



# Carbonite Black UltraChrome User Manual

v1.0

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# Thank You For Choosing Ross

*you know in your heart is right. (You may rent helicopters if necessary.)*

You've made a great choice. We expect you will be very happy with your purchase of Ross Technology.

Our mission is to:

1. Provide a Superior Customer Experience
  - offer the best product quality and support
2. Make Cool Practical Technology
  - develop great products that customers love

Ross has become well known for the Ross Video Code of Ethics. It guides our interactions and empowers our employees. I hope you enjoy reading it below.

If anything at all with your Ross experience does not live up to your expectations be sure to reach out to us at [solutions@rossvideo.com](mailto:solutions@rossvideo.com).



David Ross

CEO, Ross Video

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## Ross Video Code of Ethics

Any company is the sum total of the people that make things happen. At Ross, our employees are a special group. Our employees truly care about doing a great job and delivering a high quality customer experience every day. This code of ethics hangs on the wall of all Ross Video locations to guide our behavior:

1. We will always act in our customers' best interest.
2. We will do our best to understand our customers' requirements.
3. We will not ship crap.
4. We will be great to work with.
5. We will do something extra for our customers, as an apology, when something big goes wrong and it's our fault.
6. We will keep our promises.
7. We will treat the competition with respect.
8. We will cooperate with and help other friendly companies.
9. We will go above and beyond in times of crisis.  
*If there's no one to authorize the required action in times of company or customer crisis - do what*

# Document Information

- Ross Part Number: **4806DR-110-01A**
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## Patents

Patent numbers US 7,034,886; US 7,508,455; US 7,602,446; US 7,802,802 B2; US 7,834,886; US 7,914,332; US 8,307,284; US 8,407,374 B2; US 8,499,019 B2; US 8,519,949 B2; US 8,743,292 B2; US D752,530 S; GB 2,419,119 B; GB 2,447,380 B; and other patents pending.

## Important Regulatory and Safety Notices to Service Personnel

Before using this product and any associated equipment, refer to the “**Important Safety Instructions**” listed in the front of this manual to avoid personnel injury and to prevent product damage.

Product may require specific equipment, and/or installation procedures to be carried out to satisfy certain regulatory compliance requirements. Notices have been included in this publication to call attention to these specific requirements.

## Symbol Meanings



**Protective Earth:** This symbol identifies a Protective Earth (PE) terminal, which is provided for connection of the supply system's protective earth (green or green/yellow) conductor.



**Important:** This symbol on the equipment refers you to important operating and maintenance (servicing) instructions within the Product Manual Documentation. Failure to heed this information may present a major risk of damage or injury to persons or equipment.



**Warning:** The symbol with the word “Warning” within the equipment manual indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



**CAUTION:** The symbol with the word “Caution” within the equipment manual indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.



**Warning Hazardous Voltages:** This symbol is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product enclosure that may be of sufficient magnitude to constitute a risk of shock to persons.



**ESD Susceptibility:** This symbol is used to alert the user that an electrical or electronic device or assembly is susceptible to damage from an ESD event.

## Important Safety Instructions

1.  **Warning:** Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any ventilation openings. Install in accordance with manufacturer's instructions.
8. Do not install near heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched, particularly at plugs, convenience

receptacles, and the point where they exit from the apparatus.

11. Only use attachments/accessories specified by the manufacturer.
12. Unplug this apparatus during lightning storms or when unused for long periods of time.
13. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as when the power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
14. Do not expose this apparatus to dripping or splashing, and ensure that no objects filled with liquids, such as vases, are placed on the apparatus.
15. To completely disconnect this apparatus from the AC Mains, disconnect the power supply cord plug from the AC receptacle.
16. The mains plug of the power supply cord shall remain readily operable.
17.  **Warning:** Indoor Use: To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.
18. The safe operation of this product requires that a protective earth connection be provided. A grounding conductor in the equipment's supply cord provides this protective earth. To reduce the risk of electrical shock to the operator and service personnel, this ground conductor must be connected to an earthed ground.
19.  **Warning:** This apparatus, when equipped with multiple power supplies, can generate high leakage currents. To reduce the risk of electric shock, ensure that each individual supply cord is connected to its own separate branch circuit with an earth connection.
20.  **CAUTION:** These service instructions are for use by qualified service personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.
21. Service barriers within this product are intended to protect the operator and service personnel from hazardous voltages. For continued safety, replace all barriers after servicing.
22. Certain parts of this equipment still present a safety hazard with the power switch in the OFF position. To avoid electrical shock, disconnect all A/C power cords from the chassis' rear appliance connectors before servicing.

23. This product contains safety critical parts, which, if incorrectly replaced, may present a risk of fire or electrical shock. Components contained within the product's power supplies and power supply area are not intended to be customer-serviced and should be returned to the factory for repair.
24. To reduce the risk of fire, replacement fuses must be the same type and rating.
25. Use only power cords specified for this product and certified for the country of use.
26. The safe operation of this equipment requires that the user heed and adhere to all installation and servicing instruction contained within the equipment's Setup Manuals.

27.  **Warning:** This product includes an "Ethernet Port" which allows this product to be connected to a local area network (LAN). Only connect to networks that remain inside the building. Do not connect to networks that go outside the building.

28.  **CAUTION:** This apparatus contains a Lithium battery, which if replaced incorrectly, or with an incorrect type, may cause an explosion. Replace only with a CR2032 coin type lithium battery. Dispose of used batteries according to the manufacturer's instruction by qualified service personnel.

## EMC Notices

### United States of America — FCC Part 15

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 instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

 **Important:** Changes or modifications to this equipment not expressly approved by Ross Video Limited could void the user's authority to operate this equipment.

### Canada

This Class "A" digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe "A" est conforme à la norme NMB-003 du Canada.

## Europe

This equipment is in compliance with the essential requirements and other relevant provisions of **CE Directive 93/68/EEC**.

## International

This equipment has been tested to **CISPR 22:1997** along with amendments **A1:2000** and **A2:2002**, and found to comply with the limits for a Class A Digital device.



**Important:** *This is a Class A product. In domestic environments, this product may cause radio interference, in which case the user may have to take adequate measures.*

## General Handling Guidelines

- Careful handling, using proper ESD precautions, must be observed.
- Power down the system before PCB removal.

## A Word About Static Discharge

Throughout the many procedures in this manual, please observe all static discharge precautions.



**CAUTION:** *Avoid handling the switcher circuit boards in high static environments such as carpeted areas, and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame, and exercise proper grounding precautions when working on circuit boards. Exercise proper grounding precautions when working on circuit boards.*

## Warranty and Repair Policy

Ross Video Limited (Ross) warrants its switchers and related options, to be free from defects under normal use and service for a period of **ONE YEAR** from the date of shipment. Fader handle assemblies are warranted for the life of the product. If an item becomes defective within the warranty period Ross will repair or replace the defective item, as determined solely by Ross.

Warranty repairs will be conducted at Ross, with all shipping FOB Ross dock. If repairs are conducted at the customer site, reasonable out-of-pocket charges will apply. At the discretion of Ross, and on a temporary loan basis, plug in circuit boards or other replacement parts may be supplied free of charge while defective items undergo repair. Return packing, shipping, and special handling costs are the responsibility of the customer.

Software upgrades for switchers may occur from time to time, and are determined by Ross Video. The

upgrades are posted on the Ross Video website, and are free of charge for the life of the switcher.

This warranty is void if products are subjected to misuse, neglect, accident, improper installation or application, or unauthorized modification.

In no event shall Ross Video Limited be liable for direct, indirect, special, incidental, or consequential damages (including loss of profit). Implied warranties, including that of merchantability and fitness for a particular purpose, are expressly limited to the duration of this warranty.

This warranty is **TRANSFERABLE** to subsequent owners, subject to Ross Video's notification of change of ownership.

## Environmental Information

### Waste Electrical and Electronic Equipment Directive (WEEE Directive)

**The equipment that you purchased required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.**

To avoid the potential release of those substances into the environment and to diminish the need for the extraction of natural resources, Ross Video encourages you to use the appropriate take-back systems. These systems will reuse or recycle most of the materials from your end-of-life equipment in an environmentally friendly and health conscious manner.

The crossed-out wheeled bin symbol invites you to use these systems.



If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration.

You can also contact Ross Video for more information on the environmental performances of our products.

### Use of Hazardous Substances in Electrical and Electronic Products (China RoHS)

Ross Video Limited has reviewed all components and processes for compliance to:

“ Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products ” also known as China RoHS.

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The “Environmentally Friendly Use Period” (EFUP) and Hazardous Substance Tables have been established for all products. We are currently updating all of our Product Manuals.

The Hazardous substances tables are available on our website at: <http://www.rossvideo.com/about-ross/company-profile/green-practices/china-rohs.html>

### 电器电子产品中有毒物质的使用

Ross Video Limited 按照以下的标准对所有组件和流程进行了审查：

“电器电子产品有害物质限制使用管理办法” 也被称为中国RoHS。

所有产品都具有“环保使用期限”(EFUP) 和有害物质表。目前，我们正在更新我们所有的产品手册。

有害物质表在我们的网站：<http://www.rossvideo.com/about-ross/company-profile/green-practices/china-rohs.html>

## Company Address

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## Technical Support

At Ross Video, we take pride in the quality of our products, but if a problem does occur, help is as close as the nearest telephone.

Our 24-Hour Hot Line service ensures you have access to technical expertise around the clock. After-sales service and technical support are provided directly

by Ross Video personnel. During business hours (eastern standard time), technical support personnel are available by telephone. Outside of normal business hours and on weekends, a direct emergency technical support phone line is available. If the technical support personnel who is on call does not answer this line immediately, a voice message can be left and the call will be returned shortly. Our Technical support staff are available to react to any problem and to do whatever is necessary to ensure customer satisfaction.

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# DashBoard

The DashBoard control system allows remote access to multiple pieces of Ross Video equipment, including openGear® cards, Carbonite production switchers, BlackStorm video servers, and ACID UltraChromeHR cameras.

Download and install the latest version of DashBoard from <http://www.opengear.tv/>. Review the documentation that comes with DashBoard for information on installing and launching DashBoard.

**Note:** Carbonite requires DashBoard v8.0, or higher.

**Tip:** For detailed instructions on using DashBoard with Carbonite, navigate to the online help at [help.rossvideo.com/carbonite](http://help.rossvideo.com/carbonite).

## Connecting to the Switcher from DashBoard

DashBoard should automatically detect and connect to the frame once it is connected to the same subnet. If you have trouble discovering the switcher frame, or it is located on another subnet, you can manually connect DashBoard to the switcher to establish communications. Once connected, DashBoard will remember the connection until you remove it.

### To Connect to the Frame

You need the IP address of the frame to connect to it manually from DashBoard.

1. Click **File > New > Manual Connection**.
2. In the **IP Address** field, enter the IP address of the frame. The default IP address is 192.168.0.123.
3. Click **Detect Settings**.
4. Click **Finish**.  
The frame appears in the **Tree View**.

## Carbonite in DashBoard

In DashBoard, Carbonite has a number of nodes that represent the different areas of functionality of the switcher.

Double-click on any of these nodes to open a window for controlling that specific area of functionality.

- **Status** — provides a read only overview of the state of a number of important switcher components and equipment
- **Configuration** — provides a graphical interface to switcher settings such as Reference, Inputs, Outputs, and MultiViewer

- **Live Assist** — provides a graphical interface to functions such as chroma key settings, keying, transition, and memory settings of the switcher
- **MediaManager** — allows you to connect to the MediaManager web interface from within DashBoard

**Tip:** Click **Menu** at the bottom right of the window and select to node you want to view without having to go to the tree view.

