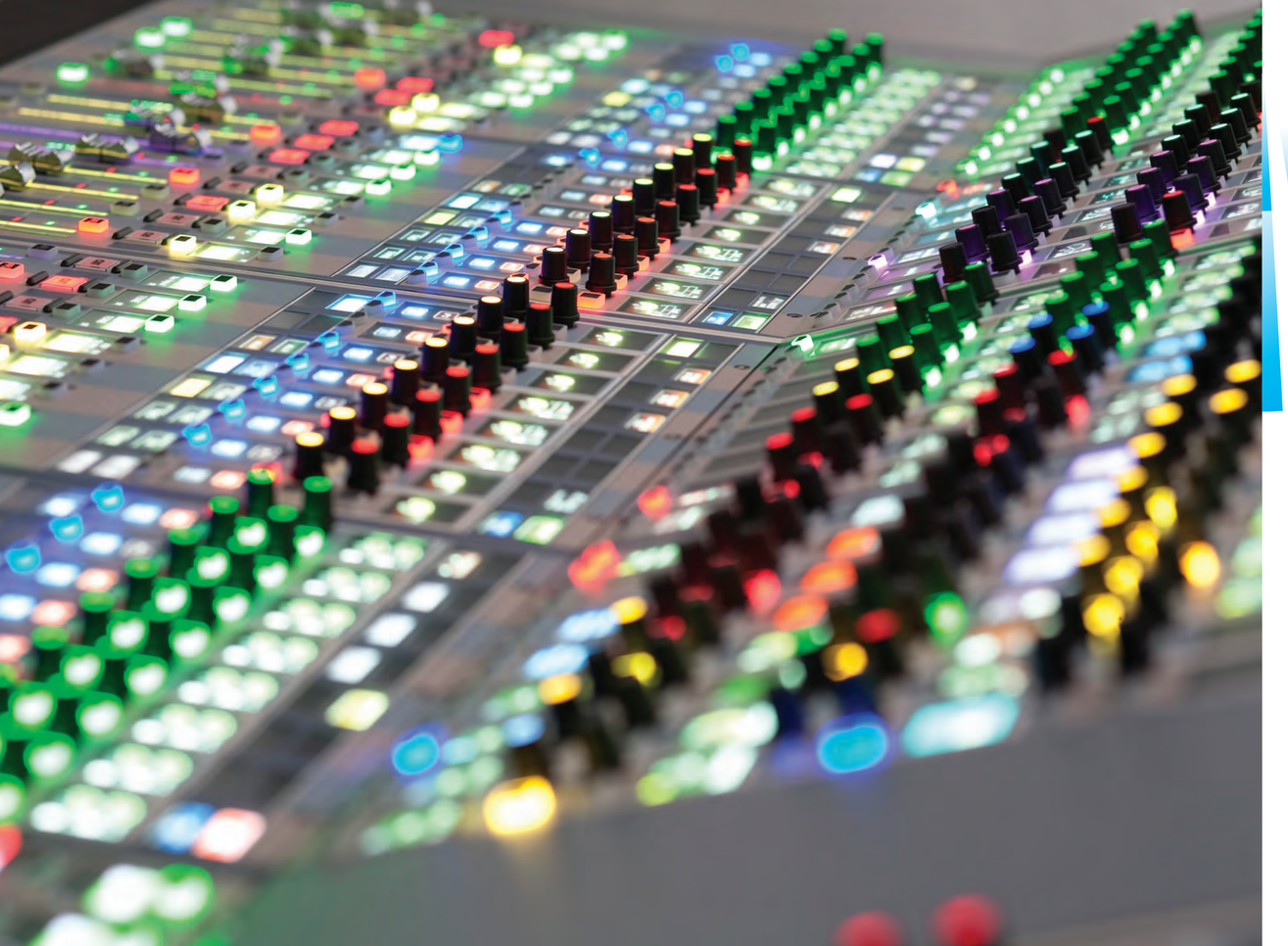

APOLLO
calrec.com



The changing face of broadcast

HD broadcast audio demands cutting-edge technology. Embrace the future of sound with Apollo.

The global transition to HD is revolutionary – perhaps the most radical change in the broadcasting arena since the move from black-and-white TV to color. Systems designed to handle analog video or even digital SD cannot be used for HD operations – a comprehensive overhaul of both equipment and behind-the-scenes infrastructure is necessary, at all levels of broadcast production, from capture and editing to playout.

In sound, high-resolution 5.1 is emerging as the standard for HD audio, requiring a complete technical renewal to produce true surround for broadcast.

At every level of the audio production chain, where there were previously two audio channels, six are now necessary for true 5.1. Neither broadcasters or broadcast equipment manufacturers can afford to fall behind.

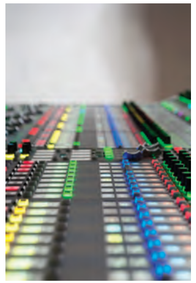
Throughout Calrec's 50 year history, its team of innovators have anticipated such major changes and consistently provided superior products which have allowed forward-thinking broadcasters to remain a step ahead.

Calrec introduced the world's first true stereo broadcast console and the first point-source surround microphone in the 1970s, anticipating the growth of multi-channel broadcast audio. When Calrec produced the world's first digitally controlled analog broadcast console in the early 1980s, the company predicted the shift from discrete-circuit mixing consoles and the separation of control surfaces from networked processing hardware.

In 2007 Calrec produced Bluefin, the first DSP processing engine based on FPGA (Field Programmable Gate Array) technology, which enabled broadcast consoles to work efficiently with true discrete-channel 5.1 surround for the first time.

Today, broadcasters need more and more digital audio channels at ever-higher resolutions. They need more and more processing power to handle the increasing channel count and more assignable, more ergonomic control surfaces to deal with the increased workload that HD broadcasting demands.

Naturally, Calrec already has the answer to all of these concerns.



It's the first of a new generation of Calrec mixing consoles and it's called Apollo.

