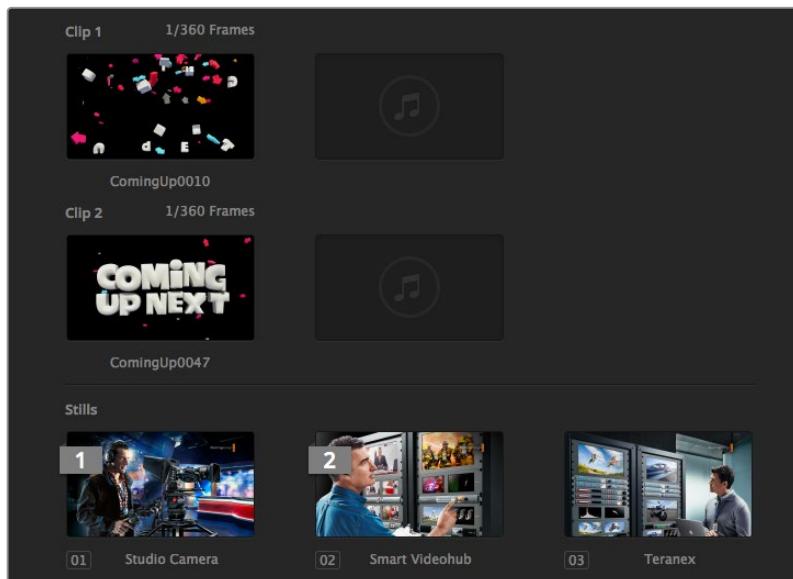
When loading an image sequence, all you need to do is drop the first still into a clip window and the media page will know it is an image sequence. Using clips is great for animated stingers, graphics and special effects. The audio slot next to each clip slot is for loading audio that is associated with your clip. This is helpful for adding accompanying sound effects.

ATEM Media Pool

When files have been loaded into the media pool, the slots will show a thumbnail image. Stills and clips are marked with a slot number so you can identify them when assigning clip or still image to the media player if you are using an additional ATEM hardware panel.

The file name for each loaded file is displayed underneath the slot so you can easily keep track of files you have loaded. This is very useful as you will see a list of media pool still and clip numbers and their file names in the media player palette on the switcher page.

Numbers are displayed on slots in the media pool to clearly show which slots are assigned to the relevant media players. When a media player slot is switched to the program output, the media player number on the slot changes to red to indicate the slot is on air. When a slot is on the preview output, the media player number changes to green.



ATEM Media Pool

On the switcher page, you can change the media player assignment from the media tab by selecting your desired still from the 'media' dropdown list. Simply click on the arrow in the player 'media' list to select from a list of media pool slots.

You can also assign stills to media players from ATEM hardware panels, or in some cases from the Photoshop plug-in when downloading stills.

Using Multiple Control Panels

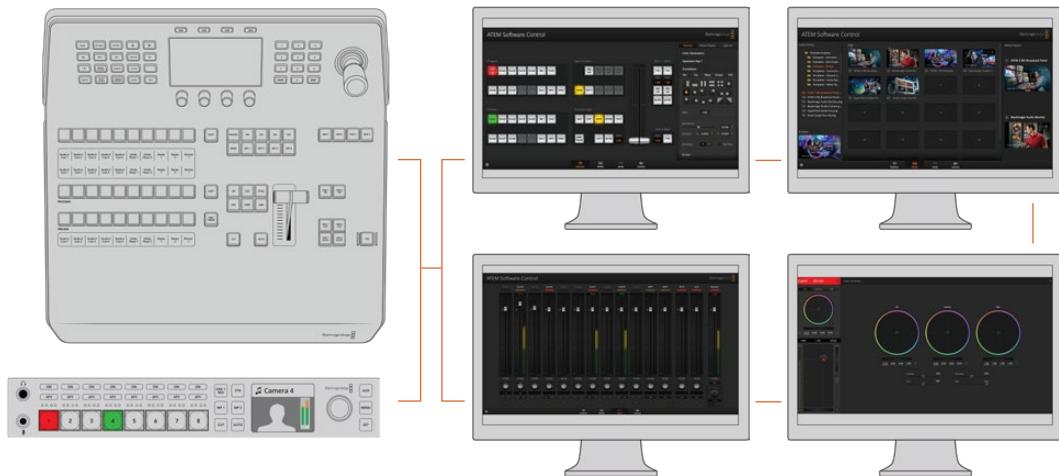
ATEM switchers have multiple ways they can be controlled and you can use this software control panel as well as a range of hardware control panels. In fact you can run multiple copies of this software control panel and this means you could have someone operating the switcher, while someone else could be managing media, controlling cameras or mixing audio. It's quite flexible and this means many people can be operating your ATEM switcher all at the same time!

A good example is the relationship between the software control panel, hardware control panel and the front panel of the ATEM Television Studio HD switcher. The software control panel has been designed to be the same as the hardware control panel and this is a convention and well understood ME style of layout where you have a program row and preview row of input controls and then a transition block that lets you command the transition.

If you plug in both control panels, you can see them mirror each other and any button pressed on one control panel will be reflected on the other control panels instantly.

However, due to space limitations the front panel of the ATEM Television Studio HD model is a little bit different and it's interesting to see the relationship between how this control panel works and how the software control panel works. A good way to understand this is to watch the front panel control while controlling the switcher via the software control panel.

Because of the limited space on the front panel, both the program and preview rows have been combined together into a single row of buttons. You can see the source selected on the program row because it's illuminated red. You can see the source selected on the preview row because it's selected green. These are the same colors as the software control panel, but they are just on the same row of physical buttons.



Multiple computers can run ATEM Software Control simultaneously, which means multiple operators can be dedicated to separate controls on your switcher, for example media management, audio mixing and camera control

Changing Switcher Settings

Clicking on the switcher settings ‘gear’ icon will open the settings window where you can change general switcher settings, Multi View, label, HyperDeck and remote settings. These settings are divided into tabs.

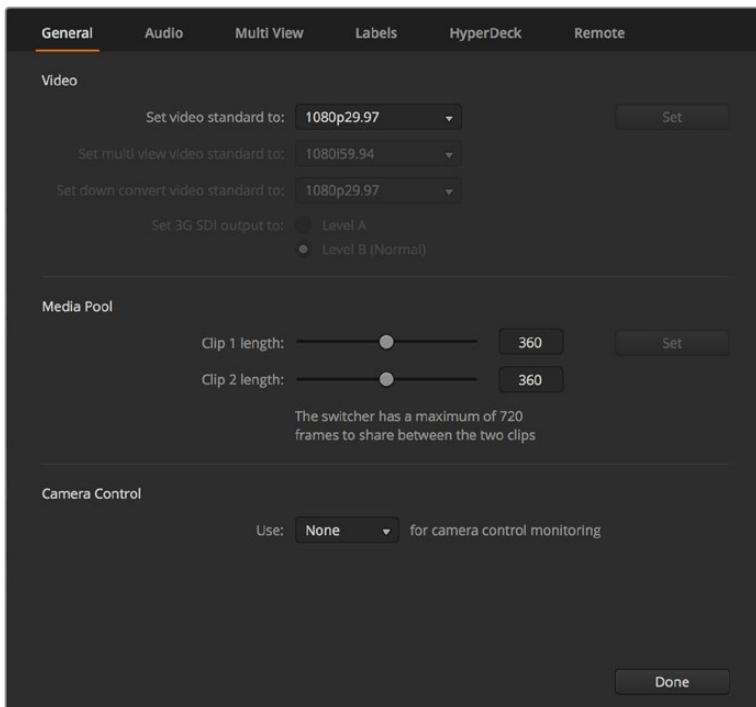


General Settings

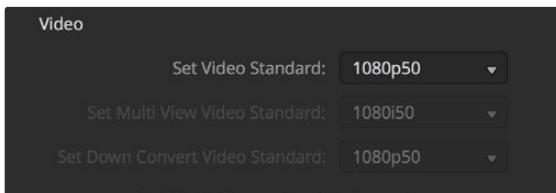
Setting the Switcher Video Standard

The video setting is used to select the operating video standard of the ATEM switcher. For HD model ATEM Television Studio switchers, this must be set to the same video standard as the video sources you are plugging into the ATEM switcher. If they don't match, the inputs won't appear correctly, and will most likely remain black. A good way to work out the video standard you should use is to check your cameras, and then set the switcher video standard to the same format.

NOTE On ATEM Television Studio Pro 4K, all inputs will automatically convert any HD or Ultra HD video format to match any HD or Ultra HD video standard set in the switcher settings.



Change switcher settings



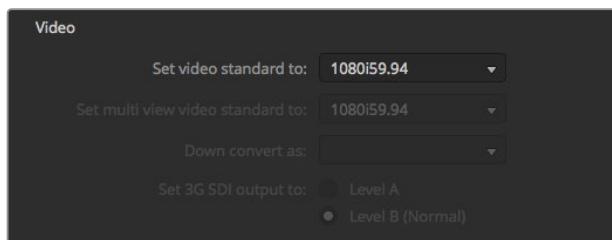
Set video standard

ATEM Supported Video Standards

ATEM Television Studio HD	ATEM Television Studio Pro HD	ATEM Television Studio Pro 4K
1080p59.94		2160p59.94
1080p50		2160p50
1080p29.97		2160p29.97
1080p25		2160p25
1080p24		2160p24
1080p23.98		2160p23.98
1080i59.94		1080p59.94
1080i50		1080p50
720p59.94		1080p29.97

ATEM Television Studio HD	ATEM Television Studio Pro HD	ATEM Television Studio Pro 4K
720p50		1080p25
625i50 PAL 16:9		1080p24
525i59.94 NTSC 16:9		1080p23.98
625i50 PAL 4:3		1080i59.94
525i59.94 NTSC 4:3		1080i50
–		720p59.94
–		720p50

To set the video standard, select the format you want to use from the 'set video standard to' drop down menu, and then click on the set button. Any time the video standard is changed, the switcher will remove any frames you have loaded into the media pool, so it's best to set the video standard before loading any media.



Set Video Standard

Setting the Multi View Video Standard

If you need to output the multi view using interlaced or progressive formats, you can change the output using the 'set multi view standard to' drop down menu. The setting options are determined by the video standard set for the switcher.

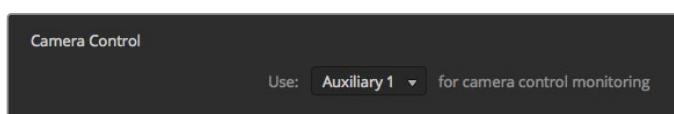
For example, if the switcher video standard is set to 1080p59.94, you can output the multi view using the same standard, or choose from 1080i59.94 or 1080p29.97.

Set 3G-SDI Output Level

This setting is only used when connected to an ATEM switcher that supports both level A and B 3G-SDI output.

Camera Control

Your switcher's auxiliary output can be set to monitor the ATEM camera control output. Set the aux output by selecting 'auxiliary 1' from the camera control drop down menu. If you want to change the name of the auxiliary output to easily identify it, you can change the output label in the 'labels' settings.



You can monitor your adjustments on each camera by routing camera control to your switcher's auxiliary output

Setting Audio Input and Output Behavior

The 'audio' tab lets you control the nature of the audio follow video feature, plus the talkback monitoring settings and mix minus settings.

Audio Follow Video Behavior

You can change the nature of the audio follow video feature for when switching sources.

For example, select 'normal' to use the standard default crossfade duration between sources, or select 'transition' to use a custom transition rate set in the transition palette.

TIP For the AFV transition setting to work as expected, make sure you have AFV enabled on both sources you want to switch between. For example, if you have camera 1 currently on air, and you want to switch to camera 2 with a custom transition rate, make sure the audio mixer has AFV enabled on camera 1 and camera 2.

Talkback via SDI Channels 15 and 16

You may want to loop one of your ATEM's outputs to an input to achieve a desired effect, but in some cases this can cause a feedback loop in SDI audio channels 15 and 16. If this occurs, you can mute SDI channels 15 and 16 by clicking the mute checkboxes for each of the SDI inputs.

Mix Minus Settings

The mix minus settings on SDI outputs let you mute the audio from their return program feed. For example, when doing live crosses there can be a delay in the audio which may be distracting when the presenter can hear his or her own voice delayed on the program return feed. Enabling mix minus for an input will output all program audio in the mix, minus that particular input.

XLR Inputs

If you are plugging in an audio source via RCA using an RCA to XLR adapter, then you can change the input level on the XLR input from XLR to RCA. This boosts the signal at the input to compensate for the lower output levels from equipment using RCA connectors, for example HiFi audio equipment.

Split Audio

On ATEM Television Studio Pro 4K you can split a mono input signal into two separate mono channels. This is helpful for mixing a mono input into both channels on the stereo master output. You can also add a stereo simulation effect using the advanced Fairlight controls on the audio page.

Click on the desired input checkbox to split the channels for that input.

Multi View Settings

The multi view settings allow you to set the multi view orientation. The 8 smaller windows are fully routable so you can monitor any switcher source. By default, external inputs 1 - 8 are routed to multi view source windows 1 to 8, but simply click the respective drop down menus to select what sources are viewed on each window!

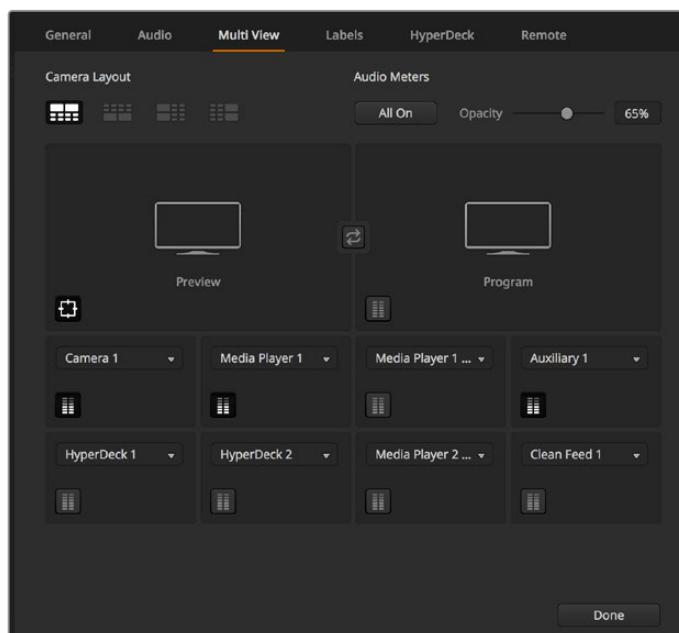
The position of the multi view preview and program views can be swapped by clicking on the toggle button located between them.

Audio meters can be turned on or off for all the switcher sources and program view by enabling the 'All On' button in the multi view settings, or you can turn them on or off individually by clicking the audio meter icon in each view.

The multi view also includes a tally feature, so if any of the sources in the multi view are used in a layer on the program or preview outputs, they will be highlighted red or green. A white border means your source is not currently switched to the preview or program output. A red border indicates the source is switched to the program output and a green border indicates a source is selected on the preview output.

The preview window on the multi view output features safe area markers so you can make sure your program will look great on any monitor. In HD, the outer border represents the 16:9 graphics safe area and the inner border represents the 4:3 graphics safe area. In SD, the single border represents the action safe area. Turn the markers on or off by clicking the safe area markers icon in the preview window.

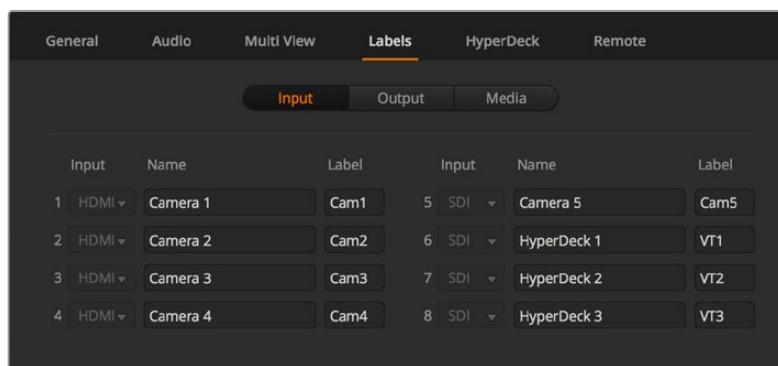
You can also change the orientation of the multi view windows by selecting one of four different layouts using the camera layout icons at the top of the multi view settings window.



Customizing the Multi View

Labels Settings

The video input settings are used to select the inputs and change labels. On other ATEM switcher models, the video inputs can select between different video sources, such as HDMI or SDI.



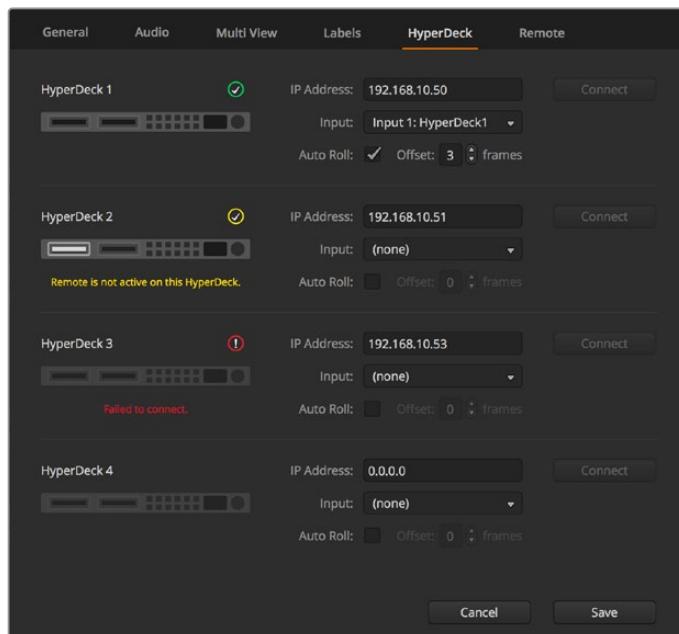
Label settings

The input labels settings let you customize the name of each input label, and these labels appear on the multi view. If you are using an additional ATEM advanced panel, the long and short labels allow for the long label to fit into the advanced panel's display.

A short 4 character name is used to identify the video input on the source names display of in ATEM Software Control. The longer input names support up to 20 characters and are displayed in various dropdown source selection boxes on the software control panel, on the multi view windows on screen labels and also on ATEM advanced panels.

To change an input name, click in the text field, enter the text and click 'save'. The input name will be updated on the multi view, software control panel and hardware panel if one is connected. It's a very good idea to change both the short and long labels at the same time, so they match. For example Camera 1 would be entered in as a long label, and CAM1 as the short label.

HyperDeck Settings



HyperDeck settings

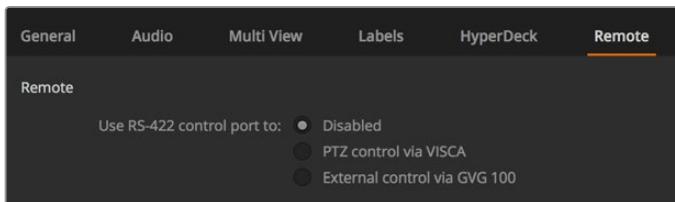
Connect up to 4 Blackmagic HyperDeck Studio disk recorders and control them using ATEM Software Control. When connecting HyperDecks, use these settings to configure the IP Address, select the inputs your HyperDecks are connected to, turn the auto roll feature for each deck on or off, and set their frame offset settings so they can switch cleanly.

Status indicators appear above and below each deck so you can easily see if they are successfully connected and if their remote buttons are active.

For detailed information on setting up Blackmagic HyperDecks with your ATEM switcher and setting the 'HyperDeck' configuration settings, refer to the 'HyperDeck control' section of this manual.

Remote Settings

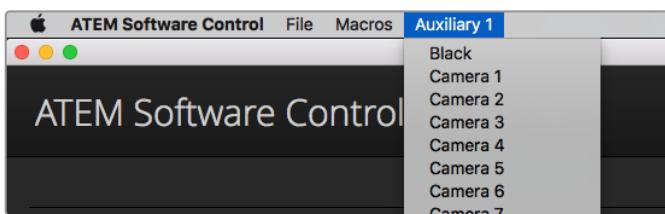
Use the 'remote' settings to tell your switcher how to use the RS-422 remote port. The options are none, VISCA and GVG, where GVG sets it to use GVG100, a common legacy interface for communicating with equipment such as linear editing suites.



Set the RS-422 remote port to disabled, VISCA and GVG

Controlling the Auxiliary Output

The auxiliary output is a separate SDI output on the switcher that can have various inputs and internal sources routed to it. The auxiliary output is very similar to a router output, and all video inputs, color generators, media players, program, preview and even color bars can be output.



Auxiliary output control menus on Mac OS

Routing the Auxiliary Output

The aux output has a menu for selecting the source to output on the aux video output. Simply select the menu, then scroll the list for the source you want to output. When selected, the output on the selected aux will change immediately. You can see the current source with a tick in the menu item.

There is a range of sources available, including black, all video inputs, color bars, media players fill and media player key outputs, program, preview and clean feeds.

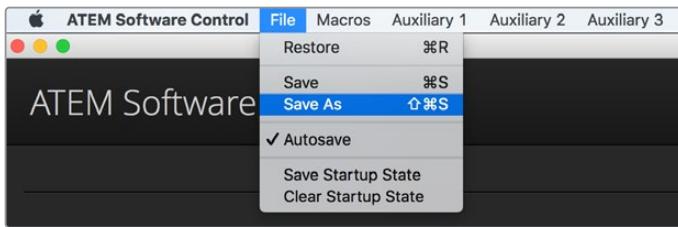
More information about auxiliary outputs and how to use them is explained in the 'using the auxiliary output' section. The aux output is extremely powerful and allow many exciting possibilities like an alternative switcher output, or very commonly used for driving video projectors and video walls on stage during concerts and live performances. Most modern live performances have complex multi media aspects to them, and the aux output is designed to allow you to control all these displays from your ATEM!

Program/Preview and A/B Direct Transition Control

When you first receive your ATEM switcher, it will be set to program/preview switching which is the current standard for an M/E switcher. You can change this preference to A/B Direct if you are using an ATEM Television Studio Pro HD and wish to use older style A/B switching. You'll find the 'transition control' options in the preferences window of ATEM Software Control.

Saving and Restoring Switcher Settings

ATEM Software Control lets you save and restore specific settings, or all of the switcher settings you have created. This powerful feature is incredibly time saving on live productions where regular settings are used. For example, you can immediately restore saved camera settings, lower third graphics and detailed key setups from a laptop or USB drive.

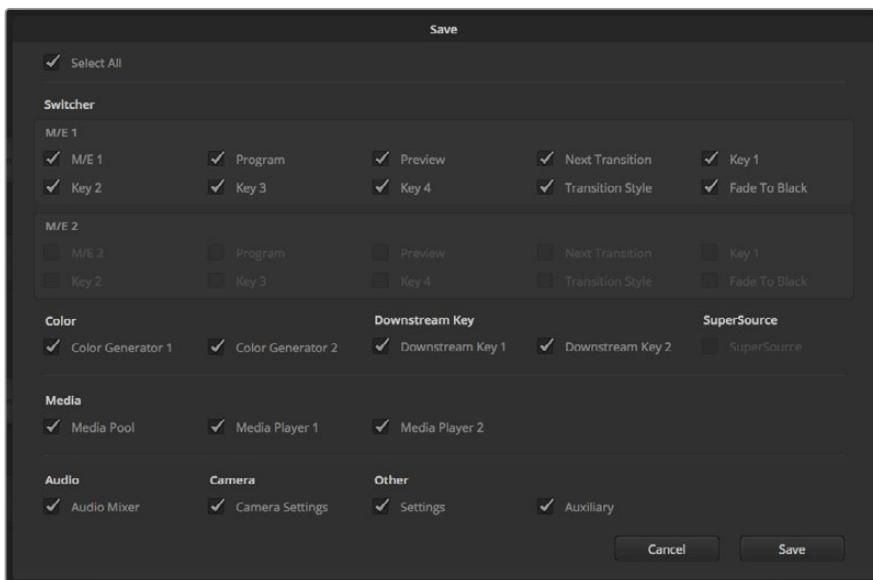


Saving settings menu.

Saving your Settings

- 1 Go to the menu bar in ATEM Software Control and select File>Save As.
- 2 A window will open asking for a file name and destination folder. After you have made your selection, click Save.
- 3 You'll now see the Save Switcher State panel containing checkboxes for all the available settings on each block of your ATEM switcher. The Select All checkbox is enabled by default. If you save with Select All enabled, ATEM Software Control saves your entire switcher settings. If you want to choose specific settings to save, you can deselect settings individually, or to remove all settings click Select All once to deselect them. Now you can select specific settings you want to save.
- 4 Click Save.

ATEM Software Control saves your settings as an XML file together with a folder for ATEM Media Pool contents.



With ATEM Software Control you can save and restore all your switcher settings for your live production, including key settings, transition styles, media pool contents and more

After you have saved your settings you can quick save at any time by selecting File>Save, or by pressing Command S for Mac, or Ctrl S for Windows. Doing so will not overwrite your previous save, but will add a new XML file to your destination folder which is clearly identified with a time and date stamp. This means you can always restore a previous save if necessary.

Restoring your Settings

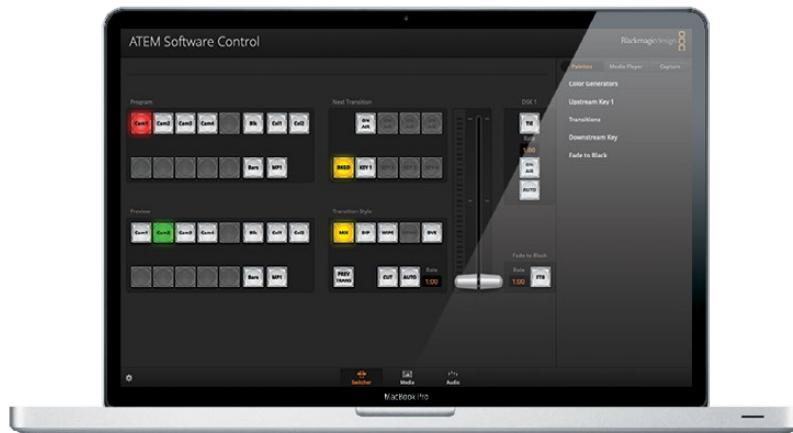
- 1 Go to the menu bar in ATEM Software Control and select File>Restore.
- 2 A window will ask for the file you want to open. Select your save file and click Open.
- 3 You'll now see a window containing active checkboxes for your saved settings on each block of your ATEM switcher. Leave Select All enabled to restore all your saved settings, or select only the checkboxes for the settings you want to restore.
- 4 Click Restore.

If your switcher settings are saved on a laptop, it's easy to take all your settings with you on location. Connect your laptop to any ATEM switcher and quickly restore your switcher settings.

Live production can be a busy and exciting time and you're always working in the moment, which means you can easily forget to back up your saved files when the production is over. If you have settings you want to keep, save them to your computer and an external drive, such as a USB drive. This means you can carry your settings with you and have a back up in case your settings are accidentally deleted on your computer.

Saving your Startup State

If you have your switcher set up the way you want it, you can easily save your entire switcher state as your default startup state. Go to the 'file' menu in ATEM Software Control and select 'save startup state'. Now whenever you restart your switcher, it will start up with your saved settings by default. If you want to clear the startup state and revert to the factory settings on restart, go to the 'file' menu and select 'clear startup state'.



Saving your switcher settings on a laptop gives you the portability to restore your settings on any ATEM switcher. Saving to a USB drive means you can even carry your settings in your pocket.

Using Camera Control

Clicking on the 'camera' button in ATEM Software Control opens the camera control feature that lets you control Blackmagic Studio Cameras, Micro Studio Cameras, URSA Mini or URSA Broadcast from your ATEM switcher. Blackmagic camera settings such as iris, gain, focus, detail and zoom control are easily adjusted using compatible lenses, plus you can color balance cameras and create unique looks using the DaVinci Resolve primary color corrector that's built into the camera.

When controlling cameras, the ATEM switcher control works by broadcasting camera control packets via all the non down converted SDI outputs of your ATEM switcher. So this means you can connect an SDI output of your ATEM switcher to the camera's video inputs and the camera will detect the control packets in the SDI link and allow you to control features in the camera itself. You can control cameras via both regular SDI or optical fiber SDI connections when an optional SFP module is installed in a Blackmagic Studio Camera.



ATEM Camera Control.

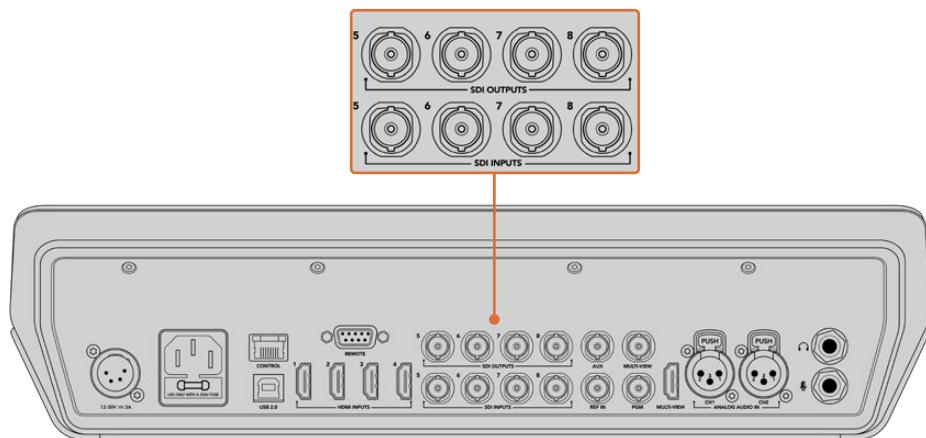
Connecting via SDI

- 1 Connect your Blackmagic camera's SDI output to any SDI input on your ATEM switcher.
- 2 Connect each of the camera SDI outputs from the switcher to the program input on each respective camera.

NOTE SDI inputs and outputs on ATEM Television Studio switchers are configured for inputs 5 to 8. For example, if you are connecting two cameras, the first available SDI inputs on ATEM Television Studio HD Pro are inputs 5 and 6. Therefore, it is also important to make sure their respective outputs from the switcher are returned to the corresponding cameras with their camera numbers set to 5 and 6. This so tally will be correct for each camera.

TIP The auxiliary output also carries camera control data so you can connect the auxiliary output to a camera's program input if you want to. Camera control signals are not sent via the multi view SDI output.

- 3 In your camera's settings, set the camera ID number to match your switcher input. For example, if studio camera 1 is connected to 'cam 5' on your ATEM switcher, the camera number in your camera settings must also be set to 5. This ensures tally is sent to the correct camera.

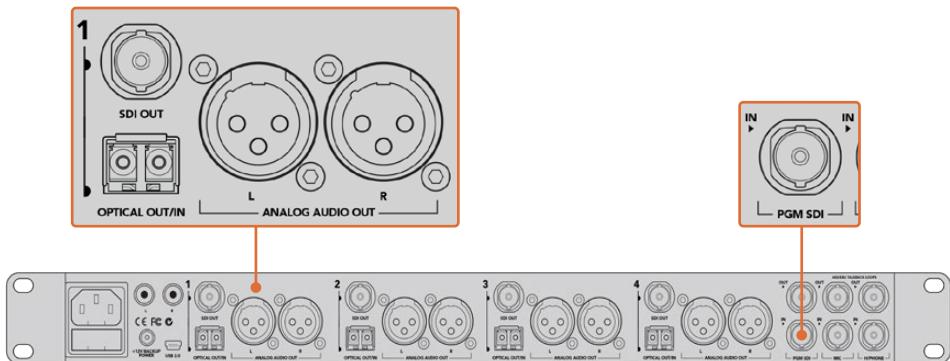


Connect a Blackmagic URSA Mini to any of your ATEM switcher's SDI inputs, and the corresponding SDI output back to the camera's program input

Connecting via Optical Fiber

- 1 Connect the Blackmagic Camera's optical out/in to the optical out/in on an ATEM Studio Converter or ATEM Talkback Converter 4K. You'll need to have SMPTE compatible optical fiber SFP modules installed in your Studio Camera and ATEM converter to connect via optical fiber.
- 2 Connect a suitable SDI out from your ATEM converter to any SDI input on your ATEM switcher.
- 3 Connect any one of your ATEM switcher's SDI outputs, except the multi view outputs to your ATEM Converter's 'SDI in'. Camera control signals are not sent via the multi view SDI output.
- 4 On the Blackmagic camera, open the LCD menu and set the camera number to match your switcher input. For example, if camera 5 is connected the 'cam 5' SDI input on your ATEM switcher, your camera number must also be set to 5. This ensures tally is sent to the correct camera.

Open ATEM Software Control preferences and set your switcher's button mapping to make sure you are switching the right camera with correct tally. With a video connection from your switcher to a Blackmagic camera, you can also get the advantage of live tally indicators, as well as the camera operators being able to view the program feed of your switcher by pressing the camera's 'pgm' button.



Connect multiple Blackmagic Studio Cameras via optical fiber using an ATEM Studio Converter. You'll need to have an optional SFP module installed in your Studio Camera to connect via optical fiber.

Camera Control Panel

Launch ATEM Software Control and click on the 'camera' button located at the bottom of the software window. You'll see a row of labeled Blackmagic camera controllers containing tools to adjust and refine each camera's image. The controllers are easy to use. Simply click the buttons using your mouse, or click and drag to adjust.

Camera Control Selection

The button row at the top of the camera control page lets you select the camera number you would like to control. If you have more cameras that fit onto the window size, or you are running the color corrector window, then you can use these buttons to select between which camera you would like to control. If you are using an Aux output for monitoring your camera control, pushing these buttons to change the camera to control will also send that camera's video output to the Aux output setup in the switcher preferences.

Channel Status

The channel status at the top of each camera controller displays the camera label, On Air indicator and lock button. Press the lock button to lock all the controls for a specific camera. When on air, the channel status illuminates red and displays the On Air alert.

Camera Settings

The camera settings button near the bottom left of the master wheel lets you turn on the color bars feature in Blackmagic Studio Cameras, Micro Studio Cameras and URSA mini, plus adjust detail settings for each camera's picture signal.



Each camera controller displays the channel status so you know which camera is on air. Use the color wheels to adjust each YRGB channel's lift, gamma and gain settings.

Show/Hide Color Bars

Blackmagic cameras have a color bars feature built in which you can turn on or off by selecting 'show' or 'hide' color bars. This feature can be very useful for visually identifying individual cameras while setting up for your live production. Color bars also provide an audio tone so you can easily check and set the audio levels from each camera.

Detail

Use this setting to sharpen the image from your cameras live. Decrease or increase the level of sharpening by selecting: Detail off, detail default for low sharpening, medium detail, and high detail.

Color Wheel

The color wheel is a powerful feature of the DaVinci Resolve color corrector and used to make color adjustments to each YRGB channel's lift, gamma and gain settings. You can select which setting to adjust by clicking on the three selection buttons above the color wheel.

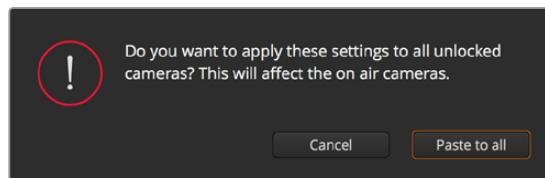
Master Wheel

Use the master wheel below the color wheel to make contrast adjustments to all YRGB channels at once, or luminance only for each lift, gamma or gain setting.

Reset Buttons

The reset button near the bottom right of each camera controller lets you easily choose color correction settings to reset, copy or paste. Each color wheel also has its own reset button. Press to restore a setting to its default state, or copy/paste a setting. Locked controllers are not affected by the Paste feature.

The master reset button on the bottom right corner of the color corrector panel lets you reset lift, gamma and gain color wheels plus Contrast, Hue, Saturation and Lum Mix settings. You can paste color correction settings to camera controllers individually, or all cameras at once for a unified look. Iris, focus, coarse and pedestal settings are not affected by the Paste feature. When applying Paste to all, a warning message will appear asking you to confirm your action. This is so you don't accidentally paste new settings to any unlocked cameras that are currently on air.



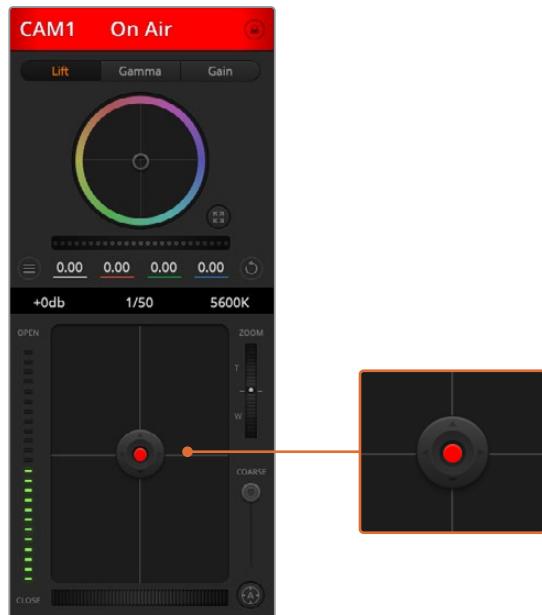
When applying 'paste to all', a warning message will appear asking you to confirm your action. This is so you don't accidentally paste new settings to any unlocked cameras that are currently on air.

Iris/Pedestal Control

The iris/pedestal control is located within the cross hairs of each camera controller. The control illuminates red when its camera is on air.

To open or close the iris, drag the control up or down. Holding the shift key allows only iris adjustments.

To darken or lift the pedestal, drag the control left or right. Holding the command key on a Mac, or the Control key on Windows, allows only pedestal adjustments.



The iris/pedestal control illuminates red when its respective camera is on air.

Zoom Control

When using compatible lenses with an electronic zoom feature, you can zoom your lens in and out using the Zoom control. The controller works just like the zoom rocker on a lens, with telephoto on one end, and wide angle on the other. Click on the zoom control, located above the Coarse slider, and drag up to zoom in, or drag down to zoom out.

Coarse Setting

The coarse setting is located to the right of the iris/pedestal control and is used to limit the iris range. This feature helps you prevent over exposed images from going to air.

To set your coarse threshold, completely open the iris using the iris control, then drag the coarse setting up or down to set optimum exposure. Now when you adjust the iris, the coarse threshold will prevent it from going above optimum exposure.

Iris Indicator

The iris indicator is located to the left of the iris/pedestal control and displays a visual reference so you can easily see how open or closed the lens aperture is. The iris indicator is affected by the coarse setting.

Auto Focus Button

The auto focus button is located at the bottom right corner of each camera controller. Press to automatically set the focus when you have an active lens that supports electronic focus adjustments. It's important to know that while most lenses support electronic focus, some lenses can be set to manual or auto focus modes, and so you need to ensure your lens is set to auto focus mode. Sometimes this is set by sliding the focus ring on the lens forward or backward.



Click on the auto focus button or drag the manual focus adjustment left or right to focus a compatible lens.

Manual Focus Adjustment

When you want to adjust the focus on your camera manually, you can use the focus adjustment located at the bottom of each camera controller. Drag the wheel control left or right to manually adjust focus while viewing the video feed from the camera to ensure your image is nice and sharp.

Camera Gain

The camera gain setting allows you to turn on additional gain in the camera. This is important when you are operating in low light conditions and need extra gain in the front end of the camera to avoid your images being under exposed. You can decrease or increase gain by clicking on the left or right arrows on the dB gain setting.

You can turn on some gain when you need it, such as outdoor shoots when the light fades at sunset and you need to increase your image brightness. It's worth noting that adding gain will increase noise in your images.

Shutter Speed Control

The shutter speed control is located in the section between the color wheel and the iris/pedestal control. Decrease or increase the shutter speed by hovering your mouse pointer over the shutter speed indicator and then clicking on the left or right arrows.

If you see flicker in lights you can decrease your shutter speed to eliminate it. Decreasing shutter speed is a good way to brighten your images without using camera gain because you are increasing the exposure time of the image sensor. Increasing shutter speed will reduce motion blur so can be used when you want action shots to be sharp and clean with minimal motion blur.

White Balance

The white balance setting next to the shutter speed control can be adjusted by clicking on the left or right arrows on each side of the color temperature indicator. Different light sources emit warm or cool colors, so you can compensate by adjusting the white balance. This ensures the whites in your image stay white.



Hovering your mouse pointer over the gain, shutter speed and white balance indicators reveal arrows you can click on to adjust their respective settings.

DaVinci Resolve Primary Color Corrector

If you have a color correction background, then you can change your camera control from a switcher style CCU interface to a user interface that's more like a primary color corrector on a post production color grading system.

Blackmagic cameras feature a DaVinci Resolve primary color corrector built in. If you have used DaVinci Resolve, then creatively, grading in the Blackmagic camera will be identical so you can use your color grading experience for live production. The color corrector panel can be expanded out of any camera controller and provides expanded color correction control with extra settings and a full primary color corrector interface.

You have color wheels and settings such as saturation available and you can see shadows, mid tones and highlight settings all at the same time. Simply switch between cameras using the camera selection controls at the top of the window as you need.



Click on the DaVinci Resolve primary color corrector button to expand the color correction window and adjust settings.



Lift, gamma and gain color wheels in the color corrector panel.

Color Wheels

Click and drag anywhere within the color ring

Note that you don't need to drag the color balance indicator itself. As the color balance indicator moves, the RGB parameters underneath change to reflect the adjustments being made to each channel.

Shift-Click and drag within the color ring

Jumps the color balance indicator to the absolute position of the pointer, letting you make faster and more extreme adjustments.

Double-click within the color ring

Resets the color adjustment without resetting the master wheel adjustment for that control.

Click the reset control at the upper-right of a color ring

Resets both the color balance control and its corresponding master wheel.

Master Wheels

Use the master wheels below the color wheels to adjust each YRGB channels' lift, gamma and gain controls.



Adjust the master wheels by dragging the wheel control left or right.

To make adjustments using the master wheel:

Drag the master wheel left or right

Dragging to the left darkens the selected parameter of the image, dragging to the right lightens that parameter. As you make an adjustment, the YRGB parameters underneath change to reflect the adjustment you're making. To make a Y-only adjustment, hold down the ALT or Command key and drag left or right. Because the color corrector uses YRGB processing, you can get quite creative and create unique affects by adjusting the Y channel only. Y channel adjustments work best when the Lum Mix setting is set to the right side to use YRGB processing vs the left side to use regular RGB processing. Normally, most DaVinci Resolve colorists use the YRGB color corrector as you get a lot more control of color balance without affecting overall gain, so you spend less time getting the look you want.

Contrast Setting

The Contrast setting gives you control over the distance between the darkest and lightest values of an image. The effect is similar to making opposing adjustments using the lift and gain master wheels. The default setting is 50%.

Saturation Setting

The Saturation setting increases or decreases the amount of color in the image. The default setting is 50%.

Hue Setting

The Hue setting rotates all hues of the image around the full perimeter of the color wheel. The default setting of 180 degrees shows the original distribution of hues. Raising or lowering this value rotates all hues forward or backward along the hue distribution as seen on a color wheel.

