APOLLO OPERATOR MANUAL V1.6

Digital Broadcast Production Console

CALREC

Putting Sound in the Picture

calrec.com

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IMPORTANT INFORMATION

After Sales Modifications
Please be aware that any modifications other than those made or approved by Calrec Audio Limited or their agents, may invalidate the console's warranty. This includes changes to cabling provided by Calrec and variations to the recommended installation as detailed in Calrec documentation.

Modifications to this equipment by any party other than Calrec Audio Limited may invalidate EMC and safety features designed into this equipment. Calrec Audio Limited can not be liable for any legal proceedings or problems that may arise relating to such modifications.

If in doubt, please contact Calrec Audio Limited for guidance prior to commencing any modification work.

ESD (Static) Handling Procedures
In its completed form, this equipment has been designed to have a high level of immunity to static discharges. However, when handling individual boards and modules, many highly static sensitive parts are exposed. In order to protect these devices from damage and to protect your warranty, please observe static handling procedures, for example, use an appropriately grounded anti-static wrist band. Calrec will supply an electrostatic cord and wrist strap with all of it's digital products.

All modules and cards should be returned to Calrec Audio Limited in anti-static wrapping. Calrec Audio Limited can supply these items upon request, should you require assistance.

This applies particularly to digital products due to the types of devices and very small geometries used in their fabrication, analog parts can however still be affected.

ROHS Legislation
In order to comply with European RoHS (Reduction of Hazardous Substances) legislation, Calrec PCB and cable assemblies are produced with lead-free (tin/copper/silver) solder instead of tin/lead solder. See Figure 1.

FIGURE 1 - LEAD FREE

In the unlikely event of a customer having to carry out any re-soldering on such assemblies, it is imperative that the correct type of solder is used; not doing so is likely to have an adverse effect on the long-term reliability of the product. Circuit boards assembled with lead-free solder can be identified (in accordance with IPC/JEDEC standards) by a small oval sticker placed on the top-side of the circuit board near the PCB reference number (8xx-xxx). See Figure 2.

FIGURE 2 - LEAD FREE STICKER

The same sticker is used on the connectors of soldered cable assemblies. The absence of a sticker indicates that tin/lead solder has been used.

If in doubt, please check with a Calrec customer support engineer before carrying out any form of re-soldering.

ISO 9001 and RAB Registered
Calrec Audio Ltd has been issued the ISO9001: 2008 standard by the Governing Board of ISOQAR.

The award, for both UKAS (Figure 3) and RAB (Figure 4) registration, is the most comprehensive of the ISO9000 international standards. Granted in recognition of excellence across design, development, manufacture and after-sales support, the certification follows a rigorous and thorough review of Calrec's internal and external communication and business procedures.

FIGURE 3 - UKAS REGISTRATION

FIGURE 4 - RAB REGISTRATION

HEALTH AND SAFETY

Please observe the following

- This equipment must be EARTHED
- Only suitably trained personnel should service this equipment
- Please read and take note of all warning and informative labels
- Before starting any servicing operation, equipment must be isolated from the AC supply (mains)
- Fuses should only be replaced with ones of the same type and rating as that indicated
- Operate only in a clean, dry and pollutant-free environment
- Do not operate in an explosive atmosphere
- Do not allow any liquid or solid objects to enter the equipment. Should this accidentally occur then immediately switch off the unit and contact your service agent
- Do not allow ventilation slots to be blocked
- Do not leave the equipment powered up with the dust cover fitted
- The rack mounting parts of this equipment must be fitted into an enclosure which complies with local regulations

Cleaning

For cleaning the front panels of the equipment we recommend anti-static screen cleaner sprayed onto a soft cloth to dampen it only.

Explanation of Warning Symbols

Triangular warning symbols contain a black symbol on a yellow background, surrounded by a black border.

The lightning flash with arrow head symbol within an equilateral triangle, as shown in Figure 1, is intended to alert the user to the presence of dangerous voltages and energy levels within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock or injury.

The exclamation mark within an equilateral triangle, as shown in Figure 2, is intended to prompt the user to refer to important operating or maintenance (servicing) instructions in the documentation supplied with the product.

FIGURE 1 - DANGEROUS VOLTAGES

FIGURE 2 - IMPORTANT INSTRUCTIONS

Earthing

This is a Class I product. An Earth connection **MUST** be provided in each AC power cord.

The Earth Bolt connection at the rear of the console should be connected to Earth using Earth cable at least 6mm^2 in cross section (10 AWG).

TECHNICAL SUPPORT

Should you require any technical assistance with your Calrec product then please contact your local distributor, if outside the U.K. and Ireland. For a list of Worldwide distributors please see the Calrec Web site at www.calrec.com or contact Calrec UK.

For technical assistance within the UK and Ireland, please contact the Customer Support Team. Contact details are shown in Figure 1.

We can deal with all technical after sales issues, such as :

- Arrange repairs
- Supply of replacement or loan units while repairs are being carried out
- Service / commissioning site visits
- Operational training courses
- Maintenance training courses
- Supply of replacement components
- Supply of documentation
- Technical advice by telephone

Customer Support Hours

Factory based customer support engineers can be contacted by telephone during normal office hours (Monday - Friday 9:00a.m - 5:30p.m). Outside these hours, a message can be left on the answering machine, all messages are dealt with promptly on the next working day. Alternatively a message can be sent to them by email.

Product Warranty

A full list of our conditions & warranties relating to Goods & Services is contained in the Company's standard Terms and Conditions. A copy of this is available on request.

Repairs

If you need to return goods to Calrec, for whatever reason, please contact the Company beforehand in order that you can receive advice on the best method of returning the goods, and that a repair order reference number can be issued.

Standard of Service

Ensuring high standards is a priority, if you have any comments on the level of service, product quality or documentation offered to you by Calrec, then the Customer Support team would be pleased to receive your comments through any of the normal contact numbers, email or on the User registration form located at the end of this manual. If you have any other issues regarding your Calrec purchase, then please contact us and we will do our best to help. Calrec welcomes all Customer feedback.

FIGURE 1 - CONTACT DETAILS

Address	Customer Support Calrec Audio Ltd Nutclough Mill Hebden Bridge HX7 8EZ England UK
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APOLLO
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INTRODUCTION

Apollo is a hugely flexible, large format digital console designed for the most critical broadcast production and on-air applications.

Apollo continues to meet the changing requirements demanded by the onset of surround sources in live production, providing sophisticated assignable monitoring solutions and encompasses flexible TFT metering.

The 'soft' nature of the Apollo surface encourages customization. The OLED and TFT displays show the information you want, where you want it. As processes and functions are not tied to specific hardware controls, the surface is inherently future proof and updates to functionality will integrate easily into existing hardware.

Bluefin2

The original Bluefin technology, released in 2006 to critical acclaim provided a huge amount of signal processing on just one card. The Bluefin2 High Density Signal Processing system developed for Apollo has extended this functionality to 1020 channels per card.

Calrec's Bluefin systems have an unrivalled history of reliability. With just two Bluefin2 cards in the console rack, 100% processing redundancy is achieved. This is almost like having a second console as a hot spare ready to switch over instantly with no loss of audio.

The reality of HD programming is that it will continue to create more demand for multichannel audio content, particularly 5.1 surround. Bluefin2 technology is designed to scale to support future requirements.

Commitment

Calrec has a world-wide customer base which includes many of the world's most prestigious broadcasters. By consistently focusing upon purely broadcast products, Calrec offers consoles with the most comprehensive combination of performance and features available. The high level of reliability of all Calrec products, many of which are still in daily use after 20 years service, reflects a clear awareness of the critical nature of the operating environment.

This understanding of the real issues of broadcast operations is one of the many reasons why operators and management alike prefer Calrec. Apollo is designed to ensure this level of confidence will continue in the foreseeable future.

PRINCIPAL FEATURES

Surface Operation

- Latest generation color OLED and TFT touch displays.
- Illuminated rotary, button and slider controls with function nominated color.
- User choice of assignable or channel based in-line operation.
- Control surface can be functionally split for multiple operators with independent monitoring and APFL systems.
- All faders are motorized and touch sensitive.
- Options for panels with a single or dual row of faders.
- Flexible and extremely configurable TFT screen-based meters.
- 12 layers of A and B paths gives great flexibility in organization.

Resilience

- Full redundancy of Apollo rack (control processor, router, PSU and DSP modules), control links and Hydra2 IO links.
- Console operates independently of configuration PC
- Independent DSP operation ensures audio continuity even during a surface or rack control processor reset.
- Automatic change over to hot spares for all Apollo rack modules and connections.
- All cards and modules are designed to be hot plugged.
- All cards and modules are designed to initialize upon insertion.

Channel/Group Facilities

- **At 48kHz :** 1020 Channels, 16 Main Outputs, 48 Groups, 96 Tracks, 48 Auxiliaries, 3 x PFL/AFL
- All channels and groups have 6 bands of full range EQ (each with changeable response) and full dynamics processing (2 x Compressor/Limiter and Expander/Gate).
- 256 mono legs of delay, each up to 2.73 seconds giving a total of 11.6 minutes.
- Up to four individual track sends per channel.
- Up to 256 mono equivalent assignable inserts for outboard equipment.
- A pool of 512 direct outputs provides channels and groups with up to four direct outputs which can be pre EQ, pre fader or post fader.
- Every channel can route to the mix minus buss.
- Every channel can route to every buss at the same time, without restrictions.

Power

- Distributed PSU system – no heavy duty power cables.
- Power Over Ethernet technologies for simple internal distribution.
- Low power consumption and heat generation.

Hydra2 Networking

- All IO is provided over Hydra2 networks allowing port to port routing.
- Large total system size of up to 8192 crosspoints per router.
- Allows for 48KHz and 96KHz sample rates to be used simultaneously across the network.
- Very low latency (<2.5 mS A-A, <0.5 mS D-D).
- Simple screened cat5e or fiber interconnection of IO to consoles.

TERMINOLOGY

In order to be clear and consistent throughout Apollo documentation and eliminate confusion, certain common Calrec terms are described here.

ADC (Analog to Digital Conversion)
The process by which continuous analog signals are sampled and converted into discrete digital representations. The frequency of samples in the resultant digital signal is determined by the Sample Rate of the system (e.g. 48kHz). The dynamic range of the sampled signal is dependant on the wordlength (e.g. 24bit).

AFL
After-Fade Listen. Allows the user to hear only the selected channels after they have been affected by fader position, pan position and channel processing. Multiple AFL signals can be sent to the AFL buss. AFL does not affect the main outputs, so can be seen as being similar to 'safe solo'.

APFL
A buss that combines both AFL and PFL signals. This removes the need to have separate loudspeakers and meters for monitoring AFL and PFL signals.

Assign Mode
An operating mode of the surface in which it acts as an assignable console. A fader is assigned and all controls on an assign panel become relevant to the assigned path.

Assign Panel
When a wild assign panel is set to operate in Assign Mode, it can be referred to as an Assign Panel. The controls and information on this panel will reflect the data associated with the currently assigned path.

Assigned Path
When a path is assigned, certain functionality becomes available to it. For example the spill controls can affect components of a multichannel path, or any Assign Panels can update to display and control data relevant to the assigned path.

Aux (Aux)
An Aux is a buss to which signals can be sent and grouped. The send for the originating channel may be pre or post fade. Auxes can be patched to output ports and can be controlled by certain logic functions such as pre-send cut when originating channel is cut, pre-send cut when originating channel fader is closed and Bird Beater.

Auto Fade
Faders can be set to fade in and out in response to GPI signals. This might be set up so that a vision mixer can control relevant audio sources by simply fading up or down the video signal.

AWACS (Automatic Warning And Correction System)
This system provides information and logs of any developing or occurring faults in the system.

Bird Beater
With the function turned on for a given Aux, the pre-fade send from an originating channel can be cut when the originating fader is opened and not cut.

Bluefin 2
The next generation of Calrec's High Density Signal Processing (HDSP) system. Providing over 1000 channel paths from just a single card.

Broadcast Facilities Panel
A panel located in the surface upstand. This provides access to useful broadcast functions such as TX/REH modes, system reset indicators and buttons, a talkback microphone input and a USB port for the surface PC.

Buss Path
A path in which multiple signals can be combined. A buss is the general term and can refer to a number of path types including Group, Aux, Track, Main, Mix Minus, AFL, PFL.

Channel Faders
Channel Faders are located on the Fader Panels. A generic term, as channels, groups, mains can all be attached to them allowing assignment and level control. They may also be used to control VCA groups.

Configuration PC
The Configuration PC is a Windows based computer linked to a touch screen external to the surface, normally mounted on a flexible arm. This PC provides access to system settings.

Continuous Memory
A continually updated memory that stores the state of the system. In the event of a restart after power loss or reset, the system can reload the continuous memory and continue from almost the same state prior to power loss.

Control Cell
The collection of controls consisting of an OLED, two buttons and two rotary controls.

Control Processor Module
The control processor module acts as the main controller of the Apollo system, passing messages between all modules. The surface communicates with the rack via the control processor module.

DAC (Digital to Analog Conversion)
The reverse of ADC. The digital representation of a signal is converted back into a continuous analog signal.

Desk Output
A desk output is a main output, similar to a line output but which never receives tone or talkback.

Direct Output
Each channel can have a number of direct outputs. These are available at different points in the processing chain and can be sent to external destinations.

Downmix
The process of converting a signal of a given width into a signal of a smaller width allowing fixed or variable amounts of each of the contributing legs to be included. For example, a downmix must be applied to a 5.1 surround signal for it to be correctly translated into a stereo format. Without a downmix, surround, LFE or center information may be lost and levels may become unbalanced.

DSP
Digital Signal Processing. Discrete mathematical operations applied to a stream of digital audio signals.

DSP Module
A module fitted in the Apollo rack which performs all the DSP functions of the system.

Fader
Fader refers to one of the physical faders available on the surface (see Channel Faders, Main Faders and Spill Faders).

Fader Bargraph Meters
LED meters next to each fader on the surface provide input metering.

Foldback
An audio mix sent to a presenter or artist. Applications include enabling them to hear their own input or communications.

Gigabit Ethernet
A family of network technologies used for connecting equipment and efficiently passing large amounts information over copper or fiber links.

GPI/O (General Purpose Inputs/ Outputs)
These connections allow simple on/off signals to be sent and received by the system. Functions of the system can be controlled from external sources via opto-isolated inputs. The system can control external items of equipment based upon surface actions via relay outputs. GPI/O connections are optional fittings on Hydra 2 IO boxes

Group Buss
A buss to which many audio signals can be routed, summed and controlled simultaneously with a single fader. For example all audience microphones may be sent to the same group buss for easy access. Busses can be patched to physical outputs and have full EQ and dynamics processing. For a non summing group see VCA Groups.

Hydra2
An audio networking system which links IO boxes to one or many consoles over Gigabit Ethernet. Apollo is based around a Hydra 2 system.

Hydra2 Router Module
All Hydra2 IO boxes connect to the network via a router. The router module contains 16 SFP sockets that can accept either copper or a range of fiber connections by using the appropriate adaptor.

IO Expansion Module
The IO Expansion Module located in the rack provides 16 more SFP sockets to extend the connectivity of a Router Module.

Interrogation
Interrogating a buss reveals all contributing paths. For example an Aux buss could be interrogated in order to find all the paths which have been routed to it. Routing can also be performed in reverse where a number of paths can be selected and be routed to the currently interrogated buss. (See Reverse Routing).

Interruptible Foldback (IFB)
IFB is a foldback mix which can be interrupted by tone or talkback. This function is normally handled by the track busses.

Layers
Layers allow the faders on the surface to change the paths they are controlling. On each layer, a different path can be attached to and controlled by a given fader. There can be up to 24 layers on the Apollo surface. Given an example surface containing 64 faders and using 6 layers, the user may control up to 384 paths with the faders simply by changing layers.

Line Output
A main output which contains everything routed to the main, including talkback and tone overrides. See Desk Output.

Mix Buss
When multiple signals are routed to a buss they are mixed together. This allows the combined signal to be processed, routed or have it's level controlled from a single location.

MADI (Multichannel Audio Digital Interface)
A coaxial or optical transmission medium providing a 56 or 64 channel capacity. The MADI standard (AES10) allows simple high density connectivity between different manufacturer's equipment. MADI is interfaced with an Apollo system via a Hydra 2 MADI IO unit.

Main
A main is an output buss, a final point at which signals are mixed and affected before they leave the console. Each main path can be accessed for external patching via a Desk Output and a Line Output.

Main Application
The touch screen based configuration PC application that provides additional access to many controls and allows system settings to be configured.

Mic Input Headroom
The amount of headroom above the mic gain setting, used as a safety net in the case of sudden high signal level. The headroom is currently fixed at 36dB. A high headroom offers greater safety at the expense of slightly more noise.

Mix Minus Buss
A dedicated buss used for simple yet powerful creation of mix minus feeds. A unique mix is created for each recipient which consists of the whole mix minus buss, minus their own contribution. Each mix minus feed is sent from a channel or group's direct output.

Mode Buttons
The mode buttons allow the operating mode of each wild assign panel on the surface to be switched.

OLED Display (Organic Light Emitting Diode)
An OLED Display (or OLED for short) is a small interactive display. It may be used as a single large display, two horizontal displays, or four smaller square displays depending on its application.

On Air Mode
On Air mode allows certain operational functions to be activated or inhibited when the system is switched in to it.

Online Documentation
The touch screen based configuration PC application for displaying and providing interaction with Calrec documentation and training materials.

Port
A port refers to any physical audio input or output in a Hydra 2 IO box. Ports can be of any form of analog or digital IO. In the case of analog signals, a single port relates to a single signal in the system. Where digital signals are connected, multiple signals become available for each port. A single AES3 port provides two signals, SDI can provide up to 16 signals (or more with Dolby E decoding) and MADI can provide up to 64 signals.

Patch
A patch is a connection made between a source and a destination in the system. For example an input port may be patched to one or more channel inputs, or a main output may be patched to one or more output ports.

Path
A generic term that refers to a DSP process in the system. A signal present at an input port must be routed to a path in order for it to be processed and then sent back out of the system. Paths include channels, groups, auxes, tracks, mains, talkback and monitor paths. Paths can be routed to other paths, for example a channel path can be routed to a group path and a main path simultaneously.

PFL
Pre-Fade listen. A function to allow a signal to be heard before it has it's level altered by a fader. Multiple PFL signals can be sent to the PFL buss.

Power over Ethernet (POE)
A technology used to provide power to equipment through the same Ethernet connection that carries information.

Pre-Selectors
Part of the monitoring controls on the surface, Pre-Selectors allow a number of sources to be preset, ready to be sent to the main control room loudspeakers and meters.

PSU Module
The PSU module provides power to the rack and the other modules contained within it.

Rack
The single 8U enclosure containing all power, processing and networking modules for an Apollo system.

Redundancy
All main components of the system are redundant, meaning that there is always a secondary hot spare ready to step in and take over control if the primary component fails. The failed primary unit can be replaced with a working unit which then becomes the new hot spare, effectively re-introducing redundancy.

Reverse Routing
When a buss is interrogated, routes to that buss may be made in reverse by specifying which paths will be routed to it. Normal routing involves specifying which busses a certain path is routed to. (See Interrogation and Routing)

Rotary
A knob which can be rotated, allowing variable control of a parameter. In some cases it can be pressed giving it extra functionality. Each control cell contains two rotary controls.

Route
A route is a connection made from one path to another within the system. For example a group path may be routed to a main path, or a channel path may be routed to an Aux path via an aux send. (See also Reverse Routing).

Row
A row is a horizontal arrangement of controls on a surface panel. For example the row of OLEDs at the top of a standard fader panel is called the 'Modes Row'.

SDI (Serial Digital Interface)
Although SDI is primarily a means for encoding and transporting video signals, audio signals can also be encoded and sent through in the ancillary data space. Certain Calrec SDI de-embedders can decode all groups and Dolby E encoded audio for a maximum of 128 mono signals per SDI stream.

SFP (Small Form-Factor Pluggable) connections
SFP sockets accept a range of adaptors which provide different interface connections for copper or fiber connectivity. This allows units fitted with SFP sockets to be customized to meet a range of requirements. All main network connections in a Apollo system make use of SFP sockets.

Spill Faders
Allow control of legs of a multichannel signal. For example the overall level of 5.1 surround channels is controlled by a single fader. By using the spill faders, components of the multichannel signal can be altered. If a spill fader is the currently assigned fader, then processing can also be applied to that component using the assign panels. For a 5.1 channel the legs are broken into the following components: L/R (stereo), C (mono), LFE (mono), LsRs (Stereo).

SRC (Sample Rate Conversion)
A sample rate converter is by default switched in on each AES3 input in the event that an incoming external signal is at a different sample rate or not synchronized to the same source as the system. It can be switched out if the incoming signal is known to be synchronous.

Standard Fader Panel
A physical surface panel containing eight faders, a row of cells and three rows of OLEDs. Along with the wild assign panel and TFT meter, the standard fader panel is the most common panel on a surface.

Strip (Channel Strip)
Strip refers a vertical arrangement of controls on the surface which can be a combination of fader and assign panels. There are eight strips on a wild assign panel and on a fader panel.

Surface
The surface is the physical control surface for a Apollo system containing the collection of faders, rotary controls, buttons and displays allowing hands on control of the audio signals. Sometimes referred to as the Console or Desk.

System
The term 'system' encompasses the rack, surface, and configuration PC. From the moment a signal enters a Hydra 2 input it is in the system and remains there until it is passed out of a Hydra 2 output.

TFT Meter
A TFT screen in the surface used to display customized high resolution metering.

Tracks
Multi function busses that can be patched to physical outputs. Used for such purposes as generating multiple interruptible clean feeds (IFB) or sending audio to a multitrack machine.

Upmix
The opposite of Downmix. Narrow width signals can be processed in order to be sent to a wider buss. This occurs when monitoring a mono signal through a stereo buss. Here the pan control can be considered an upmix parameter as it varies the resultant stereo upmix.

VCA Groups
The term VCA stands for Voltage Controlled Amplifier. A VCA group, unlike a group buss does not sum any audio. Instead it allows a single fader to control the relative levels of any contributing paths. The controlling fader is known as the master, the contributing paths are known as slaves. This maintains the relative levels of all paths in the group yet still allows individual control where required.

Wild Assign Panel
A panel containing a touch screen TFT and multiple Cells and OLEDs. The function of this panel can be altered during operation of the surface.

Wild Assign Touchscreen
The TFT touch screen display located in a wild assign panel. Provides flexible options for displaying and controlling information directly through touch.

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OPERATION

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CONFIGURATION PC OVERVIEW

The configuration PC is mounted inside the surface. The only access available to the PC is through the keyboard, trackball, touch screen display and USB port on the console upstand.

Apollo does not rely on the PC for audio processing. The console will continue to operate and process audio uninterrupted even if the PC is reset or suffers a loss of power.

Main application

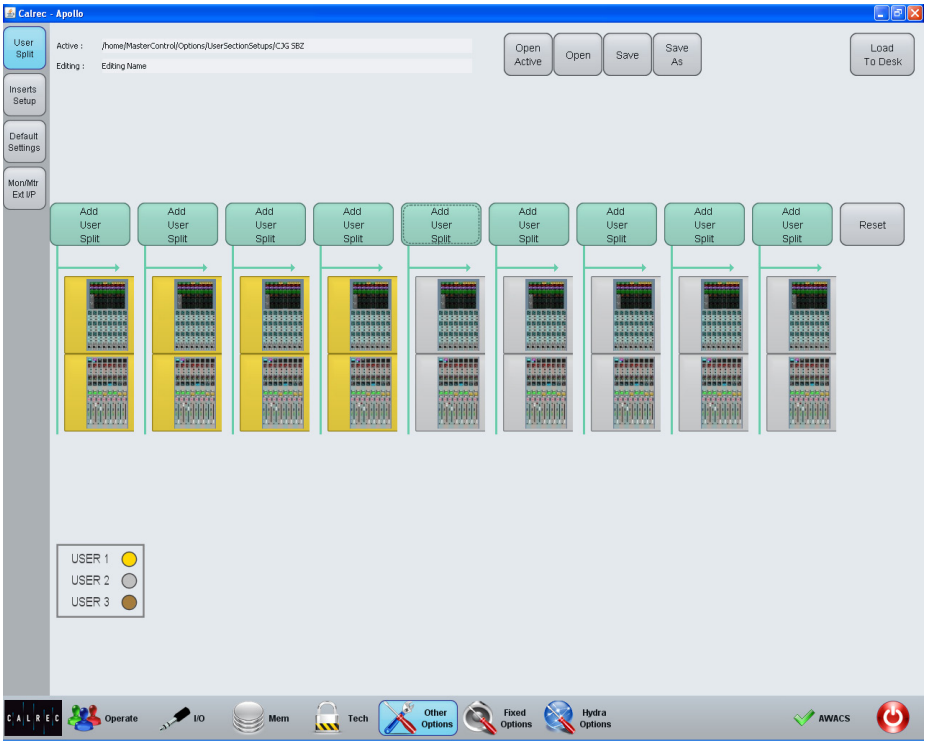
The main purpose of the configuration PC is to run the main application, which provides access to many important console options.

The main application is launched automatically when the configuration PC is booted. If the application has been closed, it can be re-loaded from the 'Main Application' icon on the desktop.

Figure 1 shows the layout of the main application. Along the bottom edge of the application is the main menu which contains buttons for each of the main sections of the application. When this document instructs the user to go to the MEM section for example, it is the equivalent of saying 'touch the MEM button on the main menu of the main application'.

Once a certain section has been selected, a list of available screens will appear vertically along the left hand edge of the application. Touching one of these buttons will update the main application to display the relevant screen. When this document instructs the user to go to a certain screen, it is referring to touching the relevant button on this list.

FIGURE 1 - MAIN APPLICATION



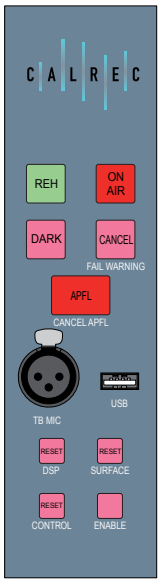
USB Port

A USB port linked to the configuration PC is available in the broadcast facilities panel located in the TFT meter upstand. This can be used for backing up and restoring memories or settings from the console. It is designed for portable flash based USB memory devices and as such may not provide power for larger USB hard drives.

Online Documentation

Electronic versions of all documentation may be accessed on the configuration PC by using the Online Documentation application. This can be loaded from the Online Documentation folder on the desktop.

FIGURE 2 - USB PORT



TOUCH OVERVIEW

Apollo makes great use of touch technologies to provide direct interaction with on screen controls.

The configuration PC display, surface OLEDs and wild assign TFTs are all touch sensitive and should be used with a finger rather than any other pointing device (such as the top end of a pen) which may damage the surface of the displays. Certain aspects of the software have been designed to be accessed primarily through touch and so some terms should be defined to aid in reading this document.

Touch/Tap

The main interaction between operator and touch control is the touch (or tap). The operator should touch the desired control on the display then immediately release without changing position. See Figure 1.

Multiple touches (Hold and Touch)

In some cases it is necessary to combine touch controls to achieve the desired result. One control will normally be held which touching other controls. Figure 2 demonstrates this process. This is normally only required between OLED controls on the surface. Combinations between configuration PC and the surface will not be used.

Swipe

The swipe motion may be used to scroll through a list of items or page through a number of views. Touch the control and straight away swipe in the required direction. Remove the at the end of the swipe. This motion is shown in Figure 3.

FIGURE 1 - TOUCH/TAP

Touch the screen momentarily and then release in the same position

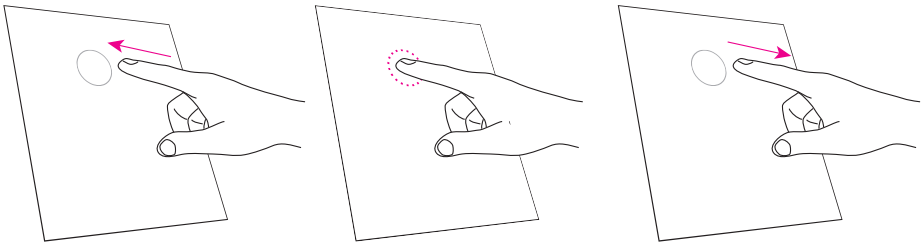


FIGURE 2 - HOLD AND TOUCH

Touch an OLED and hold while touching another OLED

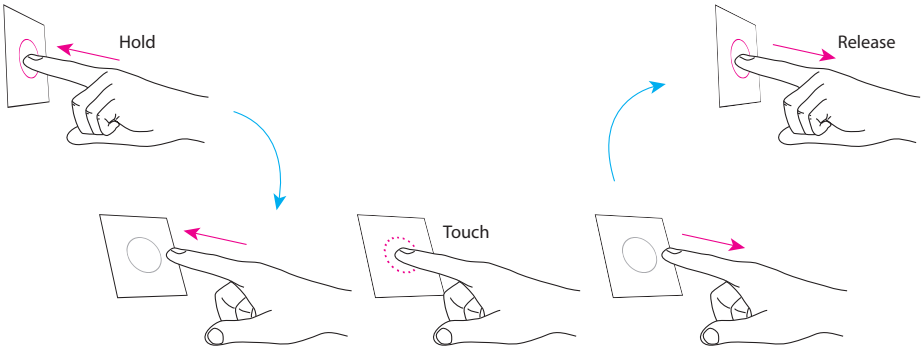
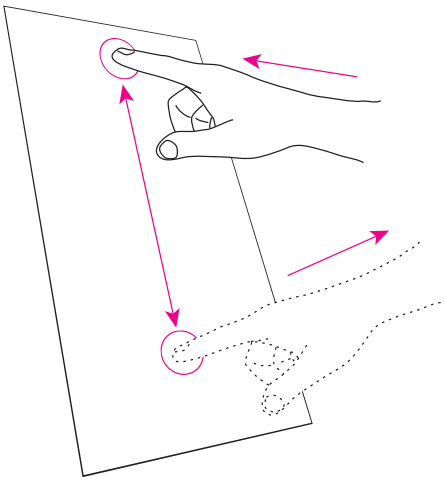


FIGURE 3 - SWIPE

Touch the display, swipe a finger to another position then release



SURFACE CONTROL OVERVIEW

Apollo works the way you want to. A variety of operating modes and different ways to display information ensure that every operator will feel at home behind the console.

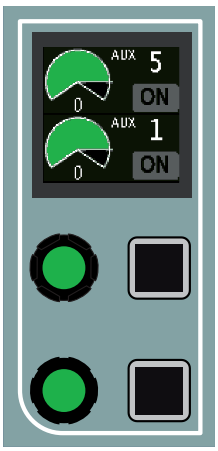
There are a range of different panels available that make up the Apollo surface. These are detailed in the 'Surface Panel Overview' section of this document. It is first important to understand the different control types which make up these panels.

The main control types on the surface are as follows:

OLEDs

The OLEDs (Organic Light-Emitting Diodes) on the surface can display one large section, two half sized horizontal sections, four quarter sized sections, or any combination of half and quarter sizes. Text is displayed along the center of some OLEDs to clearly label the functions or to indicate certain assignments. The OLEDs in the layers and modes rows are touch sensitive and can be touched to access the functions displayed.

FIGURE 1 - CONTROL CELL



Maximizing OLED lifespan

To optimize the lifespan of the OLED displays in your console, reducing fading and burn-in over time, it is recommended that the brightness is adjusted down where operational conditions allow. There is also a screensaver / "Dark Mode" that will turn off the displays after a period of inactivity on the control surface. The screensaver cannot be turned off; however the time-out period for inactivity can be adjusted between 1 minute and 1 hour. During Dark Mode, only displays are turned off (all control and audio processing continues). Displays are brought instantly to life on any control change, such as activating a fader touch sensor (fader does not have to be moved), or adjusting the Monitor LS level. It is recommended that the timeout is adjusted to minimize the time the displays are illuminated whilst the console is not in use. The "Dark" button on the reset panel can be pressed to enter dark mode at any time and also illuminates to display when dark mode is active.

Display brightness and Dark Mode timeout can be adjusted from the PC Main Application, Fixed Options>Surface Illum.

FIGURE 2 - BUTTON CELL

Rotary controls

The rotary controls on the surface will change color to reflect the type of control they are currently assigned to. For example, when assigned to an Aux control they would be colored green.

Buttons

The small square and triangular buttons, like the rotary controls, change color when active to reflect the currently assigned control.

Where there are buttons that relate to the same control as displayed on an OLED, the buttons will be used for control. The OLEDs are not touch sensitive when a physical button is present.

Control cell

The three interface elements described above are combined on the surface to make up a number of control cells. One of these cells is shown in Figure 1.

The upper rotary control and button control the parameters shown in the upper half of the OLED. The lower rotary control and button control the parameter shown in the lower area of the OLED.

Controls that are not active (for example pan controls when assigned to a surround buss) will be hidden. The rotary controls, buttons and OLED sections will not be lit.

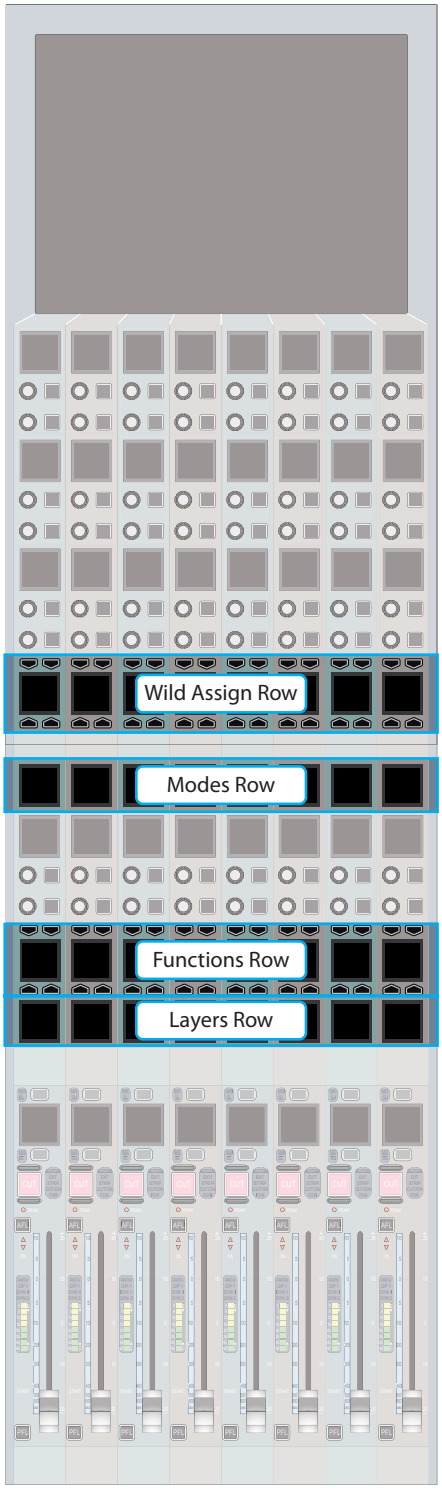
Button cell

The arrangement of controls is shown in Figure 2 is known as a button cell. The buttons above and below the OLED map directly to the nearest OLED section. The switchable controls may be accessed by pressing the relevant button.

Strip

A Strip is a collection of controls that are specific to each fader on the surface. For example each fader control cell always

FIGURE 3 - ROWS



contains controls that affect the fader directly below it. The control cells and TFT on the wild assign panel may also be arranged in this way dependant on the wild assign panel mode.

Rows

Certain horizontal sets of controls are used together to group similar controls. These are known as **rows**. Each row on the surface has a name, such as 'Functions row' or 'Modes row'. The rows are identified in Figure 3.

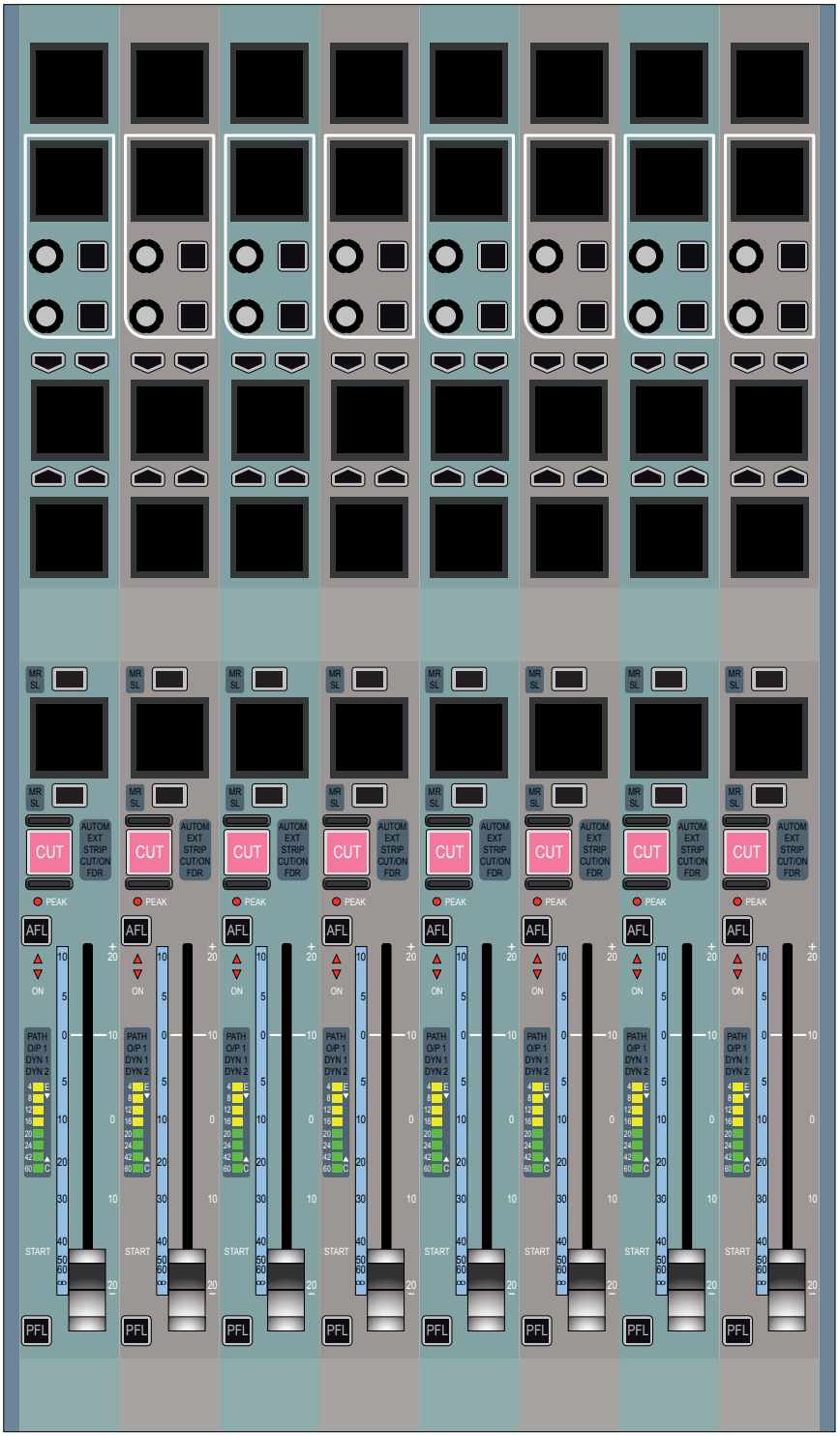
The Layers row and Modes row always span the width of the panel and contain controls that do not relate directly to a specific fader.

SURFACE PANEL OVERVIEW

Fader Panel

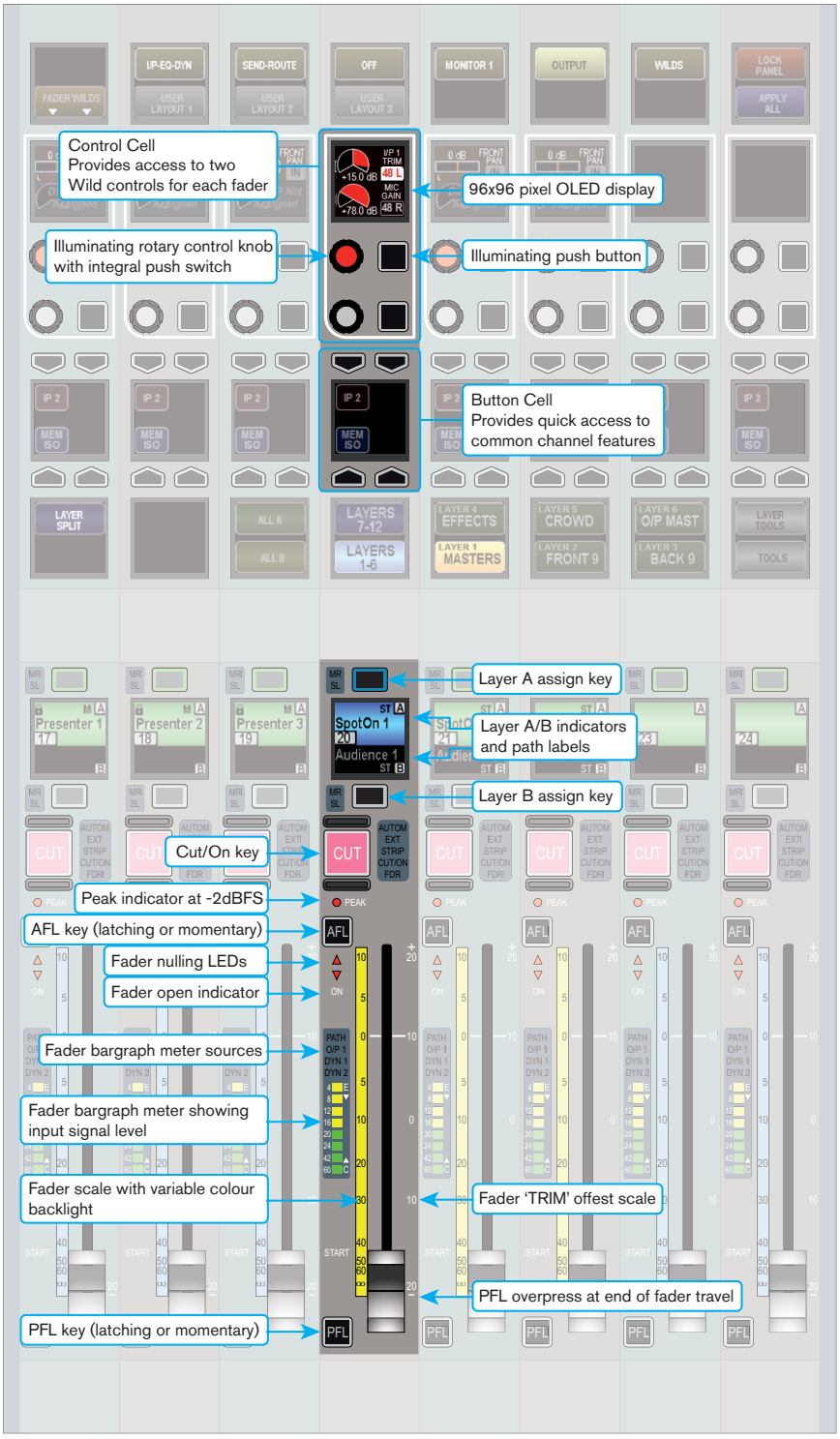
Each fader panel consists of 8 fader strips at a fader pitch of 30 mm. Each fader strip contains an A/B assign section, a button cell and a control cell. A blank fader panel is shown in Figure 1.