APOLLO

Channel Facilities

- 1020 freely assignable channel processing paths
- Up to 16 x stereo or 5.1 surround main outputs from a Mains/Group pool of 128 resources
- Up to 48 x mono, stereo or 5.1 surround audio groups from Mains/Group pool of 128 resources
- 96 x multi-track busses for IFB or recording
- 48 x auxiliary busses
- All channels and groups can have up to 4 x Direct or Mix-minus outputs
- 3 x independent user sections, each with independent APFL and monitoring systems
- All channels and groups have 6-band parametric EQ, each with variable response
- All channels and groups have full dynamics processing (Compressor/Limiter and Expander/Gate) plus secondary compressor/limiter
- Side Chain EQ/Filters have 2 band parametric EQ, each with variable response
- 256 x Inserts
- 1728 mono legs of delay, each up to 2.73 seconds, giving a total of 78 minutes delay
- Direct outputs can be pre-EQ, pre-fader or post-fader
- 12 layers, each with its own A and B paths

Networking

- Integral 8192² router
- 32 + 32 Router connections
- All I/O provided over Hydra2 network via a range of Hydra2 I/O boxes
- Cat5e or fiber connectivity

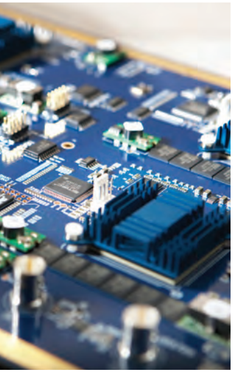
Resilience

- Highly resilient – all modules are hot-pluggable with automatic redundant PSU, DSP, Control processor, Router module, I/O Expansion module
- Independent DSP operation ensures audio continuity in the event of a PC or control reset
- Low power consumption and heat generation

Sheer power

Bluefin2 gives Apollo more channel paths than ever before.

Super-high-density processing for HD broadcast.



Bluefin 2

Bluefin High Density Processing Technology (HDSP) changed the way broadcasters regarded DSP. A truly revolutionary technology, it provided vastly superior levels of signal processing in a fraction of the space of conventional systems.

Bluefin was the world's first implementation of Field Programmable Gate Array (FPGA) technology for full DSP processing, providing enough processing on one DSP card to power an entire mixing console running surround-sound productions.

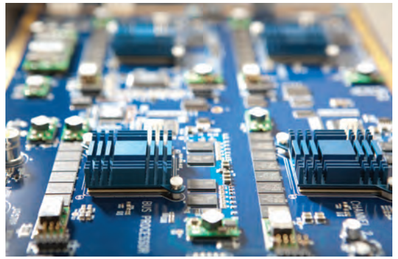
Bluefin2 is the next generation of Calrec's FPGA technology and has been designed for surround operation from the outset. It gives the Apollo console more than twice the processing power with a staggering 1020 channel processing paths. It is the DSP powerhouse for the next generation of Calrec consoles and provides enough processing muscle to cope with the biggest, boldest 5.1 projects.

Thanks to Bluefin2, each Apollo channel has access to its own dedicated six-band parametric EQ, dynamics and delay processor, with a total delay of 78 minutes. Apollo can address up to 16 main outputs, 48 group outputs, 96 IFB/Track outputs and 48 auxiliary outputs.

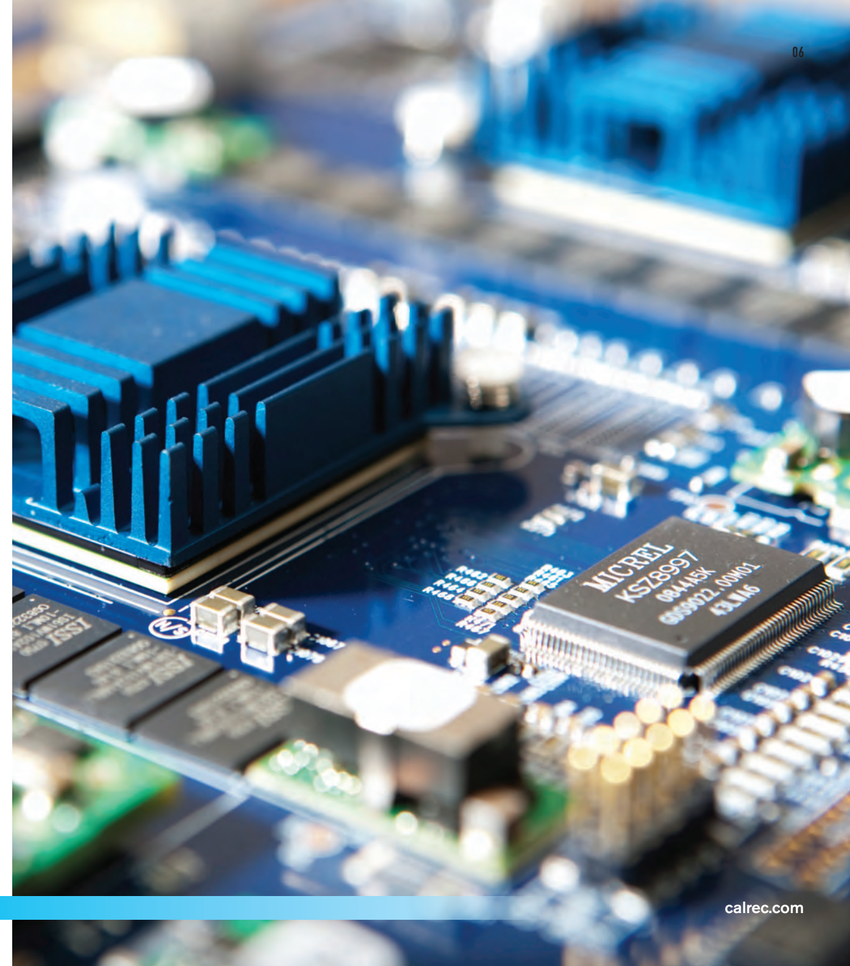
Bluefin2 also gives Apollo enough DSP power for two dynamics processors per channel if required, without any reduction in channel count.

As you would expect from Calrec, all these features are available irrespective of the processing load on other channels, as channel resources are not shared across the console.

And of course, system resilience is always reinforced with a second Bluefin2 card in each Apollo rack – it's like having another console as a hot spare.



Whatever the developing requirements of HD broadcast, Calrec's Bluefin2 processing engine will keep you on the air and sounding great.



Making connections

Like Bluefin, Calrec's Hydra networking technology is now capable of even more.

