Ultra 60
Configuration Guide

v9.1

ROSS

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Document Information

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Patents

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Contents

Ultra 60

Designed for Live!

Ultra 60 builds on the Ross Video reputation for designing switchers for live studios, trucks, and post-production. At the center of the action, it is important that the switcher be powerful and versatile, yet maintain its ease of operation. This frees the operator to concentrate on the programming instead of the equipment, delivering a cleaner, more professional production.

The Ultra series improves on the highly popular Carbonite Black series by bringing more I/O and more features.

Designed for Automation!

The Ultra series of switchers support the highly advanced OverDrive® Caprica automated production control system. Caprica takes advantage of the years of device integration that Ross® has developed in the large switcher product lines and puts it into an independent server. The Caprica server takes the place of the production switcher for controlling over 200 additional production elements (such as robotics, graphics, audio mixers, servers, etc.), timing the show and creating production macros.

Designed for Linear!

The Ultra series of switchers continues to build on Ross® Video's reputation for setting the standard for multi-definition linear editing suites. The traditional layout and familiar controls of other Ross® switchers provide the power and ease of use you have come to expect.

Ultra 60 cleanly connects to virtually any editor using the industry standard GVG100/110 protocols.

Designed for You!

With Ross® Video products installed in well over 125 countries world-wide, our sales, demonstration, and training people get a lot of ongoing feedback from customers. This feedback is carefully tracked and considered in the design and feature-set development of our products. Key members of the design teams are part of an ongoing program in which they provide product demonstrations, assist with product installation, and train operators. As a result, the complete line of Ross Video products continues to offer our legendary combination of power and ease of use.

Join our Growing Customer Base!

Deciding to purchase a Ultra 60 switcher will put you in good company, with many thousands of Ross switchers installed worldwide. Carbonite continues to build on a family of multi-definition switchers that have been delivering the goods every day in live sports, stadium scoreboards, and drama productions, mobile productions, as well as local and network newscasts.

Experience Great Support!

Ross® has designed and manufactured production switchers for over 50 years, with significant year over year growth for the past 35 years. We believe that an important factor of our success is our focus on providing a superior customer experience. We continually benchmark our warranty and technical support to ensure that they are the best in the industry.

We hope that you join the many thousands of satisfied video professionals around the world that are proud owners of Ross® production switchers. Please do not hesitate to contact us with any questions or comments you have related to this Configuration Guide at Tel: +1-613-652-4886, Fax: +1-613-652-4425 or email us at *solutions@rossvideo.com*.

Features

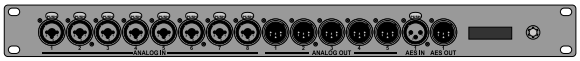
Thank you for your interest in the Ross® Carbonite Family of Production Switchers. The Ultra 60 builds on the Ross® reputation for designing switchers that fit the needs of any production environment.

RAVE Audio Mixer

RAVE (Ross Audio Video Engine) that was first introduced in Graphite is now available in Ultra. This licensable option includes internal audio routing and output channel shuffling, together with a hardware-based 24bit digital audio production mixer.

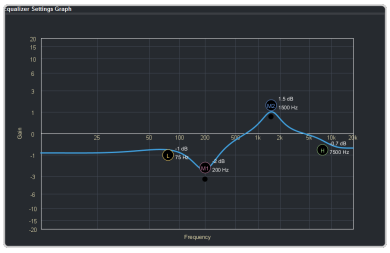
The number of audio inputs and outputs depends on the model and options you have. All audio streams are 24bit at 48kHz and can be controlled from DashBoard.

The 1RU Audio Breakout Unit (ABU) provides a number of analog and AES input and output ports. The analog inputs have direct control over gain, phantom power on/off, and 20dB pad on/off. These audio inputs and outputs are fed back and forth to the production system as embedded audio in the SDI-Audio Loop.



Audio Equalization (EQ)

The audio equalizer (EQ) allows you to enhance the sound quality of audio sources. An independent stereo equalizer is available for every audio fader in the system and allows for adjustment in four bands (low-shelf, mid-range 1/2, high-shelf).



The EQ graph allows you to visualize the EQ adjustments as well as actively change them on the graph.

Tip: You can change the processing order of the EQ and CL.

Compressor/Limiter (CL)

The audio compressor allows you to restrict audio levels from passing a threshold level. These are often used to prevent digital clipping of audio levels that are too high for output equipment. Once the threshold is reached, the compressor starts to reduce the gain at a specific ratio. The higher the compression ratio, the harsher the reduction in gain. The compression continues until the audio level falls below the threshold. You can adjust how quickly the compressor is applied once the threshold is surpassed as well as how long after the level drops below the threshold that the compressor is still applied.

Tip: You can change the processing order of the EQ and CL.

MADI

The MADI interface supports an SFP transceiver module using the AES10-1991, AES10-2003, and AES10-2008 specifications for a maximum of 56 or 64 audio channels, depending on the specification. The **MADI** SFP port is located on the back of the frame.

Note: The MADI interface is only available with the Audio Mixer software license (CUF3-RAVE-AUDIO).

- **Inputs** — Audio channels from the MADI SFP must be assigned to an audio fader for them to be available in the switcher.
- **Outputs** — Audio channels to the MADI SFP are fixed to specific audio sources from the switcher.

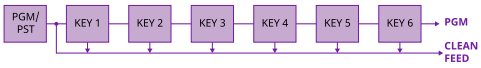
Option	Description
SFP-MADI-COAX	Embrionix EB06HDRT-MN-MADI, a medium reach electrical MADI Audio SFP (emSFP) transceiver module.
SFP-MADI-850MM	Embrionix GO2949-85CL, a short reach optic video SFP.

Clean Feed Output

Clean feed is typically used for bilingual and live-to-tape productions. It provides a second Program output that is derived from a different location than the standard program output. A frequent application is the recording of shows for later airing without call-in phone numbers inserted.

The clean feed can be set to include any keys for an ME. This allows you to remove particular

keys without affecting the primary program output.



Expandable I/O

Ultra 60 is the first in the Carbonite family to offer expandable I/O by installing up to two Ultra 60 I/O boards. Each Ultra 60 I/O adds 24 inputs, 8 outputs, and 2 I/O MultiViewer outputs to the switcher.

Custom Controls

This feature brings the power of macros to the switcher operator. Button presses, menu selections, event commands, or even the switcher state can be recorded to a custom control with pauses or holds between the events. A simple button press can play these events back again. Step through complex show openings as easily as pressing Custom Control buttons 1, 2, then 3.

Sequencer

The switcher has 5 Sequencers that allow you to create a playlist or rundown of custom events, much like custom controls. Each Sequencers can be run independently or linked to other Sequencers so that they all advance together. The Sequencer uses sequences to store the rundown of events. These sequence files can be loaded into one or multiple Sequencers.

> ***Tip:*** *You can link multiple Sequencers together so that as you advance though one, the other Sequencers will advance.*

Device Control

The switcher can control a number of external devices, such as video servers and robotic cameras. For a complete list of supported devices, and information on how to set up and control these devices, visit the Ross Video website (*rossvideo.com/production-switchers/carbonite/interface-list*).

Device setup can be done through DashBoard.

DVE (Fly Key)

The advanced DVE engine comes standard with each switcher and can be used for performing over the shoulder, or picture in picture, shots with 3D borders and lighting effects.

2D DVE Keys

All key types can be zoomed, cropped, and repositioned horizontally and vertically to create the look you want, or you can use one of the useful pre-built 2D effects to perform 2D background transitions.

3D Borders

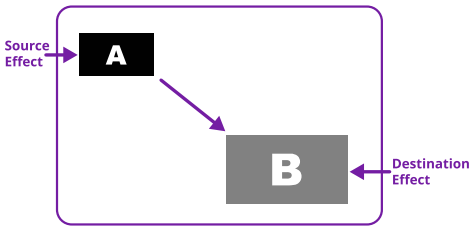
Flat or bevelled borders with independent inner and outer shaping and Y-axis perspective, or skew, can be applied to any DVE key.

Lighting/Drop Shadow

A single directional light with optional drop shadow can be applied to the key and border. The bevel lighting of the border and shadow changes as the position of the light is moved.

Effects Dissolve

The Effects Dissolve feature allows you to interpolate from one memory to another using a memory recall. The switcher will interpolate from the starting memory to the destination memory, creating a smooth, two key frame effect.



Only elements such as clip level and pattern position can be interpolated in the effects dissolve. Other elements, such as crosspoint selection, pattern, and next transition data are recalled first, and then the switcher will slew to the recalled memory.

An effects dissolve can be performed on as many elements and MEs as required, based on the memory that is being recalled.

General Purpose Interface (GPI)

The switcher is equipped with 24 GPI I/Os that can be assigned as either an input or output independently.

The GPI inputs allow the switcher to interface with peripheral equipment such as editors. Each GPI input can be used to perform simple editing

and switcher functions such as fade to black or an auto transition.

LiveEDL

Edit Decision Lists (EDL) are files used by non-linear editing (NLE) suites to aid in post-production. Your switcher can capture EDL data in a file that you load into your NLE suite.

For information on using the LiveEDL feature, visit the Ross Video Website (*rossvideo.com*).

Matte Generator

A matte generator per ME comes standard. Any one of the color generators can be assigned to MATTE. An additional simple color generator is available for an Aux Bus.

ME Effect System

The ME (Multi-level Effect) systems are standard. The number of MEs depends on the chosen switcher model.

Each ME provides independent keyers supporting pattern mask, box mask, self-key, linear key.

Media-Store

Each channel of Media-Store provides a combined video with alpha for playout of stills and animations that are available switcher-wide, allowing for thousands of full screen stills and logos that can be cached and used on the switcher.

Media-Store provides 12 GB of distributed cache. The Media-Store cache is broken into 3 × 4GB blocks. Channels 1,4,7 have access to the first block; 2,5,8 have access to the second; and 3,6 have access to the last.

The number of images cached increases considerably when smaller, non-full screen images like logos are loaded.

Media items can be stored on a USB or the internal User Storage.

MediaManager

The MediaManager allows you to easily manage stills and animations on the switcher in a graphics interface.

MediaWipe

A MediaWipe allows you to use an animation, with audio, from the Media-Store to play over a background or key transition. When the transition starts, the switcher plays the selected animation and audio over top of the background and keys that are being transitioned. A cut, dissolve, wipe, or DVE wipe is then performed layered under the animation to bring up the next shot when the animation ends. The audio is embedded with a video stream from the audio mixer.

Clip Player

The clip player offers a single playout channel for clips in the ITU-T H.264 (MPEG-4 AVC) and ITU-T H.265 (MPEG-H HEVC) codecs in specific HD and UHDTV1 video formats that can be assigned as a source on any bus in the switcher. Basic transport controls can be performed manually from the **Clip Player** page or using custom controls.