### Status

The DashBoard control system allows you to connect to the switcher and view status information for various components of the frame.

### Configuration

The Configuration node provides a graphical interface to switcher settings such as Reference, Inputs, Outputs, and MultiViewer. You can switch between the different configurations by selecting the tabs at the bottom of the DashBoard window.

### Live Assist

The Live Assist node provides a graphical interface to functions such as chroma key settings, keying, transition, and memory settings of the switcher. You can switch between the different settings by selecting the tabs at the bottom of the DashBoard window.

### MediaManager

The MediaManager node allows you to connect to the MediaManager web interface from within DashBoard.

**Tip:** You can either launch the MediaManager directly using the switcher IP address, or you can access it using the MediaManager node in DashBoard. If you are logging into MediaManager from DashBoard, you must have Microsoft® Internet Explorer® 10, or higher, installed.

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## Transitions

Transitions are used to change the background video and take keys on and off-air. A transition can include any combinations of background and keyers for an ME. The background and each keyer can be transitioned independently and at the same time using the dedicated **KEY CUT** and **KEY AUTO** buttons.

### To Perform a Transition

All transitions, with the exception of cuts on the background or key bus, have the same basic setup. To perform a transition, you must select what sources you want to transition on what buses, and how you want the transition to appear.

1. Click **Navigation Menu > Live Assist > Buses** and select the MiniME™ that you want to perform a transition on.

*Tip: You can also select sources from the **MiniME** tab (Click **Navigation Menu > Live Assist > MiniME**) by clicking **Trans > Background** or **Preset** and selecting a source, or **Key X > Key Fill** and selecting the source.*

2. Select the bus and source that you want to take on-air on that bus.

For a background transition you must select the source you want to transition to on the preset bus.

3. Click **Navigation Menu > Live Assist > MiniME**.
4. Click the **MiniME X** button for the MiniME™ that you want to perform the transition on.
5. Click **Trans**.
6. Use the **Time** knob to set the length of the background transition.
7. Perform the transition.
  - **Auto Trans** — click **Auto Trans**
  - **Cut** — click **Cut**

### Transition Limits

The Transition Limit allows you to set the point in a transition where an auto transition stops. When active, the point in the transition where the auto transition will stop is indicated by a flashing segment on the transition progress bar next to the fader handle. The auto transition proceeds to this point and stops. The second auto transition starts from the transition limit point and goes back to where the first transition started.

*Tip: If you turn Limit off when the transition has stopped at the transition limit point, the next transition starts from the transition limit point and goes forward to complete the transition, instead of going back to the start.*

### To Set Up a Transition Limit

A transition limit is set using the fader of the ME that you want to set up the transition limit on. The transition limit is specific to the ME it is set on.

1. Set up the transition you want to perform.
2. Press **NEXT** until **Limit** is shown on the menu.
3. Move the fader to the position in the transition where you want to set the transition limit point.
4. Toggle the **Limit** knob (**On**) to set the transition limit point.

The segment on the transition progress bar next to the fader handle flashes, indicating the location of the transition limit point.

The transition limit is set and active for the ME you set it on. You can turn transition limit on and off by toggling the **Limit** knob while the fader is at either the top or bottom limit. If the fader is not on a limit when you toggle the transition limit on, a new transition limit will be set. Double-press the **Limit** knob to reset the transition limit point.

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# Mattes

Mattes are solid color signals that can be applied to backgrounds, keys, and borders. Color selection is done either by picking a preset color, or by adjusted hue, saturation, and luminance to create a custom color.

## To Set Up a Matte Color

1. Click **Navigation Menu > Live Assist > Matte**.
2. Click the **Global Matte** preset color you want to use, or click on the color box on the right side and use the color picker to select a new color.

# Keying

Keying is the term used to describe when you insert (or electronically cut) portions of one scene into another, or place titles over background images. Keys are made up of two basic components, an alpha, that cuts the hole in the background video, and a fill, that fills the hole with different video.

Keys are layered onto the background video signal from the lowest numbered key to the highest.

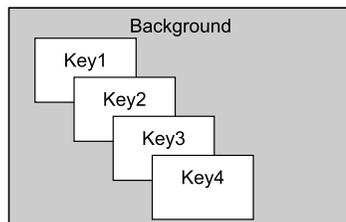


Figure 1: Key Priority

## Self Keys

A Self Key is a key in which the luminance, or brightness, values of the key source are used as the alpha for the key.

### To Set Up a Self Key

A self key is set up by selecting the keyer and video source you want to use, and adjusting the key parameters.

**Tip:** You can return the clip and gain values to the default settings by clicking **Make Linear**.

1. Click **Navigation Menu > Live Assist > MiniME** and select the MiniME™ (MiniME X) and key (**Key X**) that you want to set up.
2. Click **Key Fill** and select the video signal you want to use for the key. The **Key Alpha** is automatically set according to the key type and auto key settings.
3. Click **Self Key**.
4. Use the **Clip** slider to remove lower-luminance areas from the video image.
5. Use the **Gain** slider to adjust the transition between the video image and the parts of the video image that are removed.
6. Use the **Transparency** knob to adjust the transparency of the key from opaque (**0**) to fully transparent (**100**).
7. Click **Key Invert** to reverse the polarity of the key alpha so that the holes in the background are

cut by dark areas of the key alpha instead of bright areas.

8. Click a **Keyer Mode** button to override the shaped setting for the key.
  - **Normal** — set to a linear keyer for an unshaped source.
  - **Additive** — set to an additive keyer for a shaped source. The **Key Invert** function is disabled in this mode.
  - **Full** — set the alpha to fully opaque (white). The **Clip**, **Gain**, **Make Linear**, and **Key Invert** functions are disabled in this mode.
9. Click **Mask** to apply a mask to the key.

## Auto Select Keys

An Auto Select key is a key in which two video signals are required to make the key. The alpha is used to cut the hole in the video and the fill is used to fill the hole. These signals often originate from external devices such as character generators, external still stores, or other graphics systems.

### To Set Up an Auto Select Key

An auto select key is set up by selecting the keyer and video source you want to use, and adjusting the key parameters. The pairing of the video and alpha video signals is done when configuring video inputs. Refer to the Setup Manual that came with your switcher for information on setting up Auto Keys.

**Tip:** You can return the clip and gain values to the default settings by clicking **Make Linear**.

1. Click **Navigation Menu > Live Assist > MiniME** and select the MiniME™ (MiniME X) and key (**Key X**) that you want to set up.
2. Click **Key Fill** and select the video signal you want to use for the key. The **Key Alpha** is automatically set according to the key type and auto key settings.
3. Click **Auto Select**.

**Note:** If you select a chroma key engine as the **Key Fill**, you will not be able to adjust the key parameters.

4. Use the **Clip** slider to remove lower-luminance areas from the video image.
5. Use the **Gain** slider to adjust the transition between the video image and the parts of the video image that are removed.
6. Use the **Transparency** knob to adjust the transparency of the key from opaque (**0**) to fully transparent (**100**).

7. Click **Key Invert** to reverse the polarity of the key alpha so that the holes in the background are cut by dark areas of the key alpha instead of bright areas.
  8. Click a **Keyer Mode** button to override the shaped setting for the key.
    - **Normal** — set to a linear keyer for an unshaped source.
    - **Additive** — set to an additive keyer for a shaped source. The **Key Invert** function is disabled in this mode.
    - **Full** — set the alpha to fully opaque (white). The **Clip**, **Gain**, **Make Linear**, and **Key Invert** functions are disabled in this mode.
- Note: The mode is reset to **Normal** when a different source is selected on the key bus or the alpha is changed.*
9. Click **Mask** to apply a mask to the key.

## Masks

A Mask is a technique in which a square is combined with the key source to block out unwanted portions of the key source.

### To Box Mask a Key

Box masks use a box shape to mask out part of the key.

1. Click **Navigation Menu > Live Assist > MiniME** and select the MiniME™ (**MiniME X**) and key (**Key X**) that you want to set up.

*Tip: To apply a box mask to a chroma key, navigate to the chroma key tab (Click **Navigation Menu > Live Assist > Chroma Key**) and click the **CKX** button for the chroma key you want to apply the mask to.*

2. Click **Mask > Box**.
3. Click **Mask Invert** to invert the masked area with the unmasked area.

The portion of the key that was masked out is now visible, and the portion that was visible is masked.
4. Use the **X-Position** and **Y-Position** sliders to position the mask.
5. Use the **Size** slider to adjust the size of the mask region.
6. Use the **Left Edge** and **Right Edge** sliders to adjust the position of the left and right sides of the box mask.
7. Use the **Top Edge** and **Bottom Edge** sliders to adjust the position of the upper and lower sides of the box mask.

# UltraChrome 2 Chroma Key Engine

An UltraChrome Chroma Key is a key in which the hole is cut based on a color value, or hue, rather than a luminance value or alpha signal. The color is removed and replaced with background video from another source. The default color is blue.

UltraChrome 2 can work in two modes, depending on the lighting conditions and subject matter used for the chroma key.

- **HR Wedge Key** — Based on the standard chroma keyer and discriminates between the color vector angle and level of the background color vs the color vectors and levels in the foreground components. This produces very good results under ideal conditions. However, if the scene includes high detail luma content in edge regions, these may not be included in the output.
- **HR Detail Key** — Differs from the standard chroma keyer in that it adds luminance dependency to a three-dimensional spherical color discriminator. This chroma keyer can develop subtle video and alpha shapes and discriminate high detail luma content in edge transition areas. However, this design may have problems with content where background and foreground levels are similar within the video itself.

*Tip: UltraChrome 2 also offers the option to combine these two modes to offer good capture of high luma detail in the edge regions as well as compensation for similar foreground and background levels.*

The UltraChrome 2 chroma keyer uses an independent chroma key engine to produce the video and alpha components of the key. These internal video streams can be composited in a MiniME™ keyer, or fed out two separate video streams to an external device, such as a video server.

## To Select the Chroma Key on a Keyer

The outputs of the chroma key engine must be selected on a key bus to be properly keyed and to adjust the chroma key parameters.

1. Click **Navigation Menu > Live Assist > MiniME**.
2. Click the **Key X** button for the keyer you want to view the chroma key on.
3. Click **Auto Select**.

4. Click **Key Fill:** and select **CKX** for the chroma key you want to use.

## To Set Up a Chroma Key

Set up the chroma key with the source you want to use and adjust the parameters. Ensure that the chroma key output has been selected on a keyer so that you can view the output as you adjust the parameters.

1. Click **Navigation Menu > Live Assist > Chroma Key**.
2. Click **CK X** for the chroma key engine you want to use.
3. Click **CK Source** and select the video source you want to use for the chroma key.

*Note: You can only select a physical input, frame delay, or a Media-Store for a chroma key. You can also select an Aux Bus, but the source selected on the Aux Bus must be valid for the chroma key.*

4. Click **Setup** (only required if you are using a separate 0:4:4 source).
5. Click the **Use 0:4:4 Source** button to turn UltraChromeHR with a separate 0:4:4 chroma source on. Ensure that the chroma key source and 0:4:4 UltraChromeHR signals are properly set up. Refer to [To Assign an 0:4:4 Stream to a Source](#) on page 29 for information on assigning a source as an 0:4:4 input.