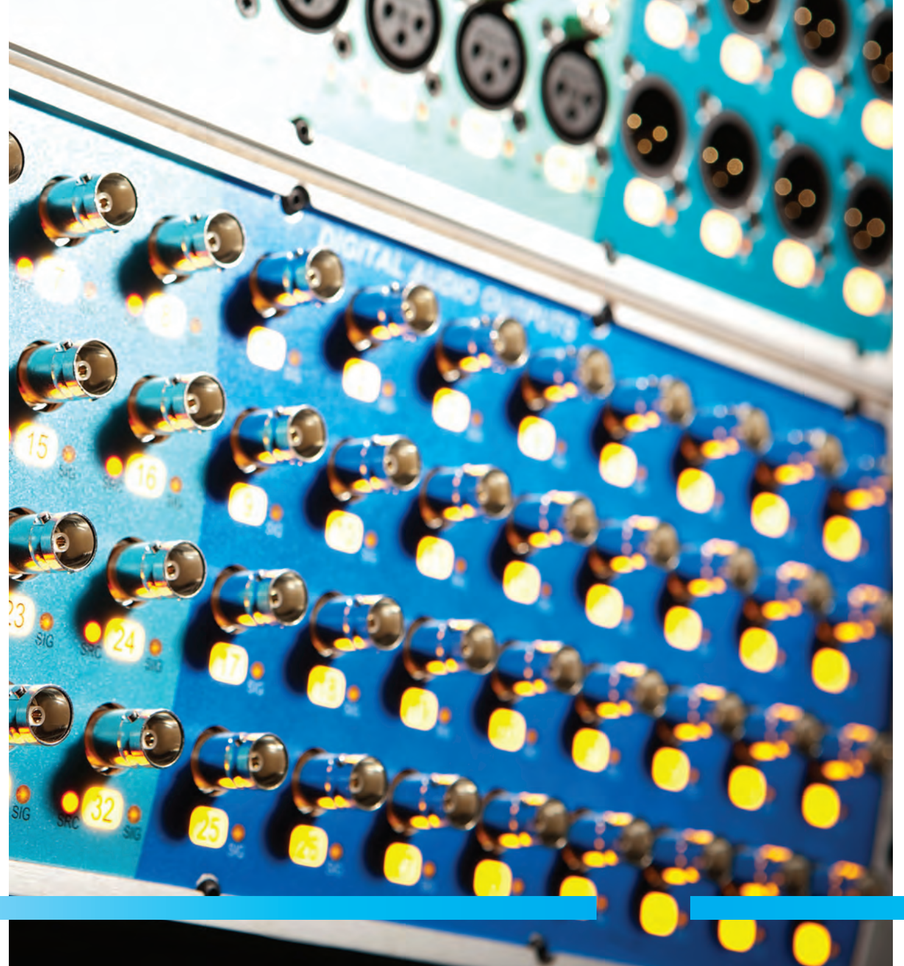
Hydra2 & Networking

If Bluefin2 provides the raw power for Apollo, Hydra2 is its backbone, linking the console's control surface to its 8192² router and on to more complex networks if required.

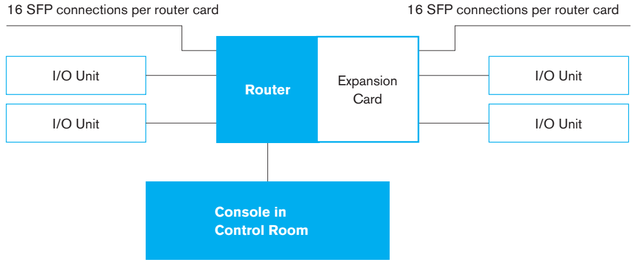
Offering up to 512 bi-directional channels of I/O per copper or fiber-optic connection, Hydra2 is the ultimate point-to-point protocol, offering true 'one-to-many' routing with about half the connection latency of the original Hydra network and allowing the construction of large-scale distributed mixing networks with multiple control surfaces and router/processors.

Hydra2 allows large numbers of audio inputs and outputs to be easily shared and controlled. The term 'network' is used, rather than routing matrix, to reflect the sophisticated nature of the control software that makes connecting resources very straightforward, even with ad hoc networks that change regularly. Audio interfaces and consoles may be added and removed without the need for manual intervention – the control software recognises the changes and informs all parts of the network so that new resources are made available to console operators just seconds after they are plugged in.

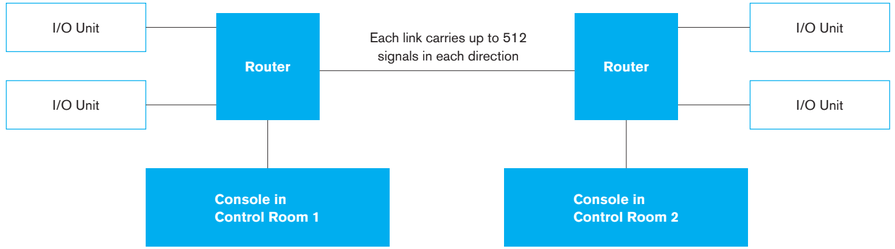
In fact, a network's topology may be designed to meet the specific requirements of the broadcast facility, cutting installation costs and ensuring future flexibility.



I/O Connections



Console to Console Connections



Hydra2 allows the construction of complex routing networks for broadcast production while keeping it simple – with control software which transparently organises all routing, Hydra2 is extremely user friendly.

Hydra2

When Calrec began the process of separating the mixing control surface from processing hardware with the development of the first assignable control surface back in the 1980s, the company predicted the future of mixing console design.

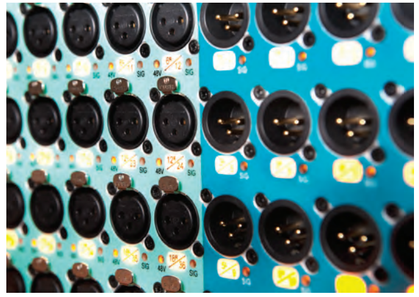
Hydra2 goes one stage further – it is the flexible link that liberates the network from the physicality of the mixing console.

The Apollo control surface is just one of many possible clients on a Hydra2 network, which might include other mixing control surfaces and multiple Hydra2 router/processors in larger networks. Several Apollo or Artemis control surfaces in a multi-studio broadcast facility can be seamlessly linked via Hydra2 for large-scale productions or live broadcasts, for example and separated again after completion of the project.