FIGURE 1 - FADER PANEL



The main control features are highlighted in Figure 2. All these controls are normally relevant to the highlighted fader and are repeated eight times across the panel.

FIGURE 2 - FADER PANEL CONTROLS



There are two, eight wide OLED rows that span the width of the panel which are highlighted in Figure 3.

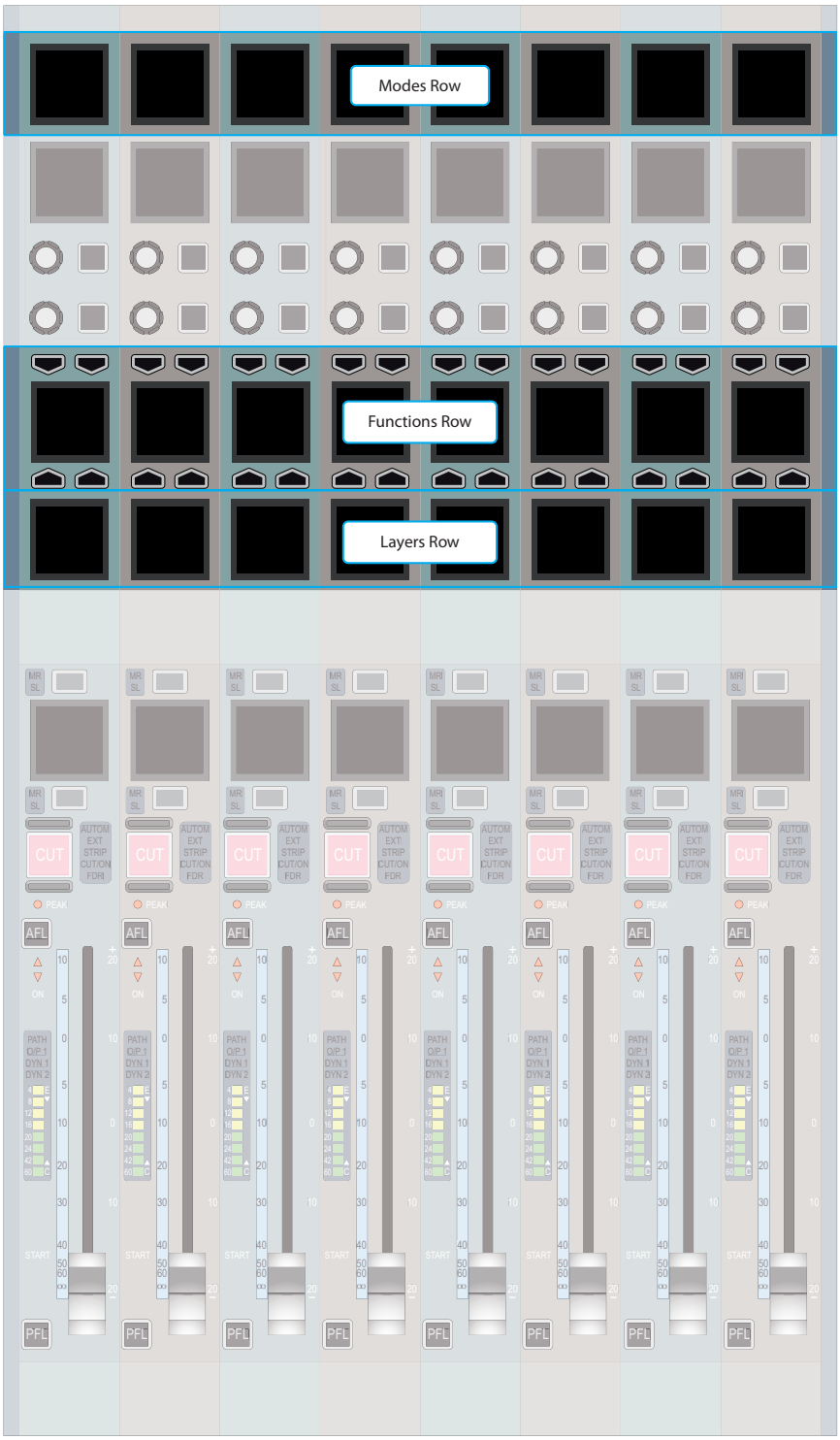
The Modes row is used to control the mode of the wild assign panel above it.

The Layers row is used for layer switching and accessing certain other panel functions.

The Functions row changes between displaying controls relevant to each fader (as shown in the previous figure), or a range of setup and configuration options which do not directly relate to any one fader.

It is an important to make the distinction that unlike other OLEDs and controls on the panel, these rows are not linked to a single fader.

FIGURE 3 - FADER PANEL ROWS



Wild assign Panel
Each wild assign panel consists of 24 identical control cells and a row of button cells.

The bottom row, or wild assign row, is generally used to control the operation of the “fader wild” control cells above.

The control cells will display different controls and be arranged in different ways depending on the mode that the panel is operating in.

The panel could be in Assign, Outputs Monitor or Wilds modes.

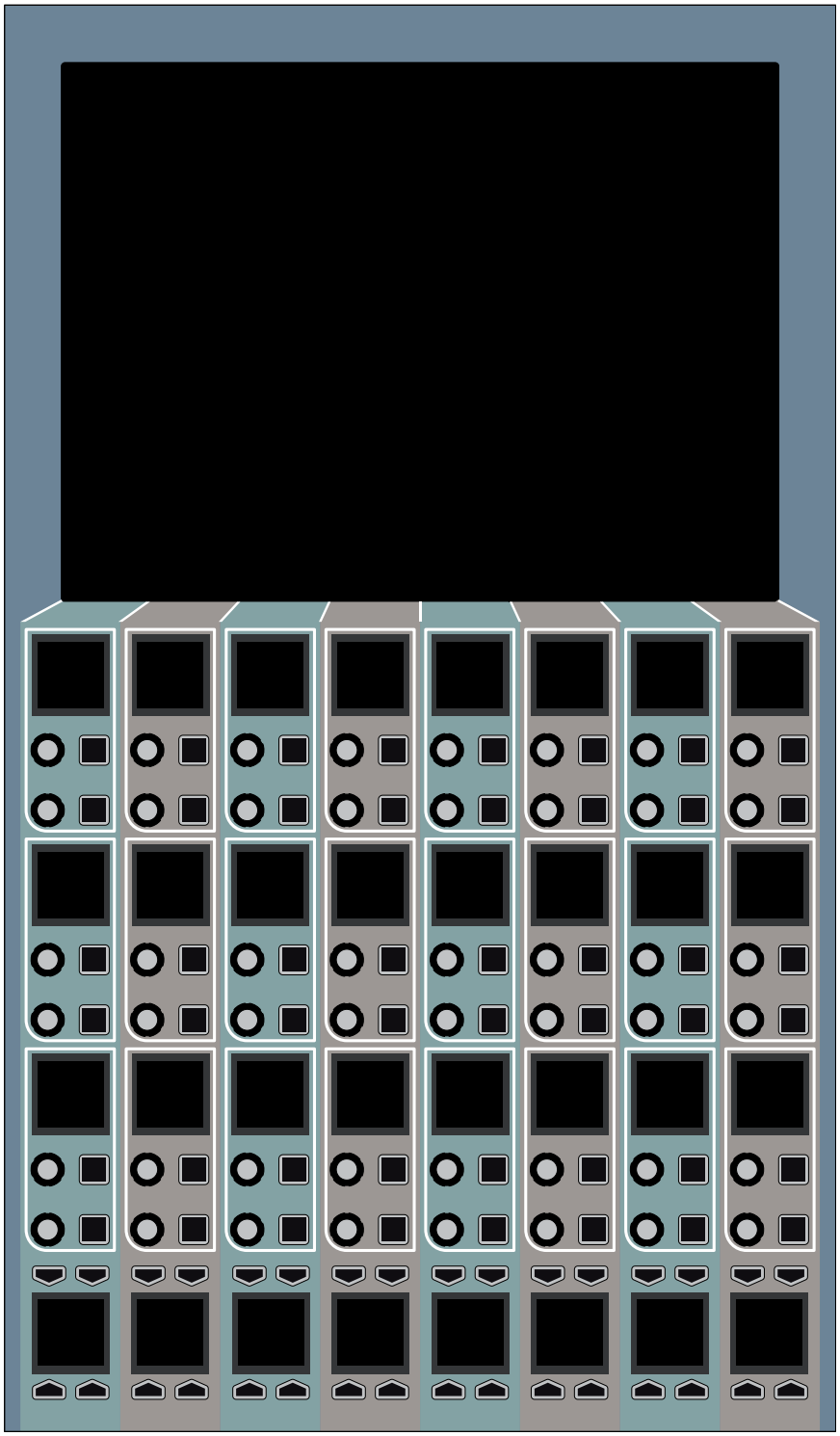
Assign mode makes the panel function as an assignable panel. In much the same way as previous Calrec assignable console such as Alpha, a range of parameters would be displayed that reflect the values of, and allow control over the currently assigned path.

Wilds mode splits the panel up into eight vertical strips effectively providing six additional wild controls per fader.

Outputs and Monitor modes provide control over output and monitor functions.

A TFT touchscreen located at the top of the panel is used to display and interact with control settings.

FIGURE 4 - WILD ASSIGN PANEL



Each type of control on the wild assign panel is detailed in Figure 5.

FIGURE 5 - WILD ASSIGN PANEL CONTROLS

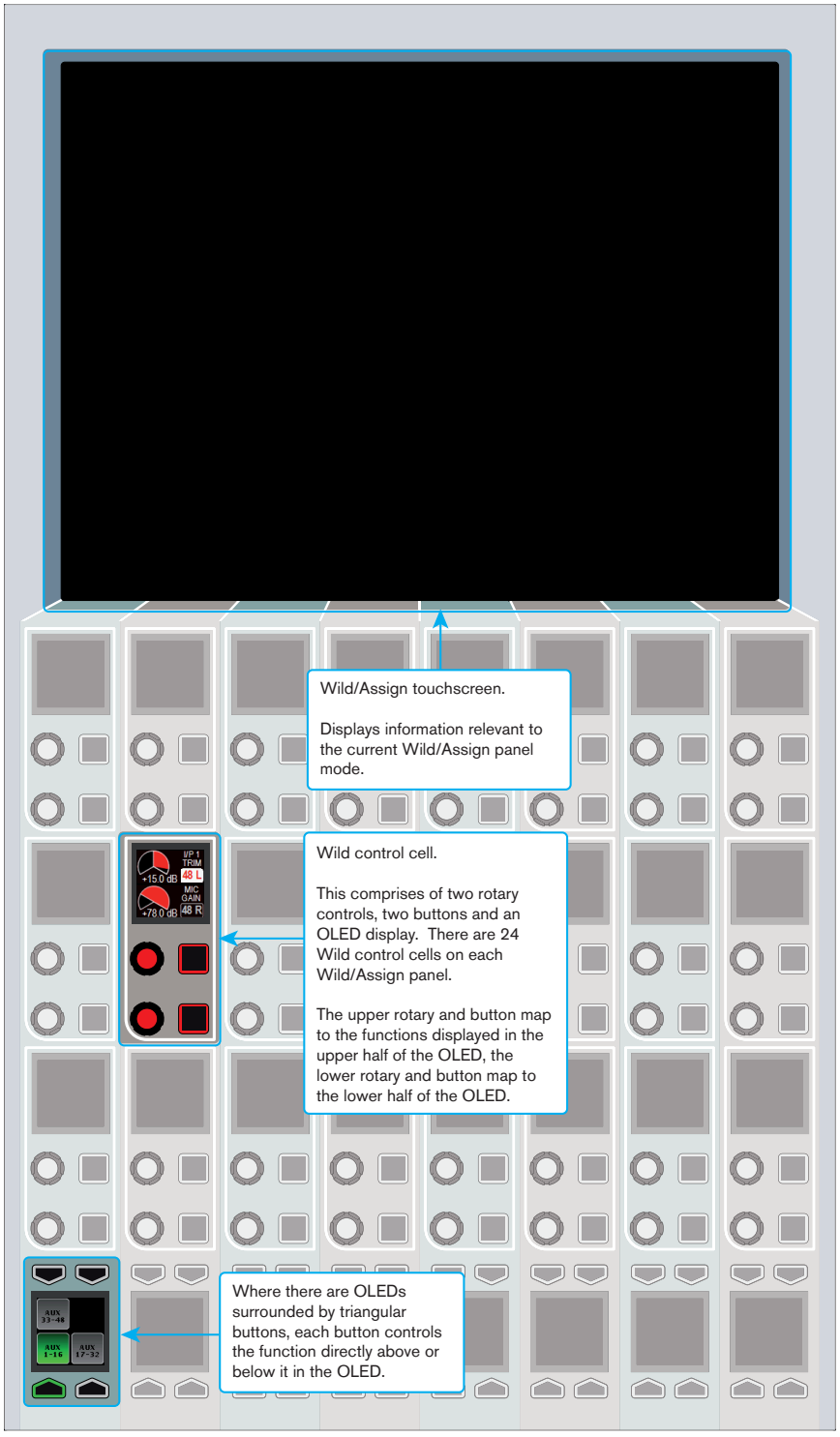
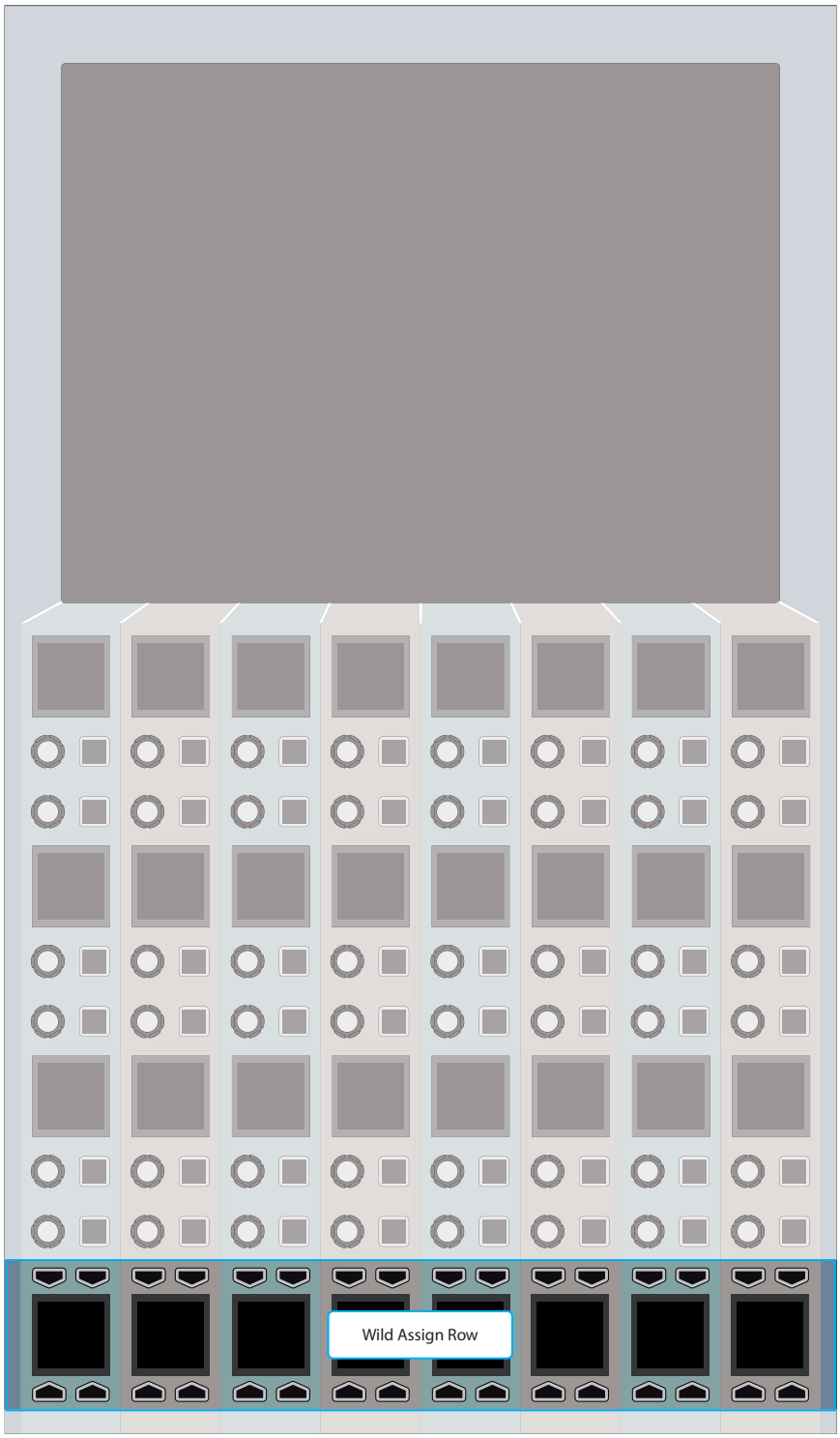


Figure 6 highlights the main row at the bottom of the wild assign panel. This row is known as the wild assign row. In Assign, Outputs or Monitor mode this functions as a panel wide row working with various controls in the control cells and TFT above.

In Wilds mode, the panel is divided up into eight vertical strips. In this case the OLEDs in the Wild Assign row each relate to a separate strip of controls.

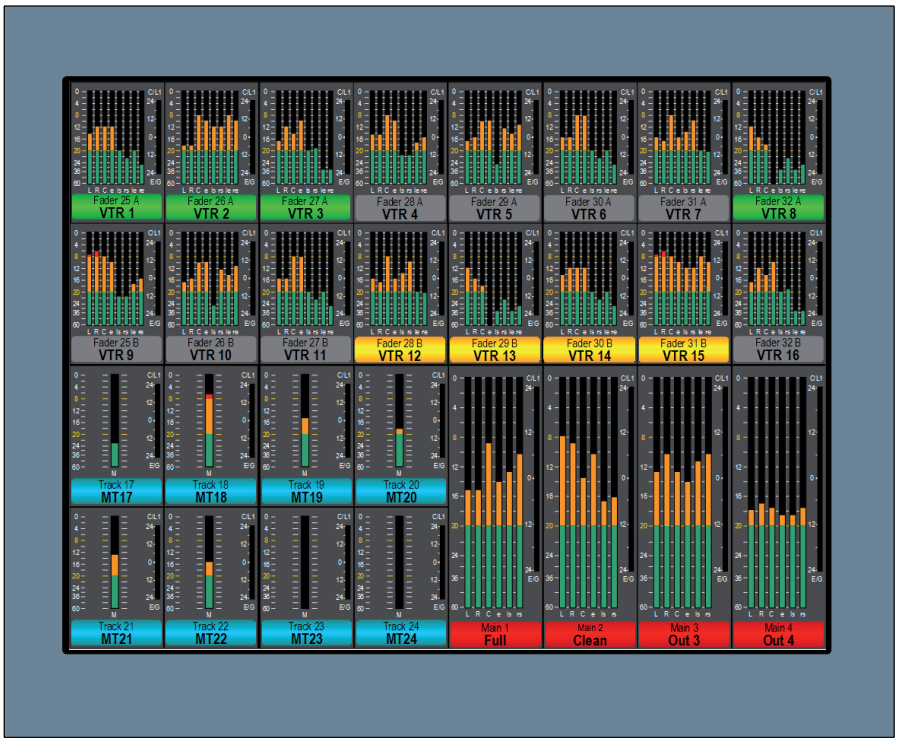
FIGURE 6 - WILD ASSIGN PANEL ROWS



TFT Panel

This is primarily used to display metering information and is not touch controlled An example meter layout is shown in Figure 7.

FIGURE 7 - TFT METER PANEL



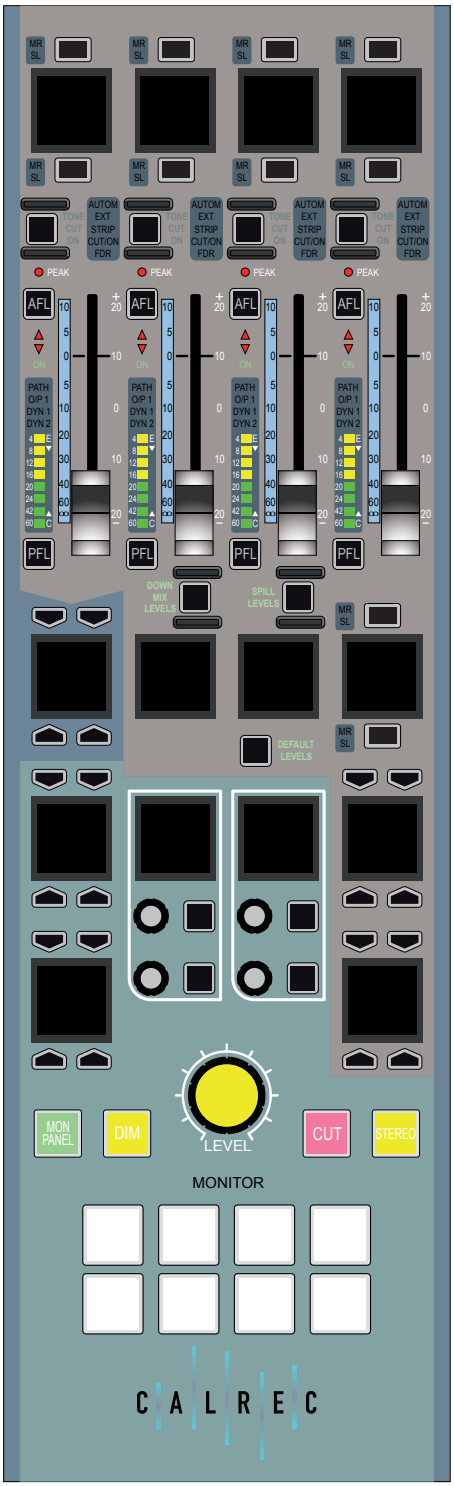
Monitor Panel

The panel (Figure 8) can act as either a spill controller, downmix controller or a main output controller. These functions are accessed with the four 60mm motorized faders. Each fader has its own PFL/AFL/CUT controls and a set of A/B assign keys either side of an OLED display.

The panel also contains a subset of the main monitoring controls including the large CR Monitor level knob, small LS trim and changeover, Dim level, AFL and PFL levels and the 4 preselected monitor Hear controls.

At the bottom of this panel are 8 illuminating buttons which can be configured to act as general purpose controls or indicators.

FIGURE 8 - MONITOR PANEL

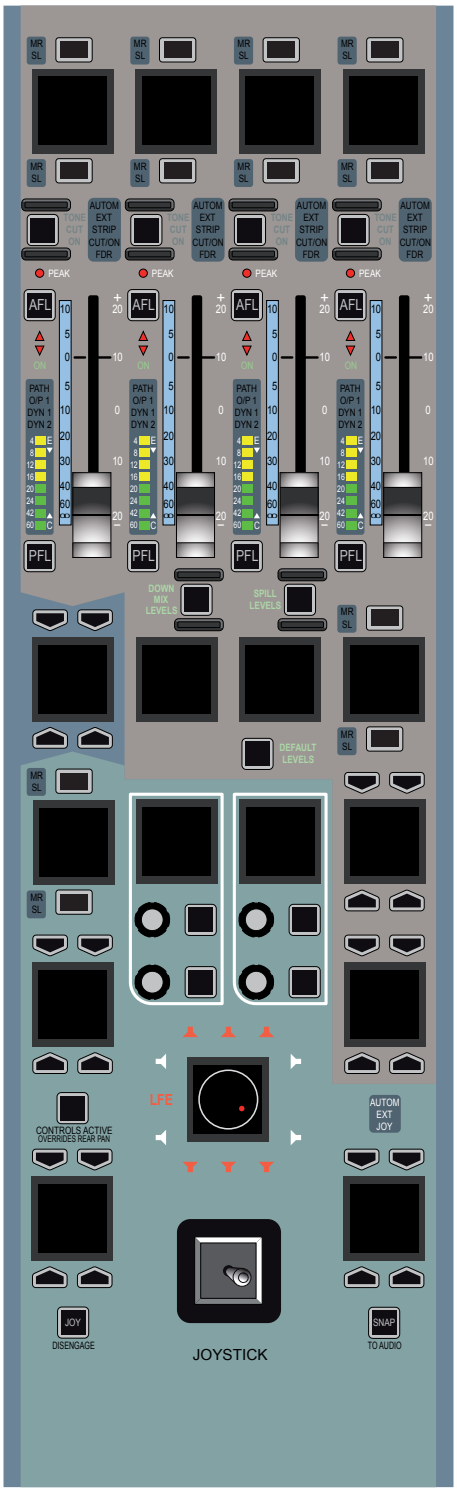


Joystick Panel

Like the monitor panel, this panel (Figure 9) can act as either a spill controller, downmix controller or a main output controller accessed via the four 60mm faders.

Instead of monitor controls, the lower green area of the panel is dedicated to controlling the surround panning facilities of the console with a motorized joystick.

FIGURE 9 - JOYSTICK PANEL



Broadcast Facilities Panel
The Broadcast Facilities panel is shown in Figure 10.

The top two buttons provide switching and indication for On Air and Rehearse states. The Fail Warning Cancel button acknowledges any failures in the system.

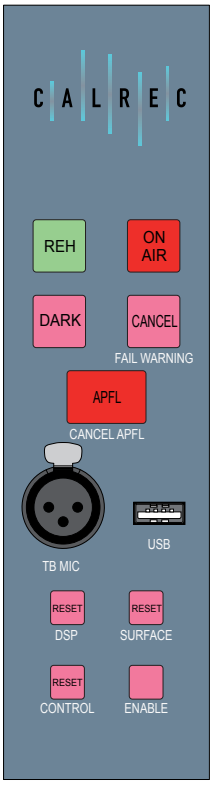
Under these is an APFL indicator which lights if the main monitoring is being overridden by AFL or PFL. This is also used to clear any latched AFL and PFL when pressed.

A Talkback Mic XLR connector is provided on the panel and also a USB connector which allows the user to plug in a USB memory stick which can be used to load and store console configurations from the Configuration PC in the body of the console.

At the bottom of the panel are the reset switches. Each of these can be pressed together with the Enable button to reset the Console Surface, DSP module or Control System independently.

The Dark button switches on the surface screensaver. This turns off all OLEDs and LEDs and displays a screensaver graphic on the TFT displays. Simply touching any fader or control on the surface will disable the screensaver and switch on all displays.

FIGURE 10 - BROADCAST FACILITIES PANEL



Dual Fader Panel

The Apollo dual fader panel is shown in Figure 11. This panel is the same size as and can be used in place of the standard fader panel.

The panel contains eight 100mm and eight 60mm motorized faders with overpress. The functionality of these faders and controls around them are as described in a previous paragraph in this section.

The 60mm faders on the dual fader panel take the place of the control cells and button cells which are present on the standard fader panel.

Modes and Layers rows

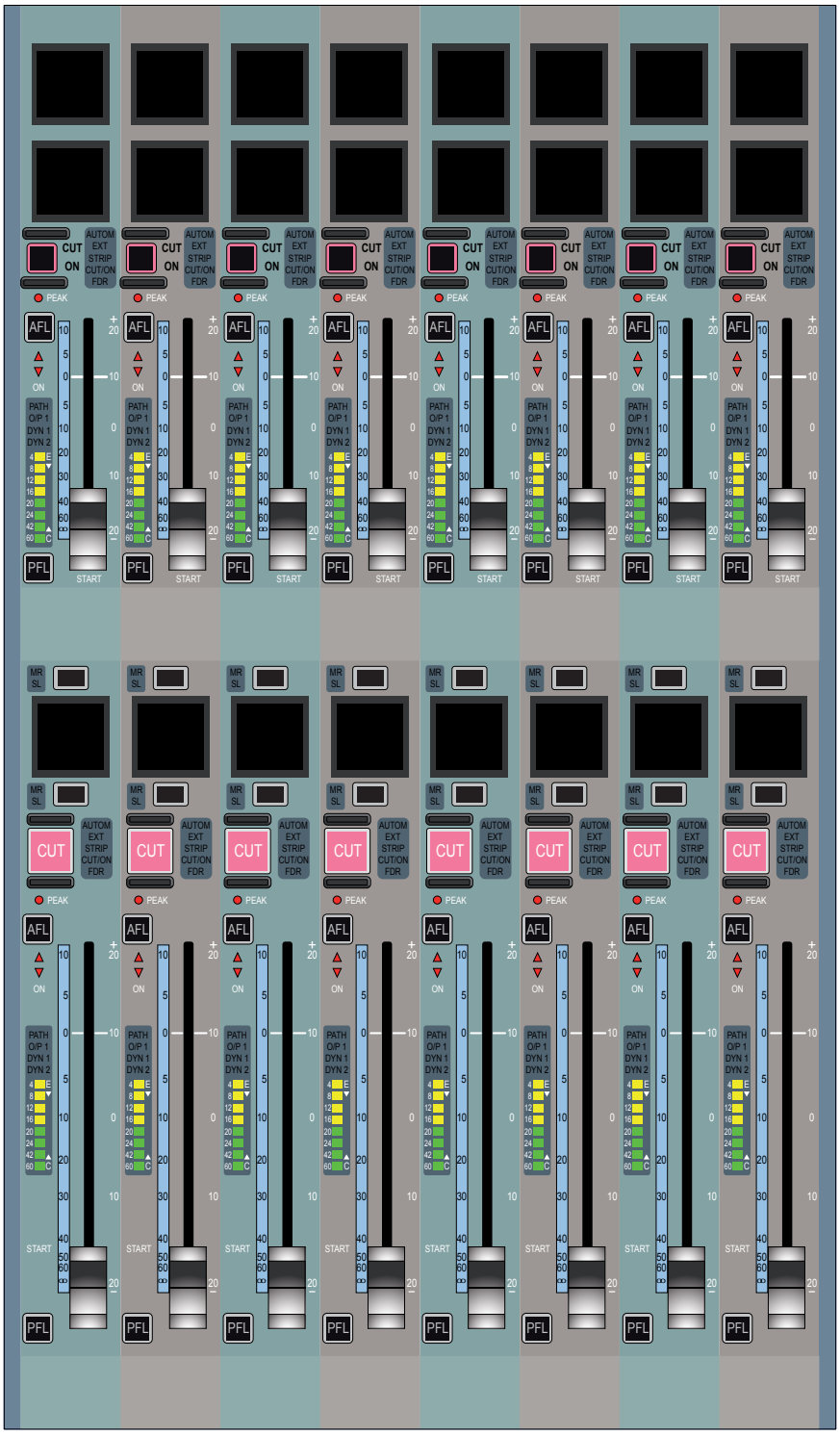
The Layers row and Modes row from the standard fader panel remain in place but are both situated at the top of the panel as shown in Figure 12. Both rows are touch sensitive as on the standard fader panel.

The controls in the Tools and Layer Tools functions of the standard fader panel are also accessible on the dual fader panel. They are accessed in the same way using controls on the Layers row, but instead of appearing on the button cells of the standard fader panel, the controls appear on the Modes row OLEDs. While accessing these functions, the standard controls of the modes row are inaccessible.

Path access

Where the standard fader panel has two paths available per fader (in each of the 12 layers) using the A and B assign buttons, the dual fader panel associates only one path per fader (in each of the 12 layers). The B paths are presented on the upper 60mm faders and the A paths are presented on the lower 100mm faders. This is the opposite way to the orientation on the standard fader panels. The A and

FIGURE 11 - DUAL FADER PANEL



B assign buttons assign the paths to any relevant assign modes on the surface, as on the standard fader panel, but the advantage is that both A and B paths are visible and accessible on faders at all times.

The assigned path will have it's assign button illuminated blue as on the standard fader panel.

Wilds mode

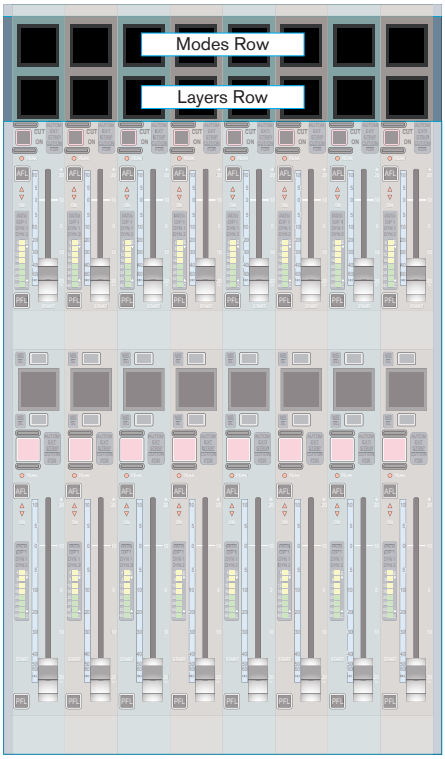
When a wild assign panel is located above a dual fader panel and is switched into Wilds mode, the path which the wild controls relate to (the active path) is determined by which assign button is selected for each fader. The active path for each fader can be changed by pressing the relevant assign button.

The path label for the active path will take up two thirds of the path label OLED and will have the relevant assign button illuminated.

Mixing dual and standard fader panels

A surface can be configured with both dual fader panels and standard fader panels. In this situation, the standard fader panels will only have the A layer enabled on the lower assign button so that operation is consistent with the dual fader panels. The B layer will not be accessible on these standard fader panels.

FIGURE 12 - ROWS



Custom Metering Panel

This panel provides the customer with an area to mount moving coil PPM/VU style meters and/or Vectorscope displays such as the DK MSD600M++ (Figure 13) or the RTW 10800 range (Figure 14).

FIGURE 13 - DK METERING PANEL

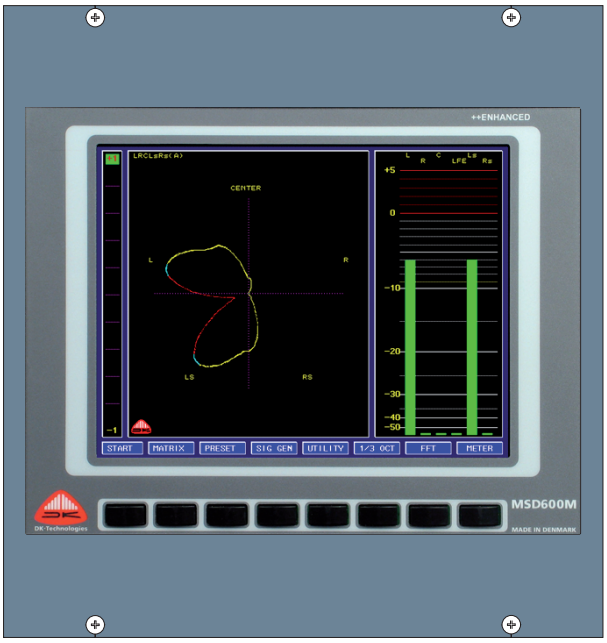
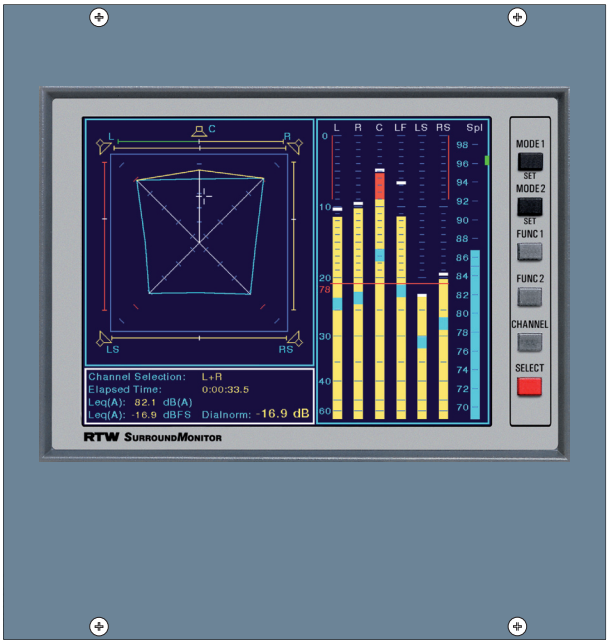


FIGURE 14 - RTW METERING PANEL



PANEL MODES

Wild assign panels can be set into a number of modes allowing the panels to function in a number of ways.

The four main modes are:

- Wilds mode
- Assign mode
- Output mode
- Monitor mode

To set a wild assign panel into one of these options, touch the desired mode on the Modes row shown in Figure 1. This is located at the top of the fader panel, as highlighted in Figure 2. The modes row on a given fader panel sets the mode of the wild assign panel directly above it. If there is no wild assign panel above a fader panel, the mode controls relating to a wild assign panel will be disabled.

Apply all

A mode can be applied to all panels in the user section by holding the desired mode button, then tapping the APPLY ALL button.

Locking modes

A panel may be locked into a certain mode by pressing the LOCK PANEL button. The mode buttons on the modes row will be removed and the panel mode will not change when APPLY ALL is used to change the rest of the surface. Press the LOCK PANEL button again to unlock.

'Off' Mode

A fifth mode exists which removes all controls from a panel allowing the user to create a very simple and clear surface.

For example if there are nine wild assign panels in a surface but the user wishes only to use four of them in a central assignable style, the remaining panels may be set to 'Off'. This can also allow a simplified operating style for novice users.

Layouts

Layouts are a stored arrangement of modes on the surface. Buttons in the lower half of the modes row allow switching between these layouts. An example layout is shown at the top of Figure 3. This layout is set up to simulate the same operational concept as a centrally assignable console such as Calrec's Alpha, Sigma, Omega or Zeta.

Pressing a layout button allows the surface to be switched to a known arrangement of modes on the surface. This feature is very useful if the arrangement of the surface layout has been altered and the user needs to quickly get back to a known and familiar state. It is also useful to be able to switch between two operational concepts easily. The user could switch between a console full of Wild controls and a centrally assignable surface at the touch of a button, and switch back with the same ease.

Some example layouts are shown in Figure 3.