*Tip: The Debug Output Source buttons are for diagnostic purposes only. Adjust these settings only when instructed to do so by Ross Video Technical Support.*

6. Click **Parameters**.
7. Click the **Color** button for the color of the background you are using for your chroma key.

*Note: The scene must contain at least 5% of the desired chroma key color for the chroma key to properly key out that color.*

8. Click **Init**.
9. Click the **Key Type** button for the chroma key mode you want to use.
  - **Wedge Key** — based on the standard chroma keyer and discriminates between the color vector angle and level of the background color vs the color vectors and levels in the foreground components.
  - **Detail Key** — differs from the standard chroma keyer in that it adds luminance dependency to a three-dimensional spherical color discriminator.
  - **Combination Key** — combine the two modes to offer good capture of high

luma detail in the edge regions as well as compensation for similar foreground and background levels.

*Note: All adjustments are always available, even if the are not applied by the selected mode.*

10. Adjust the **Wedge Key Parameters** as follows:

- **Gain** — use this setting to set the **Angle Control** to 100 and the **Lift** to 0 and then adjust this setting until the background is fully removed, leaving a reasonable edge to the key. Too much gain will produce hard and undesirable edges.

*Tip: Adjust the **Gain** with the **Bkgd Luma Suppress** to balance between background removal and edge quality.*

- **Bkgd Luma Suppress** — use this setting to compensate for uneven color or lighting in the shot to ensure the chroma background is fully suppressed.

*Tip: Turn on the box mask in the chroma key to compare the backgrounds. The masked area shows the background source without the key settings applied.*

- **Angle** — use this setting to change the color wedge angle (wedge shape) that is used to detect areas of foreground (fill) and background (alpha) based on the chosen color vector. This can help fill in areas of heavy spill without hardening edge detail.
- **Lift** — use this setting to amplify the generated alpha signal to fill in areas of transparency.
- **Highlight Correction** — use this setting to lift areas of the image might contain high luminance levels at edge boundaries. This could be due to lighting conditions, camera setup, or subject.

11. Adjust the **Detail Key Parameters** as follows:

- **Clip** — use this setting to clip between the foreground and background. You are looking to achieve complete background removal.

*Tip: Clip should be set to the point where the background is just removed. Setting it too high will reduce edge quality.*

- **Gain** — use this setting to lift the fill image. You are looking to achieve solid fill content.

*Tip: Setting the gain too high may introduce dark boundaries.*

- **Shadow Sensitivity** — use this setting to adjust the level of dark image areas, particularly in cast shadow areas.
- **Shadow Density** — use this setting to adjust the apparent lightness of the dark / shadow areas in conjunction with the **Shadow Sensitivity**.
- **Highlight Sensitivity** — use this setting to fill areas with specular highlights, such as reflective surfaces, that can show through to the background.

12. Configure the **Auto Adjust** parameters as follows:

- **Measurement Src** — click **Measurement Src** and select the video source that you are going to be putting the chroma key over. The chroma key engine uses this source to adjust the edge area and re-spill values.
- **Auto Edge Luma** — use the measurement source to automatically calculate the edge luma.
- **Auto Re-Spill Color** — use the measurement source to automatically calculate the re-spill color. The color is based on the average color of the measurement source.

13. Adjust the **Global Parameters** as follows:

- **Chroma Angle** — use this setting to select the fill color that has been detected as color spill. You should not have to adjust this setting.
- **Edge Luma** — use this setting to adjust the luminance of the edges.
- **Edge Softness** — use this setting to filter the edges to eliminate undesirable hard edges and add realism to a scene by simulating depth of field characteristics.
- **Re-Spill** — use the **Re-Spill Color** and **Re-Spill Sat** settings to select a color that is near the average color of the background/lighting that needs to be added into those areas of the fill that contain the spill from the chroma set.

---

## To Apply Color Correction to the Chroma Key

Apply color correction to the output of a chroma key.

1. Click **Navigation Menu > Live Assist > Chroma Key**.
2. Click **CK X** for the chroma key engine you want to use.
3. Click **Fill Video Adj.**
4. Click the **Enable** button to turn correction on (**On**) or off (**Off**).
5. Use the sliders to adjust the video source.
6. Click **Fill Color Adj.**
7. Click the **Enable** button to turn correction on (**On**) or off (**Off**).
8. Click the **Component** button **RGB** or the individual color component you want to adjust, and use the sliders to adjust the color components.

*Tip: Click one of the **Preset Color Temp** buttons to apply a temperature color correction to the video.*

## To Box Mask a Chroma Key

Box masks use a box shape to mask out part of the key.

1. Click **Navigation Menu > Live Assist > Chroma Key** and click the **CKX** button for the chroma key you want to apply the mask to.
2. Click **Mask > Box**.
3. Click **Mask Invert** to invert the masked area with the unmasked area.

The portion of the key that was masked out is now visible, and the portion that was visible is masked.

4. Use the **X-Position** and **Y-Position** sliders to position the mask.
5. Use the **Size** slider to adjust the size of the mask region.
6. Use the **Left Edge** and **Right Edge** sliders to adjust the position of the left and right sides of the box mask.
7. Use the **Top Edge** and **Bottom Edge** sliders to adjust the position of the upper and lower sides of the box mask.
8. Use the **Edge Softness** slider to adjust the softness of the edges of the box mask.

## To Garbage Mask a Chroma Key

You must have a garbage mask source assigned to the chroma key source to be able to apply the mask.

Refer to *To Assign a Garbage Mask to an Input* on page 29 for information on assigning a garbage mask source to a chroma key source.

1. Click **Navigation Menu > Live Assist > Chroma Key** and click the **CKX** button for the chroma key you want to apply the mask to.
2. Click **Mask > External**.
3. Click **Mask Invert** to invert the masked area with the unmasked area.

The portion of the key that was masked out is now visible, and the portion that was visible is masked.

# Memory Functions

A memory register is a snapshot of the current state of the switcher that can include the MiniME™ or chroma keys. Up to 100 memory registers per MiniME™ or chroma key can be stored and recalled on the system.

## Storing Memories

When you store a memory, you are storing the complete state of that part of the system. This includes keyer settings, transition rates, and source selections.

### To Store a Memory

1. Click **Navigation Menu > Live Assist > Memory > Store**.
2. In the **Inclusions** area, select the MiniME™ and chroma key that you want to store the memory for.
3. In the **Memory Store** area, click the **Bank X** and **Mem X** button for the bank and memory register that you want to store to.

*Tip: The button will be lit if that memory register already has a memory stored in it.*

4. Click **Store** to store the memory.

## Recalling Memories

When you recall a memory, the existing configuration replaced with the settings stored in the memory.

**Keep the following in mind when recalling memories:**

- How a memory is recalled depends on the how the Memory Attributes are set.
- Recalling a memory that includes a new Media-Store item to be loaded from a USB drive may result in the currently loaded item to be displayed for a few frames while the new item is loaded.
- Enabling Memory AI mode changes the way key elements are recalled. If a key is currently on-air, the element for that key is recalled in the next available off-air key. If there is no available off-air keys, the element is not recalled. All resource sharing is set to FLOAT mode so that key elements may be recalled to other keys than originally stored.

### To Recall a Memory

1. Click **Navigation Menu > Live Assist > Memory > Recall**.
2. In the **Inclusions** area, select the MiniME™ and chroma key that you want to perform the memory recall on.

3. In the **Memory Recall** area, click the **Bank X** button for the bank you want to recall a memory from.
4. Click the **Mem XX** button to recall the memory.

*Tip: Click **Undo** to undo the last memory recall.*

## Memory Recall Mode

The Memory Recall mode sets how a memory is recalled. You can recall a memory using MemoryAI, recall it as stored, or recall it with the mode that was stored in the memory.

- **Memory** — the memory recall mode stored with the memory is used
- **Program** — all elements are recalled as stored (default)
- **MemoryAI** — current on-air elements are unchanged and the transition area is configured to take the on-air elements of the memory on-air with the next transition

### To Set Up the Recall Mode Memory Attribute

1. Click **Navigation Menu > Live Assist > Memory > Recall**.
2. Click a **Recall Mode** button to select the memory recall mode you want to use.
  - **Memory** — the memory recall mode stored with the memory is used
  - **Program** — all elements are recalled as stored (default)
  - **MemoryAI** — current on-air elements are unchanged and the transition area is configured to take the on-air elements of the memory on-air with the next transition

## Memory Attributes

Memory Attributes allow you to specify what elements are recalled with a memory. These elements include the background/preset buses, keyer bus, Aux bus, chroma key, and Media-Store selections, as well as keyer on-air status, and transition selections.

Memory attributes can be set both when the memory is stored, and when it is recalled. This allows you to store a set of attributes with a memory and then recall it as stored, or override the attributes stored in the memory and apply different ones when the memory is recalled. A memory attribute does not need to be stored in the memory to be recalled.

*Tip: It is recommended that if you are new to working with memories, use the memory store attributes to set how you*

want a memory to be recalled and set the recall attributes to be **Memory**.

## To Set the Memory Attributes

Memory attributes can be set when the memory is stored or when it is recalled. This procedure sets the recall attributes, but the information applies to both.

1. Click **Navigation Menu > Live Assist > Memory > Recall**.
2. In the **Inclusions** area, select the MiniME™ and chroma key that you want to include with the memory recall.

Only those items that are included with the memory recall are changed when a memory is recalled.

**Tip:** Click the attribute button multiple times to have that attribute included with the recall (■), not included with the recall (□), or use the setting stored in the memory (■).

3. Click **General** and select the attributes that you want recalled with the memory.
  - **Override Chroma Key X Inclusion** — whether the chroma key bus inclusion setting is overridden.
  - **MediaX** — whether Media-Store image and settings for the selected channel are recalled.
4. Click **MiniMEs** and select the attributes that you want recalled with the memory.
  - **Trans Area** — how the next transition type and parameters are recalled.
  - **Next Trans** — how the next transition area is recalled.
  - **Run Auto** — whether a transition is performed after the memory is recalled.
  - **PGM Bus** — how the sources selected on the program bus are recalled.
  - **PST Bus** — how the sources selected on the preset bus are recalled.
  - **KeyX Bus** — select whether sources selected on the selected key bus are recalled.
  - **KeyX Active** — whether the selected key is recalled on-air (active) or not.
  - **KeyX Type** — whether the key type is recalled for the selected key.
  - **KeyX Mask** — whether mask settings for the selected key are recalled.

5. Click **Chroma Key** and select the attributes that you want recalled with the memory.
  - **Source** — select whether the sources selected on the chroma key engine buses are recalled.
  - **Key Parameters** — select whether the chroma key parameters are recalled.
  - **Fill Adjust** — select whether chroma key video and color adjustments are recalled.
6. Click **Auxes** and select how the sources selected on the aux bus are recalled..

## Deleting a Memory or Bank

You can delete the contents of a single memory.

### To Delete a Memory

1. Click **Navigation Menu > Live Assist > Memory > Store**
2. In the **Memory Store** area, click the **Bank X** and **Mem X** button for the memory register that you want to delete.
3. Click **Delete Memory**.

---

## Switcher Sets

The switcher stores configuration and operation data in a number of registers that contain the individual entries for items such as memories. These registers can be stored as a single archive file, or as a register set that contains all the individual register of that type; all memories for example. These files are stored into Sets on USB drive. Different Sets can be created for different shows or applications, allowing you to quickly locate and recall the switcher configurations.