MemoryAI Recall Mode

We take the guessing out of memory recalls by ensuring that a memory recall will not affect what is currently on-air. MemoryAI uses the content of the memory to configure the Next Transition area and Preview bus for the background and keyers so that the next transition takes the same sources on-air that were on-air in the memory.

For example, store a memory that has a key on-air with CAM1 and CAM2 selected on the background. When this memory is recalled normally, it pops the same key on-air with CAM1 and CAM2 on the background. When the memory is recalled with MemoryAI turned on, CAM1 is selected on the preset bus, and CAM2 is selected on a key that is not on-air. The transition area is then set up for a background transition to bring CAM2 onto the background, take any on-air keys off, and take a key on-air with CAM1.

Memory System

Storage for 100 complete switcher snapshots per ME, MiniME™, and Canvas comes standard with all switchers. All of these memories can be stored to a USB media drive, providing custom tailored memories for every operator and every show.

Each memory has an independent set of Store and Recall Attributes that can be used to specify what elements are stored or recalled with a memory, as well as adding effects to memory recalls. 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.

MiniME™

The MiniME™ is an additional ME that is provided with the switcher to perform basic dissolves and cuts. Each MiniME™ has keyer, background, and preset buses. Unlike a full ME, the MiniME™ only supports dissolves and cuts. The MiniME™ shares all the same sources as the ME.

UltraScene (HD Only)

UltraScene provides a simplified interface for creating a show with multiple key layers and basic transitions. UltraScene consists of 4 scenes that share 8 layers in 4 layer pairs. Layers can only be added in pairs, so a scene can have 2, 4, 6, or 8 layers. Each layer is set up like a keyer with a video source, alpha, and key type. Each layer can also be turned on or off to cut the video source on or off-air. A background source is also available over which the layers are keyed, or the scene can be taken as a source on bus.

I/O Processor

The Input/Output Video Processors are independent video processing engines that allow you to perform a number of functions for video correction.

- Format Conversion (FC)
- Frame Synchronisation (FS)
- Color Correction
- Frame Delays

High Dynamic Range (HDR) and Wide Color Gamut (WCG) Conversion

The RGB color correctors are used to convert between different SDR and HDR ranges and between color gamuts (WCG).

Note: *You must have available color correctors to be able perform the HDR/WCG conversion.*

Supported Color Gamuts:

- **BT.709** — color gamut recommended for HD video signals.
- **BT.2020** — wide color gamut recommended for UHDTV1 video signals.

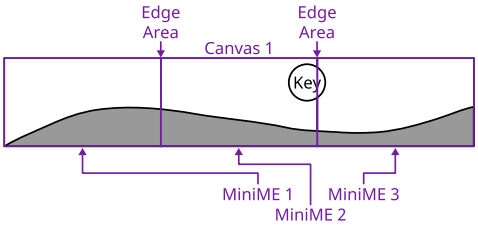
Supported Dynamic Ranges

- **SDR** — Standard Dynamic Range.
- **HLG** — Hybrid Log Gamma.
- **PQ** — Perceptual Quantizer.
- **S-Log3** — Sony® S-Log3.

MultiScreen

The MultiScreen is made up of a number of Canvas generators. Each Canvas breaks the scene up into separate outputs (MiniME™ outputs) that can be sent to independent projectors or displays to make a unified picture.

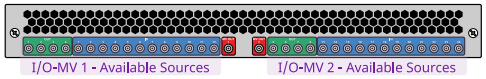
Each screen in the Canvas output uses a MiniME™ to create the background and keys of the output.



MultiViewer

Each MultiViewer allows you to view up to 16 video sources (32 with Shift), in 51 different layouts, from a single output BNC. Any video source on the switcher, including ME Program, Preview, and Media-Store channels, can be routed to any box on the Video Processor MultiViewer. All boxes on the MultiViewer output include mnemonic source names and red and green tallies.

The I/O MultiViewers can only show sources from the I/O Group that they are associated with on the same board.



The MultiViewer Shift features allows you to access a shifted set of sources for the MultiViewer by pressing the **SHIFT** button on a control panel or in ViewControl. The

MultiViewer Shift functionality can only be assigned to a single panel at a time.

Each MultiViewer head supports an integrated clock that can display time of day, timecode, or a countdown timer. The position, size, and color of the clock can be adjusted.

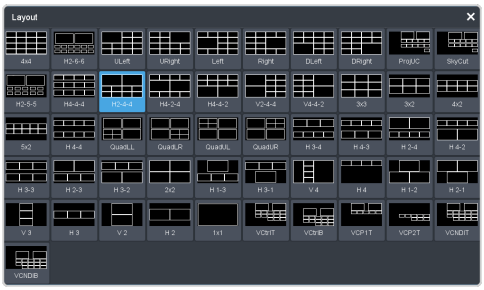


Figure 1: HD Layouts

Figure 2: MultiViewer Grid

ViewControl

The ViewControl touchscreen interface through DashBoard allows you to select sources on switcher buses, perform transitions, and run custom controls to recall memories or control external devices. The MultiViewer Shift function allows you to assign sources to a shifted set of MultiViewer boxes, expanding the number of sources available on ViewControl from 16 to 32.

> ***Tip:*** *It is recommended that the large Preview and Program boxes not be assigned shifted sources as they will follow the bus selecting.*

ViewControl takes the MultiViewer output of the switcher and overlays the DashBoard interface over it. Bringing the MultiViewer output into DashBoard is accomplished either by using multiple SDI/HDMI™ converters or a single SDI to NDI® converter.

OverDrive® Caprica Support

Ultra 60 can be controlled from OverDrive® using the Caprica interface. This interface allows OverDrive® to perform memory recalls, transitions, and run custom controls on the switcher. For information on setting up Caprica to interface with the switcher, refer to the documentation that came with your Caprica server.

Pattern and Matte Generators

A single pattern generator dedicated to wipes comes standard, and is equipped with 10 classic wipes. Most wipes can be rotated, bordered, multiplied, aspectized, and repositioned.

Tally Outputs

The switcher has 24 assignable tally transistors located in the rack frame. Each tally can be assigned to any number of combinations of input and output or bus.

UltraChrome

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

Ross Platform Manager Licensing

RPM licenses are issued by the Ross Activation Server under a Customer Product Key. The Product Key is then added to a Ross Platform Manager that multiple switchers can access to request software licenses. Each switcher must request and release licenses from/to the Ross Platform Manager.

RPM licenses can easily be requested or released from a switcher to a pool of licenses on the Ross Platform Manager. This allows you to move licenses between different studios depending on production needs by releasing licenses from one switcher and requesting them by another.

> ***Note:*** *A network connection to the Ross Platform Manager is required to request or release RPM licenses.*

> ***Note:*** *Ross Keys licenses are not impacted by RPM licenses. All licenses are cumulative and can be combined on the same switcher.*

> ***Tip:*** *A new switcher set register has been added to store RPM license requests.*

XPression Live CG

Seamlessly combine the creative power of the Ross® XPression Designer software with the ease of use of your Ross® switcher. Create stunning

still graphics using XPression Designer, and transfer them directly to an media-store channel on the switcher using the RossLinq interface. Up to four (4) channels with dedicated alpha can be controlled from the XPression Software Client. This feature supports still images only.

Each switcher comes with a single license of XPression. Additional licenses can be ordered.

Note: *A separate Windows® PC with an NVIDIA® graphics card is required to use this option. PC no provided.*

Product Comparison

Use the following table to compare the different switchers in the product line.

TouchDrive Control Panels

	TD1C	TD1	TD2	TD2S	TD3S	TD3	TD4	TDx3	TDx4
Control Panel									
Panel Source Buttons per Row	15	15	15	25	25	35	35	35	35
Number of User Assignable Buttons per Row	15	15	15	25	25	35	35	35	35
Number of Control Panel Rows	1	1	2	2	3	3	4	3	4
Dual Delegation Row	No							Yes	
DashBoard Interface	Yes								
Touchscreen Monitor	Optional								
Integrated Touchscreen Panel Displays	Yes								
Button Colors	Full HSL								
Mnemonic Colors	20 (background and text)								
Source Mnemonic Icons	Yes								
Legendary Ross Fader Handle with Lifetime Guarantee	Yes								
Positioner	Z Axis					Z Axis plus Flex Buttons			
Flex Control Module	No					1	2	1	2
On Panel Mini Menu	1 Touch Display with 3 Knobs					2 Touch Displays with 6 Knobs			
In Row Memory Keypad	No			Yes					
Engineering and Networking									
Redundant Power	Yes (optional)								
Ethernet Connectivity	1 × 2.5GigE								
USB	4 × USB 2.0, 1 × USB 3.0								

Ultra 60 Frames

	Ultra 60
Frame	
Separate Rack Frame	Yes
Rack Frame Height	3 RU
Redundant Power	Yes (optional)
Power Supplies	Internal Power Supply Module
Video Input/Output	
UHDTV1 Video Formats	UHDTV1 23.98/24/25/29.97/30/50/59.94/60
HD Video Formats	1080p 23.98/24/25/29.97/30/50/59.94/60 1080pSF 23.98/24/25/29.97/30 1080i 50/59.94 720p 50/59.94
SD Video Formats	-future release-
HD-BNC Inputs (max)	60[2]
HDMI Inputs	0
Analog Inputs	0
HD-BNC Outputs (max)	20[2]
Clean Feed System	Yes
Input Reference Format	Internal / Black Burst / Tri-Level
Reference Inputs	1
Reference Outputs	1
Storage and Networking	
Media-Store Storage	1 × USB
Media-Store CACHE	12 GB[3]
Audio Only Playout for Media-Store	Yes[4]
Ethernet Connectivity	1 × GigE
Linux® OS	Yes
Peripheral Interfacing	
Device Control	Yes
OverDrive®Caprica Compatible	Yes
Roll Clip Control	AMP/RossTalk/GPI Output
Serial Ports	0
Ethernet Serial Port Expanders	Comtrol® DeviceMaster® RTS Series

	Ultra 60
Automation and Editor Protocols	RossTalk/GVG100/OGP
GPI I/Os	24
Tallies	24
USB Ports	3 × USB 3.0

Notes

[1] The number of actual SDI input and output signals depends on the mode (SD, HD, or UHDTV1) that the switcher is operating in and what software options have been installed.

[2] The number of SDI inputs and outputs depends on the number of Ultra 60 I/O boards installed.

[3] The Media-Store cache is broken into 3 × 4GB blocks. Channels 1,3,7 have access to the first block, 2,4,8 have access to the second, and 5,6 have access to the last.

[4] Only Media-Store channels 1 and 2 support audio.

Hardware Options

Hardware Options are typically ordered when the switcher is purchased. However, you can order options if your needs change in the future. Most of our options can be easily installed in the field. You can take comfort in knowing that you can purchase options in the future and that installation at your site will be a smooth process.

Control Panels

Control Panels

Select the control panel that meets the needs of your production environment.