FIGURE 1 - LOCATION OF MODES ROW

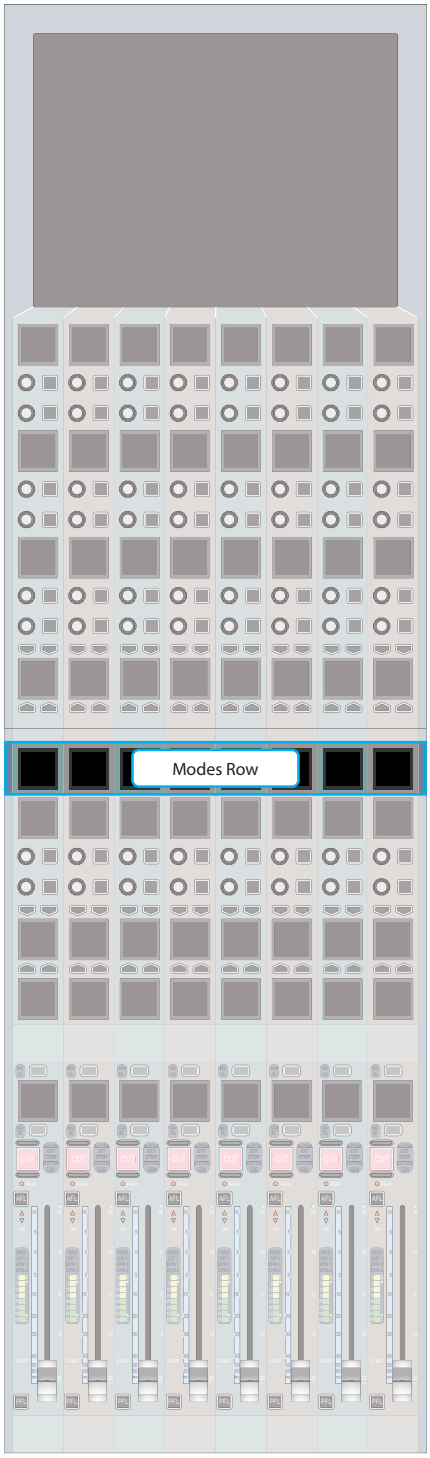
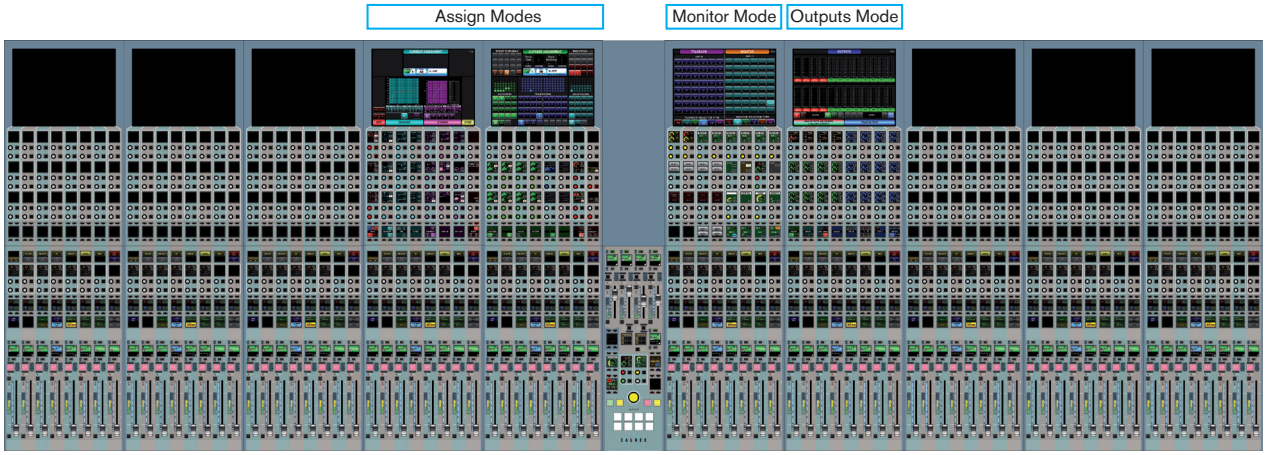


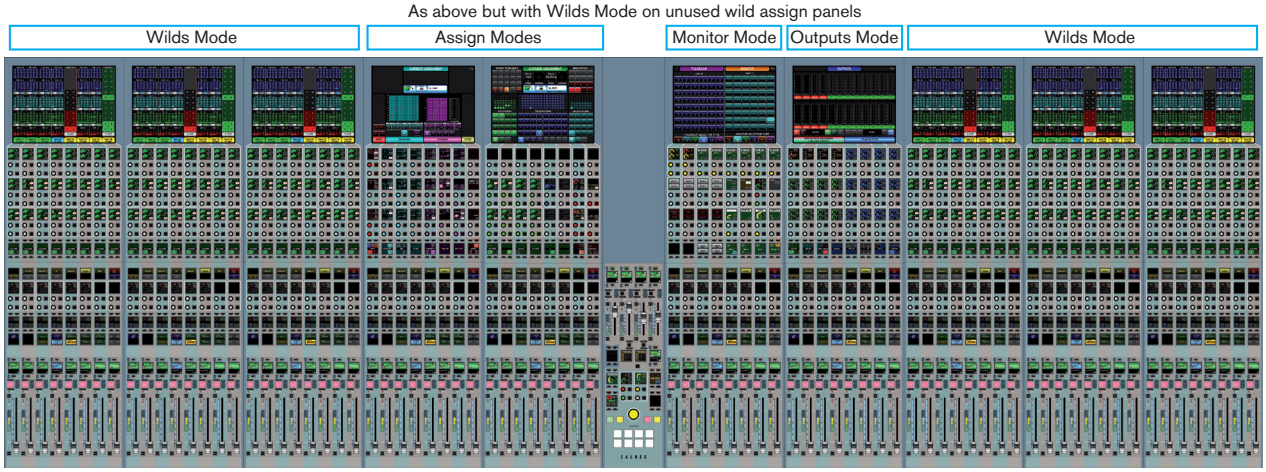
FIGURE 2 - MODES ROW DETAIL

FIGURE 3 - EXAMPLE LAYOUTS

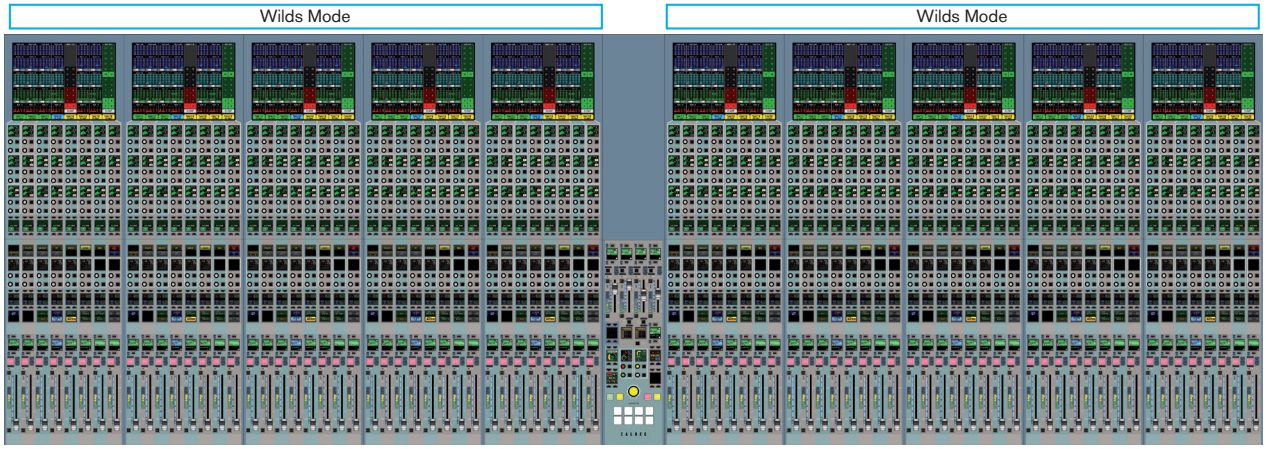
Simple central assign section with monitor and output controls. Wild assign panels outside of this central area are turned off



As above but with Wilds Mode on unused wild assign panels



Wilds Mode on all wild assign panels



WILDS MODE

Wilds mode arranges the wild assign panel controls and touchscreen into vertical strips, providing quick access to up to eight wild controls (including the two fader wild controls) and a section of the TFT touchscreen for each fader.

A wild assign panel set into Wilds mode is shown in Figure 1. Currently there are a range of pre-configured Wild strips available for use.

Accessing Wilds mode

To set a wild assign Panel into Wilds mode, touch the WILDS button on the Modes row at the top of the Fader panel below. If the Wilds button is not visible on the Modes row, make sure that the panel is not locked by checking the status of the LOCK PANEL button also located on the Modes row.

Selecting Wilds mode will display the last used Wild strips on the panel and show the wilds mode setup buttons.

Changing Wild strips

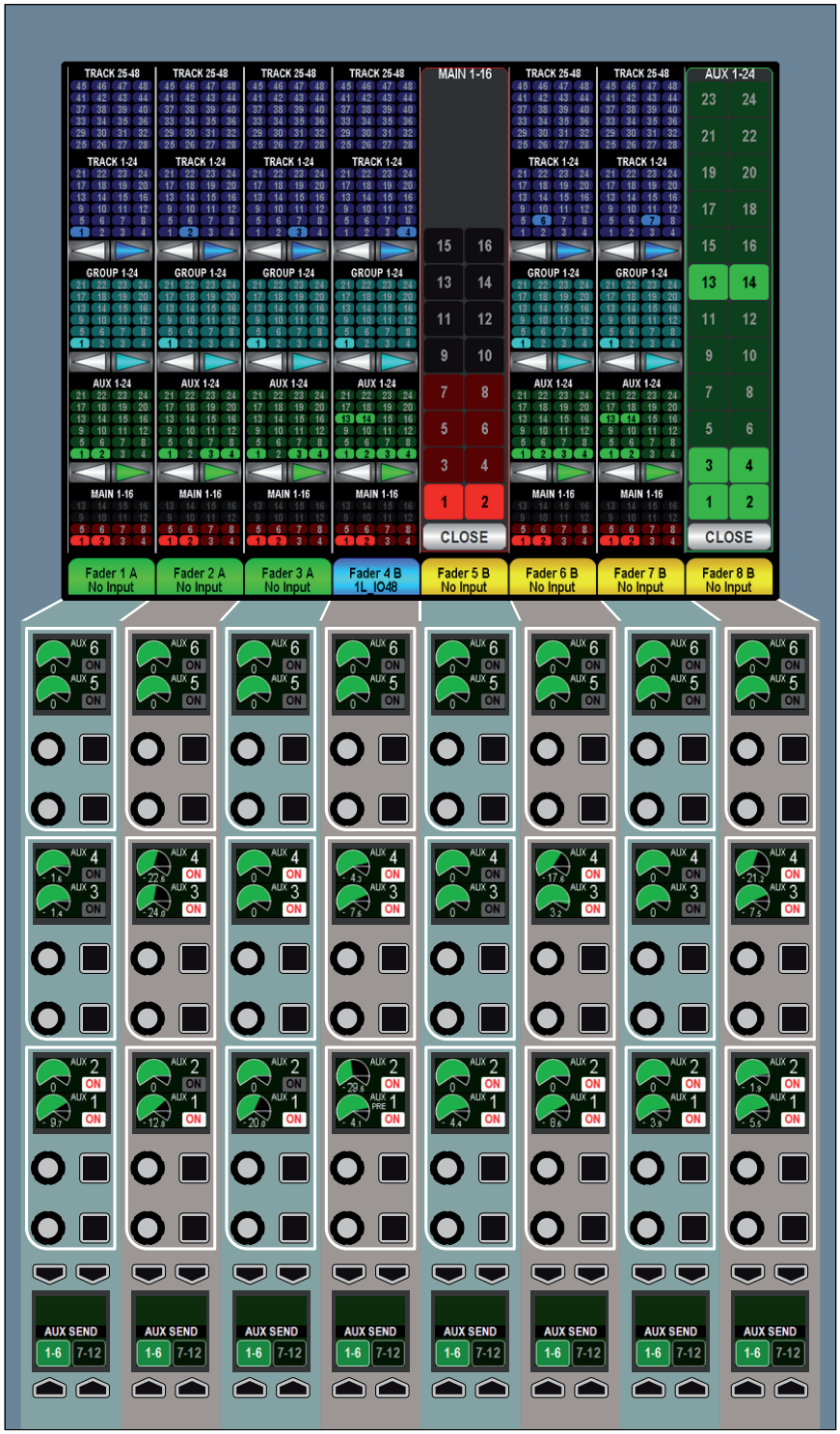
When Wilds mode is selected on the modes row, the available Wild control strips are shown on the Modes row. To select a different arrangement of Wild strips, touch the desired wild strip to assign it to the panel. Touch the EXIT button to return to the typical Modes row display. This process is illustrated in Figure 2.

If the available Wilds strips are not shown when in Wilds mode, touch the WILDS SETUP button.

Routing display

Each strip on the TFT contains a routing overview for the relevant fader. This overview also allows routes to be made and removed. The functionality of this

FIGURE 1 - WILDS MODE LAYOUT

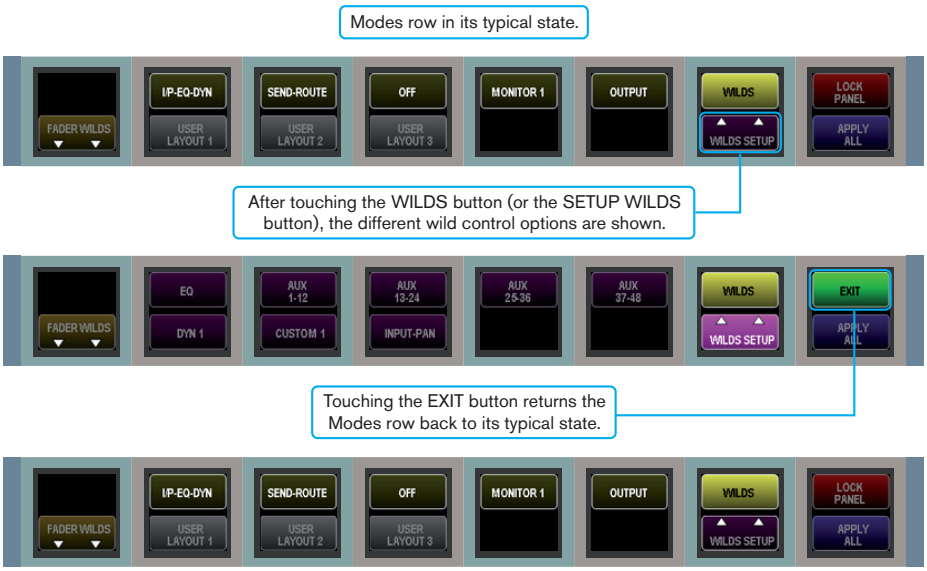


feature is explained in the Routing section of this document.

A/B path indicator

There is an indicator below each routing stirp on the TFT which shows the fader number and path label. This changes color to indicate whether the A (green) or B (yellow) path is selected on the fader. The currently assigned path is colored blue.

FIGURE 2 - SETUP WILDS ON THE MODES ROW



ASSIGN MODE

Assign mode provides a way for the panels in an Apollo surface to function as a familiar Calrec assignable surface.

The concept of Assign mode is to provide a standard layout of controls on the surface which display and allow control over the parameters of the currently assigned path.

Assign Mode is made up of two layouts:

- INP-EQ-DYN
- SEND-ROUTES

Both of these layouts appear as separate buttons on the Modes row.

INP-EQ-DYN layout

This layout contains controls relevant to Input, EQ, Dynamics processing for the currently assigned path. The layout of controls is shown in Figure 1.

Sends-Routes layout

The Sends-Routes layout is shown in Figure 2. It contains controls for routing or sending the currently assigned path to Auxiliaries, Tracks, Groups, Mains, direct outputs and Mix Minus busses. Pan controls are provided for placing the path in any of these destinations. It also allows interrogation of busses.

Responding to path assignment

The exact controls displayed and the paths which they will affect depend on the currently assigned path. For example, different pan controls are visible depending on whether the currently assigned path has a mono or stereo width.

For details on assigning a path, please refer to the Assigning Paths section of this document.

FIGURE 1 - THE INP-EQ-DYN ASSIGN LAYOUT

FIGURE 2 - THE SENDS-ROUTES ASSIGN LAYOUT

Description of controls

The functionality of the controls on these panels will be detailed in the relevant sections of this document such as Input Processing, Equalization and Routing.

MONITOR MODE

Monitor mode allows control over the monitoring, talkback and metering systems.

The arrangement of controls is shown in Figure 1.

Monitor mode allows the user to select sources to feed the monitoring systems, control the levels and functions of the monitoring systems (such as downmixes, speaker mutes and APFL behavior), talk to destinations, setup talkback groups and select sources for the assignable meters.

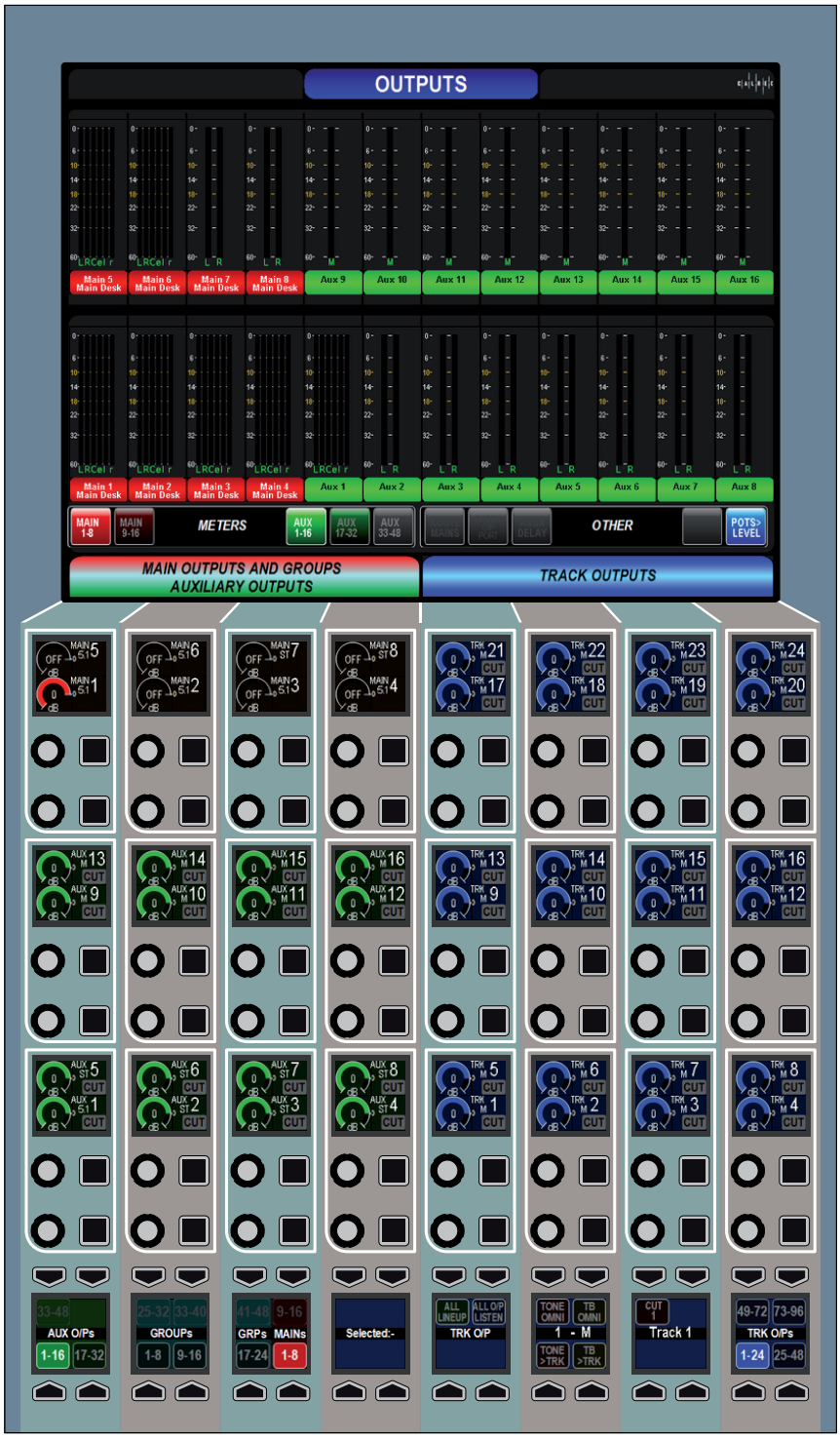
FIGURE 1 - MONITOR MODE CONTROL LAYOUT

OUTPUTS MODE

Outputs mode provides controls for manipulating output paths such as Main outputs, Track outputs, Aux outputs and Groups.

The TFT displays meters for Main and Aux outputs. The control cells provide level control and, where appropriate, cut functionality. A greater range of controls for the selected output such as tone, talkback, AFL and PFL can be accessed from the selected control area in the button cells at the bottom of the panel.

FIGURE 1 - OUTPUTS MODE CONTROL LAYOUT



ASSIGNING PATHS

An important concept of Calrec consoles is that of assignability. This allows controls to be shared amongst all paths, reducing physical space requirements and providing quick and familiar access to all controls.

When a path is assigned, certain areas of the surface will display and allow control of parameters of that assigned path. For example, any wild assign panels in Assign mode and the surround spill panel will update to reflect values of the currently assigned path. Assigning a different path will alter these displayed values.

Assigning a path

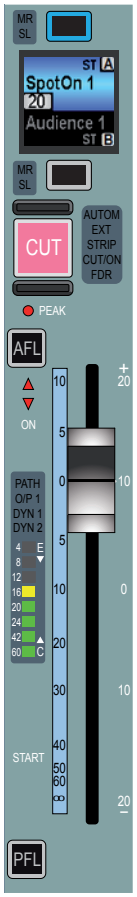
Above each fader is an OLED and two buttons as shown in Figure 1. The OLED displays the name of the A and B paths of each fader. The upper section (green) shows the A path and the lower section (yellow) shows the B path. The path that is currently being controlled by the fader takes up a greater percentage of the OLED area, is colored with the relevant color and has the relevant assign button lit.

To assign either of these paths, press the relevant button above or below the OLED (above for path A, below for path B). The section of the OLED displaying the assigned path will turn blue to indicate the current assignment. The relevant button will also light up blue as confirmation. The fader will now control the assigned path as shown in Figure 2. Other areas of the surface that are set up to respond to Assignments will display and control parameters of this selected path.

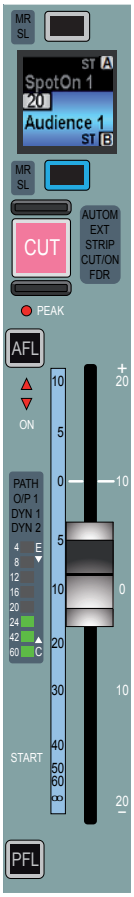
FIGURE 1 - ASSIGN BUTTONS

FIGURE 2 - PATH ASSIGNMENTS

Path A assigned



Path B assigned



FADER WILDS

Touching the FADER WILDS button on the modes row allows the user to assign different controls to the fader control cells.

The fader control cells are highlighted in Figure 1.

When FADER WILDS is touched, the modes row will update to show the available control arrangements that the fader control cells can display (Figure 2). Touching one of these options sets the eight fader control cells on the current panel to display the selected arrangement.

Each of the eight control cells on a fader panel act separately and affect the path assigned to the fader below it, much like an analog in-line console. They do not operate in a panel-wide assign mode.

FIGURE 1 -FADER CONTROL CELLS

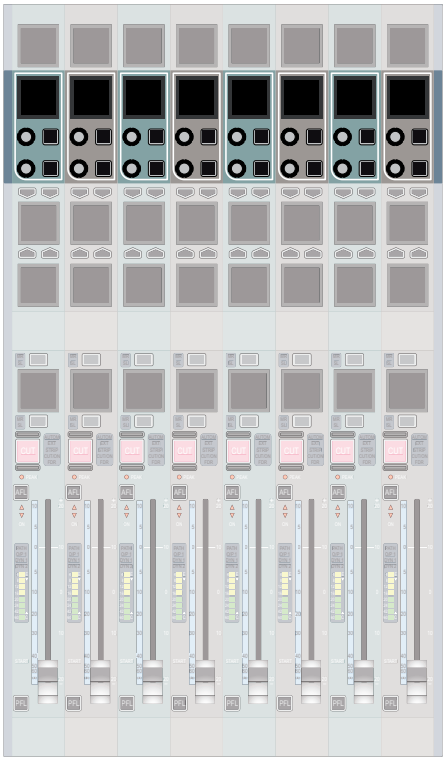
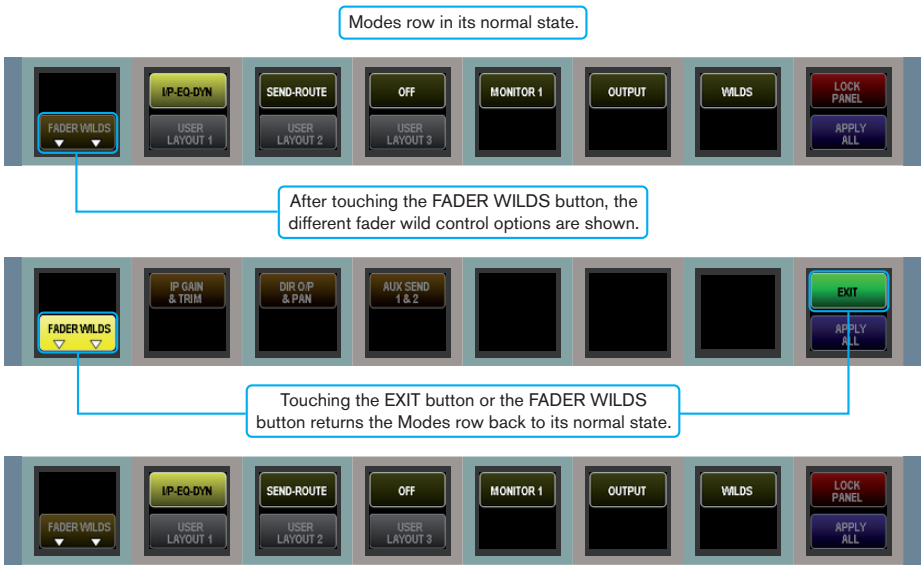


FIGURE 2 -FADER WILD CONTROL SELECTIONS



Apply all

Holding a fader wilds option and tapping the APPLY ALL button will set all fader wilds in the current user section to use the selected controls.

Exit

When the FADER WILDS button has been pressed and the modes row has been updated to show the fader wild arrangements, an EXIT button will appear at the lower right of the modes row. Touching this (or touching the FADER WILDS button again) will return the modes row to its normal state allowing access to all other mode buttons.

USER SECTIONS

The Apollo surface can be split into separate sections to allow multiple users to operate and organize the console simultaneously.

There are a maximum of three user sections available. The surface can be split along the left hand side of any panel.

When multiple individual surfaces are connected to the rack intended for use by separate operators, they can be thought of as one large surface, and the user splits should be made in the software to coincide with the physical splits in the surfaces.

Each user section provides independent path assignment meaning each user can freely assign different paths and apply processing simultaneously without affecting any other user.

Each user can also select which of the two monitor and APFL systems to use. These can be shared between all users or split for separate use.

Options files

User section layouts are saved into option files rather than being saved into the show directly. This makes it easy to apply common system settings across multiple shows.

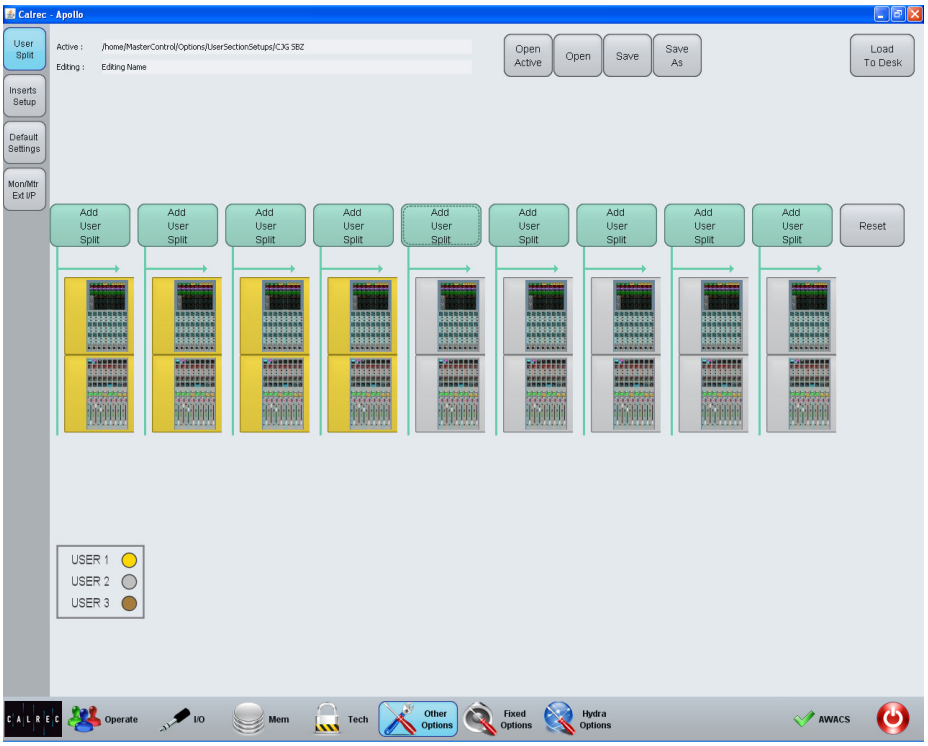
Be aware that multiple shows may use the same user split file, so changing a file may affect more than one show.

For more information on option files, refer to the Option Files section of this document.

User split screen

Navigate to the USER SPLIT screen of the OTHER OPTIONS section of the main application as shown in Figure 1. A representation of all surfaces connected to the rack will be shown.

FIGURE 1 - USER SPLIT SETUP



There are two text fields shown at the top of the screen. These are titled EDITING and ACTIVE. The active field displays the user split layout file that is currently active in the system. The EDITING field displays the file that is displayed on the screen for editing. These may be the same file.

Creating a user split

Press one of the ADD USER SPLIT buttons to insert a split at the desired position. A popup will appear providing a choice over which user section should appear to the right of the split. After making this decision, make any other necessary splits and then save the changes by pressing the SAVE button (overwrites the current file shown in the EDITING field at the top of the screen) or the SAVE AS button which allows a new file to be created.

Once the file has been saved correctly, press LOAD TO DESK to save the current layout to the file displayed in the EDITING field and apply the changes to the system.

Ensure that user split files used by other shows are not being unintentionally overwritten.

Resetting the user sections

On the USER SPLIT screen of the main application, press the RESET button. This removes all user splits from the surfaces. Be sure to save the layout to the correct file and press the LOAD TO DESK button afterwards to actually commit the changes into the system.

Open an existing user split
To open an existing user split file touch the OPEN button. On the popup dialog which appears, select the required file then choose either OPEN or LOAD. OPEN simply opens the file and displays the user split layout in the main application. It does not load any settings to the system. Selecting the LOAD option from the dialog displays the user split layout in the main application and loads the settings to the system immediately.

Opening the active file
To open the active file for editing touch the OPEN ACTIVE button.

LAYERS

Apollo provides an comprehensive layers feature to aid in organizing and accessing many paths extremely quickly.

Figure 1 shows the layout of controls on the Layers Row.

A/B Paths

Each fader provides instant access to two paths. These paths are known as the A and B paths and are described in the Assigning Paths section of this document.

To switch all faders to the A or B path use the ALL A or ALL B buttons on the Layers row.

Layers 1-12

There are also 12 layers available on the surface. Each layer contains it's own A and B paths.

Layers can be switched using the green buttons on the Layers row. The 12 layers are divided into two banks. The first bank contains layers 1-6 and the second contains layers 7-12.

The selected bank and selected layer are highlighted.

Using layers

Layers provide a flexible method of organizing paths on the surface. Layer 1, for example, may be configured to contain all main presenter microphones on path A and audience microphones on path B. Layer 2 may contain VT or server audio sources on path A. Switching between layers 1 and 2 provides fast access to both of these organized collections of sources. A path may appear on multiple layers simultaneously.

Layer Locking

A path can be locked to a fader and remain present on the surface regardless of the selected layer. To lock a path touch the LAYER TOOLS button on the Layers Row. On the updated Functions row above, touch and hold the LAYER LOCK button and then tap the assign buttons of any faders which contain paths that are to be locked to the surface. Holding LAYER LOCK and tapping an assign button toggles the lock on and off.

When a path is locked, a padlock icon will appear in the path label OLED to indicate the lock is active.

When a path is unlocked the A/B OLED will show text to indicate the original layer location of the path as it may not be the currently selected layer. The locked path will still remain in view until a different layer or All A/B selection is made.

Layer Split

The Layers row contains a button entitled LAYER SPLIT. Touching this button on any panel inserts a layer split along the left hand side of that panel. The button will light up as an indication of the split. Any layer changes made to the left of the split will not affect any faders to the right of the split. This applies to All A and All B selections too.

Multiple layer splits can be put in place across the surface, each obeying the same rules described above.

Turning off the B layer

The global B layer, which allows each fader to access a B path can be turned off. This is currently a factory set option and Calrec should be contacted for activation.

With this option set, the faders on the surface will only have access to one path per layer and can be accessed using the A layer path assignment buttons.

FIGURE 1 - LAYERS ROW

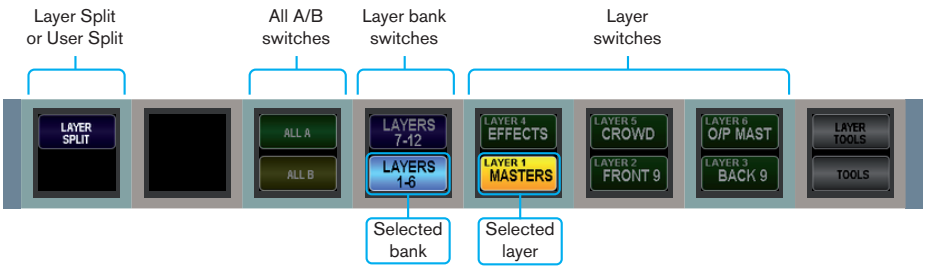


FIGURE 2 - LAYER TOOLS

APOLLO
GETTING SIGNALS INTO APOLLO

CALREC

Putting Sound in the Picture

calrec.com

INPUT SOURCES

Input sources may take the form of physical audio input ports, outputs from the same Apollo console, or outputs from another Apollo console connected to the same network.

Filtering the Hydra2 network

Given the shared and hugely scalable nature of the Hydra2 system, your console may be able to access a large number of IO boxes. Many of these will not be relevant to the show or project that is currently being worked on and their inclusion in any source lists would only reduce clarity and result in clutter. Apollo provides a method to filter out unwanted IO boxes so that they do not appear in the patching lists, or anywhere else in the software. This feature is shown in Figure 1.

Open the EDIT NETWORK screen in the HYDRA OPTIONS section of the main application. There will be two lists shown. The left list shows all Hydra2 boxes connected to the network. Selecting a box in this list and pressing the ADD button will add that box to the list on the right. This means it will now be visible in the console patching screens.

Boxes can be removed in a similar way by selecting one in the right hand list and pressing the REMOVE button.

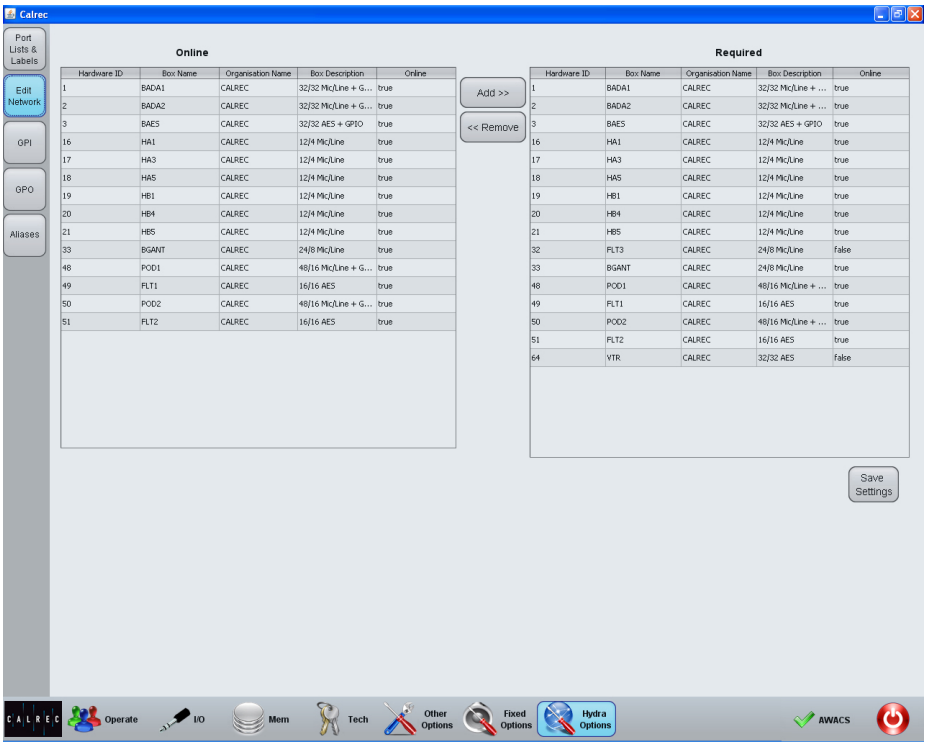
Input ports

A port is a physical input to, or output from the Apollo system. As all IO is contained in a Hydra2 network, each input socket on a Hydra2 box can be termed an input port.

Console outputs

Outputs from an Apollo console can be patched back into the console without leaving the rack. As the Hydra2 router module handles all patching within the system, flexible internal patching is possible.

FIGURE 1 - EDIT NETWORK SCREEN



Outputs from any other Apollo console connected to the same network can also be patched back into the input of any console. This again is handled by the Hydra2 network. When two or more consoles are connected together via their routers, all of their outputs become available to the other consoles as input sources.

Port Labels

Ports may be labelled in the PORT LISTS & LABELS screen in the HYDRA OPTIONS section of the main application (Figure 2). In this screen, touch the INPUT ALLOC or OUTPUT ALLOC button to access the available input or output ports. Double click a port name to provide a new name, which must be 12 characters or less.

When viewing port lists in the patching screens, the ports are displayed alphabetically. This should be considered when labelling ports. Ports can be grouped together even if they are not in alphabetical order using sets which are described later in this section.

Port Lists

Ports can be assigned to lists. Lists provide a way of filtering the information shown when patching ports.

To access ports lists, go to the PORT LISTS & LABELS screen in the HYDRA OPTIONS section of the main application (Figure 2). Select the INPUT ALLOC or OUTPUT ALLOC button at the left of the screen to work with input or output ports respectively. The screen will show all available port lists just to the right of the INPUT ALLOC button. The DEFAULT LIST is created automatically and contains all available input or output ports.

Creating lists

To create a new list, select the required ports from the default list (or any other list that already exists) and touch the CREATE LIST button. A popup will appear prompting for the name of the new list, which can be six characters or less. Enter the name and touch OK. The new list will appear below the default list and will contain the selected ports. Touch the new list to confirm this. It is possible to make a new list which is empty, by ensuring that no ports are selected when touching the CREATE LIST button.

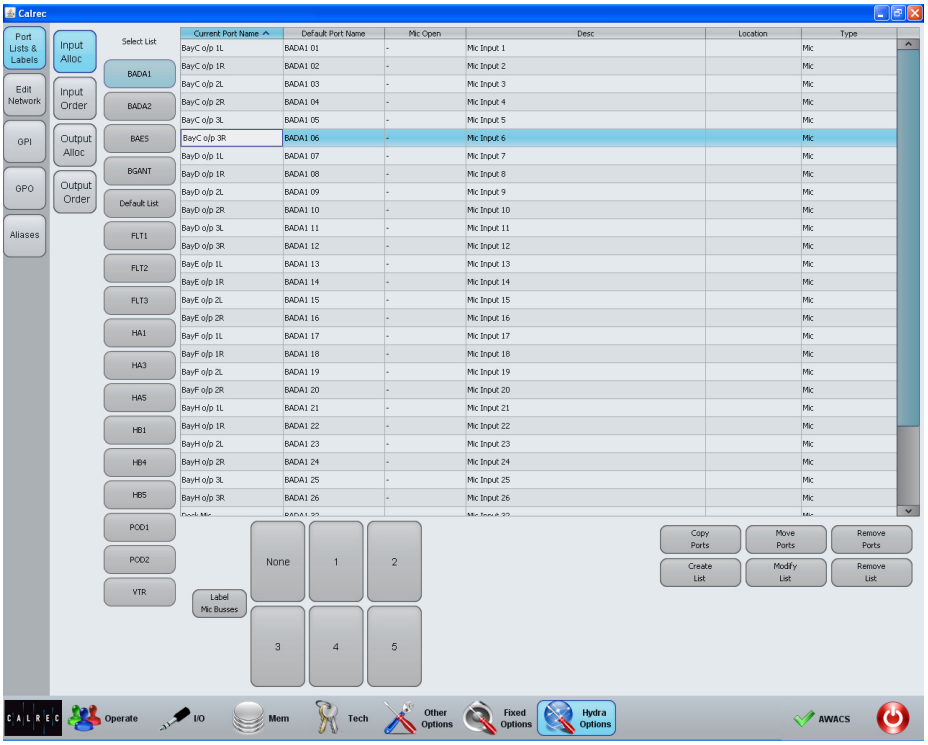
Copying and moving ports to lists

Ports can be copied or moved between lists by selecting the required ports in the source list and touching COPY LISTS or MOVE LISTS. A popup dialog will appear allowing selection of the destination list. Select the destination list and touch OK.

Removing ports from lists

To remove ports from a list, select the required ports and touch the REMOVE PORTS button.

FIGURE 2 - PORTS LIST SETUP SCREEN



Renaming lists

Touch the MODIFY LISTS button to bring up a popup dialog. This dialog allows you to select a list and rename it.

Removing lists

To remove a list, select the required list and touch the REMOVE LIST button. A popup dialog will appear asking for confirmation of the removal.

Mic Busses

While allocating ports to lists it is possible to assign certain ports to one of five mic open busses. This is done by selecting the required ports, then touching the relevant mic buss number button below. The function of the mic open busses will be detailed in the GPO section of this document.

Sets

Sets provide a way to group ports which together form part of a single source, for example a 5.1 surround source.

When viewing a port list, ports are sorted alphabetically according to their port name. If ports are labelled with the box name and port number this will present a logical order in the list. If however, the ports are labelled according to their function, for example the name of the source feeding the ports with a suffix of each individual leg as shown in the left column of Figure 3, the ports may not appear in a sensible order in the list.

If all ports associated with a certain source are added to a set and arranged in the correct order within it, they will be presented in the port list in that order. The set will be sorted in the port list by the name of the first port in the set.

Adding ports to sets

To add ports to a set, navigate to the PORT LISTS & LABELS screen in the HYDRA OPTIONS section of the main application and select either INPUT ORDER or OUTPUT ORDER from the buttons at the left of the screen (Figure 4).

On the left of this screen, the lists in the current view are displayed. Press the MORE LISTS button to scroll through any available views. Select a list to work on by touching it. The main area will now update to show the ports stored in the selected list. Select the ports that re to be stored in a set and touch the CREATE SET button. The number of the set will appear next to the ports. The order of the ports within the set can be changed by selecting a port and touching the up or down arrow buttons.