The switcher stores information in the following registers:

- **Memory** — contains all the memories for MiniME™ and chroma keys.
- **Installation** — contains all the external device setup, and software settings for the switcher.

### To Store a Set

Switcher Sets can only be stored to a USB drive. The USB drive must be present before you try to store the Set. A total of 10 Sets of switcher setup information can be stored onto the same USB drive.

1. Insert a USB drive into the USB Port on the switcher. You must wait 5 seconds for the switcher to recognise the USB drive.
2. Click **Navigation Menu > Configuration > System > Save Sets**.
3. Click the **Select Set** button for the set you want to store to.
4. Click the **Save** button for the registers you want to store to the selected set.
  - **All** — store all registers to the set.
  - **Memories** — store only the memory registers to the set.
  - **Installation** — store only the installation registers to the set.
5. Click **Ok**.

### To Load a Set

Switcher Sets can only be loaded from a USB drive. The USB drive must be present before you try to load the settings.

1. Insert your USB drive into the USB Port on the switcher. You must wait 5 seconds for the switcher to recognise the USB drive.
2. Click **Navigation Menu > Configuration > System > Load Sets**.

3. Click the **Select Set** button for the set you want to load from.
4. Click the **Load** button for the registers you want to recall from the selected set. The button will appear gray if that register is not present in the set.
  - **All** — recall all registers from the set.
  - **Memories** — recall only the memory registers from the set.
  - **Installation** — recall only the installation registers from the set.
5. Click **Ok**.

# Media-Store

Media-Store allows you to load stills, animations, or audio files from the USB drive and make them available across all buses on the switcher.

## Keep the following in mind when working with the Media-Store:

- Each Media-Store channel has a dedicated alpha channel and does not need to use a second Media-Store channel for the alpha.
- An FTP connection using RossLinq can be created from an external device directly to a Media-Store channel on the switcher.

## Working With Media-Store Animations

Media-Store animations are used for animated backgrounds, branding "bugs", or media transitions. You can set up an animation to loop, play automatically when take on-air, play in reverse, or even play at different speeds.

## Keep the following in mind when working with Media-Store animations:

- When you load an animation to an off-air Media-Store channel, or the animation goes off-air with a transition, the preview shows the cut point (**CutFr**) for that animation, and not the first frame of the video.

## Loading Stills or Animations

Stills or animations can be loaded into Media-Store channels either from USB or the internal cache using the media number, or by browsing to the file.

*Note: The internal cache is used for sample images only and cannot be used to store user stills or animations.*

## Media-Store File Specifications

Media-Store images and animations can be TGA, PNG, or JPG file formats. For animations, the files must be numbered to indicate the order they go in, and the name and the number must be separated with an underscore. For audio, 20-bit or 24-bit wav files of the same name as the still or animation are used to associate audio with a still or animation.

- Anim\_001.tga
- Anim\_002.tga
- Anim\_003.tga
- ...
- Anim\_100.tga

Together, these files are treated as a single animation named Anim that is 100 frames long.

*Note: An animation must start with \_001 as the end of the name of the first frame.*

Files names cannot contain symbols such as ! @ # & \* ( ) / , ? ' " and cannot start with an underscore ( \_ ).

## Media-Store Capture

Stills can be captured to either Media-Store from any video input or a number of internal sources. You can capture the still with or without alpha.

### To Capture a Still

1. Insert your USB drive into the USB Port on the switcher. You must wait 5 seconds for the switcher to recognise the USB drive.
2. Click **Navigation Menu > Live Assist > Media**.
3. Click the **MediaStorex** for the Media-Store channel that you want to capture into.
4. Click a **Display** button to select the mode you want the Media-Store channel in.
  - **E/E** — electronic-to-electronic, or record, mode allows you to record a still
  - **P/B** — playback mode allows you to review your still
5. Click the **Source** button and select the video source that you want to perform the capture of.
6. Click the **Alpha** button to select whether you want to capture the alpha signal (**Yes**) or not (**No**). You must have an input BNC selected as the capture source to capture the alpha.
7. Use the **Capture Number** slider to select the number for the image you want to capture.
8. In the **Name** field, enter the name you want to apply to the capture. The first part of the is the number of the capture that you just selected.
9. Click **Capture** to perform the capture. The new media item is stored and the media number is increased by one.

## MediaManager

The MediaManager provides a graphical interface to the operation of the Media-Store from. The layout of the MediaManager window is stored in Perspectives. The last loaded Perspective is used when the browser is refreshed or opened.

From the Menu Bar at the top of the window you can manage Perspectives.

**Tip:** You can either launch the MediaManager directly using the switcher IP address, or you can access it using the MediaManager node in DashBoard. If you are logging into MediaManager from DashBoard, you must have Microsoft® Internet Explorer® 10, or higher, installed.

## Using MediaManager

To use the MediaManager, you must have a computer connected to the same subnet as the switcher, the IP address of your switcher, and the Google Chrome™ browser installed on your computer. In the web browser, navigate to the IP address of the switcher, the MediaManager is displayed.

When you are communicating with the switcher, a moving status indicator is shown in the lower right corner of the browser window. If you lose communications with the switcher, refresh the browser window to reconnect. Refreshing the browser will reset your Perspectives.

### Keep the following in mind when logging in and using the MediaManager:

- Ross Video recommends using Google Chrome™ v14.0 running on Microsoft® Windows® 7 or Macintosh® OS X® Lion to connect to the MediaManager.
- Your browser must have Oracle® JavaScript® and cookies enabled.
- Ross Video recommends that you do not connect more than 5 MediaManager clients to a single switcher at the same time.

## The MediaManager Window

The MediaManager window provides a graphical interface to the Media-Store. From this window, you can load stills or animations from the internal cache or USB into a Media-Store channel or edit the on-air properties. Media-Store channels have a red background when on-air and green when going on-air with the next transition.

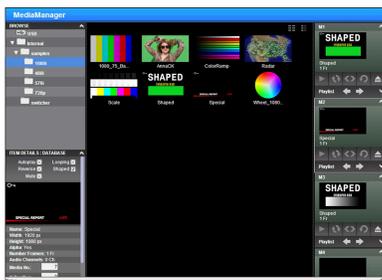


Figure 2: MediaManager Window

**Tip:** The film-strip symbol (🎞️) on a thumbnail indicates that the media item is an animation, the key symbol (⌨️) indicates that the still or animation has an alpha, and the

speaker symbol (🔊) indicates that the media item has audio associated with it.

Stills and animations can be loaded into a channel by either selecting the channel and double-clicking on the file, or by dragging a file and dropping it onto the channel. When a channel or file is selected, the properties for the animation or still can be viewed in the **ITEM DETAILS** area.

**Note:** If the files on your USB are new, it takes about 2 seconds per file for the switcher to generate the thumbnail for the MediaManager. Once all the thumbnails are generated, they are displayed in the MediaManager window.

## Animation Controls

The MediaManager interface allows you to manually control the play-out of an animation.



Figure 3: Media-Store Channel — Animation Controls

Table 1: Animation Controls

Icon	Name	Description
	<b>Play</b>	Play the animation loaded in the Media-Store channel.
	<b>Looping</b>	Turns <b>Looping</b> of the animation on or off.
	<b>Reverse</b>	Toggle the direction that the animation is played in.
	<b>Recue</b>	Loads the animation again.
	<b>Eject</b>	Eject the current still or animation from the Media-Store channel. This is the same as loading media number <b>000</b> .

## Playlists

Playlists allow you to create a rundown of stills or animations that you want to load into a Media-Store channel. Using the left and right arrows, you can advance to the next or previous still or animation in the playlist.

**Note:** Items on the playlist are not pre-cached. As you advance to the next item in the list, the switcher must load that still or animation. Depending on what you are loading,

and if the item has been loaded before, this could take a few seconds.

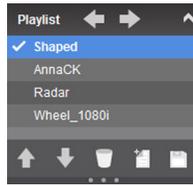


Figure 4: Playlist

Table 2: Playlist Controls

Icon	Name	Description
	<b>Previous</b>	Advance to the previous item in the playlist. The item in the playlist that is being shown on the Media-Store channel indicated with a check-mark. The playlist does not loop back to the top when it reaches the last item.
	<b>Next</b>	Advance to the next item in the playlist.
	<b>Up and Down</b>	Move the currently selected item up in the playlist.
	<b>Up and Down</b>	Move the currently selected item down in the playlist.
	<b>Delete</b>	Delete the selected item from the playlist. This does not delete the item, or clear the Media-Store channel.
	<b>New Playlist</b>	Clears the current playlist.
	<b>Load or Save Playlist</b>	Allows you to load, save, or delete a playlist on the switcher. If you delete a playlist that was loaded into a Media-Store channel, it does not clear that channel.
	<b>Expand or Collapse</b>	Expand or Collapse the playlist area for the Media-Store channel.

---

## Network Connections

The ethernet connection to the frame is used to upload stills to the Media-Store channels, download data files, and control functions using DashBoard.

The switcher uses the following network ports:

- **FTP** — 21
- **SSH** — 21
- **DashBoard** — 5253
- **SLP** — 427
- **Web Server** — 80
- **RossTalk** — 7788

## Network Setup

If you are connecting to the frame over ethernet you must use DashBoard to set the IP address of the frame. The frame comes from the factory set with a static IP address (192.168.0.123) but can be set to use DHCP to automatically obtain an IP address.

**Note:** If you use a DHCP server, it must be set to always give the frame the same IP address. DashBoard needs a fixed IP address to connect to.

**Tip:** If you do not know the IP address of the frame, you can set DIP switch 3 on the frame to lock the IP address to 192.168.0.123. The frame must be re-started for the new IP address to be applied.

## To Change the IP Address

1. Click **Navigation Menu > Configuration > Network**.
2. Enter a name in the **Switcher Name** field. This is the name that appears in the tree view in DashBoard.
3. Click **Edit**.
4. Click an **ETHX Mode** button to set that network port to use DHCP (**DHCP**), or a static IP address (**Static**).
5. For a static IP address, enter the IP address (**ETHX IP Address**), subnet mask (**ETHX Subnet Mask**), and gateway (**Gateway**) you want to use.
6. Click **Update**.

## FTP Connection (RossLinq)

You can create a File Transfer Protocol (FTP) connection from a computer to your switcher. You can use the FTP connection to copy still images and animations to and from your switcher as well as copy Edit Decision List (EDL) files from your switcher.

The procedure for creating an FTP connection from a computer varies between operating systems and client software. Consult with the documentation that came with your computer for assistance with creating an FTP connection.

## To Create an FTP Connection with Windows 7

This procedure applies to Microsoft® Windows XP® Professional and Windows® 7.

1. On your computer launch Windows Explorer.
2. In the address bar, type `ftp://IP Address of your switcher`. You are prompted for a username and password.
3. Type the user name for the application your are creating an FTP connection for. Each application has specific requirements. The switcher will set these requirements automatically based on the username.
  - `xpression` – used when creating a connection from a Ross® XPression Motion Graphics System directly to the Media-Store channels on the switcher, as well as any USB drive installed in the switcher
  - `liveedl` – used to create a connection to the LiveEDL folder on the switcher to download an edit decision list file form the switcher
  - `user` – used to create a connection to the general storage folders on the switcher, as well as any USB drive installed in the switcher
4. Enter the password `password`

## Default IP Addresses

DIP switches in the frame are used set the IP address to the static default (192.168.0.123). Once you set the DIP switch, you must restart the frame to use the new IP address.