Option	Description
TouchDrive Panels	
TD1C-PANEL	A compact rack-mountable panel with 15 source buttons, 15 user select buttons (plus 3 in the transition area), independent keyer and transitions areas, updated 3-knob menu interface, and an advanced z-axis positioner.
TD1-PANEL	The same features as the TD1C panel but in a standard panel row design.
TD2-PANEL	The same features as the TD1 panel, but with 2 panel rows.
TD2S-PANEL	The same features as the TD2 panel, but with 25 source buttons, 25 user select buttons (plus 3 in the transition area), and an Acuity® style memory area with keypad and rate buttons.
TD3S-PANEL	The same features as the TD2S panel, but with 3 panel rows.
TD3-PANEL	The same features as the TD3S panel, but with 35 source buttons and 35 user select buttons per row, a single Flex Control module, an advanced Positioner module, a stacked 3-knob menu with two displays, and a second Row Control display at the left end of the each row.
TD4-PANEL	The same features as the TD3 panel, but with 4 panel rows, and an additional Flex Control module.
TDx3-PANEL	The same features as the TD3 panel, but the single keyer row is replaced with a Dual Delegation keyer row providing two rows of buttons.
TDx4-PANEL	The same features as the TDx3 panel, but with 4 panel rows.

Note: *The TouchDrive control panels do not come with power supplies. You must pick either a standard brick power supply (CUF-PSU), or a rack power option (CUF-RACKPWR) to provide power for the control panel.*

TouchScreen Display

A 15.6-inch 1920×1080 touchscreen monitor that connects directly to the TouchDrive control panel for power, DashBoard interface, and touch-control.

Note: *A separate VESA®-100 (VESA® MIS-D, 100, C) mounting arm is required for the display.*

Tip: *The Touchscreen Display gets power directly from the control panel and uses the panel redundant power.*

Option	Description
TD-TOUCHSCREEN	The 15.6-inch touchscreen monitor.

Note: *Third party touchscreens are not supported. If you want to use a different display with the TouchDrive control panel, it must be a standard display used in conjunction with a mouse and keyboard.*

Power Supplies

Note: *The TouchDrive control panel does not come with a power supply. You must pick either a standard brick power supply (CUF-PSU), or a rack power option (CUF-RACKPWR) to provide power for the control panel.*

The redundant power supply options provides protection against AC power failure. It allows two external power supplies to receive power from independent power sources. Complete failure of one source, or power supply, will not affect standard operations. If the main AC power fails, power is drawn from the remaining source. The transition from one power source to the other is totally transparent and has no effect on operations; a critical feature should one power source fail during an on-air broadcast.

Tip: *You can order a second CUF-PSU option to provide redundant power for the control panel.*

Option	Description
CUF-PSU	Adds a brick power supply for the TouchDrive control panel.

Option	Description
CUF-RACKPWR	Adds the Ultripower rack power supply for the TouchDrive control panel.
PSU-12V16A-2PIN	Adds a redundant power supply for the CB9 control panel.

Table 1: Number of Required Power Supplies

Panel	Primary Power	Full Redundant Power
TD1	1	2 (1+1)
TD1C	1	2 (1+1)
TD2	1	2 (1+1)
TD2S	1	2 (1+1)
TD3S	1	2 (1+1)
TD3	2	4 (2+2)
TD4	2	4 (2+2)
TDx3	2	4 (2+2)
TDx4	2	4 (2+2)

Extended Warranty

This extends the standard one-year warranty on your control panel by one year. Additional years can be purchased if required.

Option	Description
TouchDrive	
TD1C-PANEL-HM	Adds an additional year of warranty to the TD1C control panel.
TD1-PANEL-HM	Adds an additional year of warranty to the TD1 control panel.
TD2-PANEL-HM	Adds an additional year of warranty to the TD2 control panel.
TD2S-PANEL-HM	Adds an additional year of warranty to the TD2S control panel.
TD3S-PANEL-HM	Adds an additional year of warranty to the TD3S control panel.
TD3-PANEL-HM	Adds an additional year of warranty to the TD3 control panel.
TD4-PANEL-HM	Adds an additional year of warranty to the TD4 control panel.
TDx3-PANEL-HM	Adds an additional year of warranty to the TDx3 control panel.
TDx4-PANEL-HM	Adds an additional year of warranty to the TDx4 control panel.
TD-TOUCHSCREEN-HM	Adds an additional year of warranty to the touchscreen display.

Frame

Ultra 60 Frame (CUF3-112)

The Ultra 60 comes standard with the following in HD video mode:

- 1 ME
- 4 MiniME™ Engines
- 4 UltraScene Scenes
- 12 input HD-BNCs
- 4 output HD-BNCs
- 1 Reference Input
- 1 Reference Output
- 2 Video Processor MultiViewer Outputs
- 1 Dedicated I/O MultiViewer Output
- 12 I/O Processors
- 24 GPI I/Os
- 24 Tallies
- 1 MADI Port
- 1 LTC Output

Power Supplies

The redundant power supply options provides protection against AC power failure. It allows two power supplies to receive power from independent power sources. Complete failure of one source, or power supply, will not affect the operation of the switcher. If the main AC power fails, the switcher instantly draws power from the remaining source. The transition from one power source to the other is totally transparent and has no effect on the output of the switcher; a critical feature should one power source fail during an on-air broadcast.

Tip: *You can order a second CUF3-PSU option to provide redundant power for the frame.*

Option	Description
CUF3-PSU	Adds a second internal power supply module for the frame.

Additional I/O Boards

The number of HD-BNC inputs and outputs can be increased with additional I/O boards.

Option	Resources
Base	12 × Inputs
	4 × Outputs
	1 × I/O MultiViewer
1 × CUF3-ADD-I/O -BOARD	36 × Inputs (12 + 24)
	12 × Outputs (4 + 8)
	3 × I/O MultiViewer (1 + 2)
2 × CUF3-ADD-I/O -BOARD	60 × Inputs (12 + 24 + 24)
	20 × Outputs (4 + 8 + 8)
	5 × I/O MultiViewer (1 + 2 + 2)

Extended Warranty

This extends the standard one-year warranty on your frame and Ultra 60 I/O boards by one year. Additional years can be purchased if required.

Option	Description
CUF3-112-HW	Adds an additional year of warranty to the base frame.
CUF3-ADD-I/O -BOARD-HW	Adds an additional year of warranty to a single Ultra 60 I/O board.
Audio	
GRAPHITE-1RU -AUDBKM-ROSSCARE	Adds an additional year of warranty to the 1RU Audio Breakout Unit

Tip: *The CUF3-ADD-I/O-BOARD-HW option adds an additional year of warranty to a single Ultra 60 I/O board. For example, if you have two Ultra 60 I/O boards and want to add two years of warranty to each, you must order 4 CUF3-ADD-I/O -BOARD-HW options.*

Optional Hardware

1RU Audio Breakout Unit (ABU)

The 1RU Audio Breakout Unit supports the RAVE audio engine by providing dedicated analog (XLR and headphone) and AES inputs and outputs for the audio mixer. The audio signals are embedded/de-embedded into video streams going between the switcher and the ABU.

You can connect up to 3 ABUs to the switcher.

Option	Description
GRAPHITE-1RU -ABU-12G	Single ABU-12G with 8 Analog and 1 AES inputs and 5 Analog and 1 AES outputs.
CUF3-RAVE-AUDIO -BUNDLE	Add the RAVE audio mixer and a single ABU-12G.

Ultritouch

The 2 or 4 RU rack mountable Ultritouch adaptable system control panel allows you to control some aspects of switcher operation using a DashBoard interface.

The DashBoard interface on Ultritouch provides status, buses, and custom control tabs. You must connect to the switcher from Ultritouch to be able to control the switcher functions.

Option	Description
ULTRITOUCH-2-HR	2RU Ultritouch High Resolution adaptable system control panel.
ULTRITOUCH-4	4RU Ultritouch adaptable system control panel.
ULTRITOUCH-PS	Ultritouch redundant power supply.

Remote Panels

This option provides external control for selecting sources on an Aux bus from a remote panel. There are a number of options for the remote control panels, depending on your requirements.

Option	Description
RCP-ME	Adds the 40 source button ethernet enabled RCP-ME remote control panel with integrated backlit display.
RCP-QE18	Adds the 18 mnemonic source button ethernet enabled RCP-QE18 remote control panel.
RCP-QE36	Adds the 36 mnemonic source button ethernet enabled RCP-QE36 remote control panel.

XPression Live CG (XDS0-0001-CPS)

Each switcher comes standard with a single license of XPression that provides up to two (2) channels with dedicated alpha that can be controlled from the XPression Software Client. This feature supports still images only.

The XPression Designer requires a computer with a Windows® 10 or 11 operating system and an NVIDIA® graphics card.

SHC-9642 SDI to HDMI Converter (SHC-9642)

The SHC-9642 SDI to HDMI Converter is a high-quality signal conversion solution within the family of GearLite compact, self-contained modular products. The SHC-9642 is the ideal solution for converting any SDI input signal (up to 3Gb/s) into an HDMI Type-A output format. User-selectable audio decoding is available with unbalanced, stereo analog audio outputs. Up to 16 channels of embedded audio are selectable, in stereo pairs, for de-embedding and decoding.

Tip: *The SHC-9642 SDI to HDMI Converter is a great way to convert a 3Gb/s MultiViewer output to HDMI™ for external monitoring.*

HD-BNC to BNC Adapters

Option	Description
CUF-HDBNC-BNC	8 HD-BNC to BNC cable adapters.

Software Options

Software Options can be installed at any time to expand the functionality or resources of your switcher. Software options can be obtained either permanently using Ross Keys or temporarily using Ross Platform Manager (RPM).

- **Ross Keys Licenses** — a one-time key is permanently applied to your switcher to unlock the purchased software options. These options cannot be externally managed and are only available to the switcher they were purchased for.
- **RPM Licenses** — a pool of multi-use licenses are accessed from Ross Platform Manager using a Customer Product Key. Any switcher of the same make and model with the Customer Product Key can connect to the RPM server and request software license from the pool or release licenses back to the pool.

ME Upgrade

Ultra 60 comes standard with 1 HD/UHD ME (ME P/P) and can be expanded to 3 HD/UHD MEs.

Note: *Support for UHDTV1 video modes comes standard. The resources that are available depends on the MEs licensed and the mode the switcher is operating in.*

Note: *The ME options are added through DashBoard using license keys and can be increased at any time.*

Software License	Resources / Switcher Modes		
	HD	UHD 2 ME 2 MM	UHD 3 ME
Base (1 ME)	1 × ME	1 × ME	--
	6 × Keys/ME	6 × Keys/ME	
	4 × MiniME™	2 × MiniME™	
	4 × UltraScene	4 × UltraScene	
CUF3-ADD-ME2 (2 MEs)	2 × ME	2 × ME	--
	6 × Keys	6 × Keys	
	4 × MiniME™	2 × MiniME™	
	4 × UltraScene	4 × UltraScene	
CUF3-ADD-ME3 (3 MEs)	3 × ME	2 × ME	3 × ME
	6 × Keys	6 × Keys	6 × Keys
	4 × MiniME™	2 × MiniME™	0 × MiniME™
	4 × UltraScene	4 × UltraScene	0 × UltraScene

I/O Processor Upgrade

The Input/Output Video Processors are independent video processing engines that allow you to perform FSFC and color correction functions on specific inputs or outputs. Once an I/O Processor has been assigned to an input or output, it can be used to frame sync, format convert, frame delay, and color correct.