FIGURE 3 - SETS EXAMPLE

When ports are not assigned to sets, they appear in the port lists in alphabetical order. This may not list the ports in a sensible order, for example in the case of 5.1 surround sources.

- Playback 1 C
- Playback 1 L
- Playback 1 LFE
- Playback 1 LS
- Playback 1 R
- Playback 1 RS
- Playback 2 C
- Playback 2 L
- Playback 2 LFE
- Playback 2 LS
- Playback 2 R
- Playback 2 RS
- Playback 3 C
- Playback 3 L
- Playback 3 LFE
- Playback 3 LS
- Playback 3 R
- Playback 3 RS

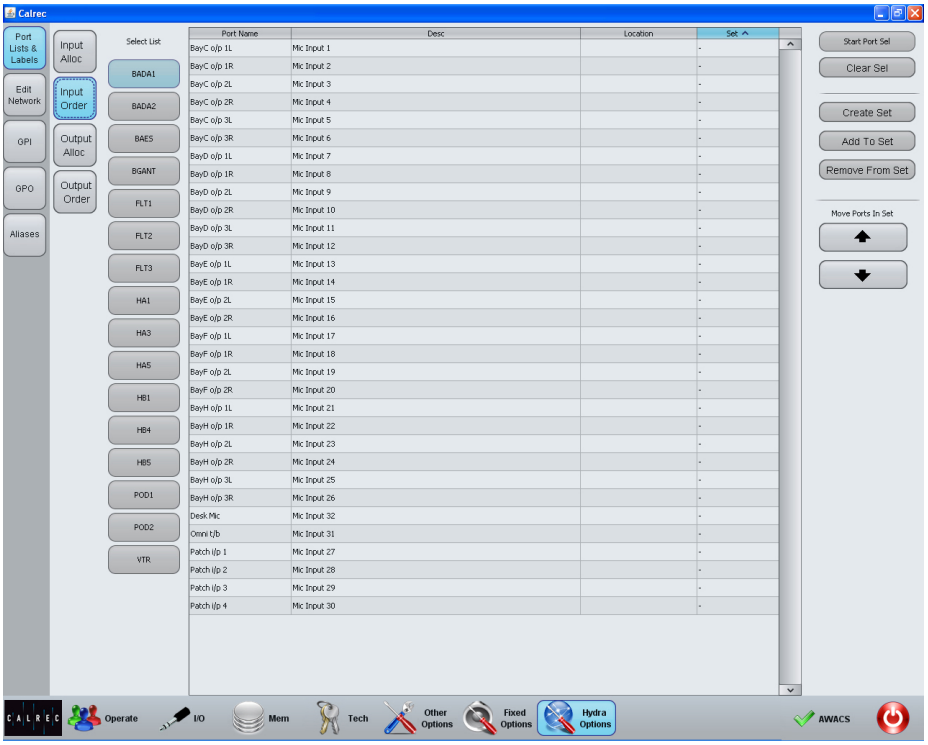
By using sets to group ports for realted inputs, the lists will display the ports in the correct order. The ports will be sorted by the name of the first port in each set.

- Playback 1 L
- Playback 1 R
- Playback 1 C
- Playback 1 LFE
- Playback 1 LS
- Playback 1 RS
- Playback 2 L
- Playback 2 R
- Playback 2 C
- Playback 2 LFE
- Playback 2 LS
- Playback 2 RS
- Playback 3 L
- Playback 3 R
- Playback 3 C
- Playback 3 LFE
- Playback 3 LS
- Playback 3 RS

Ports can be removed from a set by selecting them and touching the REMOVE FROM SET button.

Ports can be added to an existing set by selecting them and touching the ADD TO SET button. This will bring up a popup dialog which allows the user to select the destination set.

FIGURE 4 - SETS



PATHS AND FADERS

A path is a generic term that refers to a DSP process in the system. A signal present at an input port must be routed to a Channel path in order for it to be processed, routed, then sent back out of the system

Running at 48KHz, Apollo has 1020 mono channel paths available. The user is free to configure this pool of mono resources as required. Simply assigning any path type to a fader (mono, stereo or surround) automatically allocates the required number of DSP resources from the pool of 1020. A mono channel path uses a single DSP resource, a stereo channel path uses two mono resources, and a 5.1 channel path uses six mono resources.

Attaching paths to faders

For a path to be directly controlled, processed and routed, it must be attached to a fader on the surface.

(An input signal also needs to be patched to a path in order for audio to pass through the system. This is detailed in the Getting Signal into Apollo section of this document)

The Layers Row is highlighted in Figure 1. On this row touch the TOOLS button. This will update the Layers Row to display a range of options as shown in Figure 2. Now touch the FADER ASSIGNMENT button. The Functions Row above will update to show the paths types that are available to be attached to faders.

The main path types, including channels and groups, are listed on the lower half of the Functions Row. Touching one of these path types will list the available paths that can be attached to faders in the upper half.

Press and hold the button above the desired path and then press the A or B assign button of the fader to which you wish it to be attached.

Inserting paths

It is possible to blank out the A or B path of a fader and shuffle the existing paths on the surface to the left or the right. Figure 3 illustrates this feature.

To achieve this, hold the INS << BLANK or INS >> BLANK button and then press the A or B assign button on the fader where the blank is to be inserted.

FIGURE 1 - ROW LOCATIONS

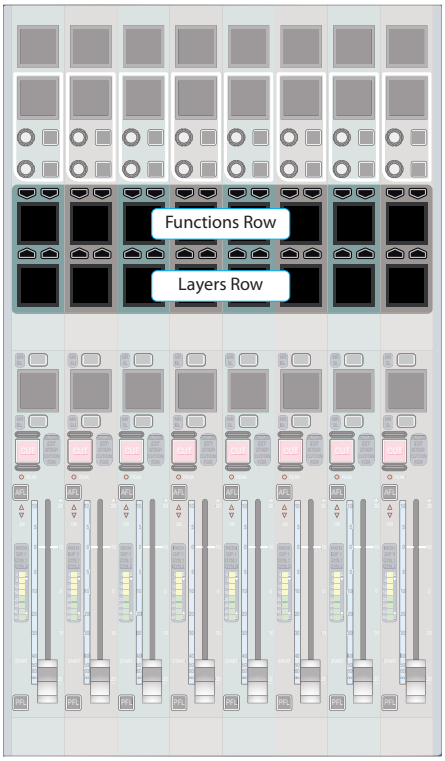


FIGURE 2 - ASSIGN FADERS VIEWS ON THE SETUP ROW

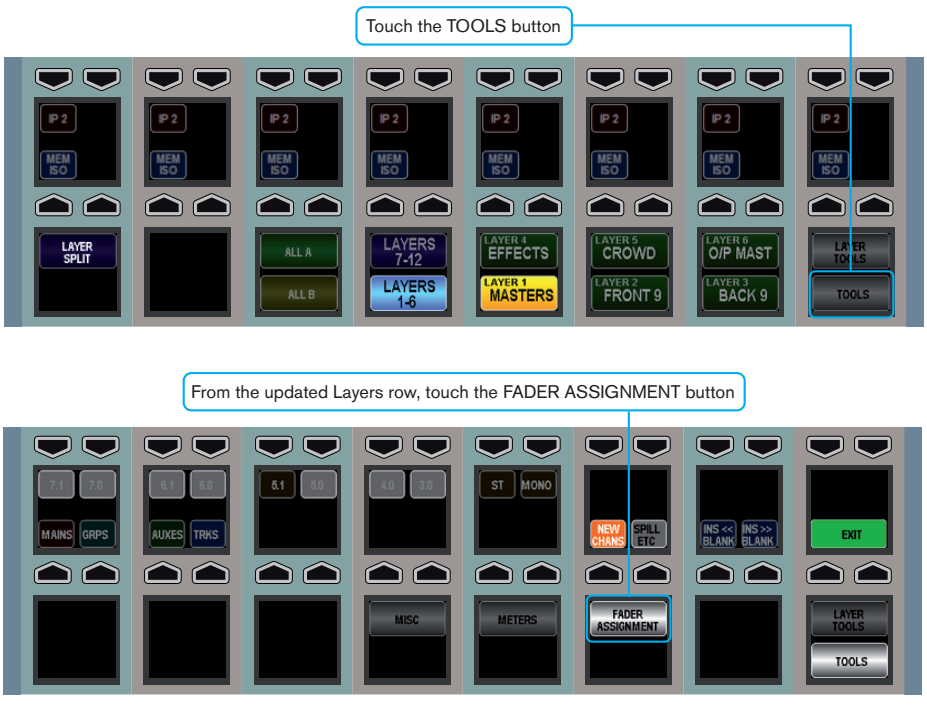


FIGURE 3 - INSERTING BLANKS

The arrangement of paths below serves as the starting point for the two following examples.

Paths may only be inserted if there are enough empty faders to the left or right of where the path is inserted. If there are locked paths between the empty faders and the path to be inserted they will not allow the insertion to continue. Similarly, paths cannot be moved past the faders at the left and right edges of the surface.

Removing a path from a fader

To completely remove a path from a fader on the surface, touch the LAYER TOOLS button on the Layers Row. In the updated Function row touch and hold the REMOVE PATHS button, then touch the assign buttons of the faders that contain the paths to be deleted. The assign buttons of the selected paths will strobe to indicate the selection. Release the REMOVE PATHS button and touch either the EXEC or CNC buttons to execute or cancel the selection respectively.

Locking Paths

A path can be locked to a fader and remain present on the surface regardless of the selected layer. To lock a path touch the LAYER TOOLS button on the Layers Row. On the updated Functions row touch and hold the Lock Paths button and then tap the assign buttons of any faders which contain paths that are to be locked to the surface. Tapping the assign button again toggles the lock on and off.

When a path is locked, a padlock icon will appear in the path label OLED to indicate the lock is active.

When a path is unlocked the A/B OLED will show text to indicate the original layer location of the path as it may not be the currently selected layer. The locked path will still remain in view until a different layer or All A/B selection is made.

Cloning Paths

An existing path may be cloned to an empty fader. This action does not duplicate the path, rather it allows multiple faders to control the same DSP path. Any changes made to the path on one fader will be reflected when the path is accessed by another fader.

The source path should be assigned by pressing the A or B assignment button. Now touch the LAYER TOOLS button on the Layers row to update the Functions row above. Touch and hold the CLONE PATHS button on the Functions row and then press the assignment button of the destination fader to which the path will be cloned. This must be an empty fader. The destination fader's A or B assign button will strobe to indicate the selection. The CLONE PATHS button can now be released and either EXEC or CNC can be pressed to confirm or cancel the cloning respectively.

Swapping Paths

Two paths attached to faders on the surface can have their locations swapped. All settings on the paths remain intact, this function simply swaps the faders that control two paths.

In a similar way to cloning a path, one path should be assigned by pressing the relevant assign button. Touch the LAYER TOOLS button on the Layers row to update the Functions row above. Touch and hold the SWAP PATHS button on the functions row then press the assign button of the other path which is to be swapped. The assign buttons of the two

paths should now be strobing to indicate the selection. Release the SWAP PATHS button and press the EXEC button to confirm the process. Press the CNC button to cancel the process and leave the path positions unchanged.

Copying path settings

Settings for a given path may be copied over to another path. The user has a choice of whether to copy all settings, or just a certain subset of the settings.

The elements which can be copied are:

- EQ 1-4 (EQ bands 1-4)
- EQ 5-6 (EQ bands 5-6)
- TO M/G (Routing to mains and groups)
- TO TRK (Routing to tracks)
- TO AUX (Routing to Auxiliaries)
- ALL (All of the above elements)

To access the copy function, touch the LAYER TOOLS button on the Layers row. The updated Functions row above will display the controls shown in Figure 4.

Controls at the left of the upper row allow selection of the path elements to be copied. Elements are toggled on or off using the buttons above.

Press the assign button of the path from which the settings should be copied. Now press and hold the COPY PATH button then press the assign button of the path which is to receive the settings. Release all buttons and then press the EXEC or CNC buttons to confirm or cancel the copy respectively.

FIGURE 4 - COPY PATH SETTINGS

PATCHING SOURCES TO DESTINATIONS

An input port must be linked to a path in order for a signal to pass into the console.

Once a path has been assigned to a fader, one or more input ports can be assigned to that fader (dependant on the path width chosen). This can be done on the configuration PC.

The flexible Apollo patching matrix allows the user to easily patch any source to any destination. For example, Hydra2 input ports can be patched to paths on the surface, console outputs can be patched back into console inputs, even outputs of other consoles on the same network can be patched to the inputs of another console. A source can be patched to multiple destinations, but a given destination can have only one source.

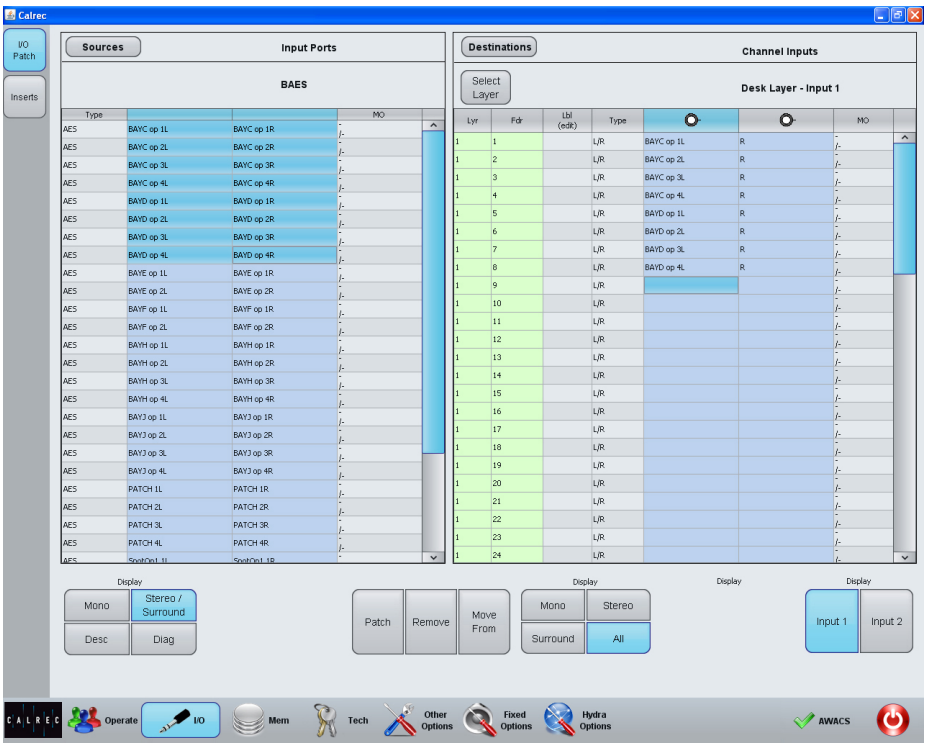
Patching

On the configuration PC switch to the IO screen. This screen is divided into two main sections, the left showing available source ports and the right showing destination ports (Figure 1).

Pressing the SOURCES button in the sources section on the left opens a popup window that allows the user to select from the available source lists These groups are configurable but could include Hydra2 inputs, possibly grouped into different studios, or local console aux, main or track outputs. Selecting a list closes the popup window and populates the source section of the IO screen with the available source ports from the chosen list.

In the same way, the destination section can be populated by selecting a list from the destination popup window. This is accessed by pressing the DESTINATIONS button.

FIGURE 1 - IO SCREEN ON THE CONFIGURATION PC



When the two sections are showing the desired source and destination lists, connections can be made between the two. To make a connection select a source by clicking on a blue cell, then select a destination also by clicking on a blue cell. Pressing the PATCH button will execute the connection. The name of the source should now appear in the destination cell to indicate a connection has been made.

If a connection already exists between a source and a destination and a new connection is made between that same destination and a different source, the existing connection is removed and replaced with the new one.

Removing connections

To remove a connection, select the required destination port and press the remove button. This breaks the connection and frees up the destination.

Moving connections

A connection between source and destination can be moved to allow the source to connect to a different destination. To perform a move, select the destination cells that contain the sources that are to be moved and press the Move From button. The Move From button will change to display Move To to indicate that a move is in progress. To finish the move select the destination cells that the sources should be moved to and then press the Move To button.

Channel input layers

If the Channel Inputs destination list is selected, a button labelled LAYERS becomes available which allows the user to select which possible destinations are

shown in the list. Filtering options available include which of the twelve numbered layers should be shown and within that layer which channel widths (mono, stereo, surround or all) and which of the A or B layers (or both) are displayed. A layer option called 'Desk Layer' is available which will list all available paths currently on the surface regardless of the layer.

There is an option to select the Scratch Layer rather than one of the numbered layers. Selecting this layer will display all visible paths currently on the surface regardless of their layer assignment. This is very useful in the situation where a layer split has been made and subsequently there is more than one layer visible on the surface.

Port inputs 1 and 2
Each path has access to two input ports. These could for example be used to provide redundancy to presenter microphones. A primary microphone could be patched to input 1 of a certain path and a secondary backup microphone could be patched to input 2.

ALIAS FILES

Alias files enable easier setup of input and output configurations when productions move to different studios.

In systems with several studios and control rooms, moving a production causes a change to some of the resources used, but retaining a similar IO patching scheme. For example changing a show from Studio 1 to Studio 2 is likely to require a similar set of inputs patched to the console channels but coming from a different studio wall box. An alias file provides easy re-patching. Similar alias files also exist for output routing.

Editing alias files

To create or modify an input alias file, go to HYDRA OPTIONS and ALIASES and choose INPUT FILES. With either a new or existing file open for editing, all the available input ports are shown in the right hand window and can be placed as part of the alias by touching the ADD PORTS button. Once added, the ports can be given a function related name as shown in figure 1. The commonly used CTRL X, CTRL C and CTRL V for cut, paste and copy can be used to speed the entry of text names. Names must all be unique and any temporary duplicate is shown with a red warning.

Once the alias file for use with one set of ports has been saved, another can be created using an alternative set of ports, assigning matching names for the audio signal to those used in the first alias file. It will often be convenient also to organise the output ports into suitably named Output Alias files.

Alias groups

The display order is alphabetical so to ensure related are adjacent in source lists, ALIAS GROUPS can be created. These can be thought of as performing

FIGURE 1 - INPUT ALIAS FILE EDITING

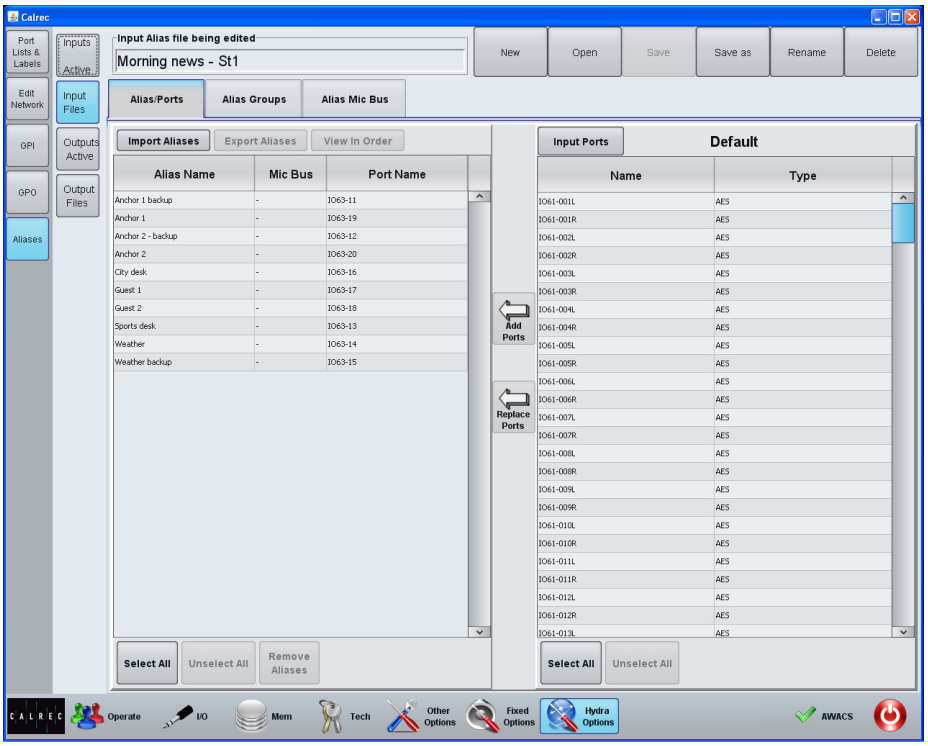
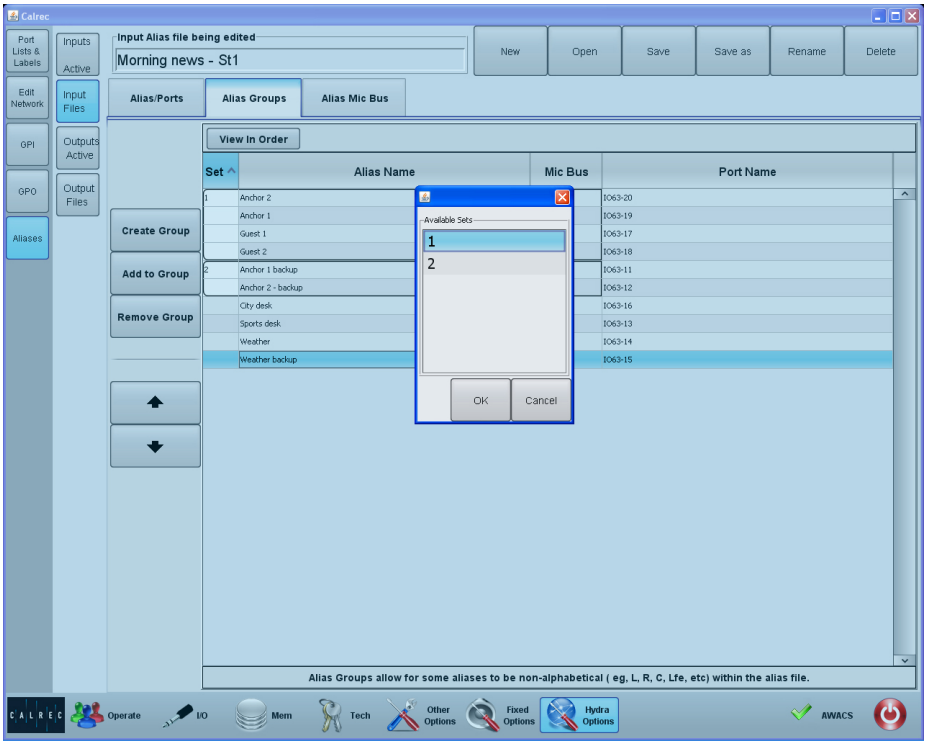


FIGURE 2 - ALIAS GROUPS



a function similar to input sets and within the group, the term SET is again used.

First select the alias file for which groups are going to be assigned and then select the first port that is to belong to that group. Touch CREATE GROUP and 1 appears in the SET column. Other ports can then be chosen as in figure 2, either to be added to an existing group, or for a newly created group. This grouping is only of the ports within the alias file and should not be confused with any other form of grouping that may be in use on a console.

Alias mic bus

ALIAS MIC BUS allows the ports to be assigned to one or more of the console's five mic open busses so that studio speaker muting is correctly assigned when the production changes studios.

Enabling an alias file

To make an input alias file active and ready for use, go to INPUTS ACTIVE and using the arrows, placed the required file(s) into the left window of active alias files as in figure 3. Only files that contain valid input patching can be made active.

When output alias files have been created, they should also be enabled to make them available for use.

Alias patching

To use the routes defined in the input alias file, go to the IO patching screen. When filtering the Sources, as shown in Figure 4, all the currently active Input Alias files will be shown, as well as available inputs ports and desk outputs. Output aliases are used in a similar way.

FIGURE 3 - ALIAS ENABLING

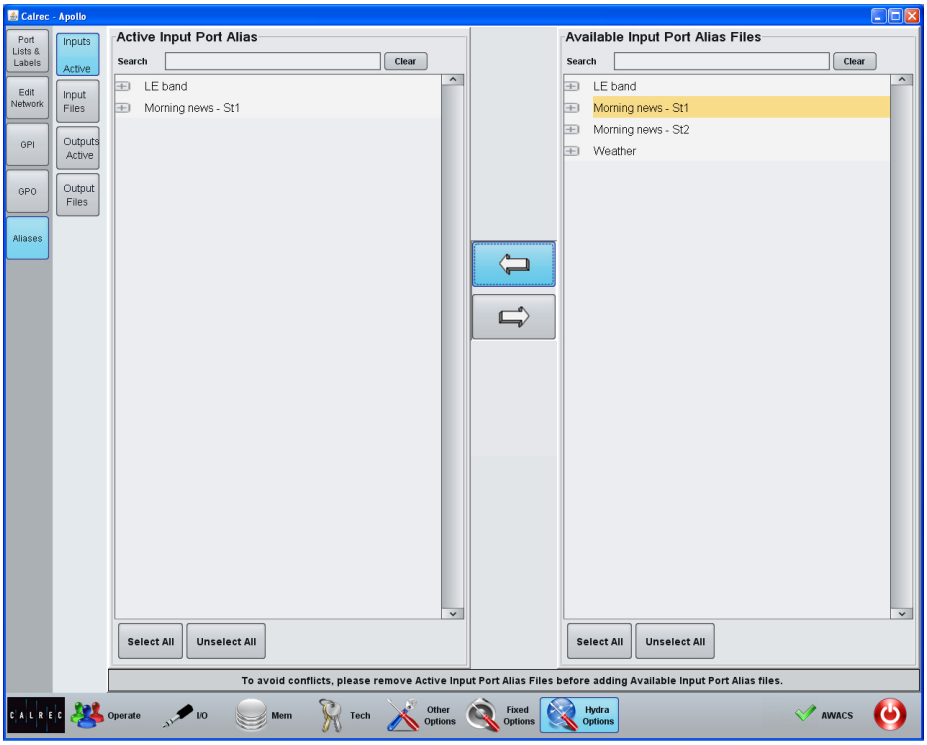
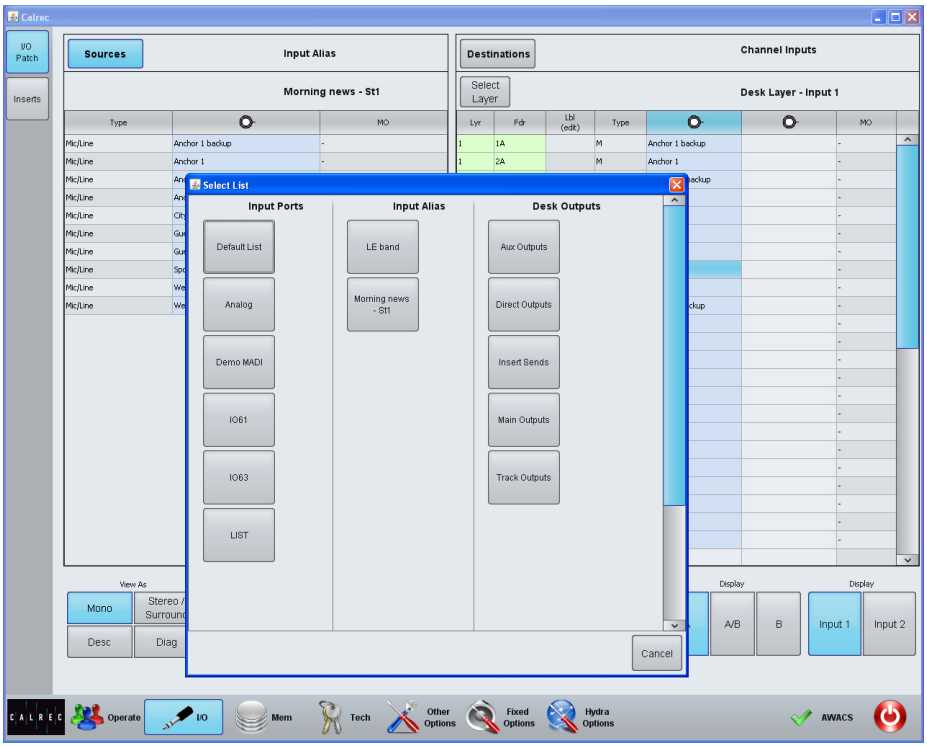


FIGURE 4 - USING AN INPUT ALIAS



INPUT CONTROLS

Once a path has been assigned to a fader, certain options are available to control the input signal.

Depending on the operating mode, the controls may be accessible in various locations on the surface. As the controls available in Wilds mode are very flexible and may have been customized by the user, this section will detail the controls available on a panel in Assign Mode using the INP-EQ-DYN layout.

Figure 1 shows the layout of input controls in the INP-EQ-DYN Assign mode layout.

Inputs 1 and 2

There are two inputs available to each path on the console. The first input may be used alone, or the second input could be used to connect a backup signal. This could be a presenter's backup microphone ready to be used in the case of failure of the primary microphone. Switching between the two inputs feeds the selected input to the path. This can be achieved with a single button press.

Mic/Line gain

The gain of any connected mic/line input can be adjusted with this control. The gain range varies from +78 to -18 dB. This gain control alters the gain at the input port in a Hydra2 IO unit and will only be available to the owner of that port. Port ownership was discussed in the Input Sources section of this document.

±6dB coarse gain

This control allows coarse gain adjustments to be made to the mic/line input gain. Pressing the + or - buttons will boost or attenuate the gain by 6dB respectively.

Input trim

Input trim boosts or attenuates an input signal by ±24dB inside the channel path.

FIGURE 1 - INPUT CONTROLS

This is the only input gain control available for digital input signals and the only input gain control available for a port owned by another user. As the gain is applied inside the channel path it has no effect on any other operators using the same port.

Tone
A button on the TFT touchscreen overrides the input of the path with tone at the frequency and level currently set. When tone is applied to a channel an indicator will appear on the input controls, the fader and any meters relevant to the fader as a visual aid to the user.

Input delay
There are 256 legs of input delay in the system, each providing up to 2.73s of delay.

Delay can be set on a channel or group input from the INP-EQ-DYN layout of ASSIGN mode. With the required channel assigned, use the control in the upper left control cell as shown in Figure 1.

Press the ASSIGN DELAY button on to assign an input delay resource to the channel. The required amount of delay can be set using the rotary control and then inserted into the path using the IN button.

The following controls allow manipulation of mono or stereo input signals. Should a fader have a surround path assigned to it, each mono or stereo leg of this surround signal may be manipulated by assigning the relevant leg on the spill panel.

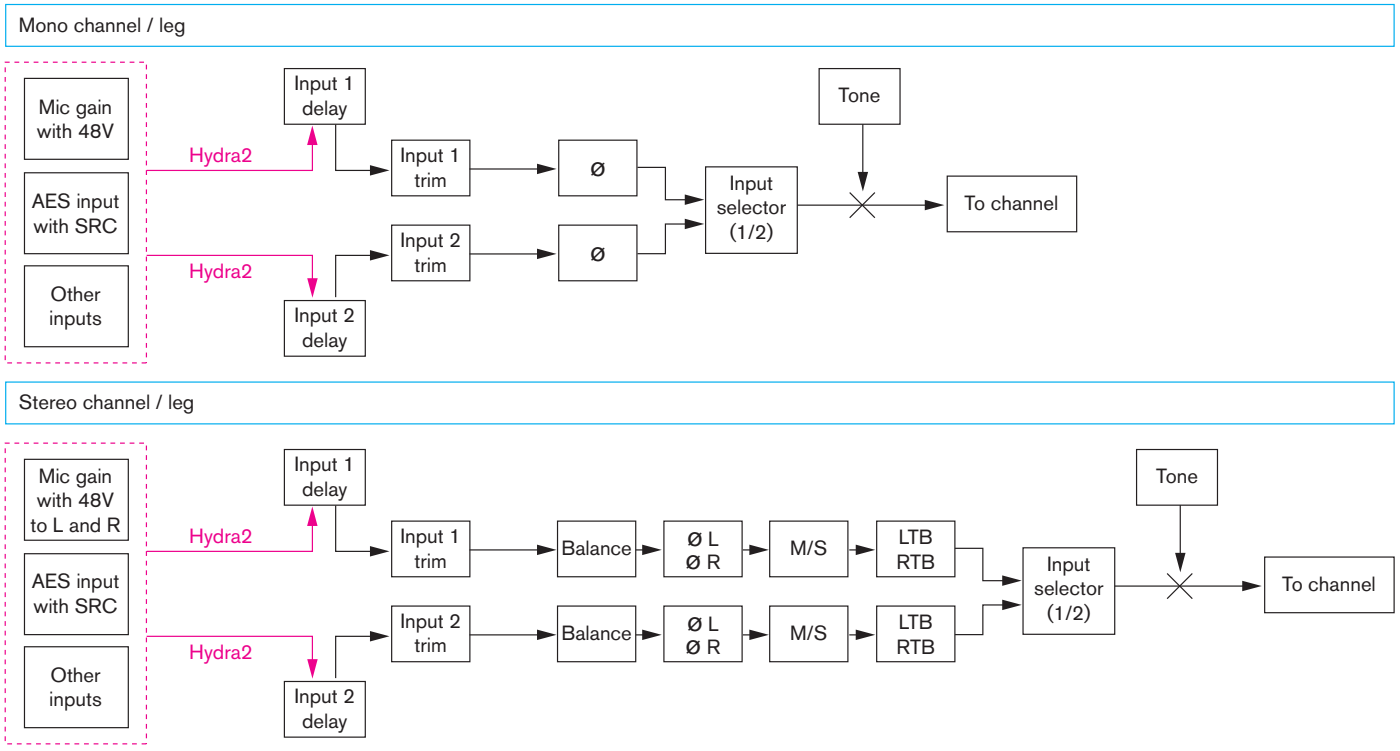
48v
48v (phantom power) can be sent to each leg of the input signal using the 48V button (mono) or the 48L and 48R buttons (stereo). These are located on the TFT touchscreen.

Polarity inversion
The polarity of the each leg of the signal may be inverted individually.

Input balance
The balance of a stereo input pair can be varied from full left, through center stereo to full right. If the balance control is switched out, then the balance is set to center stereo.

M-S
If the input signal on a stereo input is presented as an M-S pair it may be

FIGURE 2 - INPUT SIGNAL FLOW



presented incorrectly unless the M-S decoder is switched in. A button on the touchscreen toggles the decoder in or out.

SRC
Sample rate conversion may be turned on if an AES input is selected.

Signal flow
Figure 2 shows the signal flow of Apollo's input section for a stereo input with input 1/2 selection.

TONE / OSCILLATOR CONTROLS

There are many tone injection points within the Apollo DSP to aid with path checking and line-up.

For example, tone can be selected to the currently assigned channel or group fader's input from the I/P-EQ-DYN panel mode's TFT screen (lower left corner), or to bus outputs from the OUTPUTS panel mode by pressing on the shaft encoder of the required bus to bring up extra controls including tone switching in the Wild Assign row across the bottom of the panel. (Changing the mode of panels or the assigned focus by selecting a different fader or output bus does not clear the tone. Tone will remain until deselected or globally cleared.)

The Oscillator functions provide control over internal tone parameters and allow the option to override the internal tone generator with external or "house" tone.

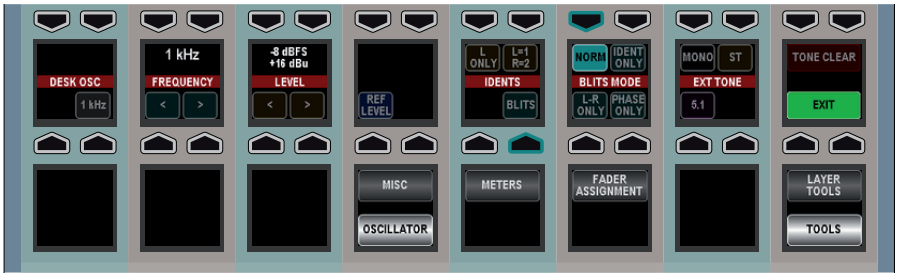
These controls can be accessed from any fader panel by pressing TOOLS and then OSCILLATOR on any fader panel's Layer Select row. The oscillator controls will then be displayed in the Functions row above, as shown in Figure 1.

*Tip: Remember the Layer Select row uses OLED touch / presses to select, whereas the Functions Row above uses the surrounding buttons to select the functions displayed in the OLED's.

Tone Parameters

The Functions row provides controls to adjust the internal oscillator's level and frequency. Frequency ranges cover the band from 20Hz to 20kHz. Level is displayed in both dBFS and dBU. Pressing and holding "1KHz" or "Ref Level" will reset to the default values. Note, the default level value is intended to match your regional or chosen running levels and line-ups, eg for the US, the default lineup setting is -20dBFS/+4dBU whereas for the UK it is -18dBFS/0dBU. If your line-up levels are not as expected please contact your engineering support or Calrec support at www.support@calrec.com.

FIGURE 1 - TONE CONTROLS



Tone Idents

Ident patterns are used to identify which channel is which to help verify routing and patching. Apollo / Artemis consoles support three ident formats which can be selected from the "Idents" control cell within the oscillator control row.

"L ONLY" is similar to the EBU ident specification. The tone on the left audio channel is repeatedly interrupted whilst the right channel remains constant.

"L=1, R=2" is similar to the GLITS ident specification. Tone is repeatedly interrupted on both left and right channels. Each interruption on the left channel is followed by two interruptions on the right channel.

These are stereo idents and will only be applied to tone being injected onto stereo paths / outputs. If tone is selected directly onto a surround output (rather than on a fader routed to an output) the stereo ident will only affect the stereo downmix / encoded output channels.

Only one of the two stereo idents can be selected at any given time.

BLITS ident is for use on 5.1 surround paths and will not affect tone on mono or stereo paths. BLITS ident can be selected / used at the same time as one of the stereo idents.

Four different modes can be selected for the BLITS format, selectable from the control cell to the right.

"NORM" is the full BLITS cycle mode - First, a short burst of tone is applied to each of the 6 channels, one at a time, in order. Four different frequencies of tone are used at this stage to help ID the channels - L/R outputs at 880Hz, Center at 1320Hz, Lfe at 82.5Hz, Ls/Rs at 660Hz. This is followed by 1KHz tone the on L & R legs only. The right channel is continuous, whilst the left channel is repeatedly interrupted. The last stage of the cylce applies 2KHz tone on all 6 channels simultaneously before beginning the cycle again. Each cycle lasts approx 13 seconds. The different frequencies used also help to identify each part of the

cycle, for example if 1KHz can be heard anywhere other than front L/R there must be a problem with routing or patching.

External Tone
The "EXT TONE" buttons override the console oscillator, allowing for externally generated tone to be applied for users who have a "house" tone / ident system.

Mono, stereo and 5.1 tone paths are separated to support their idents. External tone can be applied and selected individually to each "width" of tone bus, meaning a mixture of internal and external tone could be used if required.

External tone sources can be fed into any Hydra2 input. The inputs used need to be patched accordingly -

From the PC Main Application, FIXED OPTIONS>Mon-TB-MTR-PATCH page, Select DESTINATIONS in the upper right area of the screen and choose TONE + TB. From the upper left, select SOURCES and choose the relevant Desk Inputs list for the IO ports the external tone is connected to. Highlight the blue cell for the correct "Ext Tone" destination, highlight the blue cell for the correct input port and click Patch to apply. Repeat for any other sources required.

The destinations side of this page also provides the option to switch in/out sample rate convertors if digital sources are patched or to select phantom power and adjust input gain on analogue inputs, though the analogue settings are normally only changed from their defaults for the Talkback destinations displayed in the same list. For Tone destinations using analogue inputs the default setting is 0dB gain and NO power.

Patches made on this page are automatically saved and remain the same for all memories and shows

Tone Clear
The upper half of the control cell on the far right provides a TONE CLEAR function. This will clear all tone selections made on the control surface - IE it will deselect tone switched to channel inputs, bus outputs etc (it does not affect external tone patches and does not turn off the oscillator). This is a convenient way to ensure all paths are passing normal signal and no tone is injected over the path prior to going on air. It is also a convenient method to kill tone in a hurry when the source is not so obvious.

Tone Troubleshooting & FAQ's

No tone present when selected
Selecting external tone will replace the console oscillator whether external tone is present or not. If internal tone is not present when expected, check it is not set to external.
If using external tone, check the correct input ports are patched to the external input (and that the tone generator is connected, on and set correctly)
Also check that the oscillator level and frequency are set to suitable values.

Tone on stereo downmixed / encoded outputs lower than expected
When selecting tone to a surround output bus, it is also applied to that buses' LoRo/LtRt outputs at the same level. This is because tone is being applied at the final output stage. With tone to line selected the signal on LoRo/LtRt is NOT derived from a downmix or encoding of the surround channels. The same level of tone is applied to both the 5.1 and the downmixed output.

Tone on stereo downmixed / encoded outputs higher than expected
If tone is fed from a surround channel / path which is in turn routed to a surround output, the LoRo/LtRt of that output will generally be of a higher level than that on the surround legs as the LoRo/LtRt output is derived from a downmix of the content on the surround legs as per the downmix settings.

Tone not present or low on Lfe channel of outputs
If tone is routed from a channel to surround main output and signal is not present on the Lfe leg of the output, this is likely to be due to the default state of surround Main outputs having a high frequency filter switched in on their Lfe leg. Reduce the frequency of the oscillator to around 50Hz to see (and hear) the Lfe channel. If desired, the filter can be switched out or adjusted by selecting the Main output as assigned, then selecting the Lfe channel from the surround spill panel and adjusting the filters from an EQ panel.