# Video Reference

The flexible reference system in the switcher allows you to use an Interlaced video format as the reference to operate the switcher in a video format of the same frequency. Choosing a progressive video format as a reference limits you to operating the switcher only in that same video format and frequency.

## Supported Reference Formats

The switcher supports a number of reference modes for both internal and external reference signals. References to 1080p 59.94Hz (A) and 1080p 50Hz (A) refer to 1080p Level A only.

**Table 3: Supported Reference Formats**

Input Reference	Usable Format
480i	480i
	480i 16:9
	720p 59.94Hz
	1080i 59.94Hz
	1080pSF 29.97Hz
	1080p 29.97Hz
	1080p 59.94Hz (A)
576i	576i
	576i 16:9
	720p 50Hz
	1080i 50Hz
	1080pSF 25Hz
	1080p 50Hz (A)
	1080p 25Hz
720p 59.94Hz	720p 59.94Hz
	1080p 59.94Hz (A)
720p 50Hz	720p 50Hz
	1080p 50Hz (A)
1080i 59.94Hz	480i
	480i 16:9
	720p 59.94Hz
	1080i 59.94Hz
	1080pSF 29.97Hz
	1080p 29.97Hz
1080p 59.94Hz (A)	1080p 59.94Hz (A)
	576i

Input Reference	Usable Format
	576i 16:9
	720p 50Hz
	1080i 50Hz
	1080pSF 25Hz
	1080p 50Hz (A)
	1080p 25Hz
1080pSF 23.98Hz	1080pSF 23.98Hz
1080pSF 29.97Hz	1080pSF 29.97Hz
1080pSF 25Hz	1080pSF 25Hz

The switcher allows you to use any interlaced video format to operate the switcher in any format of the same frequency; however, the use of 480i or 576i (Composite Sync) reference signals for High Definition (720p, 1080i, or 1080p) video modes is not recommended.

The use of composite sync reference formats is recommended for Standard Definition video modes only, and provides stable outputs with jitter performance in compliance with SMPTE-259M specifications.

## Reference and Video Mode Setup

The switcher supports both internal and external references. An external reference is provided by an external device to the switcher through the **REF IN** BNC on the frame. An internal reference is generated by the switcher and can be fed out to other devices.

The switcher automatically detects the reference signal and only shows the video modes that you can operate the switcher in that are supported for that reference format.

### To Set a Video Mode

If you are using an external reference, ensure that a proper reference is connected to the **REF IN** input BNC on the frame.

**Note:** You must use an interlaced reference source to have the switcher operate in an interlaced reference format if you are using an external reference.

1. Click **Navigation Menu > Configuration > Reference**.
2. Click the **Video Mode** button and select the video format you want to use.

The available video modes depends on the reference format coming into the switcher.

- Click the **Reference Source** button and select an internal or external reference source.

## Frame Sync and Format Conversion

The switcher has multiple input frame synchronizer / format converter (FSFC) and input de-interlacers that can be used to convert video input signals to the format that the switcher is operating in, as well as correct mistimed, or drifting, video input signal. The frame synchronizers cannot completely correct badly formatted video, mistimed switches, signal drops, or similar issues.

Each FSFC channel maintains a separate setting for different video formats. This lets you change between video formats without losing FSFC channel configurations.

### Keep the following in mind when working with Frame Synchronizers and Format Converters:

- If a video format not compatible with the currently defined conversion is used, the video image is frozen with the last successfully processed image frame.
- FSFCs create a one-frame delay in the video output of the switcher for the video signal being converted.
- FSFCs strip embedded audio data from the video signal. Ensure that no FSFC channels are assigned to any input or bus you are using with external audio mode.
- The FSFCs used in the switcher conform to the SMPTE ST 125:2013 standard. Some older equipment may not fully conform to the current standards and can send out-of-spec video to the switcher which can have unexpected results.

## Supported FSFC Video Formats

FSFCs can only convert between specific video formats at a given frequency.

- The switcher supports synchronized and unsynchronized 1080p and 1080i inputs. The 1080i inputs are converted using a 4-line interpolator and may result in lower quality video.

**Table 4: Supported FSFC Input and Output Formats**

Input	Switcher	Output
1080p 59.94Hz	1080p 59.94Hz	1080p 59.94Hz
1080i 59.94Hz		
720p 59.94Hz		

Input	Switcher	Output
1080p 50Hz	1080p 50Hz	1080p 50Hz
1080i 50Hz <sup>1</sup>		
720p 59.94Hz		
1080p 29.97Hz	1080p 29.97Hz	1080p 29.97Hz
1080p 59.94Hz <sup>2</sup>		
1080p 25Hz	1080p 25Hz	1080p 25Hz
1080p 50Hz <sup>2</sup>		
1080i 59.94Hz	1080i 59.94Hz	1080i 59.94Hz
1080p 59.94Hz		
720p 59.94Hz		
480i 59.94Hz		
1080i 50Hz	1080i 50Hz	1080i 50Hz
1080p 50Hz		
720p 50Hz		
576i 50Hz		
720p 59.94Hz	720p 59.94Hz	720p 59.94Hz
1080p 59.94Hz		
720p 50Hz	720p 50Hz	720p 50Hz
1080p 50Hz		
576i 50Hz	576i 50Hz	576i 50Hz
1080p 50Hz		
1080i 50Hz		
720p 50Hz		
480i 59.94Hz	480i 59.94Hz	480i 59.94Hz
1080p 59.94Hz		
1080i 59.94Hz		
720p 59.94Hz		

### Notes

- <sup>1</sup> Converted using either a simple line-doubler or 4-line interpolator and may result in lower quality video.
- <sup>2</sup> Converted by dropping frames and may result in lower quality video.

## To Set Up Input FSFC

Input mode locks a specific FSFC channel to a specific input. Refer to [Supported FSFC Video Formats](#) on page 25 for a list of compatible video format conversions.

1. Click **Navigation Menu > Configuration > Inputs > Physical**.
2. Click the **Configure** button for the input you want to assign an FSFC to.
3. Click the **Type** button for the conversion you want to apply.
  - **SDI** — no FSFC is applied to the input.
  - **SDI-FS** — an FSFC is applied to the input.
  - **QuadFS** — a timed FSFC is applied to the input. Each QuadFS is timed to the first SDI-FS in the group of four (1-4, 5-8, 9-12). The SDI-FS must be applied to the first input and QuadFS to the rest of the inputs in the group.

*Tip: Use this if you are taking the quad-split output from an untimed UHD camera that you need to frame-sync. The frame syncs applied to each input are locked together for timing so that all four inputs are in sync.*

4. Select the aspect ratio conversion mode you want to use.

The options that are available depend on the video format that the switcher is converting from and to.

- **Full** — The video signal is scaled disproportionately to fill the display of the new aspect ratio. Aspect distortion occurs as the image is stretched/compressed to fit in the new aspect ratio.
- **Zoom** — The central portion of the video signal is zoomed to fill the display of the new video format. No aspect distortion is introduced but the edges of the video signal may be cropped.
- **Letter Box** — Black bars are added to the top and bottom of a 16:9 image to display correctly in a 4:3 video format.
- **Pillar Box** — Black bars are added to the right and left of a 4:3 image to display correctly in a 16:9 video format.

## Output Reference Synchronizers

The output reference synchronizers allow you to have the switcher output a reference signal that other devices, such as cameras and video servers, can lock to.

*Note: Different applications require different output reference formats and delay settings. Consult a facility engineer for assistance in configuring these settings.*

## To Set Up an Output Reference Sync

If you are using one of the output references to time external devices, ensure that they are connected to the appropriate **REF OUT** output BNC.

1. Click **Navigation Menu > Configuration > Reference**.
2. Click on the **Reference Output X** button for the reference output BNC that you want to set up.
3. Click on the reference format you want to output from the switcher.
 

The available output reference formats depend on the video format that the switcher is operating in. You must be in a 50Hz video format for PAL and a 59.94Hz video format for NTSC.
4. Select the type of delay you want to apply to the reference signal.
  - **V** — vertical delay in lines
  - **H** — horizontal delay in pixels
  - **F** — frame delay in frames (NTSC/PAL only)
5. Click **Update**.
6. Click **Yes** to assign the output reference synchronizer.

If you select an analog reference format (NTSC/PAL) you must set whether you want to use color framing for the reference output or not.

## To Set Color Framing for Analog Reference

When the output reference (OSync) is set to an analog format (NTSC/PAL), the color framing in the sub-carrier can be synced to the color framing of the input reference. The input reference must also be set to an analog format.

*Note: Jitter on the color framing of the input reference causes the analog output reference to reset in an attempt to re-sync.*

1. Click **Navigation Menu > Configuration > Reference**.
2. Toggle the **Color Framing** button to turn color framing on or off.
  - **No Sync** — color framing not synced between input and output references
  - **Sync** — reference output color framing is synced with reference input color framing

## Switching Field

The switching field is the field in an interlaced video format that the switcher uses to transition from one video source to another. An interlaced video format is

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made up of two fields, field 1 (odd lines) and field 2 (even lines).

*Note: If you are running in a progressive video format, selecting an even or odd fields will cause the switcher to only allow transitions on every second frame.*

## To Set the Switching Field

If you are using a Frame Sync or Format Conversion (FSFC), transitions are locked to F1.

1. Click **Navigation Menu > Configuration > System > Configuration**.
2. Click a **Field Dominance** button to select which field video transitions occur on.
  - **Field 1** — transitions occur on odd field
  - **Field 2** — transitions occur on even field
  - **Both** — transitions occur on current field, either even or odd

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## Video Input Setup

Video inputs to the Carbonite Black UltraChrome have the additional options of being able to assign a garbage matte/mask to a source, as well as assign the source with the UltraChromeHR 0:4:4 video.

**Note:** The special UltraChromeHR chroma key input requires an ACID camera with the 0:4:4 video output stream.

### Source Names

Each video source in the switcher can be given a unique name.

#### To Set Up a Source Name

Source names are restricted to eight characters in length.

1. Click **Navigation Menu > Configuration > Inputs > Physical** if you are naming a physical input, or **Internal** if you are naming an internal input.
2. Enter a new name in the text box for the video input that you want to name.
3. Click on the **Size** button and select the size of the font for the mnemonic display.
  - **Large** — first two characters are shown
  - **Medium** — all eight (8) characters are shown on two lines with four characters on the top line
  - **Small** — all eight (8) characters are shown on two lines with six characters on the top line
4. Click on the **Color** button and select the color you want to use for the background of the mnemonic display.
5. Click the **Inverse** button and click **Yes** to invert the background color and the font color, or **No** to not invert the colors.

### Video Setup

Inputs are separated into physical and internal. Physical inputs are the video sources on the BNC at the back of the frame. Internal sources are video sources that are generated internally.

#### To Set The Video Mode

1. Click **Navigation Menu > Configuration > Inputs > Physical**  
Each input number corresponds to an input BNC on the back of the frame.

2. Click the **Vidmode** button for the input you want to set the video mode for and select a video mode.
  - **HD/3G** — the video input on this BNC is in an HD or 3G video format.
  - **SD** — the video input on this BNC is in an SD video format.

#### To Set Up an Auto Key Association

As well as input sources, internally generated sources, such as media-stores and color backgrounds, can be set up as an auto key.