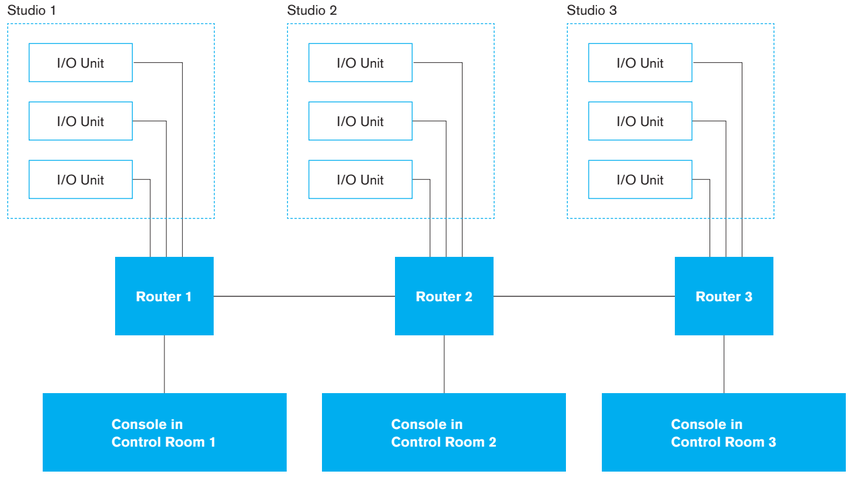
Controlling the network couldn't be simpler. All on-line resources are made available to all consoles (unless intentionally isolated for security) no matter where they are physically connected to the network. Input and output ports may be patched at any time, either manually, or *en masse*, as part of a snapshot memory load.

Hydra2 provides 1-to-N routing, meaning that an input may be routed to any number of destinations without restriction. This means the input may be connected to a channel on multiple consoles and patched directly to one or more output ports on the network.

With a growing range of I/O interface boxes, Hydra2, gives you the flexibility you need to build adaptable networks that can be tailored to suit the challenges of HD broadcast.



Multi-control room, multi-studio layout with complete transparent management of all resources across the network.



In this example, any console on the network can access any input – multiple consoles can even access channels from the same studio. This illustration shows the potential expansion capacity of the Hydra2 network. There are no limits to the number of additional I/O boxes and/or additional consoles which can be quickly and seamlessly integrated. Over Hydra2, any client can be added to the network – even remote trucks can be accommodated via a single copper or fiber connection.

In control

Benefitting from Calrec's 25 years of assignable control surface design, Apollo's control surface is tremendously powerful, functional and beautiful at the same time.

The color of audio

Assignability is what gives a modern control surface its flexibility and power, allowing a console with relatively few physical controls to drive a much greater number of channels, tracks, busses and other outputs. Since the advent of assignable consoles, designers have been able to adapt workflows and introduce new control possibilities beyond the limits of analog technology.

However, live broadcast consoles must also be intuitive, easy to drive and have a fast learning curve – it's imperative that users can understand at all times how their physical controls are assigned. Added to this, the advent of 5.1 audio requires consoles with fewer physical faders to be used to control a much greater number of channels, tracks, or other outputs.

Apollo has the full benefit of Calrec's many years of user interface design. The Calrec assignable control surface is now in its sixth generation, and the Apollo surface introduces color as a new element to the Calrec design, with inviting displays and elegant touchscreens, as well as light-emitting panels incorporated into the controls themselves.

Color-coding is used across Apollo's control surface to provide instant, unambiguous visual feedback about control assignments. Fader scales adjacent to the fader change color to provide feedback to show when mono, stereo or surround channels are assigned. These fader scales also provide alternate color indication when the faders are assigned to control groups or mains.

The function of buttons and rotary controls is also immediately obvious. Organic LED displays (OLEDs) next to each hardware control are clearly labelled with the currently assigned function and update when the assigned function changes. Multi-colored indicators in the rotary controls also indicate function, with a spectrum of control parameters available.

Not only is the result practically elegant, offering users the same sense of assurance associated with one knob-per-function control surfaces, it's also visually striking. Form and function, seamlessly matched.

From Cells to Panels to User Layouts, Apollo's control surface is logically structured, flexible and user-reconfigurable.

Mission control

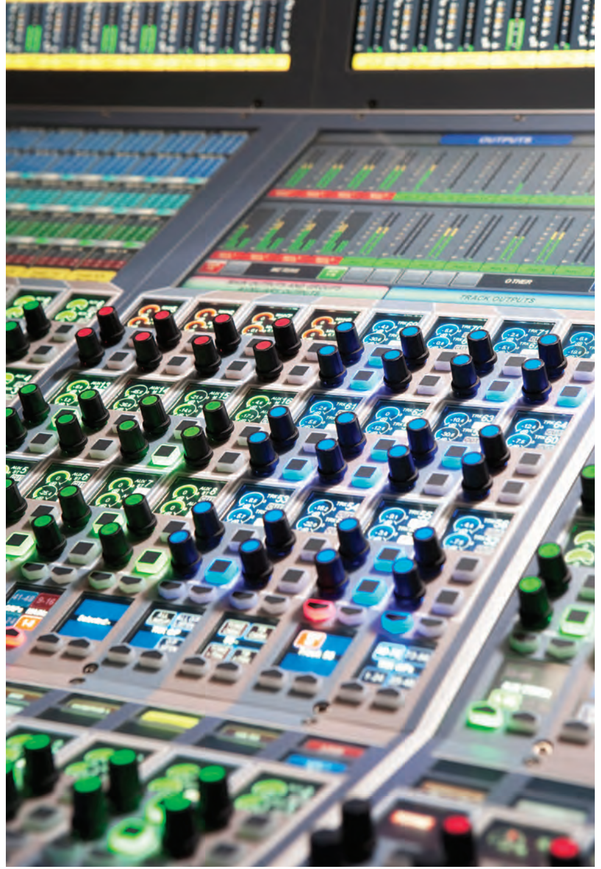
Apollo's control surface is made up of intuitive touchscreens and repeated tactile elements, the smallest of which is called the Cell. Once users have grasped how Cells work, mastering the rest of the interface is child's play, as it is built logically from the Cell upwards.

Each Control Cell is made up of two colored rotary controls and two colored buttons arranged in a square, together with a compact OLED display directly above which indicates how the rotary controls and buttons are assigned. The use of touch technology encourages users to interact with the control surface directly and adapt the Cells to specific set-ups – OLED technology and color-changing rotary controls give the user instantaneous feedback as to the panel setting.

The Cells are arranged into two panels formats; Wild/Assign panels feature four rows of Cells, with Fader panels giving operators a choice of additional control options.

As well as more physical flexibility, Apollo offers more assignability than ever before. Each fader has two audio paths, but Apollo also offers 12 A/B Layers, making for 24 possible assignments to each control or fader. The assignable nature of the interface removes the restrictions of physical hardware – users can instantly configure controls wherever they want them and even change them on the fly. The choice of hardware panels can even be changed if users decide they need more physical faders and fewer Cells.

The nature of Wild/Assign panels enable the user to drive the desk in the most appropriate way for the application and the visual nature of the surface reflects these parameters in a clear, colorful and practical manner.



Once users have grasped how Cells work, mastering the rest of the interface is child's play, as it is built logically from the Cell upwards.