Note: *FSFCs and PA/CC are assigned independently. If you assign a PA/CC to an input, that does not consume a FSFC for that input as well.*

Ultra 60 comes standard with 12 Input Processors and 4 Output Processors that can be assigned to any input or output in the system.

Note: *The I/O Processor options are added through DashBoard using license keys and can be increased at any time.*

Option	Description
CUF3-ADD-I/OPLUS	Add 12 Input Processors and 4 Output Processors that can be assigned to any input or output.

Tip: *You can add up to 4 CUF3-ADD-I/OPLUS options to the Ultra 60.*

Software License	Resources / Switcher Modes		
	HD	UHD 2 ME 2 MM	UHD 3 ME
Base System	12 × Input	8 × Input	
	4 × Output	4 × Output	
1 × CUF3-ADD-I/OPLUS	24 (12+12) × Input	16 (8+8) × Input	
	8 (4+4) × Output	8 (4+4) × Output	
2 × CUF3-ADD-I/OPLUS	36 (24+12) × Input	24 (16+8) × Input	
	12 (8+4) × Output	12 (8+4) × Output	

Software License	Resources / Switcher Modes		
	HD	UHD 2 ME 2 MM	UHD 3 ME
3 × CUF3-ADD-I/OPLUS	48 (36+12) × Input	32 (24+8) × Input	
	16 (12+4) × Output	16 (12+4) × Output	
4 × CUF3-ADD-I/OPLUS	60 (48+12) × Input	40 (32+8) × Input	
	20 (16+4) × Output	20 (16+4) × Output	

RAVE Audio Mixer

RAVE (Ross Audio Video Engine) breaks the mold of uninspired audio capability in all-in-one production systems. RAVE includes internal audio routing and output channel shuffling, together with a hardware-based 24bit digital audio production mixer.

All audio streams are 24bit at 48kHz and can be controlled from DashBoard.

The 1RU Audio Breakout Unit (ABU) provides a number of analog and AES input and output ports. The analog inputs have direct control over up to 60dB of gain, up to 14 frames of audio delay, phantom power on/off, and 20dB pad on/off per input. These audio inputs and outputs are fed back and forth to the switcher as embedded audio in the SDI-Audio Loop.

Option	Description
CUF3-RAVE-AUDIO	Add the RAVE audio mixer.
CUF3-RAVE-AUDIO -BUNDLE	Add the RAVE audio mixer and a single ABU-12G.

MIDI Panel

RAVE supports a standard USB MIDI interface for the Behringer X-TOUCH COMPACT MIDI panel, but other untested USB MIDI or standard MIDI interface devices can be used.

The Behringer X-TOUCH COMPACT MIDI panel interface supports the control of audio levels, and other mixer functions, as well as EQ/CL. Preconfigured layouts based on the RAVE audio mixer are provided.

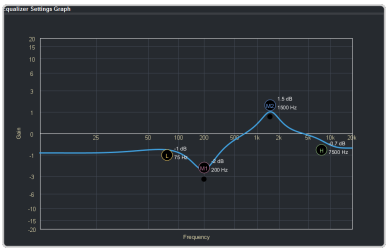
The MIDI controller is used to control the RAVE audio mixer through DashBoard.

Noise Gate (NG)

The audio noise gate allows you to attenuate audio levels that are below a set threshold. These are often used to reduce background noise from the audio output signal. The noise gate does not remove the noise, but attenuates the entire signal when it is below the set threshold. When the input audio level is below the threshold the noise gate is closed and the attenuation is applied. When the input audio level passes above the threshold, the gate opens and the attenuation is removed. You can adjust how quickly the attenuation is removed once the threshold is surpassed as well as how quickly it is applied when the audio level drops below the threshold.

Audio Equalization (EQ)

The audio equalizer (EQ) allows you to enhance the sound quality of audio sources. An independent stereo equalizer is available for every audio fader in the system and allows for adjustment in four bands (low-shelf, mid-range 1/2, high-shelf).



The EQ graph allows you to visualize the EQ adjustments as well as actively change them on the graph.

Tip: *You can change the processing order of the EQ and CL.*

Compressor/Limiter (CL)

The audio compressor allows you to restrict audio levels from passing a threshold level. These are often used to prevent digital clipping of audio levels that are too high for output equipment. Once the threshold is reached, the compressor starts to reduce the gain at a specific ratio. The higher the compression ratio, the harsher the reduction in gain. The compression continues until the audio level falls below the threshold. You can adjust how quickly the compressor is applied once the threshold is surpassed as well as how long after the level drops below the threshold that the compressor is still applied.

Tip: You can change the processing order of the EQ and CL.

MADI

The MADI interface supports an SFP transceiver module using the AES10-1991, AES10-2003, and AES10-2008 specifications for a maximum of 56 or 64 audio channels, depending on the specification. The **MADI** SFP port is located on the back of the frame.

Note: The MADI interface is only available with the Audio Mixer software license (CUF3-RAVE-AUDIO).

- **Inputs** — Audio channels from the MADI SFP must be assigned to an audio fader for them to be available in the switcher.
- **Outputs** — Audio channels to the MADI SFP are fixed to specific audio sources from the switcher.

Option	Description
SFP-MADI-COAX	Embrionix EB06HDRT-MN-MADI, a medium reach electrical MADI Audio SFP (emSFP) transceiver module.
SFP-MADI-850MM	Embrionix GO2949-85CL, a short reach optic video SFP.

Training and Commissioning Options

Carbonite Onsite Operational Training

Although Ross Video switchers are designed to be as easy as possible to install and operate, training is highly recommended to ensure that the process of taking your Ross Video switcher to air is a smooth one.

Training is provided on the customer's equipment at their site. Expenses are extra, and billed at the completion of the visit. Ross Video cannot guarantee the availability of a local Trainer, as such, travel costs to all locations will be invoiced at cost. Two (2) days, or more, of training is recommended for multiple ME systems. Four (4) weeks advanced scheduling notice is required. Additional days of training can be added with the **CARBONITE-OTR-1DAY** option. Please quote one additional option for each additional day of training required.

Customers cancellation or rescheduling of on-site services without seven (7) calendar days advanced notice will incur full invoice.

Option	Description
CARBONITE-OTR-1DAY	Add 1 Day of on-site operational training.

Carbonite Online Operational Training

Sometimes you don't need the hands-on attention that having a trainer come to your facility provides. In these situations Ross Video provides comprehensive, web-based, online training.

Two (2) days, or more, of training is recommended for multiple ME systems. Four (4) weeks advanced scheduling notice is required. Additional days of training can be added with the **CARBONITE-ONL-1DAY** option. Please quote one additional option for each additional day of training required.

Customers cancellation or rescheduling of on-site services without seven (7) calendar days advanced notice will incur full invoice.

Option	Description
CARBONITE-ONL-1DAY	Add 1 Day of online operational training.

Carbonite Onsite Technical Training

On-site technical training introduces the user to some of the technical aspects of switcher operation and maintenance. This includes, but is not limited to; Basic operation, Switcher installation and configurations, Peripheral interfaces, Video signal flow, System timing requirements, Circuit block diagrams, Circuit board overviews, Jumpers and indicators, Troubleshooting tips, Software upgrading, and Routine maintenance.

Training is provided on the customer's equipment at their site. Expenses are extra, and billed at the completion of the visit. Ross Video cannot guarantee the availability of a local Trainer, as such, travel costs to all locations will be invoiced at cost. Two (2) days, or more, of training is recommended for multiple ME systems. Four (4) weeks advanced scheduling notice is required. Additional days of training can be added with the same option code. Please quote one additional option for each additional day of training required.

Option	Description
CARBONITE-OTT-1DAY	Add 1 Day of on-site technical training.

Carbonite Onsite Commissioning

On-site Commissioning is a great way to ensure that your switcher is properly installed into your facility and tuned to maximum performance.

Once the customer has installed and cabled the equipment, a Ross Commissioning expert will come on site to get the switcher configured, verify that all peripheral interfaces are operating properly, provide a basic technical orientation, and help you get on the air.

Training is provided on the customer's equipment at their site. Expenses are extra, and billed at the completion of the visit. Ross Video cannot guarantee the availability of a local Trainer, as such, travel costs to all locations will be invoiced at cost. Two (2) days, or more, of training is recommended for multiple ME systems. Four (4) weeks advanced scheduling

notice is required. Additional days of training can be added with the same option code. Please quote one additional option for each additional day of training required.

Customers cancellation or rescheduling of on-site services without seven (7) calendar days advanced notice will incur full invoice.

Please note that commissioning does not replace operator or technical training. Contact your Ross representative to discuss which types of assistance are best suited to your needs.

Option	Description
CARBONITE-COM-1DAY	Add 1 Day of on-site commissioning.

Specifications

Switcher resources, video specifications, power rating, and port pinouts.

Resources

The number of resources specific to your switcher depends on the options installed.

	HD	UHD 3 ME	UHD 2 ME 2 MM
Audio			
Audio Mixer Faders	48		
Mix Layers	13		
Max 1RU Audio Breakout Unit	3		
Video			
MEs (Max)[1]	3	3	2
MiniME™ Engines	4	0	2
Keyers per ME (+Trans)	6		
Canvas Generators	2[2]	0[2]	1[2]
Video Processor MultiViewer (Max)[1]	2	1	1
MultiViewer Boxes	16		
MultiViewer Layouts	51		
I/O MultiViewer (Max)[1]	5		
I/O Processor (Max)[1]	80 (60 In + 20 Out)	40[5](20 In + 20 Out)	
Input FSFCs (Max)[1]	60[5]	40	
Output FCs (Max)[1]	20[5]	20	
Frame Delay (Max Frames)	13		
Proc Amp/Color Correctors (Max)[1]	60	40 (8 per I/O Group)	
2D DVE Channels Switcher Wide	12	8	
Aux Buses	28		
Chroma Keys (floating)	4	2	
Custom Controls	256 (8 Banks × 32 CCs)		
Max Events per CC	998		
GPI I/Os	24		
Media-Store Channels (Video + Alpha)	8	6	
Media-Store CACHE	12 GB[3]		
Memories per ME	100		
Pattern Generators per ME	2	1	
Matte Generators per ME (1+ Global)	2	2	
UltraScene Scenes (Max)	4	0	4
Sequencers (Max)	5		
Tallies	24		
SDI Video Inputs (Max)[4]	60		

	HD	UHD 3 ME	UHD 2 ME 2 MM
SDI Video Outputs (Max)[4]	20 (+MV Outputs[6])		
Frame IP (default)	192.168.0.123		
Panel/CarboNET IP (default)	192.168.0.129		

Notes:

[1] Software options are required to be installed to activate the maximum number of resources.