Lum Mix Setting

The color corrector built into Blackmagic cameras is based on the DaVinci Resolve primary color corrector. DaVinci has been building color correctors since the early 1980's and most Hollywood films are color graded on DaVinci Resolve than any other method.

This means that your color corrector built into the camera has some unique and creatively powerful features. The YRGB processing is one of those features.

When color grading, you can choose to use RGB processing, or YRGB processing. High end colorists use YRGB processing because you have more precise control over color and you can independently adjust the channels with better separation and more creative options.

When the Lum Mix control is set to the right side, you have the 100% output of the YRGB color corrector. When you have the Lum Mix control set to the left side, you get 100% output of the RGB corrector. You can set the Lum Mix to any position between the left and right to get a blend of output from both the RGB and YRGB correctors.

Which is the correct setting to use? That's up to you, as color correction is a pure creative process and there is no right and wrong, and the best setting is what you like the most and what you think looks good!



Drag the sliders left or right to adjust Contrast, Saturation, Hue and Lum Mix settings.

Synchronizing Settings

When connected, camera control signals are sent from your ATEM switcher to the Blackmagic camera. If a setting is accidentally adjusted from your camera, camera control will automatically reset that setting to maintain synchronization.

NOTE All camera control features including color correction can be adjusted and controlled directly from ATEM Television Studio Pro HD's built in hardware camera control. Refer to the 'using ATEM Television Studio Pro HD's built in control panel' section for more information.

Using a DaVinci Resolve Micro Panel

The DaVinci Resolve primary color corrector in each camera controller can be controlled using a DaVinci Resolve Micro panel. This lets you make fast and precise color adjustments using a hardware control panel.

TIP For the DaVinci Resolve Micro Panel to communicate with your ATEM switcher, make sure you have installed DaVinci Resolve 12.5.5 or later, and ATEM switchers 7.1 or later.

To set up a DaVinci Resolve Micro Panel with your ATEM switcher

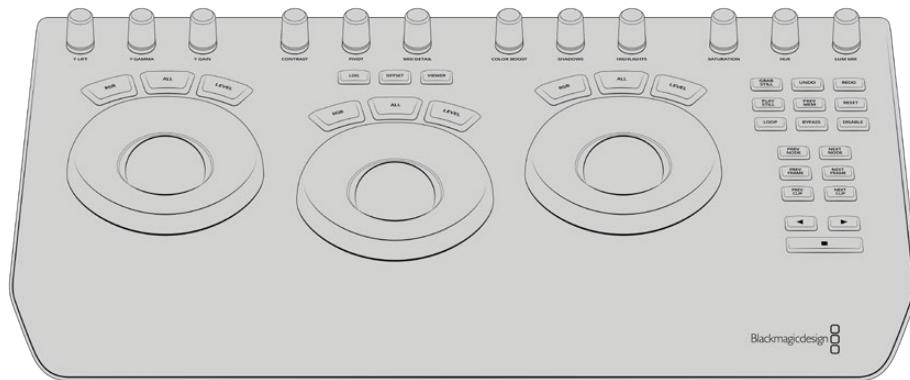
- 1 Connect the DaVinci Resolve Micro Panel to your computer via USB-C and launch ATEM Software Control.
- 2 Click on the 'camera' tab and select a camera by clicking anywhere in the desired camera controller.
- 3 On the DaVinci Resolve Micro Panel, rotate the trackballs and turn the knobs to adjust the corresponding controls in the primary color corrector.

Making Color Correction Adjustments

The DaVinci Resolve Micro panel is primarily designed for use with DaVinci Resolve software, but you can also use it to make adjustments in the color corrector panel of ATEM Software Control in the following way:

The Trackballs

The three trackballs control the lift, gamma and gain color wheels in the color corrector panel. The ring surrounding each trackball adjusts the corresponding master wheels beneath the color wheels.



DaVinci Resolve Micro Panel

Control Knobs

As you change settings with the hardware panel, you will see the corresponding settings on the software panel change as well. Use the following control knobs to make adjustments.

Y Lift	Allows you to modify image contrast via a Y-only adjustment for the black level.
Y Gamma	Allows you to modify image contrast via a Y-only adjustment for gamma.
Y Gain	Allows you to modify image contrast via a Y-only adjustment for highlights.
Contrast	Rotate clockwise to increase contrast and counterclockwise to reduce contrast.
Highlights	The 'highlights' knob controls the iris on your selected camera. Rotate the knob clockwise to open the iris and counterclockwise to close.
Saturation	Rotate clockwise or counterclockwise to increase or decrease color saturation.
Hue	Adjust the hue along the hue distribution as seen on a color wheel by rotating the 'hue' knob clockwise or counterclockwise.
Lum Mix	Rotate clockwise or counterclockwise to set the output blend between the RGB and YRGB correctors.

Control Buttons

Left Arrow	Select the previous camera number
Right Arrow	Select the next camera number

For more information on how each control affects the image, refer to the details provided earlier in this section.

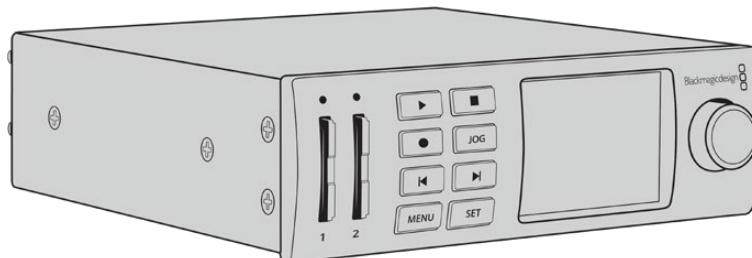
HyperDeck Control

Introducing HyperDeck Control

You can connect up to 4 Blackmagic HyperDeck Studio disk recorders to your switcher and control them using the HyperDecks palette in ATEM Software Control, the macro buttons or LCD menu on ATEM Television Studio Pro HD's built in control panel, or from the system control buttons on an ATEM hardware panel. This is a very powerful feature! With four HyperDecks connected to your switcher, it's like having a portable videotape department able to record outputs from your switcher, play back graphics, or you can even set your switcher to roll prerecorded segments at the press of a button!

Transport controls are located in the HyperDecks palette in ATEM Software Control, or in the system control menu on an ATEM hardware panel, which lets you play back video, jog and shuttle, skip clips, pause and more. You can also record video.

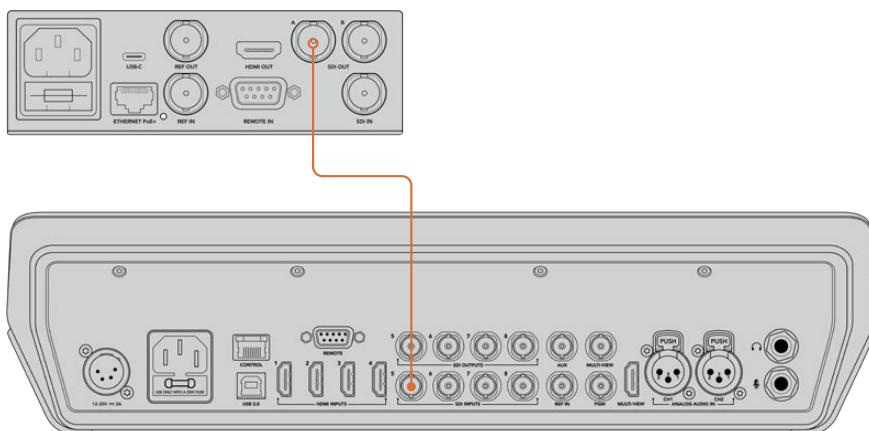
When you combine this feature with ATEM's powerful macros feature, it opens up a world of creative possibilities that can really enhance your live production!



Connecting HyperDecks

Connecting Blackmagic HyperDecks to your switcher is very similar to connecting cameras and other video sources via your switcher's SDI or HDMI inputs. The only additional connection is Ethernet which lets your ATEM switcher communicate with the HyperDeck disk recorder.

- 1 Using the Ethernet connector, connect your HyperDeck disk recorder to the same network your ATEM switcher is connected to.
- 2 Press the remote button marked 'REM' on the HyperDeck's control panel. The 'REM' button will illuminate which means the HyperDeck has remote control enabled. On HyperDeck Studio Mini, remote is enabled by setting the 'remote' setting to 'on' using the LCD menu.



Plug the SDI or HDMI output of a HyperDeck into one of your ATEM switcher's SDI or HDMI inputs

- 3** Plug the SDI or HDMI output of your HyperDeck into one of the SDI or HDMI inputs of your ATEM Switcher.
- 4** Repeat the process for each HyperDeck you want to connect.

Now all you have to do is tell ATEM Software Control or ATEM hardware panel which input and IP address each HyperDeck is using. You can do this easily in the HyperDeck tab in ATEM Software Control switcher settings, or using the system control soft buttons or LCD menu on an ATEM hardware panel.

TIP If you want to record the output from your switcher to a HyperDeck, plug your switcher's program or auxiliary SDI output into the SDI input of the HyperDeck. If using the auxiliary output to record the program feed, don't forget to route the program output to the aux output. Or if you want to, you can even record a clean feed, or any of your switcher's inputs by routing them to the aux output.

HyperDeck Settings

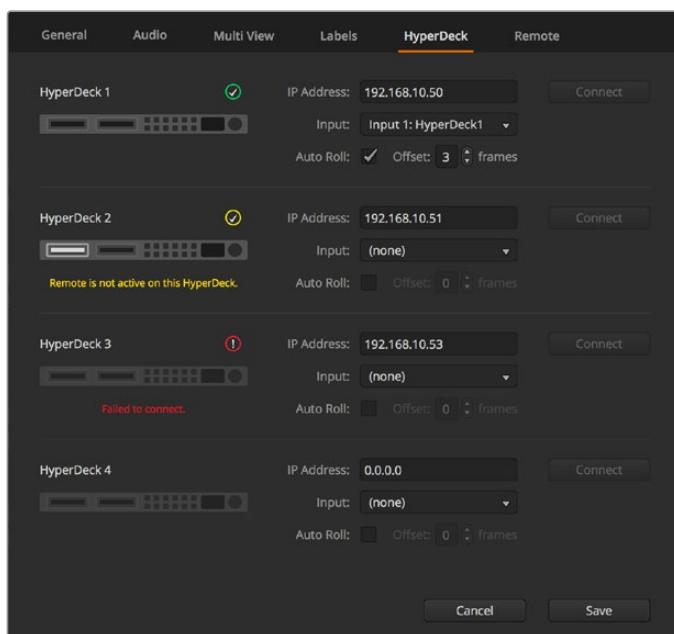
HyperDeck connection settings are located in the 'HyperDeck' tab of the ATEM Software Control switcher settings. Here you'll see setup options for up to four HyperDecks.

Type in your HyperDeck's IP address in the 'IP Address' box and choosing the source it's plugged into from the 'input' dropdown menu. Click 'connect' and your HyperDeck is ready to be controlled.

Status indicators appear above and below each HyperDeck icon to let you know the connection status. A green tick means your HyperDeck is connected, in remote and ready to go.

If your HyperDeck is connected and recognized, but does not have its remote button enabled, you will see an indicator letting you know remote is not active.

If your HyperDeck is not recognized, you will see a 'failed to connect' indicator. If you see this indicator, check the HyperDeck's Ethernet port is connected to your network and the IP address is entered correctly.



Auto Roll

You can set a HyperDeck disk recorder to automatically roll video when it is switched to the program output. For example, you can cue a HyperDeck to the point you want your source to begin, then roll the source by pressing its input button on the mix effects program row.



As HyperDecks must buffer a couple of frames before commencing playback, the actual cut will be delayed a preset number of frames to ensure a clean transition. This is just like setting a preroll on a videotape machine. You can adjust the length of this delay by changing the number in the 'offset' box. We've found that five frames usually ensures a clean cut.

If you want to cue to a still frame of video or manually trigger video playback on your HyperDeck, you can also deselect the 'auto roll' feature.

Controlling HyperDecks with ATEM Software Control

To control the HyperDecks connected to your switcher, click the 'media players' tab in the software control panel, and choose the 'HyperDecks' palette.

Here you can choose between each of the HyperDecks connected to your system by clicking one of the four buttons along the top of the panel. These are named according to the labels entered in ATEM settings. Available HyperDecks are shown with white text, while the HyperDeck you are currently controlling is shown in orange.



Choose from up to four HyperDecks by clicking their selection buttons in the HyperDecks palette

In addition to the text color, each HyperDeck's selection button also has a tally indicator.

Green Outline	Indicates a HyperDeck that is currently switched to the preview output.
Red Outline	Indicates a HyperDeck that is currently switched to the program output, meaning it is currently live to air. You may also see one of the following status indicators above the selection buttons for your HyperDecks.

Ready	HyperDeck is set to remote and a disk is inserted. It is ready for playback and recording if space is available.
Record	HyperDeck is currently recording.
No Disk	HyperDeck has no disk inserted.
Local	HyperDeck is not set to 'remote' and cannot currently be controlled by your ATEM switcher.

When you select a HyperDeck, you'll see information about the currently selected clip such as the name and length, as well as time elapsed and time remaining. Below this you'll see the control buttons.

	Record Click on this button to start recording on your HyperDeck. Click again to stop recording.
	Previous Clip Moves to the previous clip in your HyperDeck's media list.
	Play Clicking 'play' once initiates playback, clicking it again stops playback. If you have 'auto roll' enabled in your HyperDeck settings, playback will commence automatically when your HyperDeck is switched to the program output.
	Next Clip Moves to the next clip in your HyperDeck's media list.
	Loop Click 'loop' once to loop the currently selected clip and again to loop all of the clips in your HyperDeck's media list.

To move through a clip use the shuttle/jog slider underneath your HyperDeck's control buttons. This lets you move quickly, or shuttle through a selected clip, or jog frame by frame. You can switch between these modes with the buttons next to the shuttle/jog slider.



Choose between shuttle and jog transport controls with the buttons to the left of the transport slider. Adjust the slider left and right to move forward or backwards through your clip.

The clip list below the transport control shows all of the clips currently available on the selected HyperDeck. You can expand or collapse the list by pressing the arrow to the right of the clip list.

Playback

To play media on your HyperDeck, simply switch the HyperDeck source to the preview output and select the clip you want to show. Use the transport controls to cue to the preferred point in your clip. When you switch your HyperDeck to program output, the 'auto roll' feature will automatically start playback from this point.

If you want to manually trigger the playback, for example holding on a still frame then rolling, simply disable the respective HyperDeck's auto roll checkbox in the 'HyperDeck' tab in ATEM software's 'settings' menu.

Recording

To record to a HyperDeck with a formatted disk inserted, simply press the 'record' button in the HyperDeck palette transport controls. The 'time remaining' indicator in the HyperDeck palette will let you know the approximate recording time remaining in the SSD.

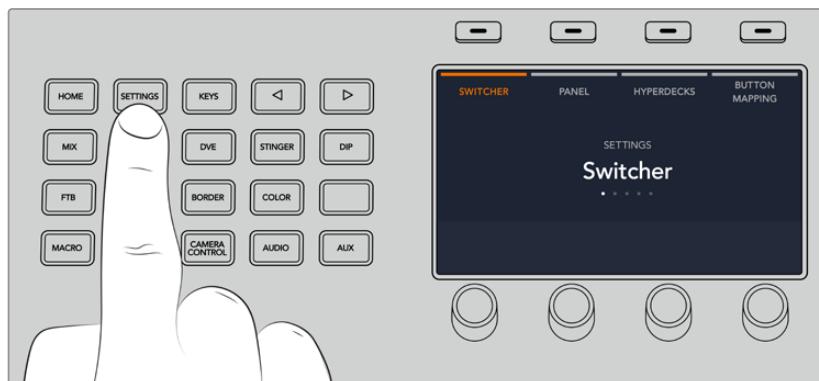
Controlling HyperDecks with External Hardware Panels

If you are using an external ATEM hardware panel, you can control any connected HyperDecks using the hardware panel. Once you have connected your HyperDecks to your switcher as described in the 'connecting HyperDecks' section, you can use the system control buttons and LED menu on your panel to set up and control each HyperDeck.

HyperDeck Setup with ATEM Advanced Panels

Once you have connected your HyperDeck to your switcher, as detailed in the 'connecting HyperDecks' section, use ATEM Advanced Panel's system control and LCD soft buttons to setup and control your HyperDecks.

To begin, press the system control 'settings' button.



You'll notice that ATEM advanced panels display four setup options along to top of the LCD screen. These include 'switcher,' 'panel,' 'HyperDecks,' and 'button mapping.' Each corresponds to a setup menu. Simply press the LCD soft button above 'HyperDecks' to enter the 'HyperDeck settings' menu.

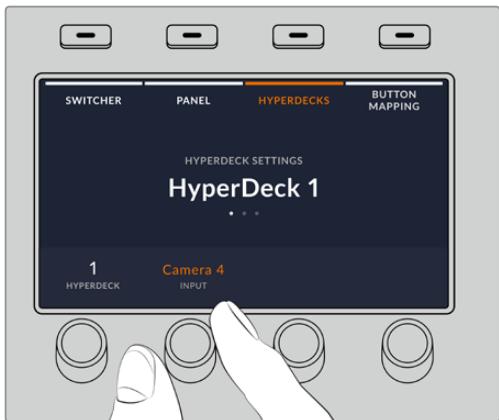
The HyperDeck settings menu has three pages, which you can select using the 'left' and 'right' arrow buttons in the system control panel, or by pressing the '1,' '2,' and '3' buttons on your ATEM advanced panel's numerical keypad.

Assigning an input to a HyperDeck

In the first menu page, you'll see the 'HyperDeck' indicator in the bottom left corner, and an 'input' indicator.

Use the control knob under the 'HyperDeck' indicator to cycle through the available HyperDecks.

Once you have selected a HyperDeck, simply rotate the knob under the 'input' indicator to select which input that HyperDeck is connected to on your switcher. For example, if HyperDeck 1 is connected to SDI In 4 on your switcher, rotate the knob under the 'input' indicator to select 'camera 4.' Press the 'input' knob to confirm your selection.



Repeat this process for any additional HyperDecks you have connected to your switcher by assigning inputs to HyperDeck slots 1, 2, 3 and 4, if required.

Assigning an IP Address

Once you've assigned an input to a HyperDeck, you'll need to enter its IP address. This allows ATEM Advanced Panels to control the HyperDeck via Ethernet.

To enter a HyperDeck's IP address, navigate to the third HyperDeck settings page with the 'left' or 'right' arrow buttons, or pressing '3' on the numeric keypad while in the HyperDeck settings menu.

In this page, you'll see an IP address for the currently selected HyperDeck. Each IP address number corresponds to a rotary knob below it. To change these numbers, you can rotate the corresponding knob, or press the knob once and enter a number using the numeric keypad. Do this for each number in the IP address.

Once you've entered the IP address for your HyperDeck, press the soft button corresponding to the 'save changes' indicator to confirm the address. To cancel, press 'undo'.



To enter the IP address for subsequent HyperDecks, you'll need to select the HyperDeck using the first page of the HyperDeck settings menu.

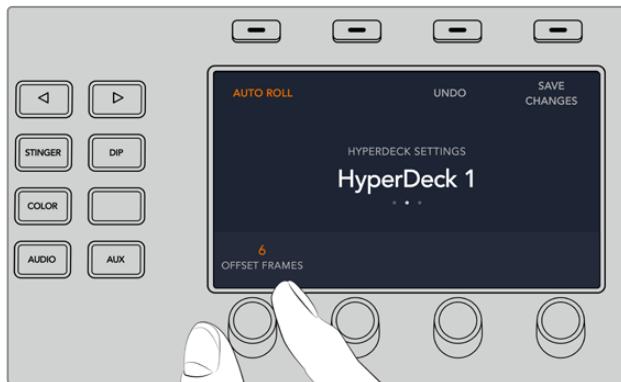
Auto Roll

You can toggle your HyperDeck's auto roll function from the second screen of the HyperDeck settings menu. While in the HyperDeck settings menu, use the 'left' or 'right' arrow buttons in the system control panel to navigate to this screen.

While in this menu, press the LCD soft button above the 'auto roll' indicator to turn the auto roll feature on. The indicator text will illuminate blue when auto roll is on.

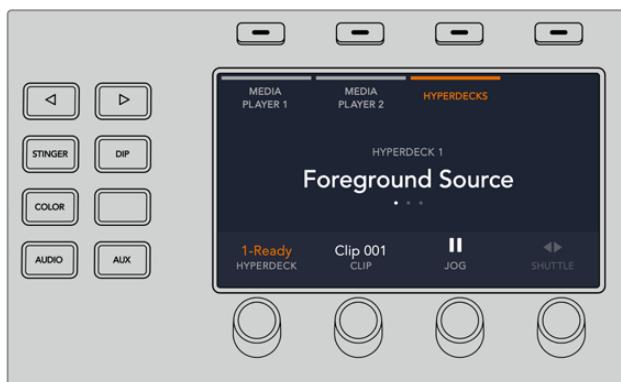
The auto roll feature lets you set a HyperDeck disk recorder to automatically roll video when it is switched to the program output. For example, you can cue a HyperDeck to the point you want your source to begin, then roll the clip by pressing the HyperDeck's input button on the program row.

As HyperDecks must buffer a couple of frames before commencing playback, the actual cut will be delayed a preset number of frames to ensure a clean transition. This is just like setting a preroll on a videotape machine. You can adjust the length of this delay by changing the 'offset' frames number using the control knob under this indicator. Press the soft button above the 'save changes' indicator to confirm your change.



Controlling HyperDecks with ATEM Advanced Panels

HyperDeck controls are available in the 'media players' menu in your ATEM Advanced Panel. To access this menu, simply press the 'media players' control panel button and press the soft button above the 'HyperDecks' indicator to access HyperDeck control. If your switcher has more than two media players, you may need to navigate to the next menu page to access HyperDeck controls.



You can now use the rotating knobs below the 'hyperdeck,' 'clip,' 'jog' and 'shuttle' indicators to select HyperDecks, select clips, and jog and shuttle these clips.



The text in the center of the HyperDeck control menu will change to reflect the HyperDeck and clip that you have selected.



Use the third and fourth pages of the ‘media players’ LCD menu for more HyperDeck controls, including play, stop, loop playback, and forward and reverse skip for moving between clips.

TIP To play all clips, hold down the shift button and press the ‘play’ soft button.



In the fourth menu page, press the ‘record’ button to record the program output of your switcher to your HyperDeck. Use the ‘jog’ and ‘shuttle’ commands to scrub through recorded footage.

Using the ATEM Television Studio HD Front Panel

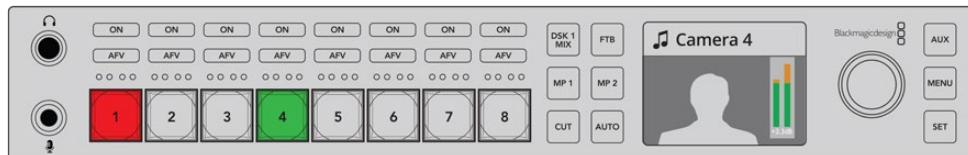
The ATEM Television Studio HD model includes a fully functioning front panel that lets you operate the switcher from the front panel. However, due to space limitations on the small 1 rack unit front panel, the panel is different to the other hardware and software control panels that ATEM switchers use. In this section we will show you how to use your switcher from this front panel.

Performing a Transition

The first step in using the front panel is to perform a transition. You can see the row of 8 large buttons, which represent the inputs into the switcher. The first 4 buttons are for HDMI inputs, and the second 4 buttons are for the SDI inputs. When you first turn on the switcher, you will see input 1 is the button illuminated red. This means that input 1 is on air, and if you have a video source connected to input 1 it should appear on the program output.

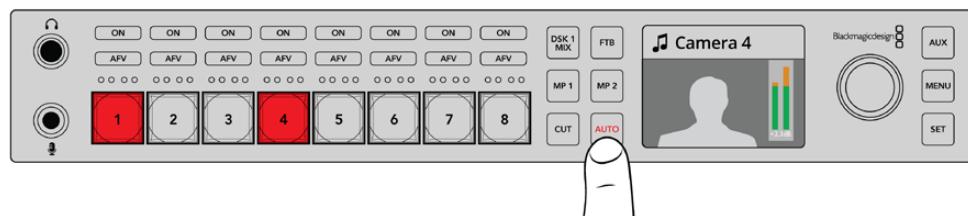
But unlike a normal hardware or software control panel, the row of input buttons is really the preview row, with the active program source also shown on this same row of 8 buttons. This is because of the small size of the control panel and there is not enough room to have two rows of buttons like a normal program/preview switcher control panel has.

To perform a transition, use the following steps. In the example below, we have input 1 on air, and we want to transition to input 4.



- 1 Select the next source by pressing button 4. The button will now illuminate green to show it's selected on the preview bus.
- 2 Now press the cut or auto buttons.

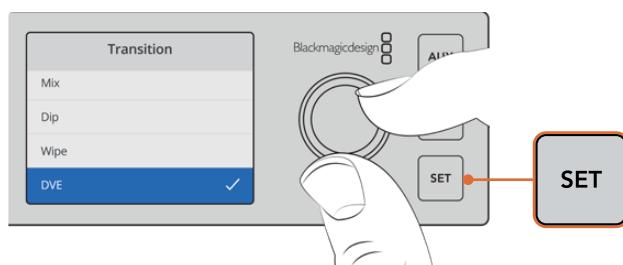
If you press cut, button 4 will now illuminate red as it's on air. Input 4 will also be switched to the program outputs. If you select auto, then the currently selected transition will be triggered and for the transition duration, you will see both buttons 1 and 4 illuminated red, because during the transition both sources are on air.



Press the 'auto' button to perform an auto transition

That's all there is to it! If you would like to change the transition type, then you can do this in the LCD menus. To change the transition type, use the following steps.

- 1 Press the menu button to display the menus.
- 2 Scroll with the knob through the menus to the "Transition" menu.
- 3 Press the set button and you will see the transition menu page will be selected.
- 4 Now scroll down the list of items in the transition menu until you get to the transition item.
- 5 Press the set button and scroll through the list of options. Let's select the DVE transition.
- 6 Press set to select it. You can press the menu button to back out of the menus back to the main video preview screen.



Use the LCD menu to select the transition type and you can also set the transition duration in the transition settings.

While in the menu, you can press the auto button to see the different types of transitions available to you. Each one of the transition types listed in the LCD menus can also be selected on the software control panel or a hardware control panel if you have one.

As well as the 8 main input buttons, there is also some other sources on the front panel and they are labeled MP 1 and MP 2. These are media player 1 and media player 2. If you have graphics in your switcher, such as a graphic or title slide, then you can select the media players as sources and then cut or transition to them.

Selecting Other Sources

You can select other sources in the switcher that are not on the front panel from the LCD menus.

To select an alternative program source, use the following steps.

- 1 Press the menu button to display the menus.
- 2 Scroll with the knob through the menus to the "Program" menu.
- 3 Press the set button and you will see the program menu page will be selected.
- 4 Now scroll down the list of sources in the program menu until you get to the one you want. In this example, let's select color bars.
- 5 Press set to select it.
- 6 Press the menu button to back out of the menus back to the video preview screen.

You will see color bars appear on the program output and you will notice that none of the buttons on the front panel will be illuminated red any longer and that's because none of the sources that use the front panel buttons are on air. If you have a source on the front panel selected on preview, you will still see that button illuminated green. You can press cut or auto to transition between the color bars and the preview source.

However, selecting sources on the program bus is quite dangerous as they are instantly switched to air. So a better option is to scroll to the preview LCD menu and select the source you want, then confirm it on the preview monitor in the multi view as being the correct source before transitioning to it using the cut or auto buttons.



A safe way to preview sources before switching them to air is to use the LCD menu to select sources to the preview output and monitor them on the multi view

Changing to Cut Bus Switching

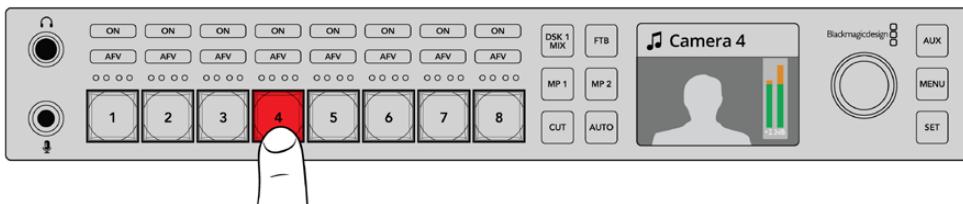
By default, the control panel works in program/preview mode, which is more like a traditional switcher and means changing sources is a two step process where you select the next source on the preview bus and then select cut or auto. However, in many cases you might like to have the switch to the new source happen immediately when you select it. This mode is called cut bus switching and you can change the mode in the LCD menus.

To change to cut bus mode, use the following steps.

- 1** Press the menu button to display the menus.
- 2** Scroll with the knob through the menus to the “Settings” menu.
- 3** Press the set button and you will see the settings menu page will be selected.
- 4** Now scroll down the list to the mode menu and select it by pressing the set button.
- 5** Scroll to the cut bus mode and select it by pressing set.
- 6** Press the menu button to back out of the menus back to the video preview screen.

Now the front panel will have changed how it works and switching is performed the instant you select a source. For example, try selecting a different source using the main input buttons and you can see that it's immediately selected and the button is illuminated red. You will notice that there is no green button highlighted now and that's because there is no preview bus to select the source as the source is simply selected the moment you push the button and it's on air instantly. That's why all buttons are now illuminated red.

However, there is another change to the front panel in cut bus mode and that's the behavior of the cut and auto buttons. Now the inputs are selected the instant you press them, the cut and auto buttons don't trigger the transition anymore. What they are now used for is to select the type of transition you want when you press the input buttons.



In cut bus mode, any input button you press switches directly to the program output

So for example if you want cuts when you select sources, then select the cut button. It will be illuminated and now when you select sources you will see a cut. If you want to do transitions now, then press the auto button. It will illuminate and now when you select sources, you will see that each transition will use your currently selected transition. As we selected the DVE transition in the example above, you should see a DVE transition, but the transition performed will be the transition you selected in the transition menu. Use the same process as shown in the previous examples to select the type of transition you want in the LCD menus.

If you have many people using your ATEM Television Studio HD, you might want to do a few test transitions to see what mode the switcher is set to. It's a very personal choice to use either program/preview or cut bus style of operation, so you will find that different operators will change between modes based on their preference.

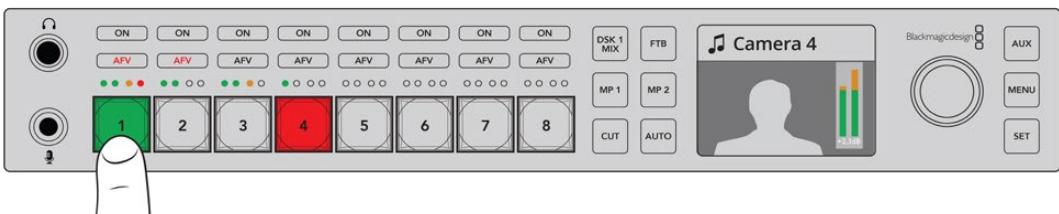
In Case of Strange Behavior!

It's important to note that anything you change on the front panel buttons or in the LCD menus here will also be reflected on the software and hardware panel. What this means is if the front panel does not behave in a normal way and seems to be doing strange things that are unexpected, then it could be that another user has selected a mode that you cannot easily see on the front panel. For example, another user could have a keyer selected and no background, so when you press the auto button you are actually selecting a keyer. If you see this happen, it's a good idea to check the LCD menus or use the software control panel to clear these settings back to normal.

This is very important if someone selects a specific switcher feature and then saves the switcher state! It could mean you turn on the switcher and the front panel does not do what you expect!

Understanding the Audio Controls

You can mix audio on the front panel using the audio controls. As audio is quite dynamic and changes constantly, the front panel audio controls are important to ensure you don't have audio distortion from audio sources that are too high in level, or the audio is not so soft that your program master or streaming is hard for viewers to listen to.



The ON and AFV buttons let you control the audio for each source, and the 4 LED meter lets you visually identify if the audio for a specific source is too low or too high

If you look at the front panel above the main source buttons you can see that each source button has a small audio meter plus an ON and AFV button. These buttons above the source buttons are the audio controls for that specific input. If you want to control the audio settings for input 1, then you use the controls immediately above input 1. It's the same for each of the other inputs to the switcher and the controls for each input are above the input source button.

You can also change audio settings in the LCD menus as there is a full menu just for audio settings, proving an alternative way of adjusting audio. Of course, any control you do on the front panel and in the LCD menus is also reflected in the software control panel. You can try connecting a computer, selecting the audio mixer in the software control panel and watching the effect of each front panel setting on the audio mixer. This can be a good way of better understanding what the front panel audio controls are doing.

Audio Control

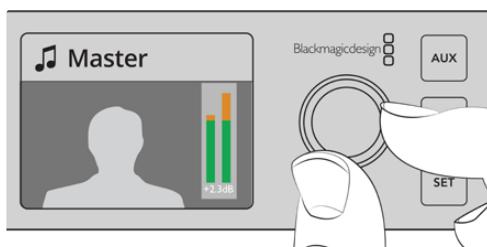
To turn audio for this input on permanently, simply press the ON button above its source button. Now the audio from that input will be sent to the built in audio mixer and be heard on the program output.

To select audio only when the input is on air, select the AFV button. This means audio follows video and the input is now only on when the source is on air.

Audio Levels

The function of the knob on the front panel is primarily for audio level adjustment, although it is used for menu selection when you are in the LCD menus. However, normally it's used for audio level control, and you can tell what it's controlling by looking at the LCD. The label on the LCD will tell you what the knob is adjusting.

Normally, the LCD has the label Master and this means the knob is adjusting the main audio mixer master output. Adjusting the knob will lower the whole program audio levels and you can see the effect on the main audio meters in the LCD that are superimposed on the video preview.



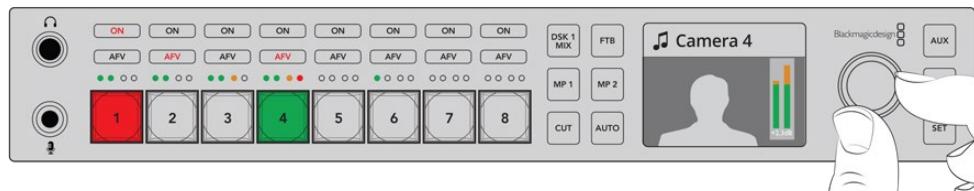
Use the knob to adjust the master audio level and you can see the effect on the main audio meters in the LCD

If you want to adjust the audio for one of the inputs, this is where the small 4 LED meter above the source button is used. This small meter lets you identify where a hot audio level could be coming from. If the main audio level is too high and only one of the small meters on the front panel has a red flashing LED then this means that only that single input is too high level.

So in this case you don't want to adjust the master audio level because all the other inputs will now become too low. You really want to select the input audio level and adjust just that single audio level.

To adjust an input audio level, for example on input 4:

- 1 Select the input 4 button. This is easier when using program/preview mode as you can just select it on the preview source.
- 2 The LCD will change to that input and for this example input 4 would be displayed on the LCD.
- 3 Now adjust the knob and you will see the small 4 LED audio meter will reduce in level. If this input is on air, you will also see the master audio output will be reduced because this input is being lowered in level.



The small 4 LED meters above each input let you quickly identify if a specific input audio level is too high and you can adjust it by pressing the respective input button and then adjusting the control knob

To go back to the master audio level:

- 1 Press the set button on the right side of the control panel and it will go back to master. After a few moments, the front panel will automatically switch itself back to master too.
- 2 Now adjusting the knob will be adjusting the master audio output and the LCD has master displayed.

Fading the Downstream Key 1

You can trigger the downstream key 1 from the front panel by using the DSK 1 MIX button. This can be useful when you have a logo or bug and you want to bring it on and off again regularly. For example you could have a “live” logo that you want to fade on from time to time. You can set up the logo in the downstream key 1 and then use the DSK 1 MIX button to bring it on and off air. The duration of the transition when pressing the button will be set in the downstream key LCD menu, or on a control panel.

You feed a keyer with an input or a media player and this can also be set up in the LCD menus or on one of the control panels. If your switcher is new, then you can use the software control panel to load the media pool with some graphic or logos so you have sources to use.



Press the DSK 1 MIX button to fade the downstream key 1 on and off air

Fade to Black

When you start or finish a program, you want to be able to fade to black without worrying about leaving a logo on the screen by accident. Your ATEM switcher has a lot of powerful features and lots of layers that you can enable for transitions. What this means is you could have a complex setup on the switcher with many layers but you really just want a single button to start your program. This is what the FTB or fade to black button does.

If you press the FTB button, the whole program output of the switcher will fade to black. The button will flash to indicate to you that it's active. You can set the duration for the fade to black transition in the LCD menu or on a software or hardware control panel.



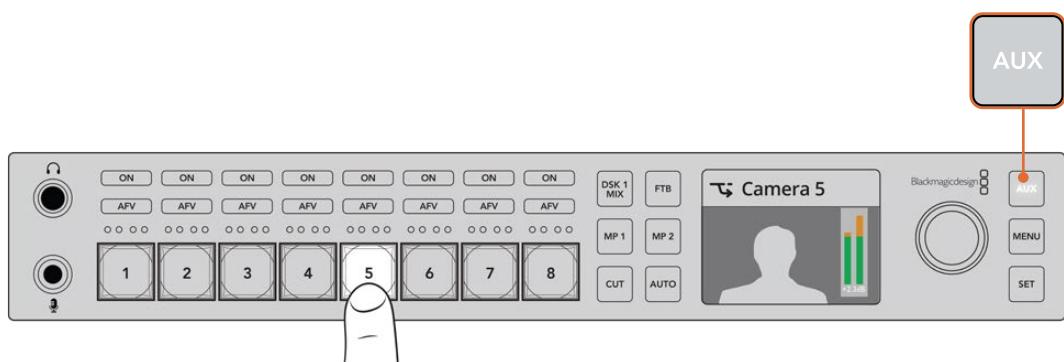
Press the fade to black or FTB button to perform a fade to black on the whole program output, including any graphics or keyers that may be in use

Front Panel Aux Switching

If you want to live switch the aux output of the switcher then press the AUX button to go into aux mode. Once in aux mode you will notice that the source buttons have now changed to white and the aux button is illuminated white also. This means that any source button you select will send that output to the aux SDI output of the switcher. While in aux mode, you won't be controlling the switcher anymore and you are only changing the aux output, not the program output. To go back to normal switcher operation, just select the aux button again.

If you select aux and you don't see any front panel buttons illuminated, then it could be that there is a source selected to the aux output that does not have a button on the front panel. For example if you had color bars selected to the aux output, when you go into aux mode, none of the front panel buttons would be illuminated.

You can change aux sources in the LCD menus or on a software or hardware control panel. There are more options for aux sources than available on the buttons on the front panel and please check out the LCD menus for all the options.



Press the auxiliary or aux button to go into aux mode and press an input button to select it on the auxiliary output

Using the LCD Menus

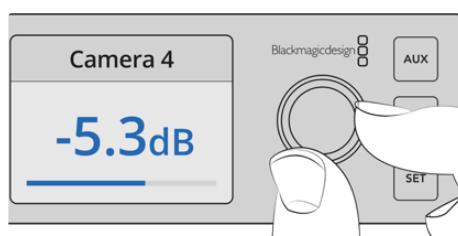
The LCD Menus make the entire operation of the switcher available. In the examples above, we used the menus and it's a good idea to explore the menus to see what's available. If you have used the software control panel on an ATEM switcher in the past, then you will see that each menu is like a palette on the software control panel and each palette on the software control panel has a menu page on the LCD. However, there are a few extra LCD menus and these include program, preview and aux source, the audio mixer, and there is also a settings page for setting up your ATEM Television Studio HD.

To use the menus:

- 1 Press the menu button to display the menus.
- 2 Scroll with the knob through the menus to the menu you want.
- 3 Press the set button and you will see the menu page will be selected to use.
- 4 Now scroll down the list to the specific menu setting you want to change.
- 5 Select it by pressing the set button.
- 6 Now scroll through the list of options for this menu item.
- 7 Press set when you want to make the desired setting active.
- 8 Press menu a few times to go back to the main video preview screen.



Press the menu button to enter the LCD menu.

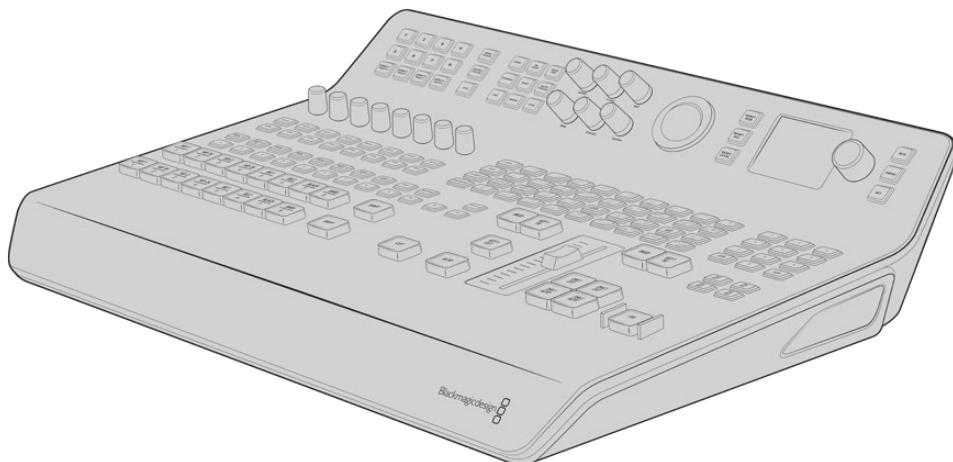


Use the knob to navigate through the settings and make adjustments, for example selecting the audio for input 4 and adjusting the audio level

Using ATEM Television Studio Pro Switchers

ATEM Television Studio Pro HD is the same as ATEM Television Studio HD as both have hardware control panels and share the same settings and features, however, the Pro HD model switcher has a console style control panel similar to an ATEM advanced panel, plus extra camera control features. The 4K model shares all the same settings and features but supports Ultra HD video up to 2160p60, plus includes an advanced chroma keyer and Fairlight audio controls. On the 4K model, all video inputs support SDI video via BNC connectors.

This section shows you how to use all the features on your ATEM Television Studio Pro model's built in control panel.

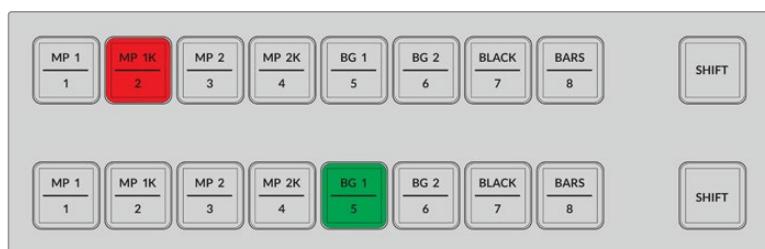


ATEM Television Studio Pro models has a console style control panel similar to an ATEM advanced panel

Program and Preview Buttons

The two main rows of large buttons numbered 1 to 8 are used to switch sources to the program and preview outputs. With M/E style switching, the top row is the program output and the bottom row is the preview output. In A/B style switching, the two rows will swap between program and preview as you switch sources to air.