In Assign Mode, the Wild/Assign panels replicate a classic Calrec assignable console. Individual panels take on the roles of EQ/Dyn, Routing, Output and Monitor panels and are assigned to display whatever parameters are most relevant to the currently selected fader and path.

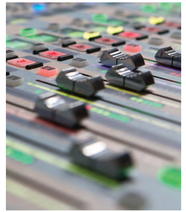
In Wilds Mode, each vertical channel strip is assigned to represent a single channel, with controls down its vertical length.

These panel Modes can be mixed and matched across the Apollo control surface, but to simplify operation, Calrec offers three default User Layouts. The first is an 'Assign' Layout, where panels are assigned as EQ/Dyn, Routing, Output and Monitor panels. A second Mode is a 'Wilds' Layout, where all of the control panels are in Wilds Mode and the console can be driven like a traditional analog console. A third layout option combines both of these, giving the operator the best of both worlds. Operators also have the option of creating unique User Layouts, customizing the console to suit a facility's exact requirements.

Apollo assign layout – overview

The Apollo is the pinnacle of over 25 years of control surface development and represents the most flexible and user-friendly broadcast console control surface available in the world. Assign Mode replicates Calrec's classic assignable surface, used in 60% of HD trucks in the USA alone. Calrec introduced the world's first digitally controlled assignable mixing console in 1981 – the Apollo platform has enabled Calrec to push the ergonomic boundaries even further, resulting in yet another seismic shift in user-friendly control.

Assign Mode replicates Calrec's classic assignable surface, used in 60% of HD trucks in the USA alone.



1. Inp/EQ-Dyn Panel
Control Cells are divided up into sections to control input parameters (gain and trim), Apollo's six-band, variable-bandwidth EQ, two onboard dynamics sections (compressor/limiters and expander/gates) as well as other miscellaneous functions such as stereo width.

2. Send-Routes Panel
Control Cells are divided into sections to control the send contributions of Apollo's 48 Aux busses, Tracks, Direct Outputs and Groups and well as panning controls. Routing and Panning is controlled and displayed using the TFT touchscreen above the panel.

3. Monitor Mode Panel
In Monitor Mode, Control Cells are divided into different sections governing talkback groups, assignments and levels and control room monitoring. Talkback, Monitoring and Metering assignments are carried out via the TFT touchscreen above the panel.

4. Output Mode Panel
In Output Mode the Control Cells control the levels of the console's Main, Aux, Group and Track outputs. The TFT display shows the metering for selected Main and Aux outputs.

5. Wild/Assign Row
In Assign Mode this row of Button Cells provides additional functionality to the Assign Panel controls above.

6. Modes Row
This row of OLEDs determine which Mode the Wild/Assign panel will operate in.

7. Functions Row
This row of Button Cells is used to perform various functions such as fader assignments, copy, clone and clear assignments based on the status of the Layers Row.

8. Layers Row
These are the main controls for Layer switching and Layer Split controls, as well as accessing the Layer Tools and other Tools menus for console configuration.

1. Wilds Mode allows a user to drive the console in a more traditional analog style.

2. TFT display
In Wilds Mode, the touchscreen display at the top of the panel assembly shows a routing overview on a strip-by-strip basis.

All individual settings can be saved to a USB stick.

3. Broadcast Facilities Panel
This panel houses the connection for the optional talkback microphone and is where console configurations can be backed up to and restored via a USB interface. It's also the home of the Rehearsal/On-Air switches and indicators, as well as the console's master reset switches.

Apollo's Rehearsal and On-Air modes can be set up to work in conjunction with the Broadcast Facilities Panel. This allows conditional switching for Transmission, Rehearsal and Neither (TX and REH off). The conditional switching sets up operational inhibits on functions such as tone and talkback on the main output to reduce the risk of human error, making the system a more robust and user friendly environment for the operator.

Apollo wilds layout – overview

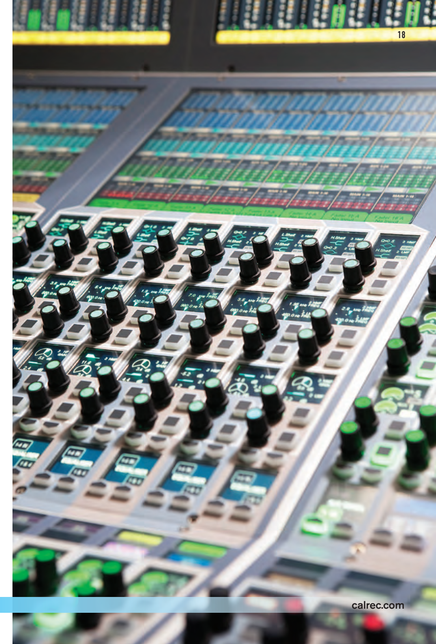
Operators like having options.

Wilds Mode allows a user to drive the console in a more traditional analog style, providing eight rotary controls and switches per fader. This allows an operator to effectively control the channel strip on a fader by fader basis.

It also provides a high degree of visual feedback to the operator for each individual channel across the console. Channel strips can be configured to include controls which the operator needs immediately to hand.

In addition, the Wilds Mode contains a Setup Wilds button, situated in the Modes row, which allows users to swap between pre-configured types of Wild strip.

The Fader Wilds button, also in the Modes row, allows users to assign the functions of the Control Cells directly above the faders. The Fader Wild Control Cells above each fader are always accessible irrespective of the Mode of the Wilds/Assign panel.



Apollo combined layout – overview

On a live broadcast, audio mixers are under enormous pressure, with immediate access to controls and channel information high on their priority lists.

Some more complex set-ups may benefit from having local controls on particular channels, whilst still wanting detailed control over the rest of the surface.

Apollo gives users the best of both worlds.

In addition to Assign and Wilds modes, Apollo also offers a combination of the two, giving the operator global control of all channel parameters via the Assign panels as well as local control over pre-determined channels. It allows more controls to be used simultaneously to access features like routing, dynamics and EQ via the Assign panels, but without sacrificing the singular detail of more traditional channel strip control.

It can also be useful on larger broadcast productions where multiple operators may be seated at the console. In fact, Apollo also offers dedicated, user-controllable facilities for splitting the mixing control surface into independent sections, each with fully independent APFL.

Apollo gives users the best of both worlds.

Heart of the sun

Size matters and in some circumstances bigger isn't necessarily better.

Apollo's 8U control rack is amazingly compact, given that it houses all of the console's processing, power and routing capabilities.