[2] Each Canvas consumes MiniME™ engines to generate the output. The number of Canvas outputs that are available depends on the number of MiniME™ engines that are available.

[3] The Media-Store cache is broken into 3 × 4GB blocks. In HD, channels 1,3,7 have access to the first block; 2,4,8 have access to the second; and 5,6 have access to the last. In UHDTV1, channels 1,3 have access to the first block; 2,4 have access to the second; and 5,6 have access to the last.

[4] The total number of Inputs and Outputs depends on the number of Ultra 60 I/O boards installed in the frame.

[5] In HD the total number of input FSFCs, and output FCs is shared. In UHDTV1 there are separate input FSFC, and output FC resources.

[6] Up to 5 additional outputs are fixed to I/O MultiViewers.

Table 2: Audio Mixer Available Audio Channels

	0 ABU	1 ABU	2 ABU	3 ABU
Analog	0	4 stereo pairs	8 stereo pairs	12 stereo pairs
AES	0	1 stereo pair	2 stereo pairs	3 stereo pairs
SDI (1-24)[1]	192 stereo pairs	184 stereo pairs	176 stereo pairs	172 stereo pairs
Media-Store (1-2)	2 stereo pairs	2 stereo pairs	2 stereo pairs	2 stereo pairs
Total Channels	**194 stereo pairs**	**191 stereo pairs**	**188 stereo pairs**	**189 stereo pairs**

Notes

[1] When the 1RU Audio Breakout Unit is connected to the switcher, the HD-BNCs used for the SDI-Audio Loop are not available for embedded audio. This uses one SDI input and one SDI output.

Hardware Weights

Hardware	Weight
Ultra 60	47 lbs (21.3 kg)

Environmental Characteristics

	All Switchers
Ambient Temperature Range	Operating: 0 - 40°C (32 - 104°F) Storage: -20 - 70°C (-4 - 158°F)
Ambient Humidity Range	Operating: 20% - 80% (non-condensing)
Frame Cooling	Active, Front-to-Back airflow

Video Input Specifications

Input Specification	Value
UHDTV1 Video Formats	UHDTV1 23.98/24/25/29.97/30/50/59.94/60
HD Video Formats	1080p 23.98/24/25/29.97/30/50/59.94/60 1080pSF 23.98/24/25/29.97/30 1080i 50/59.94 720p 50/59.94
SD Video Formats	-future release-
Dynamic Range Support (HD and UHDTV1 only)	Standard Dynamic Range (SDR) Hybrid Log Gamma (HLG) Perceptual Quantizer (PQ) Sony® S-Log3.
Color Gamut Support (HD and UHDTV1 only)	BT.709 BT.2020
Equalization (using Belden cable)	<35m @ 12Gb/s (0°-40°C, 1694A cable)
	<40m @ 12Gb/s (0°-40°C, 4694R cable)
	<45m @ 6Gb/s (0°-40°C, 1694A cable)
	<175m @ 3Gb/s (0°-40°C, 1694A cable)
	<260m @ 1.5Gb/s (0°-40°C, 1694A cable)
Impedance	75 ohm, terminating
Video Inputs, SDI	SMPTE 259M/292M/424M/ST-2082 (non-looping)
Reference Inputs (terminating)	Standard Definition — analog black
	High Definition — tri-level sync

Video Output Specifications

Output Specification	Value
UHDTV1 Video Formats	UHDTV1 23.98/24/25/29.97/30/50/59.94/60
HD Video Formats	1080p 23.98/24/25/29.97/30/50/59.94/60 1080pSF 23.98/24/25/29.97/30 1080i 50/59.94 720p 50/59.94
SD Video Formats	-future release-
Return Loss	<-4dB @ 12GHz
	<-7dB @ 6GHz
	<-17.5dB @ 3GHz
	<-19dB @ 1.5GHz
Rise and Fall Time	30ps ±10% (UHD)
	49ps ±10% (HD)
Signal Level	800mV ±10%
DC Offset	<-7mV
Overshoot	<10%
Video Outputs, SDI HD Mode	10-bit SMPTE-292M/424M serial digital

Output Specification	Value
Video Outputs, SDI UHDTV1 Mode	SMPTE ST 2082-1:2015 (Amendment 1:2016)

ABU Analog Audio Input Specifications

Analog audio inputs on the 1RU Audio Breakout Unit.

Specification	Value
Input Impedance	XLR: 2K ohm
	¼" Jack: 10K ohm
Maximum Level	+24dBu
Frequency Response	±0.3dBu (22Hz to 20kHz @ Fs = 48kHz)
Signal to Noise Ratio • "A" Weighting • CCITT Weighting	-95dB -98dB -107dB
THD	>93dB or <0.002%
Amplitude Linearity	<0.8dB @ -100dBFS
Crosstalk	-94dB

ABU Analog Audio Output Specifications

Analog audio outputs on the 1RU Audio Breakout Unit.

Specification	Value
Maximum Level	+24dBu
Frequency Response	±0.4dB (22Hz to 20kHz @ Fs = 48kHz)
Signal to Noise Ratio	-103dB
THD	>93dB
Amplitude Linearity	<0.3dB @ -100dBFS
Crosstalk	-106dB (20Hz to 20kHz)

Jitter

Specification	Value
UHD - Tri-Level Sync	Alignment (> 100KHz) < 0.2UI
	Timing (<10Hz) < 3.0UI
UHD - Composite Reference	Performance not guaranteed with composite reference
HD - Tri-Level Sync	Alignment (> 100KHz) < 0.1UI
	Timing (<10Hz) < 1.0UI
HD - Composite Reference	Performance not guaranteed with composite reference

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.

Max Power Consumption — Frame

	Ultra 60
Consumption	100-127VAC, 6.9A, 621W 200-240VAC, 3.45A, 621W
Input Voltage	100 - 120V~, 220 - 240V~, 47-63Hz

Embedded Audio Assignment

The audio signals are passed back and forth between the 1RU Audio Breakout Unit and the switcher as embedded audio signals in the SDI loop between the components.

The MADI interface supports an SFP transceiver module using the AES10-1991, AES10-2003, and AES10-2008 specifications for a maximum of 56 or 64 audio channels, depending on the specification.

The embedded audio signals sent to the ABU outputs are fully assignable.

ABU Outputs

Table 3: Embedded Audio Signals in SDI Stream From 1RU Audio Breakout Unit

Group	Channel	Input Signal to Mixer
1	1	Group 1 is passed through from SDI 1 IN. Audio delay can still be applied independently to these inputs.
	2	
	3	
	4	
2	1	Analog Input 1
	2	Analog Input 2
	3	Analog Input 3
	4	Analog Input 4
3	1	Analog Input 5
	2	Analog Input 6
	3	Analog Input 7
	4	Analog Input 8
4	1	AES Input — Left Channel
	2	AES Input — Right Channel
	3	unused
	4	unused

Note: *All embedded audio streams going to the 1RU Audio Breakout Unit pass through the hardware and are available on the SDI1 OUT.*

MADI Outputs

Audio channels to the MADI SFP are fixed to specific audio sources from the switcher.

Table 4: MADI Audio Output Mapping

MADI Channel	Switcher Audio Source
1	Main Left
2	Main Right
3	Aux 1 Left
4	Aux 1 Right
5	Aux 2 Left
6	Aux 2 Right
7	Aux 3 Left
8	Aux 3 Right
9	Aux 4 Left
10	Aux 4 Right
11	Aux 5 Left
12	Aux 5 Right
13	Aux 6 Left
14	Aux 6 Right
15	Aux 7 Left
16	Aux 7 Right
17	Aux 8 Left
18	Aux 8 Right
19	Aux 9 Left
20	Aux 9 Right
21	Aux 10 Left
22	Aux 10 Right
23	Aux 11 Left
24	Aux 11 Right
25	Aux 12 Left
26	Aux 12 Right
27	ABU Analog 1-1
28	ABU Analog 1-2
29	ABU Analog 1-3
30	ABU Analog 1-4
31	ABU Analog 1-5
32	ABU Analog 1-6
33	ABU Analog 1-7
34	ABU Analog 1-8
35	ABU Analog 2-1
36	ABU Analog 2-2

MADI Channel	Switcher Audio Source
37	ABU Analog 2-3
38	ABU Analog 2-4
39	ABU Analog 2-5
40	ABU Analog 2-6
41	ABU Analog 2-7
42	ABU Analog 2-8
43	ABU Analog 3-1
44	ABU Analog 3-2
45	ABU Analog 3-3
46	ABU Analog 3-4
47	ABU Analog 3-5
48	ABU Analog 3-6
49	ABU Analog 3-7
50	ABU Analog 3-8
51	Media-Store 1 Channel 1
52	Media-Store 1 Channel 2
53	Media-Store 2 Channel 1
54	Media-Store 2 Channel 2
55	Clip Player Channel 1
56	Silence

Option Codes

Refer to the individual sections for more detailed information on each option.

TouchDrive Control Panel Options

	TD1C	TD1	TD2	TD2S	TD3S	TD3	TD4	TDx3	TDx4
Control Panels									
Panel	TD1C-PANEL	TD1-PANEL	TD2-PANEL	TD2S-PANEL	TD3S-PANEL	TD3-PANEL	TD4-PANEL	TDx3-PANEL	TDx4-PANEL
Brick Power Supply (Power + Redundant)	CUF-PSU (1+1)					CUF-PSU (2+2)			
Ultripower Rack Power Supply	CUF-RACKPWR								
Extended Warranty, Panel	TD1C-PANEL -HM	TD1-PANEL -HM	TD2-PANEL -HM	TD2S-PANEL -HM	TD3S-PANEL -HM	TD3-PANEL -HM	TD4-PANEL -HM	TDx3-PANEL -HM	TDx4-PANEL -HM
TouchScreen Display									
Display	TD-TOUCHSCREEN								
Extended Warranty, Display	TD-TOUCHSCREEN-HM								

Frame Options

	Ultra 60
Frames	
Base frame with 1 ME and 12 Inputs	CUF3-112
Switcher Hardware	
Ultra 60 I/O Board (×2 max)	CUF3-ADD-I/O-BOARD
Frame Options	
Add 2nd ME	CUF3-ADD-ME2
Add 3rd ME	CUF3-ADD-ME3
HD-BNC to BNC Adapter Cables (set of 8)	CUF-HDBNC-BNC
Power Supply Module	CUF3-PSU
Audio Options	
RAVE Audio Mixer	CUF3-RAVE-AUDIO
1RU Audio Breakout Unit-12G (×3 max)	GRAPHITE-1RU-ABU-12G
RAVE Audio Mixer and ABU Bundle	CUF3-RAVE-AUDIO-BUNDLE
COAX SFP (MADI)	SFP-MADI-COAX
Fiber SFP (MADI)	SFP-MADI-850MM
Switcher Software Licenses	
Extra I/O Processor (24/8 HD)	1 × CUF3-ADD-I/OPLUS
Extra I/O Processor (36/12 HD)	2 × CUF3-ADD-I/OPLUS
Extra I/O Processor (48/16 HD)	3 × CUF3-ADD-I/OPLUS
Extra I/O Processor (60/20 HD)	4 × CUF3-ADD-I/OPLUS