You can always identify which row is the preview and program row by looking at the color of the buttons. For example, when a source in the program row is switched to the program output, the button will illuminate red to indicate the source is on air, and buttons on the preview row will illuminate green to indicate which source is switched to the preview output.



Sources switched to the program output are illuminated red, and the preview output green

A blinking button indicates there is a shifted source selected. Press the 'shift' button for the program or preview rows to select a shifted source, such as a media player, color bars, or color generators, known as background 1 and background 2. The labels on the buttons show you which sources, both main and shifted, are available on each button.

TIP Shifted sources can also be selected by double pressing the corresponding source button.

Transition Buttons

The transition buttons are located above the transition slider and contain all the different transition types and patterns available in your switcher.

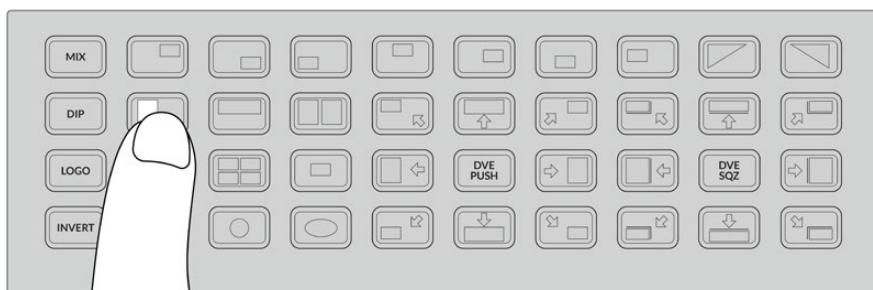
To perform a transition:

- 1 Press a transition button, such as a mix, dip, logo, DVE, or wipe.
- 2 If choosing a DVE push or squeeze transition, choose a movement pattern from any of their 8 surrounding pattern buttons.

TIP A stinger transition can be selected by holding down shift and pressing the 'mix' button. You can confirm the selection using the LCD menu.

Similarly, there are many choices for different SMPTE wipe patterns and to select one, all you need to do is press any of the wipe patterns, for example a diagonal, diamond or oval wipe.

- 3 When you are happy with your transition selection, press the 'auto' button next to the transition slider to automatically perform the transition, or use the slider to perform the transition manually.



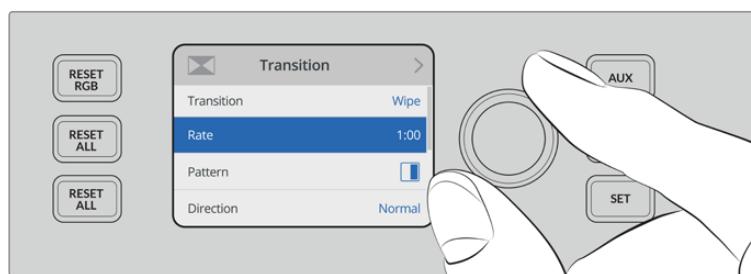
The transition pattern buttons let you choose which pattern to use in a transition, such as a horizontal wipe

TIP The invert button lets you swap the direction of a wipe. For example, a diamond wipe typically starts from the center of the screen and moves out to the edges, but if you press the invert button, this changes the direction of the wipe so it will start from the edges of the screen and move towards the center.

If you want to change the duration of the transition when using the auto button, go to the Transition settings in the LCD menu and use the rotary knob next to the LCD to change the duration.

To change the transition duration:

- 1** Press the menu button to display the menus.
- 2** Scroll through the menus to the “Transition” menu using the rotary knob.
- 3** Press the set button and you will see the transition menu page will be selected.
- 4** Now scroll down the list of items in the transition menu until you get to the rate setting.
- 5** Press the set button to select the setting and adjust the rotary knob to change it.
- 6** When you are happy with the change, press set to confirm and then press the menu button to back out of the menus back to the main video preview screen.

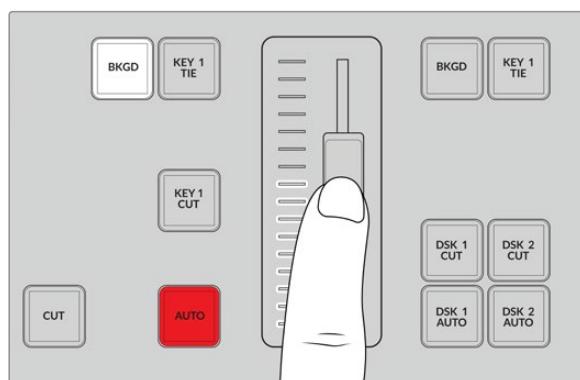


Go to the transition settings in the LCD menu to change the transition rate

Transition Slider

The transition slider works in the same way as the fader bar on other ATEM hardware panels. Just like a fader bar, using the slider gives you more control over a transition, compared to pressing the auto button. This lets you create special effects. For example, you can hold a transition between two sources by sliding half way into the transition creating a double exposure effect. However, unlike the auto button, you don't have to complete the transition! You can return to the original source by sliding back to the start point instead of progressing through to opposite end of the slider.

By performing a transition manually, you can also control the transition speed with greater variations, for example gradually easing in and out of a transition.



The transition slider lets you control a transition manually

Using the Numeric Keypad

This feature will be enabled in a future update.

Understanding the Audio Controls

You can mix audio directly from the control panel using the audio controls. As audio is quite dynamic and changes constantly, the audio controls are important to ensure you don't have audio distortion from audio sources that are too high in level, or the audio is not so soft that your program master or streaming is hard for viewers to listen to.

The knob next to the LCD on the control panel is primarily for adjusting the main audio mixer master output, although it is also used for menu selection when you are in the LCD menus. If you look at the control panel above the main source buttons you can also see that each of the 8 source buttons has a similar control knob. Using these individual knobs together with the 8 small audio meters, plus respective ON and AFV buttons, give you the audio controls for their corresponding source inputs in the program and preview rows.

If you want to control the audio settings for input 1, then use the controls above input 1. It's the same for each of the other inputs to the switcher and the controls for each input correspond to each source button.

Audio Control

To turn audio for an input on permanently, simply press the ON button above its corresponding source button. Now the audio from that input will be sent to the built in audio mixer and be heard on the program output.

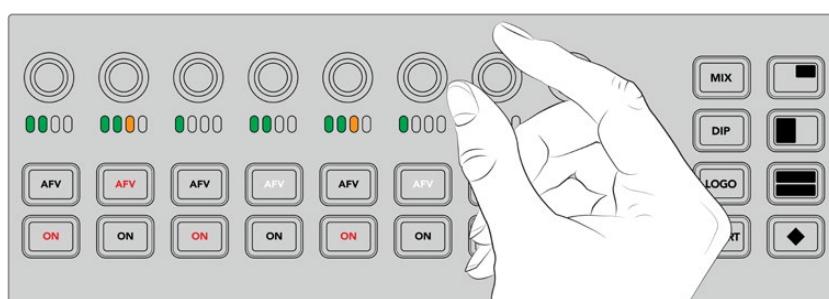
To select audio only when the input is on air, select the AFV button. This means audio follows video and the input is now only on when the source is on air.

When you make an adjustment to the audio level of a source using its dedicated adjustment knob, you can see the effect on the audio meters in the LCD.

Audio Levels

Normally, the knob next the LCD is used to adjust the main audio mixer master output. Adjusting the knob will lower or strengthen the whole program audio levels and you can see the effect on the main audio meters in the LCD that are superimposed on the video preview.

If you want to adjust the audio for one of the inputs, this is where the small 4 LED meter above each input is used. This small meter lets you identify where a hot audio level could be coming from. If the main audio level is too high and only one of the small meters on the control panel has a red flashing LED then this means that only that single input is too high level. So in this case you don't want to adjust the master audio level knob because all the other inputs will now become too low. You really want to identify the specific input that is too hot and adjust just that single audio level.



Adjust the audio knobs to adjust the audio level for a specific source

You can also change audio settings in the LCD menus as there is a full menu just for audio settings, proving an alternative way of adjusting audio. Of course, any adjustments you make on the control panel and in the LCD menus is also reflected in the software control panel.

By connecting a computer and selecting the audio mixer in the software control panel, you can watch the effect of each control panel setting on the audio mixer. This can be a good way of better understanding what the control panel audio controls are doing.

Changing Levels for Split Audio Channels

If you have split a mono input using ATEM Software Control so they are two separate channels for stereo output, then you will notice the control knob will change the level for the left channel only. To change the level for the right audio channel, simply hold down the shift button and turn the control knob.

Camera Control

The camera control knobs, buttons and trackball give you the ability to control Blackmagic URSA Mini and Blackmagic Studio model cameras via the SDI program return signal. When using compatible lenses, you can adjust settings such as iris, focus, zoom and camera features such as the camera color correctors using the respective controls on your switcher's panel.

Having the ability to make fast adjustments to your cameras directly from ATEM Television Studio Pro HD's control panel is like having a built in CCU.

VISCA PTZ cameras and remote heads can also be controlled using the camera control trackball.

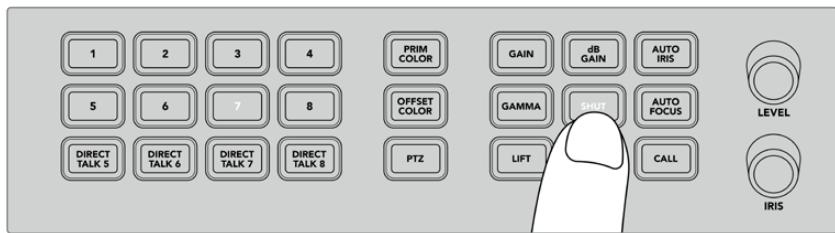
TIP Camera control is possible via camera control packets of information embedded in the SDI outputs from the ATEM switcher to your Blackmagic Design cameras. For more details, refer to the 'using camera control' information located in the 'using ATEM Software Control' section of this manual.

Controlling Cameras

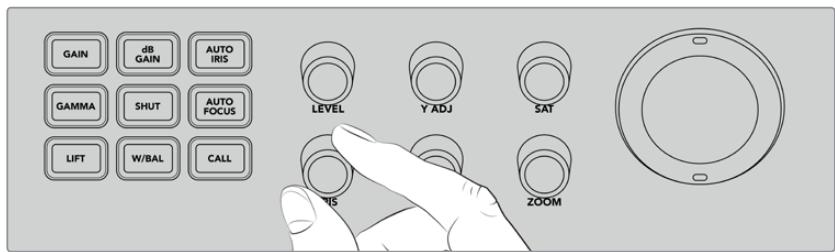
The first step when changing a camera setting is to select the specific camera you want to control.

- 1 Press one of the camera buttons on the top left corner of your switcher. The button will illuminate so you can easily see which camera you are adjusting.
- 2 With the camera selected, you can immediately make adjustments. For example, to open or close the lens aperture on a compatible servo lens, rotate the iris knob clockwise or counterclockwise. If you want to increase or decrease the shutter speed or shutter angle, press the shutter button marked SHUT on the control panel to cycle through the available shutter settings.

NOTE It's worth mentioning that if you want to control focus, iris and zoom settings, a compatible lens with servo controlled focus, iris and zoom control must be attached to the camera.



Press a camera button to select the camera you want to control, then use the camera control buttons and knobs to make adjustments, such as changing the shutter angle on Blackmagic URSA Mini



After selecting the camera you want to adjust, rotate the iris knob to open or close the lens aperture on compatible lenses

Camera Settings

Below is a description of the different camera settings you can adjust including dB gain, shutter, white balance, iris, focus, and zoom.

dB Gain

Press the dB Gain button to adjust a selected camera's overall gain, or light sensitivity. On Blackmagic URSA Mini, this setting is called ISO. Pressing the dB Gain button cycles through the camera's gain or ISO settings.

Auto Iris

Pressing the 'auto iris' button will automatically set the aperture of the camera's lens to optimize the exposure on cameras with compatible auto iris lenses.

TIP Your camera may have a variety of modes for evaluating the exposure of an image, such as spot exposure and center weighted averaging. These can affect what your camera interprets as correct exposure. Check your camera settings to make sure you are happy with the exposure of your image when pressing the auto iris button.

Shutter

The shutter button is labelled SHUT and is used to select the desired shutter speed or shutter angle. Press the shutter button to cycle through the available shutter settings.

Auto Focus

By pressing the auto focus button, you can set the selected camera to automatically focus the image and maintain sharpness. To use this function, the selected camera must have a compatible lens with built in electronic auto focus control, and the auto focus feature enabled on the lens.

TIP The area of the image used when determining focus can often be set independently in the camera settings. If you find your camera focussing on the wrong part of the image when using ‘auto focus,’ check the camera’s auto focus settings.

White Balance

The white balance button is labeled ‘w/bal’, and this feature lets you adjust the white balance on a selected camera. Press the white balance button to cycle through the available white balance settings and set the correct color temperature.

Iris

Rotate the iris knob clockwise or counterclockwise to open or close the lens aperture on compatible lenses.

Focus

Rotate the focus knob clockwise or counterclockwise to adjust the focus when using compatible lenses.

Zoom

Rotate the zoom knob clockwise or counterclockwise to zoom in and out when using compatible zoom lenses.

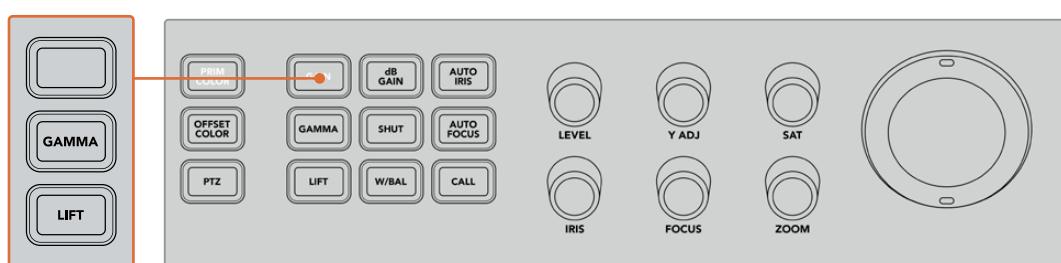
Controlling Color

The primary color button lets you select primary color correction feature so you can make color adjustments to the lift, gamma, and gain tonal ranges using the trackball.

Before we look at the different ways you can control color, it’s important to look at the three tonal ranges that form a video image.

Lift	Lift controls the shadows, or the darkest ranges of the image. For example, the color and brightness, or luminance, of the black level.
Gamma	The midtones of your image are controlled via the gamma value. Midtones are regions of your image that are approximately half way between the darkest and brightest levels of the image.
Gain	The gain represents the highlights, or the brightest areas of the image.

By making specific color and luminance adjustments to each of these tonal regions, you have incredible control over the image. When making adjustments, you can select each tonal range by pressing the respective lift, gamma, and gain buttons.



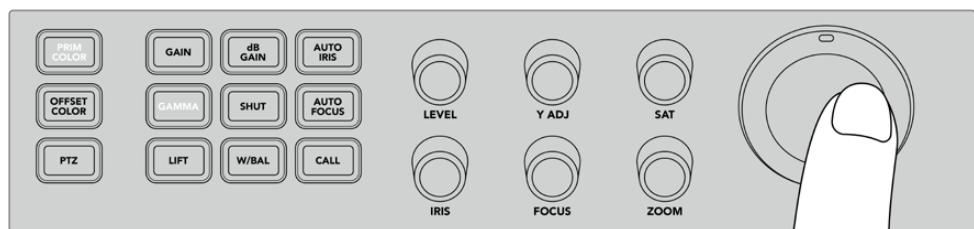
Primary color control lets you adjust the color and luminance for specific lift, gamma and gain tonal ranges in the image

Primary Color

This feature enables precise color control over each of the RGB color channels for lift, gamma and gain.

To adjust primary color:

- 1 Press the camera button for the camera you want to control.
- 2 If not already selected, press the primary color button to enable primary color control.
- 3 Press the lift, gamma or gain button to select the tonal range you want to adjust.
- 4 Rotate the camera trackball in any direction to apply color changes to your chosen tonal range.



In primary color mode, press the lift, gamma, or gain tonal range you want adjust, then rotate the trackball towards the desired color

In addition to using the trackball, you can make changes to the brightness and saturation of the image using the following color adjustment knobs.

Level	Rotate the level knob to increase the luminance and color channels simultaneously. This increases the overall brightness of the image.
Y ADJ	To increase or decrease the brightness, or luminance, for a specific tonal range, rotate the Y ADJ knob clockwise or counterclockwise.
SAT	The saturation knob lets you increase or decrease the amount of overall color in the image.

Reset Buttons

The three reset buttons are used if you want undo recent color correction adjustments you have made to the lift, gamma or gain tonal ranges.

These controls only affect the specific tonal range you have selected. For example, pressing the reset buttons when gain is selected will only affect the gain tonal range.

Reset RGB	Press this button to reset the RGB color channels for lift, gamma or gain to their default neutral position without affecting luminance adjustments.
Reset All	This button lets you reset luminance and RGB color channels to their default neutral position for the selected camera, as well as all other color adjustments such as hue and contrast.
Reset Level	Press this button to reset the YRGB luminance and color channels to their default neutral position.

Offset Color Control

This feature will be enabled in a future update.

Controlling Cameras using the Trackball

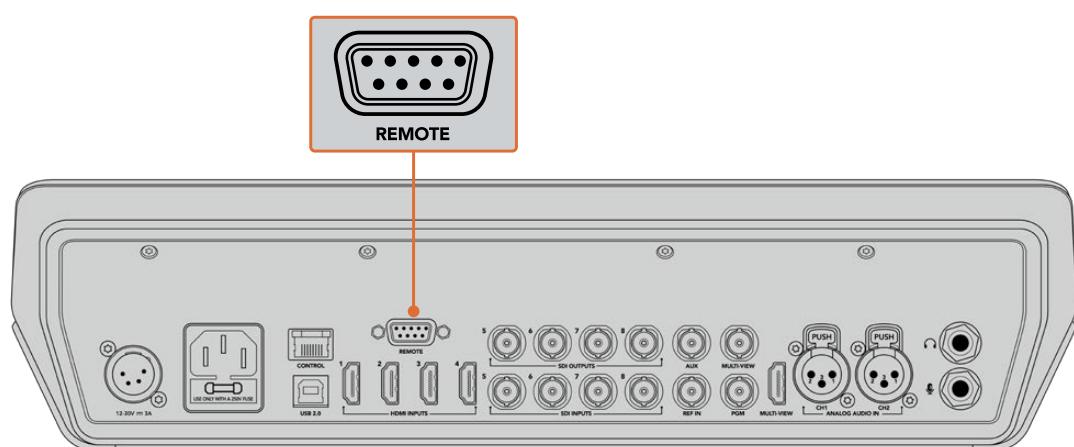
Using the “PTZ,” or pan, tilt, zoom function, you can use an ATEM Television Studio Pro model switcher to control remote camera heads using the common VISCA protocol.

The switcher's trackball can also be used to control a remote camera head using the common VISCA protocol.

PTZ, or “pan, tilt, zoom.” control is an extremely powerful tool for controlling pan, tilt and zoom on remote cameras. You can easily control a bank of cameras one at a time by pressing the “PTZ” button and then selecting each camera via the numbered buttons on the numeric keypad. Make your pan and tilt adjustments with the trackball.

Connecting a Remote Head

The switcher communicates with remote heads via the RS-422 port labelled ‘remote’ on the rear of the control panel. Connect your remote head to this panel via a DB-9 serial connector.



Multiple heads can be controlled from an ATEM Television Studio Pro model switcher by daisy chaining the heads together via the RS-422 inputs and outputs on each head

TIP When daisy chaining remote heads, make sure you set the remote head's identity to “auto.” Check the manual for your particular remote head for information on how to change this setting for that model.

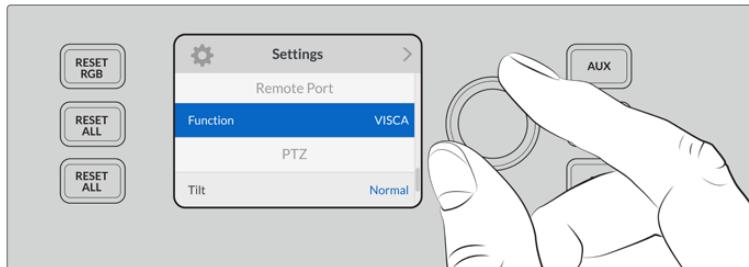
PTZ Setup for Remote Heads

All PTZ setup options are accessed through the “Settings” menu in your switcher's LCD menu.

To setup remote heads for PTZ control:

- 1 Press the menu button to display the menus.
- 2 Scroll through the menus to the “Settings” menu using the rotary knob.
- 3 Press the set button and you will see the settings menu page will be selected.
- 4 Scroll down the list of items in the settings menu until you get to the “Remote Port” section.

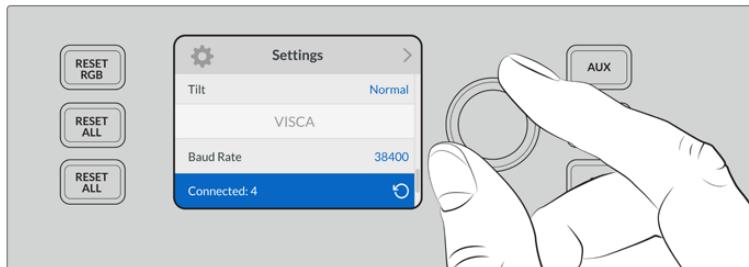
- 5 Press the set button to select the setting, use the rotary knob to select “VISCA” and press the set button to confirm this setting.



- 6 Press the “menu” to return to the settings menu and scroll down to the “VISCA” section.
- 7 Select the “Baud Rate” setting and use the set button and rotary knob to select the proper baud rate for your remote head.

TIP Check the documentation for your PTZ remote head for the correct RS-422 baud rate

- 8 Use the menu button to return to the settings menu. Underneath baud rate in the “VISCA” section you’ll see the number of remote heads currently connected. Select this item and press “set” to update this list and detect any connected heads. These will automatically assigned to camera buttons 1 through 7, depending on the number of remote heads detected.



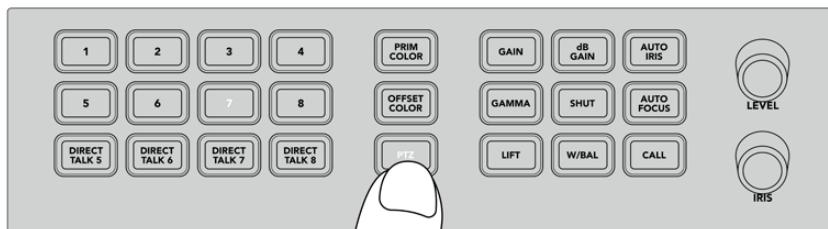
Use the “set” button with VISCA connections selected to detect any remote heads connected to ATEM Television Studio Pro HD.

TIP If the number of connected devices that appear doesn’t match the physical number you have connected, check that all your camera heads are powered and their RS-422 ports are plugged in correctly.

- 9 If you want to choose the tilt direction of your trackball, you can also scroll to the “PTZ” setting in the settings menu and use the set button to toggle between ‘inverted’ and ‘normal’ modes.

PTZ Control

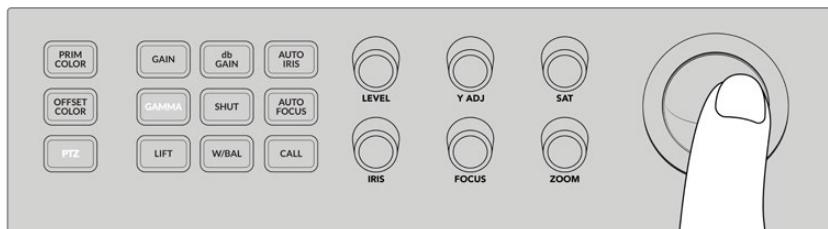
Press the “PTZ” soft button to select the remote head you would like to control with the trackball.



Press the “PTZ” soft button to enable PTZ control via the trackball.

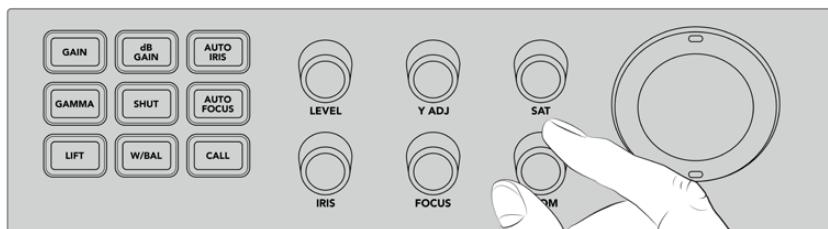
With “PTZ” selected, the camera buttons assigned to each remote head will illuminate. Simply select the button corresponding to the camera you would like to use and move the trackball to adjust pan and tilt.

Trackball PTZ controls are very intuitive. Simply roll the trackball in the direction you would like to move the camera. Roll left or right to pan, and up and down to tilt. The controls are sensitive to the speed of movement of the trackball, letting you ease in and out of your camera moves. The amount of sensitivity may vary between remote heads.



Use the trackball to pan and tilt the selected PTZ head.

If your remote head has zoom and focus capabilities, you can use the “zoom” and “focus” knobs to the left of the trackball to control them.



Turn the “zoom” knob left to zoom out, and right to zoom in on compatible remote heads.

Addressing Cameras using the Call Button

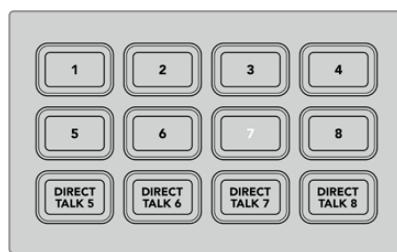
Pressing the call button flashes the tally lights on all Blackmagic Design cameras connected to your switcher via their return SDI feed. This lets you send out a visual ‘standby’ indicator to all camera operators, which is helpful for when you are about start your live production.

Using the Talkback Controls

The numbered buttons on the left side of the control panel are also used for communicating with camera operators. You can communicate with each camera independently, or address all cameras simultaneously.

To address each camera independently, hold down the ‘shift’ button and press any of the corresponding buttons from 1 to 8. This is helpful if you want to talk momentarily to one single operator.

To address all cameras, press the four direct talk buttons from 5 to 8 so they are all enabled. This opens a direct, locked talkback signal to all cameras 1 to 8 and will stay on until you press the buttons again. Doing so will turn the direct talk buttons off, returning the talkback to single camera address.



The numbered buttons together with the direct talk buttons let you communicate with your camera operators

Using the Upstream and Downstream Keyers

Upstream and downstream keyers give you a huge amount of control over special effects such as titles, lower thirds graphics, chroma keying, general overlays and effects, but also lets you control how to transition them on and off air.

BACKGROUND

The background button, labeled BKGD, lets you tie the program output, before any keyers are added, to the next transition. This gives you flexibility to transition the upstream keyer on or off air independently from the downstream keyers.

KEY 1 TIE

The KEY 1 TIE button enables the upstream keyer on the preview output, along with the next transition effects, and ties it to the main transition control so that the keyer can be taken to air with the next transition.

When the upstream keyer is tied to the main transition, the transition will happen at the rate specified in the transition rate setting.

KEY 1 CUT

The KEY 1 CUT button for the upstream keyer is used to cut the upstream keyer on or off air and indicates whether it is currently on or off air. The button is illuminated if the upstream keyer is currently on air.

DSK 1 TIE and DSK 2 TIE

In a similar fashion to the KEY 1 TIE button, the DSK 1 and 2 TIE buttons will enable downstream keyers 1 and 2 on the preview output, along with the next transition effects, and tie them to the main transition control so that the downstream keyers can be taken to air with the next transition.

When the downstream keyer is tied to the main transition, the transition will happen at the rate specified in the transition rate setting.

DSK 1 CUT and DSK 2 CUT

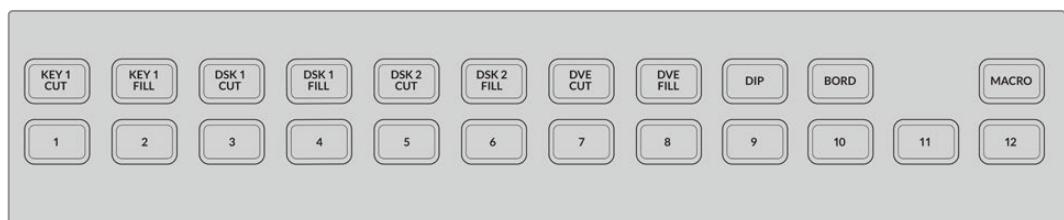
The DSK CUT buttons for downstream keyers 1 and 2 are used to cut the downstream keyers on or off air and indicates whether they are currently on or off air. The buttons are illuminated if the DSKs are currently on air.

DSK 1 AUTO and DSK 2 AUTO

The DSK AUTO buttons will mix the downstream keyers on or off air at the rate specified in the downstream keyer's rate setting.

Source Select Buttons for Keyers and Macros

The source select row of numbered buttons above the program and preview rows are used to set sources for the upstream keyer and each of the downstream keyers. You can also use these buttons to record and run macros.



The source select buttons let you choose sources for keyers, such as the fill and cut source

Source Buttons	Source
1	HDMI Input 1
2	HDMI input 2
3	HDMI input 3
4	HDMI input 4
5	SDI input 5
6	SDI input 6
7	SDI input 7
8	SDI input 8
9	Media Player 1
10	Media Player 1 Key
11	Media Player 2
12	Media Player 2 Key

Selecting a source for a Keyer

Simply press a button in the upper select row to choose which keyer element you want to change, such as DVE CUT or DVE FILL, then press a button in the numbered row directly underneath to choose your desired source. For example, you can select a graphic loaded in a media player, or any of the input sources.

Using DVE Picture in Picture Buttons

These four buttons control preset positions for picture in picture DVEs, for example, when switching an interview with two individuals in different locations that are on screen simultaneously. Picture in picture DVEs are great for fast, efficient overlays.

To perform a picture in picture DVE:

- 1 Press any of the 4 DVE PiP buttons.
- 2 You will see the PiP box on the preview output. You can change to a different position by pressing another DVE PiP button.

TIP When you press a DVE PiP button, you will notice the Key 1 Tie button is also selected. This is because the DVE PiP is an upstream key and is tied to the next transition. If you had a different key selected on the upstream keyer, the keyer is now changed to a DVE key.

- 3 Once you are happy with the position of the DVE, select a source for the PiP box using the Key 1 Fill button on the source select row of buttons. Simply press the Key 1 Fill select button, and then press the button for the source you want to fill the PiP box. You can also use the LCD menus if you prefer.
- 4 Now all you need to do is press the cut or auto button to perform the transition. Your DVE PiP effect will appear superimposed over the program output using your chosen transition. You can also use the transition slider if you want to perform the transition manually.

If you want to combine the upstream key with a new background simultaneously, simply press the BKGD button together with the Key 1 Tie button. Now your background and upstream key will transition together.

NOTE ATEM Television Studio Pro HD has 1 DVE, so DVE features can only be applied one at a time. The DVE is very powerful, but it's important to plan how you want to use the DVE resources available to make the most of them.

Using the LCD Menus

The LCD menus let you change all the settings for your switcher and it's a good idea to explore the menus to see what's available. If you have used the software control panel on an ATEM switcher in the past, then you will see that each menu is like a palette on the software control panel and each palette on the software control panel has a menu page on the LCD. However, there are a few extra LCD menus and these include program, preview and aux source, the audio mixer, and there is also a settings page for setting up your ATEM Television Studio Pro model switcher.

To use the menus:

- 1 Press the menu button to display the menus.
- 2 Scroll with the knob next to the LCD to navigate through the menus to the menu you want.
- 3 Press the set button and you will see the menu page will be selected to use.
- 4 Now scroll down the list to the specific menu setting you want to change.
- 5 Select it by pressing the set button.
- 6 Now scroll through the list of options for this menu item.
- 7 Press set when you want to make the desired setting active.
- 8 Press menu a few times to go back to the main video preview screen.

Switching the Auxiliary Output

The auxiliary button marked AUX lets you select a source for the auxiliary output.

If you want to live switch the aux output of the switcher then press the AUX button to go into aux mode. Once in aux mode you will notice that the source buttons have now changed to white and the aux button is illuminated white also. This means that any source button you select will send that output to the aux SDI output of the switcher. While in aux mode, you won't be controlling the switcher anymore and you are only changing the aux output, not the program or preview output. To go back to normal switcher operation, just press the aux button again.

Shifted sources, such as color bars and media players, will be indicated by a flashing source button corresponding to the shifted source when your switcher is in aux mode.

You can also change aux sources in the LCD menus, or on an external ATEM hardware control panel, or via ATEM Software Control.

Fade to Black

When you start or finish a program, you want to be able to fade to black without worrying about leaving a logo on the screen by accident. Your ATEM switcher has a lot of powerful features and lots of layers that you can enable for transitions. What this means is you could have a complex setup on the switcher with many layers but you really just want a single button to start your program. This is what the fade to black button does.

If you press the fade to black button, marked FTB on the control panel, the whole program output of the switcher will fade to black. The button will flash to indicate to you that it's active. You can set the duration for the fade to black transition in the LCD menu or on the software control panel.

To fade into your live production from black, simply press the FTB button again.

Operating your ATEM Switcher

Internal Video Sources

In addition to the SDI and HDMI inputs, the switcher also has 8 internal sources that can be used in a production. The internal source names are represented on the software control panel and ATEM advanced panels using a long name. The labels represent what the sources are, so they are easy to understand.



Black

Internally generated black is available as a source and can be used as a black matte in the production.



Color Bars

Internally generated color bars are available as a source. Color bars can be useful for verifying signals going out of the switcher and can also be useful when setting up a chroma key with a vectorscope monitor.



Color Generators

ATEM switchers have two color sources that can be customized to generate any color matte for use in the production. Color sources can be used to add color borders for wipe transitions or as dip through colors for a dip transition such as dip through white.

To adjust a color source using the LCD menu

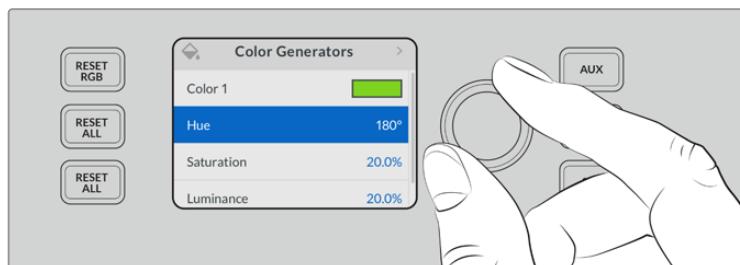
- 1 Press the menu button and navigate to the 'color generators' settings.
- 2 Press the set button to edit the settings. Using the set button and rotary knob, scroll down the list and make changes to color 1 and color 2 where required.

For example, you can change the hue to select a different color, or adjust the saturation and luminance of the colors to make them more colorful, or brighter or darker.

To adjust a color source on the software control panel

Go to the color palette and click the color chip, and the color picker will appear and you can select colors.

NOTE It's important to know that the deepest colors are set at 50% luminance.



ATEM switchers have two color sources that can be customized to generate any color matte for use in your production

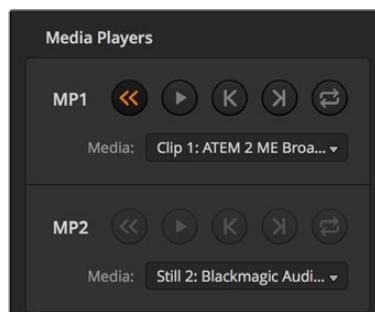
Media Players

Each of the two media player sources have a fill and key (cut) output. Media player fill sources are called media player 1 or 2, and media player key sources are called media player 1 key and media player 2 key.

The media player sources are used to play stills from the media pool. The fill sources show the color channels of the selected still while the key sources show the black and white alpha channel of the selected still. Media players can be used in many parts of the production.

Controlling media players on the software control panel

- 1 From the switcher window, select the media player palette.
- 2 Use the select media drop down list to select a still from the media pool.



Media players showing a clip loaded into each.

Performing Transitions

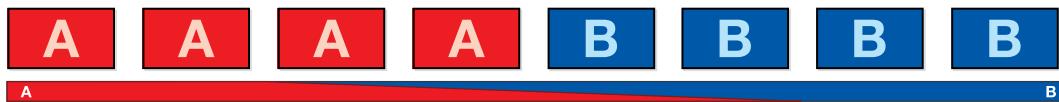
One of the primary functions of a broadcast switcher is performing transitions from one video source to another. The combinations of transition effects and styles provide endless creative options that can enhance your production in just the right way for the right moment.

You can perform transitions using the control panel on your switcher, or with ATEM Software Control, or you may even be using an additional ATEM advanced panel. This section shows you how to perform the various transitions available on your switcher using the built in control panel on your switcher and ATEM Software Control.

NOTE For information on how to perform transitions using an ATEM advanced panel, refer to the section titled 'performing transitions using ATEM advanced panels'.

Cut Transitions

The cut is the most basic transition that can be performed on the switcher. In a cut transition the program output is immediately changed from one source to another.



Program output for a cut transition.

A cut transition can be performed directly from the program bus, or using the CUT button on the built in control panel.

Program Bus

When a cut transition is performed from the program bus, only the background will be changed, and all upstream and downstream keys will maintain their current state.

To perform a cut transition from the program bus on an ATEM Television Studio Pro model switcher:

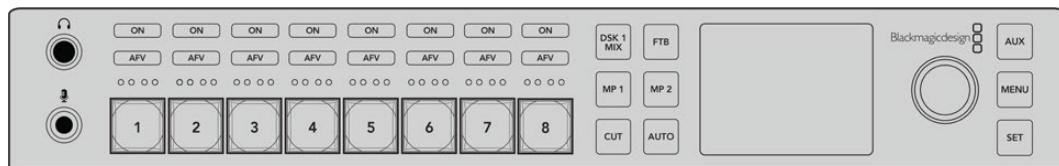
On the program bus, select the video source that you want on the program output. The program output will immediately change to the new source.

Cut bus mode on ATEM Television Studio HD

In cut bus mode, you can make cut transitions directly to the program output by pressing the source buttons. To do this, you will need to change the switching style from M/E style switching to cut bus mode.

- 1 Press the menu button to open the LCD menu and navigate to the ‘settings’ menu.
- 2 Press set to enter the switching mode settings and change the switching mode to ‘cut bus’. Press the menu button to step back to the master output screen.

In cut bus mode, there are only program source buttons without a preview row, so whenever you press a source button, that source will cut directly to the program output and the source buttons will only illuminate red.



Press any of source buttons in the program row to perform a cut transition from the program bus

To perform a cut transition from the program bus on the software control panel:

On the program bus, select the video source that you want on the program output next. The program output will immediately change to the new source.

To perform a cut transition on the software control panel using a keyboard:

- 1 Enable <caps lock> or press and hold the <shift> key.
- 2 Press the number key on the keyboard corresponding to the video source that you want on the program output. The program output will immediately change to the new source.

CUT Button

When a cut transition is performed using the CUT button, any upstream keys that were selected in the next transition and any downstream keys that were tied to the transition control will also change state. For example, a downstream key tied to the transition control will cut ON if off air, or cut OFF if on air. Similarly, any upstream keys selected in the next transition will be cut on if they were off air, or cut off if they were on air.

To perform a cut transition using the CUT button on ATEM Television Studio HD:

- 1 Select the source you want on the preview bus using the source buttons on the front control panel or the LCD menu. If you select a camera input, the button will illuminate green.
- 2 Press the ‘cut’ button on the built in control panel to immediately switch the source to air.

if you selected a camera source on the control panel buttons, the button illuminated green will now be red to indicate it is on the program output.

To perform a cut transition using the CUT button on an ATEM Television Studio Pro model switcher:

- 1 On the preview bus, select the video source that you want on the program output. The program output will remain unchanged.
- 2 Press the CUT button. The sources selected on the program and preview buses are exchanged to indicate that the video source that was on preview is now on program and vice versa.

It's recommended to use the 'cut' button to perform transitions because it provides the opportunity to verify the video content on the preview output before sending it to the program output, for example to verify that a camera is in focus.

To perform a cut transition using the CUT button on the software control panel:

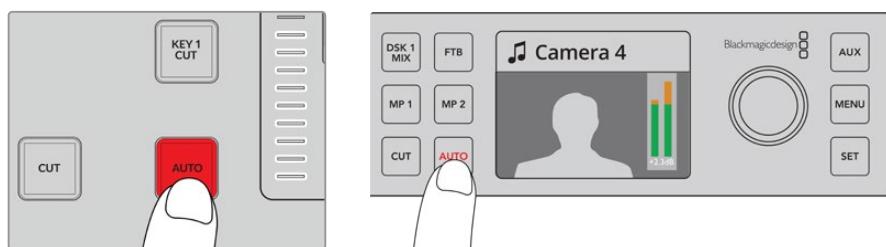
- 1 On the preview bus, select the video source that you want on the program output. The program output will remain unchanged.
- 2 In the transition control block, press the CUT button. The sources selected on the program and preview buses are exchanged to indicate that the video source that was on preview is now on program and vice versa.

To perform a cut transition on the software control panel using a keyboard:

- 1 Ensure that <caps lock> is off.
- 2 Press the number key on the keyboard corresponding to the video source that you want on the program output. The source will be selected on preview and the program output will remain unchanged.
- 3 Press <spacebar>. The sources selected on the program and preview buses are exchanged to indicate that the video source that was on preview is now on program and vice versa.

Auto Transitions

An auto transition allows you to automatically transition between program and preview sources at a predetermined rate. Any upstream keys that were selected in the next transition and any downstream keys that were tied to the transition control will also change state. Auto transitions are performed using the auto button. Mix, dip, wipe, DVE and stinger transitions can all be performed as an AUTO transition.



Press the auto button to perform an auto transition

To perform an auto transition on ATEM Television Studio HD:

- 1 Select the desired source by pressing one of the source buttons on the control panel.
- 2 Make any adjustments to the source audio if required by rotating the settings knob.
- 3 In the LCD menu, set the transition type, transition rate and adjust any other parameter for the transition as needed.
- 4 When you are happy with the audio level for the selected source, press the 'auto' button next to the LCD to perform the transition.
- 5 For more detailed information, refer to the section titled, 'using the ATEM Television Studio HD front panel'.

To perform an auto transition on an ATEM Television Studio Pro model switcher:

- 1 In the preview row of buttons, select the video source that you want on the program output.
- 2 Select the transition type using the transition type buttons on the control panel.
- 3 In the LCD menu, set the transition rate and adjust any other parameter for the transition as needed.
- 4 Press the auto button on the control panel to initiate the transition.
- 5 During the transition, the red and green buttons on the program and preview buses both turn red to indicate that you are in the middle of a transition. The transition slider indicator displays the position and progress of the transition.
- 6 At the end of the transition, sources selected on the program and preview buses are exchanged to indicate that the video source that was on preview is now on program and vice versa.