1. Click **Navigation Menu > Configuration > Inputs > Physical** if you are setting up the auto key for a physical input, or **Internal** if you are setting up the auto key for an internal input.
2. Click the **Alpha Source** button for the key video source that you want to assign an alpha to.
3. Click the key alpha source that you want to assign to the key video.
  - **--none--** — no alpha
  - **WT** — assign a white background as a key alpha
  - **XX** — assign the source on the selected input as a key alpha
  - **FDX** — assign a frame delay as a key alpha.
  - **BK** — assign internal black as a key alpha
  - **BG** — assign the matte generator as a key alpha
  - **MX** — assign the video source on Media-Store *X* as a key alpha
  - **MXA** — assign the alpha channel for Media-Store *X* as a key alpha
  - **MiniMEX** — assign the output of MiniME™ *X* as the key alpha
  - **MMX PV** — assign the preview output of MiniME™ *X* as the key alpha
  - **MMXCmb** — assign the combined alpha of the MiniME™ *X* as the key alpha
  - **CKX** — assign the output of chroma key *X* as the key alpha
  - **CKXA** — assign the alpha output of chroma key *X* as the key alpha
4. Click the **Alpha Mode** button for the same source and select the alpha mode for the key alpha.
  - **Linear** — the alpha cuts a hole based on the gradient values of the alpha (gray)
  - **Shaped** — the alpha cuts a hole based on the monochrome value of the alpha (black or white)

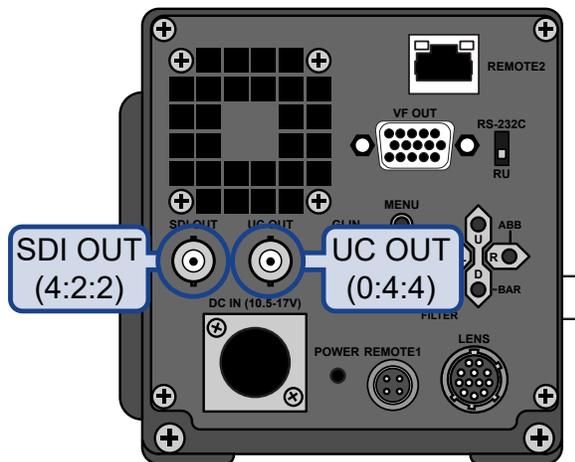
## To Assign a Garbage Mask to an Input

The garbage mask input is similar to a standard box mask but allows for a dynamically generated mask. The mask is applied directly to the chroma key outputs and does not consume any of the key resources of the MiniME™.

1. Click **Navigation Menu > Configuration > Inputs > Physical**.
2. Click the **Mask Source** button for the video input that you want to apply the garbage mask to.
3. Click the source that you want to use as the garbage mask.

## To Assign an 0:4:4 Stream to a Source

The UltraChromeHR signal consists of a standard 4:2:2 camera input and an exclusive 0:4:4 chroma input from the Ross ACID cameras. You must associate the 0:4:4 input with the primary camera input.



**Figure 5: UltraChromeHR Connections on ACID**

1. Ensure that you have the **UC OUT** and **SDI OUT** video streams from the ACID camera connected to two input BNCs on Carbonite Black UltraChrome.
2. Click **Navigation Menu > Configuration > Inputs > Physical**.
3. Click the **0:4:4 Source** button for the SDI video input that is coming from the camera.
4. Click the source that has the 0:4:4 video stream coming from the camera.

## Frame Delays

Physical sources are assigned to a frame delay to allow that video source to be delayed relative to the rest of the video signals in the switcher.

**Keep the following in mind when working with delays:**

- You must select the frame delay as a source on a bus to apply the delayed video to that output.
- If you want to apply a delay to a UltraChromeHR signal, you must assign a frame delay to both the source video and the 0:4:4 video.

## To Set Up a Frame Delay

1. Click **Navigation Menu > Configuration > Inputs > Frame Delays**.
2. Click the **Source** button for the frame delay you want to set up and select the video source you want to delay.
3. In the **Delay** field, enter the number of frames you want to delay the video signal.

# Video Output Setup

The output of each chroma key engine, MiniME™, MultiViewer, and aux bus can be assigned to an output BNC.

**Note:** Restrictions on what video signals can be output on specific BNCs for the Carbonite Black and Carbonite Black frames also apply when the Carbonite Black UltraChrome software is loaded.

## To Assign a Source to an Output

1. Click **Navigation Menu > Configuration > Outputs**.
2. Click the **Source** button for the output BNC that you want to assign an output to.
3. Click the video output that you want to assign to the output BNC.

## MultiViewer

The MultiViewer allows you to view multiple video sources from a single output BNC. Video inputs or outputs on the switcher, including Program, Preview, and Media-Store channels, can be assigned to any box on the MultiViewer. Up to 4 (1 on Carbonite Black) MultiViewer outputs are supported.

A time-clock can be added as an overlay to the MultiViewer showing either system time or time code.

### Keep the following in mind when working with a MultiViewer:

- All MultiViewer outputs are in 1080p.
- MultiViewer 1 output is fixed to output BNCs 1 and 2.
- On Carbonite Black+ and Carbonite Black+ 12G the additional MultiViewer outputs (2, 3, and 4) are fixed to output BNCs MV 3, 4, and 5.
- The layout is configured independently for each MultiViewer.
- Inputs are displayed with a red border when they are on-air. A green border is displayed when the input is selected on the Preset bus.
- All ancillary data is stripped from the MultiViewer outputs.

## To Set Up a MultiViewer

**Note:** A MultiViewer must be assigned to a video output to be usable.

1. Click **Navigation Menu > Configuration > MultiViewers**.

2. Click **MultiViewer X** to select the MultiViewer you want to set up.
3. Click the **Layout** button and select the arrangement of the boxes that you want to use for the selected MultiViewer.
4. Use the **Transparency** slider to adjust the transparency of the background behind the source label for the selected MultiViewer.
5. Click the **Overlay** button and click **On** to turn the overlay on, or **Off** to turn it off.

**Tip:** The overlay source can be used to overlay a camera shot of a shot-clock over the MultiViewer output.

6. Click the **Source** button for the video source that you want to overlay over the MultiViewer output.
7. Use the **Clip** slider to adjust the clipping of the overlay source.  
At **0%** the overlay source is completely opaque, and at **100%** it is completely transparent.
8. Click a **Tally** button to select how boxes on the MultiViewer are tallied.
  - **Box** — red or green border is shown around the outside of the MultiViewer box
  - **Label** — red or green boxes are shown inside the label area of the MultiViewer box
  - **LblRev** — the same as Label, but the placement of the tally boxes is swapped
9. Click an **FS Label** button to select whether FSFC is shown on the source labels (**On**) or not (**Off**) when a FSFC is applied to the source.
10. Click on one of the **Boxes** buttons and set up how that box appears on the MultiViewer.
  - **Input/Output** — select the video source or bus that you want to assign to this box on the MultiViewer. When you assign an output to a box, the switcher routes the source selected on that bus to the box, and not the output of the bus.
  - **Green Tally** — turn the preview (green) tally for the MultiViewer box on or off.
  - **Red Tally** — turn the program (red) tally for the MultiViewer box on or off.
  - **Border** — turn the border around the MultiViewer box off (**Off**), white (**White**), or black (**Black**). When the border is turned

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off, some distortion may be visible around the edges of the box.

- **Label** — turn source labels for the MultiViewer box off, or on in a selected position
- **Label Pos** — select a position for the source label for the MultiViewer box (**Bottom** or **Top**).
- **Aspect** — turn aspect ratio markers for the MultiViewer box on (**Aspect**) or off (**Off**).

## To Set Up a MultiViewer Clock

1. Click **Navigation Menu > Configuration > MultiViewers** and click **MultiViewer X** for the MultiViewer you want to set up the clock for.
2. Click **Clock**.
3. Click a **Mode** button to select the type of clock you want.
  - **Off** — turns the clock off
  - **Timecode** — displays the timecode fed to the switcher (hh:mm:ss:ff)
  - **System** — displays the system time of the switcher in 12-hour or 24-hour format (hh:mm:ss)
4. For a Timecode clock, click a **Frame Count** button to select whether the number of frames for a timecode is displayed (**On**) or not (**Off**).
5. For a System clock, click a **Time Display** button to set how the time is displayed.
  - **24 hr** — time is displayed in 24-hour format.
  - **12 hr** — time is displayed in 12-hour format without am/pm.
  - **12 hr AM/PM** — time is displayed in 12-hour format with am/pm.
6. Click the **Position** tab.
7. Use the **X Position**, **Y Position**, and **Size** sliders to position the clock and change the size.
8. Click the **Foreground Color** tab and select the color and transparency you want to use for the text of the clock.
9. Click the **Background Color** tab and select the color and transparency you want to use for the background of the clock.

## On-Air Setting

Some switcher outputs can be set to be considered on-air or not. This allows you to set which outputs are tallied and how resource allocation is divided.

## To Set the On-Air Status for an Output

Click **Navigation Menu > Configuration > On Air**.

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## Media-Store Audio Output

The audio output from the Media-Store is only available on the AES outputs of the frame.

Only Media-Store channels 1 and 2, and the MediaWipe channel can be assigned to an AES output. Embedded audio is not available on the AES outputs.

### To Assign Media-Store Audio to an AES Output

1. Click **Navigation Menu > Configuration > Outputs**
2. Click the **Source** button for the AES output you want to assign an audio source to and select the Media-Store or MediaWipe you want to assign to it.

**Note:** When one of the AES outputs is set to MediaWipe (**ME1MW**) the other AES output is fixed to **<none>**.

- **none** — no audio source is assigned to the AES output.
- **MX** — the audio from Media-Store *X* is assigned to the AES output.
- **MEXMW** — the audio from the MediaWipe on ME *X* is assigned to the AES output.

# Color Correction

**Note:** This feature is available on the Carbonite Black+ and Carbonite Black+ 12G only.

Color correction in the switcher is performed by either Processing Amplifiers (Proc Amps) in the HSL (Y-Cr-Cb) color space or by RGB Color Correctors in the RGB color space. Both Proc Amps and RGB Color Correctors allow you to apply color correction to video on input to the switcher, before the crosspoint, and on the output from the switcher. Correction applied to the input video is then available to all MEs. Output based correction is only available on outputs 3, 4, and 5.

Color correction is additive, allowing you to apply any combination of Proc Amp and RGB Color Corrector based adjustment to a video signal. If multiple color corrections are applied, the correction is applied first, and the bus-based correction is applied after that.

## Proc Amp Color Correction

The Proc Amp video correction allows you to adjust the gain, offset, black level, and gamma of the video signal.

### To Apply a Proc Amp to a Video Source

1. Click **Navigation Menu > Configuration > ProcAmps > ProcAmp**.
2. Click the **ProcAmps and Color Correctors** button and select the input or output that you want to apply the Proc Amp to.

**Tip:** If correction has already been applied (**ON**), press **Reset** to return the Proc Amp and Color Correction to the default values.

3. Click an **Enable** button to turn the Proc Amp on (**On**) for the selected input or output.
4. Use the sliders to adjust the video source.
  - **Gain** — adjust the chrominance and luminance gain together.
  - **Chroma Gain** — adjust the chrominance gain only.
  - **Luma Gain** — adjust the luminance gain only.
  - **Hue Rotation** — adjust the Hue. Increasing the Hue Rotation turns the color wheel

clockwise, and decreasing the Hue Rotation turns the color wheel counter-clockwise.