	Ultra 60
Options	
HD-BNC to BNC Adapter Cables (set of 8)	CUF-HDBNC-BNC
SHC-9642 SDI to HDMI Converter	SHC-9642
XPression Live CG	XDS0-0001-CPS
PTZ-12G	PTZ-12G-BLACK
PTZ-NDI	PTZ-NDI-BLACK
2RU Ultritouch	ULTRITOUCH-2-HR
4RU Ultritouch	ULTRITOUCH-4
Ultritouch Redundant Power	ULTRITOUCH-PS
Extended Warranty	
Extended Warranty, Ultra 60 Base System	CUF3-112-HW
Extended Warranty, Ultra 60 I/O Board	CUF3-ADD-I/O-BOARD-HW
Extended Warranty (1RU Audio Breakout Unit-12G)	GRAPHITE-1RU-ABU-12G-ROSSCARE

Training Options

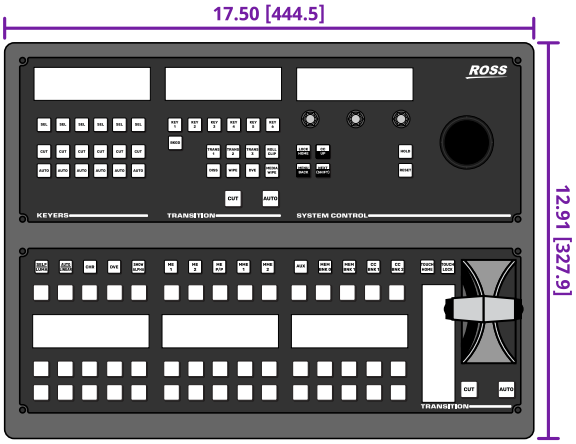
	Code
Carbonite Online Operational Training	CARBONITE-ONL-1DAY
Carbonite Onsite Commissioning	CARBONITE-COM-1DAY
Carbonite Onsite Operational Training	CARBONITE-OTR-1DAY
Carbonite Onsite Technical Training	CARBONITE-OTT-1DAY

Panel Dimensions

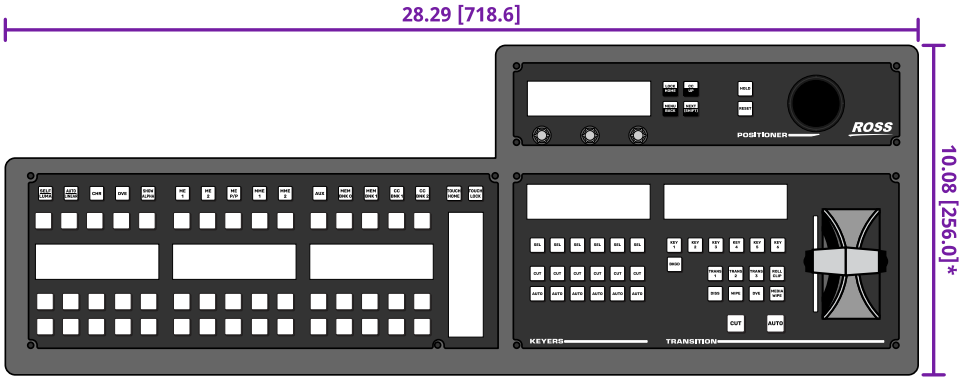
Important: *These dimensions are provided as a guide only. Scale DXF/CAD drawings of the control panels are available from the Ross Video website.*

Dimensions are in inches with metric dimensions shown in brackets [mm].

TD1C

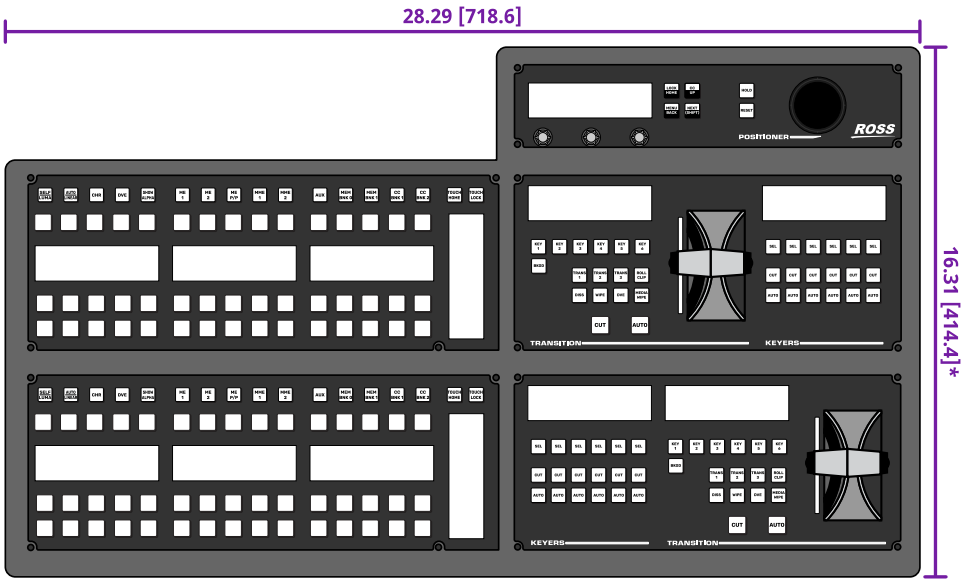


TD1



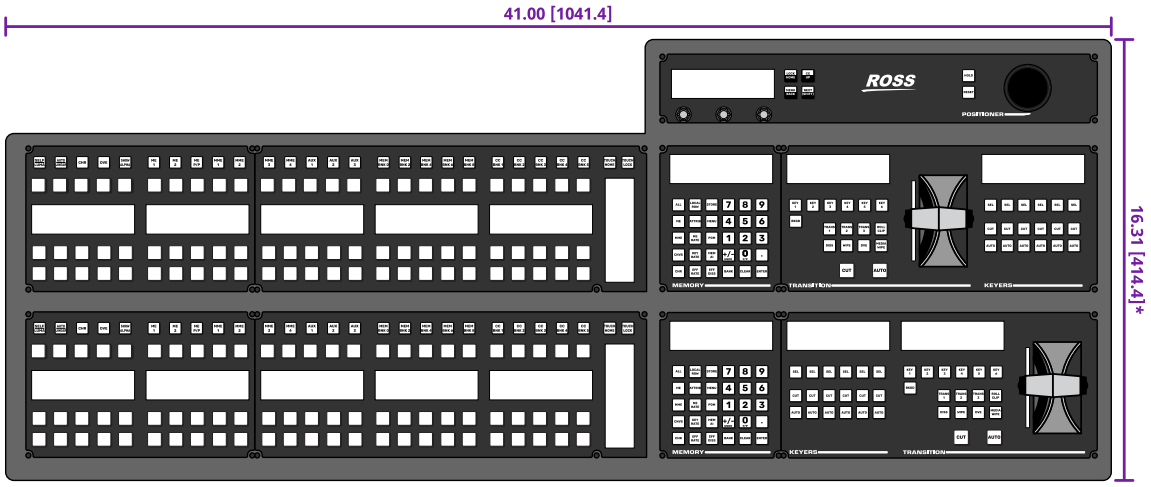
Note: ******* *Because the TouchDrive control panel is curved, the depth measurement is only approximate.*

TD2



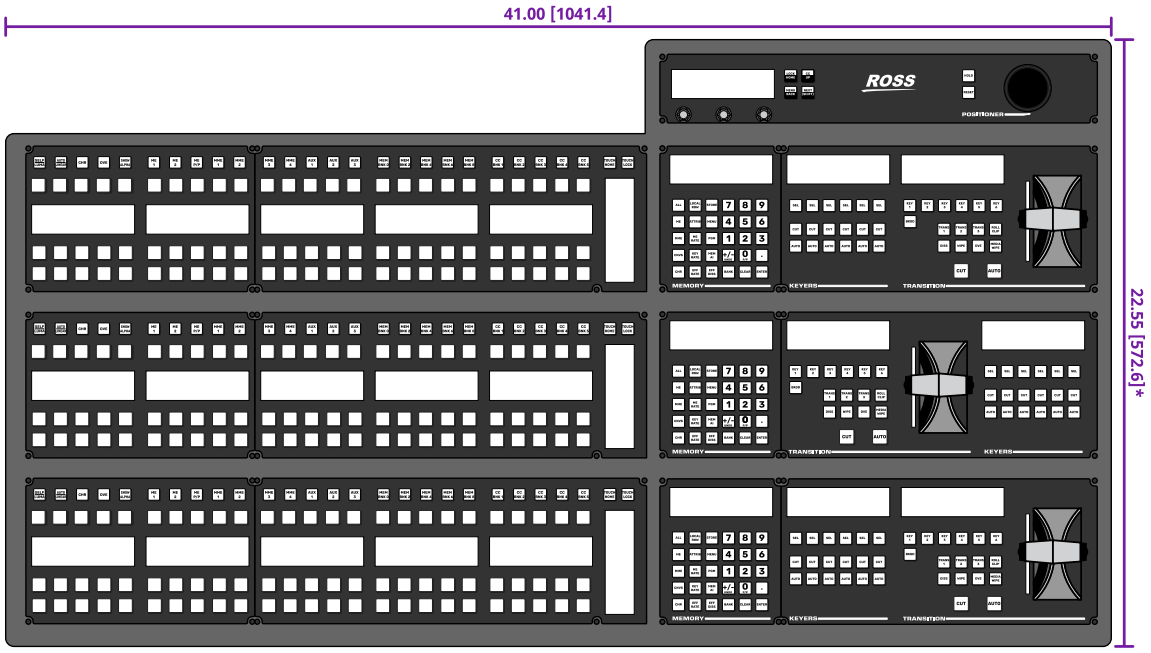
Note: ******* *Because the TouchDrive control panel is curved, the depth measurement is only approximate.*