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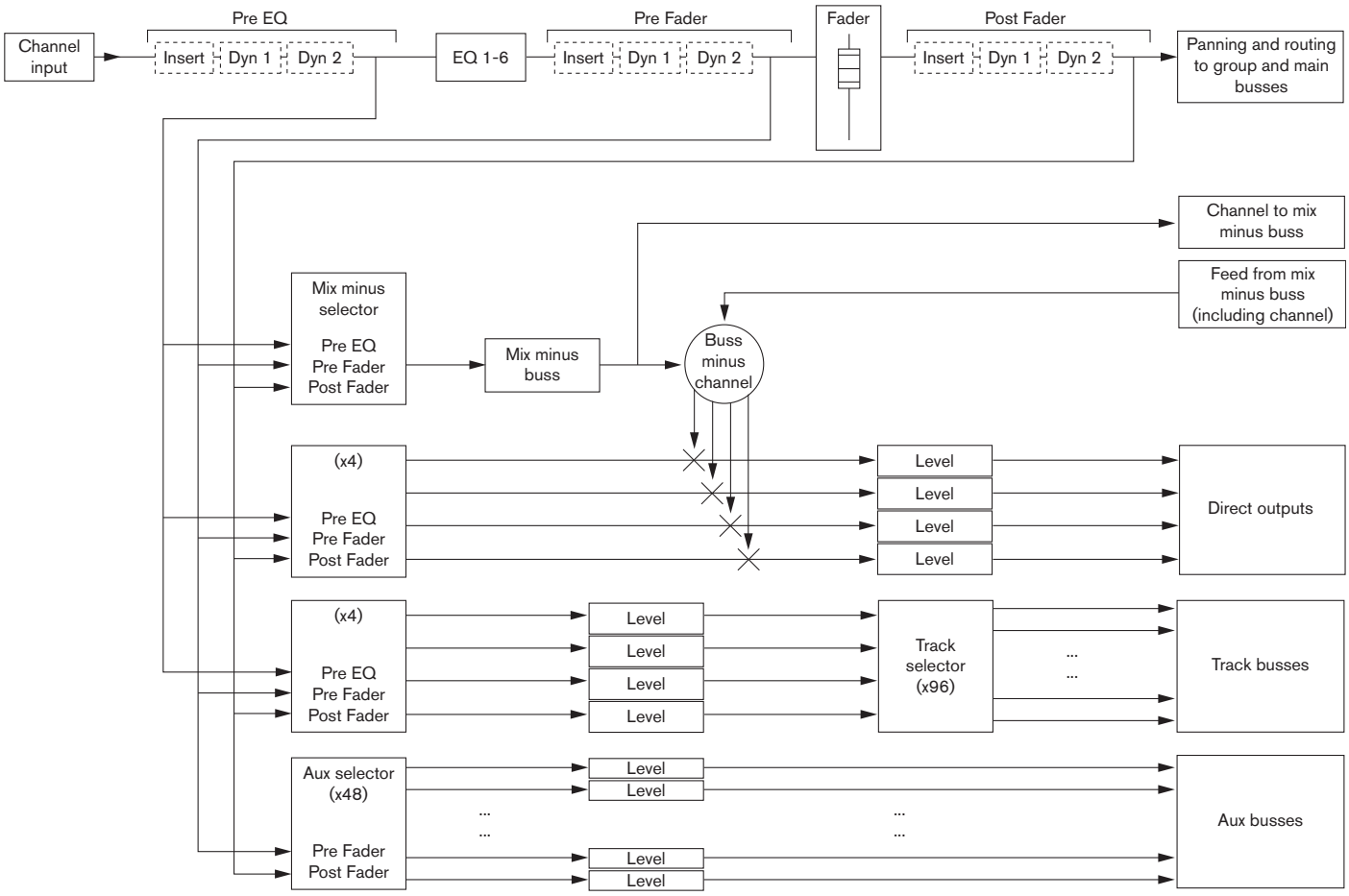
CHANNEL SIGNAL FLOW

Figure 1 illustrates the signal flow in an Apollo channel path. It shows the positions at which inserts, EQ and, two dynamics units and the relevant send and output points can be positioned.

FIGURE 1 - CHANNEL SIGNAL FLOW



EQ AND FILTERS

EQ is available on all paths without restriction. Each path has access to six full range, fully parametric, switchable response EQ bands.

Each EQ band has a frequency range from 20Hz to 20kHz and can have either a highpass filter, low shelf, notch, bell, high shelf or lowpass filter response.

Given the flexible and configurable nature of the surface, the EQ control layouts used here are available on the INP-EQ-DYN Assign mode layout. This layout is shown in Figure 1. These controls would only affect the currently assigned path.

On/Off

The buttons in the left column of Control cells switch each band on and off. Buttons in the left Button cell switch all bands 1-4 on or off together and bands 5 and 6 on or off together.

Gain

The left column of Control cells contains gain controls (where relevant) for all six bands. The gain for shelf and bell responses is -18dB to +18dB.

Response

Pressing the RESP button for any band in the right column of Control cells allows the rotary control to scroll through the available response types. The button will be lit during this process. Once the response has been chosen it can be selected by pressing the button a second time. When the RESP button is not pressed, the rotary doubles as the Q control.

Frequency

Each band has a full frequency range from 20Hz to 20kHz. This is controlled by the middle rotary control on each row.

FIGURE 1 - EQ CONTROLS ON THE INP-EQ-DYN ASSIGN MODE LAYOUT

Q
The bell response has a variable Q from 0.3 to 10. The notch response has a fixed Q of 30.

EQ flat
Holding the EQ FLAT button for a second will reset the gain, frequency and response (and Q where applicable) for all EQ bands.

Alternate EQ
Two EQ curves can be created per channel using the ALT EQU button. Touching this button flips between the two EQ curves for quick EQ changes or comparisons. The ALT = NORM button copies the main EQ settings over to the alternate EQ.

EQ curve display
The touchscreen shows a graphical representation of the current EQ curve for the assigned channel. It also shows an overview of the settings of each EQ band below it.

Each path has access to two dynamics units. The first contains a compressor/limiter and an expander/ gate and the second contains another compressor/limiter. These processors are dedicated resources and are available on all Channel, Group and Main paths at any time without restriction.

Dynamics controls

Figure 1 shows the layout of the dynamics controls in the INP-EQ-DYN layout of assign mode when controlling the first dynamics unit. When controlling the second dynamics unit, the layout is similar, except there are no expander/gate controls shown. To switch between the dynamics units, use the DYN 1 and DYN 2 buttons in the button cells at the bottom of the panel.

Figures 2 show the parameter values for the compressor/limiter and expander/ gate.

The compressor can be used as a limiter by selecting the highest ratio (50:1). The expander can be switched to a gate by pressing the GATE button on the surface controls. It can be switched back to an expander by pressing the same button again.

The touchscreen shows a gain reduction meter, an input-output curve and the current numerical settings for the dynamics processing.

Processing order

The dynamics processing can be placed at various points in the signal chain. Buttons in the left button cell of the dynamics area allow a choice over:

- Post Fader
- Pre Fader

FIGURE 1 - DYNAMICS CONTROL LAYOUT

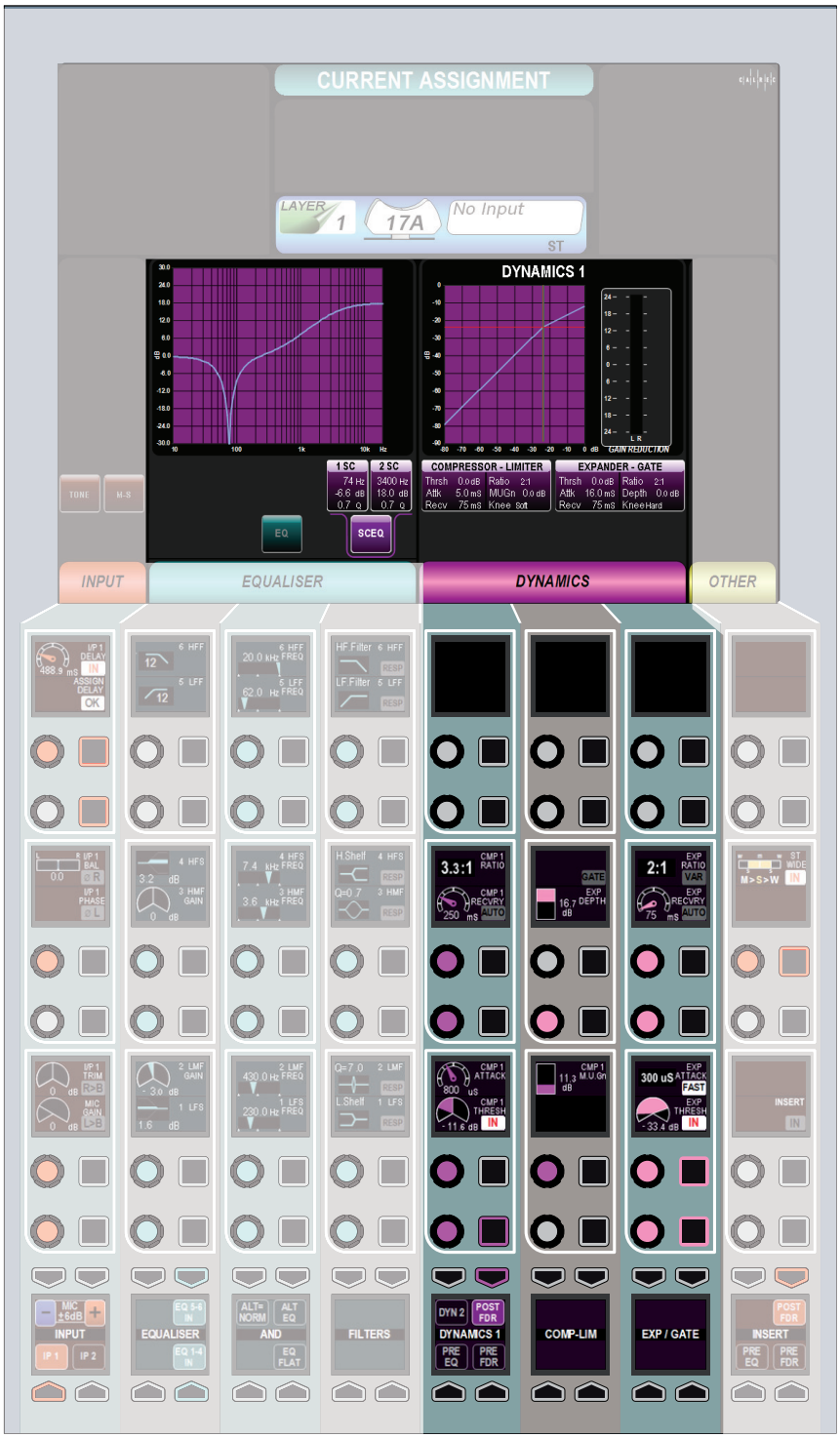


FIGURE 2 - DYNAMICS PARAMETERS

Compressor/Limiter

Parameter	Range
Attack	50µs - 30ms
Release	75ms - 4s or Auto
Threshold	±20dB
Ratio	1:1 - 50:1
Knee	Hard or Soft (on channel paths only)
Makeup Gain	0-20dB or Auto

Expander/Gate

Parameter	Range
Depth	0-40dB
Attack	Fast (300µs) or normal (16ms)
Release	75ms - 4s or Auto
Threshold	-40dB - +10dB
Delay	0-1000ms
Hysteresis	6dB switched in or out
Expander Ratio	2:1 or VAR (Variable according to level)

- Pre EQ

Dynamics Metering

The dynamics meter to the right of the dynamics graph shows gain reduction for both compression/limiting and expansion/gating. The red compression and limiting indicators start in the center of the meter at the zero mark and extend upwards. The green expansion and gating indicators also start in the center of the meter but extend downwards.

Sidechain EQ

The "SC EQ IN" button in the wild assign (bottom) row of the dynamics control section is used to switch sidechain EQ in and out.

The top row of control cells in the dynamics section provides control over the parameters. As with regular EQ bands, you can select various response types by pressing RESP and turning the related shaft encoder. The remaining controls change according to the response chosen

The EQ response curve for the sidechain can be viewed by selecting SCEQ from the TFT screen beneath the EQ curve.

About Dynamics Sidechains & EQ

All dynamics processors have optional sidechain EQ. Channels have 2 band EQ, whilst Groups and Mains have a 1 band EQ.

The sidechain is an offshoot from the audio path through the Channel / Group / Main. Dynamics processors use the sidechain to determine the audio level and then apply gain reduction to the "through" audio path. Sidechain audio is not passed on, it is used purely as a reference for dynamics processors.

Applying EQ to the sidechain does NOT change the relative frequency response of the audio path though the console, only the audio that "triggers" the dynamics.

By applying EQ to the sidechain you can tune the dynamics to act on or ignore peaks depending on the frequency. For example, a basic "De-Esser" used to reduce sibilance is a compressor with a high pass filter on the sidechain. The compressor only receives the high frequency content and will therefore only apply gain reduction if high frequency content exceeds the threshold setting.

STEREO WIDTH

Stereo paths and stereo legs of surround paths have access to the stereo width control.

This control varies the width of the paths stereo image from mono through stereo, through to wide. Wide creates an apparent extension of the image past the usual left and right limits.

Stereo width appears pre fader, post EQ and dynamics in the processing chain and must be switched in using the IN button.

FIGURE 1 - STEREO WIDTH CONTROL

SURROUND SPILL

Apollo makes very efficient use of surface controls for accessing and controlling surround signals.

Whether controlling mono, stereo or surround signals, only one fader is required on the surface for global manipulation and application of signal processing to the complete collection of paths that make up that signal. For a stereo signal, two mono paths are required and controlled simultaneously by a single fader. For surround signals, six or more mono paths are required and controlled simultaneously by a single fader.

Under normal circumstances this provides an extremely quick way to alter the level of, or assign processing to all component paths of a given signal. However for times when more flexibility or greater control of individual component signals is required, the signal can be expanded onto the spill faders.

Accessing the spill faders

On the dedicated monitor panel, shown in Figure 1 (or the Joystick panel which has the exact same upper section as highlighted in Figure 1) press the SPILL LEVELS button. This upper section will now allow access and control of the individual legs of a surround path via the spill faders.

Spill faders

The spill controls follows the currently assigned path. When a fader which controls a surround signal is selected as the currently assigned fader, the spill panel updates to reflect the status of the component signals. If the assigned fader controls a mono or stereo path, the spill panel will become unavailable until a fader controlling a surround path is assigned.

The faders on the spill panel behave in the same way as every other fader on the surface. They have the same assign buttons above and below the fader label OLED, the same AFL, PFL and cut buttons and the same bargraph meters. They can be assigned in the same way as any other fader and by doing so, individual control of the processing of a specific component path is possible.

FIGURE 1 - SPILL CONTROLS

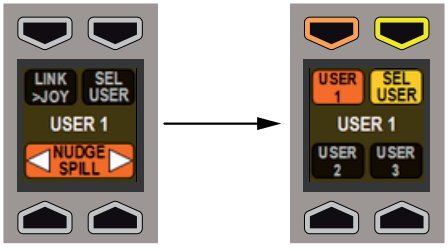
Depending on the width of the surround signal present on the assigned fader, the component signals will be arranged differently on the spill faders. Stereo components of the surround signal such as L-R and Ls-Rs are normally grouped together and controlled by a single spill fader, whereas mono components such as LFE are present on their own fader. The fader label OLEDs above each fader list the available component paths which may be split between the A and B paths. These are accessed and behave in the same way as all other A and B paths on the surface.

Current spill panel assignment

The path selection OLED above the currently assigned fader is mirrored below the rightmost spill fader. This can be used to change the path assignment between the A and B paths on that same fader without leaving the spill controls.

The spill controls can be set to follow the current path assignment, or they can be locked to a specific path. This function can be changed by pressing either the FOLL A/B or LOCK buttons respectively.

FIGURE 2 - SEL USER



If the path controlled by the spill faders is locked, the path selection OLED on the spill panel will not follow the path assignment on the surface. It will display the locked path as an indicator of which path is being controlled by the spill panel.

Nudge

The spill controls contain a function that will nudge the current path assignment along the surface in either direction. Pressing the right nudge button changes the fader assignment to the fader on the right of the currently assigned fader. The left button moves the assignment to the left along the surface.

Changing the user section of the monitor panel

When multiple operators are using the surface, it is possible for any of them to access the spill controls for paths assigned in their own user sections.

Press the SEL USER button in the lower button cell of the spill control area as shown in Figure 2. This will update the rest of the OLED to display the three user sections. Press the button corresponding to the required user section that the spill controls should respond to and then press the SEL USER button again. The chosen user section should now be shown in the middle of the OLED and the spill faders should respond to that users path assignments.

Assigning paths on the spill panel

When a surround path is accessed on the spill panel, each leg of the surround signal may have processing applied to it individually. Individual legs may be assigned using the assign buttons above each spill fader in the same way that paths on the normal faders are assigned.

When a path on a spill fader is assigned, the assign button of the parent surround path will still appear blue but will also strobe. This indicates that any assign modes will affect a single component of the surround signal, rather than the whole signal.

Main paths on the Monitor or Joystick panels

When the faders on the Monitor or Joystick panels are switched into 'Mains' mode (rather than Spill or Downmix mode) and a Main path on one of these faders is assigned, it is not possible to switch the mode of the faders on the same panel and use them to alter the spill legs of the assigned main. The function of the faders cannot be switched unless a path from a normal fader or another Monitor or Joystick panel is assigned. This is intended to avoid the confusion of having a single fader indicate the assigned path and the relevant spill leg at the same time.

PROCESSING INDEPENDENCE

Processing independence
By default on a surround path, any processing is applied to all legs in the path (with some exceptions discussed later). One set of master controls set the processing applied to all legs. However, processing can be made independent for an individual leg of a surround signal, for example the C leg of a 5.1 path. The surround path which is being processed will be referred to as the surround master in this explanation.

EQ independence
By default, the EQ set on the surround master is applied to all legs of the path. To apply independent EQ to an individual leg of the path, first assign the required leg on the spill faders (see the Surround Spill section of this document for information on this process). Now in INP-EQ-DYN mode press the INDEP button next to the EQ band you wish to make independent for the assigned leg. This band can now be adjusted to process the assigned leg independently from the assigned surround master. EQ bands still following the surround master settings will display the text S.MSTR below their frequency value.

Adjustments to EQ bands still following the surround master will also affect all other legs in the path.

Dynamics independence
Dynamics of individual legs can be made independent from the surround master in two ways.

Firstly, the dynamics sidechain linking can be made independent. Under normal circumstances, any leg of the surround signal which crosses the threshold first determines the amount of processing to be applied to all legs equally. For example, if the C leg has the highest level and is the only leg to cross the compressor threshold, it will have a certain amount of gain reduction applied to it. This same amount of gain reduction is also applied to all other legs even if they didn't cross the threshold. This keeps the relative balance of the sound field intact.

FIGURE 1 - INDEPENDENCE CONTROLS IN INP-EQ-DYN MODE

By making the dynamics sidechain linking independent for a given leg, that leg will only have gain reduction applied when it crosses the threshold itself. The control values remain common with the surround master, but the leg will be processed independently.

To make the dynamics sidechain linking independent, assign the required leg of the surround master and press the DYN1 SURR SC LINK INDEP (or the DYN2 equivalent to make the second dynamics unit linking independent).

The second way to make dynamics processing independent is to make the control values independent for a given leg. This would mean that any leg in the surround master can have different dynamics controls. If the dynamics linking is not made independent, the paths would be processed according to the first path to cross the threshold, but their thresholds and other parameters may be set independently.

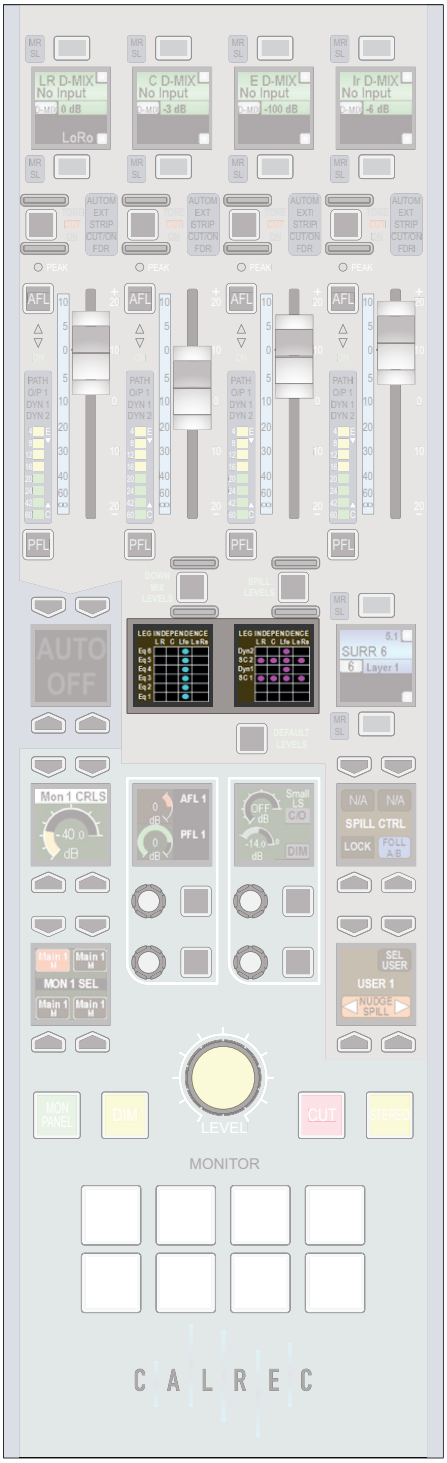
It is possible to have both dynamics linking independence and control independence set for individual legs. For example, a surround group or main path may contain a 5.1 sports mix with a commentator in the C leg, and crowd, music and effects signals in other legs. Using Apollo's flexible processing section it is possible to compress the commentator independently from the signal in the surround legs. This provides Apollo with a very flexible processing section, able to handle almost all situations with ease.

By default the LFE leg of a surround path has independent EQ and dynamics from the surround master. The independence can be removed by reversing the previous processes.

Independence status indicators

The status of EQ and dynamics independence in indicated on the monitor and/or joystick panel. When a surround path is assigned and the faders on the monitor or joystick panel are se to show spill or downmix levels, the two OLEDs highlighted in Figure 2 show a blob next to any processing which has been made independent.

FIGURE 2 - INDEPENDENCE INDICATORS



INSERTS

Apollo has a pool of 256 mono insert resources available. These may be used to create inserts for any width of path in the system.

Configuring inserts is a two step process. First any insert send and return resources should be patched to output ports and input ports respectively. The insert resources should then be connected to the required paths on the surface. This process is shown in Figure 1.

Patching insert resources to ports
Insert sends and returns can be patched to ports in the IO PATCH screen of the IO section of the main application. This screen is shown in Figure 2.

In this screen select INSERT SENDS from the sources list and OUTPUT PORTS in the destinations list. Select the required insert sends and outputs ports then touch the PATCH button.

Now select INPUT PORTS from the sources list and INSERT RETURNS from the destinations list and patch the required ports to insert returns.

FIGURE 1 - INSERT ABSTRACTION

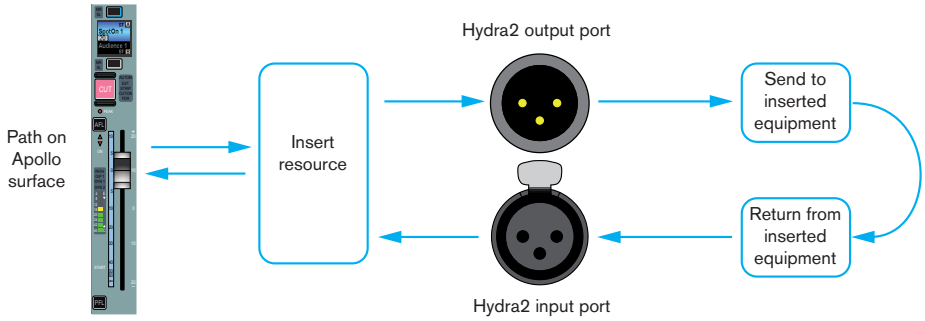
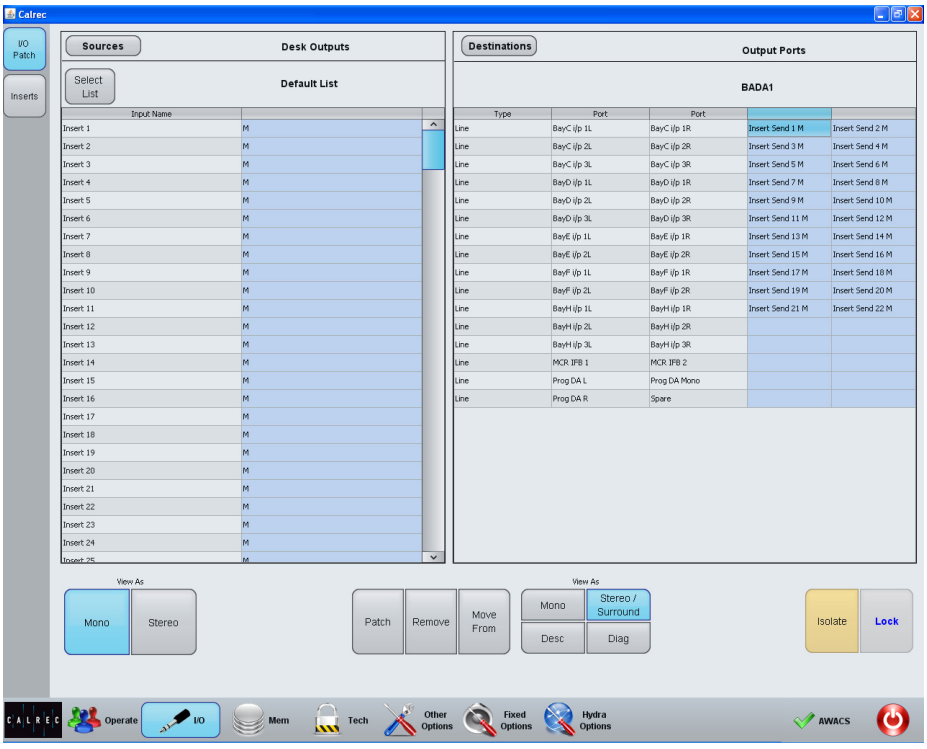


FIGURE 2 - PATCHING INSERTS



Connecting insert resources to paths

Navigate to the INSERTS screen in the IO section as shown in Figure 3. The available insert resources are shown in the list on the left. Paths on the surface are shown in the list on the right. Select the required insert resources, then the paths to which the insert should be connected and touch the PATCH button.

Naming insert resources

Insert resources may be labelled in the INSERTS SETUP screen in the OTHER OPTIONS section of the main application, as shown in Figure 4. In this screen, touch the INSERT ALLOC button. Double click an insert resource name to provide a new name, which must be 12 characters or less.

Insert resource lists

Insert resources can be assigned to lists. Lists provide a way of filtering the insert resources and can be selected when patching insert resource sends and returns to ports, or connecting insert resources to paths.

To access insert resources lists, go to the INSERTS SETUP screen in the OTHER OPTIONS section of the main application. Select the INSERT ALLOC button at the left of the screen. The screen will show all available insert resource lists just to the right of the INSERT ALLOC button. The DEFAULT LIST is created automatically and contains all available resources.

Creating lists

To create a new list, select the required insert resources from the default list (or any other list that already exists) and touch the CREATE LIST button. A popup will appear prompting for the name of the new list, which can be six characters or less. Enter the name and touch OK. The new list will appear below the default

FIGURE 3 - CONNECTING INSERTS TO FADERS

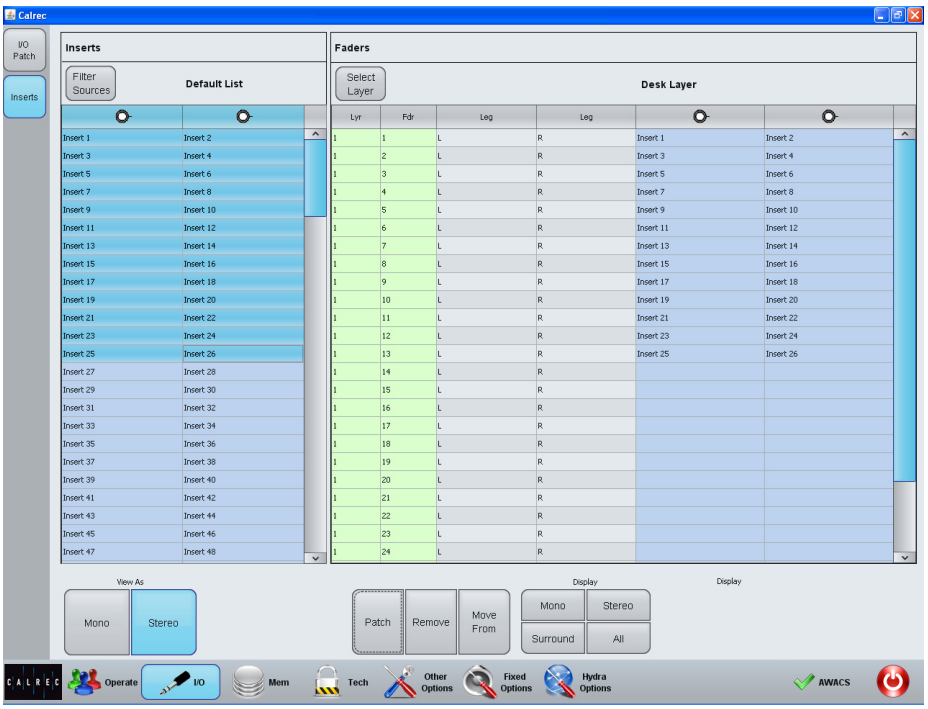
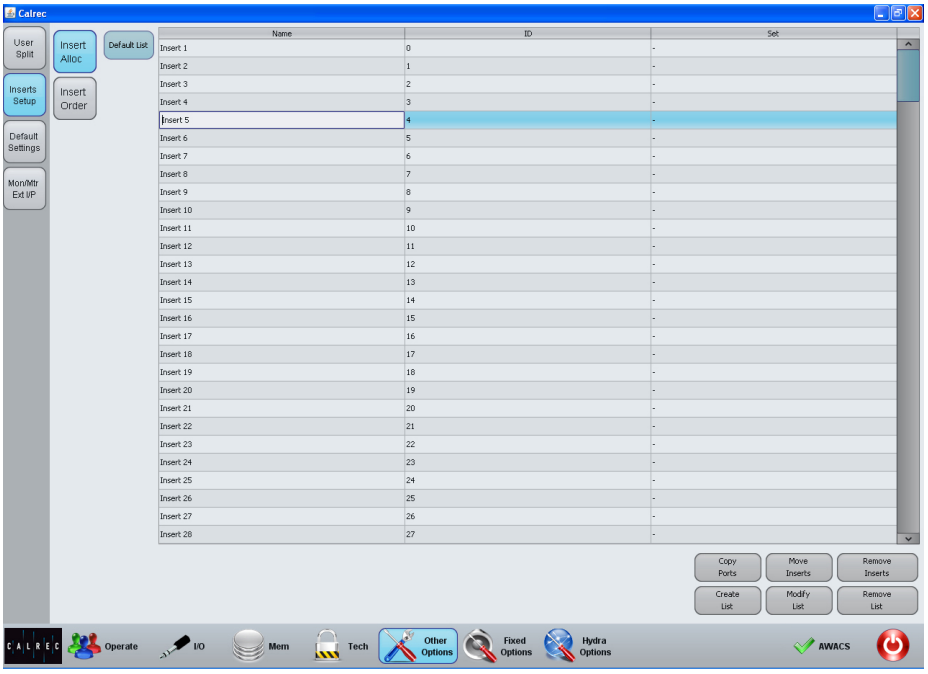


FIGURE 4 - INSERTS SETUP SCREEN



list and will contain the selected insert resources. Touch the new list to confirm this. It is possible to make a new list which is empty, by ensuring that no resources are selected when touching the CREATE LIST button.

Copying and moving insert resources to lists

Resources can be copied or moved between lists by selecting the required resources in the source list and touching COPY LISTS or MOVE LISTS. A popup dialog will appear allowing selection of the destination list. Select the destination list and touch OK.

Removing insert resources from lists

To remove resources from a list, select the required resources and touch the REMOVE INSERTS button.

Renaming lists

Touch the MODIFY LISTS button to bring up a popup dialog. This dialog allows you to select a list and rename it.

Removing lists

To remove a list, select the required list and touch the REMOVE LIST button. A popup dialog will appear asking for confirmation of the removal.

Insert Order and Sets

Insert resources can be ordered into sets. For a description of sets and the order of items within a set, please refer to the Input Sources section of this document.

VCA STYLE GROUPS

Apollo's moving fader VCA style groups provide control over fader level, cut status and APFL status.

Creating and dissolving VCA style groups

A group is created by holding the assign button of the fader which is to be the master, then pressing the assign buttons of any other faders to add or remove them as slaves of the master. Slaves may only have one master.

Group hierarchy

Apollo provides up to three levels of group hierarchy. A master can have slaves but can also be made a slave of another master. Figure 1 illustrates the hierarchy. When the full hierarchy is in place, the slave master is known as the secondary master, and its master is known as the primary master.

When the level of a primary master is adjusted it will change the audio level of its own slaves and the level of its secondary master's slaves by the same amount. Changing the CUT, AFL and PFL settings of a primary master applies the settings to the slaves, secondary masters and their slaves.

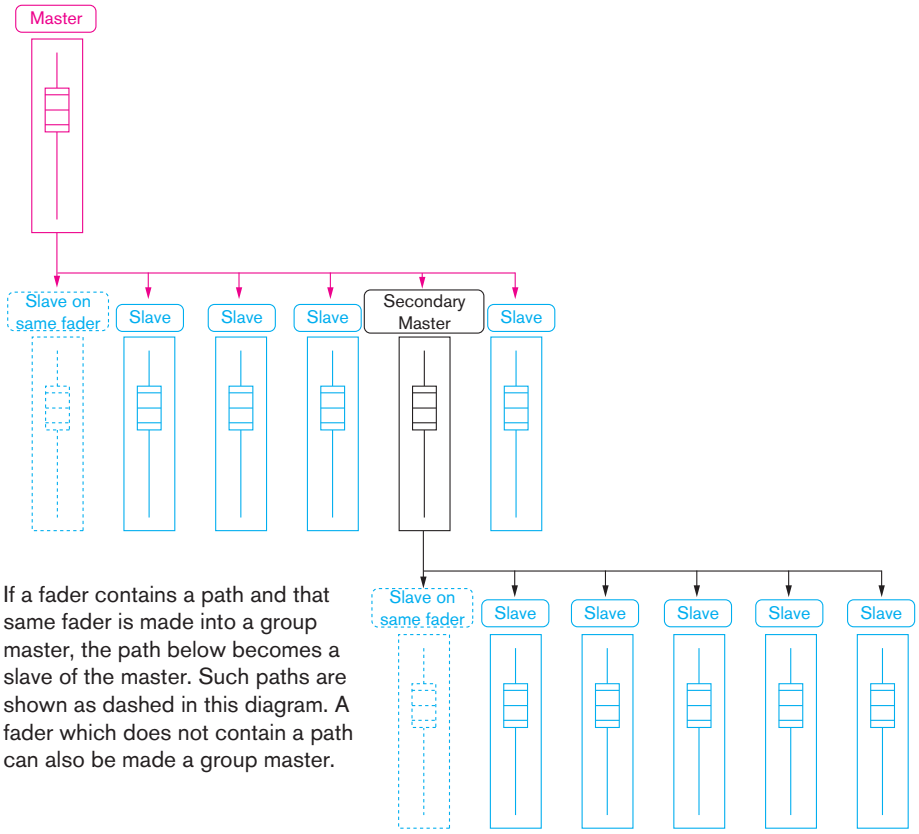
When the level of a secondary master is adjusted, the audio level of all its slaves changes by the same amount. Its adjustment will not affect the level of the primary master or its slaves. Changing the CUT, AFL or PFL of a secondary master applies the settings to the secondary master's slaves only.

Fader status indicators

Each fader contains two indicators next to each assign button as shown in Figure 2.

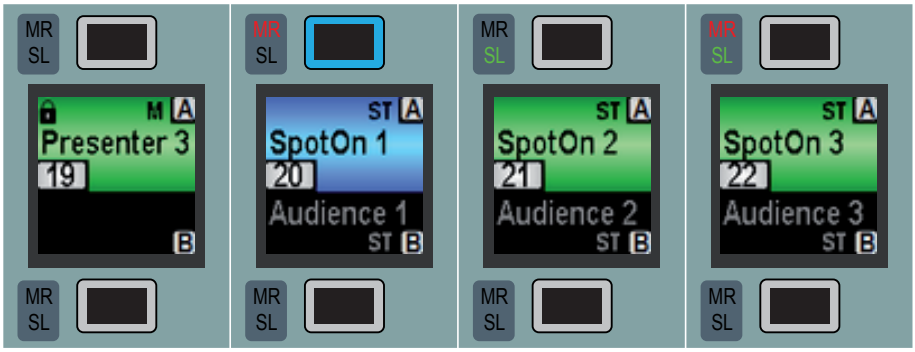
- Neither indicator will be illuminated if the fader is not part of any VCA style group.

FIGURE 1 - GROUP HIERARCHY



If a fader contains a path and that same fader is made into a group master, the path below becomes a slave of the master. Such paths are shown as dashed in this diagram. A fader which does not contain a path can also be made a group master.

FIGURE 2 - FADER STATUS



Fader is neither a primary or secondary master or slave

Fader is a master. As it has a path attached to it, the path 'SpotOn 1' is a slave of the master

Fader is a slave of a primary or secondary master

Fader is a secondary master. As it has a path attached, the path 'SpotOn 3' is a slave of the secondary master

- The MR indicator illuminates red if the fader is a master
- The SL indicator illuminates green if the fader is a slave
- Both MR and SL indicators illuminate if the fader is a secondary master.

Creating VCA style groups

To set up a VCA style group, first designate a fader as a master and then assign a number of other faders for it to control. To do this push and hold the master fader's assign button, then press the assign buttons of any paths which are to become slaves. The relevant fader status indicators will illuminate.

VCA group interrogation

Interrogation works in a similar way to the routing interrogation feature. It provides a clear way of indicating group assignment using the path assign buttons. As with creating a group, interrogation is performed by holding the assign button of the path to be interrogated. A number of different situations exist:

- The interrogation of a master will illuminate all the assign buttons of its slaves. If any intermediates exist which are controlled by the selected master, their assign buttons will strobe slowly. The slaves of the intermediate will not be lit.
- The interrogation of an intermediate will illuminate all the assign buttons of its slaves. The assign button of its master will strobe quickly.
- Interrogating a slave of a master will cause the master's assign button to strobe quickly.
- The interrogation of a slave of an intermediate will strobe the intermediate's assign button slowly and the intermediate's master's assign button quickly.

While holding an assign button, only the assign buttons relevant to the VCA group will illuminate or strobe. The rest will be unlit for clarity.

Masters and slaves on the same fader

Masters can be created on a fader which does not contain a path. They can also be created on faders which already have a path attached to them. In this case, the path on the fader becomes a slave of the master. The master and the new slave beneath it can be accessed and controlled in different ways.

Normally any changes to the fader level, cut or APFL status will apply to the master and subsequently all slaves in the group. If the fader assign button is held down, then the changes will apply to the slave beneath the master.

If the fader is assigned but the button is not held down, any alterations to EQ, dynamics and routing for example will apply to the slave only as normal. Processing outside of fader level, cut and APFL status does not apply to VCA style groups.

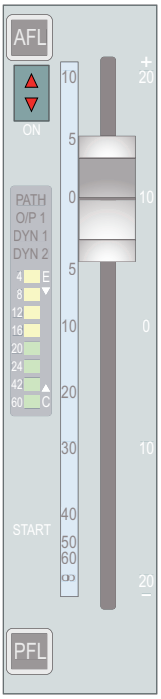
Fader level indicator

Touching a fader will display its level in the OLED above. This indicator will disappear after a short period of time.

Nulling indicators

If the combined level of a master and slave is greater than +10dB or less than -100dB, the slave fader will remain at the appropriate end of its travel and the relevant up or down nulling indicator will be illuminated. The nulling indicators are shown in Figure 3.

FIGURE 3 - NULLING INDICATORS



Preserving the balance of slaves at low levels

When a master is set to a level below -50dB, its slaves cannot be altered. Altering the levels of slaves when the master is turned down to this degree would most likely produce inaudible results. To preserve the balance of the group and to prevent any signals being turned up excessively when the master is raised, this restriction has been put in place. In this case, both nulling LEDs on the slaves will illuminate.

5.1 Surround channels

If a surround master is part of a VCA group then the VCA primary and secondary master levels, cut settings and APFL settings affect all of its spill legs. It is not possible for the spill faders themselves to be masters or slaves of a VCA group.

AUTOFADERS

Autofaders allow Apollo's faders to be opened and closed under the control of another system through the use of GPIs.

There are 256 autofaders in the Apollo system. GPIs are assigned to control one or more of these autofaders when they receive the required trigger signal. The autofaders can then be assigned to control one or more faders on the surface.

Assigning GPIs to autofaders

GPIs are assigned to autofaders in the GPI screen in the HYDRA OPTIONS section of the main application as shown in Figure 1.

The FILTER INPUTS button will bring up a popup which lists all available Hydra2 IO boxes that have the GPIO module fitted. Selecting one will populate the left hand side of the screen with the opto-inputs available in that box.