- **Black Level** — adjust the black level. Black level acts as a luminance offset.
- **Gamma** — adjust the luminance gamma value.
- **Gamma Offset** — adjust the luminance gamma offset.
- **Cr Gain** — adjust the gain of the Cr (red color difference).
- **Cr Offset** — adjust the offset of the Cr.
- **Cb Gain** — adjust the gain of the Cb (blue color difference).
- **Cb Offset** — adjust the offset of the Cb.

## RGB Color Correction

**Note:** This feature applies to the Carbonite+ and Carbonite MultiMedia only.

The RGB color correctors allow you to adjust the red, green, and blue component gain, offset, and gamma of the video signal.

### To Apply a RGB Color Correction to a Video Source

1. Click **Navigation Menu > Configuration > ProcAmps > ProcAmp**.
2. Click the **ProcAmps and Color Correctors** button and select the input or output that you want to apply the RGB color corrector to.

**Tip:** If correction has already been applied (**ON**), press **Reset** to return the Proc Amp and Color Correction to the default values.

3. Click an **Enable** button to turn the color corrector on (**On**) for the selected input or output.
4. Click the **Component** button for the individual color component (**Red, Green, Blue**) you want to adjust, or **RGB** for all of them.
5. Use the sliders to adjust the color components.

**Tip:** Click one of the **Preset Color Temp** buttons to apply a temperature color correction to the video.

- **Gain** — adjust the gain of the component(s).
- **Offset** — adjust the offset of the component(s).
- **Lower Offset** — adjust the lower offset of the component(s).
- **Gamma** — adjust the gamma value of the component(s).
- **Gamma Offset** — adjust the gamma offset of the component(s).

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## High Dynamic Range Conversion (HDR)

The RGB color correctors are used to convert between High Dynamic Range (HDR) and Standard Dynamic Range (SDR). The actual conversion takes the form of contrast matching between SDR and HDR. This contrast matching preserves the colors of the SDR video signal.

Only the HLG600 and HLG1200 HDR presets are supported at this time.

### To Convert a Source to HDR

A source is converted between SDR and HDR using the RGB color correctors to contrast match the SDR video stream to the HDR video stream.

1. Click **Navigation Menu > Configuration > ProcAmps > Color Correction**.
2. Click the **ProcAmps and Color Correctors** button and select the input or output that you want to apply the RGB color corrector to.

*Tip: If correction has already been applied (ON), press **Reset** to return the Proc Amp and Color Correction to the default values.*

3. Click an **Enable** button to turn the color corrector on (**On**) for the selected input or output.
4. Click an **HDR** button to apply the conversion.
  - **SDR To HLG600** — conversion using contrast matching in the HLG600 format.
  - **SDR To HLG1200** — conversion using contrast matching in the HLG1200 format.

*Tip: Click the **HDR** button again to reset the color correction values if you have adjusted them.*

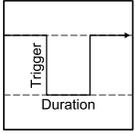
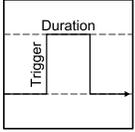
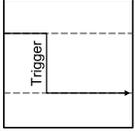
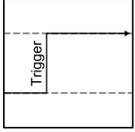
# GPI Control

General Purpose Interface (GPI) is a high/low voltage signalling protocol that allows the switcher to send simple commands to an external device, or receive commands from a device. Each pin on the GPI is set as either high (+5 Volts), or low (0 Volts), and it is the switching between high and low that sends commands to the external device, or to the switcher.

## GPI Trigger Types

There are four trigger types supported by the switcher. These can be either output triggers, or input triggers.

**Table 5: Trigger Types**

Trigger	Description	
Low Edge	The output level is set high, and momentarily goes low for the trigger.	
High Edge	The output level is set low, and momentarily goes high for the trigger.	
Low Level	The output level toggles from the base high level to the low level. The output signal remains at this level until reset.	
High Level	The output toggles from the base low level to the high level. The output signal remains at this level until reset.	

## GPI Setup

Each GPI pin on the switcher can be configured as either an input, or an output. By default, all GPIs are set as inputs.

### To Set Up a GPI Input

The switcher requires a Low Edge GPI input trigger.

1. Click **Navigation Menu > Configuration > GPIO**.  
The page lists all the GPIs on the switcher and how they are currently configured.
2. Click **Edit** for the GPI that you want to configure as an input.

3. Click **GPI**.
4. Click an **Event** button to select the action you want to assign to the selected GPI input pin.
  - **--none--** — no action is taken
  - **CC** — run a specific custom control
    - enter the custom control bank in the **Bank** field
    - enter the custom control in the **CC** field
  - **Mem Recall** — recall a memory on all MEs (enter the memory to recall in the **Mem** field)
  - **FtB** — perform a transition to black on the program ME that also takes all keys off-air. The source originally selected on program is selected on preset
  - **ME Cut** — perform a background cut on the selected ME (click an **ME** button to select the ME, or MiniME™)
  - **ME Auto** — perform a background auto transition on the selected ME (click an **ME** button to select the ME, or MiniME™)
  - **Key Cut** — perform a key cut on the selected ME and Key
    - click an **ME** button to select the ME, or MiniME™
    - click a **Key** button to select the keyer
  - **Key Auto** — perform a key auto transition on the selected ME, or MiniME™ and Key
    - click an **ME** button to select the ME, or MiniME™
    - click a **Key** to select the keyer number
  - **Aux Xpt** — select a video source on an aux bus
    - click the **Aux** button and select the aux bus
    - click the **Source** button and select the video source

### To Set Up a GPI Output

A GPI output can be set as a Normal GPI output, or as a Tally output. As a tally output, the GPI output must be assigned to a video source. A GPI output in tally mode can still be used as a normal GPI output.

1. Click **Navigation Menu > Configuration > GPIO**.  
The page lists all the GPIs on the switcher and how they are currently configured.
2. Click **Edit** for the GPI that you want to configure as an output.
3. Click **GPO**.

- 
4. Click a **Trigger** button to select whether you want to use an edge trigger (**Edge**), or a level trigger (**Level**).
  5. Click a **Level** button to select whether you want the GPI to trigger low (**Low**), or high (**High**) trigger.
  6. For edge triggers, use the **Duration** slider to set the length of time (in frames) that the GPI edge output remains triggered.
  7. For level triggers, click a **Mode** button to select how you want to GPI output to act.
    - **Normal** — when assigned to a video source and RollClip is active, will trigger with the source going on-air, and back with the source going off-air (pre-delay values are only used when the source is going on-air)
    - **Tally** — when assigned to a video source, will trigger with the source going on-air, and back with the source going off-air (RollClip and pre-delay values are ignored)

---

# Diagnostics and Calibration

There are a number of calibration and diagnostics tools in the switcher that can be used to troubleshoot problems with your switcher.

*Note: If you are having problems with your switcher, please contact Ross Video Technical Support for assistance.*

## Switcher Information and Logs

Switcher information and logs can be used to identify and diagnose problems with the switcher. Use this information when contacting Ross Video Technical Support.

### Status

The Status node provides a read only overview of the state of a number of important switcher components and equipment.

The following items are available on the **Status** node:

- **Software Version** — the current version of the software running on the switcher
- **Serial Number** — the serial number of the frame
- **Engine Type** — the model of frame
- **Video Mode** — the video format that the switcher is operating in
- **Video Reference Source** — the source of video reference to the switcher
- **External Reference** — the video format of the external reference, if connected
- **Reference** — status of whether the switcher has locked to the reference format
- **Ancillary Mode** — how ancillary data is handled (strip or pass)
- **Temperature** — status of the ambient temperature in the frame
- **CPU Temperature (C)** — the temperature of the frame CPU in degrees Celsius
- **FPGA Temperature (C)** — the temperature of the frame FPGA in degrees Celsius
- **I/O FPGA X Temperature (C)** — the temperature of each of the video processing FPGAs in degrees Celsius
- **Fan #1** — status of fan 1 in the frame (left fan)
- **Fan #2** — status of fan 2 in the frame (right fan)
- **Timecode** — the current timecode being received by the switcher
- **RossTalk Server Port** — the network port that the switcher is listening on for RossTalk commands.

### To View the Software Version

- Press **MENU > Status**.

The current software version (**SW Ver**) and reference format are displayed.

### To Copy Logs To a USB

Switcher logs can be stored onto a USB to be sent to technical support to diagnose problems with your switcher.

*Note: Logs must be copied before a reboot or power-cycle of the switcher, or the information in them will be lost.*

1. Insert USB drive into the USB port on the switcher. Wait 5 seconds after inserting the USB drive before using it.
2. Click **Navigation Menu > Configuration > Diagnostics**.
3. Click **Copy** to copy the switcher logs to the USB drive.

*Tip: You can have logs stored directly to the USB drive. Click a **Logs Direct to USB** button to select **Yes**.*

The logs have been copied into the `\switcher` directory on the USB drive.

---

# Switcher Soft Reset

If required, the switcher can be reset to return it to a user-defined default setting, or the factory default state. A reset can be performed for the entire switcher, or individual components, such as keys.

## Custom Reset Settings

You can customize many of the default switcher parameters and save them as a user-defined reset settings. These custom reset settings can then be recalled when you want to return the switcher to a previous state.

### To Save a Custom Reset Setting

The Custom Reset Setting, or RState, saves how you want the switcher to be configured when it powers up, or when you recall the RState manually.

You can customize many of the default switcher parameters and save them as a user-defined custom reset.

1. Click **Navigation Menu > Live Assist > Memory > RState**.
2. Click **AuxX, MediaX, MiniMEX,** and **MultiScreenX** to select the buses or channels that are reset with a switcher reset.

*Tip: Click the **All** button to select or de-select all the items in that category.*

3. Click **Save RState** and **Yes**.

### To Load a Custom Reset Setting

The Custom Reset Setting, or RState, is recalled every time the switcher is powered on, or it can be recalled manually.

1. Click **Navigation Menu > Live Assist > Memory > RState**.
2. Click **Load RState** and **Yes**.

## Factory Default Settings

You can restore the switcher to the factory default state. All installation and personality settings are reset.

### To Factory Reset the System

1. Click **Navigation Menu > Configuration > System > Factory Reset**.
2. Click **Reset** to load the factory default settings.

---

## Frame DIP Switches

There are a number of DIP switches inside the frame that are used to diagnose the operation of the switcher.

**Table 6: Carbonite Black Frame DIP Switches**

DIP	Description
1	This DIP switch forces a RAM test every time the switcher is powered on. It is in the up (off) position by default.
2	This DIP switch is unused and should be left in the default up (off) position.
3	This DIP switch is used to set the IP address of ethernet port 1 on the frame to the default value (192.168.0.123) and ethernet port 2 to DHCP. It must be in the up (off) position to set another IP address for the frame.
4	This DIP switch prevents software upgrades. It must be in the up (off) position to upgrade the switcher.
5	This DIP switch is unused and should be left in the default up (off) position.
6	This DIP switch is unused and should be left in the default up (off) position.
7	This DIP switch is unused and should be left in the default up (off) position.
8	This DIP switch is unused and should be left in the default up (off) position.

# Specifications

The information in this section is subject to change without notice.