TD2S



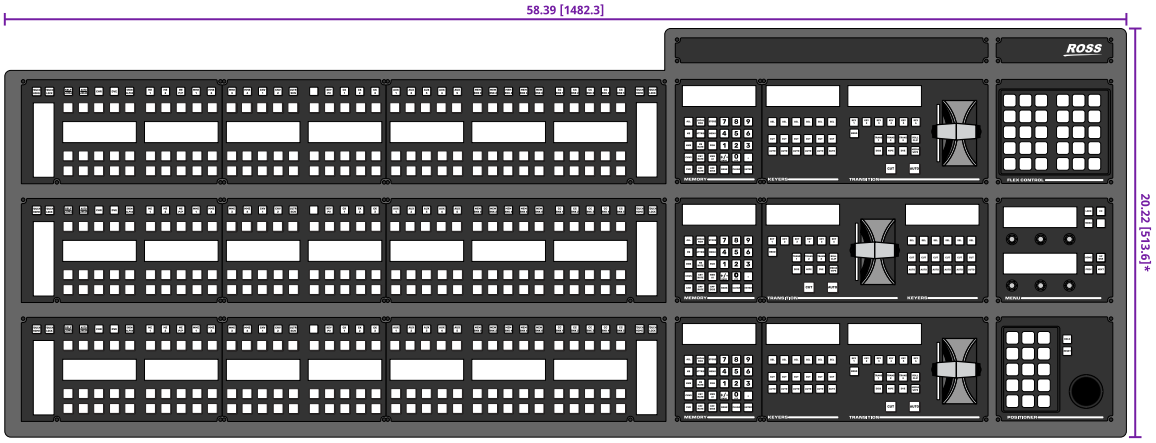
Note: ******* *Because the TouchDrive control panel is curved, the depth measurement is only approximate.*

TD3S



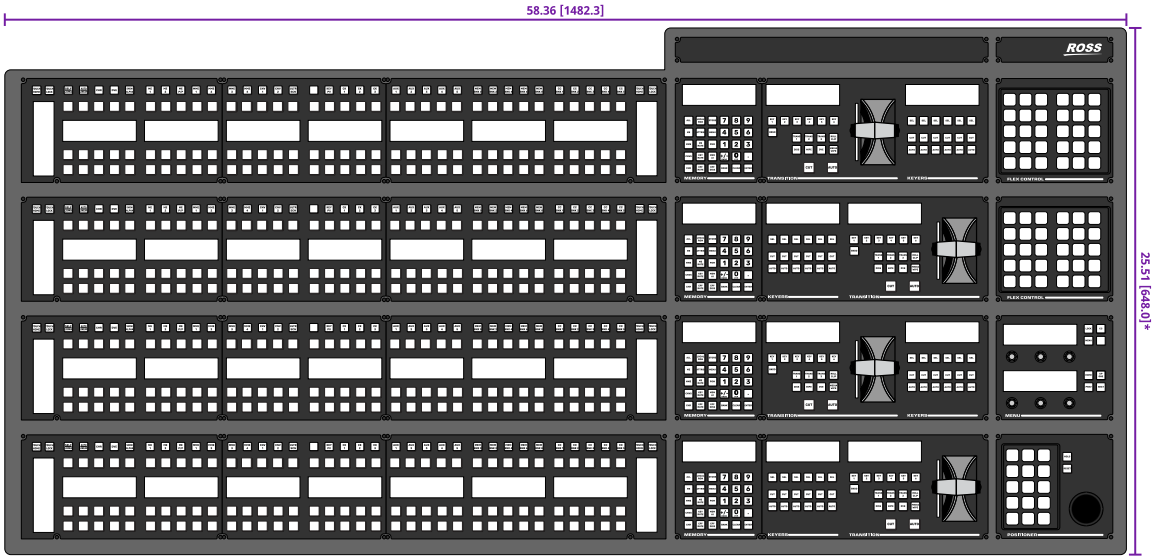
Note: ******* *Because the TouchDrive control panel is curved, the depth measurement is only approximate.*

TD3/TDx3



Note: ******* *Because the TouchDrive control panel is curved, the depth measurement is only approximate.*

TD4/TDx4

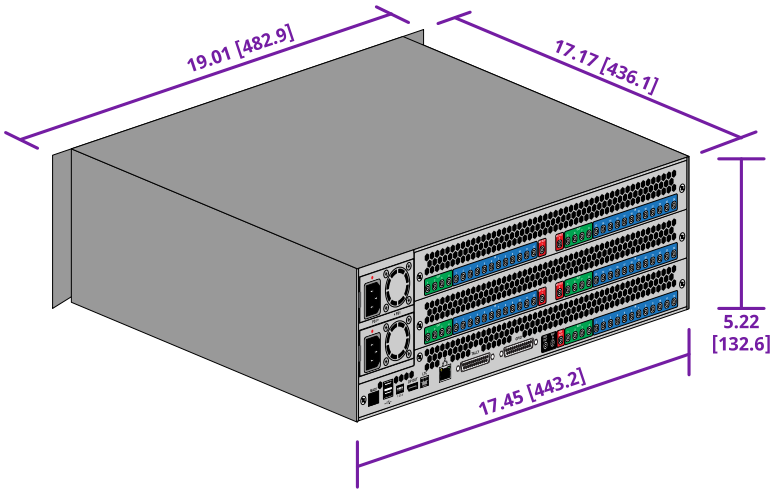


Note: ******* *Because the TouchDrive control panel is curved, the depth measurement is only approximate.*

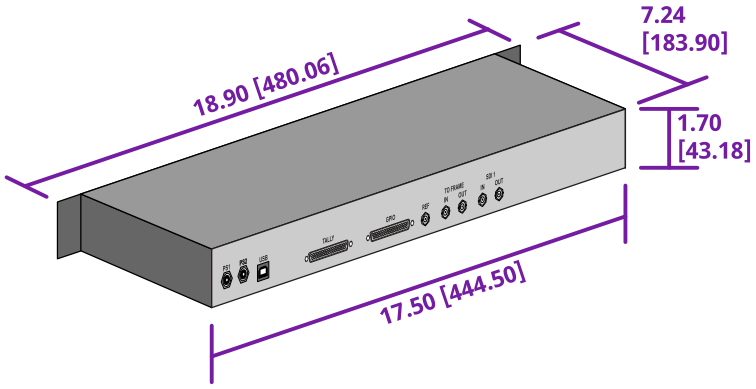
Frame Dimensions

Dimensions are in inches with metric dimensions shown in brackets [mm].

Ultra 60 Frame



1RU Audio Breakout Unit Dimensions



TouchDrive Desk Cutouts

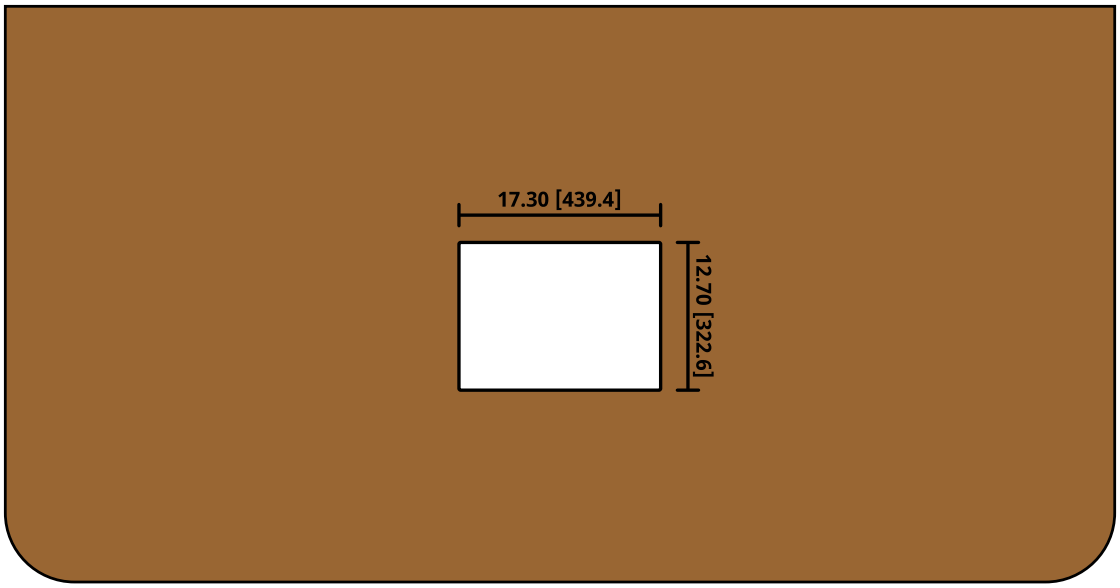
Important: *These dimensions are provided as a guide only. Scale DXF/CAD drawings of the control panels are available from the Ross Video website that should be used as a template for a desk cutout.*

Dimensions are in inches with metric dimensions shown in brackets [mm].

Note: *The Desk Mounting option is required to properly secure the panel to a desk.*

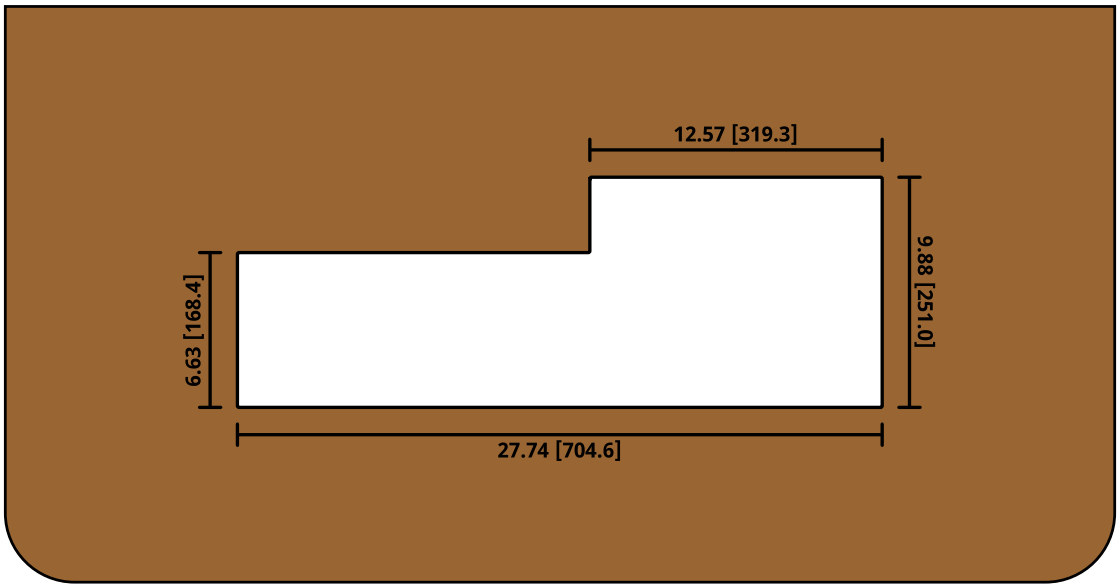
Note: *Remove the on-desk legs from the bottom of the control panel to mount it in a desk.*