If Bluefin2 provides the processing power and Hydra2 is the backbone, the heart and nerve center of the Apollo is its rack. The 8U rack is strikingly energy efficient – its compact dimensions, low power consumption and reduced heat generation making it ideally suited to operation in environments where rack space is at a premium, as in remote broadcast vehicles.

The Apollo rack consists of secondary redundant power supplies, DSP, router, router expansion and processing cards as standard. As one would expect with Calrec digital consoles, these cards auto-takeover within milliseconds in the unlikely event of a component failure to ensure that the flow of audio is uninterrupted during live transmissions. And of course, all cards are hot swappable.

This is also where Apollo accesses Calrec's Hydra2 network, which provides audio and control signals via the rack's 8192x8192 router card. Small-format pluggable mini-GBIC connectors allow users to choose the nature of the cabling to suit their operational requirements, with options for both fiber-optics or copper connections. I/O connections are made via stand-alone Calrec interface boxes in a variety of sizes and in all industry-standard audio formats, including analog, AES3, MADI and SDI.

If Bluefin provides the processing power and Hydra is the backbone, the heart and nerve center of the Apollo is its rack.

5.1 management

Calrec's surround channels give operators the ability to control a complete six-channel surround buss on a single fader.

Designed from the ground up with surround sound in mind, Apollo offers plenty of processing, monitoring and mixing options for true 5.1 operation.

Working in 5.1

The switch to a multi-channel surround environment demands more from the mixing console, not just in terms of processing but also providing an elegant and intuitive way of manipulating those surround signals.

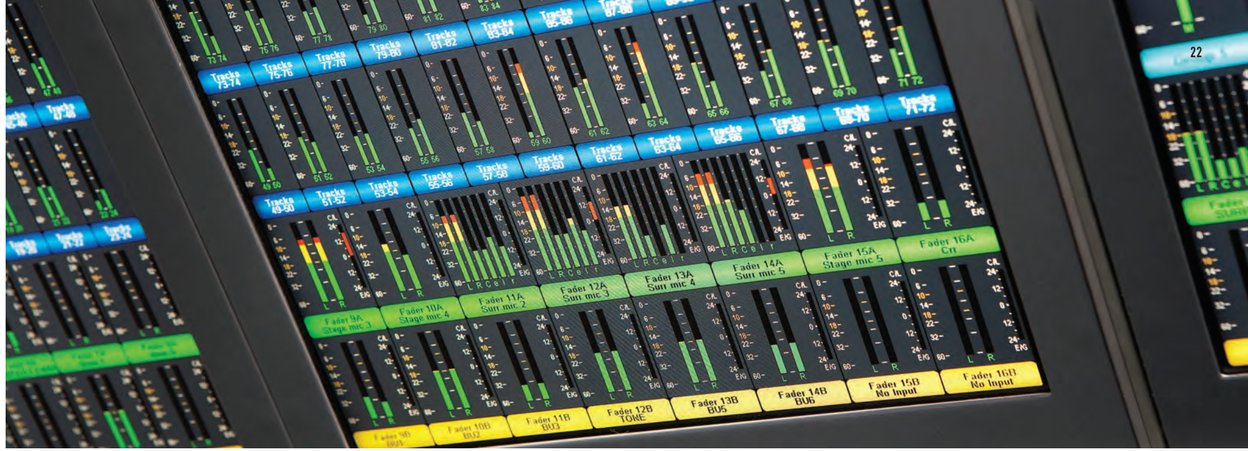
One of the principles for Apollo was that it should be as simple to operate in 5.1 surround as in mono or stereo. Calrec's surround channels give operators the ability to control a complete six-channel surround buss on a single fader and have processing applied to it just like a mono or stereo source. Convenient, quick and simple.

However, if individual control is required over the constituent channels of the surround signal, that's also possible. Surround channels can be spilled out into their component channels (L/R, Ls/Rs, Center and LFE) for individual adjustment where control is managed on four faders of a dedicated Spill panel. Processing may then be controlled on each leg of the surround mix individually.

Surround panning can be achieved using the Spill faders to effect level changes, or an optional additional Spill panel is available with a surround joystick.

In addition, surround production is not limited by processing power – Apollo provides up to 16 x 5.1 main outputs and 48 x 5.1 groups, with full control of the stereo downmix of the surround main outputs. This is important when doing simultaneous HD and SD transmissions.

However you prefer to work in surround, Calrec makes it possible.



Level best

With per-channel bargraph meters next to each fader and multi-channel metering via an array of TFTs, Apollo offers no shortage of ways to monitor signal levels.

Metering

Clear and efficient metering allows an operator to concentrate on the job in hand – producing a mix which pins the viewer to their chair.

Calrec's TFT metering does all this and more. As well as providing a greater density of signals to be metered, Calrec's system also provides full operator configurability over layout, size and color without increasing cost.

Surround signals can be metered in the same space as mono and stereo signals and each TFT can be configured to be $^{1}/_{4}$, $^{1}/_{3}$, $^{1}/_{2}$, $^{2}/_{3}$, $^{3}/_{4}$ and full height meters. A variety of signals can be metered such as main outputs, groups, auxes, track outputs, external inputs, AFL/PFL, meter selectors, CRLS and mix-minus.

Channel metering is also displayed whether the source is in mono, stereo or surround and an extra gain-reduction meter may be displayed next to each level meter if dynamics processing is assigned to that channel. If you prefer to keep your eyes on your faders as you mix, an LED bargraph meter is built in next to every channel fader.

Recognizing that some users prefer to rely on third-party meters, Apollo can drive metering from its outputs just like monitor speakers. There's also an empty option bay on Apollo's upstand which is physically compatible with industry-standard phase meters and vectorscope displays from third-party manufacturers.

In short, Apollo offers users a wealth of metering options, whether built in or by seamlessly integrating third-party technology.

Multiple operators

Need hands-on assistance during the broadcast? Apollo's User Split function allows up to three users to share a control surface, each with their own independent layout, assignment options and APFL buss.

Control surface splits

Complex live broadcasts, such as live concerts or large LE shows with multiple participants, often call for more than one mixing console operator, particularly when working in 5.1. With Apollo's User Split options, one control surface can be quickly and easily split to accommodate up to three users working independently.

Each user section behaves like an independent control surface, with individual channel processing, monitoring and APFL facilities, panel mode settings and path assignment controls.

Split points can be set up along the left-hand edge of any panel and redefined quickly and easily on the fly if required. In addition, smaller sidecar consoles can easily be introduced to work remotely to the main console.

Interested third parties

With complex modern working practices, it is increasingly important to simplify workflow procedures and reduce costs.