## Environmental Characteristics

All Switchers	
Ambient Temperature Range	0 - 40°C (32 - 104°F)
Frame Cooling	Active, Front-to-Back airflow

## Video Input Specifications

Input Specification	Value
Equalization (using Belden 1694A cable)	>50m @ 3Gb/s
	>100m @ 1.5 Gb/s
	>300m @ 270 Mb/s (5°-40°C)
Impedance	75 ohm, terminating
Video Inputs, SDI	SMPTE 259M/292M/424M/ST-2082 (non-looping)
Reference Inputs (non-terminating, looping)	Standard Definition — analog black
	High Definition — tri-level sync

## Video Output Specifications

Output Specification	Value
Return Loss	<-10dB @ 3GHz
	<-15dB @ 1.5GHz
Rise and Fall Time	240ps ±10% (HD)
	800ps ±10% (SD)
Signal Level	800mV ±10%
DC Offset	0 Volts
Overshoot	<10%
Video Outputs, SDI HD Mode	10-bit SMPTE-292M/424M serial digital

## Audio Specifications

Specification	Value
Audio Depth	24-bit AES3 in HD (20-bit in SD)
Channels	1 Stereo Pair (2 channels)
Output	AES

Specification	Value
File Format	Multi-channel Waveform Audio File (.wav)
Impedance	110 Ohms, differential
Minimum/Maximum output voltage swing	1.5/6V peak-to-peak
Rise and Fall Times	20ns, typical
Sample Rate	48kHz
Synchronization	Locked to Video

## Jitter

Specification	Value
HD - Tri-Level Sync	Alignment (> 100kHz) < 0.2UI
	Timing (<10Hz) < 1.0UI
HD - Composite Reference	Performance not guaranteed with composite reference
SD - Tri-Level Sync	Alignment (> 1kHz) < 0.2UI
	Timing (<10Hz) < 0.2UI
SD - Composite Reference	Alignment (> 1kHz) < 0.2UI
	Timing (<10Hz) < 0.5UI

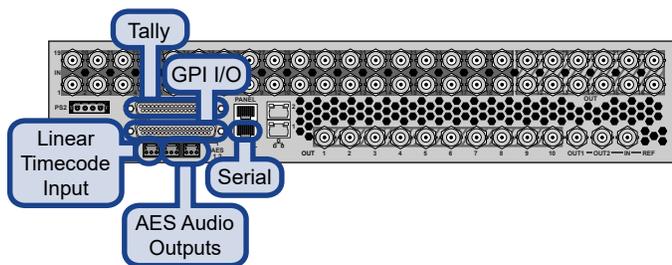
## System Timing

- All video inputs zero time relative to reference input, auto timing will correct for inputs out of time by up to +/- 0.25 line.
- System delay is less than 1 line.

## Power Consumption — Frame

	Carbonite Black	Carbonite Black+	Carbonite Black+ 12G
Consumption	120W 2.5A 48V	180W 3.75A 48V	206W 4.3A 48V
Input Voltage	100 - 120V~, 220 - 240V~, 47-63Hz		

## Ports



### Serial Port

The serial port supports the RS-422 transmission standard in the following format:

- 38.4k Baud
- 8 bits
- 1 stop bit
- Even Parity

**Table 7: Serial Port Pinouts**

Pin	Signal
1	Tx+
2	Tx-
3	Rx+
4	n/c
5	n/c
6	Rx-
7	Ground
8	Ground

### GPI Port

The switcher supports 34 GPI I/Os.

**Table 8: GPI I/O Pinouts**

Pin	Signal
1	GPI I/O 1
2	GPI I/O 2
3	GPI I/O 3
4	GPI I/O 4
5	GPI I/O 5
6	GPI I/O 6
7	GPI I/O 7
8	GPI I/O 8
9	GPI I/O 9

Pin	Signal
10	GPI I/O 10
11	GPI I/O 11
12	GPI I/O 12
13	GPI I/O 13
14	GPI I/O 14
15	GPI I/O 15
16	GPI I/O 16
17	GPI I/O 17
18	GPI I/O 18
19	GPI I/O 19
20	GPI I/O 20
21	GPI I/O 21
22	GPI I/O 22
23	GPI I/O 23
24	GPI I/O 24
25	Ground
26	GPI I/O 25
27	GPI I/O 26
28	GPI I/O 27
29	GPI I/O 28
30	GPI I/O 29
31	Ground
32	GPI I/O 30
33	GPI I/O 31
34	GPI I/O 32
35	GPI I/O 33
36	GPI I/O 34
37	n/c

### Tally Port

The switcher supports 0 fixed tallies.

**Table 9: Tally Rating**

Specification	Value
Input Voltage	24VAC(rms)/40VDC
Maximum Current	120mA
Impedance	<15 ohm

**Note:** The tally pin must be connected to the proper common to complete the circuit. For example, tally 6 on pin 7 must be connected to the common on pin 31.

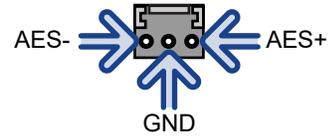
**Table 10: Tally Pinouts**

Pin	Tally #
1	Common (pins 2-6, 20-25)
2	1
3	2
4	3
5	4
6	5
7	6
8	7
9	8
10	9
11	10
12	11
13	12
14	13
15	14
16	15
17	16
18	17
19	Common (pins 13-18, 32-37)
20	18
21	19
22	20
23	21
24	22
25	23
26	24
27	25
28	26
29	27
30	28
31	Common (pins 7-12, 26-30)
32	29
33	30
34	31
35	32

Pin	Tally #
36	33
37	34

## AES Port

The AES ports on the back of the frame each support a single 24-bit (20-bit in SD) stereo pair.



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# Glossary

## Interlaced

An Interlaced video format starts at the top of the screen and draws all the odd number scan lines and then all the even number scan lines in sequence. This results in half the image being drawn in one pass and the other half of the image being drawn in the second. These two passes are called Fields, where the first pass is called Field 1 and the second pass is called Field 2. When both Field 1 and Field 2 have been drawn, resulting in a complete image, you have a single Frame.

## Progressive

A Progressive scan video format draws each scan line in sequence, starting from the top of the screen and working to the bottom. Unlike Interlaced, with Progressive scan the entire image is drawn at one time, in a single pass. This means that there are no fields in a Progressive scan image.

## Auto Key

A pairing of two video signals, a key video and a key alpha, to create a key. In the switcher, you associate the fill and alpha so that the switcher knows which alpha to use when the video is selected.

## Auto Transition

An automatic transition in which the manual movement of the fader handle is simulated electronically. The transition starts when the **AUTO TRANS** button is pressed and takes place over a pre-selected time period, measured in frames.

## Chroma Key

Chroma Key is a key in which the hole is cut based on a color value, or hue, rather than a luminance value or alpha signal. The color is removed and replaced with background video from another source.

## Cut

An instantaneous switch from one video signal to another.

## Dissolve

A transition from one video signal to another in which one signal is faded down, while the other is simultaneously faded up. The terms mix or cross-fade are often used interchangeably with dissolve.

## Field

One half of a complete picture (or frame) interval containing all of the odd, or all of the even, lines in interlaced scanning. One scan of a TV screen is called a field; two fields are required to make a complete picture (which is a frame).

## Force, Mask

An effect that forces the masked region to the foreground but is not bound by the key. For example, if you have a key and apply a mask to it. The masked area is bound by the edges of the key. When force is turned on, the masked area is filled with the video from the key (nothing appears masked) but you can move the mask outside of the key and the key video is still filling the masked region.

## Frame

One complete picture consisting of two fields of interlaced scanning lines.

## File Transfer Protocol

A network protocol that is used to transfer files from one host computer to another over a TCP-based network.

## Gain

Gain represents the range of signal values present in a video signal from a lowest to a highest point (from black to white for example). Increasing gain expands this range, while decreasing gain compresses this range. Clipping occurs if applied gain changes cause output signal values to fall outside the allowable range. Generally, increasing the gain for a specific color component causes the video signal colors to become increasingly saturated with that color. Similarly, decreasing the gain for a specific color component progressively removes that color component from the output video signal.

## Gamma

Gamma corrections introduce non-linear corrections to a video signal. A gamma correction can be described as taking a point on the output versus input video signal line and pulling it perpendicularly away from the line. The result is a Bezier curve between the start, the new point, and the end point. Generally, increasing the gamma value adds more of the component to the video signal in the location of the gamma offset point. Decreasing the gamma value reduces the amount of the component in the video signal in the location of the gamma offset point. Moving the gamma offset point allows you to select which part of the input video

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signal receives the gamma correction. For example, if you increase the red gamma correction to the part of the video signal that has no red component you will add red to those areas while having little effect on areas that already contain a significant amount of red. This allows you to add a red tint to the image while minimizing the amount of red-clipping that occurs.

## General Purpose Interface

A simple high/low signal that is used to trigger an action either on an external device or on the switcher. A GPI can be an input or an output to the switcher.

## High Definition

A high definition (720p, 1080i, or 1080p/3G) video signal.

## Hue

The characteristic of a color signal that determines whether the color is red, yellow, green, blue, purple, etc. (the three characteristics of a TV color signal are chrominance, luminance, and hue). White, black, and gray are not considered hues.

## Hue Rotation

Hue rotate affects the color of the entire video signal by rotating the input video hues. This produces an output video signal with colors that are shifted from their original hues. By rotating colors around the wheel, hue values will shift. For example, a clockwise rotation where yellows become orange, reds become magenta, blues become green. The more rotation applied, the further around the wheel colors are shifted.

## Key

An effect produced by cutting a hole in the background video, then filling the hole with video or matte from another source. Key source video cuts the hole, key fill video fills the hole. The video signal used for cut and fill can come from the same, or separate, sources.

## Key Alpha

The video signal which cuts a hole in the background video to make a key effect possible. Also called Key Video or Source. In practice, this signal controls when a video mixer circuit will switch from background to key fill video.

## Key Invert

An effect that reverses the polarity of the key source so that the holes in the background are cut by dark areas of the key source instead of bright areas.

## Key Mask

A keying technique in which a shape is combined with the key source to block out unwanted portions of the key source.

## Key Video

A video input which is timed to fill the hole provided by the key source video. An example of key video is the video output of a character generator.

## Linear Key

Linear keys make it possible to fully specify the transparency of a key from opaque, through transparent, to fully off. The transparency is specified by the key alpha that is associated with the key video. A keyer capable of a linear key converts the key signal voltage directly to the transparency effect on the screen.

## Mnemonics

A green, orange, or yellow display used to show the names of a source above or below the source button or used as a custom command or pattern button.

## Offsets

Offsets shift the video signal by a set amount. Depending on the offset applied, different parts or all of the video signal may be affected. Clipping occurs if applied offsets cause output signal values to fall outside the allowable range.

## Pre-Delay

A pre-delay is a delay that is inserted into a transition between the triggering of a GPI output and performing the transition. The length of the pre-delay is usually the length of time your video server requires to start playing a clip or your character generator required to load a page.

## RossTalk

An ethernet based protocol that allows the control over Ross devices using plain english commands.

## Standard-Definition

A standard definition (480i or 576i) video signal.

## Self Key

A key effect in which the same video signal serves as both the key signal and key fill.

---

## Shaped Key

An additive key where the Key Alpha cuts a hole based on the monochrome value of the alpha. Shades of gray are translated into either white or black, giving the key a hard edge. Shaped Key alphas are sometimes used with Character Generators to cut very precise holes for the fill.

## Split Key

A Split key allows you to assign a different alpha source for a key than the fill/alpha associations that are set up during configuration or to use a separate alpha source for a Self key.

## Tally

An indicator which illuminates when the associated button, or control, is selected or is on-air.

## Unshaped Key

A multiplicative key where the Key Alpha cuts a hole based on the gradient values of the alpha. Shades of gray are translated into transparency levels, giving the key a soft edge. Unshaped Key alphas can also be considered true linear alphas.

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