TD1C



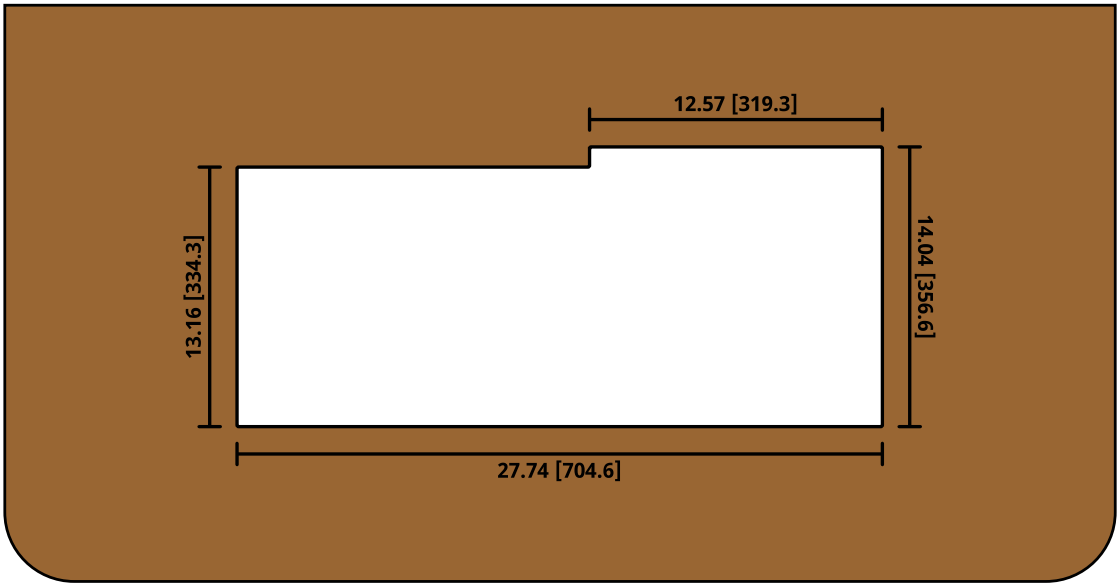
Note: *Remove the on-desk legs from the bottom of the control panel to mount it in a desk.*

TD1



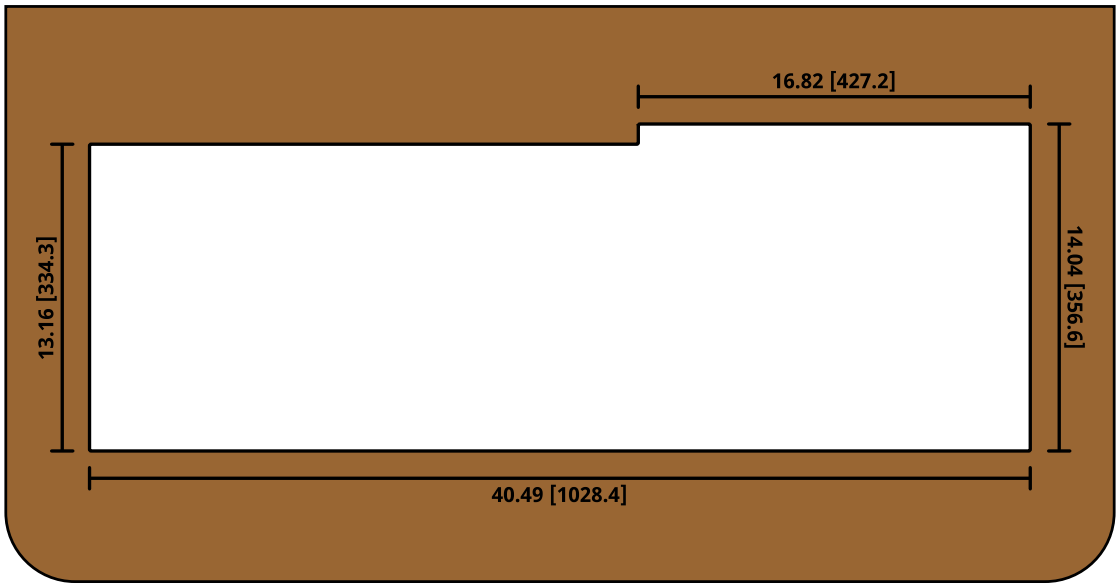
Note: *Remove the on-desk legs from the bottom of the control panel to mount it in a desk.*

TD2



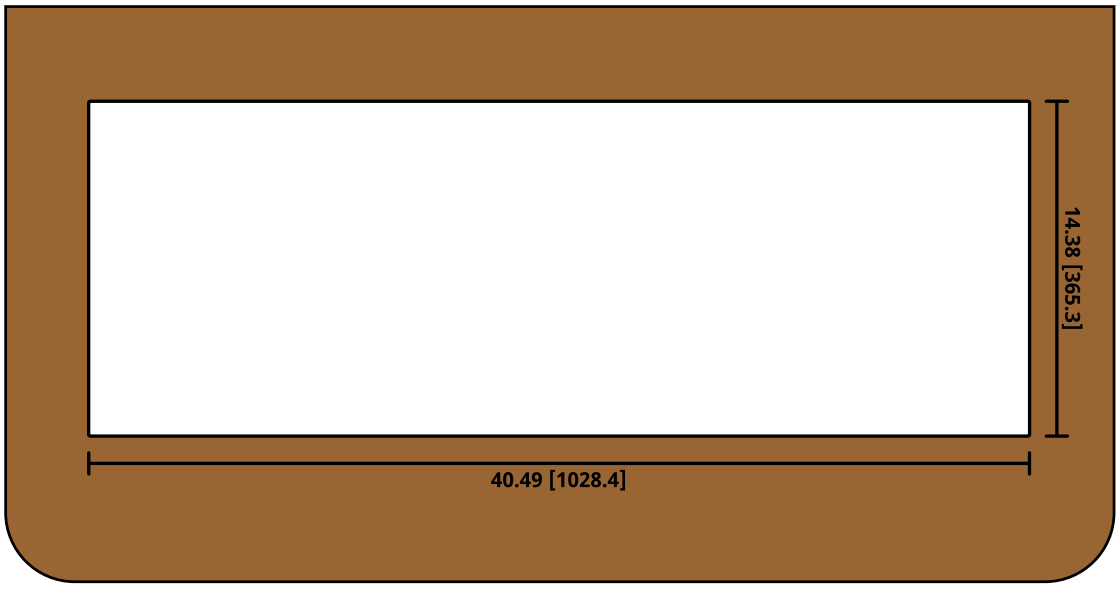
Note: *Remove the on-desk legs from the bottom of the control panel to mount it in a desk.*

TD2S



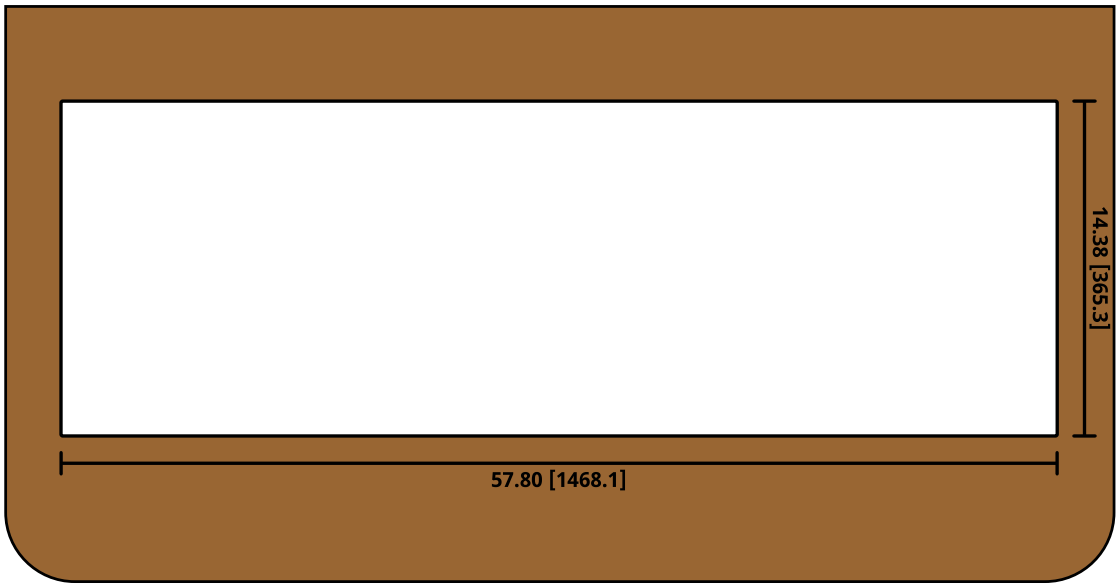
Note: *Remove the on-desk legs from the bottom of the control panel to mount it in a desk.*

TD3S



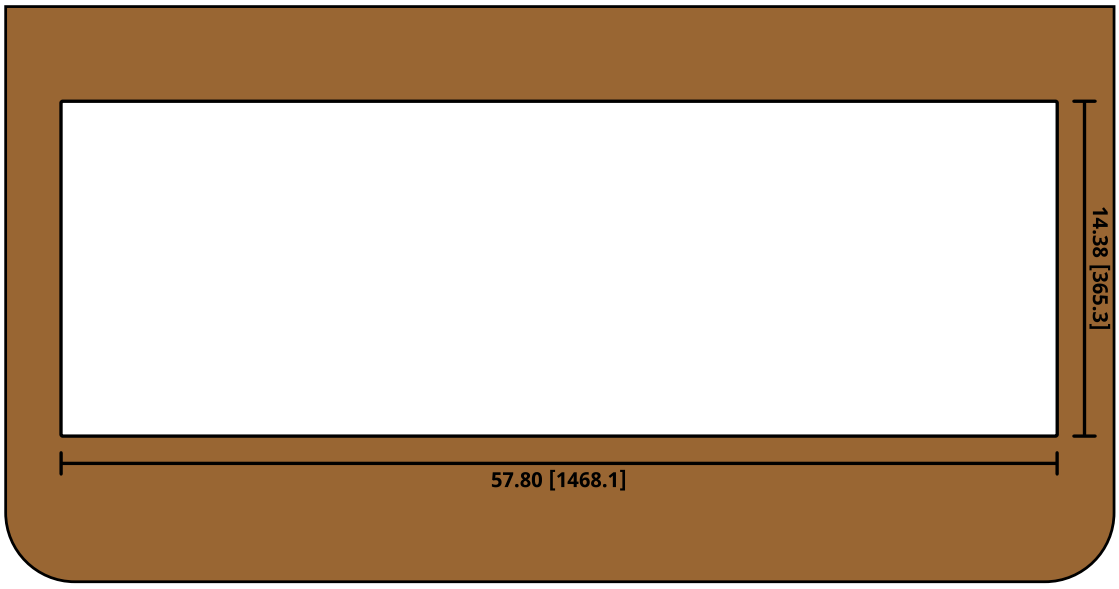
Note: *Remove the on-desk legs from the bottom of the control panel to mount it in a desk.*

TD3/TDx3



Note: *Remove the on-desk legs from the bottom of the control panel to mount it in a desk.*

TD4/TDx4



Note: *Remove the on-desk legs from the bottom of the control panel to mount it in a desk.*