The FILTER FUNCTIONS button brings up a popup with groups of available functions that can be controlled by the GPIs. Select AUTOFADERS to populate the right hand side of the screen with the available autofaders.

A single GPI may control any number of autofaders, so assignments can be made one to one or one to many. Select the required GPI from the list on the left and any number of autofaders from the right. Now touch the PATCH button.

To remove a connection, select the connected autofader from the GPI list on the left and touch remove.

Assigning autofaders to faders

Once the relevant GPIs have been assigned to autofaders, the autofaders can be assigned to control faders on the surface. This is done on the AUTO FADE

FIGURE 1 - PATCHING GPIS TO AUTOFADERS

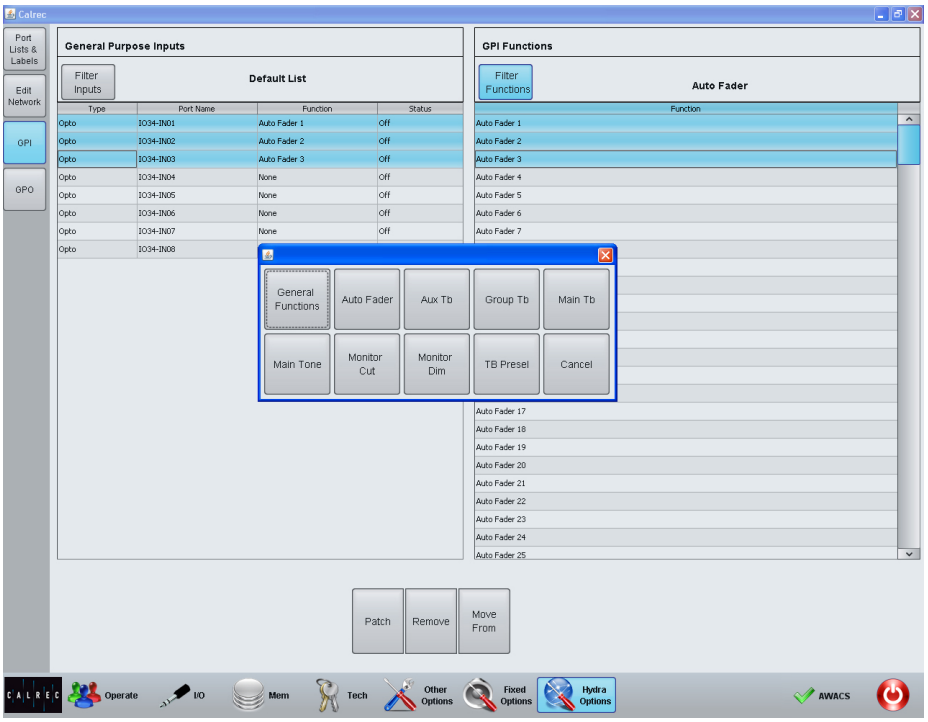
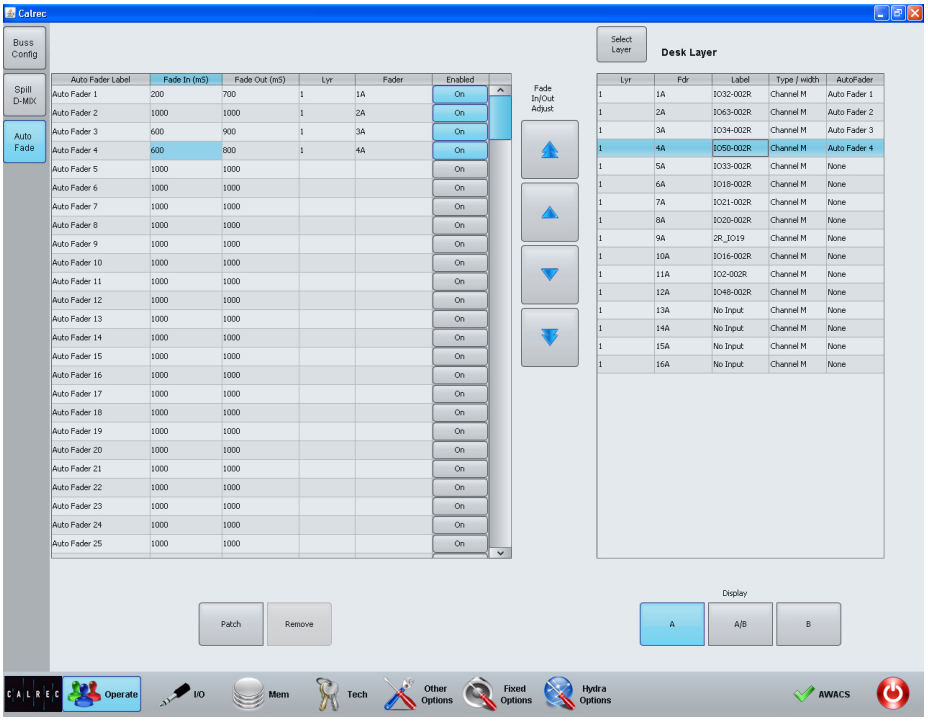


FIGURE 2 - ASSIGNING AUTOFADERS TO FADERS



screen in the OPERATE section of the main application, as shown in Figure 2.

The autofaders are listed at the left side of the screen, and the surface faders are listed at the right. To change the layer of faders shown, touch the SELECT LAYER button and select the required layer from the popup. The A, B and A/B buttons below the list allow only the A faders only, B faders only or A and B faders to be shown.

To connect an autofader to one or more faders, select the required autofader in the left list, and the target faders in the right list and touch the PATCH button. To remove a connection, select the relevant autofader and touch the REMOVE button.

Autofader levels
When an autofader is attached to a fader and is enabled, providing the trigger signal is not present, the fader will jump to -infinity dB. When the trigger signal is present, the fader will fade up to the level set before the autofader was made active. When the fader has been faded up, any changes to level will be remembered and the fader will return to this value on any subsequent fade ins.

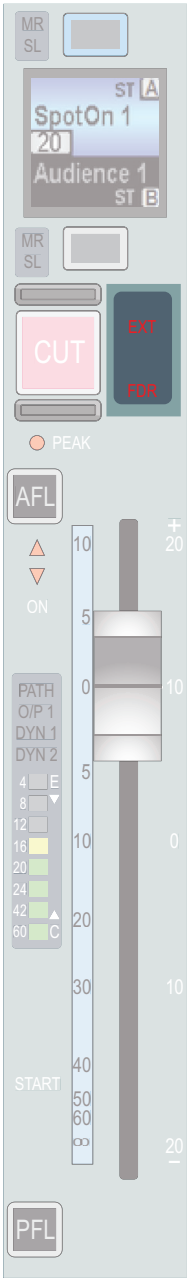
Autofader settings
The AUTO FADE screen allows the settings of the autofaders to be configured. The available settings are:

- FADE IN (ms). This setting varies the fade in time between 10ms and 5s. This is how long the fader will take to reach it's maximum level after the trigger signal begins.
- FADE OUT (ms). This varies the fade out time between 10ms and 5s. This is the time the fader takes to fade out when the trigger signal ceases.

Each autofader can be enabled and disabled individually using the ENABLED button to the right of the autofader on the AUTO FADE screen.

Autofader indicators
When an autofader is assigned to a fader, the fader will show the EXT and FDR indicators as shown in Figure 3. FDR indicates that the fader is automated and EXT indicates that the control is an external source.

FIGURE 3 - AUTOFADER INDICATORS



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BUSSES OVERVIEW

There are a pool of mono DSP resources available for each buss type. The user may configure the number and width of the busses they require from these pools of resources.

The number of resources available to each buss type and the maximum number of each buss type supported by the Apollo system are detailed in Figure 1. From a pool of mono resources, the user can define the number and widths of the busses they require.

For example, there are 48 mono DSP resources available for Aux busses. The maximum number of Aux busses that can be configured in the system is 48 and these would all be mono. The maximum number of stereo Aux busses that can be created is 24 as it takes two mono DSP resources to create a stereo buss.

Busses which can be configured up to 5.1 width (mains and groups for example) each use 6 mono DSP resources. The busses do not all have to be the same width, and any combination of mono, stereo and surround formats can be created from the pool of mono resources.

Setting buss widths

The number and width of busses chosen for use are defined in the BUSS SETUP screen in the OPERATE section of the main application (Figure 2). Select a buss type using the buttons on the left of the screen. The total number of busses will now be listed, which in the case of Auxiliaries is 1-48. For each of these the width can be defined by selecting the relevant row or rows and choosing the desired width from the buttons on the right of the screen.

At the top of the screen a number shows the remaining mono DSP resources for that buss type. When this number reads zero, no more busses may be created unless more resource is made available. This can be achieved by setting previously configured busses to NO BUSS in the WIDTH column.

LtRt / LoRo downmixes

For each 5.1 main buss, the stereo down mix can be chosen to be LoRo or LtRt.

LoRo maximizes mono compatibility at the expense of losing the front rear separation that a Dolby ProLogic decoder could recover when using an LtRt downmix.

Buss routing

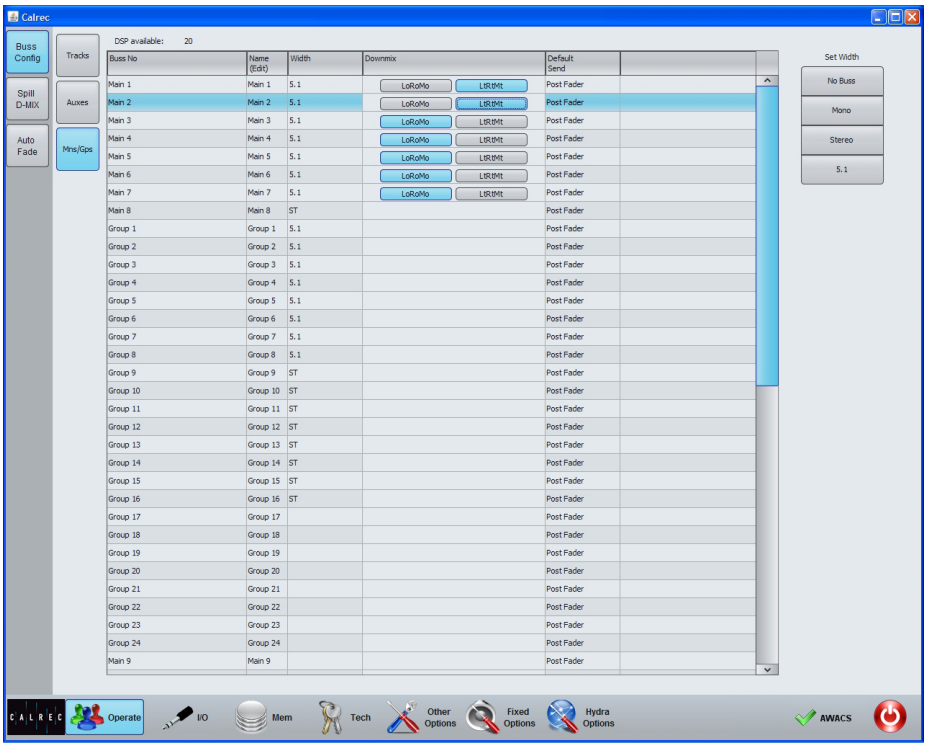
Apollo has a very flexible buss structure allowing many routing possibilities:

- Channels can route to Groups, Auxes, Tracks and Mains.
- Groups can route to other Groups, Tracks, Auxes and Mains.
- Mains can route to other Mains.
- Tracks cannot route to any other buss.
- Auxes cannot route to any other buss.

FIGURE 1 - BUSS RESOURCES

Buss Type	Mono Resources Available	Max Number Configurable Busses
Mains & Groups	128	16 Mains, 48 Groups
Auxes	48	48
Track	96	96

FIGURE 2 - BUSS SETUP SCREEN



MAKING A ROUTE

Using Assign Mode

Routes can be made using the SENDS-ROUTES assign panel as shown in Figure 1. When a path is assigned, the wild assign touchscreen displays and allows the user to change which busses the assigned path is routed or sent to. Touching a buss on the touchscreen will toggle the route on or off.

The control cells allow the levels of individual Aux sends to be set and their routing to be toggled on or off. They also allow the track send levels to be altered.

Accessing detailed send controls

Pushing the rotary control of any Aux or Track send will bring that send to focus in the central five button cells at the bottom of the panel. This section provides access to positional controls such as pre/post fader and on/off switching. It also provides talkback and tone controls in the case of Track sends.

Paging through busses

Given the finite size of the touchscreen and number of available control cells, it may not be possible to view all required busses at once. In this case, paging buttons will be made available at the bottom of each buss section on the touchscreen and also on the left and right button cells at the bottom of the panel.

Routing overview

An overview of each bus type is located on the touchscreen above the routing buttons and provides a complete overview of where the assigned path is routed without having to page through the different screens.

FIGURE 1 - ROUTING IN THE SENDS-ROUTES LAYOUT OF ASSIGN MODE

Using Strips Mode

Routes to busses can also be made when using Wilds mode. Each vertical strip on the touchscreen displays an overview of the routing of the relevant path. A strip of the touchscreen is shown in Figure 2. There may not be room to show every destination of each buss type and so paging buttons are provided.

Routes can be made or broken by touching the required destination buss type on the touch screen strip. The strip will be populated with larger routing buttons of the selected type, which can be touched to create or remove routes. As with the overview, it may not be possible to fit all possible routing destinations on a single page. The destinations can be paged through either by using paging buttons similar to the overview screen, or by swiping the screen up or down.

To exit the routing screen for the selected buss type and return back to the routing overview, touch the CLOSE button.

FIGURE 2 - WILDS MODE ROUTING STRIP ON TOUCHSCREEN

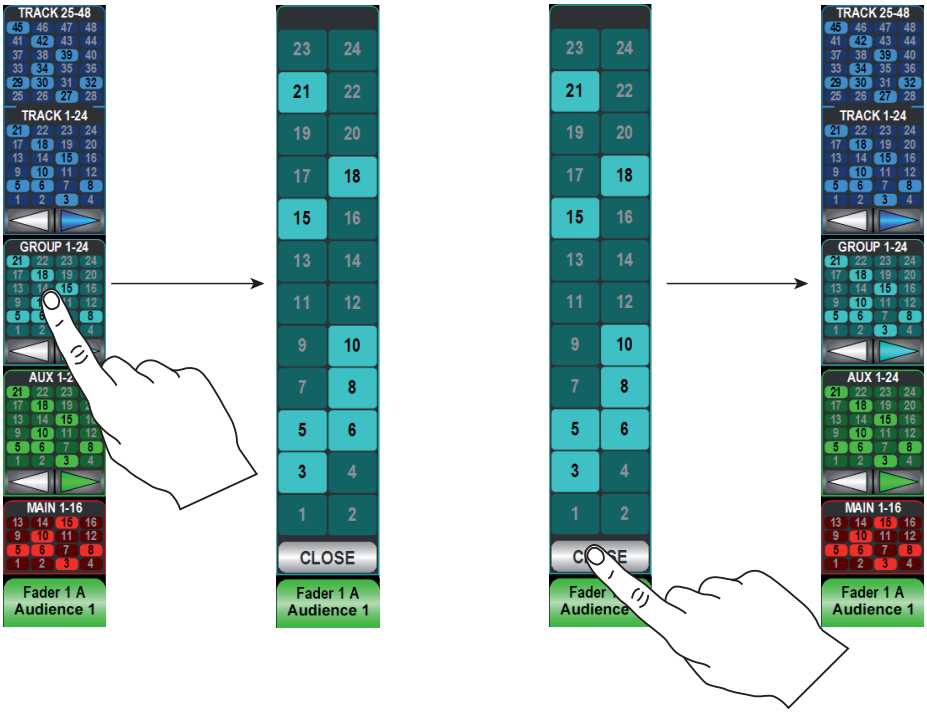
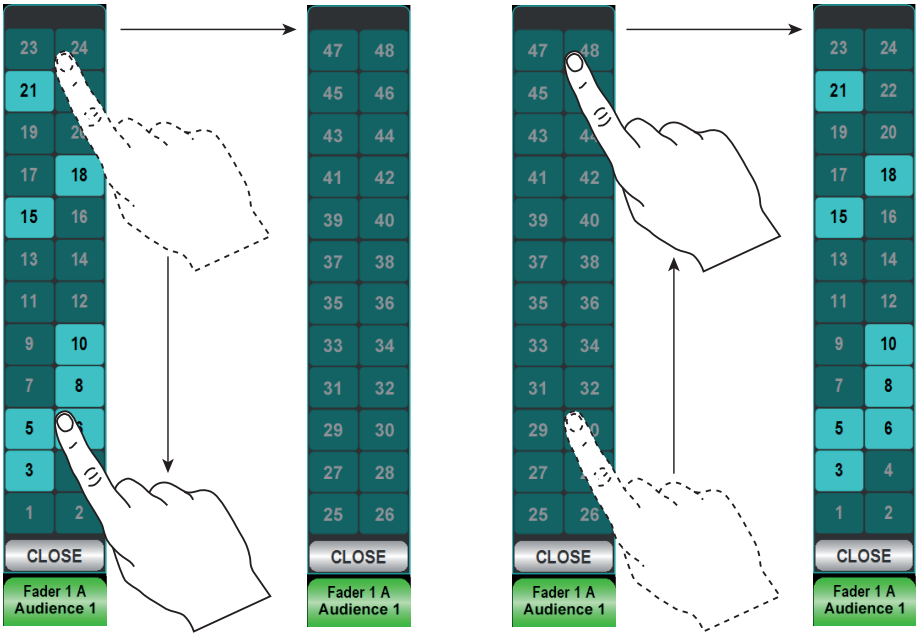


FIGURE 3 - SWIPING THROUGH BUSSES



PANNING

Apollo provides flexible and adaptive panning controls which change to reflect the width of both the source and destination paths.

It is important to note that the pan controls for a given path do not actually alter the panning of the path itself. They do in fact alter the pan position of that paths contribution to it's destination buss. It is therefore possible to have different pan positions set when sending to multiple busses, for example to an Aux, Track and Main simultaneously.

There is a shared pan position for the channel when it is routed to Main and group busses. There is another pan position for the channel when it is routed to Tracks. Finally, the channel has an individual pan position for each Aux buss it is sent to.

Which pan position is currently being controlled?
When in the SENDS-ROUTES layout of Assign mode, the right hand button cells contain three buttons labelled:

- PAN > MN/GRP
- PAN > TRK
- PAN > AUX

These buttons determine which pan position the pan controls are affecting for the assigned path.

As there is one pan position that applies to all mains and groups, and another position applying to all tracks, these can be controlled by selecting either PAN > MN/GP or PAN > TRK respectively.

Pushing the PAN > AUX button allows control over the pan position for each individual Aux send. The send currently being controlled is indicated by a number in the graphic above the button.

To change the pan controls to alter a different Aux send, push down on the required Aux rotary control. The number in the graphic should now update to show the affected Aux send.

Controls
Depending on the width of the current path, and the width of the destination buss, different pan controls will be made available on the surface. For example when sending a mono path to a mono buss, there will be no controls available. When sending a mono path to a surround buss, a great deal more controls will be presented that allow control over mono placement in a surround field.

The complete range of controls is described here:

Front Pan
Front pan allows positioning of the signal in the L and R speakers. The button next to the Front Pan rotary control switches the pan position in or out.

C only
C ONLY sets the signal to appear only in the center speaker. It effectively overrides all left and right pan positions.

Front L-C-R
Pushing the FRONT L-C-R button switches the FRONT PAN control between L-R panning and L-C-R panning.

Front Divergence
With FRONT L-C-R switched in, the spread of the signal can range from fully converged in the C speaker, through equal level in L, C and R, right the way to full divergence with no level in the C speaker and full level in the L and R speakers. The button next to the divergence rotary control switches the divergence position in or out.

Front-Rear pan
FRONT-REAR PAN varies the position of the signal between the front and rear speakers. The L and R position in the front and rear speakers is independent and can be controller separately with the FRONT PAN and REAR PAN controls. The signal is moved from the front pan position through to the rear pan position.

Rear Pan
Rear pan allows the left to right position of the signal to be set in the rear speakers. This is independent from the front pan position and can be switched in or out using the button next to the rotary control.

LFE
LFE varies the level sent to the LFE speaker. When this control is switched out, no signal is sent to the LFE.

Non LFE
The level sent to all channels other than the LFE channel can be varied with the NON LFE control. When this control is switched out and the signal is panned to one or more channels other than the LFE, the signal is sent at full level.

PANNING USING THE JOYSTICK

In addition to using the pan controls in Wilds mode, panning can be achieved using the joystick panel, if fitted.

The panel is shown in Figure 1 with the joystick controls highlighted. The upper half of the panel containing the faders functions in exactly the same way as those on the monitor panel. The relevant sections of this document (Surround Spill, Downmixes, Main Paths on the Spill Faders) should be referred to if these functions are required.

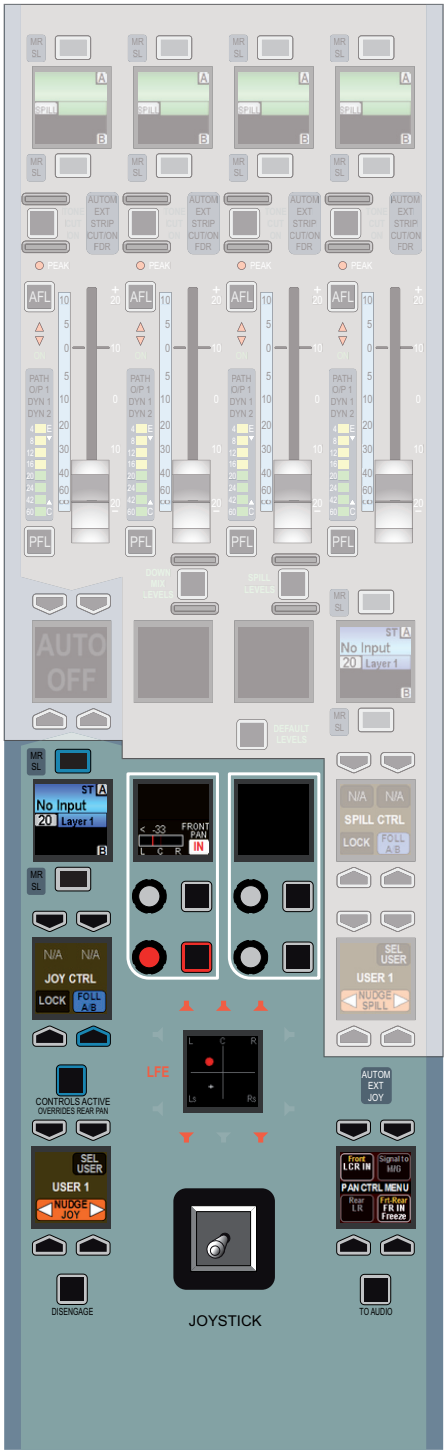
Accessing the joystick controls

The information displayed on the joystick controls relates to the path shown in the upper left OLED. This OLED and its assign buttons function in the same way as the assign OLEDs above each fader. This path can be selected in a number of ways.

Firstly, if the FOLL A/B button in the JOY CTRL button cell is selected, the joystick controls will follow the currently assigned path. If FOLL A/B is deselected, the controls will not follow the currently assigned path. If selected, the controls will follow the assigned path in the user section displayed in the lower left button cell. To change this user section, press the SEL USER button and select a different section.

The NUDGE JOY buttons in the lower left button cell allow the joystick controls to step up or down faders on the surface. The upper assign OLED will reflect this change to indicate which path is now selected. If the FOLL A/B button is selected, the NUDGE JOY buttons will move the path assignment up and down the faders too. If it is not selected, the currently assigned path will remain the same, but the joystick controls will control a different path.

FIGURE 1 - JOYSTICK CONTROLS



If the LOCK button in the JOY CTRL button cell is pressed, the controls will not affect any other path until they are unlocked. Press the button again to unlock.

Making the joystick controls active

When the required path has been assigned, the joystick controls must be made active. To do this, press the CONTROLS ACTIVE button. The controls can now be used to alter the pan position.

Disengaging the joystick

At any time, the joystick can be disengaged to prevent accidental changes to pan position. To do this, press the DISENGAGE button. The rest of the joystick controls remain active, and can be interacted with.

Pan display

The pan display OLED in the center of the joystick controls displays a range of information. The hidden-till-lit loudspeaker indicators provide a indication of the widest path that is being panned to. Take an example when panning to mains and groups. If two main paths were of a 5.1 width and two were stereo width, the loudspeaker indicators would appear as they do in Figure 1, as 5.1 is the widest path in this instance. The stereo busses would receive a downmix of the 5.1 signal.

The red blob shows the position of the audio in the sound field.

The white crosshair indicates the physical position of the joystick, which may not necessarily be the same as the audio. For example freezing an axis, panning only to LR or disengaging the joystick can all cause this situation to occur.

Snap to audio

Should the joystick be in a physically different position to the audio position

it can be snapped to the audio position by pressing the TO AUDIO button to the lower right of the controls.

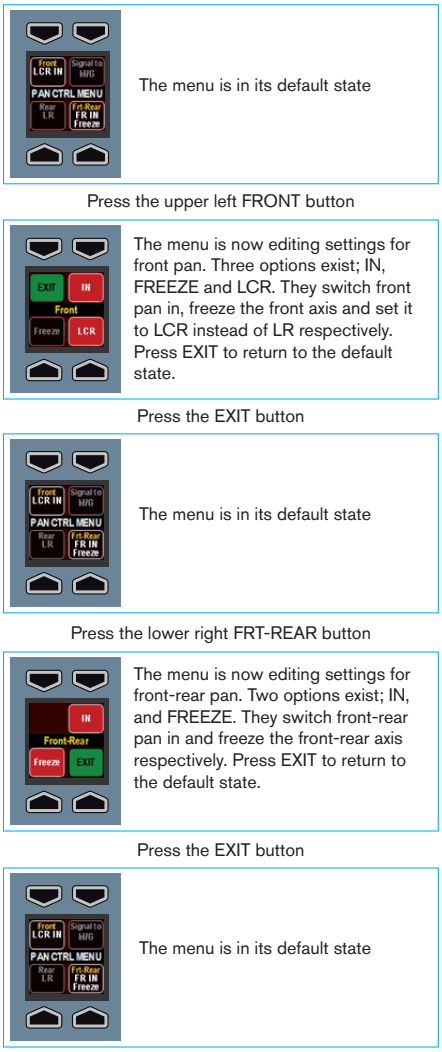
Pan control menu

The PAN CTRL MENU OLED allows certain pan settings to be configured. It allows front-rear pan to be switched in and the axis to be frozen. It also allows left-right pan to be switched in, optionally set to LCR pan and to freeze the left-right axis. The operation of the menu is shown in Figure 2.

Freezing axes

The freeze controls, for example FREEZE LR and FREEZE FB, stop the joystick from affecting the pan position in the frozen axes. If the left-right axis is frozen by selecting FREEZE LR, then the audio will remain in a constant position along that axis, regardless of the physical joystick position.

FIGURE 2 - PAN CONTROL MENU



INTERROGATION AND REVERSE ROUTING

Interrogation allows the user to see all contributing paths that have been routed to the selected buss.

Set a wild assign panel on the surface to the 'SENDS-ROUTES' Assign mode layout. The wild assign touchscreen will be showing controls for routing the assigned path to the many destinations available as shown in Figure 1. Notice in the central title area at the top of the screen the text 'Press to interrogate'. Touching this area will switch the screen into interrogation mode as shown in Figure 2.

When the screen is switched to interrogation mode, select the destination you wish to interrogate. If a path on the current layer is routed to the selected buss, it's path assignment button (above or below the fader label OLEDs) will strobe. The path assignment buttons of any paths that are not routed to the selected buss will be unlit.

Layers may be switched while interrogating a buss to reveal contributing paths on other layers.

Reverse routing

While in interrogation mode, routes from multiple paths to the selected buss may be made or removed by pressing the relevant path assignment buttons. The path assignment buttons will strobe if the route is made.

Again, layers may be switched while performing reverse routing.

Leaving interrogation mode

When interrogation or reverse routing is complete, touch the 'Press to Route' area to return the surface to the normal operational state.

FIGURE 1 - ROUTING SCREEN

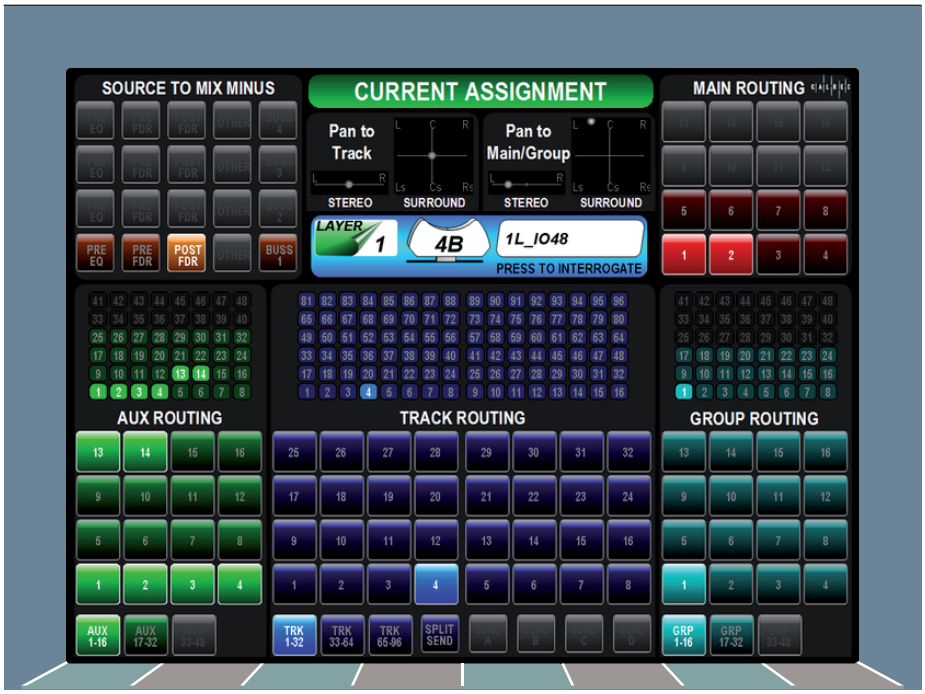
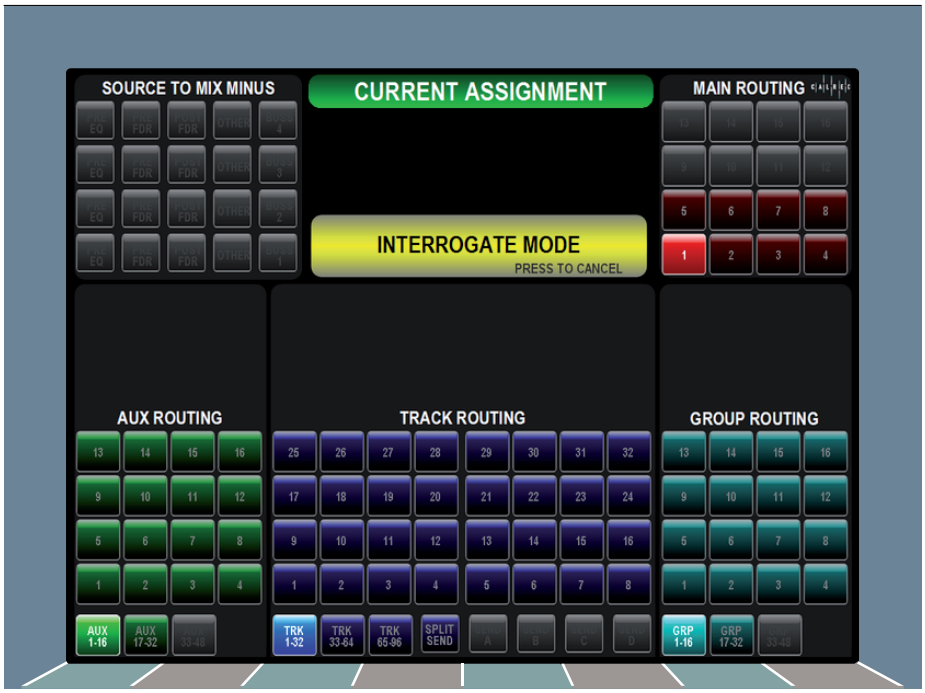


FIGURE 2 - INTERROGATION SCREEN



SPLITTING TRACK SENDS

Each channel has up to four track sends although by default only one is enabled.

The enable the four sends, touch the SPLIT SEND button below the track routing buttons. This will enable four more buttons for selecting the required send (A, B, C or D) as shown in Figure 1. Select one of these sends and then create or remove routing to tracks as required. A letter will appear below the track number when a route is made to indicate which send it is associated with.

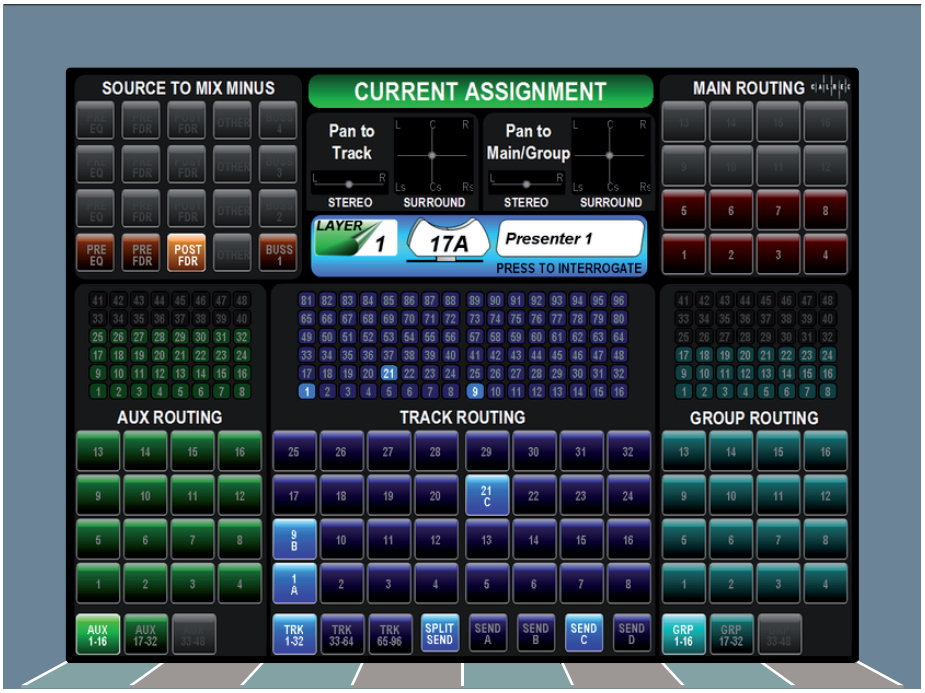
Each of the four sends has an individual level control and can be selected by pushing the relevant rotary control to appear in the 'Selected' button cells at the bottom of the panel. This enables access to a wider range of controls for that specific send such as pre or post fade.

Removing sends

If a channel has been routed to a track using send C then send C must be selected when removing the route. Only routes made with the currently selected send may be removed.

In order for the track routing to be collapsed back to just one send, all routes from sends B, C and D must be removed. The SPLIT SEND button can now be touched again to remove the three unused send controls.

FIGURE 1 - ROUTING SCREEN



DOWNMIXES

Apollo has comprehensive downmix facilities to make downmixing as simple as possible while retaining complex control where necessary.

Downmixes are applied to the metering and monitoring systems, including APFL, and all relevant paths in the system.

When a surround path, metering or monitoring signal is routed to a stereo or mono destination, a downmix must be applied to take care of the increase in level that will occur due to the summing of surround components, and also to shape the sound in the desired way.

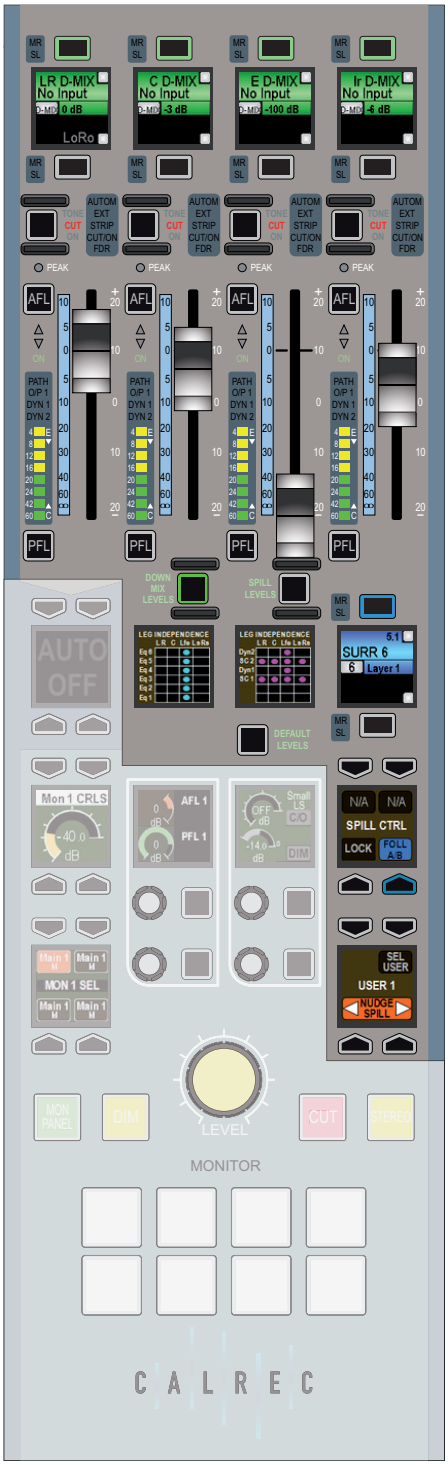
Apollo allows a number of default downmix configurations to be set up. One of these downmix configurations can be selected for use in a show. All downmixes performed within that show will follow the default settings selected, unless changes are made to individual paths or busses by the user. Apollo uses the monitor panel, shown in Figure 1, to make these adjustments.

Pressing the DOWNMIX button on the monitor panel changes the faders from controlling main or spill levels, to allowing them to alter the downmix levels for the assigned path. The downmix configuration selected for the show is applied to downmix faders automatically for all surround paths. Changes to the downmix faders for an individual path can be made and apply only to that path.

The downmix faders available for a 5.1 path are:

- L/R
- C
- LFE
- Ls/Rs
- Lo/Ro

FIGURE 1 - DOWNMIX FADERS



Note that there may be a different number of faders for paths of different widths. The LoRo fader defaults to being on the B layer of the left-most downmix fader.

Bypassing the downmix faders

When routing a surround path or buss to a stereo or mono buss, the downmix levels set by the downmix faders are applied automatically. To bypass the downmix faders for a given buss, select the buss in SENDS-ROUTES mode and press the BYPASS DOWNMIX FADERS button.

For information on selecting a buss in SENDS-ROUTES mode, please refer to the 'Making a Route' section of this document.

Pre-fader downmixes

Should a surround path or buss be sent to a buss pre-fader, it may be necessary to have the spill fader levels applied to make the downmix the same as the post-fader downmix. This is because the post-fader downmix is processed after the spill faders, and so adjustments to individual legs on the spill faders will have an effect on the resultant downmix.

To make the pre-fader send follow the spill faders (but not the overall path fader) to produce the correct downmix, select the destination buss in SENDS-ROUTES mode and press the FOLLOW SPILL FADER LEVELS button. This button will only be visible if the send or route is pre-fader.

Setting downmix defaults

Users with technician access can set up five different downmix defaults (with an additional default set up by Calrec). One of these defaults can be selected by operators to act as the default for their show. To enable Technician mode, please refer to the Technician Mode section of this document.

Navigate to the DOWNMIX screen in the FIXED OPTIONS area of the main application. This screen is shown in Figure 2. The six downmix defaults are presented in a table. The first set of downmix values is set by Calrec and cannot be changed. User sets 1-5 may be altered freely by the technician.

Default values can be provided for most parameters including L, C, R, Surround L&R, and LFE contributions to LoRo downmixes, with separate adjustments available for the levels sent to any LtRt downmixes that are being created.

Levels may be set by selecting the relevant cell, then using the buttons at the right to increase of decrease the value. Buttons are provided to quickly set a given cell to 0dB or to turn the level off entirely.

Once the levels have been set, resultant levels are shown in the cells below. These resultant levels include:

- Resulting L/R level for downmix faders
- Resulting C level for downmix faders
- Resulting LFE level for downmix faders
- Resulting Ls/Rs level for downmix faders

These resulting levels are the levels which will be applied to the downmix faders and to the metering, monitoring and APFL downmixes due to the overall LoRo offsets.

FIGURE 2 - DOWNMIX DEFAULTS

Selecting the required downmix default for a show

When any relevant downmix defaults have been set up, users can select the required configuration for use in their show by navigating to the SPILL D-MIX screen in the OPERATE section of the main application as shown in Figure 3.