Each transition type has its own independent transition rate allowing the operator to perform faster transitions by simply selecting the transition type and pressing the AUTO button. The previously used transition rate is remembered for that transition type until it is changed.

To perform an auto transition on the software control panel:

- 1 On the preview bus, select the video source that you want on the program output.
- 2 Select the transition type using the TRANSITION STYLE buttons in the transition control block.
- 3 In the transition palette, select the settings tab for the same transition type as the transition control block.
- 4 Set the transition rate and adjust any other parameter for the transition as needed.
- 5 Press the AUTO button in the transition control block to initiate the transition.
- 6 During the transition, the red and green buttons on the program and preview buses both turn red to indicate that you are in the middle of a transition. The virtual fader bar automatically follows the progress of the transition and the rate display updates to indicate the number of frames remaining as the transition progresses.
- 7 At the end of the transition, sources selected on the program and preview buses are exchanged to indicate that the video source that was on preview is now on program and vice versa.

To perform an auto transition on the software control panel using a keyboard:

- 1 Ensure that <caps lock> is off.
- 2 Press the number key on the keyboard corresponding to the video source that you want on the program output. The source will be selected on preview and the program output will remain unchanged.
- 3 Select the transition type using the transition style buttons in the transition control block.
- 4 In the transition palette, select the settings tab for the same transition type as the transition control block.
- 5 Set the transition rate and adjust any other parameter for the transition as needed.
- 6 Press the <return> or <enter> key to initiate the transition.

During the transition, the red and green buttons on the program and preview buses both turn red to indicate that you are in the middle of a transition. The virtual fader bar automatically follows the progress of the transition and the rate display updates to indicate the number of frames remaining as the transition progresses.

At the end of the transition, sources selected on the program and preview buses are exchanged to indicate that the video source that was on preview is now on program and vice versa.

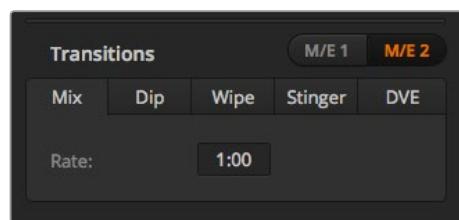
A production switcher provides multiple methods of transitioning from one shot to another. Generally, you use a simple cut transition to move from one background source to another. Mix, dip, wipe and DVE transitions allow you to transition between two background sources by gradually phasing out one and phasing in another. The logo wipe is a special transition which will be covered in a later section. Mix, dip, wipe and DVE transitions are performed as an auto transition or manual transition using the transition fader bar or slider.

Mix Transitions

A mix is a gradual transition from one source to another and is achieved by interpolating gradually between two sources, effectively overlapping the sources for the duration of the effect. The length of the transition or length of the overlap can be adjusted by changing the mix rate.



Program output for a mix transition.



Mix Transition rate setting

To perform a mix transition in program/preview mode on ATEM Television Studio HD:

- 1 Press a source button on the control panel for the video source that you want on the program output. The button will illuminate green.
- 2 In the LCD menu, select 'transitions' and set the transition type to 'mix'.
- 3 Set the duration of the mix by changing the rate setting. Press 'set' to confirm the setting changes, then press the 'menu' button to step back to the master output screen.
- 4 Perform the transition as an auto transition or manual transition using the auto button on the control panel.

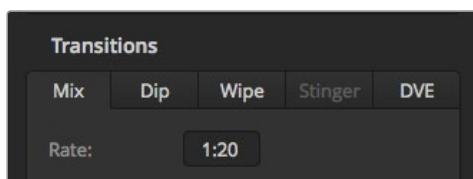
NOTE You can also perform a mix transition using cut bus mode. In cut bus mode, the transition is performed when you press the desired source button, as it transitions directly to air.

To perform a mix transition on an ATEM Television Studio Pro model switcher:

- 1 On the preview bus, select the video source that you want on the program output.
- 2 Press the mix button to select the mix transition type.
- 3 To set the transition rate, press the menu button and navigate to the 'transitions' settings menu on the LCD. Set the duration of the mix by changing the rate setting. Press 'set' to confirm the change, then press the 'menu' button to step back to the master output screen.
- 4 Perform the transition as an auto transition or manual transition using the auto button or the transition slider.

To perform a mix transition on the software control panel:

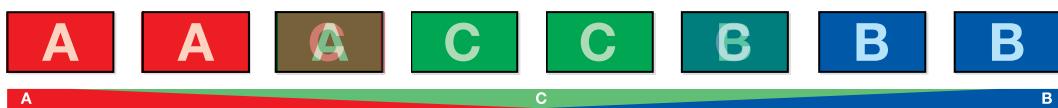
- 1 On the preview bus, select the video source that you want on the program output.
- 2 Select the mix transition style in the transition control block.
- 3 Expand the transition palette and select mix from the transition types bar.
- 4 Adjust the mix rate by entering a number in the rate window. The rate display in the transition control block will update.
- 5 Perform the transition as an auto transition or manual transition from the transition control block.



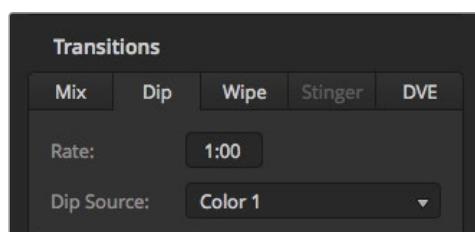
The mix transition rate is displayed in seconds and frames

Dip Transitions

A DIP is similar to a mix in that it is a gradual transition that transitions from one source to another. However, a dip transition gradually mixes through a third source, the dip source. For example, the dip transition can be used for a transition that calls for a white flash or a transition that quickly flashes the sponsor logo. The length of the dip transition and the dip source can be customized.



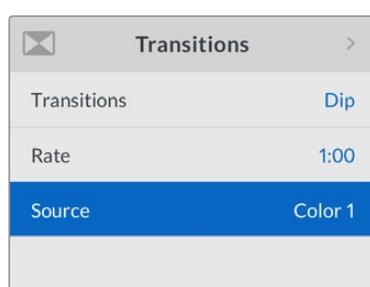
Program output for a dip transition.



Dip Transition Settings

To perform a dip transition on ATEM Television Studio HD:

- 1 Press a source button on the control panel for the video source that you want on the program output. The button will illuminate green.
- 2 In the LCD transitions settings, select 'dip' and press the 'menu' button to return to the transitions settings. Set the transition rate and change the dip source if you want to. You can use any of the switcher sources, including cameras, Media players or background colors.
- 3 Press the menu button to step back through the menus to the master output screen.
- 4 Perform the transition as an auto transition by pressing the auto button on the front panel.



Change the dip source in the transitions LCD menu.

To perform a dip transition on an ATEM Television Studio Pro model switcher:

- 1 On the preview bus, select the video source that you want on the program output.
- 2 Press the dip button to select the dip transition type.

- 3** To set the transition rate, press the menu button and navigate to the ‘transitions’ settings menu on the LCD. Set the duration of the dip by changing the rate setting. You can also set the dip source. You can use any of the switcher sources, including cameras, Media players or background colors.
- 4** Press ‘set’ to confirm the changes, then press the ‘menu’ button to step back to the master output screen.
- 5** Perform the transition as an auto transition or manual transition using the auto button or the transition slider.

To perform a dip transition on the software control panel:

- 1** On the preview bus, select the video source that you want on the program output.
- 2** Select the DIP transition style in the transition control block.
- 3** Expand the transition palette and select dip from the transition types bar.
- 4** Adjust the dip rate by entering a number in the rate window. The rate display in the transition control block will update.
- 5** Select the dip source.
- 6** Perform the transition as an auto transition or manual transition from the transition control block.

Dip transition parameters

Rate	The dip transition rate in seconds and frames.
Dip Source	The dip source is any video signal in the switcher that will be used as the intermediate picture for the dip transition, usually a color generator or media player.

Wipe Transitions

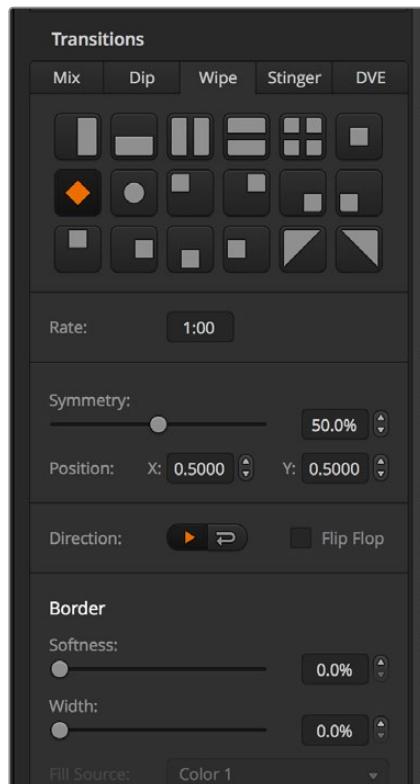
A wipe is a transition from one source to another and is achieved by replacing the current source by another source with a pattern that forms a shape. For example an expanding circle or diamond.



Program output for a wipe transition.

To perform a wipe transition on ATEM Television Studio HD:

- 1** Press a source button on the control panel for the video source that you want on the program output. The button will illuminate green.
- 2** In the LCD transitions settings, select ‘wipe’. Press the ‘menu’ button to return to the transitions settings and change the transition rate if you want to.
- 3** Press the menu button to step back through the menus to the master output screen.
- 4** Perform the transition as an auto transition by pressing the auto button on the front panel.



Wipe transition settings

To perform a wipe transition on an ATEM Television Studio Pro model switcher:

- 1 On the preview bus, select the video source that you want on the program output.
- 2 Press any of the wipe pattern buttons. For example, the vertical or horizontal wipe button.
- 3 In the transitions LCD menu, adjust the border softness and width settings, or select which source to use for the border in the border fill setting.
- 4 Use the transitions LCD menu to set the direction of the wipe transition.
- 5 Perform the transition as an auto transition or manual transition using the auto button or transition slider.

To perform a wipe transition on the software control panel:

- 1 On the preview bus, select the video source that you want on the program output.
- 2 Select the WIPE transition style in the transition control block.
- 3 Expand the transition palette and select wipe from the transition types bar.
- 4 Use the settings in the wipe palette to customize the wipe transition.
- 5 Perform the transition as an auto transition or manual transition from the transition control block.

Wipe transition parameters

Rate	The length of the wipe transition in seconds and frames.
Pattern	The pattern setting lets you change the wipe pattern from the LCD menu.
Symmetry	Symmetry can be used to control the aspect ratio of the pattern. For example, adjusting the symmetry will allow you to change a circle into an ellipse. On the advanced panel symmetry can be adjusted using the z axis of the joystick.
Position X and Y	If the wipe pattern has positioning, then the x position and y position menu settings can be used to move the center of the pattern. The trackball on ATEM Television Studio Pro HD can also be used to make positioning changes and will dynamically update the x and y position values in the software control panel.
Direction	Press the set button to change the direction between normal and reverse. The normal direction for closed patterns such as circles, diamonds and boxes is to grow from the center of the screen and progress outward. Reverse changes the progression of closed patterns such as circles, diamonds and boxes so that the pattern closes in from the edges of the screen toward the center.
FlipFlop	Press the set button to toggle flip flop on or off. When FlipFlop mode is toggled on, the transition changes between normal to reverse every time the transition is executed.
Border Softness	The edges of the wipe can be adjusted between sharp and fuzzy by adjusting the border softness parameter.
Border Width	Width of the border.
Border Fill	The source for the border. The border source used in a wipe transition can be any source in the switcher. For example, a thick border with the media player as its source can be used for sponsorship or branding.

DVE Transitions

Your ATEM switcher includes a powerful digital video effects processor for DVE transitions. A DVE transition displaces the image in various ways to transition from one picture to another. For example, a DVE transition can be used to squeeze the current picture off screen revealing a new video under it.

To perform a DVE transition on ATEM Television Studio HD:

- 1 Press a source button on the control panel to select the video source that you want on the program output. The button will illuminate green.
- 2 Press the 'menu' button to open the LCD menu and navigate to the 'transitions' settings. Set the transition type to DVE.
- 3 Now set the DVE pattern, for example push or squeeze, the direction of the DVE, and change the rate if you need to.

NOTE If the DVE is already being used in an upstream key, the DVE transition type will not be available for selection until the key is taken off air and off next transition. Refer to 'sharing DVE resources' later in this section for more information.

- 4 Press the 'auto' button on the control panel to perform the DVE transition.

To perform a DVE transition on an ATEM Television Studio Pro model switcher:

- 1 On the preview bus, select the video source that you want on the program output.
- 2 To select a DVE, press any of the DVE push or DVE squeeze pattern buttons. If you want to change the direction of the DVE, press the invert button.

NOTE If the DVE is already being used in an upstream key, the DVE transition type will not be available for selection until the key is taken off air and off next transition. Refer to 'sharing DVE resources' later in this section for more information.

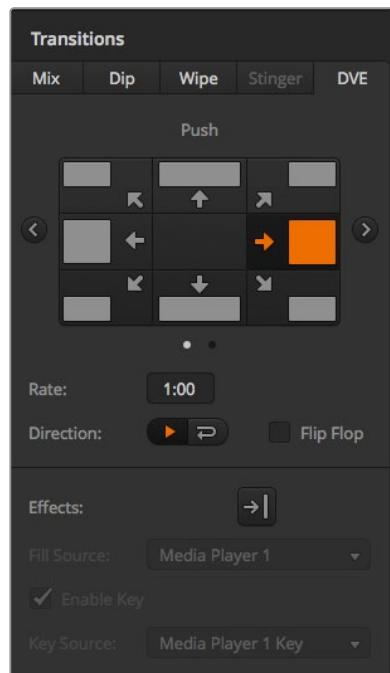
- 3 Perform the transition as an auto transition or manual transition using the auto button or transition slider.

To perform a DVE transition on the software control panel:

- 1 On the preview bus, select the video source that you want on the program output.
- 2 Select the DVE transition style in the transition control block.
- 3 Expand the transition palette and select DVE from the transition types bar.

If the DVE is being used in an upstream key, the DVE transition style button will be unavailable for selection until the key is taken off air and off next transition. Refer to sharing DVE resources below for more information.

- 4 Use the settings in the DVE palette to customize the transition.
- 5 Perform the transition as an auto transition or manual transition from the transition control block.



DVE transition settings

DVE transition parameters

Rate	The duration of the DVE transition in seconds and frames. Use the set button and settings knob to adjust the DVE transition rate.
Pattern	Selects the DVE pattern. The pattern can be selected from the LCD menu, or ATEM Television Studio pro HD's control panel.
Direction	The 'normal' direction applies the DVE effect on program, revealing the preview channel. The 'reverse' direction changes the direction so the DVE effect is applied on the preview channel. In the case of reverse, program is covered by a DVE effect with the preview video.
FlipFlop	When FlipFlop mode is toggled on, the transition changes between normal and reverse every time the transition is executed.

DVE key parameters

Fill Source	Selects the source for the fill. The fill signal is the graphic used to move across the top of the transition.
Enable Key	Enables or disables the DVE key. Set to 'on' to enable, or 'off' to disable.
Key Source	Selects the source for the key. The key signal is a grayscale image that defines the region in the graphic that will be removed so that the fill signal can be correctly stacked on top of the transition.
Pre Multiplied Key	Selects the DVE key as a pre multiplied key. Set to 'off' to enable additional key parameters.
Clip	The clip level adjusts the threshold at which the key cuts its hole. Decreasing the clip level reveals more of the background. If the background video is completely black then the clip value is too low.
Gain	The gain adjustment electronically modifies the angle between on and off thereby softening the edges of the key. Adjust the gain value until the edge softness is desirable but the background video luminance, or brightness, is not affected.
Invert Key	When the key is not pre multiplied, inverts the key signal.

Sharing DVE Resources

ATEM features a DVE channel which can be used to perform DVE transitions or used in an upstream keyer. When you select a DVE transition, if the DVE is used elsewhere in the system, the DVE transition type will not be available. In order to use the DVE transition you must free the DVE from where it is currently used. Verify that the upstream key currently on program or preview is not a DVE key. To free DVE from the upstream keyer, change the key type to anything other than DVE. The DVE will be released and therefore available for use as a DVE transition.

The graphic transition is a popular transition that uses the DVE and moves a graphic across the screen over a background transition. For example, the graphic wipe moves a graphic over a horizontal wipe, essentially replacing the wipe border. A graphic mix spins the graphic across the screen over a mix transition. Graphic transitions are perfect for wiping the station logo or football graphic across the screen revealing a new background. Graphic transitions use a special keyer built into the transition block, leaving all of the upstream and downstream keyers available for compositing the output. The following section explains how to build and perform graphic transitions.



The above image sequence provides an example of the program output for a graphic wipe transition.

Performing a Graphic Transition

To perform a graphic transition on ATEM Television Studio HD:

- 1 Press the 'menu' button to open the LCD menu.
- 2 Select the DVE transition style setting in the 'transitions' LCD menu.
If the DVE is being used in an upstream key, the 'DVE' will be unavailable for selection until the key is taken off air and off next transition. Refer to 'sharing DVE resources' later in this section for more information.
- 3 Select the DVE graphic wipe transition pattern and set the direction using the 'direction' setting.
The graphic wipe setting is the last item in the list of patterns.
- 4 While you are still in the transitions menu, set the fill and key source.

TIP Typically, for a graphic transition, the source would normally be a graphic loaded in a media player. By default, when you select a media player for the fill source, the key source will automatically select the media player key channel and set pre multiplied key to 'on'. This means a graphic with a key matte embedded in the alpha channel will automatically be selected by the switcher. You can disable pre multiplied key and change the key source if you want to use a separate media file on a different media player, or a different input source.

- 5 Adjust the key parameters in the LCD menu if required.
- 6 Press the 'auto' button to perform the transition as an auto transition, or use the transition slider for a manual transition.

To perform a graphic transition on an ATEM Television Studio Pro model switcher:

- 1 Press the 'logo' transition style button on the control panel. This assigns the DVE to the upstream keyer and sets the DVE transition pattern to 'graphic wipe'.
- 2 In the source select row of buttons, select the source you want for the DVE cut and DVE fill.

TIP Typically, for a graphic transition, the source would normally be a graphic loaded in a media player. By default, when you select a media player for the fill source, the key source will automatically select the media player key channel and set pre multiplied key to 'on'. This means a graphic with a key matte embedded in the alpha channel will automatically be selected by the switcher. You can disable pre multiplied key and change the key source if you want to use a separate media file on a different media player, or a different input source.

- 3 Adjust the key parameters in the LCD menu if required.
- 4 Press the 'auto' button to perform the transition as an auto transition, or use the transition slider for a manual transition.

To perform a graphic transition on the software control panel:

- 1 Select the DVE transition style button in the transition control block. If the DVE is being used in an upstream key, the DVE transition style button will be unavailable for selection until the key is taken off air and off next transition. Refer to 'sharing DVE resources' later in this section for more information.
- 2 Expand the transition palette and select the DVE transition type. Use the previous or next arrows to select a different DVE type. The 'effects' graphic wipe icon will be enabled by default.
- 3 Select the fill source and key source for the graphic from the drop down list.

TIP Typically, for a graphic transition, the source would normally be a graphic loaded in a media player. By default, when you select a media player for the fill source, the key source will automatically select the media player key channel and set pre multiplied key to 'on'. This means a graphic with a key matte embedded in the alpha channel will automatically be selected by the switcher. You can disable pre multiplied key and change the key source if you want to use a separate media file on a different media player, or a different input source.

- 4 Adjust the key parameters if required.
- 5 Perform the transition as an auto transition or manual transition from the transition control block.

Description of graphic wipe parameters

Rate	Rate specifies the length of the transition in seconds and frames. The rate can be adjusted using the rate knob or by entering a number on the number pad and pressing the set rate button.
Direction	The normal direction moves the graphic from left to right, and the reverse direction changes the direction so that it moves the graphic from right to left.
FlipFlop	When FlipFlop mode is toggled on, the transition changes between normal and reverse every time the transition is executed. The 'Normal' or 'Reverse' direction settings indicates the direction of the next transition.

Fill Source	The fill signal is the graphic used to move across the top of the transition.
Enable Key	Enables or disables the key. Set to 'on' to enable, or 'off' to disable.
Key Source	The key signal is a grayscale image that defines the region in the graphic that will be removed so that the fill signal can be correctly stacked on top of the wipe.

Sharing DVE Resources

The one DVE channel available in the switcher can be used to perform DVE transitions or it can be used in an upstream keyer. When you select a DVE transition, if the DVE is used elsewhere in the system, the DVE transition type will not be available. In order to use the graphic wipe transition you must free the DVE from where it is currently used. Verify that the upstream key currently on program or preview is not a DVE key. To free DVE from the upstream keyer, change the key type to anything other than DVE. The DVE will be released and therefore available for use as a graphic wipe.

Graphic wipe images

The graphic wipe feature requires a static graphic that is used as a moving border for a horizontal wipe. This graphic should be a vertical 'banner' type graphic that is no more than 25% of the total screen width.



Graphic wipe screen width requirements

1080i and 1080p	If the switcher is operating at 1080i or 1080p then the graphic should be no wider than 480 pixels.
720p	If the switcher is operating at 720p then the graphic should be no wider than 320 pixels.
SD	If the switcher is operating in Standard Definition then the graphic then the graphic should be no wider than 180 pixels.

Manual Transitions

Manual transitions let you manually transition between program and preview sources using the fader bar in the software control panel, or using the transition slider on ATEM Television Studio Pro HD's control panel. Mix, dip, wipe and DVE transitions can all be performed as a manual transition.

To perform a manual transition:

- 1 On the preview bus, select the video source that you want on the program output.
- 2 Select the transition type using the transition type buttons.
- 3 Manually move the fader bar or transition slider from one end to the other to execute the transition. The next move will begin a new transition.

- 4** During the transition, the red and green buttons on the program and preview buses both turn red to indicate that you are in the middle of a transition. The transition slider also indicates the position and progress of the transition. On the software control panel, the virtual fader bar displays the position and progress of the transition.
- 5** At the end of the transition, sources selected on the program and preview buses are exchanged to indicate that the video source that was on preview is now on program and vice versa.

Preview Transition

ATEM switchers have a powerful feature which allows you to review and adjust a transition on the preview output. The preview transition feature can be performed using the 'prev trans' button in ATEM Software Control's transitions block, and lets you verify a transition before actually performing it on air.

To preview a transition:

- 1** On the preview bus, select the video source that you want on the program output.
- 2** Select the transition type using the transition type buttons in ATEM Software Control, or on your switcher's built in control panel.
- 3** Press the PREV TRANS button to put the switcher into preview transition mode. The PREV TRANS button will illuminate red and the preview output will change so that it is a copy of the program output.
- 4** Manually move the fader bar from one end to the other to preview the transition on the preview output. The program output will remain unchanged.
- 5** Press the PREV TRANS button or return the fader bar to its starting position to turn off preview transition mode. Returning the fader bar to its starting position will automatically disable preview transition mode and turn off the red light on the PREV TRANS button. Moving the fader bar after the light is off will take the transition on the program output.

Keying using ATEM Switchers

Keyers are a powerful production tool that allow the arrangement of visual elements from different sources on the same video image.

To do this, multiple layers of video or graphics are stacked on top of the background video. Altering the transparency of various parts of these layers allows the background layer to be visible. This process is called keying. Various techniques are used to create this selective transparency and these correspond to the different types of keyers available on your switcher.

The following section explains luma and linear keyers, which are available either upstream or downstream, and chroma, pattern and DVE keys, which are upstream keyers.

Understanding Keying

A key requires two video sources; the fill signal and the key or cut signal. The fill signal contains a video image which is to be stacked on top of the background, while the cut signal is used to select regions of the fill signal to be made transparent. The fill and cut signals can be selected from any of the switcher's external inputs or internal sources, allowing both still and moving images to be used as fill or cut sources.

Fill and cut signals are selected on the software control panel from drop down lists in the upstream and downstream key palettes. In your switcher's LCD menu, you can select fill and cut signals in the upstream or downstream key menus.

There are two types of keyers used in your switcher; upstream keyers and downstream keyers. One upstream keyer, also known as an effects keyer, plus two downstream keyers are available via the switcher's control panel and LCD menu, or via ATEM Software Control. The upstream keyer can be set up as a luma, linear, pre-multiplied, chroma, pattern or DVE key. Two downstream keyers are available in the dedicated DSK block. Each downstream keyer can be set up as a luma or linear key.

Luma Key

A luma key or self key consists of one video source containing the video image that will be stacked on top of the background. All of the black areas defined by the luminance in the video signal will be made transparent so that the background can be revealed underneath. Since only one image is used to define the areas to be cut out, a luma key uses the same signal for the fill and key. The following images are an example of what background, luma key signals and the resulting combined image might look like.



Combining a background and fill/key in a luma key

Background

A full screen image, often a camera source.

Fill

The graphic you plan to display on top of your background video. Notice that the final composition does not retain any black from the graphic because all of the black parts have been cut out of the image.

Linear Key

A linear key consists of two video sources; the fill signal and the key or cut signal. The fill signal contains a video image which is to be stacked on top of the background, while the key signal contains a grayscale mask that is used to define regions of the fill signal to be made transparent. Since both the fill and key signals are video inputs, both signals can be in motion while on screen. The following images are examples of what background, fill, key signals and the resulting combined image might look like.



Combining a background, fill and key in a linear key

Background

A full screen image, often a camera source.

Fill

The graphic you plan to display on top of your background video. Notice that the black parts of the graphic remain intact because the key signal is used to determine the transparency of the fill signal. The fill signal is often provided by a graphics system.

Key

A grayscale image that defines the region in the image that will be removed so that the fill signal can be correctly stacked on top of the background. The key signal is often provided by a graphics system.

Pre multiplied Key

A modern graphics system or character generator that offers fill and key outputs will most likely provide what is known as a pre multiplied or shaped key. A pre multiplied key is a special combination of the fill and key signal where the fill signal has been pre multiplied with the key signal over a black background. Photoshop generated images that contain an alpha channel are pre multiplied.

ATEM switchers have an auto key adjustment for pre multiplied keys so that when the pre multiplied key setting is enabled, the clip and gain parameters are automatically set by the system.

When using a Photoshop generated image, generate graphics over a black background layer and place all content on the upper layers. Add an alpha channel in your Photoshop document that the ATEM can use for blending the graphic over the live video. Then, when saved as a Targa image file, or downloaded direct to the media pool, you can select pre multiplied in the keyer and you should have a great key!

Photoshop documents are pre multiplied by nature, so you should always use the pre multiplied settings on the ATEM switcher when keying them.

Performing an Upstream Luma/Linear Key

Since luma and linear keys use the same parameters, they are set up on the software control panel and advanced panel using a common menu, called the luma key menu. What defines the key as being either luma or linear is in the selection of fill and key sources. In a luma key, fill and key sources are the same. For a linear key, fill and key sources are different.

To set up a luma/linear key on the upstream keyer on ATEM Television Studio HD:

- 1 Press the 'menu' button to open the LCD settings.
- 2 In the upstream key settings, select the 'luma' key type.
- 3 Select the fill source.

TIP If you select a media player for the fill source, the media player key source will automatically be selected for the key. For example, if you select media player 1 for the fill source, media player 2 key will automatically be selected.

For a luma key, always make sure the same source is selected for both fill and key.

Upstream Key >	
Key	On Air
Next Transition	Off
Key Type	Luma
Fill Source	Camera 3
Key Source	Media Player 1

Pre Multiplied key	
Pre Multiplied Key	On
Clip	20.0%
Gain	20.0%
Invert Key	On
Mask	

Luma Key Settings

To set up a luma/linear key on the upstream keyer on an ATEM Television Studio Pro model switcher:

- 1 Press the KEY 1 TIE button on the control panel to enable the keyer on the preview output.
- 2 Select 'luma' key type in the upstream key LCD settings.
- 3 Press the KEY 1 FILL button from the source select row, and press one of the numbered buttons immediately below to select the fill source for your luma key.

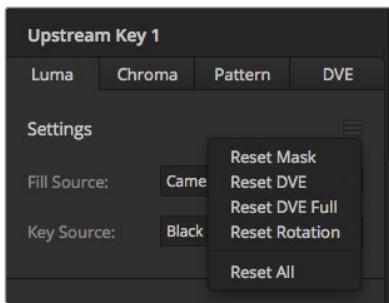
TIP If you select a media player for the fill source, the media player key source will automatically be selected for the key. For example, if you select media player 1 for the fill source, media player 2 key will automatically be selected.

- 4 In the upstream key LCD settings, adjust the clip and gain controls to refine the key or turn pre multiplied key on for pre multiplied keys. The clip and gain are set automatically for pre multiplied keys.

To set up a luma/linear key on the upstream keyer 1 on the software control panel:

- 1 Expand the upstream key 1 M/E 1 palette and select luma tab.
- 2 Select the fill source and key source.

If performing a luma key, select the same source for both fill and key.



Select sections of the Palette you wish to reset from the reset menu

Adjust the key parameters to refine the key. For a description of luma key parameters, refer to the table below.

Upstream key luma/linear key parameters:

Mask	Enables a rectangular mask that can then be adjusted using the top, bottom, left and right parameters.
Pre-Mult	Identifies the key signal as a pre-multiplied key.
Clip	The clip level adjusts the threshold at which the key cuts its hole. Decreasing the clip level reveals more of the background. If the background video is completely black then the clip value is too low.
Gain	The gain adjustment electronically modifies the angle between on and off thereby softening the edges of the key. Adjust the gain value until the edge softness is desirable but the background video luminance or brightness is not affected.
Invert Key	Inverts the key signal.
Flying Key	Enables/disables DVE effects.

Setting up a Luma/Linear key on Upstream Keyer 1 using ATEM Advanced Panels

- 1 Press the 'key 1' button to enable the keyer on the preview output. This automatically selects the keyers menu on the system control LCD, but you can also press the 'keyers' button to enter the menu directly.
- 2 Select the desired M/E keyer by pressing the corresponding soft button along the top edge of the LCD menu.
- 3 Use the control knob underneath the 'key type' indicator to choose the 'luma' key.
- 4 Rotate the 'fill source' and 'key source' control knobs to choose a fill and key source. You can also press the corresponding buttons on the source select bus to select the fill and key source.
- 5 Once you have chosen a key type, fill and source, press the 'right' arrow button to scroll through to the next menu item and use the control knobs to adjust key parameters such as mask, gain, clip, enable or disable pre multiplied key, etc.

Performing a Downstream Luma/Linear Key

To set up a luma/linear key on downstream keyer 1 on ATEM Television Studio HD:

- 1 Press the 'menu' button to open the LCD settings.
- 2 In the downstream key 1 settings, select the 'luma' key type.
- 3 Select the fill source.

TIP If you select a media player for the fill source, the media player key source will automatically be selected for the key. For example, if you select media player 1 for the fill source, media player 2 key will automatically be selected.

For a luma key, always make sure the same source is selected for both fill and key.

To set up a luma/linear key on downstream keyer 1 on an ATEM Television Studio Pro model switcher:

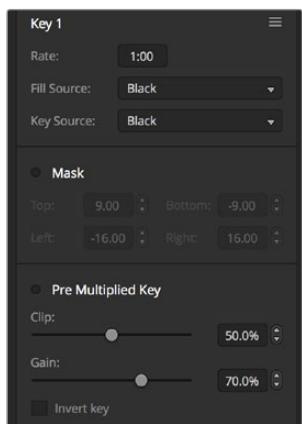
- 1 Press the KEY 1 TIE button on the control panel to enable the keyer on the preview output.
- 2 Select 'luma' key type in the downstream key 1 LCD settings.
- 3 Press the DSK 1 FILL button from the source select row, and press one of the numbered buttons immediately below to select the fill source for your luma key.

TIP If you select a media player for the fill source, the media player key source will automatically be selected for the key. For example, if you select media player 1 for the fill source, media player 2 key will automatically be selected.

- 4 For a luma key, always make sure the same source is selected for both fill and key.
- 5 In the downstream key 1 LCD settings, adjust the clip and gain controls to refine the key or turn pre multiplied key on for pre multiplied keys. The clip and gain are set automatically for pre multiplied keys.

To set up a luma/linear key on downstream keyer 1 on the software control panel:

- 1 Select the downstream key 1 palette.
- 2 Use the drop down controls labeled fill source and key source to specify the fill and key sources. If performing a luma key, select the same source for both fill and key.
- 3 Adjust the key parameters to refine the key.



Downstream Keyer Settings

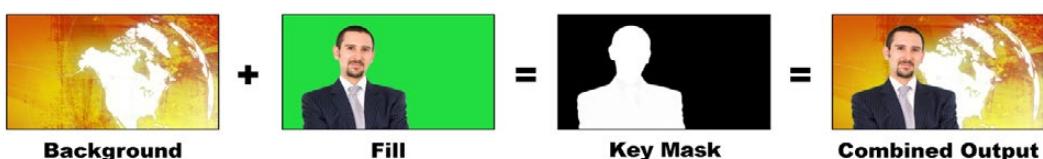
Setting up a Luma/Linear Key on Downstream Keyer 1 using ATEM Advanced Panels

- 1 Press the 'DSK 1 tie' button to enable the downstream keyer on the preview output. This automatically selects the downstream key menu on the system control LCD, but you can also press the 'keyers' button and press the right arrow to enter the menu directly.
- 2 Press the 'DSK 1' or 'DSK 2' soft button to select which downstream keyer you wish to use. You don't have to select the key type as the downstream keyer is always a luma key.
- 3 Use the control knobs under the LCD menu to select the fill source and key source. You can also use the corresponding source select buttons to select the fill and key source.
- 4 Once you have chosen the fill source and key source, use the 'left' and 'right' control buttons to scroll through additional menu screens containing key parameters such as mask, gain, clip, pre multiplied key settings, and more.

Chroma Key

Chroma key is commonly used for weather broadcasts, where the meteorologist appears to be standing in front of a large map. In the studio the presenter is actually standing in front of a blue or green background. In a chroma key two images are combined using a special technique and a color from one image is removed, revealing another image behind it. This technique is also referred to as color keying, color-separation overlay, green screen, or blue screen.

A very common use for chroma keys for backgrounds is computer generated graphics. It's simple to connect an external computer to your ATEM switcher using the HDMI output of the computer or a video card such as the Blackmagic Design DeckLink or Intensity range and then play back video clips to your ATEM switcher. If you render a green background on your animations, you can then key this green to create fast and clean animations of any length. Keying is easy as the green is computer generated so it's a very flat color that's easy to key.



Combining a background with a fill and chroma key/cut

Background

A full screen image; in the case of a chroma key it is often a weather map.

Fill

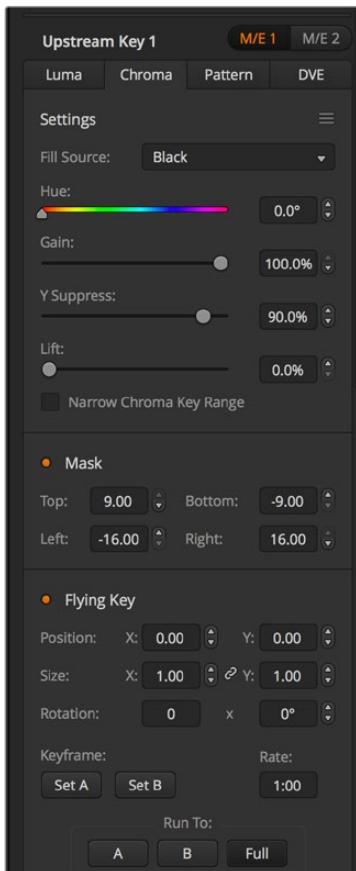
The image you plan to display on top of your background video. In the case of a chroma key, this is video of the meteorologist in front of the green screen.

Key/Cut

In the case of a chroma key the key/cut signal is generated from the fill signal.

Performing an Upstream Chroma Key

Use the following steps to perform a chroma key on your ATEM switcher.



Chroma Key Settings

To set up a chroma key on the upstream keyer on ATEM Television Studio HD:

- 1 The first step is to navigate to the upstream key settings in the LCD menu and set 'next transition' to ON. This enables the upstream keyer on the preview output so you can see the key during the setup stage and ties the key to the next transition so it will transition to air when the next transition is performed.
- 2 In the LCD menu upstream key settings, set the key type setting to 'chroma'.
- 3 Return to the upstream key menu and scroll down to the fill source setting. Select the image you want to key as the fill source.
- 4 Adjust the chroma key settings while watching the preview output to refine the key. When you are happy with your settings for the chroma key, press the 'menu' button to step back through the menu until you return to the master program output.

To set up a chroma key on the upstream keyer on an ATEM Television Studio Pro model switcher:

- 1 The first step is to press the KEY 1 TIE button to enable the key on the preview output so you can see the key during the setup stage.
- Pressing the KEY 1 TIE button ties the key to the next transition so it will transition to air when the next transition is performed.

- 2** In the LCD menu upstream key settings, set the key type setting to 'chroma'.
- 3** Return to the upstream key menu and scroll down to the fill source setting. Select the image you want to key as the fill source.
- 4** Adjust the chroma key settings while watching the preview output to refine the key. When you are happy with your settings for the chroma key, press the 'menu' button to step back through the menu until you return to the master program output.

To set up a chroma key on the upstream keyer on the software control panel:

- 1** Expand the upstream key 1 M/E 1 palette and select chroma from the key types bar.
- 2** Select the fill source.
- 3** Adjust the key parameters to refine the key. For a description of chroma key parameters, refer to the table below.

Chroma key parameters:

Fill Source	Selects the source to be keyed over the background. For example, a video source of a weather presenter standing in front of a green screen.
Hue	The hue adjustment selects the color that will be replaced. Rotate the settings knob until the background keys through the desired color.
Gain	The gain adjustment determines how the colors around the selected hue are keyed. Adjust the gain until the edges of the keyed region appear the way you want them.
Y Suppress	Adjust this setting until the black level of the chroma removed region is correct.
Lift	Lift should normally be set to zero for a well set up chroma key scene. Lift allows very low saturation values of the keyed color to be excluded from the key. Colored light spilling onto a neutral colored object in the foreground will sometimes cause small areas to key to the background source. Lift allows you to fill these small holes in the key signal.
Narrow Chroma Key Range	The acceptance angle of colors around the selected hue should generally be as broad as possible to achieve natural looking chroma keys. Sometimes, if some colors in the fill source are too close to the chroma key color, it may be hard to exclude them from the key. Enabling this setting uses a smaller acceptance angle around the chroma key color. Choosing this setting temporarily, may help you center the hue adjustment.
Mask	Allows you to mask out sections of the key. For example, if the green screen does not fill the edges of the screen, you can use the mask setting to select only the area of the screen you want to use. To return the mask to the default settings, select 'reset mask' and press the set button.

Setting up a Chroma Key on Upstream Keyer 1 using ATEM Advanced Panels

- 1 Press the 'key 1' button to enable keyer 1 on the preview output. This automatically selects the keyers menu on the system control LCD, but you can also press the 'keyers' button to enter the menu directly.
- 2 Select the 'chroma' key type using the corresponding 'key type' control knob.
- 3 Select your fill source by turning the corresponding LCD control knob. You can also select a fill source by pressing the corresponding button in the source select bus.
- 4 Use the 'left' and 'right' arrow buttons to access additional key parameters you may want to adjust such as hue, gain, y suppress, lift and masking.

TIP When adjusting settings on ATEM Advanced panels, you can restore all settings to their defaults by holding down the shift key and pressing 'reset'. To reset individual parameters, hold down the shift key and press the corresponding soft control knob.

Adjusting parameters with a vectorscope

You may wish to set up a chroma key using color bars as the background source, and watching the result on a vector scope as you perform the following procedure.

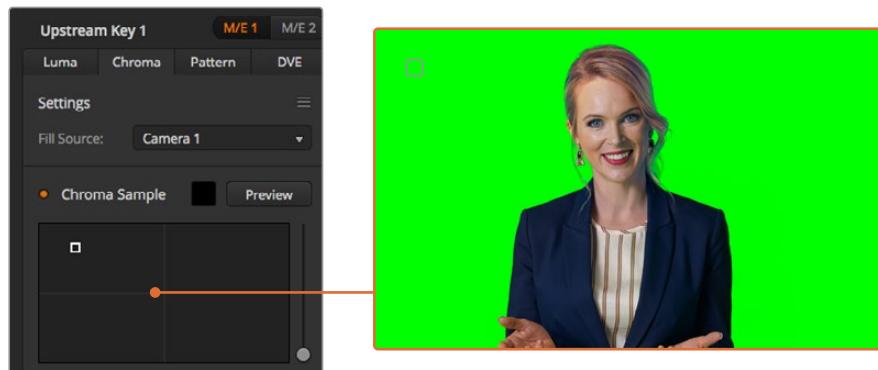
- 1 Turn narrow chroma key range off.
- 2 Set lift to 0.
- 3 Adjust the hue until the color hex dots are centered around black. Adjusting the hue will offset the black point, and the constellation of the 6 color bar dots will rotate around the screen.
- 4 Adjust the gain until the color bars are near their target boxes on the vectorscope. Adjusting the gain will expand and contract the color vectors about the center.
- 5 Adjust the Y Suppress knob until the black level is correct.

Performing an Advanced Chroma Key

ATEM Television Studio Pro 4K features an advanced chroma keyer with more detailed chroma sampling and adjustment options. These controls help you achieve the best key, improving the blend of foreground and background so you can create a more convincing visual effect.

To set up a convincing chroma key using the advanced keyer:

- 1 Expand the upstream key palette and select 'chroma' from the key types bar.
- 2 Select the fill source. Typically, this source would be from a camera facing a presenter in front of a green screen, or a graphic loaded in a media player.
- 3 Click the 'chroma sample' button. With the chroma sample selected, you'll see a new panel appear with a box cursor. This cursor is also visible on the multi view's preview window.



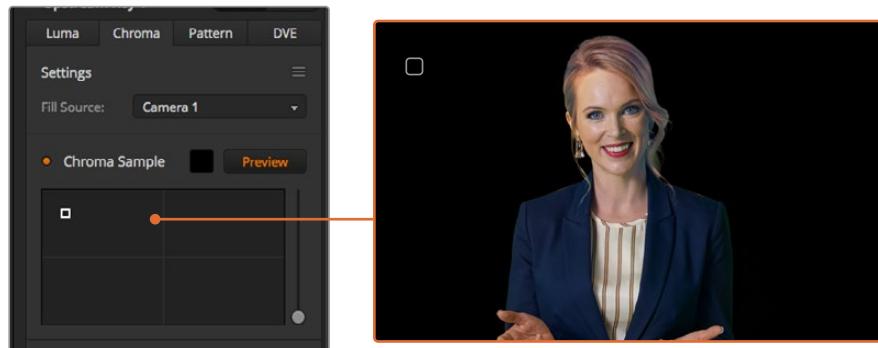
The chroma sample setting lets you position a cursor over the screen area you want to sample

- 4 Click and drag on the box cursor to move it to the position you want to sample.