Third-party Integration

Calrec have a long history of providing hardware control to third-party manufacturers' equipment, with protocols already in place with companies such as Ross Video and Snell.

Apollo proudly continues this tradition.

Calrec remains at the forefront of providing integration with third party suppliers and working with systems such as Riedel's Artist intercom system helps broadcasters save money and improve their infrastructures. The agreement with Riedel also provides for a link between Riedel's fiber-optic Mediornet and Apollo's Hydra2 networks.

Calrec are committed to improving workflow as more and more HD systems come on-line and continue to discuss further collaborations and systems integration with a variety of video and audio hardware manufacturers.

Simply put, things work better when we all talk to each other.

Questions, questions

REDUNDANCY

What if there is a hardware failure? What does Calrec mean by redundancy?

An audio console for live on-air use has to be extremely reliable. Calrec consoles have an excellent reputation in this area, but with all hardware there is always a potential for failure. That's why Calrec don't take any chances. Calrec provide on-line redundant hardware for ALL critical systems as standard and takeover is automatic and seamless. These elements are hot-pluggable for easy replacement.

Many so-called redundant systems only protect part of the system and may require closing the system down to reboot. Calrec hot spares constantly mirror what the on-line component is doing. In the rare event of a hardware failure, the spare automatically takes over with minimal disruption to the audio.

On replacement the new hardware becomes the redundant spare and mirrors the primary module as before. This intelligent system covers DSP modules, Control Processor modules, Router modules, I/O Expansion modules and all PSUs. It even runs to all connections which can be either copper or fiber. With Calrec, you can be confident that you are always in control.

CHANNELS

Why has Calrec provided so many channels?

HD and 3D broadcasting already uses 5.1 surround as a standard delivery format, and with the large channel counts this entails, processing capacity can be an issue on smaller, less well-equipped consoles. Artemis has the ability to process up to 680 simultaneous channels with no pooling of resources – all busses are available at all times on all channels.

Apollo has the ability to process 1020 channels with no pooling of resources — all busses are available at all times on all channels.

LAYERS

Apollo has a total of 24 layers across the console… why so many?

One of the major benefits of digital consoles is their ability to manage incoming signals. As paths are assigned to faders remotely, a user can arrange the same paths to different layers and in different arrangements. For example, on a large LE set up an operator may assign the inputs from a live band on one layer and the same inputs on a second layer, but with the controls closer to hand and with less critical channels off to one side. These settings can be saved to USB before the event, or even offline via Calrec's Offline Editor and recalled at the touch of a button. Layers also allow access to more channels with less hardware. Apollo has three independent APFL and monitoring systems, so one processing rack can provide management to three control surfaces. This gives a facility the option of building a remote sidecar, for example,

as an eight or 16 fader sub mixer using the same processing hardware and linking to the main console with a simple Cat5e or fiber cable. Layers give an operator the ability to access many more channels on this compact frame.

SPACE

How well suited is the Apollo for Remote Operation? I have very limited space.

With a fader pitch of just 30mm Calrec consoles have a higher fader density than other consoles – in fact, Calrec can squeeze in more physical faders into a space than any other manufacturer. Not only can users insert double fader modules, but because control surface panels are the same size, the Apollo can double bank fader modules to give access to more physical faders. Not only that, but rack space is kept to a minimum thanks to Bluefin2 and Hydra2 technology. All the processing, routing and power supplies – including redundant spares - are packed into an incredibly compact 8U rack. Not only does this reduce space but also weighs less, generates less heat and is more resilient. Calrec designs all consoles with this in mind, which is why Calrec is a clear leader among companies providing audio mixers for broadcast trucks.

Calrec hot spares. constantly mirror what the on-line component is doing and in the rare event of a hardware failure automatically takes over with no disruption to the audio.

Putting sound in the picture

Since the launch of our first audio console in 1971, Calrec Audio has been exclusively dedicated to the design and manufacture of broadcast audio mixing consoles.

Calrec understands what is most important to modern broadcast facilities and has constantly strived to ensure our customers are kept one step ahead of the changing needs of the broadcast environment.

All Calrec products are designed, manufactured and tested at our Nutclough Mill headquarters in Hebden Bridge, West Yorkshire, England. From original concept through R&D to state-of-the-art production, every step of the manufacturing process and every element of development is carried out in-house. This ensures the absolute integrity of the product development process and guarantees a quality standard unsurpassed in the broadcast console marketplace.

Throughout the decades Calrec has earned an outstanding reputation for innovation and has a well documented history of technological world firsts:

1977 Calrec supply the world's first stereo broadcast console.

1978 Calrec launches the Soundfield microphone, the world's first single point-source microphone capable of recording sound in three-dimensions for surround-compatible playback.

1981 Calrec supplies the word's first digitally controlled assignable mixing console.

2007 Calrec launches Bluefin, an FPGA-based high-density DSP card, which permits real-time 5.1 surround mixing and processing. Bluefin is available as an upgrade to existing Calrec desks and improves efficiency by a phenomenal 5000%. This technology is another world first for Calrec.

2009 Calrec unveils Bluefin2, a significant step up from Calrec's pioneering work with FPGAs for real-time audio DSP processing. Bluefin2 increases DSP capacity to a market-leading 1020 channel processing paths.

Calrec's expertise, experience and technology is trusted and endorsed by the world's most successful broadcasters.

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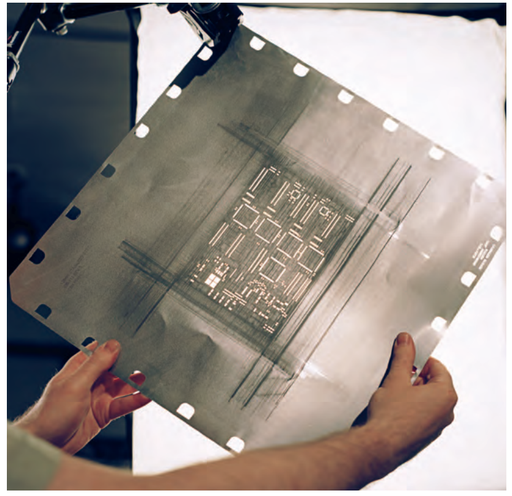


System specification

NB. All I/O on the Apollo console is determined by Hydra2 I/O boxes and performances may differ depending on the type of I/O box on the network.