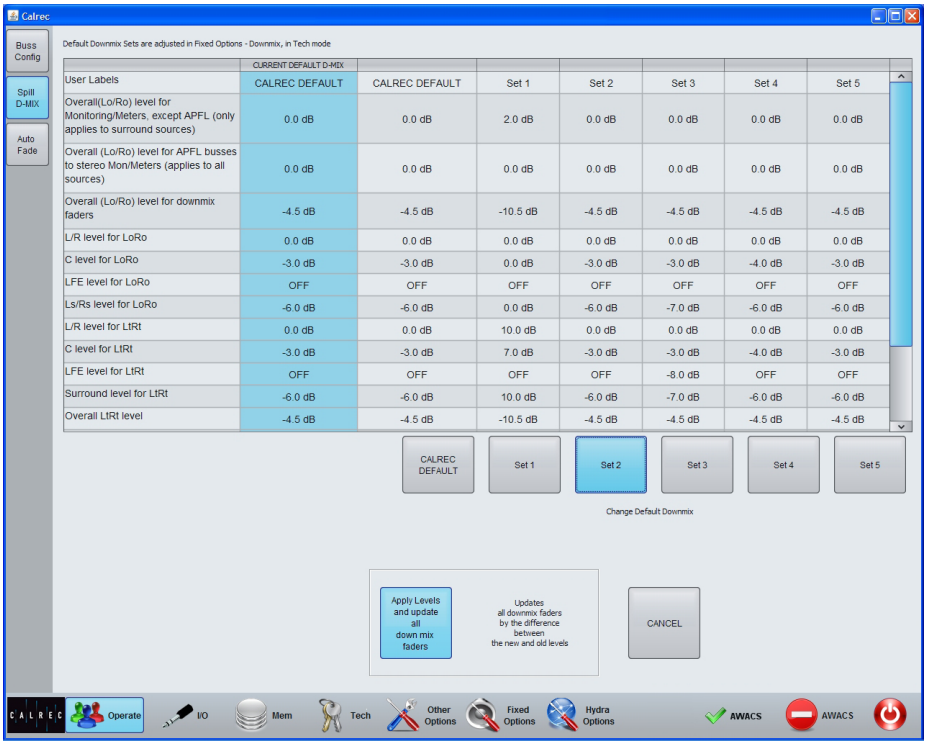
The downmix configuration currently in use is indicated in the CURRENT D-MIX column of the table. To select another configuration, touch the button below the relevant column. This will make the following three buttons at the bottom of the screen active:

- APPLY LEVELS. This applies the downmix settings to the system (monitoring, metering and new paths) but leaves the downmix faders of any existing paths where they are. Any new paths created will have the new downmix levels applied to their downmix faders.
- APPLY LEVELS AND UPDATE ALL DOWNMIX FADERS. This applies the downmix to the system (monitoring, metering and paths) as before, but also updates all existing paths. If the downmix faders on any paths have been offset from the downmix default levels, the offset will also be applied to the new downmix levels for the same paths.
- CANCEL. This cancels the selection.

Applying the default levels to any downmix faders

If any downmix faders have been changed form the defaults, or a new downmix default has been applied but the existing paths have not been updated, it is possible to set individual downmix faders to the default.

FIGURE 3 - SELECTING A DOWNMIX DEFAULT FOR USE IN A SHOW



To do this, make sure that the faders on the monitor panel are set to display the downmix levels by pressing the DOWNMIX button. Now press and hold the DEFAULT LEVELS button and press the assign button for any downmix faders that are to be set to the default.

LT/RT DOWNMIX ENCODING

The patchable downmix output of each surround Main output bus can be set to be either an Lo/Ro or an Lt/Rt format.

Lo is a mix of Left front, Left rear, Center and Lfe content. Ro is a mix of Right front, Right rear, Center and Lfe content. (By default, Lfe does not contribute to the downmix, but it can be added.) The contribution of each part is determined by the default downmix setting applied and can be adjusted using spill faders in downmix mode.

LT/RT is often referred to as an encoded output. The surround legs are summed together in a similar way to Lo/Ro, however phase changes are made to some of the content before summing which allow surround decoders to "unfold" the stereo signal back to discrete surround that matches the original 5.1 output of the console.

Lo/Ro, like any stereo signal can be "decoded" to produce a 5.1 path, however without the phase encoding of Lt/Rt the result will not match that of the original 5.1.

Note, when a Main output is set for Lt/Rt, only the downmix audio patched to output ports is phase encoded. Any internal routing of the surround main output to stereo destinations remains as LoRo. For example, if a surround Main1 bus is routed on to stereo only Main2 bus, or if a full surround bus is being monitored in stereo - IE the chosen source is full 5.1 but the monitor is in stereo mode.

Lt/Rt outputs conform to the downmix settings applied on the PC Main Application OPERATE>SPILL D-MIX page, however they are NOT affected if the downmix settings are adjusted from a Spill panel in downmix mode. When in Lt/Rt mode, changes made to the downmix from the Spill panel in downmix mode are still affecting the LoRo and can therefore affect Main to Main routing or stereo only monitoring as described above.

Selecting Lt/Rt or Lo/Ro

The downmix format for surround main output patching is selected from the Operate>Bus Config>Mns/Gps page of the PC's Main Application.

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OUTPUT TYPES AND PATCHING

Busses available to be patched as outputs are as follows:

- Mains
- Tracks
- Auxes
- Direct Outputs

These outputs can be patched to physical outputs ports on Hydra2 IO units, or back into the inputs of your console to provide internal loopback routing.

Patching
Output patching is performed in exactly the same way as input patching using the IO screens on the configuration computer.

Navigate to the IO PATCH screen in the IO section of the main application on the configuration computer. Using the filter button in the sources area, select the desired system output

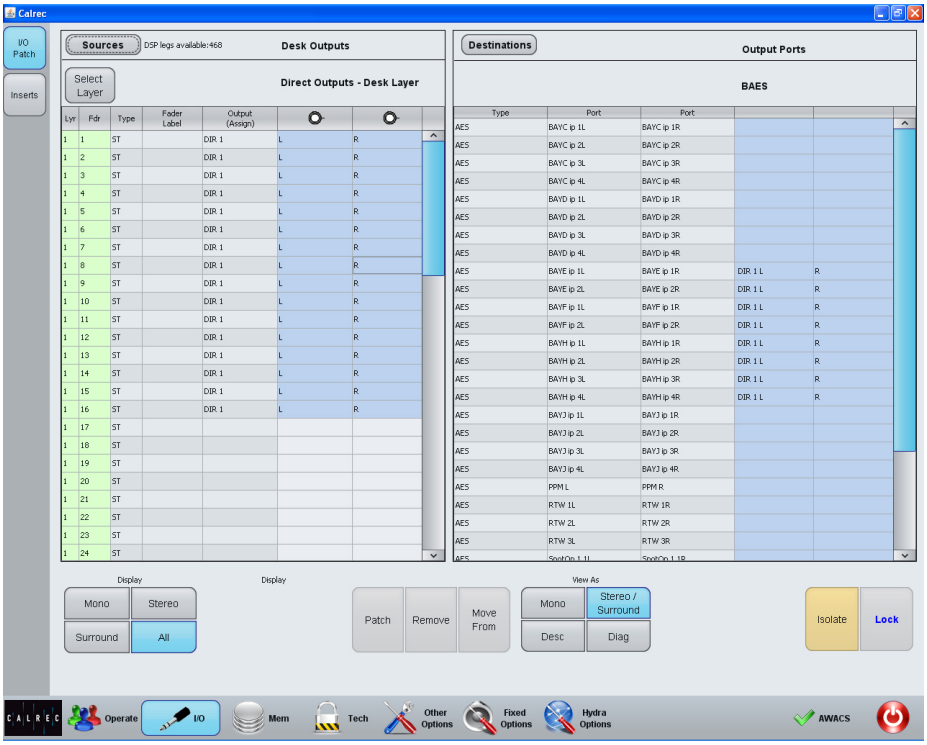
For a detailed description of the patching system please refer to the 'Patching Sources to Destinations' section of this document.

Locking output port patching
Output ports may be locked to protect their patching from unintended changes. To do this, select one or more output ports in the DESTINATIONS list and then touch the LOCK button below. Repeat the process to unlock the ports again.

Locked ports are indicated by bold blue text.

If a port is locked by a technician using Technician Mode, the ports can only be unlocked by another technician. This may be used to lock down any essential patching and prevent user error.

FIGURE 1 - OUTPUTS MODE CONTROL LAYOUT



For more information on Technician Mode, please refer to the Technician Mode section of this document.

OUTPUT CONTROL

Outputs mode provides control over output busses and displays relevant output meters.

The layout of controls on a panel set into Outputs mode is shown in Figure 1.

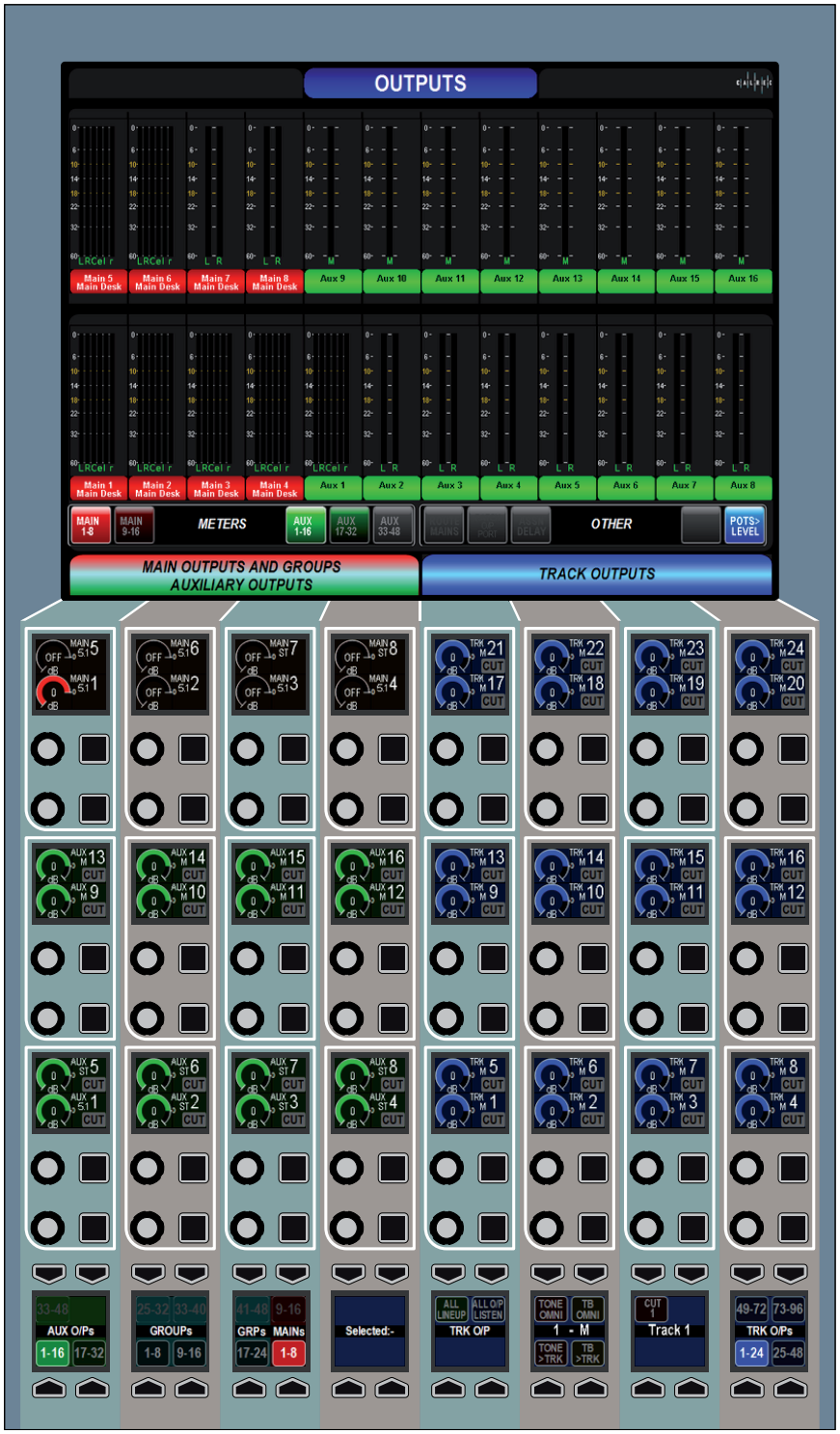
The rotary controls provide level control for Main, Group, Aux and Track outputs. The buttons cut or uncut the output (there is no cut functionality on a Main output).

Depending on the configuration of the system, there may be more outputs than can be viewed at one time on the control cells. In this case, the outputs can be paged through using the buttons in the button cells at the left and right of the panel.

Selecting an output for access to further controls

Four of the button cells at the bottom of the panel are used for more detailed control over the currently selected output. To select an output, push down on the relevant rotary control. The current selection is indicated by the color of the four OLEDs and also by a text label which spans across the center of them. Controls that can be accessed in this way include direct talkback to the output, tone to the output and PFL. This section also contains an “ASSIGN” button. Selecting this makes the current output the assigned path on the desk. The same as selecting a fader’s assign button to make that Channel/ Group/Main path the current focus of all the assign panels, this button provides an alternitve for outputs that may not be allocated to faders, or for when the fader is not close to hand.

FIGURE 1 - OUTPUTS MODE CONTROL LAYOUT



BUS OUTPUT DELAY

Available output delay resource, and delay controls for Main, Aux and Track bus outputs appear on the SEND-ROUTE panel. Select a bus output's assign button, either from the fader or from the OUTPUTS panel (see previous page) to display the delay controls for that bus on the SEND-ROUTE PANEL.

256 legs of output delay are available across the console. Being a pooled resource like input delay, the resource needs to be assigned to the path before it can be switched in. Resource used and available is also displayed on the SEND-ROUTE panel.

For Main outputs, delay can be assigned, switched in and adjusted independently for 5.1, stereo and mono, Desk and Line outputs. When delay is assigned to more than one of a busses' outputs, Link buttons appear to allow the controls to track together. Select each output to the same link bus in order for the delay control to track on all when any of them are adjusted. Linked delay can be offset - if delay is adjusted before linking, the difference in delay values is retained after the link is made, the controls will track together but maintain their offset.

MAIN PATHS ON THE MONITOR AND JOYSTICK PANELS

The faders on the Monitor and Joystick panels can be switched to allow control over the Main paths in the system.

This is achieved by ensuring the SPILL LEVELS and DOWNMIX LEVELS buttons are deselected on the panel.

Main paths can then be patched to the faders in the same way as other faders on the surface. Please refer to the Paths and Faders section of this document for more information on this process.

These faders can be assigned and have processing and routing applied in the same way as any other fader on the surface.

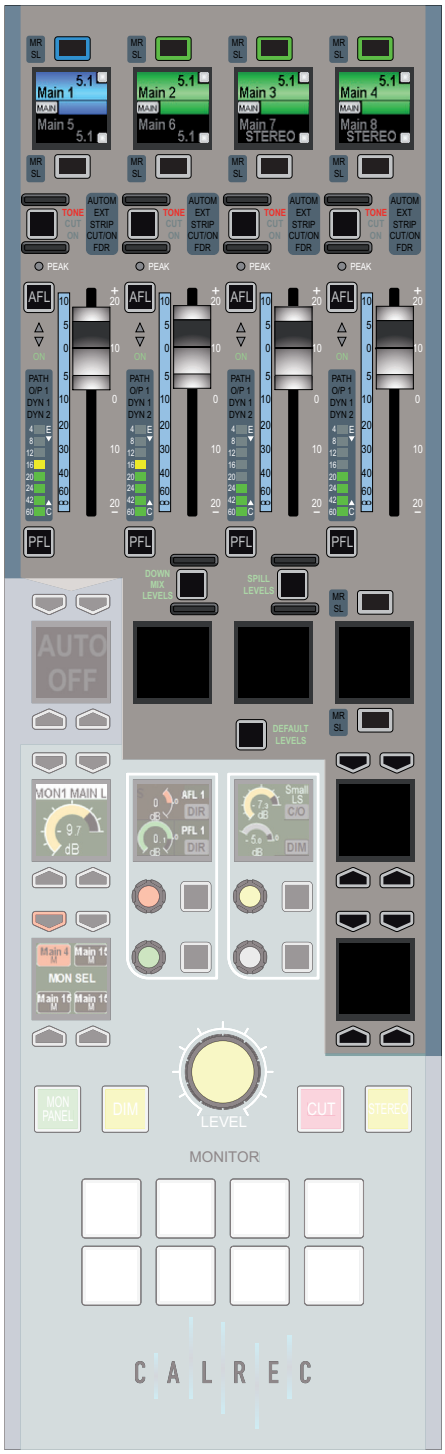
Tone to mains

When controlling Main paths, the buttons above each fader that performed the CUT or ON functions for spill levels now inject tone into the relevant Main output. The hidden-till-lit indicators will confirm this function.

Accessing Spill controls for Main faders

When controlling Main paths and a Main path on one of these faders is assigned, it is not possible to switch the mode of the faders on the same panel and use them to alter the spill legs of the assigned main. The function of the faders cannot be switched unless a path from a normal fader or another Monitor or Joystick panel is assigned. This is intended to avoid the confusion of having a single fader indicate the assigned path and the relevant spill leg at the same time.

FIGURE 1 - MAIN PATHS ON MONITOR PANEL



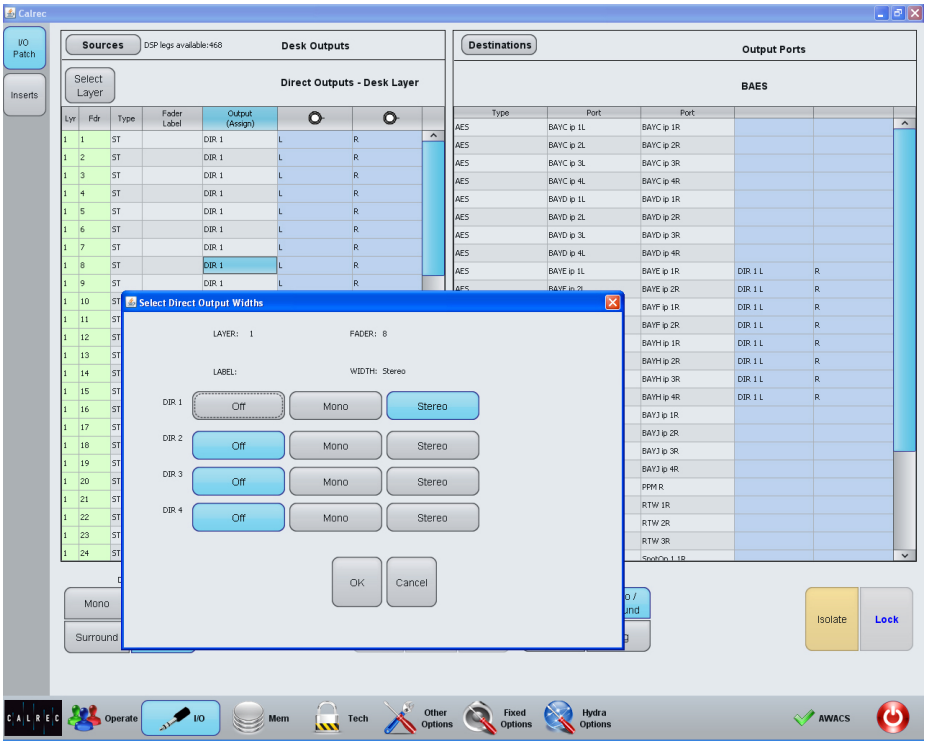
DIRECT OUTPUTS

Apollo provides 512 mono direct output resources for use with channel and group paths.

Each path may have up to four direct output resources associated with it, each with its own level control and independent signal.

To assign direct output resources to paths, navigate to the IO section and the IO PATCH screen of the main application. Touch the SOURCES button and select DIRECT OUTPUTS from the popup dialog. The sources list will now display the faders on the selected layer (which can be changed using the FILTER SOURCES button) and the type of paths attached to each fader. Touching the OUTPUT cell of any fader will bring up a popup dialog which allows the width of each direct output to be set and whether or not output delay needs to be assigned. The remaining direct output resources are indicated by a number at the top of the dialog.

FIGURE 1 -DIRECT OUTPUT ASSIGNMENT AND PATCHING



Once direct outputs have been assigned to the required faders they can be patched to output ports. Touch the DESTINATIONS button and select OUTPUT PORTS, then if necessary select a port list using the SELECT LIST button. Now highlight the direct outputs and ports that are to be patched and touch the PATCH button.

The direct outputs will now become available for use on the surface. Direct output controls which are not yet available will show the text DIR O/P NOT ASSIGNED and will not be illuminated.

Direct Output assignments and width can also be changed from the control surface. With the desired Channel / Group fader assigned, pressing on any Direct Output shaft encoder on the SEND-ROUTE panel opens up further functions for the direct output in the Wild-Assigns row at the bottom of the panel. Pressing “SETUP” will open up the Direct Output assign pop-up on the panel’s TFT screen. Even if no Direct Outputs are configured for that fader, there will still be a greyed out Direct Output shaft encoder that can be pressed to access the SETUP button.

Direct Output Delay

Delay on direct outputs comes from the same pool of DSP resource as bus output delay. The Direct Output setup screen shows the amount of available delay resource and allows delay to be assigned. Open the Direct Output setup screen by pressing a direct output shaft encoder to open the Direct Output control functions menu below and then press SETUP to view the screen on the panel’s TFT. Alternatively, find the same screen on the PC Main Application from the IO page, Sources>Direct Outs and touching the output cell for the required fader.

To switch in and adjust delay, press on the Direct Output shaft encoder and then select POT=DELAY from the Wild Assign row below. The Direct Output control cell now shows delay rather than level and the associated button is used to switch in delay.

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MONITOR MODE

A wild assign panel can be set into Monitor mode providing controls for monitoring, metering and talkback features.

Figure 1 shows the layout of controls in Monitor mode. To set a wild assign panel into Monitor mode, touch the MONITOR button on the Modes row.

FIGURE 1 - CONTROL LAYOUT IN MONITOR MODE

CONTROL ROOM MONITORING

Apollo features powerful pre-selectors for fast and clear access to multiple control room monitor sources.

Pre-selectors

The idea behind pre-selectors is to enable multiple sources to be set up, each ready to be fed to the main loudspeakers instantly at the touch of a button.

Control Room speaker pre-selectors

There are four pre-selectors available for choosing which source is fed to the control room speakers for monitoring. These are shown in Figure 1. The labels on each OLED show which path has been set to that pre-selector. Pressing the button below the triangular HEAR indicator in the lower right hand corner of each pre-selector, makes that the chosen source to be fed to the control room speakers.

Changing pre-selector source

The right hand side of the wild assign touch screen displays the available sources which the user can set to a pre-selector. This is also shown in Figure 1. Tabs at the bottom of the screen allow different types of paths to be shown in the main area above.

To change the source set to a given pre-selector, press the SEL button above it. The OLED will be highlighted to indicate the selection. Now touch the required path on the wild assign touch screen area described previously. The pre-selector OLED will update to display this newly set path. Pressing the HEAR button will select that path to be sent to the control room loudspeakers.

Control room monitor controls

The control room monitor level can be altered using the rotary control labelled MAIN LS LEVEL. A CUT button is

FIGURE 1 - CONTROL ROOM MONITORING

located to the left to this control to cut the main loudspeakers.

A dim level control is provided to set the level of attenuation applied by the dim control. The dim on/off button is located to the right of the MAIN LS LEVEL control.

To the left of the CUT button is a button labelled SMALL LS C/O which switches the monitoring from the main loudspeakers to a secondary monitoring setup. The rotary control next to this button provides control over the level of the secondary loudspeakers.

Buttons are provided above the to monitor the stereo or mono downmix of the monitor source where appropriate.

Loudspeaker cut buttons
Cut buttons are provided at the left of the panel. These cut buttons control the output of the currently selected monitor output which could be the main control room output or any of the miscellaneous monitor outputs. The required output is selected using the SEL button for each miscellaneous output or any of the SEL buttons in the main LS pre-selectors.

Multiple monitoring systems for multiple users
When working with multiple user sections on the surface, each user may have their own monitoring system. Each system contains its own busses and outputs for:

- Main LS
- AFL
- PFL

Each user may choose which monitoring system a monitor panel is controlling by using the controls in the lower left button cell, as shown in Figure 1.

DEDICATED MONITOR CONTROLS

A subset of monitoring controls can be accessed on the dedicated monitor panel.

The panel features hard controls for main loudspeaker level, cut, dim and stereo. The OLED in the upper left button cell shows the control room monitor level.

The MON SEL button cell allows the user to listen to any of the four control room monitor pre-selectors. The pre-selectors cannot be defined on the dedicated monitor panel, this must be done in Monitor mode.

In the two control cells are master AFL and PFL level controls, small loudspeaker level control and changeover switch, and a control to vary the amount of attenuation applied by the dim function.

FIGURE 1 - MONITOR PANEL

Eight GPIO buttons and indicators are located on the monitor panel.

The configuration and operation of these is described in the section External Interfacing.

AFL AND PFL

Apollo has a comprehensive AFL/PFL system for each user of the system.

Accessing from faders

When a path is attached to a fader, AFL and PFL can be accessed using the AFL and PFL buttons. Both of these are either latching, if tapped briefly, or momentary if held.

PFL can also be activated by using the overpress feature of the fader. Move the fader down to its lowest position, then press it past the normal backstop position. Release the fader to cancel the PFL for that channel.

Accessing buss AFL and PFL

When in Outputs mode, any buss can be called to attention in the strip of button cells highlighted in Figure 2, by pushing down on the relevant rotary control. Here there will be PFL and AFL (or output listen) buttons where appropriate.

Cancelling AFL and PFL

When any AFL or PFL is active, the APFL indicator on the Broadcast Facilities panel will illuminate as shown in Figure 3. Press this button to cancel all AFL and PFL that is currently active. There is also an APFL cancel button in Monitor mode.

FIGURE 1 - ACCESSING AFL AND PFL

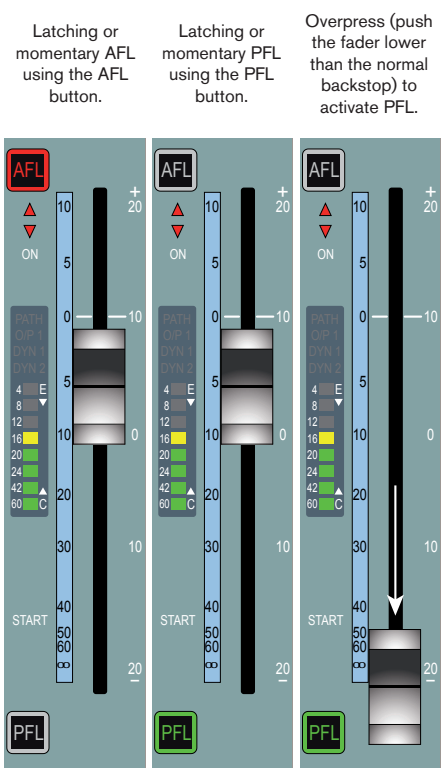


FIGURE 3 - APFL ACTIVE INDICATOR AND CANCEL BUTTON

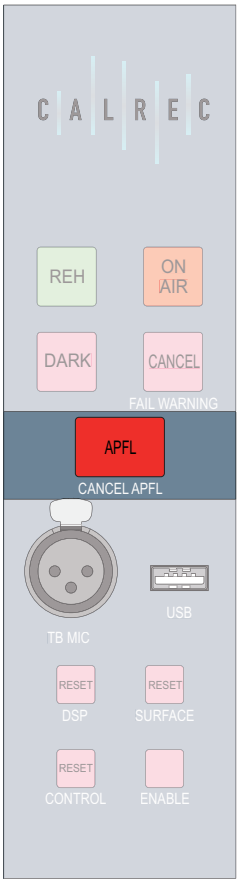
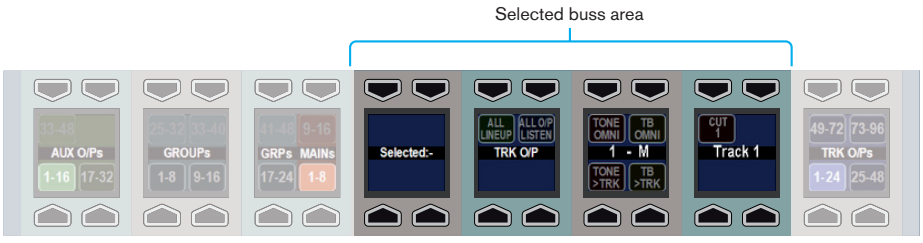


FIGURE 2 - ACCESSING AFL AND PFL FOR OUTPUT BUSSES



Patching the AFL and PFL signals to external monitors

Navigate to the MON TB MTR PATCH screen in the FIXED OPTIONS section of the main application as shown in Figure 4. Touch the sources button and select MONITOR OUTPUTS from the popup that appears. The source list will now make all monitor outputs of the system available for patching, including the three independent AFL and PFL systems for each user section. Simply select the required source and destination ports and touch the PATCH button.

Sending PFL to the main monitors

To send the PFL signal to the main monitors rather than to a separate monitor setup, press the PFL TO MON button found in Monitor mode as shown in Figure 5.

Sending PFL to the small LS

The system can be configured to route PFL signals to the small loudspeaker, overriding any other signal presently going to it. This is a factory defined configuration and should be specified with the console order.

FIGURE 4 - PATCHING AFL AND PFL SIGNALS

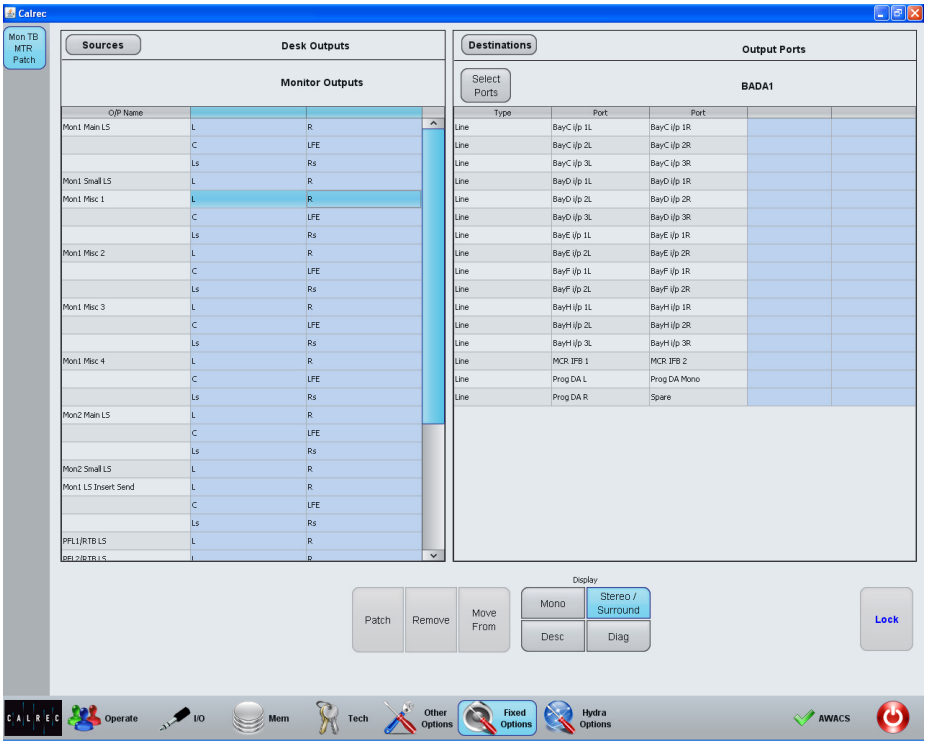
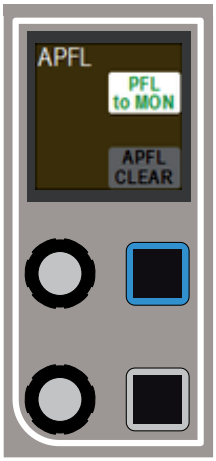


FIGURE 5 -PFL TO MON



Using the AFL and PFL systems with multiple users

When working with multiple user splits in the surface, each user has an individual APFL buss. The choice over which buss to use is made on the functions row. Touching the TOOLS button on the layers row, the press the newly revealed MISC button also on the Layers row. On the updated Functions row above the available options for APFL buss selection will be shown. Press one of these buttons in each user area to set the active APFL buss for that area as shown in Figure 6.

The APFL indicator on the broadcast facilities panel can be instructed to respond to any of the active APFL busses in the system. In Monitor mode, with any Main LS or Misc Output pre-selector selected, touch the MISC button on the touchscreen above. The available APFL busses will be shown in the upper portion of the display. Select the buss to work on by touching the relevant button (APFL 1 or APFL 2 in Figure 7).

The FLASH APFL option for each APFL buss instructs the APFL indicator in the broadcast facilities panel to flash or to illuminate steadily when any AFL or PFL is active in the relevant user section. If the option is selected, the indicator will flash. If it is deselected, the indicator will illuminate steadily. This allows two APFL busses on the same surface to have separate indicators.

The CLEAR AFL and CLEAR PFL buttons clear AFL and PFL respectively for each APFL buss.

FIGURE 6 - APFL FOR MULTIPLE USERS

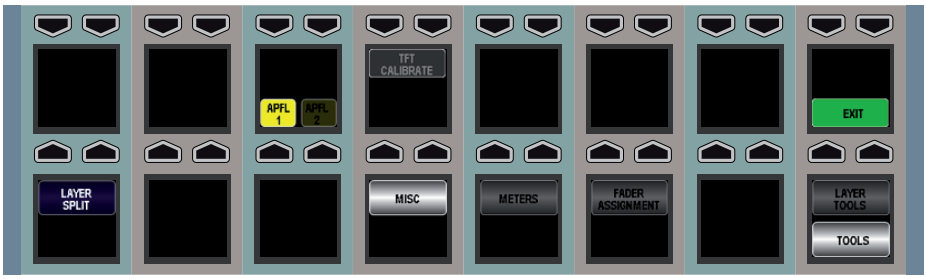


FIGURE 7 - APFL INDICATOR OPTIONS

HEADPHONES

Headphones may be connected to the headphone jack located in either of the end trims on the surface. This location is highlighted in red in Figure 1.

Patching the headphone output

Navigate to the FIXED OPTIONS section then the MON TB MTR PATCH screen of the Main Application, as shown in Figure 2.

In the sources list on the left, press the filter button and select MONITOR OUTPUTS. From the list select one of the MISC LS outputs.

In the right hand list select the output port to which the headphone connection has been made. Now press PATCH. If you are unsure which port has been connected to feed the headphones, please contact your installation technician.

FIGURE 1 - HEADPHONE JACK

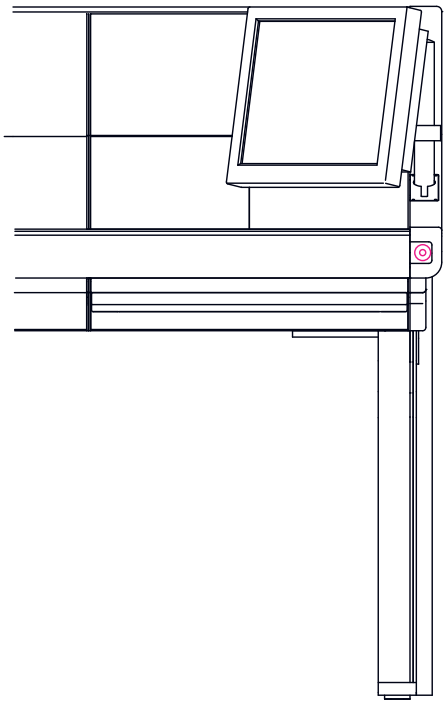
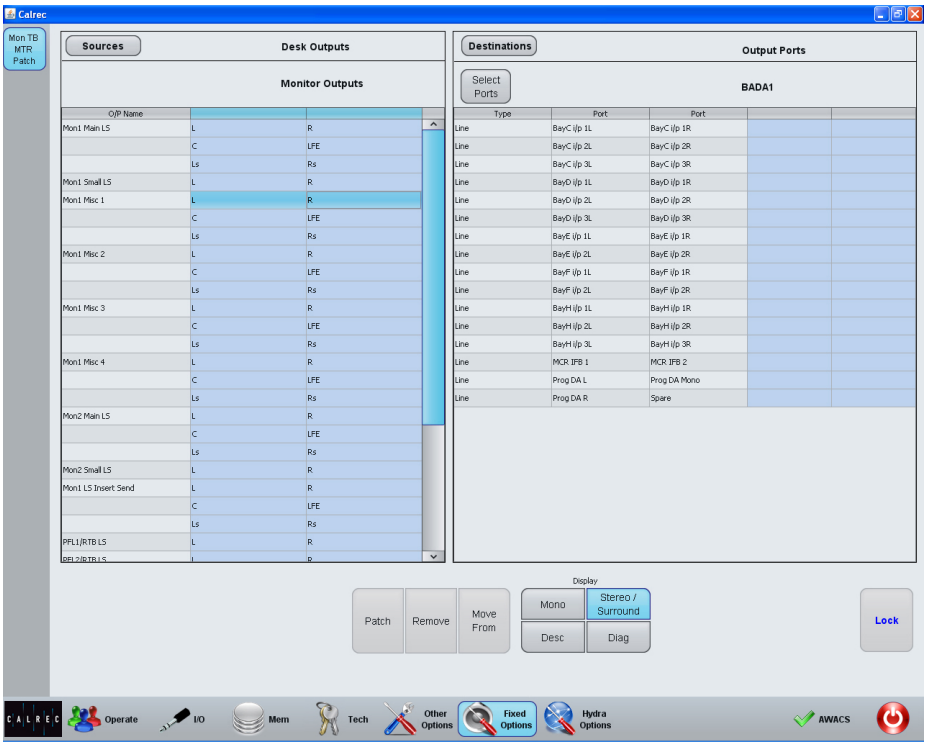


FIGURE 2 - PATCHING HEADPHONE CONNECTIONS



Controlling the headphone feed

The level and source feeding the headphones can be controlled using the relevant miscellaneous monitor output control on a panel in Monitor mode. The rotary control alters the level and the button cuts the send. Pressing the SEL button allows the source feeding the output to be changed by selecting the required source from the touchscreen above.

MISCELLANEOUS MONITOR SOURCES

There are four miscellaneous monitor pre selectors available in Monitor mode. These are set up and used in a similar way to the control room pre selectors and are shown in Figure 1.

Each output control has a rotary control for altering the level of the output and a dim button. The OLED shows the name and, if the buss has a defined configured, the width (M, ST, 5.1) and name of the elected source and indications of the output level and dim status.

Altering the output source

The output source can be altered by pressing the SEL button which brings attention to the required miscellaneous output. Now press on the new source in the right hand side of the touchscreen above. The OLED will update to show the newly selected output.

Patching miscellaneous monitor outputs

The miscellaneous monitor outputs are patched in the MON TB MTR PATCH screen in the FIXED OPTIONS section of the main application (Figure 2).

In the sources list on the left, press the filter button and select MONITOR OUTPUTS. From the list select one of the MISC LS outputs.

In the right hand list select the output port to which the miscellaneous output should be connected and press PATCH.

FIGURE 1 - MISCELLANEOUS MONITOR OUTPUT CONTROLS

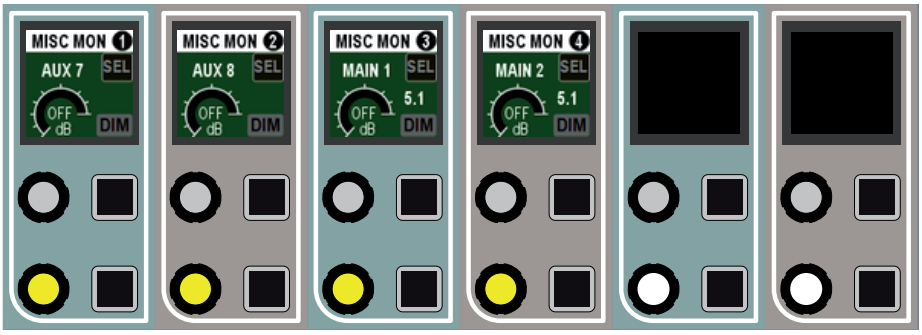
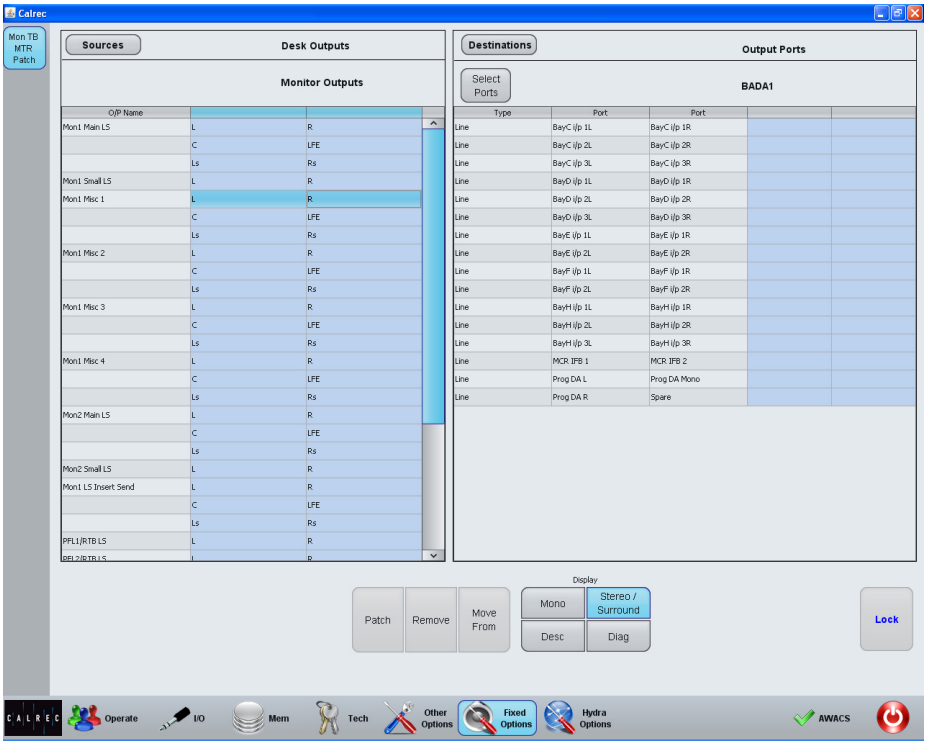


FIGURE 2 - PATCHING MISCELLANEOUS MONITOR CONNECTIONS



MONITOR FUNCTIONS

The touchscreen in Monitor mode provides a range of controls to access various functions for each monitor output.