Choose a representative area of your green screen that covers as much of the luminance range of the screen as possible. The default size of the box cursor is well suited to most green screens that are relatively evenly lit, however if there is a lot of variance in your green screen, you can adjust the size of the box by clicking on the slider to the right of the sample window and dragging it up or down.

TIP When sampling uneven green screens, we recommend sampling the darkest area first before increasing the size of the sample box. This can give you a more accurate key.

NOTE You can preview your key in the multi view at any time by clicking the 'preview' button above the chroma sample panel. This shows you the final composited version of your chroma key effect on the preview window. You can also route the preview window to your switcher's auxiliary output if you want to monitor the preview output on an external screen.



Click the preview button to check the final composite on the preview output

Fine Tuning your Key using Key Adjustments

Once you have achieved a good chroma sample that removes most of your green screen while generally retaining foreground elements, its time fine tune your key with the 'key adjustments' controls.

Foreground

Use the ‘foreground’ slider to adjust how opaque the foreground mask is. This determines the strength of the foreground against the background. By increasing the slider, you can fill in any small areas of transparency inside your foreground image. We recommend moving this slider and stopping as soon as the foreground becomes solid.

Background

The ‘background’ slider adjusts the opacity of the keyed area. Use this slider to fill in any small foreground artifacts left over in the area of the image you want to remove. We recommend moving the slider until your keyed area is consistently opaque.

Key Edge

The “key edge” slider moves the edge of your keyed area in or out, helping to remove background elements from the very edge of your foreground or extending the foreground out a little if your key is too aggressive. This can be especially useful with fine details like hair. We recommend moving this slider until the edge of your key is generally clean, without any background artifacts visible.

Using the key adjustment controls, your foreground elements should be cleanly separated from the background.

While making key adjustments, it can be useful to assign one of your multi view windows to show your key mask. For example, set a view to “**KEY MASK 1**.” This will give you a clearer view of your key for fine adjustments.



Displaying your key mask
in a separate MultiView
window can make fine
tuning a key much easier.

Chroma Correction using Color Spill and Flare Suppression

Light bouncing off a green screen can create a green edge to foreground elements as well as a general tint to the foreground, or fill image. This is called color spill and flare. The ‘chroma correction’ settings let you improve the areas of the foreground that are affected by color spill and flare.

Spill

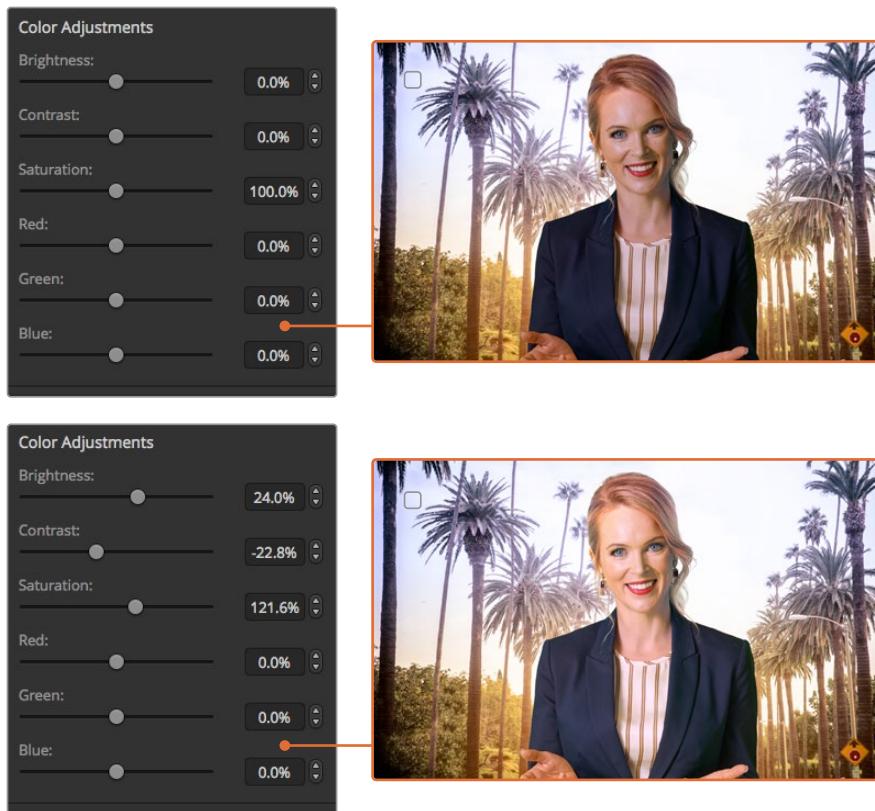
Adjust the spill slider to remove colored tint from the edges of foreground elements. For example, green reflections bouncing off a green screen.

Flare Suppression

Flare suppression removes overall green tint evenly across all foreground elements.

Matching your foreground and background

Once your foreground is properly separated from your green screen, and you have adjusted spill and flare suppression, use the ‘color adjustments’ controls to match your foreground with the background. Adjusting the brightness, contrast, saturation, and color balance of your foreground image will help blend it with the background so the effect is more convincing.



Use the color adjustments controls to match your foreground with the background

TIP When your key is on air, chroma sampling and preview are locked. While most controls are adjustable while on air, we recommend avoiding changes unless absolutely required. For example making defined color adjustments if conditions change unexpectedly.

Pattern Key

A pattern key is used to display a geometric cut out of one image on top of another image. In a pattern key the key or cut signal is generated using the switcher's internal pattern generator. The internal pattern generator can create 18 shapes that can be sized and positioned to produce the desired key signal.



Combining a background with a fill and pattern key

Background

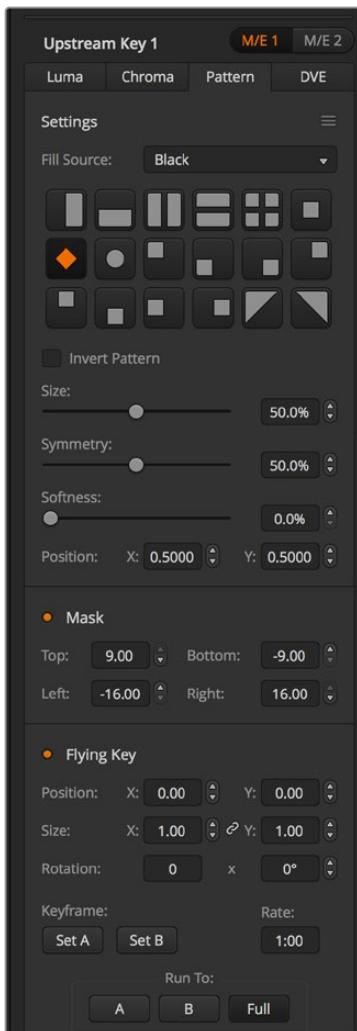
A full screen image.

Fill

Another full screen image you wish to overlay on top of the background.

Key/Cut

In the case of a pattern key the key/cut signal is generated by the switcher's internal pattern generator.



Pattern Key Settings

Performing an Upstream Pattern Key

To set up a pattern key on the upstream keyer on ATEM Television Studio HD:

- 1 The first step is to navigate to the upstream key settings in the LCD menu and set 'next transition' to ON. This enables the upstream keyer on the preview output so you can see the key during the setup stage and ties the key to the next transition so it will transition to air when the next transition is performed.
- 2 In the LCD menu upstream key settings, set the key type setting to 'pattern'.
- 3 Return to the upstream key menu and scroll down to reveal the pattern setting. Use this setting to choose the pattern you want for the pattern key.

- 4** Adjust the pattern key settings while watching the preview output to refine the key. When you are happy with your settings for the chroma key, press the 'menu' button to step back through the menu until you return to the master program output.

Upstream Key	
Key	On Air
Next Transition	On
Key Type	Pattern
Fill Source	Camera 3
Pattern	
Invert Pattern	On
Size	38.0%
Symmetry	78.0%
Softness	99.0%
Position X	0.425
Position Y	0.115

Pattern Key Settings

To set up a pattern key on the upstream keyer on an ATEM Television Studio Pro model switcher:

- 1 The first step is to press the KEY 1 TIE button to enable the key on the preview output so you can see the key during the setup stage. Pressing the KEY 1 TIE button ties the key to the next transition so it will transition to air when the next transition is performed.
- 2 In the LCD menu upstream key settings, set the key type setting to 'pattern'.
- 3 Return to the upstream key menu and scroll down to reveal the pattern setting. Use this setting to choose the pattern you want for the pattern key.
- 4 Adjust the pattern key settings while watching the preview output to refine the key. When you are happy with your settings for the chroma key, press the 'menu' button to step back through the menu until you return to the master program output.

To set up a pattern key on the upstream keyer using the software control panel:

- 1 Expand the upstream key 1 M/E 1 palette and select pattern from the key types bar.
- 2 Select the fill source.
- 3 Select the key pattern.
- 4 Adjust the key parameters to refine the key. For a description of pattern key parameters, refer to the table below.

Pattern key parameters:

Invert Pattern	This button inverts which the region is filled with the fill source. For example, fill a region outside of a circle by positioning the circle wipe as desired and then setting invert pattern to 'on'.
Size	Increases and decreases the size of the selected pattern.
Symmetry	Some patterns may have their symmetry or aspect ratio adjusted. Circle patterns may be adjusted to become horizontal or vertical ellipses.
Softness	Changes the softness of the edge of the key signal.
Position X and Y	These settings let you change the position of the pattern on the screen.
Mask	Allows you to mask out sections of the key. For example, if the green screen does not fill the edges of the screen, you can use the mask setting to select only the area of the screen you want to use. To return the mask to its default symmetrical settings, select 'reset mask' and press the set button.

Setting up a Pattern Key on Upstream Keyer 1 using ATEM Advanced Panels

- 1** Press the KEY 1 next transition button to enable the key on the preview output. This automatically selects the keyers menu on the system control LCD. Pressing the KEY 1 next transition button ties the key to the next transition so it will transition to air when the next transition is performed.
- 2** In the keyers LCD menu, select the 'pattern' key type using the corresponding 'key type' control knob.
- 3** Select the fill source using the corresponding soft control knob or by pressing a source button on the source select bus.
- 4** Turn the corresponding soft control knobs to choose the 'pattern' you want for the pattern key and set the 'size' of the pattern.
- 5** Press the system control left and right arrow buttons to navigate through the pattern key parameters, and adjust settings using the control knobs. Watch the preview output as you refine the key.

TIP Some patterns can have their center point repositioned. Use the joystick to move the position of the pattern. If you need to reset the position, navigate to the 'pattern type' setting, change it to another pattern, and then return to your chosen pattern to rest the position to its default.

DVE Key

DVEs, or digital video effects, are used to create picture-in-picture boxes with borders. Most models have 1 channel of 2D DVE that allows scaling, rotation, 3D borders and offers a drop shadow.



Combining a background, DVE fill and DVE key/cut

Background

A full screen image.

Fill

Another full screen that has been scaled, rotated or has added borders and will be overlaid on top of the background.

Key/Cut

In the case of a DVE key, the key/cut signal is generated by the switcher's internal DVE processor.

Upstream Key	
Key	On Air
Next Transition	Off
Key Type	DVE
Fill Source	Camera 3
Position X	-6.00
Position Y	4.00
Size X	0.40
Size Y	0.40
Tie X and Y	On

DVE Key Settings

Performing an Upstream DVE Key

To set up a DVE key on the upstream keyer on ATEM Television Studio HD:

- 1 The first step is to navigate to the upstream key settings in the LCD menu and set 'next transition' to ON. This enables the upstream keyer on the preview output so you can see the key during the setup stage and ties the key to the next transition so it will transition to air when the next transition is performed.
- 2 In the LCD menu upstream key settings, set the key type setting to DVE.
- 3 Return to the upstream key menu and scroll down to the fill source setting. Select the image you want to key as the fill source.

- 4 To enable the drop shadow or border and adjust their parameters, set ‘enable shadow’ in the light source setting to ON, and set the ‘border’ to ON. Set to OFF if you want to disable the shadow and border. Adjust the shadow angle and altitude settings to your preference.

To set up a DVE key on the upstream keyer on an ATEM Television Studio Pro model switcher:

- 1 The first step is to press the KEY 1 TIE button to enable the key on the preview output so you can see the key during the setup stage. Pressing the KEY 1 TIE button ties the key to the next transition so it will transition to air when the next transition is performed.
- 2 In the LCD menu upstream key settings, set the key type setting to DVE.
- 3 Return to the upstream key menu and scroll down to the fill source setting. Select the image you want to key as the fill source.
- 4 To enable the mask and adjust the mask parameters, go to the mask settings in the upstream key menu and select ON, then adjust the top, bottom, left and right settings. Select ‘reset mask’ to restore the mask to its default settings.
- 5 To enable the drop shadow or border and adjust their parameters, set ‘enable shadow’ in the light source setting to ON, and set the ‘border’ to ON. Set to OFF if you want to disable the shadow and border. Adjust the shadow angle and altitude settings to your preference.

To set up a DVE key on the upstream keyer using the software control panel:

- 1 Expand the upstream key palette and select the DVE tab.
- 2 Select the fill source.
- 3 Adjust the key parameters to refine the key. For a description of DVE key parameters, refer to the information below.

Adjusting the x/y position of the DVE

You can independently adjust the x and y positions of the DVE using the position X and Y settings, or you can tie X and Y parameters together so adjusting one will automatically adjust the other. To achieve this, simply enable the ‘tie X and Y’ setting.

This also applies to the size parameters.

DVE parameters

Size X	Adjusts the horizontal size of the DVE.
Size Y	Adjusts the vertical size of the DVE.
Reset DVE	Resets the DVE to screen. Useful if you lose track of the DVE during adjustment.

Adding DVE Borders

DVE border styles

The 3D borders used in the upstream keyer has four different style settings. The style settings adjust the overall look of the border.

No Bevel	No bevel - 2D border where the border width, softness and color adjustments are applicable.
Bevel In Out	Bevel in out - 3D border
Bevel In	Bevel in - 3D border
Bevel Out	Bevel out - 3D border

Upstream Key	
Key	On Air
Next Transition	Off
Key Type	DVE
Fill Source	Camera 3
Position X	-6.00
Position Y	4.00
Size X	0.40
Size Y	0.40
Tie X and Y	On

DVE Key Settings

Border	
Border	On
Color	[Green color swatch]
Hue	180°
Saturation	20.0%
Luminance	20.0%
Style	No Bevel
Outer Width	1.20
Inner Width	0.80
Outer Soften	20.0%
Inner Soften	20.0%
Border/Shadow Opacity	100%
Bevel Position	0.25
Bevel Soften	20%

DVE border parameters

The upstream key LCD menu is used to adjust the border parameters for the DVE and picture in picture.

Border	Enables or disables the border.
Color	This item appears greyed out because it is not a setting, but rather an indicator to show you the selected border color. You can use this indicator to quickly verify the color of the DVE border.
Hue	Changes the border color. The hue value is a location on the color wheel.
Saturation	Changes the intensity of the border color.
Luminance	Change the brightness of the border color.

Style	Sets the bevel style for the DVE border.
Outer Width	Adjusts the outside width of the border.
Inner Width	Adjusts the inside width of the border.
Outer Soften	Outside softness adjusts the outside edge of the border, the edge that touches the background video.
Inner Soften	Adjusts inside softness. This softness parameter adjusts the inside edge of the border, the edge that touches the video.
Border/Shadow Opacity	Opacity adjusts the transparency of the border and shadow, use this setting to create interesting colored glass borders.
Bevel Position	Adjusts the position of the 3D bevel on the border.
Bevel Soften	Bevel softness adjusts the overall softness of the 3D border. A high value for this parameter will result in a rounded or beveled border.

DVE shadow light source parameters

Enable Shadow	Enables or disables the drop shadow.
Angle	Adjusts the direction of the light source on the DVE or picture in picture. Both the border and drop shadow, if available, are affected by changes to this setting.
Altitude	Adjusts the distance of the light source from the DVE or picture in picture. Both the border and drop shadow, if available, are affected by changes to this setting.

Setting up a DVE Key on Upstream Keyer 1 using ATEM Advanced Panels

- 1 Press the KEY 1 next transition button to enable the keyer on the preview output.
- 2 In the keyers LCD menu, select the DVE key type using the corresponding soft control knob.
- 3 Select the fill source using the corresponding control knob or via the a source button on the source select bus.
- 4 Press the system control left and right arrow buttons to navigate through the DVE parameters, and use the soft control knobs to adjust settings, such as rotation, position, size, mask settings, light source, border, and key frames for movement.

TIP When using the number pad to enter numeric values for settings, hold the 'reset' button down for several seconds to enable negative values. Hold down again to return to standard values.

Key Masking

Both upstream and downstream keyers have an adjustable rectangular mask that can be used to crop out harsh edges and other artifacts in the video signal. The mask consists of left, right, top and bottom crop controls. Masking can also be used as a creative tool to build rectangular cut outs on screen.

The mask can be adjusted using the mask settings in the switcher's LCD menu, or via the upstream and downstream keyer palettes in ATEM Software Control.

Flying Key

Luma, chroma and pattern upstream key types include a flying key setting. If a DVE channel is available the flying key setting allows DVE effects to be applied to the key.

Performing Upstream Keyer Transitions

Performing an upstream keyer transition on ATEM Television Studio HD:

The upstream keyer is taken on and off the program output using the upstream key LCD settings.

Key

Take the upstream keyer on or off the program output by setting 'key' to 'on air' or 'off air'. You will notice this is also reflected by the ON AIR button in the software control panel.

Upstream Key	
Key	On Air
Next Transition	Off
Key Type	DVE
Fill Source	Camera 3
Position X	-6.00
Position Y	4.00
Size X	0.40
Size Y	0.40
Tie X and Y	On



Changing the 'on air' setting in the LCD menu also changes the state of the 'on air' next transition button in ATEM Software Control

Changing the 'on air' setting in the LCD menu also changes the state of the 'on air' next transition button in ATEM Software Control

Next Transition

Set the upstream keyer to the preview output by setting 'next transition' to 'on'.

Upstream Key	
Key	On Air
Next Transition	On
Key Type	Pattern
Fill Source	Camera 3
Pattern	
Invert Pattern	On
Size	38.0%
Symmetry	78.0%
Softness	99.0%
Position X	0.425

Upstream Key Example

Example 1

In this example the upstream keyer is not currently on air. The next transition is set to 'on', therefore the next transition will change the state of the key and turn it on so that it is visible on the program output. On ATEM Software Control, the corresponding KEY 1 next transition button will also illuminate.

Upstream Key	
Key	Off Air
Next Transition	On
Key Type	Pattern
Fill Source	Black

Example 2

In this example, the key is currently on air, indicated by the 'key' setting set to 'on air'. The next transition setting is also selected, therefore the next transition will change the state of the key and turn it off so that it is not visible on the program output.

Upstream Key	
Key	On Air
Next Transition	On
Key Type	Pattern
Fill Source	Black

Example 3

In this example, the key is on air, indicated by the software control panel's illuminated ON AIR next transition button. The BKGD and KEY 1 next transition buttons are also illuminated, therefore the background and the upstream key are tied to the next transition. The next transition will transition the background and change the state of the key turning it off so that it is not visible on the program output.



There are multiple ways to transition a key to the program output. The key can be cut on or off, it can be mixed on or off, or it can be mixed along with a background transition. Upstream keys are transitioned to the program output using the next transition controls. Downstream keyers can be transitioned using their own transition buttons or by using the DSK TIE buttons to link the transition with the main transition.

Performing an upstream keyer transition on an ATEM Television Studio Pro model switcher:

The upstream keyer is taken on and off the program output by pressing the switcher's KEY 1 CUT button or KEY 1 TIE next transition button.

TIP Clicking the ON AIR button in the software control panel performs the same function as pressing the KEY 1 CUT button on the switcher's control panel.

Key 1 Cut Button

Take the upstream keyer on or off the program output using the KEY 1 CUT button as follows:

- 1 Press the KEY 1 CUT button next to the transition slider to immediately turn on or turn off the upstream keyer on the program output.
- 2 The KEY 1 CUT button also indicates if the upstream keyer is currently on or off the program output.

KEY 1 TIE Next Transition Button

Take the upstream keyer on or off the program output using the KEY 1 TIE next transition button as follows:

- 1 Select the elements you wish to transition using the BKGD and KEY 1 TIE next transition buttons.
- 2 Verify the preview output, which will show you exactly what your program output will look like after you perform the transition.
- 3 Press CUT, AUTO, or use the transition slider to perform the transition.

In the examples below, KEY 1 contains a live bug on the top left of the screen.

Upstream Key Example

Example 1

In this example the upstream keyer is not currently on air. The next transition has KEY 1 TIE selected, therefore the next transition will change the state of key 1 and turn it on so that it is visible on the program output. On ATEM Software Control, the corresponding KEY 1 next transition button will also illuminate.



Control panel next transition buttons before transition.

Program output before transition.

Program output after transition.

Example 2

In this example, key 1 is currently on air, indicated by the illuminated KEY 1 CUT button. The next transition has KEY 1 TIE selected, therefore the next transition will change the state of key 1 and turn it off so that it is not visible on the program output.



Control panel next transition buttons before transition.

Program output before transition.

Program output after transition.

Example 3

In this example, key 1 is on-air, indicated by the illuminated KEY 1 CUT button. The BKGD and KEY 1 TIE next transition buttons are selected, therefore the background and the upstream key are tied to the next transition. The next transition will transition the background and change the state of key 1 turning it off so that it is not visible on the program output.



Control panel next transition buttons before transition.

Program output before transition.

Program output after transition.

There are multiple ways to transition a key to the program output. The key can be cut on or off, it can be mixed on or off, or it can be mixed along with a background transition. Upstream keys are transitioned to the program output using the next transition block. Downstream keyers can be transitioned using their own transition buttons or by using the DSK TIE button to link the transition with the main transition.

Performing Downstream Keyer Transitions

Performing a downstream keyer transition on ATEM Television Studio HD:

Downstream keyers can be transitioned on or off air via their respective downstream key LCD menu settings. For example, set the 'tie' setting to 'on' to tie the key to the next transition, or set the 'key' setting to 'on air' to cut the transition on or off air.

You can also perform an auto transition by selecting the 'auto' setting in the downstream key LCD menu and pressing the 'set' button.

Performing a downstream keyer transition on an ATEM Television Studio Pro model switcher:

The downstream keyers have their own transition buttons. Once a downstream keyer is configured it can be easily taken on and off the program output using one of the following three methods:

- 1 Press the DSK CUT button to immediately turn on or turn off a downstream key on the program output.
- 2 Use the DSK AUTO button to gradually transition a downstream key on or off the program output at the rate set in the downstream key LCD menus.
- 3 Use the DSK TIE button to link a downstream key with the main transition control transition. Once linked, the DSK will be mixed on or off along with any selected transition type at the rate specified by the transition LCD menu settings.

Pressing the DSK TIE button shows the downstream keyer on the preview output.

DSK 1 MIX

Downstream keyer 1 has its own DSK 1 MIX button on the front panel that lets you immediately mix downstream key 1 on or off air at the rate set in the downstream key LCD menu settings.

DSK parameters

Tie	Switches the DSK TIE button for the respective keyer on or off.
Rate	The mix rate at which the downstream keyer transitions on or off.
Key	Switches the respective DSK CUT button on or off.
Auto	Enables the respective DSK AUTO button to transition the keyer on air.
Fill Source	Selects the source to be keyed.
Key Source	Selects the cut source which masks the fill source.
Pre Multiplied Key	Identifies the key signal as a pre-multiplied key.
Clip	The clip level adjusts the threshold at which the key cuts its hole. Decreasing the clip level reveals more of the background. If the background video is completely black then the clip value is too high.

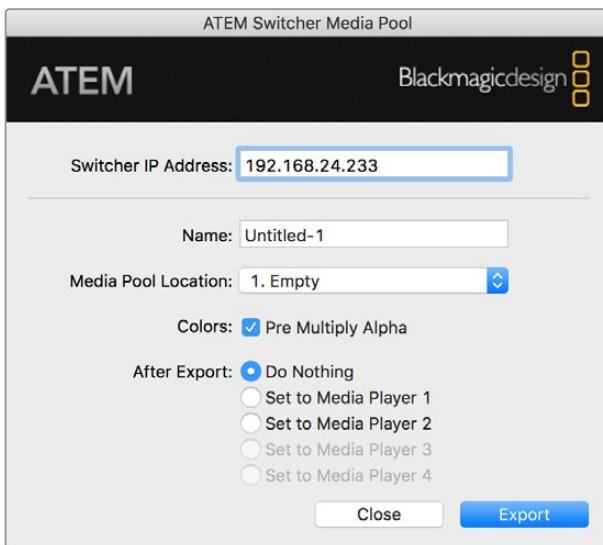
Gain	The gain adjustment electronically modifies the angle between on and off thereby softening the edges of the key. Adjust the gain value until the edge softness is desirable but the background video luminance, or brightness, is not affected.
Invert Key	Inverts the key signal.
Mask	Allows you to mask out sections of the key. For example, if you need to select only a specific section of a graphic, you can use the mask setting to select only the area of the graphic you want to use. To return the mask to the default settings, select 'reset mask' and press the set button.

Using Adobe Photoshop with ATEM

Installing the ATEM software on your computer also installs a Photoshop plug-in that lets you download Photoshop graphics direct to the ATEM media pool.

This means you can accept graphics from designers in the application that 100% of the world's designers use, Adobe Photoshop! You can even use the layers in a Photoshop image to keep variations of graphics, such as different titles in a graphic, and then select the layers in Photoshop you want, and then simply download them at the press of a button. When downloading the layers are automatically flattened in real time before download. This happens in the background and your document in Photoshop is unchanged by the export.

The ATEM export plug-in requires Adobe Photoshop CS5 or later. Install or reinstall the ATEM software after Photoshop is installed, to ensure the ATEM export plug-in is installed.



ATEM export plug-in

Setting up Plug-in Switcher Location

The first time the Photoshop export plug-in is run, it will ask you to select your switcher location. This is the IP address of the switcher so the plug-in can find the switcher to communicate with. By default, the IP is set to 192.168.10.240, which is what the switcher IP address is originally set to when first sold. If you want to export several versions of the same Photoshop file, you can use the export plug-in window to name each exported file and also choose whether to set the files to a media player after export.

Preparing Graphics for Download

For best results, you will want to use a Photoshop document resolution that matches the video standard you're using with your ATEM switcher. For 1080 HD you should use 1920 x 1080 pixels in resolution. For 720p HD formats you should use 1280 x 720 pixels. For PAL standard definition you should use 720 x 576 and for NTSC you should use 720 x 486 pixels resolution documents.

When working with Photoshop documents for ATEM, you should not put any content on the background layer, but add all content to the layers above. The background layer should always be plain full frame black, and you should use a pre multiplied key setting in the ATEM keyers for keying graphics from Photoshop.

To help you get started, we've included a guide and some graphic template files in the Example Graphics folder which was installed on your computer along with the ATEM Switchers software.

To download the graphic to the ATEM media pool, simply select the export menu in Photoshop and then select ATEM Switcher Media Pool to export. A window will appear asking you to choose which position in the media pool you want to download to. The list includes all the file names of graphics currently loaded in the media pool. Select which position you would like to download to, and then select export.

If you're in a hurry to get your graphics on air, then you can select to automatically copy this graphic to either media player 1 or media player 2 after download. This lets you get images to air fast! If you don't want to interfere with the media player graphic sources, simply select not to copy the media players to this graphic.

Pre Multiply Alpha should almost always be enabled and requires that you also switch on the Pre Multiplied Key setting in your switcher's LCD menu. Premultiplying mixes the graphic color with its alpha channel when exporting to ensure your graphic has smooth edges which blend in to the video.

Using the Auxiliary Output

The auxiliary output is an extra SDI output that can have various inputs and internal sources routed to it. The aux output is very similar to a router output, and all video inputs, color generators, media players, program, preview and even color bars can be routed.

If you need an extra program output, then the aux output is ideal, or if you need a clean feed before one or both of the downstream keyers, then you can even select these to the aux output. This will give you a program feed without a logo or bug, so you can capture this as a broadcast master for later post production or transmission.

The aux output is extremely powerful, and can be routed using your switcher's control panel aux button, as well as the LCD menu and ATEM Software Control. The aux output menu is available in the menu bar at the top of the software control panel regardless of the window currently selected so it is always available.

The switcher will always perform a clean switch when the auxiliary output changes sources so this means you can use the switcher to cut between sources on the auxiliary output cleanly and without glitches.

Routing Auxiliary Output Sources

There are three different ways you can route sources to the auxiliary output. You can use your switcher's built in control panel, ATEM Software Control, or an additional ATEM hardware panel such as an ATEM 1 M/E Advanced Panel.

Routing the Aux Output using the Built in Control Panel

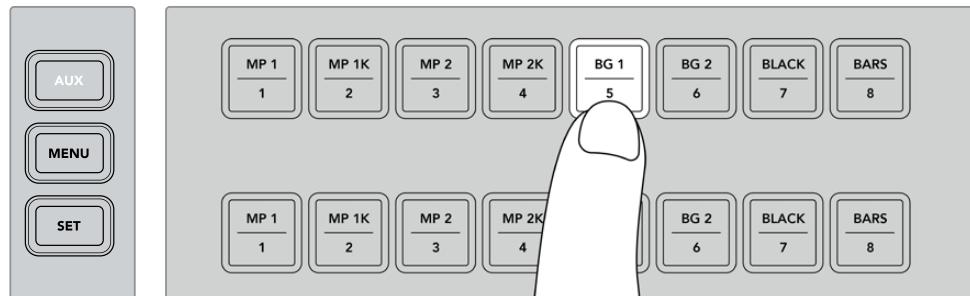
To select a source for the auxiliary output:

- 1 Press the button labeled AUX on the control panel.

The buttons will illuminate white to let you know you are in the auxiliary output selection mode.

- 2 Press a source button to route that source to the auxiliary output. This is a clean switch so you can even use this mode as a second 'cut only' switcher if you want to.
- 3 Once you have selected the auxiliary output source, press the aux button again to exit the auxiliary output selection mode and return to normal switching.

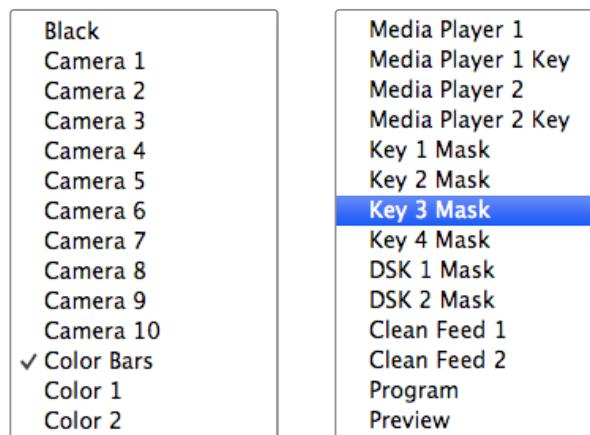
TIP Sources that aren't available on the control panel, for example clean feed, can be selected in the auxiliary source LCD menu.



Press the AUX button and select a source for the auxiliary output using the control panel buttons or via the auxiliary source LCD menu)

Routing the Aux Output using ATEM Software Control

ATEM Software Control has an auxiliary output setting in the menu bar at the top of the screen. All you need to do is click on the 'auxiliary 1' setting and scroll through the drop down list to select the source you want to output. When selected, the auxiliary output will change immediately. You can see the currently selected source with a tick in the menu item.



List of Auxiliary Output Sources)

Routing the Aux Output using an ATEM Hardware Panel

On ATEM hardware panels, you can route the auxiliary output using the auxiliary settings in the system control menu. To do this:

- 1 Press the 'aux' button in the system control 'home' menu to open the auxiliary menu.
- 2 In the auxiliary menu, select auxiliary 1.
- 3 Press a source button on the corresponding M/E's source select row. Depending on the panel you are using, you may need to hold the shift button down to access your desired source.
- 4 Press the 'home' system control button to return to the home menu.

Available Auxiliary Sources

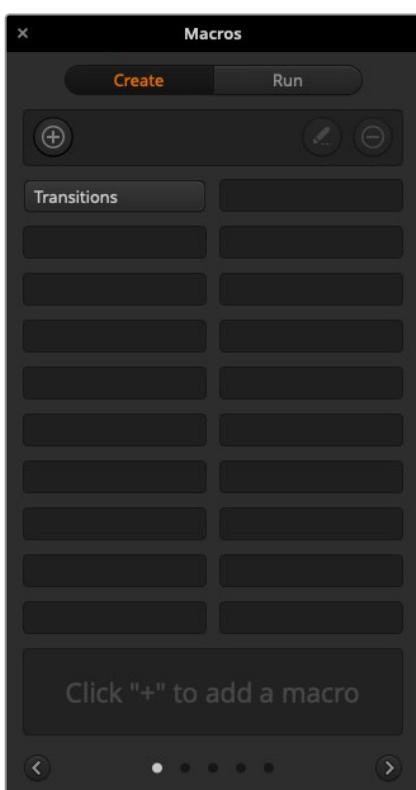
There are a range of sources available, and these include:

Black	Black source generated internally in the switcher.
Inputs	These are all the sources connected to the HDMI and SDI inputs. In ATEM Software Control, you will see the video inputs of the switcher listed in the 'auxiliary 1' drop down menu. These will be listed as the current labels you have set in the settings window of the switcher.
Color Bars	Color bar source generated internally in the switcher.
Media Player 1	This is the fill output of media player 1, and is derived from the still's RGB content.
Media Player 1 Key	This is the key output from media player 1, and is derived from the still's alpha content.
Media Player 2	This is the fill output of media player 2, and is derived from the still's RGB content.
Media Player 2 Key	This is the key output from media player 2, and is derived from the still's alpha content.
Program	This is the switcher program out, and is the same as the main program SDI output on the switcher.
Preview	This is the preview output and shows the source selected on the preview bus, and is the same as the preview window in the multi view.
Clean Feed 1	This is identical to the program output, however does not include any of the downstream keyer contents. It's useful when you want to record a master output without logos or bugs on the downstream keyers.
Clean Feed 2	This is the same as above, however this output is taken from between the two down stream keyers, and so includes down stream keyer 1, but not down stream keyer 2's output. Routing clean feeds to aux outputs allows ultimate flexibility in the use of your program video. From the auxiliary output you can record a version of your program free from any local broadcast branding you might have applied from the down stream keyer. This 'clean' version could then be easily used for an international broadcast. This is a very powerful feature!

Using Macros

What is a Macro?

A macro is an easy way to automate a sequence of switcher actions so you can repeat the sequence at the press, or click, of a button. For example, you can record a sequence of transitions between several video sources, including key effects, audio mixer adjustments, camera control settings and more. Record all your actions to a macro button, then when you press that button all your recorded actions will be instantly performed. Macros are recorded using the macros window in ATEM Software Control, and are stored inside your ATEM switcher. You can run all your recorded macros using the software control panel, or if you are using an ATEM Television Studio Pro HD switcher, you can run macros using the macro buttons on the control panel.



The macros window in ATEM Software Control lets you record and run macros so you can easily repeat a sequence of complex switcher actions at the click of a button.

The Macros Window in ATEM Software Control

To open the macros window in ATEM Software Control, click on macros in the title bar, or you can also press shift/command/M for Mac, or shift/control/M for Windows. The macros window is a floating window you can move freely about your desktop. This is so you can always access the window when moving between the switcher, media, audio and camera pages. While recording a macro, you can even reduce the size of the window by clicking on the minimize icon at the top right corner.

Macros can be recorded to any of the 100 macro slots. Up to 20 macro slots are visible on each page. Move forwards and backwards through pages by clicking on the arrows on the bottom sides of the window. Clicking on the create and run buttons lets you swap between the create and run pages so you can record your macros, and then run them during your live production.

Recording Macros

Macros need to be recorded comprehensively, in clearly defined sequences from start to finish without error. This is because your macro will record every setting, press of a button, and switcher action you perform. When you run a macro, all the switcher actions you recorded in that macro will be repeated precisely.

It's worth highlighting that a macro will only record the settings you change. For example, if you want a 3:00 second transition, and your switcher's transition rate is already set to 3:00 seconds, you'll need to change the duration, then set it back to 3:00 seconds to record the setting. If not, your desired transition rate will not be recorded and when the macro is run it will simply use the transition rate your switcher was last set to. So you can see why precision is important!

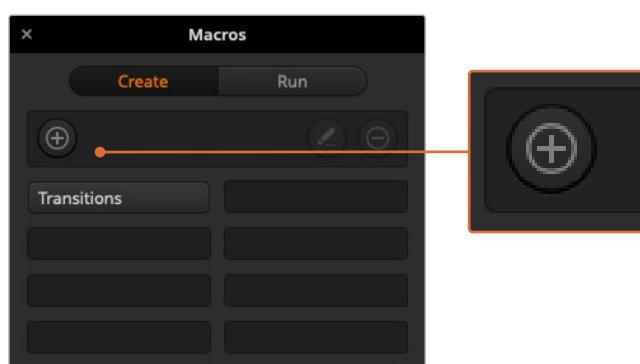
If settings are changed while recording a macro and you want them restored to a particular state, simply restore those settings while recording the final steps of the macro. You can even record macros to restore settings for various projects. You have lots of choices. The important thing to remember when recording a macro is that you change all the settings you need to so you can create the specific effects you want.

Recording a Macro using ATEM Software Control

In the example below, we're going to create a macro that will set your ATEM switcher to perform a 3 second mix transition from color bars to color 1, pause for 2 seconds, then perform a 3 second mix transition to black. Try building this macro on your ATEM switcher so you can learn the steps in creating macros.

- 1 Launch ATEM Software Control and open the macros window.
- 2 Click on the create button in the macros window to select the create page.
- 3 Click on a macro slot you want to record your macro to. In this example, click on macro slot 1. An orange border will appear around the slot you have selected.
- 4 Click on the create macro button, which is labeled with a 'plus' icon, to open the create macro popup window.

If you want to, you can enter the name of your macro and type a description. This lets you easily keep track of your macros and quickly see what each macro does. When you click on a macro, your notes will appear in the status window.

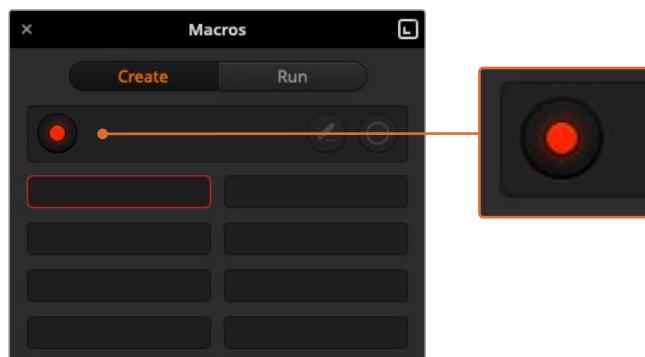


To start recording a macro, select a macro slot, then click on the create macro button. Type in your notes and click 'record'.

- 5 Click the 'record' button.

The popup window will close and a red border will appear around your ATEM Software Control panel indicating your macro is now recording. Notice the red 'add pause' button at the top of the border.

Now that your macro is recording, you can start performing your switcher actions.



While recording, the create macro button will change to a 'record' button. When you have completed your switcher actions, click on the 'record' button to stop recording.

- 6 Click on the bars button in the program panel on the switcher page. This sets bars to your switcher's program output.
- 7 Select color 1 on the preview output.
- 8 Open the transitions palette and set it to mix.

If mix is already selected, make sure your macro records the setting by selecting a different transition type, for example the wipe transition, then clicking on mix again.

- 9 Now change the transition Rate to 3:00. This sets the mix transition duration to 3 seconds.
- 10 Click on the auto button in the transition style panel. Your switcher will perform a mix transition from color bars to color 1.
- 11 To set the switcher to wait for 2 seconds before applying another transition, click on the add pause button at the top of the red border. The 'insert pause' window will open. Set the pause to 5 seconds and 0 frames and click 'add pause' to confirm.

Why set a 5 second pause when you only want a 2 second pause? That's because when the mix transition occurs, it takes 3 seconds to complete. So if you want to add a pause, you need to consider the transition duration, plus the pause you want to happen before the next transition occurs.

In this example, it takes 3 seconds for the transition to complete, then 2 seconds for your 2 second pause, so you should enter a pause of 5 seconds. Another way is to add two separate pauses, one for the duration of the transition, and then another for the pause you want. It's up to you.

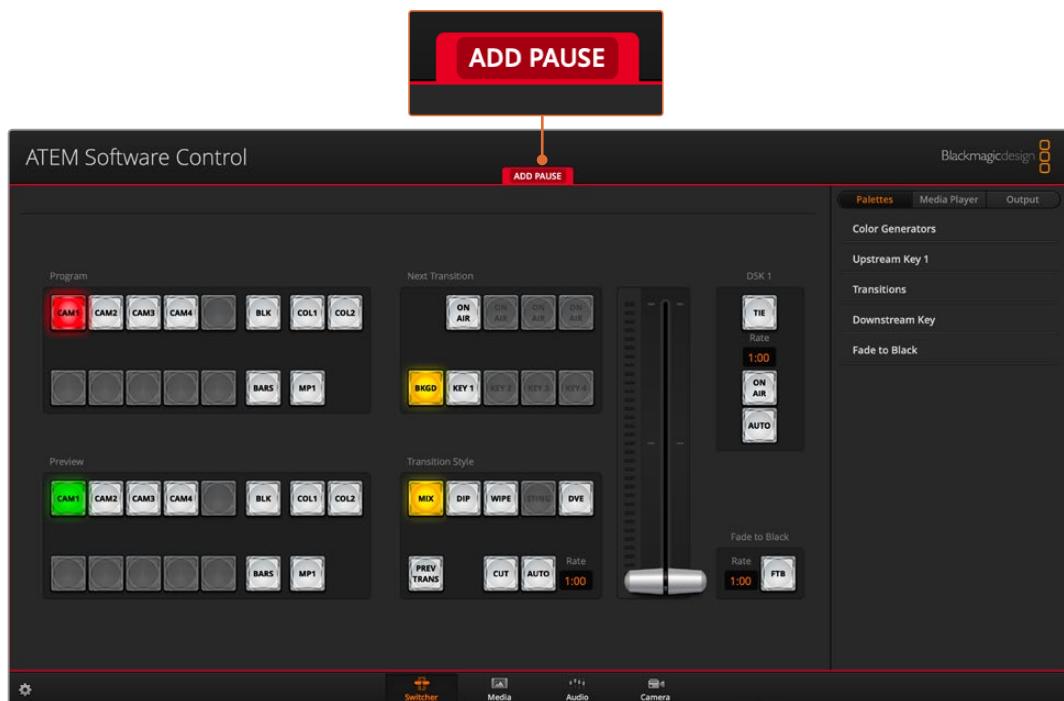
- 12 Now select black on the preview panel, and click the auto button in the transition style panel. Your ATEM switcher will perform a mix transition to black.
- 13 Click the record icon in the macros window to stop recording your macro.