AES3 Inputs

Formats Supported	AES/EBU (AES3) 24-bit Also suitable for use with SPDIF (IEC958 Type 2) signals
Interface	110 Ohm transformer balanced, 0.2V-7.0V Pk-Pk 75 Ohm unbalanced (BNC), 0.3V-1.2V Pk-Pk
Sample Rate Conversion	24-Bit switchable on all AES inputs
SRC THD+N	-117dB @ 1kHz, 0.00014%

AES3 Outputs

Formats Supported	AES/EBU (AES3) 24-bit
Interface	110 Ohm transformer balanced 4V Pk-Pk (nominal) into 110 Ohm load 75 Ohm unbalanced 1V Pk-Pk (nominal) into 75 Ohm load (BNC)

Analog Inputs

Analog – Digital Conversion	24-Bit
Input	Electronically Balanced
Input Impedance	2k Ohms for Mic gains 10k Ohms for Line gains
Sensitivity	+18 / -78dB on Mic/Line Inputs
Equivalent Input Noise	-127dB (150 Ohm source)
Distortion	-1dBFS @ 1kHz – Better than 0.003% -20dBFS @ 1kHz – Better than 0.006% -60dBFS @ 1kHz – Better than 0.3%
Frequency Response	20Hz to 20kHz +/- 0.5dB on Mic/Line Inputs
Input CMR (Common Mode Rejection)	>75 dB (Typical 85dB) on Mic/Line Inputs

Analog Outputs

Digital – Analog Conversion	24-Bit
Output Balance	Electronically Balanced, 20Hz to 20kHz, Better than -35dB, typically -45dB
Output Impedance	<40 Ohms
Distortion	-1dBFS @ 1kHz – Better than 0.006% -20dBFS @ 1kHz – Better than 0.003% -60dBFS @ 1kHz – Better than 0.3%
Frequency Response	20Hz to 20kHz +/- 0.25dB

Performance

Digital to Digital (AES3) Distortion	-1dBFS, 20Hz to 10kHz - Better than 0.0001%
Digital to Digital (AES3 with SRC) Distortion	-1dBFS, 20Hz to 10kHz - Better than 0.0002%
Frequency Response (Analog Input to Output)	20Hz to 20kHz +/- 0.5dB

Synchronization

48kHz synchronization	NTSC/PAL Video Tri-Level TTL Wordclock (48kHz) AES/EBU Digital input (48kHz) Internal Crystal Reference

The system can be pre-set with up to four external sync sources, plus internal, such that if the 1st source fails, it will automatically switch to the 2nd and so on.

Environmental Considerations

	Operating	*Non-Operating*
Temperature Range	0°C to +30°C (32°F to +86°F)	-20°C to +60°C (-4°F to +140°F)
Relative Humidity	25% to 80% Non-condensing	0% to 90% Non-condensing
Maximum Altitude	2,000 Meters (6500ft)*	15,000 Meters (49,000ft)

– Analog input for 0dBFS can be pre-set globally to +28, +24, +22, +20, +18 or +15dBu
– Pre-fader headroom on mic inputs is adjustable globally from +24 to +36dB in 2dB steps
– Analog output for 0dBFS matches input setting into >1kOhms (+24dBu max into 600 Ohms)

This is the limit to which the safety tests are valid.

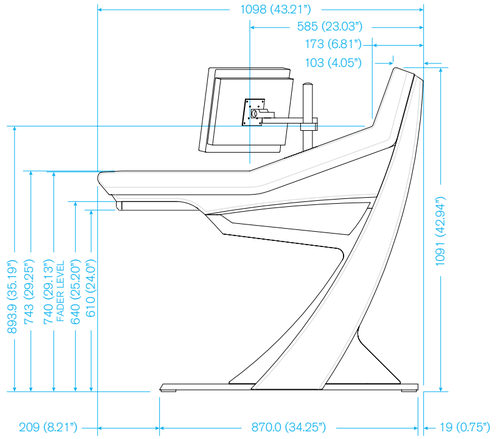
Maximum Cable Lengths

Cables		**Maximum Length**	
From	***To***	***Feet***	***Meters***
Control Surface	DSP Rack	300 (copper) 16500 (fiber)	90 (copper) 5000 (fiber)
DSP	Hydra2 I/O Boxes	300 (copper) 16500 (fiber)	90 (copper) 5000 (fiber)

Apollo surface sizes

Standard Apollo modules are 250mm (9.84") wide and contain eight faders across their width. Half width modules are 130mm (5.12") wide. Standard frame sizes are 2, 2.5 and 3 modules wide, plus a 2.5mm (0.098") bulkhead at either end. Depending on the frame size of the console, these dimensions may vary. Typical surface widths are shown here – these include the 50mm trim and the half width modules. For desk top mounting, leg dimensions may be discarded although external measurements still apply.

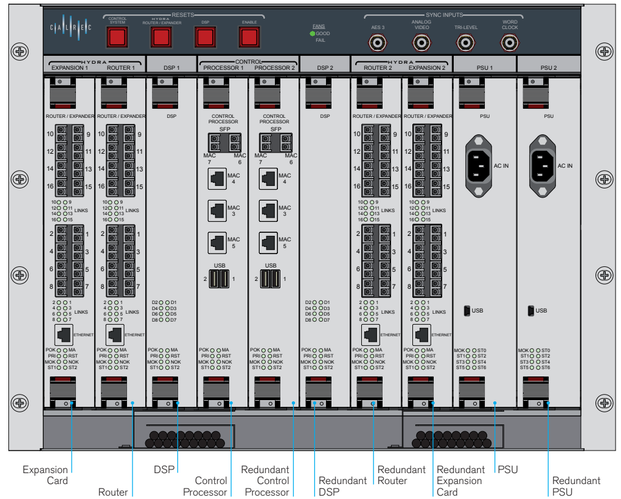
Control surface end profile



Typical surface measurements

Modules	**Frame sizes**	**Max Surface Width** ***(including 50mm trim)***	**Internal Leg**	**External Leg**
6.5	2, 2.5, 2	1748mm (68.82")	1548mm (60.94")	1718mm (67.64")
7.5	3, 2.5, 2	1998mm (78.66")	1798mm (70.79")	1968mm (77.48")
8.5	3, 2.5, 3	2248mm (88.50")	2048mm (80.63")	2218mm (87.32")
9.5	2, 3, 2.5, 2	2504mm (98.58")	2304mm (90.71")	2474mm (97.40")
10.5	2, 3, 2.5, 3	2754mm (108.43")	2554mm (100.55")	2724mm (107.24")
11.5	2, 3, 2.5, 2, 2	3010mm (118.50")	2810mm (110.63")	2980mm (117.32")
12.5	2, 3, 2.5, 3, 2	3260mm (128.35")	3060mm (120.47")	3230mm (127.17")

Typical rack layout



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