The macro you just recorded will now appear as a button in your selected macro slot. To preview your macro, click the run button in the macros window to enter the run page. Select recall and run, which sets the macros window to run a macro as soon as you click on a macro button. Now click on your new macro button, named 'Transitions'.

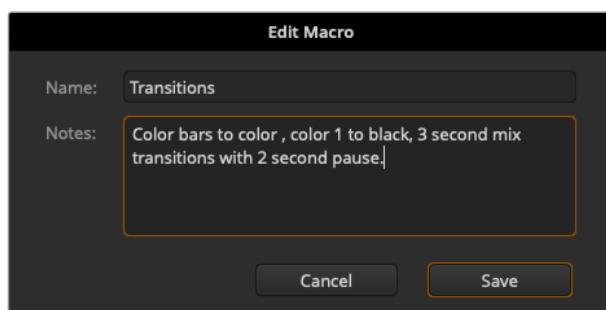
- 14 If you want your macro to instantly run as soon as you select it, click on the 'recall and run' button. By enabling this feature you can load and play your macros with only one click of a button.

If your macro was successful, you should see your ATEM switcher perform a mix from color bars to color 1 using a 3 second transition, pause for 2 seconds, then perform another 3 second mix transition to black, all by clicking one button in the macros window! Your ATEM switcher will also display an orange border around your software control panel to indicate a macro is playing.

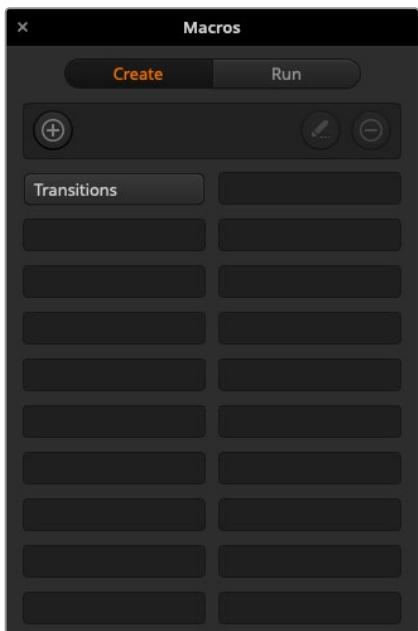
If your macro doesn't perform the way you expect it to, simply rerecord the macro you just created following the previous steps.



ATEM Software Control displays a red border to indicate when you are recording a macro. The 'add pause' button located at the top of the red border lets you enter durations for pauses between switcher actions.



Enter a name for your macro and a description so you can keep track of the switcher actions recorded in the macro.



The image shows how a macro button appears in the macros window after it has been recorded. To run a macro, click on the 'run' button to enter the run page. Now you can load and/or run the macro by clicking on the macro button.

TIP When recording a macro using an ATEM Television Studio Pro HD switcher, you can use the ATEM software panel to start and stop recording, but perform all the macro actions using the built in hardware control panel.

Building Large Macros

Macros can even include triggering other macros as part of recording a macro. This lets you easily build larger macros from multiple smaller macros, i.e., recording macros with limited actions, then compiling them into a large macro. This is because if there are any mistakes while recording a large macro in one complete sequence, you'll need to go back to the start of your sequence and rerecord it. It's a lot easier to work with segments containing a small number of actions.

By recording a large macro using small macros, you can also edit your large macro by rerecording only the small macros you want to change, then compiling your small macros back into your large macro.

To compile small macros into a large macro:

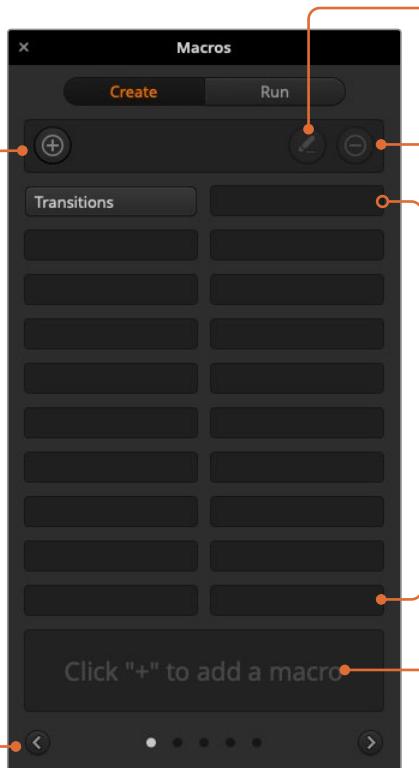
- 1 Start recording a new macro, then while the macro is recording, click on the 'run' button to enter the run page.
- 2 Select 'recall and run' to automatically run macros at the push or click of a button, or deselect to load a macro and play it manually.
- 3 Run your sequence of small macros, with pauses between each one to cover the duration of each small macro, until you've completed the large macro.
- 4 Stop recording. You now have a complex, powerful large macro built from small macros you can easily change later if you need to.

There is no limit to the amount of actions you can perform. You can easily build complex transitions, create unique repeatable effects using keyers, or set up frequently used Blackmagic Studio Camera settings, graphic overlays and DVEs so you don't have to reconstruct them every time you start a new program. Macros are fun and will save you a lot of time!

Macros Window Create Page

Create macro button:
Click this button to open the create macro popup window. From here you can name a new macro to be recorded, write a description of your macro in the notes section, and click record to start recording your macro.

Arrow buttons and page Icons:
To access or record more than 20 macros, simply click on the right arrow at the bottom corner of the macros window to open a new page of macros. To move to the previous page of macros, click on the left arrow. You can see which page of macros you are viewing by observing the page icons between the arrows.



Edit macro button:

First select the macro you want to edit, then click on the edit macro button to edit the name and description of the macro.

Delete macro button: Select the macro you want to delete, then click on the delete macro button to delete the selected macro.

Macro buttons:

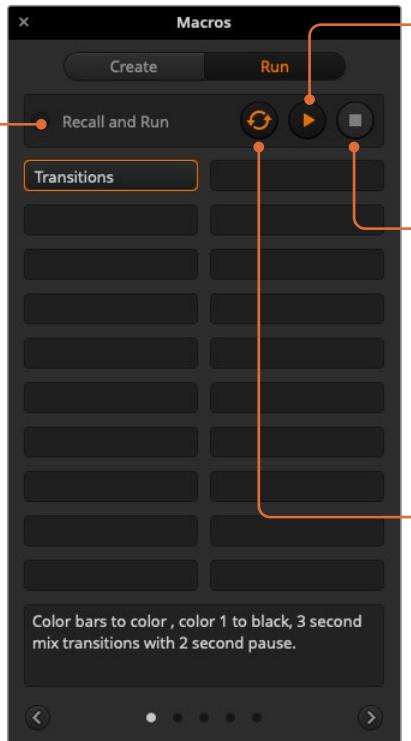
After recording a macro to a selected macro slot, your macro will appear as a macro button. 20 macro buttons can be displayed on one page. If a macro is unnamed when recording, the number of the selected macro slot will be used.

Status window:

This window provides helpful prompts and status messages to help you get started recording and running your macros. When a macro is selected, it also displays any notes you have included.

Macros Window Run Page

Recall and Run:
Selecting the Recall and Run feature lets you instantly run a macro by clicking a macro button. Deselecting the Recall and Run feature lets you load a macro by clicking on your macro button. Run the macro by clicking the play button.



Play:

When Recall and Run is deselected and you have loaded a macro by clicking on a macro button, click the play icon to start playing the macro.

Stop:

Clicking the stop button will stop the playback of a macro, but will complete the current action first. For example, if you press stop half way into a transition, the switcher will finish the transition and then stop.

Loop:

When the loop button is selected and you run a macro, your macro will run continuously until you click the stop button. When loop is deselected, your macro will run until it is completed.

Recording Macros using an ATEM Advanced Panel

You can record and run macros using an ATEM Advanced Panel independently of ATEM Software Control. All actions on the ATEM Software Control switcher page can be performed using your hardware panel. If you need to arrange graphics in the media pool, or adjust camera settings, simply access those settings using ATEM Software Control.

The buttons used to record and run macros on ATEM advanced panels are located in the system control buttons. The names of your macro buttons are displayed in the source select names display.

Follow the steps below to create the ‘transitions’ macro demonstrated earlier using ATEM Software Control. This time you will create a macro in macro slot 6.

- 1 Press the ‘macro’ soft button to open the macros LCD menu.
- 2 Using the ‘macro’ knob under the LCD, select the macro slot you want to record to. For this example, select slot 6.
- 3 Press the ‘record’ soft button at the top of the LCD to start recording. The record icon appears as a red circle. When recording, this icon becomes a red square.
- 4 Shift select color bars on the program bus. The button will flash indicating it’s a shifted source.
- 5 Shift select color 1 on the preview bus.

TIP If you wish, you can map buttons such as color bars, black, and color generators to any of the main 10 buttons of the program and preview bus for easier access. See the ‘button mapping’ section of this manual for instructions.

- 6 Press the wipe button in transition control to ensure the macro records the wipe transition selection.
- 7 In the wipe LCD menu, set the rate to 3:00 seconds.
- 8 Press the auto button in transition control to perform the wipe transition from color bars to color 1.

NOTE At this stage, you need to add a pause so the switcher knows to wait for the transition to finish before initiating the next action.

To add a pause:

- 1 Press the ‘add pause’ button in the LCD menu and set the duration to 3 seconds by rotating the ‘seconds’ knob. Press the ‘confirm’ soft button to record the pause.
- 2 Set the macro to wait for 2 seconds before applying the next transition using the method described in the note above.
- 3 Now shift select black on the preview bus and press the auto transition button. Your ATEM switcher will perform a mix transition to black.
- 4 Press the ‘record’ soft button to stop recording. The macro button will now illuminate red to indicate there is a macro recorded on that slot.

You have just recorded a macro using an ATEM Advanced Panel. The macro will appear as a macro button named ‘Macro 6’ because it is located in macro slot 6. You can name your macro and add notes by clicking on the ‘edit macro’ button in ATEM Software Control.

To run the macro, press the macro button to set your panel’s source select row to macro mode. The buttons will illuminate blue when in macro mode. Now press the macro 6 button. You can easily see when a macro is running because the macro button will flash green and an orange border appears around the LCD menu.

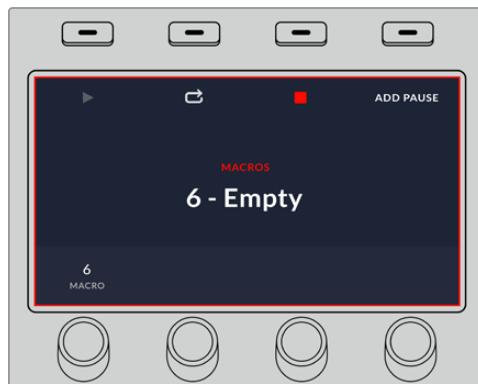
If your macro was successful, you should see your ATEM switcher mix from color bars to color 1 using a 3 second mix transition, pause for 2 seconds, then perform another 3 second mix transition to black, all by pressing one button on your ATEM Advanced Panel. If you want the macro to loop so it keeps running, press the ‘loop’ soft button to enable loop. Press again to disable loop.

NOTE If the macro you just recorded using the example is set to loop, it will fail at the end. That is because there is not a pause set between the final mix transition to black, and the loop back to the start of the macro. To make the macro work looped, you will need to record a final pause of 3 seconds so your switcher knows to wait for the last 3 second transition to complete before looping back to the first action.

It’s worth frequently testing your macros using different switcher settings to make sure the macro performs all the specific functions you intended, doesn’t miss any instructions, or produce something unexpected.



Press the ‘record’ soft button to start recording your macro



While recording, a red border will appear around the LCD



If you want to record over a previously recorded macro, or if you made a mistake and want to start recording the macro again, press the record button and confirm the overwrite when prompted

Using External ATEM Hardware Panels

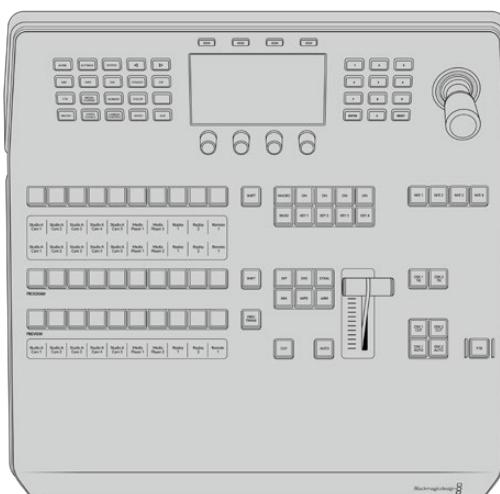
External ATEM hardware panels are external, ‘hands on’ control panels for ATEM switchers that plug into your switcher using an Ethernet connection. The keyboard has similar functions to the software panel, and the main buttons are laid out in a similar ME style, so it’s easy to move between the hardware and software interfaces.

When using an external hardware panel and the software panel together, any change on one panel will be reflected on the other, and you can use both panels at the same time. You can also plug in more than one hardware panel if you need a more advanced solution.

This section shows how to use the different ATEM panels that are available should you need an external hardware panel for your live production.

ATEM 1 M/E Advanced Panel

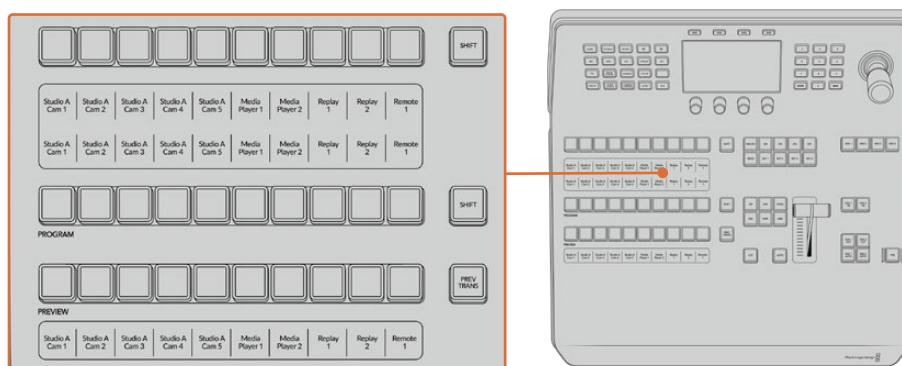
The ATEM 1 M/E Advanced Panel is designed for switchers with one mix effects row, or if you need a hardware panel to control a mix effects row on a larger ATEM switcher with more than one ME. Featuring advanced CCU control and the ability to control up to 4 M/Es from the one panel. System control is generally faster and more convenient using a centralized LCD menu with soft buttons and controls.



Using the Control Panel

Mix Effects

The program bus, preview bus and source names display are used together to switch sources on the program and preview outputs.



ATEM Mix Effects

Source Name Displays

The source name displays use labels to represent the switcher's external inputs or internal sources. Labels for the external inputs can be edited on the settings window of the software control panel. Labels for the internal sources are fixed and don't need to be changed.

The displays show the labels for each row of buttons in the source select row, program row, and preview row.

Pressing the SHIFT button will change the source names display to show extra sources, called shifted sources, allowing selection of up to 20 different sources.

Simultaneously pressing both SHIFT buttons next to the source select and program rows will change the source names display to show protected sources, and these are available in the source select row for keyers and routing to auxiliary outputs. Protected sources are program, preview, clean feed 1 and clean feed 2.

Program Bus

The program bus is used to hot switch background sources to the program output. The source currently on air is indicated by a button that is illuminated red. A blinking red button indicates that the shifted source is on air. Pressing the SHIFT button will display the shifted source.

Preview Bus

The preview bus is used to select a source on the preview output. This source is sent to program when the next transition occurs. The selected source is indicated by a button that is illuminated green. A blinking green button indicates that a shifted source is on preview. Pressing the SHIFT button will display the shifted source.

SHIFT

The SHIFT button provides a global shift and is used to shift the program, preview, and select busses along with the label. It also provides a shift for the transition type and joystick and other menu functions.

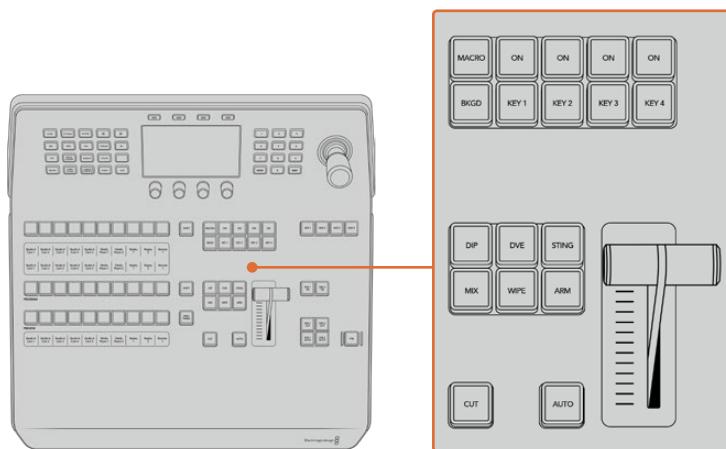
Double-pressing buttons in the preview and select busses, as well as the transition type buttons, is the same as shift-selecting them and can be a faster way to shift-select buttons. Double-pressing is not implemented for the program bus as it would cause the program output to momentarily show the wrong source.

Source Select Bus

The source select bus works in conjunction with the source names display and is used to assign sources to auxiliary outputs and keyers. When the macro button is enabled, this row of buttons is also used for loading and running macros recorded to the corresponding slots. The buttons will illuminate blue when the macro button is enabled.

The destination display and select bus together show you the routing of sources to keys and auxiliary outputs. The currently selected source is indicated by an illuminated button. A blinking button indicates a shifted source. A green illuminated button identifies a protected source. Protected sources are program, preview, clean feed 1 and clean feed 2.

Transition Control and Upstream Keyers



Transition Control and Upstream Keyers

CUT

The CUT button performs an immediate transition of the Program and Preview outputs, regardless of the selected transition type.

AUTO

The AUTO button will perform the selected transition at the rate specified in the auto rate setting located in the LCD 'home' menu. The transition rate for each transition type is set in the LCD menu, and is displayed when the corresponding transition style button is selected.

The AUTO button illuminates red for the duration of the transition and the fader bar indicator illuminates with sequential LEDs to indicate the progress of the transition. If the software control panel is active, the virtual fader bar also updates to provide visual feedback on the progress of the transition.

Fader Bar and Fader Bar Indicator

The fader bar is used as an alternative to the AUTO button and allows the operator to manually control the transition. The fader bar Indicator next to the fader bar provides visual feedback on the progress of the transition.

The AUTO button illuminates red for the duration of the transition and the fader bar indicator updates to indicate the progress of the transition. If the software control panel is active, the virtual fader bar updates simultaneously.

Transition Type Buttons

The transition type buttons allow the operator to select one of five types of transitions; mix, wipe, dip, DVE, and stinger, labelled STING. Transition types are selected by pressing the appropriately labeled transition type button. The button will illuminate when selected.

When a transition type is selected, the LCD menu shows the transition rate and provides instant access to all the corresponding settings for that transition type. Use the soft buttons and knobs to navigate through the settings and make changes.

The button marked ARM is currently disabled and will be enabled in a future update.

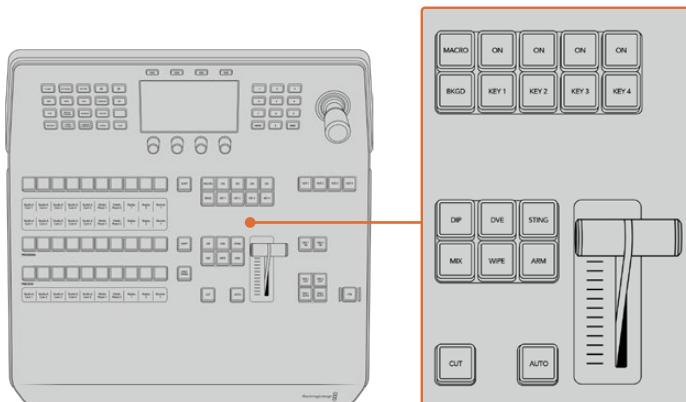
PREV TRANS

The PREV TRANS button enables the preview transition mode allowing the operator to verify a transition by performing it on the preview output using the fader bar. Once you press this button the preview transition feature is enabled and you can preview your transition as many times as you like. This lets you test the transition before going to air and make changes and corrections as needed. You can even preview stinger transitions! Once adjusted, press the button again to disable the feature and you are ready to send your transition on air.

Next Transition

The BKGD, KEY 1, KEY 2, KEY 3, KEY 4 buttons are used to select the elements which will transition on air or off air with the next transition. Any combination of background and keys can be selected by pressing multiple buttons simultaneously. Double pressing the BKGD button selects all of the next transition upstream keyers that are currently on air and copies them to the Next Transition buttons.

Pressing any of the next transition buttons will clear selection of all others. When selecting the elements of the next transition, the switcher operator should look at the preview output because it provides an accurate representation of what the program output will look like after the transition is completed. When only the BKGD button is selected, a transition from the current source on the program bus to the source selected on the preview bus will occur.



Transition Control Upstream Keyers

ON AIR

The ON AIR indicator buttons above each keyer are labelled ON and indicate which of the upstream keys are currently on air. These can also be used to immediately cut a key on or off air.

MACRO

The macro button is used to enable the macro feature which changes the source select row of buttons to macro buttons corresponding to macro slots.

TIP There are ten macro buttons in the source select row, so if you have macros recorded to slots greater than ten, you can access these by opening the macro settings in the LCD menu and changing the macro group using the control knob.

For more information on how to record and run macros using the advanced panel, refer to the ‘Using Macros/Recording Macros using an ATEM Advanced Panel’ section.

Downstream Keyers

DSK TIE

The DSK TIE button will enable the DSK on the preview output, along with the next transition effects, and tie it to the main transition control so that the DSK can be taken to air with the next transition.

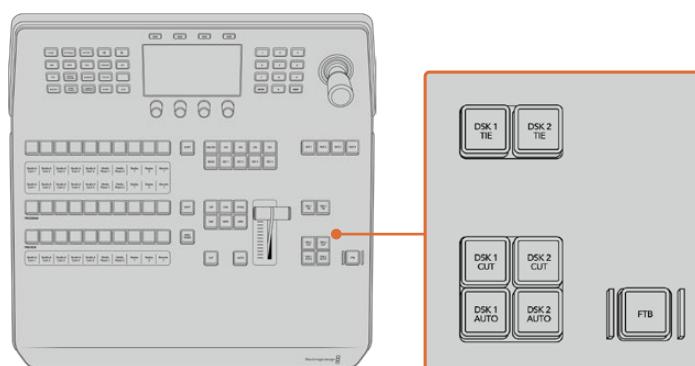
Because the tied downstream keyer is now tied to the main transition, the transition will happen at the rate specified in the auto rate setting in the LCD ‘home’ menu. When the DSK is tied, the signal routing to the clean feed 1 is unaffected.

DSK CUT

The DSK CUT button is used to cut the DSK on or off air and indicates whether the DSK is currently on or off air. The button is illuminated if the DSK is currently on air.

DSK AUTO

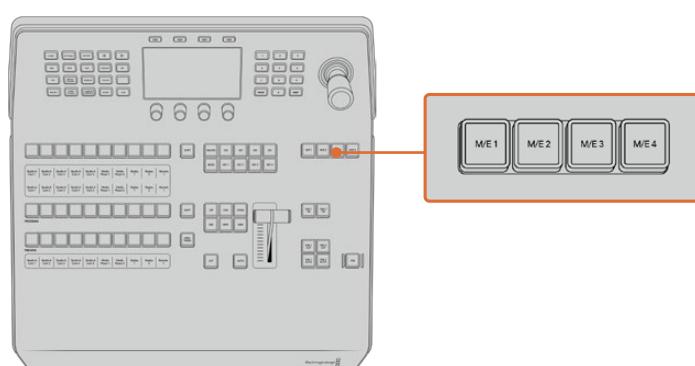
The DSK AUTO button will mix the DSK on or off air at the rate specified in the DSK rate LCD menu setting.



Downstream Keyers and Fade to Black

M/E Buttons

As some ATEM switchers have multiple M/Es you can select which one you want to control using the M/E buttons. When an M/E is selected, the LCD menu will change to show the settings that correspond to that M/E panel.



Press the M/E buttons numbered 1 to 4 to select an M/E panel to control

Fade to Black

The FTB button will fade the program output to black at the rate specified in the FTB rate LCD menu setting. Once the program output has been faded to black, the FTB button will flash red until it is pressed again, fading the program output up from black at the same rate. A fade to black cannot be previewed.

You can also set your switcher to fade audio together with the fade to black by navigating to the FTB LCD menu and setting AFV to 'on'. This sets the switcher to fade the audio to silence at the rate set for the fade to black. If you want audio to remain on during and after the fade to black, set AFV to 'off'.

System Control Menu Buttons

The buttons on the top left side of your panel, combined with the LCD and its four soft buttons are called the system control. When you press a system control button, for example the 'home' button, the LCD will change accordingly to show the relevant controls and settings. Use the soft buttons and knobs above and below the LCD to make changes.

If there are small dot icons on the LCD menu, this means there is more than one page of settings and you can move through the pages by pressing the left and right arrow buttons.

For example, to change the border softness on a wipe transition

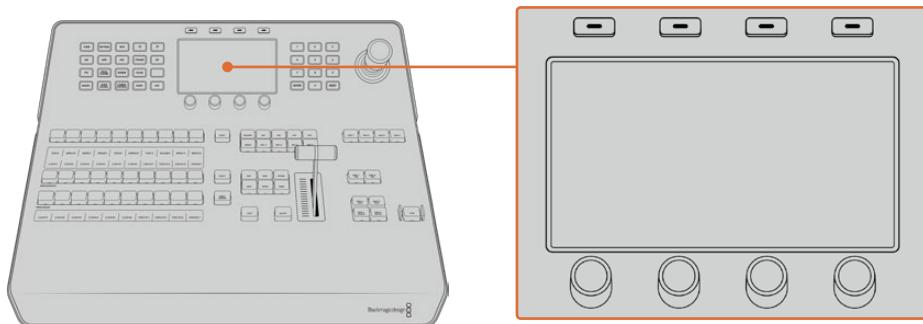
- 1 Press the 'wipe' button.
- 2 Press the right arrow button next to the LCD to move to the third page of settings.
- 3 Rotate the control knob under the 'softness' setting to change the softness of the wipe transition border.

If you want to change the direction of the wipe transition

- 1 Press the arrow buttons to navigate back to the first page of wipe transition settings, or simply press the 'wipe' button to return to the first page.
- 2 Press the 'reverse direction' soft button at the top of the LCD to change the direction.
- 3 Once you are satisfied with the setting, press the 'home' button to return to the home page.

TIP When changing the border softness, you can visually monitor your adjustments in real time. Simply press the PREV TRANS button and move the fader bar while watching the preview output on the multi view to visually monitor your settings. Remember to press PREV TRANS again to disable the transition preview when you're happy with the settings.

The system control buttons and LCD menu are used to access all the settings for your panel, and you can even set general switcher settings directly from the panel. For example, if you need to change the switcher's video format, aspect ratio, or configure VISCA control on the remote port.

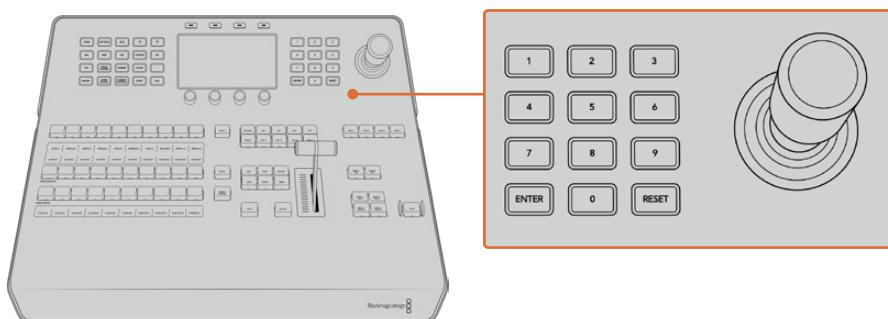


System Control

Joystick and Numeric Keypad

The number pad is used to enter numerical data. For example, the number pad can be used to enter a numerical value for transition duration. When entering data using the number pad, the soft buttons below each parameter are used to apply the entered data to that parameter.

The Joystick is a 3-axis joystick that is used to size and position keys, DVEs and other elements. You can also use the joystick to control VISCA PTZ remote cameras.



Joystick Control

Controlling Cameras using the Joystick

The joystick can also be used to control a remote camera head using the common VISCA protocol when connected to your switcher.

PTZ, or ‘pan, tilt, zoom’, control is an extremely powerful tool for controlling pan, tilt and zoom on remote cameras. You can easily control a bank of cameras one at a time by pressing the camera control button and then selecting each camera via the numbered buttons on the numeric keypad. Make your pan and tilt adjustments with the joystick.

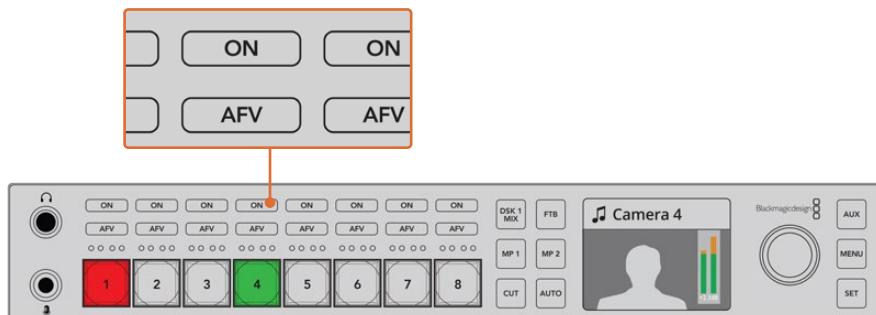
You can also choose the tilt direction of your joystick by selecting ‘inverted’ or ‘normal’ in the ‘VISCA control settings’. Selecting ‘inverted’ will reverse the tilt action of your joystick.

Connecting a Remote Head

Your ATEM Advanced Panel communicates with remote heads via your ATEM switcher’s RS-422 port labeled ‘remote’ or ‘RS-422 serial out’. After connecting your ATEM Advanced Panel to your ATEM switcher via Ethernet, simply connect your ATEM switcher to the RS-422 input on the remote camera head. RS-422 ports are typically DB-9 serial ports, or RJ11 connectors that look similar to a standard landline phone connector.

You’ll also need to make sure the remote behavior for your switcher’s RS-422 port is set to ‘PTZ’ in the ‘settings’ LCD menu.

When connecting more than one remote head, they will normally be daisy chained together via the RS-422 outputs/inputs between each head.



Connect a remote camera head to your ATEM switcher via the RS-422 port labelled 'remote' on the rear panel

PTZ Setup for Remote Heads

All PTZ setup options are set using the 'settings' LCD menu. Press the arrow buttons to move to the last page of switcher settings and set the remote port to VISCA. Set the baud rate to match the rate used by your PTZ camera. Refer to your camera's support documentation to confirm the appropriate baud rate.

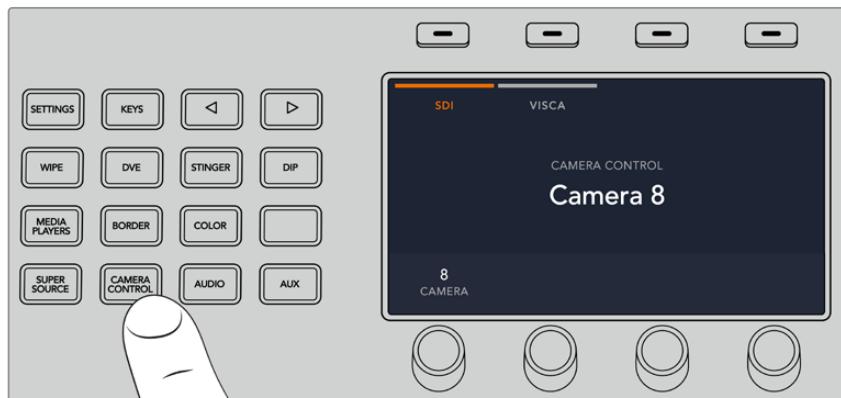
Pressing the camera control button opens the camera settings, where you can select VISCA control and choose the camera you want to adjust. But first, you will need to make sure the connected cameras are detected.

To detect the connected devices:

- 1** Press the VISCA soft button to select VISCA control.
- 2** Press the 'detect' soft button.

The first camera connected to your switcher will appear on the LCD as 'camera 1'. If you have more than one camera connected, they can each be selected by turning the 'camera' soft control knob. Camera numbering is based on consecutive order from the first remote head connected, through to the last in the chain.

If the number of connected cameras that appear on the LCD menu don't match the physical number you have connected, check that all your camera heads are powered and their RS-422 ports are plugged in correctly. Once all your camera heads are visible on your ATEM advanced panel, select each camera using the soft control knob or numeric keypad and make some quick adjustments with the joystick to check they are all working properly.



To use VISCA PTZ control, press the 'camera control' button and select VISCA by pressing the VISCA soft button.



Select the camera you want to control and use the joystick to pan, tilt and zoom

TIP Camera control defaults to SDI for general camera control via SDI, so when using VISCA control, make sure you press the VISCA soft button to access VISCA PTZ cameras.

PTZ Control via SDI

You can also control PTZ camera heads via SDI. For example, by connecting the program return feed from your switcher to a Blackmagic Micro Studio Camera, then connecting the SDI output from the camera's expansion cable to your PTZ head, you can control the head via the SDI signal.

For more information on PTZ control using a Blackmagic Micro Studio Camera refer to the Blackmagic Studio Cameras manual. This manual can be downloaded from the Blackmagic Design support center at www.blackmagicdesign.com/support

Joystick PTZ Controls

Joystick PTZ controls are very intuitive. Simply turn the joystick knob clockwise or counter clockwise to zoom in and out. Push up and down to tilt the camera, and push left and right to pan. The controls are sensitive to the degree of movement of the joystick, letting you ease in and out of your camera moves. The amount of sensitivity may vary between remote heads.

If you want to wire a custom built PTZ unit using a standard RS-422 port DB-9 connector, refer to the section labeled 'Using RS-422 for Custom Built PTZ Control'.

Button Mapping

ATEM software and hardware control panels support button mapping so you can assign your most important sources, especially cameras, to the most accessible buttons in the program and preview rows. Occasional sources can be assigned to less prominent buttons. Button mapping is set independently for each control panel so button mapping set on a software control panel will not affect the button mapping set on a hardware control panel.

ATEM Advanced Panel Button Mapping and Button Brightness Level

To access the button mapping settings, press the 'settings' button to open the general switcher settings LCD menu, then press the 'button mapping' soft button.

Use the control knobs under each LCD setting to select the button you want to map and the input you want to change it to. You can also change the button color and label color that is displayed on the panel if you want to highlight specific sources. For example, you may want to highlight your playback sources a different color so you can instantly identify them on the panel. The button will illuminate on both the preview and program rows until the source is switched to the preview or program output, where it will change to green or red respectively.

Once you have changed the setting, the change is made instantly and you don't have to worry about saving. Simply press the 'home' button to return to the home menu.

If you want to change the brightness of the buttons, press the 'settings' button to open the general switcher settings LCD menu, then press the 'panel' soft button to reveal the panel settings.

Rotate the settings knob under each setting until you see the desired brightness level.

Once you have configured all the button settings, press the 'home' button to return to the home menu.

Performing Transitions using ATEM Hardware Panels

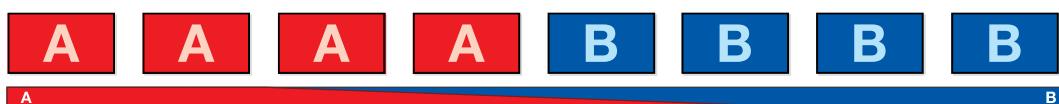
The buttons and knobs on the ATEM Advanced Panels follow the same M/E layout, plus the system control blocks share the same functions. This means controlling your switcher is intuitive when working with both advanced panels because they operate your switcher in exactly the same way.

ATEM Advanced Panels use large LCD screens with soft control knobs and buttons which lets you adjust settings dynamically as you control your switcher. This is a fast and convenient way of working with your panel.

This section describes how to perform the various transition types on your switcher using an external ATEM hardware panel.

Cut Transitions

The cut is the most basic transition that can be performed on the switcher. In a cut transition the program output is immediately changed from one source to another.



Program output for a cut transition.

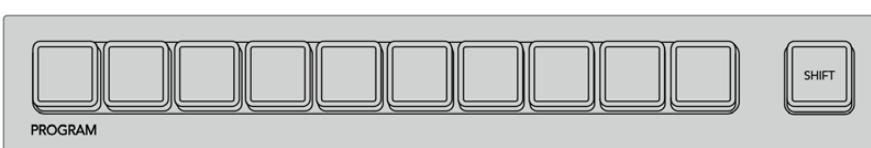
A cut transition can be performed directly from the program bus, or using the CUT button in the transition control block.

Program Bus

When a cut transition is performed from the program bus, only the background will be changed and all upstream and downstream keys will maintain their current state.

To perform a cut transition from the program bus

On the program bus, select the video source that you want on the program output. The program output will immediately change to the new source.



Press any of the source buttons on the program row to perform a cut transition from the program bus

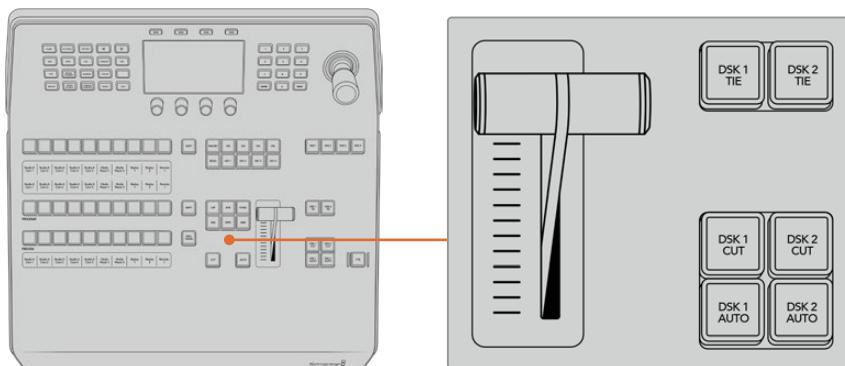
CUT Button

When a cut transition is performed using the CUT button, any upstream keys that were selected in the next transition and any downstream keys that were tied to the transition control will also change state. For example, a downstream key tied to the transition control will cut ON if off air, or cut OFF if on air. Similarly, any upstream keys selected in the next transition will be cut on if they were off air, or cut off if they were on air.

To perform a cut transition using the CUT button

- 1 On the preview bus, select the video source that you want on the program output. The program output will remain unchanged.
- 2 In the transition control block, press the CUT button. The sources selected on the program and preview buses are exchanged to indicate that the video source that was on preview is now on program and vice versa.

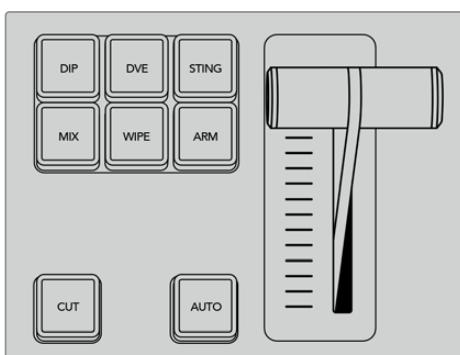
TIP It's recommended to use the transition control block to perform transitions because it provides the opportunity to verify the video content on the preview output before sending it to the program output, for example to verify that a camera is in focus.



Press the button marked CUT in the transition control block to perform a cut transition

Auto Transitions

An auto transition allows you to automatically transition between program and preview sources at a predetermined rate. Any upstream keys that were selected in the next transition and any downstream keys that were tied to the transition control will also change state. Auto transitions are performed using the auto button in the transition control block. Mix, dip, wipe, DVE and stinger transitions can all be performed as an AUTO transition.



Transition types, for example dip, mix and wipe, have their own independent selection button.

To perform an auto transition

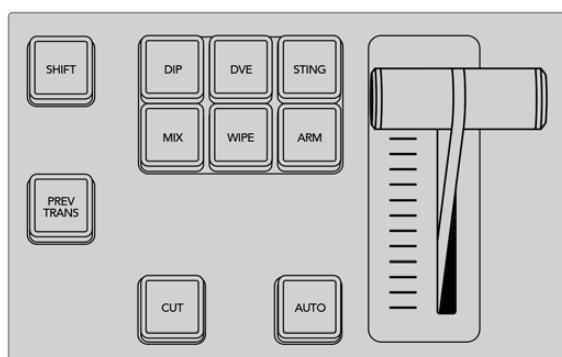
- 1 On the preview bus, select the video source that you want on the program output.
- 2 Select the transition type using the transition type buttons in the transition control block.
- 3 On the LCD menu use the control knobs to set the transition rate and adjust any other parameter for the transition as needed.
- 4 Press the AUTO button in the transition control block to initiate the transition.

During the transition, the red and green buttons on the program and preview buses both turn red to indicate that you are in the middle of a transition. The fader bar or transition slider indicator displays the position and progress of the transition and the transition rate display updates to indicate the number of frames remaining as the transition progresses.

At the end of the transition, sources selected on the program and preview buses are exchanged to indicate that the video source that was on preview is now on program and vice versa.

Each transition type has its own independent transition rate allowing you to perform faster transitions by selecting the transition type and pressing the AUTO button. The previously used transition rate is remembered for that transition type until it is changed.

A production switcher provides multiple methods of transitioning from one shot to another. Generally, you use a simple cut transition to move from one background source to another. Mix, dip, wipe and DVE transitions allow you to transition between two background sources by gradually phasing out one and phasing in another. Stinger and Graphic Wipe are special transitions which will be covered in a later section. Mix, dip, wipe and DVE transitions are performed as an auto transition or manual transition using the transition control block.



Transition types, for example dip, mix and wipe, have their own independent selection button.

Mix Transitions

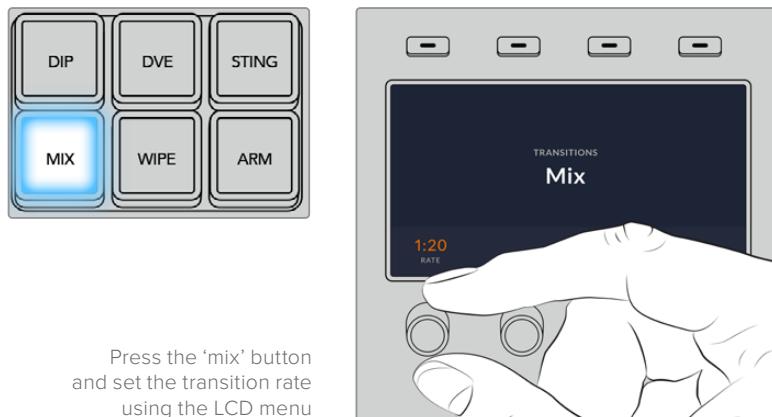
A mix is a gradual transition from one source to another and is achieved by interpolating gradually between two sources, effectively overlapping the sources for the duration of the effect. The length of the transition or length of the overlap can be adjusted by changing the mix rate.



Program output for a mix transition.

To perform a mix transition on an ATEM advanced panel

- 1 On the preview bus, select the video source that you want on the program output.
- 2 Press the MIX button to select the mix transition type. The LCD menu will automatically display the transition settings.
- 3 In the transition settings, use the corresponding LCD control knob to adjust the mix rate. You can also enter a rate duration using the number pad.
- 4 Perform the transition as an auto transition or manual transition from the transition control block.



Dip Transitions

A DIP is similar to a mix in that it is a gradual transition that transitions from one source to another. However, a dip transition gradually mixes through a third source, the dip source.

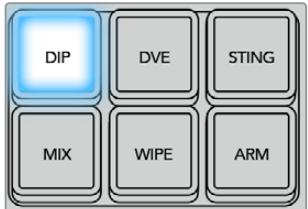
For example, the dip transition can be used for a transition that calls for a white flash or a transition that quickly flashes the sponsor logo. The length of the dip transition and the dip source can both be customized.



Program output for a dip transition.

To perform a dip transition on an ATEM advanced panel

- 1 On the preview bus, select the video source that you want on the program output.
- 2 Press the DIP button to select the dip transition type. The LCD menu will automatically display the transition settings.
- 3 In the transition settings, use the corresponding LCD control knob to adjust the dip rate. You can also enter a rate duration using the number pad. Select a dip source.
- 4 Perform the transition as an auto transition or manual transition from the transition control block.



Press the 'dip' button in the transition control block, then set the dip source and transition rate using the LCD menu



Dip transition parameters

Rate	The dip transition rate in seconds and frames.
Dip Source	The dip source is any video signal in the switcher that will be used as the intermediate picture for the dip transition, usually a color generator or media player.

Wipe Transitions

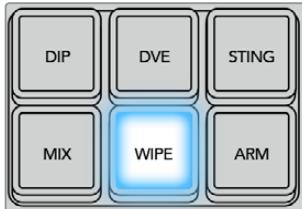
A wipe is a transition from one source to another and is achieved by replacing the current source by another source with a pattern that forms a shape. For example an expanding circle or diamond.



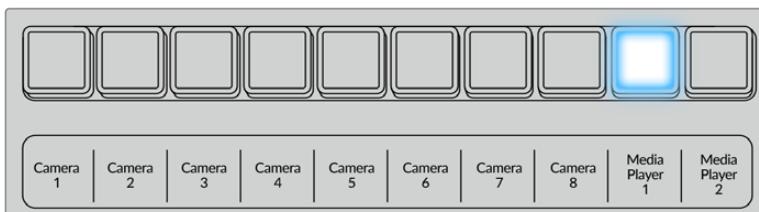
Program output for a wipe transition.

To perform a wipe transition on an ATEM advanced panel

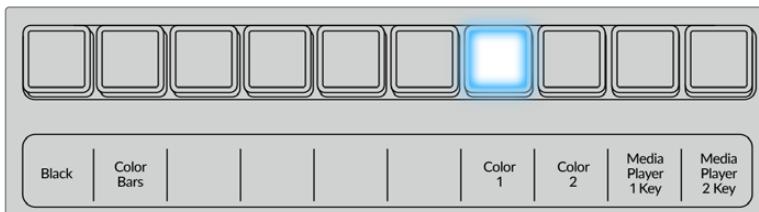
- 1 On the preview bus, select the video source that you want on the program output.
- 2 Press the WIPE button to select the wipe transition type. The LCD menu will automatically display the transition settings.
- 3 Press the desired wipe pattern button on the control panel.
- 4 In the transition settings, use the corresponding LCD control knobs to adjust the border parameters, the wipe rate and wipe direction. You can also enter a rate duration and specific setting values using the number pad.
- 5 Use the select bus to select the border source.
- 6 Perform the transition as an auto transition or manual transition from the transition control block.



Press a source button in the source select row to select a source for the wipe border. Hold the shift button down to select a shifted source, such as a color generator or media player.



Press a source button in the source select row to select a source for the wipe border, such as a camera or media player.



Hold the shift button down to select a shifted source, such as color bars or a color generator.

TIP The border source used in a wipe transition can be any source in the switcher. For example, a thick border with the media player as its source can be used for sponsorship or branding.

Wipe transition parameters

Rate	The length of the wipe transition in seconds and frames.
Symmetry	Symmetry can be used to control the aspect ratio of the pattern. For example, adjusting the symmetry will allow you to change a circle into an ellipse. On the advanced panel symmetry can be adjusted using the z axis of the joystick.
Position	If the wipe pattern has positioning then the joystick on the advanced panel or the x position: and y position: boxes in the transition palette of the software control panel can be used to move the center of the pattern. Moving the joystick dynamically updates the x and y position display in the software control panel.

Reverse Direction	Reverse changes the progression of closed patterns such as circles, diamonds and boxes so that the pattern closes in from the edges of the screen toward the center. When selected the text will illuminate orange.
Flip Flop	When FlipFlop mode is toggled on, the transition changes between normal to reverse every time the transition is executed.
Width	Width of the border.
Softness	The edges of the wipe pattern can be adjusted between sharp and fuzzy by adjusting the softness parameter.

DVE Transitions

Your ATEM switcher includes a powerful digital video effects processor for DVE transitions. A DVE transition displaces the image in various ways to transition from one picture to another. For example, a DVE transition can be used to squeeze the current picture off screen revealing a new video under it.

To perform a DVE transition on an ATEM advanced panel

- 1 On the preview bus, select the video source that you want on the program output.
- 2 Press the DVE transition type button to select the DVE transition. The DVE settings will appear on the LCD menu.

NOTE If the DVE is already being used in an upstream key, the DVE transition type will not be available for selection until the key is taken off air and off next transition. Refer to 'sharing DVE resources' later in this section for more information.

- 3 In the DVE LCD menu, use the soft control knobs and buttons to configure the DVE parameters. For example, select the DVE pattern, movement, direction and adjust the DVE transition rate.
- 4 Perform the transition as an auto or manual transition using the auto button or fader bar.

DVE transition parameters

DVE Rate	The duration of the DVE transition in seconds and frames. Rotate the DVE rate knob to adjust the DVE transition rate. The new rate is immediately displayed in the transition rate window in the transition control block.
Symmetry	Symmetry can be used to control the aspect ratio of the pattern. For example, adjusting the symmetry will allow you to change a circle into an ellipse. On the advanced panel symmetry can be adjusted using the z axis of the joystick.
Position	If the wipe pattern has positioning then the joystick on the advanced panel or the x position: and y position: boxes in the transition palette of the software control panel can be used to move the center of the pattern. Moving the joystick dynamically updates the x and y position display in the software control panel.
Normal	The normal direction for closed patterns such as circles, diamonds and boxes is to grow from the center of the screen and progress outward.

DVE key parameters

Enable key	Enables/disables the DVE key. The DVE key is enabled when the button is illuminated.
PreMult	Select the DVE key as a pre-multiplied key.
Clip	The clip level adjusts the threshold at which the key cuts its hole. Decreasing the clip level reveals more of the background. If the background video is completely black then the clip value is too low.
Gain	The gain adjustment electronically modifies the angle between on and off thereby softening the edges of the key. Adjust the gain value until the edge softness is desirable but the background video luminance (brightness) is not affected.
Inverse	When the key is not pre-multiplied, inverts the key signal.

Sharing DVE resources

ATEM features a DVE channel which can be used to perform DVE transitions or used in an upstream keyer. When you select a DVE transition, if the DVE is used elsewhere in the system, the DVE transition type will not be available and a DVE unavailable message will be displayed. In order to use the DVE transition you must free the DVE from where it is currently used. Verify that the upstream keys currently on program or preview are not DVE keys and do not have flying key enabled. To free DVE from the upstream keyer, change the key type to anything other than DVE or disable flying key. The DVE will be released and therefore available for use as a DVE transition.

The logo wipe transition is a popular transition that uses the DVE and moves a graphic across the screen over a background transition. For example, the logo wipe moves a graphic over a horizontal wipe, essentially replacing the wipe border. A logo mix spins the graphic across the screen over a mix transition. Logo transitions are perfect for wiping the station logo or spinning a football across the screen revealing a new background. Logo transitions use a special keyer built into the transition block, leaving all of the upstream and downstream keyers available for compositing the output. The following section explains how to build and perform logo transitions.



The above image sequence provides an example of the program output for a graphic wipe transition.

Performing a Graphic Transition

To perform a graphic transition on an ATEM advanced panel

- 1 Press the DVE transition type button in the transition control block. The DVE settings menu will appear on the LCD.

If the DVE is already being used in an upstream key, the DVE transition type will not be available for selection until the key is taken off air and off next transition. Refer to ‘sharing DVE resources’ later in this section for more information.

- 2 Press the ‘effect’ soft button in the LCD menu to open the effect settings and set the effect to a graphic wipe by selecting the graphic wipe icon using the ‘effect’ soft control knob.

The default direction is left to right, but you can change the direction by selecting

'reverse direction'. You can also enable 'flip flop' which will let the effect move forwards and backwards with each performance of the transition, rather than repeating the same movement direction.

- 3 Press the right arrow in the system control buttons to adjust the key settings. Enable the key and select the fill and key source. If you need to make adjustments to the key, for example adjusting clip and gain settings, press the right arrow in the system control buttons to access the key parameters.

TIP Typically, for a graphic transition, the source would normally be a graphic loaded in a media player. By default, when you select a media player for the fill source, the key source will automatically select the media player key channel and set pre multiplied key to 'on'. This means a graphic with a key matte embedded in the alpha channel will automatically be selected by the switcher. You can disable pre multiplied key and change the key source if you want to use a separate media file on a different media player, or a different input source.

- 4 Press the auto button to perform the transition as an auto transition, or use the fader bar for a manual transition.

Graphic wipe parameters

Rate	Rate specifies the length of the transition in seconds and frames. The rate can be adjusted using the rate knob or by entering a number on the number pad and pressing the set rate button.
Normal	The normal direction moves the graphic from left to right.
Reverse	Reverse changes the direction so that it moves the graphic from right to left.
FlipFlop	When FlipFlop mode is toggled on, the transition changes between normal and reverse every time the transition is executed. The 'Normal' or 'Reverse' light indicates the direction of the next transition.
Fill Source	The fill signal is the graphic used to move across the top of the transition.
Key Source	The key signal is a grayscale image that defines the region in the graphic that will be removed so that the fill signal can be correctly stacked on top of the wipe.

Graphic wipe images

The graphic wipe feature requires a static graphic that is used as a moving border for a horizontal wipe. This graphic should be a vertical 'banner' type graphic that is no more than 25% of the total screen width.



Graphic wipe screen width requirements

4320p	If the switcher is operating at 4320p then the graphic should be no wider than 1920 pixels.
2160p	If the switcher is operating at 2160p then the graphic should be no wider than 960 pixels.
1080i	If the switcher is operating at 1080i then the graphic should be no wider than 480 pixels.
720p	If the switcher is operating at 720p then the graphic should be no wider than 320 pixels.
SD	If the switcher is operating in Standard Definition then the graphic should be no wider than 180 pixels.

Manual Transitions

Manual transitions let you manually transition between program and preview sources using the fader bar in the transition control block. Mix, dip, wipe and DVE transitions can all be performed as a manual transition.

To perform a manual transition

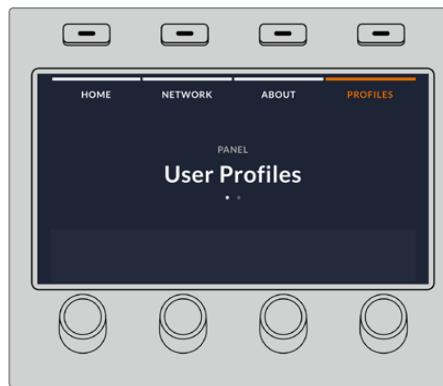
- 1 On the preview bus, select the video source that you want on the program output.
- 2 Select the transition type using the transition type buttons in the transition control block.
- 3 Manually move the fader bar or transition slider from one end to the other to execute the transition. The next move on the fader bar or transition slider will begin a new transition.
- 4 During the transition the red and green buttons on the program and preview buses both turn red to indicate that you are in the middle of a transition. The LED indicator on the fader bar or transition slider also displays the position and progress of the transition.

TIP You will also see the ATEM software control panel mirror the move on the hardware panel.

- 5 At the end of the transition, sources selected on the program and preview buses are exchanged to indicate that the video source that was on preview is now on program and vice versa.

Saving user profiles on ATEM Advanced Panel

ATEM Advanced Panels allow you to save up to ten profiles. This means you can save all your preferred panel settings and macros and then reload them the next time you are using the panel, perfect for when a panel will be used by more than one user.



To save a user profile:

- 1 Once you have set up the panel with all your preferred settings, press on the soft 'profiles' button above the LCD screen to open the user profiles settings.
- 2 Press the right arrow button in system control to navigate to the profile page.
- 3 Using the soft control knob, select an empty profile slot.
- 4 Press the soft 'save' button above the LCD to save the profile.



Now your profile is saved to the panel. The next time you want to use the panel, you simply need to restore your profile.

To restore a user profile:

- 1 Press the soft 'profile' button above the LCD screen to open user profiles and press the right arrow control panel button.
- 2 Using the soft control knob, navigate to the user profile you want to restore. If the text above your profile slot is orange, that means that profile is currently in use.
- 3 Press the soft 'restore' button above the LCD to load the profile.



All the panel settings for that user profile will now load.

If a user profile is no longer needed, you can also clear it via the profiles menu.

To clear a user profile:

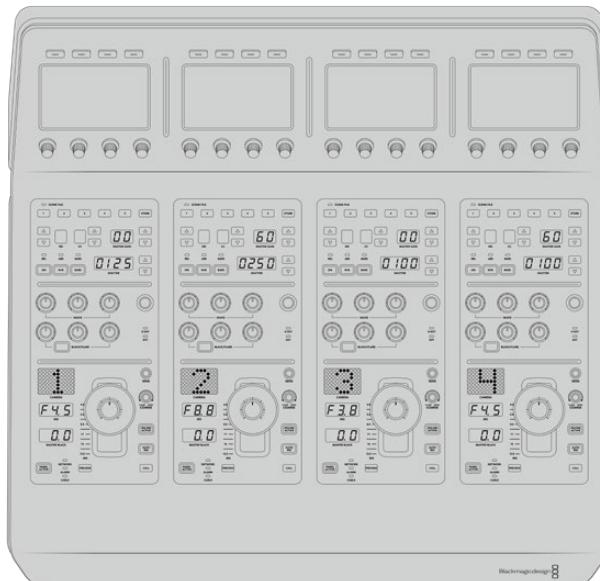
- 1 Press on the soft 'profiles' button above the LCD screen and press the right arrow control panel button to select the second page.
- 2 Using the soft control knob, navigate to the user profile you want to overwrite. If the user profile is currently in use, the text above the profile number will be orange.
- 3 Press the soft 'clear' button. The profile number will now become 'empty'.



TIP If you try to save over an existing profile with new settings, you will be given the option to either overwrite the profile or create a new one when you press the soft 'save' button.

Using ATEM Camera Control Panel

Traditionally, camera control units, or CCUs, have been designed for mounting inside a desk with independent units for each camera. ATEM Camera Control Panel is a portable solution that can be placed on a desk or solid surface with 4 CCUs built in so you can control up four Blackmagic Design cameras at once. However, you aren't locked into controlling one single camera for each CCU because you can select which camera you want to control.

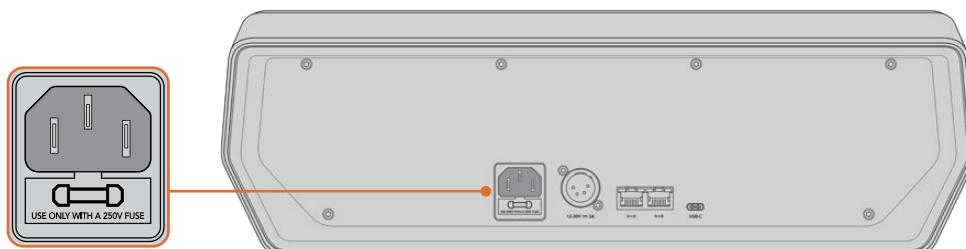


This means you can control any number of Blackmagic Design cameras using the four CCUs on one single panel, or if you have more than four cameras, you can use additional panels if you want to assign each camera with a dedicated CCU. It's completely up to you.

NOTE Blackmagic Design cameras that can be controlled using ATEM Camera Control Panel include URSA Broadcast, URSA Mini Pro 4.6K, URSA Mini and Blackmagic Studio Camera, and Blackmagic Micro Studio Camera.

Powering the Panel

To power your camera control panel, connect power via the IEC power input on the rear panel using a standard IEC power cable. You can also use the 12V DC input if you want to connect external power or redundancy via an external power supply, for example a UPS uninterrupted power supply or external 12V battery.

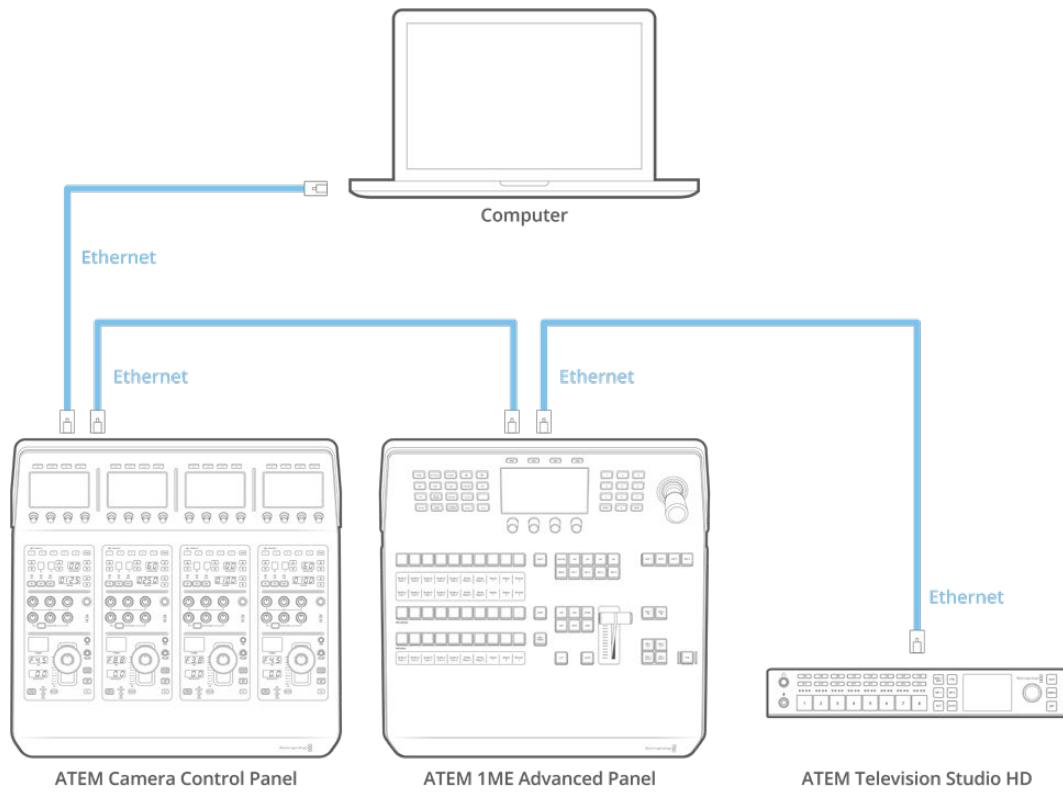


Connect power via the power input on the rear panel

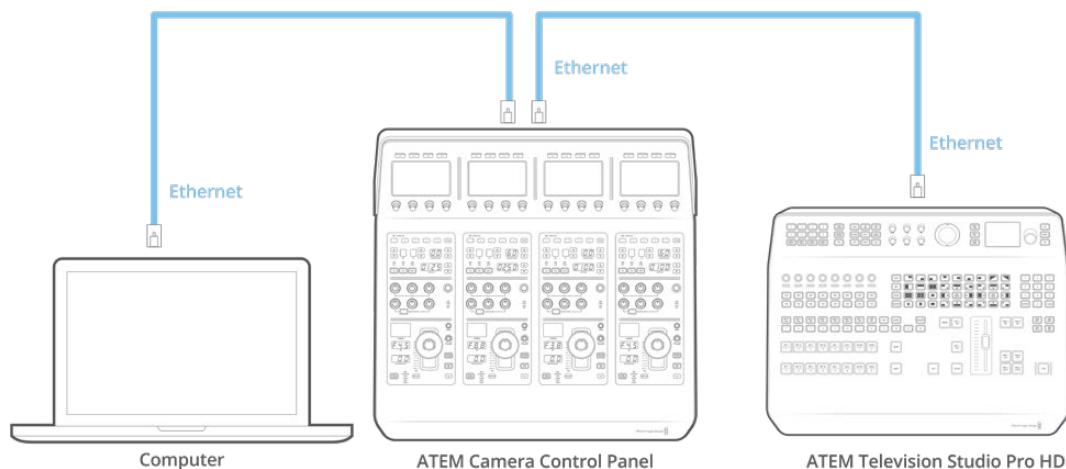
Connecting the Panel to your Switcher

To connect ATEM Camera Control Panel to your switcher, all you need to do is add the panel into your ATEM Ethernet connection chain.

For example, if you are using an external ATEM hardware panel, such as the ATEM 1 M/E Advanced Panel, remove its Ethernet cable from your computer or network and connect it to one of the camera control panel's Ethernet ports instead. The ATEM hardware panel will then be the middle unit in the chain. Now connect the camera control panel's spare Ethernet port to your computer or network.



If you are using the camera control panel with just your switcher and a computer on a shared network, connect the panel to your switcher, then the spare Ethernet port to your computer.



After connecting the camera control panel to your ATEM equipment, you should see the lights on the panel illuminate and the LCDs on each CCU will display their respectively assigned cameras. The panel is now powered, connected to your switcher and ready to start controlling your cameras!

The connection process is fast because all the network settings for each ATEM unit have a different default IP address when shipped from the factory. This means when you connect them all to each other, their network settings are automatically configured and will work straight away.

However, if you are adding a camera control panel to an already existing system, or you need to manually assign a different IP address to avoid potential conflicts on your network, you can enable DHCP so your panel determines the best IP address, or disable DHCP and set the IP address manually.

Changing Network Settings

Changing network settings means manually setting the panel's IP address so it can join your network, then entering the switcher's IP address on your panel so the switcher can be identified by your panel. These settings are located in your camera control panel's 'settings' LCD menu.

The home screen is the first menu item you will see on the CCU's LCD. To access the network settings, press the 'settings' soft button.



Press the 'settings' soft button on the LCD home screen to access all the camera control panel's settings

The DHCP setting is the first setting in the sequence of menu pages. Under this setting is a row of small dot icons. As you press the arrow soft button to navigate through the pages of settings, the dot icons will illuminate to show which page you are on. All your camera control panel settings are available via these pages.

To set the camera control panel's IP address:

- 1 If you want the panel to automatically set a compatible IP address, select the DHCP setting by pressing the 'on' soft button.

TIP If you know your network's IP address, you can navigate to the next setting page and check the panel's IP address setting to confirm it has selected an address compatible with your network.

- 2 If you want to set the IP address manually, make sure the DHCP setting is set to 'off', then press the arrow soft button to navigate to the 'panel IP address' setting.

- 3** Rotate the corresponding knobs to change the IP address fields.
- 4** Now press the arrow button to move to the subnet mask and gateway settings and make the necessary changes.
- 5** Once all the subnet mask and gateway number fields are set, press the ‘save changes’ soft button to confirm your settings.

With your camera control panel’s IP address set, the network can now communicate with your panel.

The next step is to assign the switcher’s IP address on the camera control panel. By telling your camera control panel your switcher’s IP address, the panel can then identify your switcher on the network.

TIP If your switcher is located near the camera control panel, it’s helpful to open the network settings menu on the switcher so you can observe your switcher’s IP address while entering the IP address number fields on the camera control panel. This is also a good way to cross check your network settings between each unit.

To set the switcher’s IP address on your camera control panel:

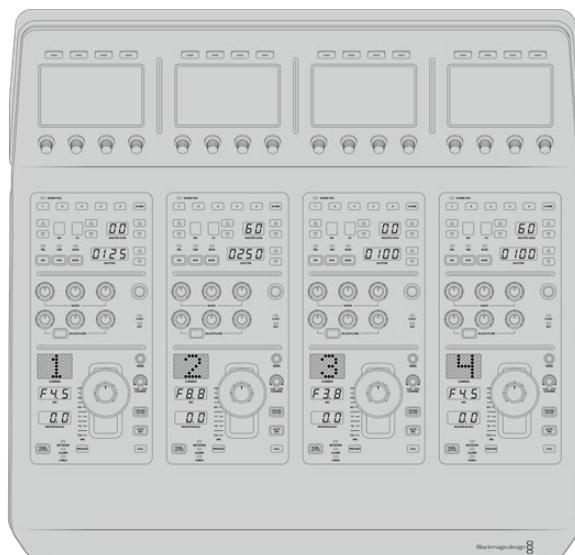
- 1** Press the arrow soft button to navigate to the ‘switcher IP address’ setting.
- 2** Using the knobs underneath the LCD, set the numbers for each address field.
- 3** Press ‘save changes’ to confirm your settings.

Now that your panel has identified the switcher, all the controls on your panel should illuminate. This lets you know the panel is communicating with your switcher and is now able to control your cameras via the program return SDI outputs from the switcher to each camera.

If the lights are not illuminated on your panel, check your network settings and ensure the Ethernet cables are connected correctly.

Camera Control Panel Layout

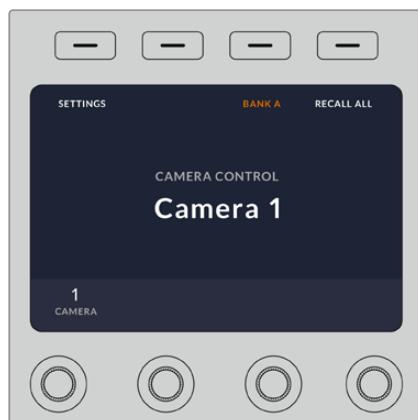
Each CCU on your camera control panel is exactly the same with the same controls. The menu settings are primarily controlled using the left CCU’s LCD and soft buttons.



Each CCU has exactly the same controls.

LCD Menu Settings

Pressing the 'home' soft button returns you to main home screen. From the home screen, you can access all your camera control panel's settings including the network settings, auxiliary for camera control, master black enable and disable settings, and the brightness settings for adjusting the lights on the various panel controls. You can also identify the software version installed on your camera control panel and the ATEM switcher your panel is connected to.



The home screen displays features you may need access to at all times, for example selecting the desired camera bank, and recalling scene files for all cameras

Camera Banks A and B

When the LCD is set to the home screen, you will see the camera bank setting at the top of the display. This setting displays which bank of cameras you are controlling.

For example, imagine you are controlling 8 cameras and you want to have a dedicated CCU assigned to each camera. You can assign cameras 1 to 4 for each CCU on bank A, then assign cameras 5 to 8 to each CCU on bank B.

Now when switching your live production, you can press the 'bank' soft button to swap between banks A and B, which lets you instantly access camera control for cameras that have been assigned to dedicated CCUs. This is a faster and more organized way of controlling cameras compared to swapping between multiple cameras on each CCU during production.



Press the bank soft button to cycle between camera banks A and B, or hold the button down to disable or enable camera banks

You can also disable the banks by holding down the bank soft button until the 'bank off' setting appears on the LCD.

Turning the banks off lets you change the CCUs to other cameras when needed, with a defined set of cameras ready on each bank you can access at any time. To enable banks, simply press the bank button again.



The bank setting lets you assign 2 banks of cameras to the four CCUs and then instantly swap between them by pressing the 'bank' soft button

TIP Any camera can be selected on each CCU in both banks. For example, imagine you want to have constant control over camera 1, even after switching to another bank of cameras. All you need to do is make sure one CCU in each bank always has camera 1 selected.

Settings

Pressing the 'settings' button on the home screen opens all settings for your camera control panel. Navigate through the pages of settings by pressing the arrow soft button. The network settings, including DHCP and IP address settings, are the first pages in the sequence. These settings are described in the section that shows how to change network settings when connecting the camera control panel to your ATEM switcher. Keep reading this section for information on the additional settings for your camera control panel.

Auxiliary Select

Select the auxiliary output you want to assign to camera control. Turn the auxiliary control knob underneath the LCD clockwise or counter clockwise to choose an auxiliary output.

NOTE The auxiliary selection differs depending on which ATEM switcher you are connected to. For example, a switcher with 1 auxiliary output will provide auxiliary 1 or none. A switcher with more auxiliary outputs lets you choose which output to assign to camera control, or select none if you want the auxiliary outputs to be dedicated to other sources.



Rotate the auxiliary select knob to assign a dedicated auxiliary output for camera control

Master Black

Setting the master black setting to on or off enables or disables the master black control, also known as the pedestal control. This is helpful if you want to lock the pedestal so it cannot be accidentally adjusted during production. The pedestal is controlled by turning the ring wheel on the joystick control knob clockwise or counter clockwise. More information on the joystick control is provided in the following sections.

Brightness

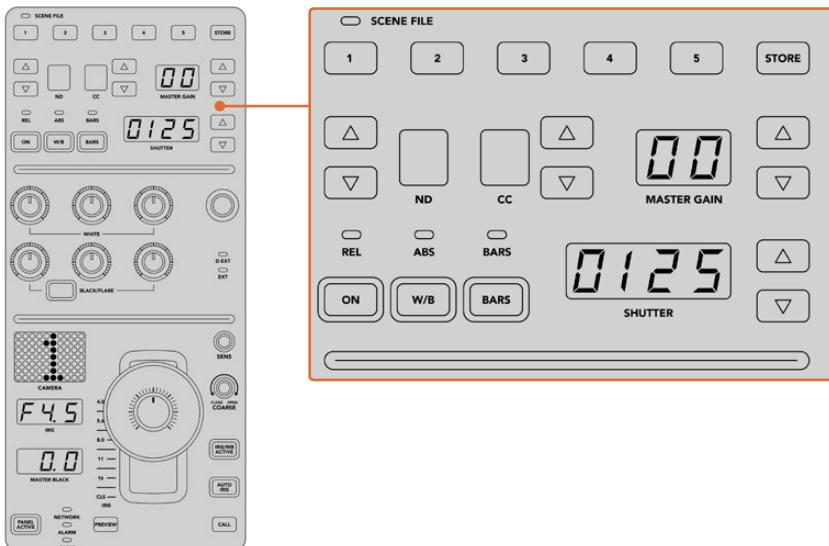
These settings let you adjust the brightness for the buttons, indicators, LEDs, and LCDs on your camera control panel. Rotate the corresponding control knobs for each setting clockwise or counter clockwise to brighten or dim the lights.

CCU Panel Controls

The panel controls for each CCU are separated into three general sections. These include:

Scene Files and Camera Settings

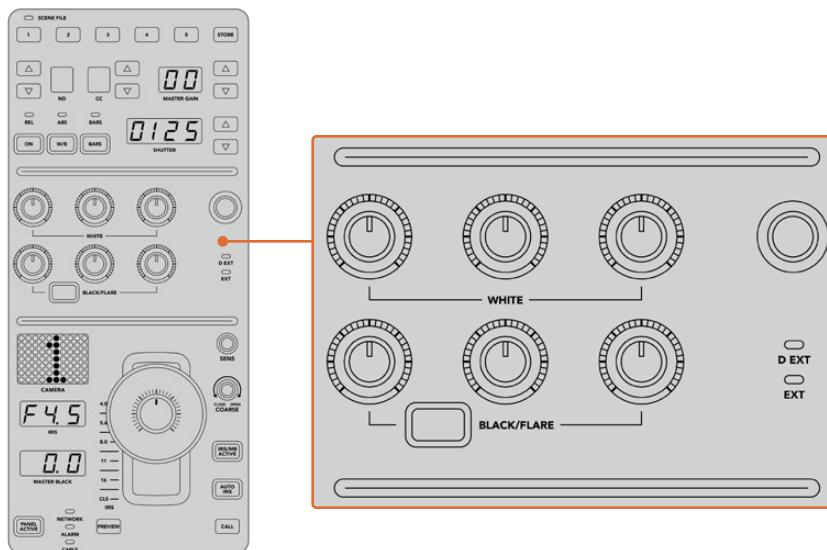
Scene files are for storing all the camera parameters for each CCU. Camera settings can be changed such as shutter speed, master gain, white balance, and enabling color bars. More information for these settings, plus the relative and absolute mode settings, are described in detail in the following ‘controlling cameras’ section.



The upper section of each CCU is used to store and recall scene files, plus control camera settings such as shutter speed, master gain, white balance and color bars

Color Balance Controls

The red, green and blue color balance knobs in the panel's mid section are for adjusting the color balance of the lift, gamma and gain levels. The white controls are for adjusting the RGB values for the gain, or highlights, and the black controls are for adjusting RGB values of the lift, or the shadows. The black/flare button lets you adjust the RGB values for the gamma, or mid tones, by holding down the button and adjusting the lift RGB knobs.



The color balance controls let you make fine adjustments to the red, green and blue channels for the master gain/white, gamma, and pedestal/black levels

There is also a custom control that will be uniquely assignable in a future update. Currently, the custom control knob is set to Y gain control. This increases or decreases the overall luminance, or brightness, of the image. More information about color balance control is provided in the following 'controlling cameras' section.

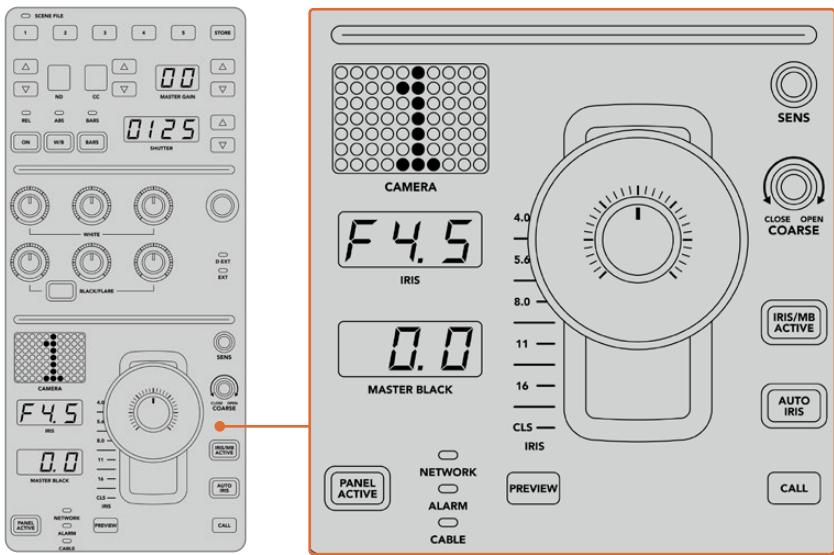
Lens Controls

The lower section of the panel is where most of the control will occur during production.

The first item you will probably notice is the joystick control. This is used to open and close the iris, also known as the white level or gain control, and for adjusting the master black level, also known as the pedestal control.

TIP You can also press the joystick down to switch its camera to the auxiliary preview for camera control.

Gain is adjusted by leaning the joystick forwards or backwards to open or close the iris. Increase or decrease the pedestal by rotating the ring wheel underneath the joystick's knob clockwise or counter clockwise. This gives you fine control over both parameters using the same controller.



The lower section of the CCU is where most of the camera control occurs during live production

Other buttons and knobs in this section of the CCU are for adjusting the sensitivity of the joystick control, setting the coarse level, locking and unlocking the CCU, and more. Details on all the features are provided in the following section.

Controlling Cameras

This section describes all the features on each CCU and a general overview on how to approach camera control.

The first step to controlling cameras is to assign a camera for a CCU.

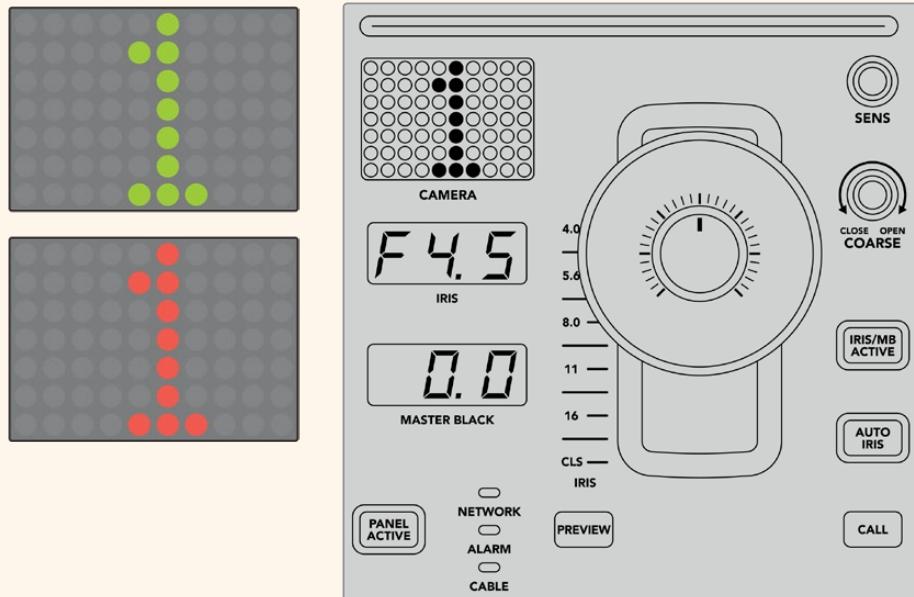
Assigning a Camera to a CCU

At the bottom of the LCD home screen for each CCU, you will see its camera number displayed and a soft control knob underneath it. Simply turn the knob to change the camera number. You will also see the camera name change on the LCD. The camera name will illuminate red when on air.



The camera name and number on the LCD home screen shows the camera currently selected for each CCU

TIP The large camera number next to the CCU's joystick control will also change when you assign a camera. This large identifying number is easy to see and will illuminate red when its camera is live on the program output.



Scene Files

The numbered buttons along the top of each CCU let you quickly store and recall up to 5 scene file presets. For example, once you have arranged all your settings for a camera and you are set up for broadcast, you can then save all the parameters for each camera and recall them later. It's a very fast process!

To store a scene file:

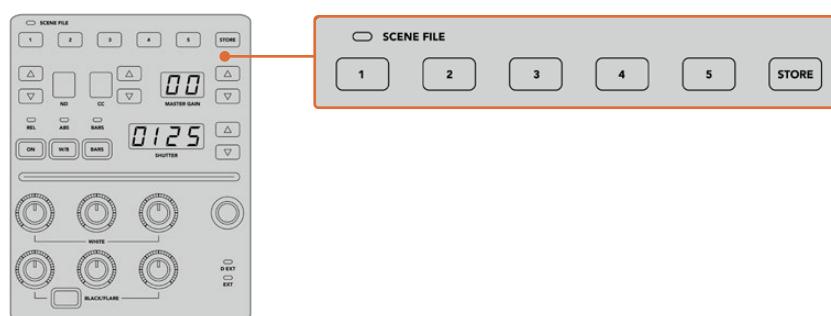
- 1 Press the 'store' button on a CCU. The button will illuminate red to indicate the panel is ready to store a file.
- 2 Press a numbered scene file button.

The scene file indicator and buttons will illuminate, indicating when a scene file is stored or recalled.

To recall a scene file:

Press the numbered button for the scene file you want to recall.

That's all you need to do!



The scene file buttons are used for storing and recalling all settings for CCU controls

Recall All

When this feature is enabled, you can recall a stored scene file on all cameras simultaneously when you press the corresponding scene file button on a single CCU.

For example, you may have a specific setup for each camera that is optimized for a set in your live production. This will likely be a large number of settings that you will want to recall later when you return to that set.

The following is an example of how you can recall complex settings for multiple cameras simultaneously.

To recall a scene file to multiple cameras:

- 1 Once all your cameras are set up, store a scene file for each camera on scene file 1.
- 2 Enable the 'recall all' setting by pressing the corresponding soft button in the LCD home menu.
- 3 Now make any changes you want to each camera.
- 4 Press the scene file 1 button on any CCU. You will notice that all CCUs have recalled the settings stored in scene file 1 for each independent CCU.

NOTE While this feature is very powerful and helpful, please use with care as it affects all cameras, including the camera switched to the program output. We recommend enabling 'recall all' for specific setups prior to air, and then immediately disabling the feature until you need it again.

ND

This setting will be enabled in a future update.

CC

This setting will be enabled in a future update.

Master Gain

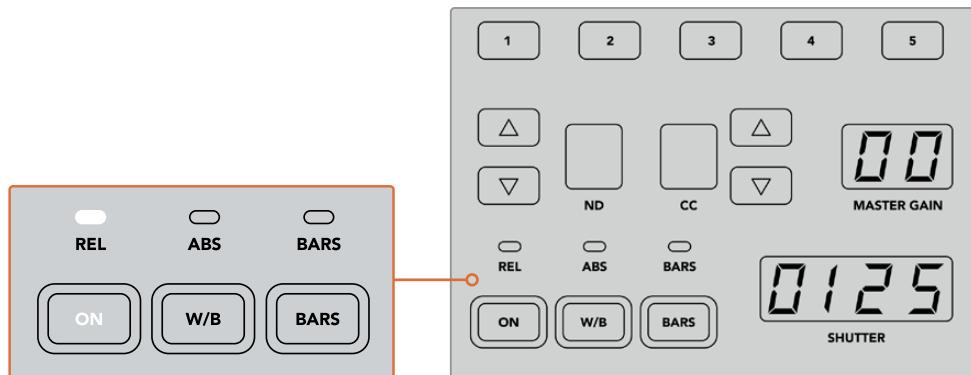
Blackmagic Design cameras have ISO and gain settings that can be set using the master gain buttons on the camera control panel. To increase the master gain, press the up arrow next to the master gain indicator. To decrease gain, press the down arrow.

Increasing or decreasing the master gain lets you allow for more light in dimly lit shooting conditions, however it's worth being careful with the master gain as electronic noise can appear in the image as it reaches its highest settings.

TIP When a negative gain value is set, the down arrow will illuminate. When positive gain is set, the up arrow will illuminate.

Relative Control and Absolute Control

The camera control panel has two control modes that determine how the panel maintains synchronization between the physical controls and their settings. The two control modes are relative control and absolute control.



Pressing the 'ON' button repeatedly will cycle between relative and absolute control modes

Relative Control

In relative control mode, when a setting is adjusted externally and becomes out of sync with the original controller, the next time a change is made to the original controller, its setting will gradually return to sync as the new adjustment is performed.

For example, if the camera's iris is set to f2.8 on the camera control panel, and then set to f5.6 using ATEM Software Control, the joystick will still be physically placed at f2.8, but the setting is now f5.6. In relative mode, when you then adjust the joystick to decrease the gain level, the setting will continue from f5.6 and gently return to sync with the controller as you make changes. The process is almost invisible and it's likely you won't even notice.

Absolute Control

In absolute control mode, the settings are always synchronized to their corresponding controls.

NOTE When the panel is in absolute control mode, it's worth keeping in mind that if a control's setting is changed using ATEM Software Control or a different CCU, the next adjustment on the original controller will result in an initially harsh settings change as it snaps back to its originally set position.

For example, if the joystick has set the iris to f2.8 on the camera control panel, and then the setting is changed to f5.6 using ATEM Software Control, the next time you adjust the gain level using the joystick, the gain level will immediately snap to f2.8 and begin adjusting from there. That is because the joystick is still positioned at f2.8 on the camera control panel.

For this reason, it's important to decide before going to air which control mode you want to use when controlling your cameras so you can be sure there is no risk of unintended changes when live to air.

White Balance

You can adjust the white balance of each camera by holding down the white balance button, marked ‘W/B’ and pressing the shutter up and down arrow buttons to warm or cool the image. The shutter setting indicator displays white balance values so you can monitor the color temperature in degrees Kelvin. Check the white balance setting at any time by holding down the white balance button and observing the shutter setting indicator.

TIP When changing a white balance or shutter speed setting, you can increase their speed of change by holding down the corresponding up or down arrow buttons.



Hold down the W/B button and press the shutter up and down arrow buttons to set a white balance in degrees Kelvin

Color Bars

Pressing the ‘bars’ button will set the camera to display color bars. Press again to turn bars off.

Shutter Speed

The arrow buttons next to the shutter display let you change the camera’s shutter speed. Press the up arrow to increase the shutter speed, and down to decrease. For general production use, the shutter speed is typically set to 50, meaning 1/50th of a second, which produces a pleasing motion blur. If you want crisper images with reduced motion blur, for example when shooting sport, a faster shutter speed may be preferred.



Press the shutter up and down buttons to set the camera’s shutter speed

White and Black Balance Controls

The two rows of color balance knobs are used to adjust the color balance of the white and black levels, also known as gain and pedestal. Turn the red, green and blue knobs clockwise or counter clockwise to make changes.

TIP For achieving accurate color settings while adjusting the color balance, it’s best to view scopes. For example, a waveform, parade or vectorscope as provided on a Blackmagic SmartScope 4K.

Black/Flare Button

Adjust the color of the gamma or mid tones by holding down the black/flare button and adjusting the black balance RGB controls.

D EXT/EXT

This feature will be enabled in a future update.

Camera Number

Each CCU has its own large camera number that shows you which camera is being controlled. This large display is illuminated green when in a neutral state, and red when its camera is switched to the program output.

Gain and Pedestal Level Control

The joystick control lets you make fine adjustments to the gain/iris and pedestal/master black levels.

Leaning the joystick forwards or backwards opens or closes the camera's iris, also known as the gain level. As you lean the joystick forwards and backwards, its indicator strip will illuminate, providing an approximate display of the camera's exposure. For a precise assessment of the exposure f-stop, observe the iris indicator.

Located around the collar of the joystick's handle is a ring wheel that controls the pedestal level. The ring wheel has small ridges built in for firm control, and a position indicator is located on the top of the knob to show the physical positioning of the wheel. Turn the wheel clockwise to increase the master black level, or counter clockwise to decrease.



The joystick lets you adjust the gain level by leaning the controller forwards and backwards, and the master black level can be adjusted by turning the ring wheel clockwise or counter clockwise. Corresponding indicators are provided for accurate measurement.

Iris and Master Black Indicators

The indicators for the iris and master black joystick control displays the gain value, shown as the f-stop exposure level for the camera lens, and the level of the master black setting.

Preview

When making changes with the camera controls, you can monitor your changes before switching to air by pressing the CCU's preview button. This performs the same function as pressing the joystick, which immediately switches the camera to the dedicated auxiliary output for camera control. This dedicated auxiliary output is set using the 'auxiliary select' setting on your camera control panel, or the general camera control settings in ATEM Software Control.

Sensitivity

The sensitivity setting lets you define a specific range between the highest and lowest gain levels so you can achieve finer control using the joystick. For example, when sensitivity is at its maximum setting, you can lean the joystick all the way forwards or backwards, however it will only affect a narrow range of gain.

You can define how narrow the range is by increasing or decreasing the sensitivity.

Coarse Control Knob

The coarse setting lets you define a limit to the maximum gain control. For example, you may want to ensure your gain never rises higher than a determined exposure.

To do this:

- 1 Lean the joystick to its highest position to increase the gain setting to its maximum.
- 2 Now decrease the coarse setting by rotating the coarse knob counter clockwise until the gain reaches the limit you want to set.

You can now lean the joystick all the way up and down and the gain will never rise higher than the limit you have set.

TIP When the coarse control is combined with the sensitivity control, you can define an upper and lower limit to the gain control.

For example, imagine you want to limit the gain so it never rises above f4.0 because gain above that level will clip highlights in your image. You also want to limit the gain so its minimum setting will be f8.0 to maintain the optimum sharpness range for your lens.

To do this:

- 1 Increase the gain control to its maximum position by leaning the joystick all the way to its top position.
- 2 Now decrease the coarse setting until it reaches the upper limit you want to set. In this case, f4.0.
- 3 To set the lower limit, lean the joystick all the way to its bottom position.
- 4 Now increase the sensitivity setting until the gain reaches the lower limit you want to set. In this case, f8.0.

Now you can lean the joystick all the way from top to bottom and the gain will stay within the limits you have set. This is a powerful way to define your exposure limits, plus gain finer control with the joystick due to allowing its maximum travel forwards and backwards.

Iris and Master Black Active

Once your levels are set and you want to lock them so they are not accidentally changed, press the 'iris/MB active' button. This enables a lock on the gain and master black so that any accidental movements of the joystick will not affect your settings. The 'Iris/MB active' button label will illuminate red when the lock is active. To disable the lock, press the button again.

TIP You can lock the black/pedestal level independently by disabling the 'master black' option in the 'settings' menu. When disabling master black, the black level is locked but the iris/gain level can still be adjusted. Don't forget to enable the master black setting if you want to make changes to the black/pedestal level.

Auto Iris

If your camera is using a compatible lens with electronic iris control via the camera, then you can press the 'auto iris' button for a quick automatic exposure setting. The camera will set exposure based on average brightness, providing an average exposure that is a balance between the brightest highlights and the darkest shadows.

Call

Holding down the 'call' button will flash the tally light on the CCU's selected camera. This is a helpful way of seeking the camera operators' attention, or to let your operators know you are about to go live.

While holding down the call button, the large camera number next to the joystick will also flash so you can visually confirm the call is being sent.

Panel Active

After you are happy with your camera settings, you may want to lock all the controls so they cannot be accidentally adjusted. Pressing the 'panel active' button enables the CCU lock so all controls cannot be changed. Press the button again to disable the CCU lock. This can be a helpful feature when you are recording a locked off shot and don't want the setting adjusted by accident, for example a wide shot of a stadium filling as the crowd enters.

ATEM Camera Control Panel is an exciting, practical and efficient way to control Blackmagic Design cameras in your live production. We believe you will enjoy the experience of hands on camera control using CCUs, which lets you take control of exposure and other camera settings, freeing up your camera operators so they can concentrate on framing and focus.

Using Tally

Sending Tally Signals via a GPI and Tally Interface

Your ATEM switcher can send tally signals to monitors and cameras to make it clear which source is on the program output, i.e. which source is on air.

Tally is commonly used to light the red light on top of a camera or monitor so the talent knows they are on air. Tally can also illuminate a border on a monitor such as a Blackmagic SmartView Duo or SmartView HD. The border allows production staff to know which camera is on air.



GPI and Tally Interface

The GPI and Tally Interface by Blackmagic Design, is an Ethernet device which provides eight mechanical relay contact closures to ground that can be used for tally. Tally signals are sent from the Ethernet port of your ATEM switcher to a GPI and Tally Interface on the same network as the switcher. By following the wiring guide on the back of the GPI and Tally Interface, a breakout cable can be connected to video equipment that supports contact closure tally signals, such as Blackmagic SmartView Duo and SmartView HD. Up to 8 tally receiving devices can be supported with a single GPI and Tally Interface.

The GPI inputs are optical isolators which are triggered by connection to ground with a maximum of 5V at 14mA.

The tally outputs are mechanical relay contact closures to ground with a maximum of 30V at 1A.

The following table illustrates which tally signal is sent when a switcher input is selected on the program output.

Program Output	Tally signal
Switcher Input 1	Tally 1
Switcher Input 2	Tally 2
Switcher Input 3	Tally 3
Switcher Input 4	Tally 4
Switcher Input 5	Tally 5
Switcher Input 6	Tally 6
Switcher Input 7	Tally 7
Switcher Input 8	Tally 8

Changing the Network and Tally Settings

Blackmagic ATEM Setup is used to configure the network settings in the GPI and Tally Interface so it will communicate with your ATEM switcher. The GPI and Tally Interface must be connected via USB in order to configure its settings with the Blackmagic ATEM Setup.

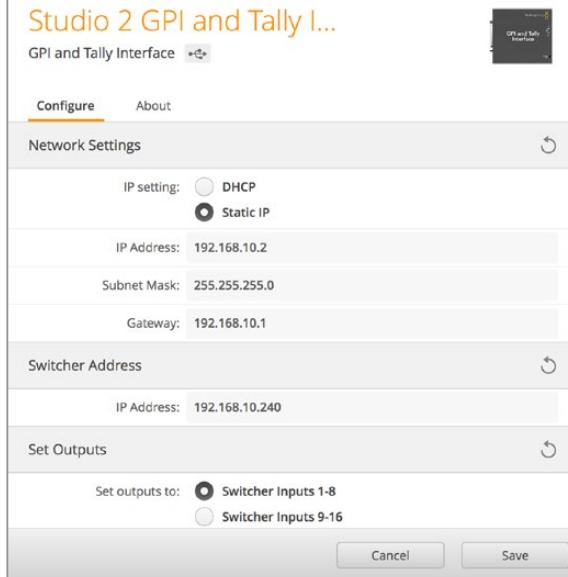
- 1 Connect the GPI and Tally Interface to the same Ethernet network as your ATEM switcher.
- 2 Connect the GPI and Tally Interface to a USB port on your computer and also connect the included power supply.
- 3 Launch the Blackmagic ATEM Setup.
- 4 If your ATEM switcher connects directly to your computer without an Ethernet network switch, choose to “Configure Address Using Static IP”. The GPI and Tally Interface defaults to a fixed IP address of 192.168.10.2 when shipped and we suggest you use this number for simplicity.

If you want to choose a different static IP address, you can set it to anything you like that's in the same range as the ATEM switcher, so long as it's not already in use by another device on your network. Default IP addresses for ATEM products are best avoided for this reason, including: 192.168.10.1, 192.168.10.2, 192.168.10.3, 192.168.10.10, 192.168.10.50, 192.168.10.60, and 192.168.10.240.

If your ATEM switcher connects via an existing Ethernet network switch, you may wish to choose “Configure Address Using DHCP” as this setting automatically obtains the IP Address, Subnet Mask and Gateway information from your DHCP server.

- 5 Type in the IP address of your ATEM switcher in the “Switcher Address” field. Your ATEM switcher defaults to a fixed IP address of 192.168.10.240 when shipped and this is the number you should type in this field unless you have changed it.
- 6 “Set tally outputs” should be set to “Switcher Inputs 1-8”.
- 7 Click “Apply”. The white LED to the right of the USB port should stop flashing and remain on to indicate it has successfully found the ATEM switcher. The GPI and Tally Interface is now ready.

- 8 Close Blackmagic ATEM Setup and disconnect your USB cable.

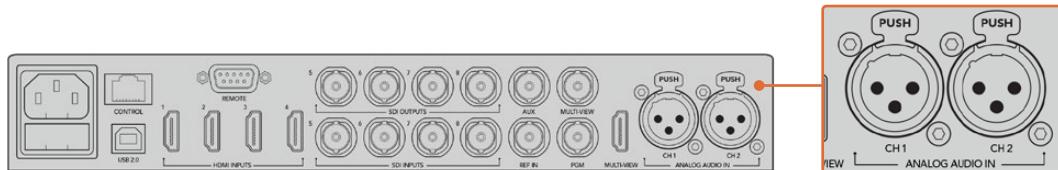


Network and Tally Settings for the GPI and Tally Interface

Using Audio

Connecting other Audio Sources

Your ATEM switcher features standard balanced XLR audio inputs and outputs so you can connect your external audio source directly. The XLR inputs are balanced and designed to reduce interference and noise, especially when long cable lengths are required.



Balanced XLR inputs let you connect external analog audio

Using Embedded SDI and HDMI Audio Sources

Your ATEM switcher includes a built-in audio mixer that lets you use the embedded HDMI and SDI audio from your cameras, media servers and other inputs without the need for an external audio mixer.

Once you've connected your SDI and HDMI cameras to the switcher for vision mixing, there are no other connections to make as the audio mixer uses the embedded audio in the video signal. This saves space and makes setup very fast and low cost as you don't need separate audio connections for every video source, and you don't need an external audio mixer unless you prefer to use one.

The audio is mixed using the control buttons and knobs on your switcher, or via the Audio tab of ATEM Software Control and output over the SDI and HDMI program outputs as embedded digital audio.



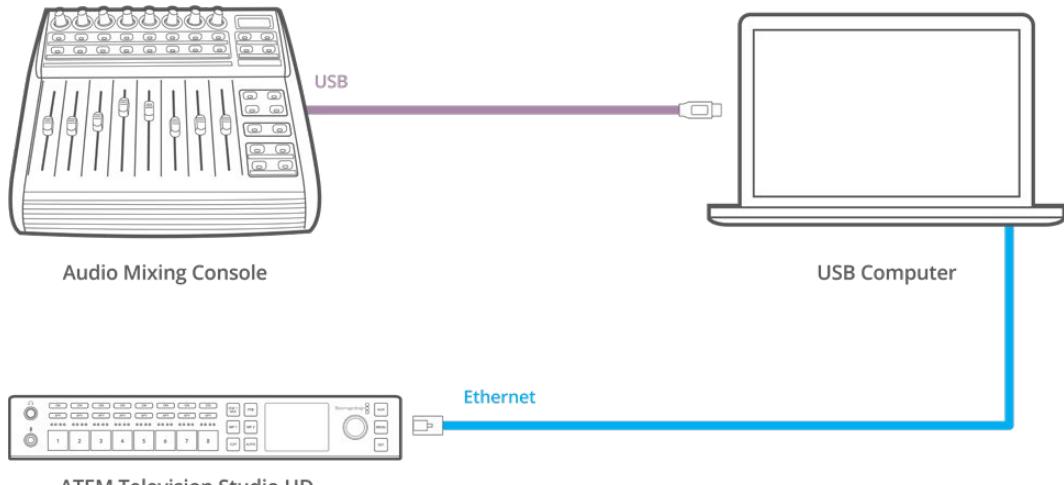
Using a Third Party Audio Mixer Control Surface

Using an Audio Mixer Control Surface

Connecting a hardware audio mixer control surface to your ATEM switcher provides you with the ability to use both hands and adjust multiple audio levels at the same time.

An audio mixer control surface can be connected to your Mac or PC as a MIDI device using Mackie Control commands to communicate with the ATEM switcher.

Many third party MIDI control surfaces are compatible with your ATEM switcher but please check with the manufacturer of your control surface if in doubt.



You can adjust multiple audio levels at the same time by connecting a hardware audio mixer to the computer which is running ATEM Software Control

Connecting Your Audio Mixer Control Surface

- 1 Connect your compatible MIDI control surface to your Mac or PC. Most modern control surfaces use USB.
- 2 Verify your control surface is recognized by your computer as a MIDI device.

For Mac OS computers, go to Applications/Utilities/Audio MIDI Setup and launch the application. Go to the Window menu and choose Show MIDI Window. Ensure your control surface appears as a MIDI device in this window.

For Windows computers, go to Computer/Properties/Device Manager/Sound, Video and Game Controllers and ensure your control surface appears in the list of icons.

- 3 The ATEM audio mixer is designed to communicate with your control surface using Mackie Control commands so your control surface will need to support Mackie Control. You'll also need to make sure your control surface is configured to use native Mackie Control or Mackie Control emulation. Please refer to your control surface's user manual for configuration details.

Some control surfaces offer several types of Mackie Control emulation and you should choose the one that activates the most features on your control surface. For example, with the Behringer BCF 2000, choosing “Mackie Control Mapping for Cakewalk Sonar 3 [MC3]” enables level faders, bank selectors, balance control, AFV and ON/MUTE functions, and also activates the LED screen which displays which bank of faders you have selected for your audio mix. The LED screen will not activate if you choose another Mackie Control emulation.

- 4** Launch ATEM Software Control and it will automatically look for your control surface using the first port on the first MIDI device that it finds. Click on the Audio tab in ATEM Software Control to display the ATEM audio mixer. Try sliding the gain faders up and down on your hardware control surface and verify that the audio mixer faders show a corresponding increase and decrease in the software on your computer screen. If so, you have successfully configured your control surface to work with the ATEM switcher.



Try sliding the gain faders up and down on your hardware control surface and verify that the audio mixer faders show a corresponding movement in the software on your computer screen

The MUTE button

In the ATEM audio mixer interface, audio is always on, or present in the mix, when the ON button is selected. When the ON button is deselected, audio is not present or is muted. To match the software interface, you'll find the MUTE button on your audio mixer control surface will be lit when audio is always on or present in the mix. The MUTE button will be unlit when audio is not present or is muted.

Decibel Scales

All hardware mixers are made differently, and the scale printed on your control surface may not match the scale in the ATEM audio mixer interface. Always refer to the ATEM audio mixer levels for the true decibel scales.

Developer Information

Blackmagic SDI Camera Control Protocol

Version 1.3

If you are a software developer you can use the SDI Camera Control Protocol to construct devices that integrate with our products. Here at Blackmagic Design our approach is to open up our protocols and we eagerly look forward to seeing what you come up with!

Overview

The Blackmagic SDI Camera Control Protocol is used by ATEM switchers, Blackmagic 3G-SDI Shield for Arduino and the Blackmagic Camera Control app to provide Camera Control functionality with supported Blackmagic Design cameras. Please refer to the ‘Understanding Studio Camera Control’ chapter section of this manual, or the ATEM Switchers Manual and SDK manual for more information. These can be downloaded at www.blackmagicdesign.com/support.

This document describes an extensible protocol for sending a unidirectional stream of small control messages embedded in the non-active picture region of a digital video stream. The video stream containing the protocol stream may be broadcast to a number of devices. Device addressing is used to allow the sender to specify which device each message is directed to.

Assumptions

Alignment and padding constraints are explicitly described in the protocol document. Bit fields are packed from LSB first. Message groups, individual messages and command headers are defined as, and can be assumed to be, 32 bit aligned.

Blanking Encoding

A message group is encoded into a SMPTE 291M packet with DID/SDID x51/x53 in the active region of VANC line 16.

Message Grouping

Up to 32 messages may be concatenated and transmitted in one blanking packet up to a maximum of 255 bytes payload. Under most circumstances, this should allow all messages to be sent with a maximum of one frame latency.

If the transmitting device queues more bytes of message packets than can be sent in a single frame, it should use heuristics to determine which packets to prioritize and send immediately. Lower priority messages can be delayed to later frames, or dropped entirely as appropriate.

Abstract Message Packet Format

Every message packet consists of a three byte header followed by an optional variable length data block. The maximum packet size is 64 bytes.

Destination device (uint8)	Device addresses are represented as an 8 bit unsigned integer. Individual devices are numbered 0 through 254 with the value 255 reserved to indicate a broadcast message to all devices.
Command length (uint8)	The command length is an 8 bit unsigned integer which specifies the length of the included command data. The length does NOT include the length of the header or any trailing padding bytes.

Command id (uint8)	The command id is an 8 bit unsigned integer which indicates the message type being sent. Receiving devices should ignore any commands that they do not understand. Commands 0 through 127 are reserved for commands that apply to multiple types of devices. Commands 128 through 255 are device specific.
Reserved (uint8)	This byte is reserved for alignment and expansion purposes. It should be set to zero.
Command data (uint8[])	The command data may contain between 0 and 60 bytes of data. The format of the data section is defined by the command itself.
Padding (uint8[])	Messages must be padded up to a 32 bit boundary with 0x0 bytes. Any padding bytes are NOT included in the command length.

Receiving devices should use the destination device address and or the command identifier to determine which messages to process. The receiver should use the command length to skip irrelevant or unknown commands and should be careful to skip the implicit padding as well.

Defined Commands

Command 0 : change configuration

Category (uint8)	The category number specifies one of up to 256 configuration categories available on the device.
Parameter (uint8)	The parameter number specifies one of 256 potential configuration parameters available on the device. Parameters 0 through 127 are device specific parameters. Parameters 128 through 255 are reserved for parameters that apply to multiple types of devices.
Data type (uint8)	The data type specifies the type of the remaining data. The packet length is used to determine the number of elements in the message. Each message must contain an integral number of data elements.

Currently defined values are:

0: void / boolean	A void value is represented as a boolean array of length zero. The data field is a 8 bit value with 0 meaning false and all other values meaning true.
1: signed byte	Data elements are signed bytes
2: signed 16 bit integer	Data elements are signed 16 bit values
3: signed 32 bit integer	Data elements are signed 32 bit values
4: signed 64 bit integer	Data elements are signed 64 bit values
5: UTF-8 string	Data elements represent a UTF-8 string with no terminating character.

Data types 6 through 127 are reserved.

128: signed 5.11 fixed point	Data elements are signed 16 bit integers representing a real number with 5 bits for the integer component and 11 bits for the fractional component. The fixed point representation is equal to the real value multiplied by 2^11. The representable range is from -16.0 to 15.9995 (15 + 2047/2048).
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Data types 129 through 255 are available for device specific purposes.

Operation type (uint8)	The operation type specifies what action to perform on the specified parameter. Currently defined values are:
0: assign value	The supplied values are assigned to the specified parameter. Each element will be clamped according to its valid range. A void parameter may only be 'assigned' an empty list of boolean type. This operation will trigger the action associated with that parameter. A boolean value may be assigned the value zero for false, and any other value for true.
1: offset / toggle value	Each value specifies signed offsets of the same type to be added to the current parameter values. The resulting parameter value will be clamped according to their valid range. It is not valid to apply an offset to a void value. Applying any offset other than zero to a boolean value will invert that value.

Operation types 2 through 127 are reserved.

Operation types 128 through 255 are available for device specific purposes.

Data (void)	The data field is 0 or more bytes as determined by the data type and number of elements.
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The category, parameter, data type and operation type partition a 24 bit operation space.

Group	ID	Parameter	Type	Index	Minimum	Maximum	Interpretation
Lens	0.0	Focus	fixed16	–	0	1	0.0 = near, 1.0 = far
	0.1	Instantaneous autofocus	void	–	–	–	trigger instantaneous autofocus
	0.2	Aperture (f-stop)	fixed16	–	-1	16	Aperture Value (where fnumber = $\sqrt{2^AV}$)
	0.3	Aperture (normalised)	fixed16	–	0	1	0.0 = smallest, 1.0 = largest
	0.4	Aperture (ordinal)	int16	–	0	n	Steps through available aperture values from minimum (0) to maximum (n)
	0.5	Instantaneous auto aperture	void	–	–	–	trigger instantaneous auto aperture
	0.6	Optical image stabilisation	boolean	–	–	–	true = enabled, false = disabled
	0.7	Set absolute zoom (mm)	int16	–	0	max	Move to specified focal length in mm, from minimum (0) to maximum (max)
	0.8	Set absolute zoom (normalised)	fixed16	–	0	1	Move to specified focal length: 0.0 = wide, 1.0 = tele
	0.9	Set continuous zoom (speed)	fixed16	–	-1	+1.0	Start/stop zooming at specified rate: -1.0 = zoom wider fast, 0.0 = stop, +1 = zoom tele fast

Group	ID	Parameter	Type	Index	Minimum	Maximum	Interpretation
Video	1.0	Video mode	int8	[0] = frame rate	–	–	24, 25, 30, 50, 60
				[1] = M-rate	–	–	0 = regular, 1 = M-rate
				[2] = dimensions	–	–	0 = NTSC, 1 = PAL, 2 = 720, 3 = 1080, 4 = 2k, 5 = 2k DCI, 6 = UHD
				[3] = interlaced	–	–	0 = progressive, 1 = interlaced
				[4] = Color space	–	–	0 = YUV
	1.1	Gain	int8		1	16	1 = 100 ISO, 2 = 200 ISO, 4 = 400 ISO, 8 = 800 ISO, 16 = 1600 ISO
	1.2	Manual White Balance	int16	[0] = color temp	2500	10000	Color temperature in K
			int16	[1] = tint	-50	50	tint
	1.3	Set auto WB	void	–	–	–	Calculate and set auto white balance
	1.4	Restore auto WB	void	–	–	–	Use latest auto white balance setting
	1.5	Exposure (us)	int32		1	42000	time in us
	1.6	Exposure (ordinal)	int16	–	0	n	Steps through available exposure values from minimum (0) to maximum (n)
	1.7	Dynamic Range Mode	int8 enum	–	0	1	0 = film, 1 = video,
	1.8	Video sharpening level	int8 enum	–	0	3	0 = off, 1 = low, 2 = medium, 3 = high
	1.9	Recording format	int16	[0] = file frame rate	–	–	fps as integer (eg 24, 25, 30, 50, 60, 120)
				[1] = sensor frame rate	–	–	fps as integer, valid when sensor-off-speed set (eg 24, 25, 30, 33, 48, 50, 60, 120), no change will be performed if this value is set to 0
				[2] = frame width	–	–	in pixels
				[3] = frame height	–	–	in pixels
				[4] = flags	–	–	[0] = file-M-rate
					–	–	[1] = sensor-M-rate, valid when sensor-off-speed-set
					–	–	[2] = sensor-off-speed
					–	–	[3] = interlaced
					–	–	[4] = windowed mode
	1.10	Set auto exposure mode	int8	–	0	4	0 = Manual Trigger, 1 = Iris, 2 = Shutter, 3 = Iris + Shutter, 4 = Shutter + Iris
	1.11	Shutter angle	int32	–	100	36000	Shutter angle in degrees, multiplied by 100
	1.12	Shutter speed	int32	–	24	2000	Shutter speed value as a fraction of 1, so 50 for 1/50th of a second
	1.13	Gain	int8	–	-128	127	Gain in decibel (dB)
	1.14	ISO	int32	–	0	2147483647	ISO value

Group	ID	Parameter	Type	Index	Minimum	Maximum	Interpretation
Audio	2.0	Mic level	fixed16	–	0	1	0.0 = minimum, 1.0 = maximum
	2.1	Headphone level	fixed16	–	0	1	0.0 = minimum, 1.0 = maximum
	2.2	Headphone program mix	fixed16	–	0	1	0.0 = minimum, 1.0 = maximum
	2.3	Speaker level	fixed16	–	0	1	0.0 = minimum, 1.0 = maximum
	2.4	Input type	int8	–	0	2	0 = internal mic, 1 = line level input, 2 = low mic level input, 3 = high mic level input
	2.5	Input levels	fixed16	[0] ch0	0	1	0.0 = minimum, 1.0 = maximum
				[1] ch1	0	1	0.0 = minimum, 1.0 = maximum
	2.6	Phantom power	boolean	–	–	–	true = powered, false = not powered
Output	3.0	Overlay enables	uint16 bit field	–	–	–	bit flags: [0] = display status, [1] = display frame guides Some cameras don't allow separate control of frame guides and status overlays.
	3.1	Frame guides style (Camera 3.x)	int8	[0] = frame guides style	0	8	0 = HDTV, 1 = 4:3, 2 = 2.4:1, 3 = 2.39:1, 4 = 2.35:1, 5 = 1.85:1, 6 = thirds
	3.2	Frame guides opacity (Camera 3.x)	fixed16	[1] = frame guide opacity	0.1	1	0.0 = transparent, 1.0 = opaque
	3.3	Overlays (replaces .1 and .2 above from Cameras 4.0)	int8	[0] = frame guides style	–	–	0 = off, 1 = 2.4:1, 2 = 2.39:1, 3 = 2.35:1, 4 = 1.85:1, 5 = 16:9, 6 = 14:9, 7 = 4:3
				[1] = frame guide opacity	0	100	0 = transparent, 100 = opaque
				[2] = safe area percentage	0	100	percentage of full frame used by safe area guide (0 means off)
				[3] = grid style	–	–	bit flags: [0] = display thirds, [1] = display cross hairs, [2] = display center dot
Display	4.0	Brightness	fixed16	–	0	1	0.0 = minimum, 1.0 = maximum
	4.1	Overlay enables	int16 bit field	–	–	–	0x4 = zebra
				–	–	–	0x8 = peaking
				–	–	–	
	4.2	Zebra level	fixed16	–	0	1	0.0 = minimum, 1.0 = maximum
	4.3	Peaking level	fixed16	–	0	1	0.0 = minimum, 1.0 = maximum
	4.4	Color bars display time (seconds)	int8	–	0	30	0 = disable bars, 1-30 = enable bars with timeout (s)
4.5	Focus Assist		int8	[0] = focus assist method	–	–	0 = Peak, 1 = Colored lines
				[1] = focus line color	–	–	0 = Red, 1 = Green, 2 = Blue, 3 = White, 4 = Black

Group	ID	Parameter	Type	Index	Minimum	Maximum	Interpretation
Tally	5.0	Tally brightness	fixed16	–	0	1	Sets the tally front and tally rear brightness to the same level. 0.0 = minimum, 1.0 = maximum
	5.1	Front tally brightness	fixed16	–	0	1	Sets the tally front brightness. 0.0 = minimum, 1.0 = maximum
	5.2	Rear tally brightness	fixed16	–	0	1	Sets the tally rear brightness. 0.0 = minimum, 1.0 = maximum Tally rear brightness cannot be turned off
Reference	6.0	Source	int8 enum	–	0	2	0 = internal, 1 = program, 2 = external
	6.1	Offset	int32	–	–	–	+/- offset in pixels
Configuration	7.0	Real Time Clock	int32	[0] time	–	–	BCD - HHMMSSFF (UCT)
				[1] date	–	–	BCD - YYYYMMDD
	7.1	System language	string	–	–	–	ISO-639-1 two character language code
	7.2	Timezone	int32	–	–	–	Minutes offset from UTC
	7.3	Location	int64	[0] latitude	–	–	BCD - s0DDddddddddd where s is the sign: 0 = north (+), 1 = south (-); DD degrees, dddddd decimal degrees
				[1] longitude	–	–	BCD - sDDDddddd where s is the sign: 0 = west (-), 1 = east (+); DDD degrees, dddddd decimal degrees
Color Correction	8.0	Lift Adjust	fixed16	[0] red	-2	2	default 0.0
				[1] green	-2	2	default 0.0
				[2] blue	-2	2	default 0.0
				[3] luma	-2	2	default 0.0
	8.1	Gamma Adjust	fixed16	[0] red	-4	4	default 0.0
				[1] green	-4	4	default 0.0
				[2] blue	-4	4	default 0.0
				[3] luma	-4	4	default 0.0
	8.2	Gain Adjust	fixed16	[0] red	0	16	default 1.0
				[1] green	0	16	default 1.0
				[2] blue	0	16	default 1.0
				[3] luma	0	16	default 1.0
	8.3	Offset Adjust	fixed16	[0] red	-8	8	default 0.0
				[1] green	-8	8	default 0.0
				[2] blue	-8	8	default 0.0
				[3] luma	-8	8	default 0.0
	8.4	Contrast Adjust	fixed16	[0] pivot	0	1	default 0.5
				[1] adj	0	2	default 1.0
	8.5	Luma mix	fixed16	–	0	1	default 1.0
	8.6	Color Adjust	fixed16	[0] hue	-1	1	default 0.0
				[1] sat	0	2	default 1.0
	8.7	Correction Reset Default	void	–	–	–	reset to defaults

Group	ID	Parameter	Type	Index	Minimum	Maximum	Interpretation
Media	10.0	Codec	int8 enum	[0] = basic codec	–	–	0 = RAW, 1 = DNxHD, 2 = ProRes, 3 = Blackmagic RAW
					–	–	RAW: 0 = Uncompressed, 1 = lossy 3:1, 2 = lossy 4:1
				[1] = codec variant	–	–	ProRes: 0 = HQ, 1 = 422, 2 = LT, 3 = Proxy, 4 = 444, 5 = 444XQ
					–	–	Blackmagic RAW: 0 = Q0, 1 = Q5, 2 = 3:1, 3 = 5:1, 4 = 8:1, 5 = 12:1
	10.1	Transport mode	int8	[0] = mode	–	–	0 = Preview, 1 = Play, 2 = Record
				[1] = speed	–	–	-ve = multiple speeds backwards, 0 = pause, +ve = multiple speeds forwards
				[2] = flags	–	–	1<<0 = loop, 1<<1 = play all, 1<<5 = disk1 active, 1<<6 = disk2 active, 1<<7 = time-lapse recording
				[3] = active storage medium	–	–	0 = CFast card, 1 = SD
PTZ Control	11.0	Pan/Tilt Velocity	fixed 16	[0] = pan velocity	-1.0	1.0	-1.0 = full speed left, 1.0 = full speed right
				[1] = tilt velocity	-1.0	1.0	-1.0 = full speed down, 1.0 = full speed up
	11.1	Memory Preset	int8 enum	[0] = preset command	–	–	0 = reset, 1 = store location, 2 = recall location
				[1] = preset slot	0	5	–

Example Protocol Packets

Operation	Packet Length	Byte															
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		header	command				data										
		destination	length	command	reserved	category	parameter	type	operation								
trigger instantaneous auto focus on camera 4	8	4	4	0	0	0	1	0	0								
turn on OIS on all cameras	12	255	5	0	0	0	6	0	0	1	0	0	0				
set exposure to 10 ms on camera 4 (10 ms = 10000 us = 0x00002710)	12	4	8	0	0	1	5	3	0	0x10	0x27	0x00	0x00				
add 15% to zebra level (15 % = 0.15 f = 0x0133 fp)	12	4	6	0	0	4	2	128	1	0x33	0x01	0	0				
select 1080p 23.98 mode on all cameras	16	255	9	0	0	1	0	1	0	24	1	3	0	0	0	0	
subtract 0.3 from gamma adjust for green & blue (-0.3 ^= 0xfd9a fp)	16	4	12	0	0	8	1	128	1	0	0	0x9a	0xfd	0x9a	0xfd	0	
all operations combined	76	4	4	0	0	0	1	0	0	255	5	0	0	0	6	0	
		1	0	0	0	4	8	0	0	1	5	3	0	0x10	0x27	0x00	
		4	6	0	0	4	2	128	1	0x33	0x01	0	0	255	9	0	
		1	0	1	0	24	1	3	0	0	0	0	0	4	12	0	
		8	1	128	1	0	0	0x9a	0xfd	0x9a	0xfd	0	0				

Blackmagic Embedded Tally Control Protocol

Version 1.0 (30/04/14)

This section is for third party developers or users who may wish to add support for the Blackmagic Embedded Tally Control Protocol to their products or system. It describes the protocol for sending tally information embedded in the non-active picture region of a digital video stream.

Data Flow

A master device such as a broadcast switcher embeds tally information into its program feed which is broadcast to a number of slave devices such as cameras or camera controllers. The output from the slave devices is typically fed back to the master device, but may also be sent to a video monitor.

The primary flow of tally information is from the master device to the slaves. Each slave device may use its device id to extract and display the relevant tally information.

Slave devices pass through the tally packet on their output and update the monitor tally status, so that monitor devices connected to that individual output may display tally status without knowledge of the device id they are monitoring.

Assumptions

Any data alignment / padding is explicit in the protocol. Bit fields are packed from LSB first.

Blanking Encoding

One tally control packet may be sent per video frame. Packets are encoded as a SMPTE 291M packet with DID/SDID x51/x52 in the active region of VANC line 15. A tally control packet may contain up to 256 bytes of tally information.

Packet Format

Each tally status consists of 4 bits of information:

uint4
bit 0: program tally status (0=off, 1=on)
bit 1: preview tally status (0=off, 1=on)
bit 2-3: reserved (0x0)

The first byte of the tally packet contains the monitor device tally status and a version number.

Subsequent bytes of the tally packet contain tally status for pairs of slave devices. The master device sends tally status for the number of devices configured/supported, up to a maximum of 510.

```

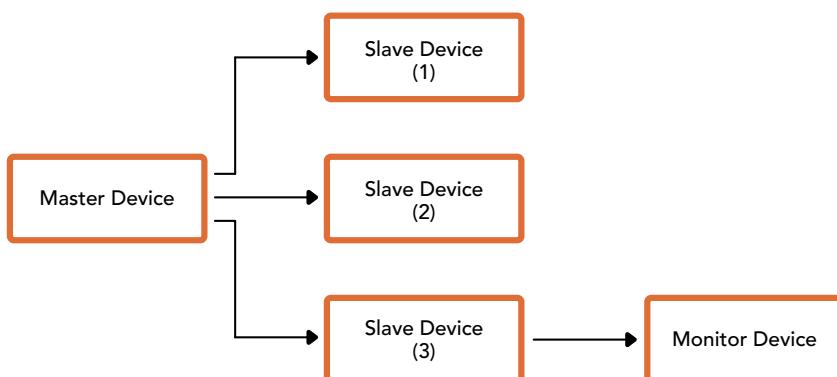
struct tally
    uint8
        bit 0: monitor device program tally status (0=off, 1=on)
        bit 1: monitor device preview tally status (0=off, 1=on)
        bit 2-3: reserved (0b00)
        bit 4-7: protocol version (0b0000)

    uint8[0]
        bit 0: slave device 1 program tally status (0=off, 1=on)
        bit 1: slave device 1 device preview tally status (0=off, 1=on)
        bit 2-3: reserved (0b00)
        bit 4: slave device 2 program tally status (0=off, 1=on)
        bit 5: slave device 2 preview tally status (0=off, 1=on)
        bit 6-7: reserved (0b00)

    uint8[1]
        bit 0: slave device 3 program tally status (0=off, 1=on)
        bit 1: slave device 3 device preview tally status (0=off, 1=on)
        bit 2-3: reserved (0b00)
        bit 4: slave device 4 program tally status (0=off, 1=on)
        bit 5: slave device 4 preview tally status (0=off, 1=on)
        bit 6-7: reserved (0b00)

    ...

```



Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Version (0b0)	Version (0b0)	Version (0b0)	Version (0b0)	Reserved (0b0)	Reserved (0b0)	Monitor Preview	Monitor Program
1	Reserved (0b0)	Reserved (0b0)	Slave 1 Preview	Slave 1 Program	Reserved (0b0)	Reserved (0b0)	Slave 0 Preview	Slave 0 Program
2	Reserved (0b0)	Reserved (0b0)	Slave 3 Preview	Slave 3 Program	Reserved (0b0)	Reserved (0b0)	Slave 2 Preview	Slave 2 Program
3	...							

Help

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 ATEM switcher.

Blackmagic Design online support pages

The latest manual, software and support notes can be found at the Blackmagic Design support center at 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 us an email" button on the support page to email a support request. Alternatively, click on the "Find your local support team" button on the support page and call your nearest Blackmagic Design support office.

Checking the version currently installed

To check which version of ATEM software is installed on your computer, open the About ATEM Software Control window.

- On Mac OS, open ATEM Software Control from the Applications folder. Select About ATEM Software Control from the application menu to reveal the version number.
- On Windows, open ATEM Software Control from your 'start' menu. Click on 'help' in the menu bar and select 'about' to reveal the version number.

How to get the latest updates

After checking the version of ATEM software installed on your computer, please visit the Blackmagic Design support center at 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.

Regulatory Notices



Disposal of Waste of Electrical and Electronic Equipment Within the European Union.

The symbol on the product indicates that this equipment must not be disposed of with other waste materials. In order to dispose of your waste equipment, it must be handed over to a designated collection point for recycling. The separate collection and recycling of your waste equipment at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city recycling office or the dealer from whom you purchased the product.



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

Operation is subject to the following two conditions:

- 1 This device may not cause harmful interference.
- 2 This device must accept any interference received, including interference that may cause undesired operation.



R-REM-BMD-201805002, R-REM-BMD-201803001, MSIP-REM-BMD-201410016

KCC-REM-BMD-ATEMTVStudio, MSIP-REM-BMD-201702003, MSIP-REM-BMD-201707001

R-REM-BMD-201804001, KCC-REM-BMD-ATEMCameraConv, MSIP-REM-BMD-201602002

KCC-REM-BMD-ATEMStudioConv



ISED Canada Statement

This device complies with Canadian standards for Class A digital apparatus.

Any modifications or use of this product outside its intended use could void compliance to these standards.

Connection to HDMI interfaces must be made with high quality shielded HDMI cables.

This equipment has been tested for compliance with the intended use in a commercial environment. If the equipment is used in a domestic environment, it may cause radio interference.

Safety Information

For protection against electric shock, the equipment must be connected to a mains socket outlet with a protective earth connection. In case of doubt contact a qualified electrician.

To reduce the risk of electric shock, do not expose this equipment to dripping or splashing.

Product is suitable for use in tropical locations with an ambient temperature of up to 40°C.

Ensure that adequate ventilation is provided around the product and that it is not restricted.

When rack mounting, ensure that the ventilation is not restricted by adjacent equipment.

No operator serviceable parts inside product. Refer servicing to your local Blackmagic Design service center.



Use only at altitudes not more than 2000m above sea level.

State of California statement

This product can expose you to chemicals such as trace amounts of polybrominated biphenyls within plastic parts, which is known to the state of California to cause cancer and birth defects or other reproductive harm.

For more information go to www.P65Warnings.ca.gov.

Warning for Authorized Service Personnel



Disconnect power from both power inlets before servicing!



Caution — Double Pole/ Neutral Fusing

The power supply contained in this equipment has a fuse in both line and neutral conductors and is suitable for connection to the IT power distribution system in Norway.

Warranty

12 Month Limited Warranty

Blackmagic Design warrants that this product 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.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Blackmagic Design shall not be obligated to furnish service under this warranty: a) to repair damage resulting from attempts by personnel other than Blackmagic Design representatives to install, repair or service the product, b) to repair damage resulting from improper use or connection to incompatible equipment, c) to repair any damage or malfunction caused by the use of non Blackmagic Design parts or supplies, or d) to service a product that has been modified or integrated with other products when the effect of such a modification or integration increases the time or difficulty of servicing the product. THIS WARRANTY IS GIVEN BY BLACKMAGIC DESIGN IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. BLACKMAGIC DESIGN AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. BLACKMAGIC DESIGN'S RESPONSIBILITY TO REPAIR OR REPLACE DEFECTIVE PRODUCTS IS THE WHOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR ANY INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER BLACKMAGIC DESIGN OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES. BLACKMAGIC DESIGN IS NOT LIABLE FOR ANY ILLEGAL USE OF EQUIPMENT BY CUSTOMER. BLACKMAGIC IS NOT LIABLE FOR ANY DAMAGES RESULTING FROM USE OF THIS PRODUCT. USER OPERATES THIS PRODUCT AT OWN RISK.

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