Select a Main LS pre-selector using the relevant SEL button. On the right hand side of the touchscreen, touch the MISC button to reveal the controls. Different control arrangements appear for surround and stereo outputs as shown in Figures 1 and 2.

Misc LS functions are accessed in the same manner, but by selecting a Misc Monitor output using the relevant SEL button. The available functions are shown in Figures 3 and 4.

The lower area of the touchscreen is common to both Main LS and Misc LS selections. It contains controls over individual legs and downmixes of the signals sent to the monitoring outputs

The upper section of the Main LS screen containing APFL controls is explained in the AFL and PFL section of this document.

The upper area of the Misc LS screen contains options for changing a button on the relevant Misc LS control cell between CUT or DIM.

FIGURE 1 - MAIN LS SURROUND OPTIONS

FIGURE 2 - MAIN LS STEREO OPTIONS

FIGURE 3 - MISC LS SURROUND OPTIONS

FIGURE 4 - MISC LS STEREO OPTIONS

SURROUND MONITORING

The Apollo has both audio signal path and remote control facilities for use with encoded surround signals such as those handled by the Dolby DP570 (Dolby Digital and E encoder/ decoder), DP564 (Dolby Digital and Pro Logic decoder) and SDU4 (Pro Logic decoder).

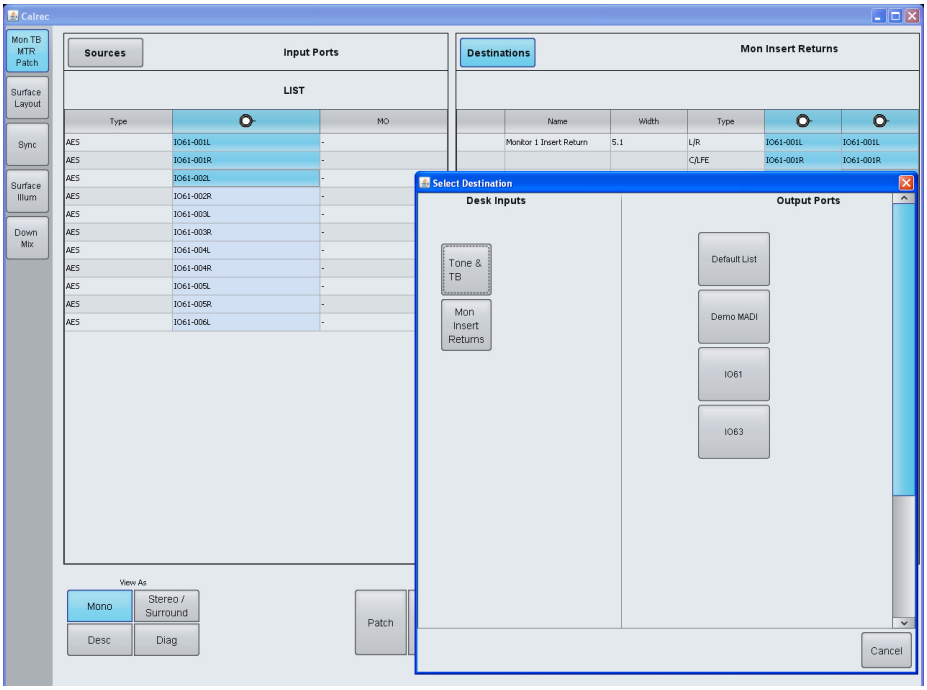
The console monitor system has insert points to allow the console selectors to route audio to the external unit and to bring it back into the signal path. The console can also provide GPO control outputs via relays and display the status of the external unit via GPI tallies and indicators on a wild assign panel.

To enable a monitor insert use the configuration PC and go to FIXED OPTIONS and choose MON TB MTR PATCH, touch the SOURCES button then choose Monitor Outputs (in the Desk Outputs column).

Then touch the DESTINATIONS button and filter that to confirm the port to be used as the insert send, typically an AES port on a BNC connector, if making a simple direct connection to a Dolby unit input. Touch PATCH to confirm the route.

Then go back to the Sources list and choose the port to be used as the insert return and filter the Destinations list to show MON INSERT RETURNS, and patch the required port (Figure 1).

FIGURE 1 - MONITOR RETURN PATCHING



The monitor insert can be placed in the signal path, or bypassed using controls on a wild assign panel in monitor mode (Figure 2). To manage the mode of the surround encoder/decoder use the SEL button to bring up a remote encoder screen in the right half of the TFT touchscreen. The software has specific touch screen controls and indicators for three different models of Dolby unit and the required one is chosen at the bottom of the panel. The upper part of the screen provides mode selection for the chosen unit. The modes can be chosen by touching on the buttons which illuminate to show the current status. It should be noted that whilst the SDU4 uses latched outputs from the console, the DP570 and DP564 only show status information as returned by signals from the encoder/decoder units.

The control outputs and tally inputs are via the console's GPIO system so can also be used to control other models and brands.

The detailed hardware connections for remote controlling Dolby units is described in the Installation Manual. To assign the GPIO ports use the HYDRA OPTION page, filtering the GPO functions to the chosen relay in a convenient IO box and the opto return input to the relevant GPI function.

FIGURE 2 - MONITOR INSERT

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TALKBACK

Talkback facilities can be set up and activated through the monitor panel, shown in Figure 1.

Live talkback routing

To toggle talkback, touch a destination in the left hand side of the touchscreen, below the words 'Live Talkback'. The talkback latches, allowing multiple destinations to be selected simultaneously.

Talkback groups

There are four talkback groups available which can be set up to allow multiple talkback destinations to be fed simultaneously with a single button press. These group controls are located in the middle row of control cells at the left hand side of the panel.

To set a talkback group's destinations, touch and hold the upper SEL button in the relevant control cell, then tap the required destinations on the touchscreen. The text at the top of the touchscreen will

To toggle talkback to a group, press the lower TALK button in the relevant control cell.

Talkback microphone level

The level of the talkback microphone may be adjusted using the TB control.

Reverse Talkback

There are three reverse talkback inputs into the system. The level of these feeds may be adjusted using the RTB 1, 2 or 3 controls.

Patching talkback and reverse talkback inputs

Navigate to the MON TB MTR PATCH screen in the FIXED OPTIONS section of the main application as shown in Figure 2. Locate the physical input ports which will feed the talkback (this will be the

FIGURE 1 - TALKBACK CONTROLS IN MONITOR MODE

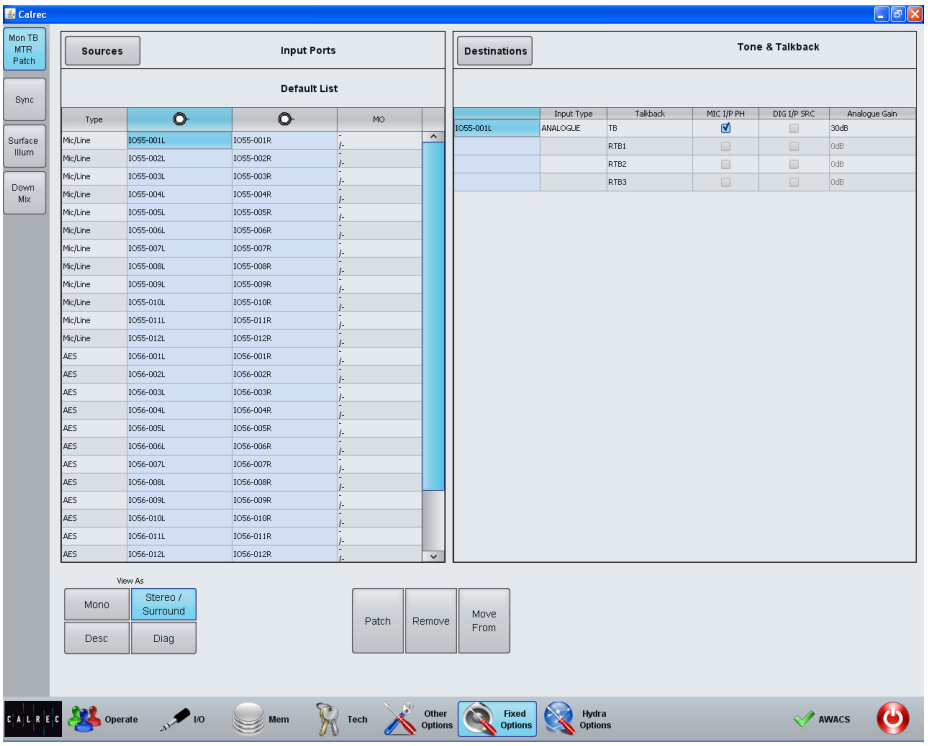
port to which the talkback microphone is patched) and the reverse talkback inputs (these could be microphones in other areas of the facility).

With an input port selected, also select the desired input from the list on the right then touch the PATCH button.

The method for physically connecting the surface talkback microphone is covered in the Installation manual. The studio technician should be consulted if it is not clear where talkback sources are patched.

Monitoring reverse talkback signals
In order to monitor reverse talkback inputs, the RTB buss must be patched to an output port where relevant loudspeakers are connected.

FIGURE 2 - TALKBACK INPUT PATCHING



MIX MINUS

Mix Minus is a system that allows a comprehensive mix to be sent to multiple listeners each receiving the complete mix, minus their own input.

Figure 1 shows an abstraction example of a mix minus system. Assume that the sources surrounded by a blue box represent people, either presenters or field reporters. The other sources may represent VT or server audio feeds.

These sources are fed to the input of eight channels on a console. Each channel has the option for it's signal to be sent to the console wide mix minus bus.

This mix minus bus can be routed back out to any sources that may require foldback, for example the presenters or field reporters. Each source would be fed the entire mix-minus bus signal, with their own contribution to that mix removed, creating an unique feed.

In Figure 1 the mix sent back to source 1 would consist of sources 2-8, source 2 would receive a mix of sources 1 and 3-8 and so on...

Why remove a sources own input from it's foldback mix?

Two reasons are presented here. The first relates to field reporters, or presenters in studios communicating via long distance systems such as satellite links.

The reporter would need to hear a mix of the show's audio in order to hear cues and communicate with the presenters. The inherent delay in these systems means that it may be a number of seconds before the audio reaches the reporter.

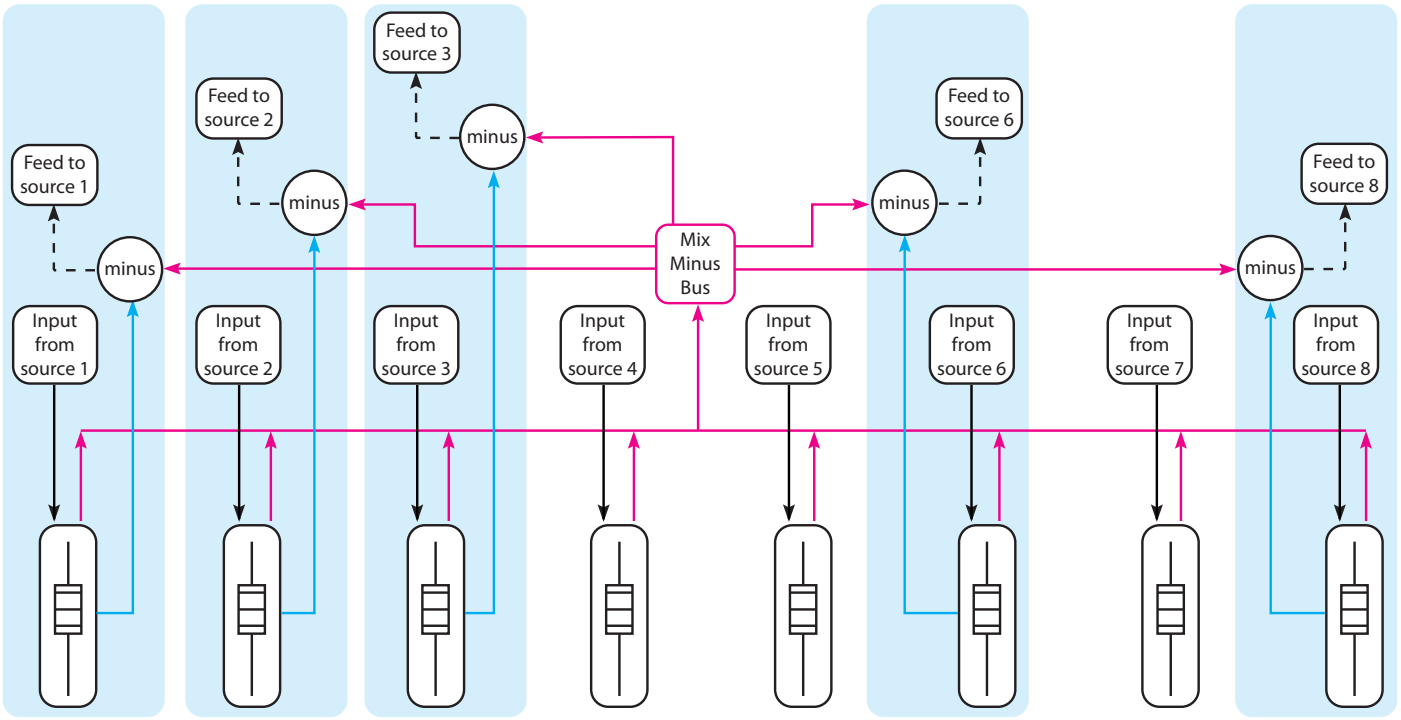
It can be very difficult to speak while hearing your own voice returned to you with even a slight delay. By using a mix minus feed to the reporter, their own contribution to the audio is removed before it is fed back to them eliminating this problem.

The second reason is to eliminate feedback. If a presenter's foldback was monitored on loudspeakers without subtracting their own contribution, some of their original signal may be picked up by the microphone again, thus creating a feedback loop. By using a mix minus system to remove the presenter's own contribution, this feedback loop is broken.

Sending signals to the mix minus buss

There is one mono mix minus buss, which is a global buss that any path can

FIGURE 1 - MIX MINUS ABSTRACTION



contribute to. To send a signal to this bus, first assign the chosen path and press the BUSS 1 button in SENDS-ROUTES mode as highlighted in Figure 2. Signals can be sent pre/post fade using the buttons to the left.

Assigning a direct output

Each path on the surface has a number of direct outputs associated with it. These direct outputs can be assigned to any output port which can then be used to feed the foldback back to that path's source.

To assign a direct output, use the IO PATCH page in the IO section of the main application. Touch the SOURCES button and select DIRECT OUTPUTS from the popup that appears. Select the fader where the source that is to be fed the mix minus signal appears. Press the DESTINATION button and select from the lists of output ports. Select an output port and then press PATCH.

For more details, including how to allocate direct out resources, please see the Direct Outputs section of this document.

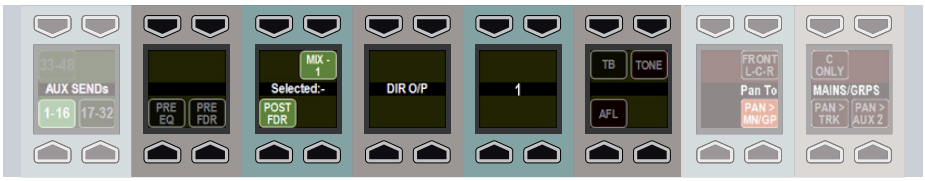
Monitoring a mix minus signal

Assign a path on the surface that is being fed by the source you wish to send a mix minus signal to. Select a Direct Output buss in SENDS-ROUTES mode by pressing the relevant rotary control. The buss selection area in the button cells will update to show the selected buss as shown in Figure 3. Press the MIX - button to route the mix minus signal to the selected Direct Output.

The mix minus signal sent to the required source will be the contents of the mix minus buss, with the source's contribution (if any) removed.

FIGURE 2 - SENDING SIGNALS TO THE MIX MINUS BUSS

FIGURE 3 - MONITORING A MIX MINUS SIGNAL



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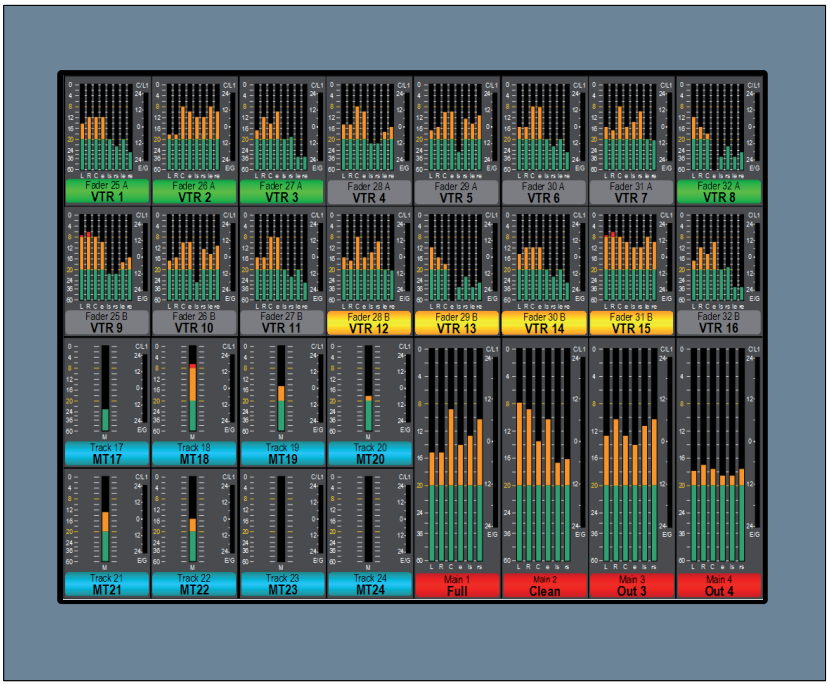
TFT METERS

The Apollo TFT meter layouts are user customizable in several ways.

Figure 1 shows an example layout of a configured TFT meter. The TFT is divided up into a number of 'cells'. Each for which can be one of a number of sizes, and can display mono, stereo or surround meters with or without dynamics information.

FIGURE 1 - EXAMPLE TFT METER LAYOUT



Meter cells

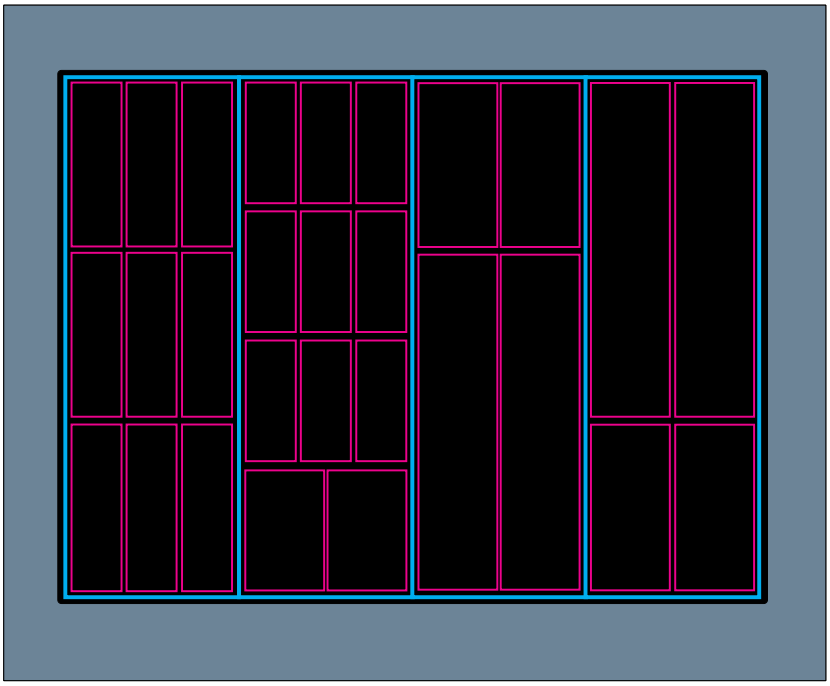
Each TFT meter is divided up into four vertical sections as shown in Figure 2.

Each of these sections can display two or three meters in the horizontal space, and three or four meters in the vertical space.. This provides a maximum of four rows of twelve meters on each TFT, 48 meter cells.

Vertically arranged cells can be combined to create taller meters of half, two thirds of the screen height. The large size of screen makes full and three quarter height meters unnecessary so attempts should not be made to configure them.

A vast range of meter cell designs can be created, but some arrangements have specific advantages. For example, using 2 meter cells across the width of each vertical section will give 8 meters across the TFT screen. This allows meters to line up with the faders on the fader panel below.

FIGURE 2 - VERTICAL AND HORIZONTAL SECTIONS



Meter layout

Meter configurations can be saved to in files with meter panels laid out and meters assigned by going to OTHER OPTIONS and choosing METER SETUP.

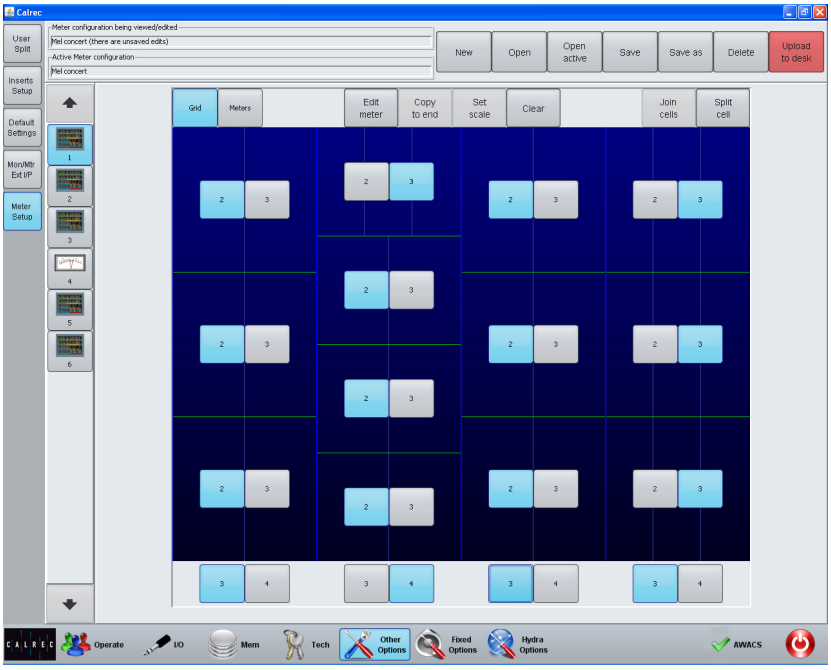
In many instances, there may be an existing meter configuration active on the console. To ensure this file is preserved, go to SAVE AS or NEW and enter a file name for the meter arrangement about to be created.

The PC screen shows one TFT panel at a time and the panel to be configured is selected from the vertical column of numbered panels. Selecting GRID allows the screen to be subdivided to create the required layout. The 3 and 4 buttons at the base of each vertical section set the vertical division accordingly. Larger vertical heights are created later by joining cells.

Selecting cells to be 2 or 3 meters side by side using the number buttons within each area. As soon as changes get entered, the file name carries a warning that there are unsaved edits and the SAVE button become active. New meter files can still be created by going to SAVE AS.

To create meters higher than a third or quarter of the screen, select the METERS tab. Adjacent vertical areas of the same width are joined by touching the upper of the two cells to be linked, then touching JOIN CELLS. To create a meter which is the full height of the screen, first join the lowest two cells, then select the one above and join that. If in 4 high mode select the top cell and finally add that. Combining ⅓ and ¼ height meters with 2 and 3 wide cells allows a vast range of alternative grids. Joined cells can be divided by touching SPLIT CELL.

FIGURE 3 - GRID CONFIGURATION



Meter assignment

Once the grid has been defined, meter functions can be assigned to place in the grid. Touch the METERS tab then the meter cell to used. Touch EDIT METER to display a list of the meter sources which are divided into AUXES, EXTERNALS etc. Some such as FADER PATHS have sub options and once the meter function has been selected, touching APPLY TO SELECTION will assign the function to that meter.

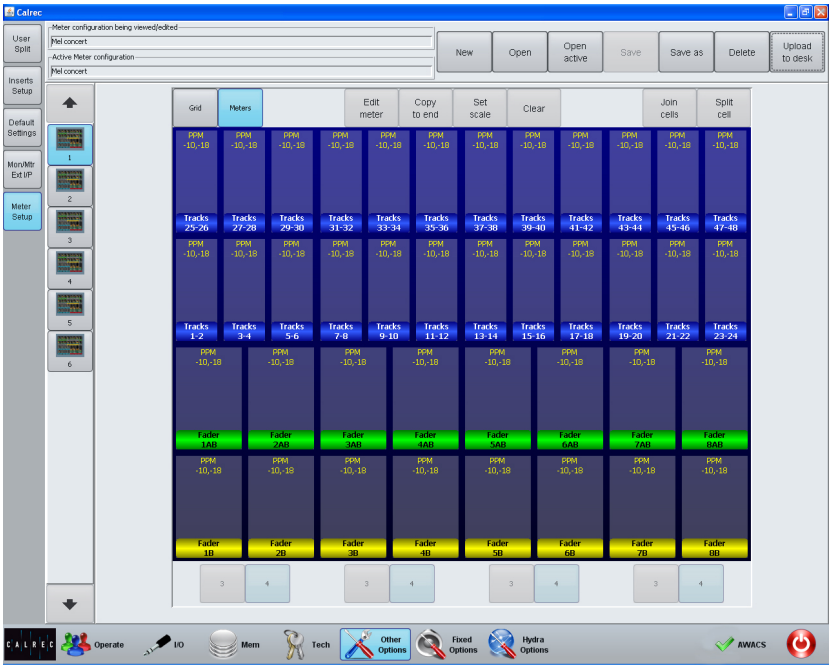
Where there are similarly sized but unassigned meter cells to the right of the selected one and the meter function is part of a sequence of similar sources, APPLY TO SELECTION sets the first cell to the assigned function. Each one to the right will increment by one. For example if the first meter was assigned to Track 1, the next would be Track 2 etc.

Each meter can be set to one of two alternative scales by touching SET SCALE. This can be copied to adjacent similarly sized meter cells by choosing APPLY TO END.

To change an already assigned meter, select it then make changes as necessary. Once the first screen is configured, the grid and meter assignment can be repeated for each of the other meter panels.

All changes to TFT meter configurations are initially held in a buffer memory and are applied to the console only when the now red UPLOAD TO DESK is touched. This first saves the file and once it is uploaded, the screen button reverts to gray.

FIGURE 4 - METER ASSIGNMENT



Dynamics meters

Any meter for a path that has dynamics processing can have a dynamics meter shown at the right hand side of the meter cell. The function of this meter is described in the Dynamics section of this document.

A/B path meters

A/B path meters are linked to a certain fader and can be set up to meter either the A or B path. As shown in Figure 1, two rows of A/B path meters can be set up to meter both A and B paths of any fader, regardless of which is currently selected for control by the fader.

The A/B path meters can also bet set to switch between the currently active path of any given fader. For example, when the user switches between the A and B paths on a fader, the A/B meter will follow this selection and the label will be colored accordingly.

Meter label colors

The color bar beneath each meter relates to the coloring of paths used throughout the surface. Red corresponds to main paths, dark blue to tracks, green to auxes, light blue to groups and so on. A and B path colors correspond to the A and B path selector buttons above the faders which are green and yellow respectively.

Meter labels

The label shown under each meter will be taken from the fader label, the port description or port name (in order of priority depending on which have been set).

Meter Selectors

There are four meters selectors available from the bottom row of the MONITOR panel mode labelled MTR1-4. The output of these meter selectors can be displayed on upstand TFT meter panels or can be patched to any Hydra2 audio to feed a non-TFT meter within the console, such as the DK/RTW surround meters, or PPM/VU moving coil meters, to external meters outside of the console or indeed anywhere you want to feed a selectable audio source.

Selecting a meter selector to display on the upstand TFT is done as normal from OTHER OPTIONS>METER SETUP. Patching the meter selector output to an audio output is done from FIXED OPTIONS>MON TB MTR PATCH, select Ext Meter Outputs from the sources list.

The meter selectors work in a very similar way to the monitor pre-selectors:

In Monitor mode, locate the four assignable meter buttons, as shown in Figure 6. Press the button associated with the required meter to select it. Now choose a signal to feed the meter from the right hand side of the touchscreen at the top of the panel. The meter cell displaying the relevant assignable meter will update to reflect the changes.

As well as for selecting sources, the TFT screen on the panel also has a MISC page for mode selection such as M/S mode.

FIGURE 5 - METER SELECTORS

TFT METER SETTINGS

Certain features of the TFT meters can be changed on the surface at any time.

Dynamics meters

The dynamics meters located to the right of channel, group and main meters, as shown in Figure 1, can be configured to show the first or second dynamics units.

To do this, touch the TOOLS button on the layers row. The Layers row will update to display various meter setup options (Figure 2). Pressing the buttons above UPSTAND DYNAMICS 1 or UPSTAND DYNAMICS 2 will change all relevant TFT meters to display the selected information.

FIGURE 1 - DYNAMICS METERS

FIGURE 2 -DYNAMICS METERS SETUP

EXTERNAL METER OUTPUTS

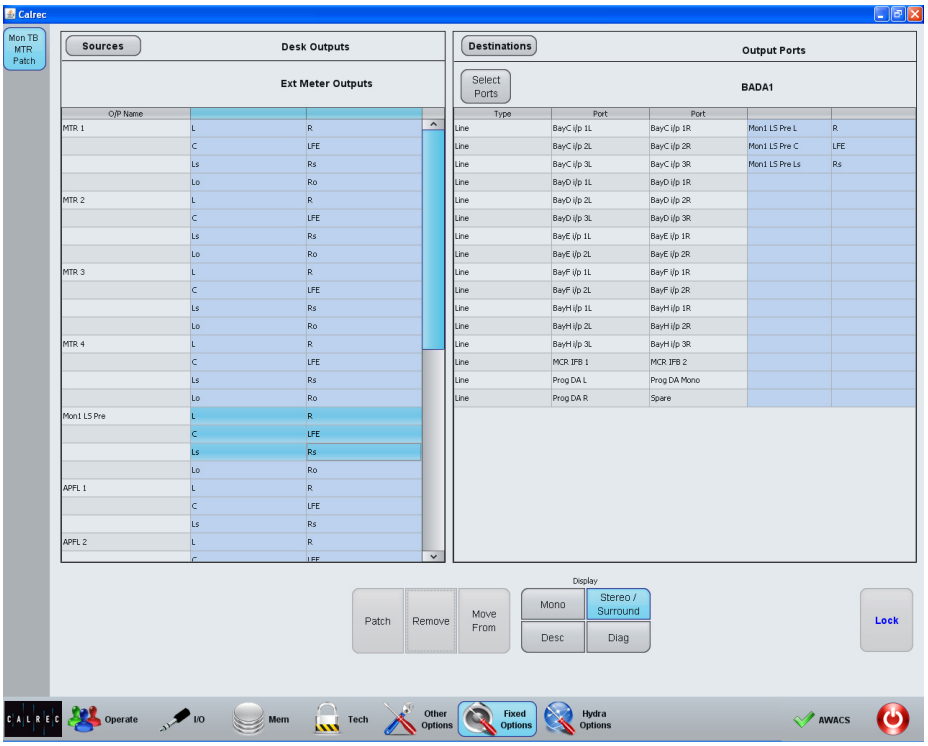
External meters can be fed by the Apollo metering system in a similar way to loudspeakers.

Navigate to the MON TB MTR PATCH screen in the FIXED OPTIONS section of the main application as shown in Figure 1. Touch the sources button at the top of the screen and choose EXT METER OUTPUTS from the popup window that appears.

Find the port to which the external meters are connected in the list of ports on the left of the screen. If you are unsure where any meter are physically connected, contact your installation technician.

With the destination port selected, choose a source to feed the meter and then touch the PATCH button.

FIGURE 1 - EXTERNAL METER PATCHING



APOLLO
SHOWS AND MEMORIES

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OVERVIEW

The powerful memory system on Apollo is based around the concept of shows.

A show can be set up for each programme or broadcast which consolidates all relevant memories. A show also stores references to relevant console option files. Memories, which include more specific operational settings, are stored inside shows. These can be thought of as snapshots, or scene memories.

Figure 1 shows a basic abstraction of the Apollo memory system. Details of one show and one memory are provided, however the same level of information is stored in every show or memory in the system.

The only limit to the number of shows and memories that can be saved is the amount of storage space available in the control processor.

The number of possible memories depends on the resources used by the show but is typically of the order of 150. If a show contains fewer paths and features, the number of memories that can be stored will increase.

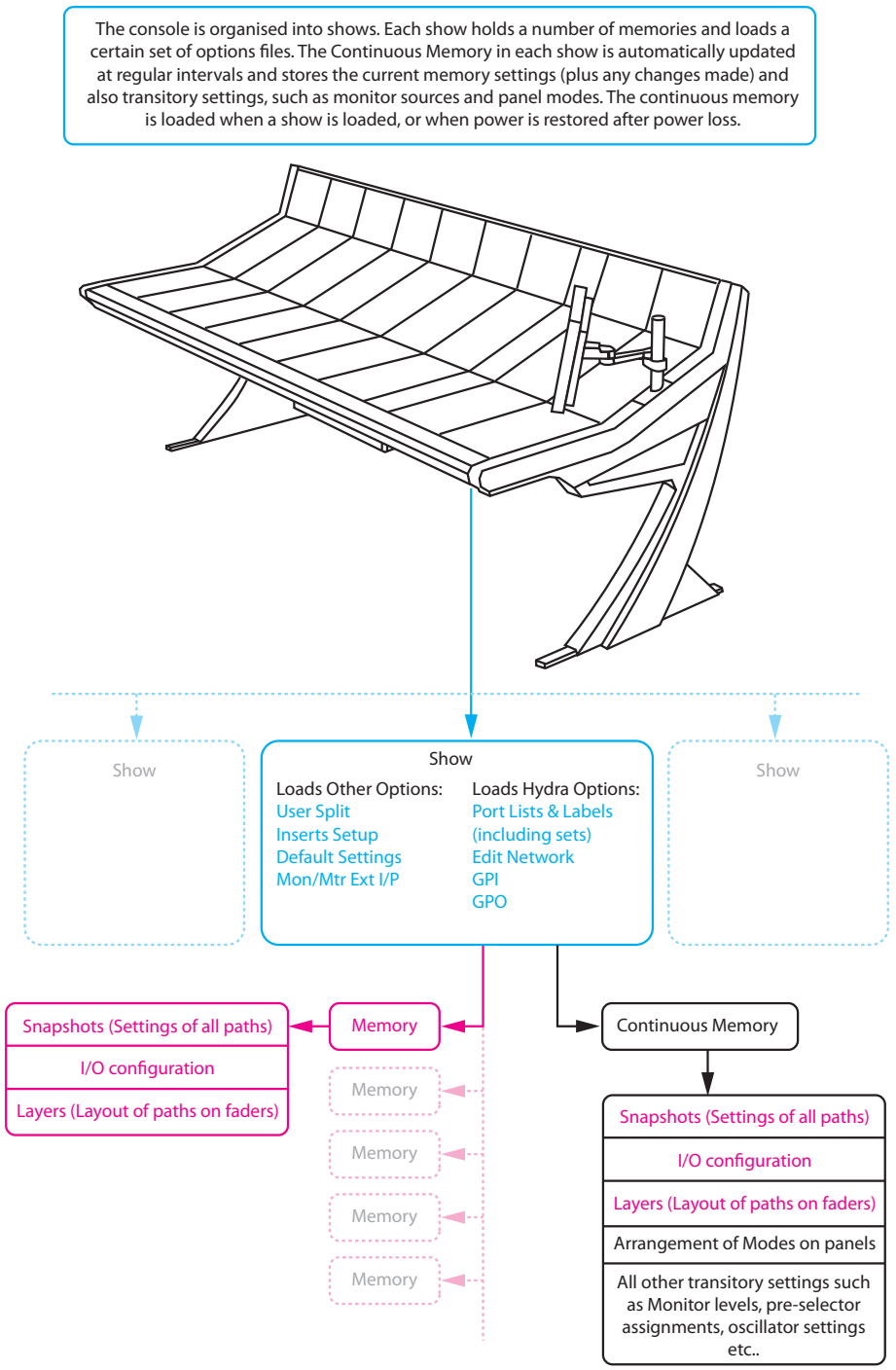
Shows and memories can be backed up to the configuration PC, facility LAN or to external USB devices in order to create space or provide storage redundancy.

Continuous memory

In addition to the standard memory system, Apollo continually stores the state of the system. This continuous memory stores the state of the console settings periodically, so that in the event of a reset or power cycle the console is able to return exactly to its previous state.

This is an extremely useful feature, but be sure to explicitly save memories if specific settings need to be recalled at a later date.

FIGURE 1 - APOLLO MEMORY SYSTEM



Shows form the basis of the memory system. They contain all relevant memories and load specific console option files.

Console Settings

Certain option files that allow various configurations to be saved to a file, for example a network configuration or a user split layout, can be loaded by a show. There may be any number of option files saved within the console and different shows may make use of different option files.

For example, the location of any user splits is stored in an option file and loaded by a show rather than a memory. This allows the user to load different memories and alter the patching and routing etc. without the user split locations changing. The same thought process applies for other settings which should remain constant throughout a show.

Please refer to the section on Option Files for more information on the settings stored within them.

Continuous Memory

Each show also operates its own continuous memory which stores:

- All information contained within a memory, such as IO patching, path arrangement on layers and all snapshot information such as routing, processing settings, panning and mute status etc. (these settings are not committed to a standard memory unless a memory is created or overwritten explicitly)
- The arrangement of modes on wild assign panels.
- Transitory settings, such as the which pre-selector is currently being listened to, the state and settings of the oscillator and the state of any AFL or PFL switching.

FIGURE 1 - MEMORY SCREEN

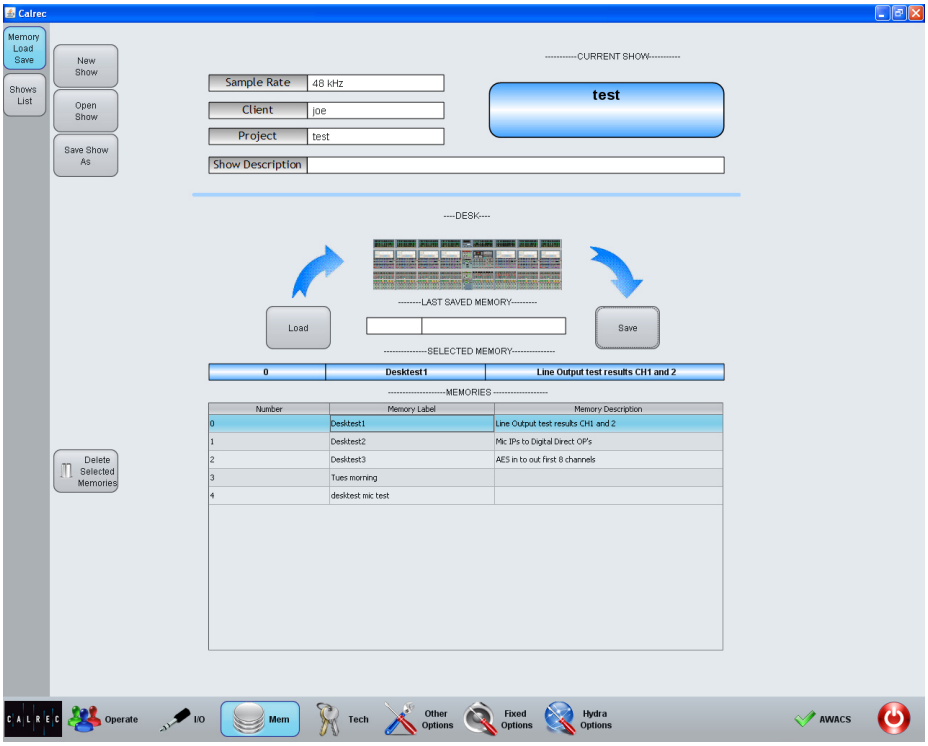
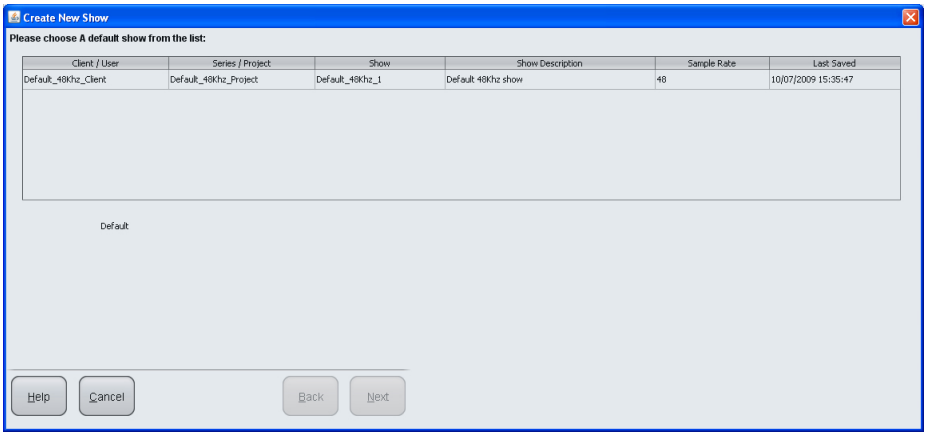


FIGURE 2 - NEW SHOW



This means that when a show is loaded, all of the above information is also loaded. This effectively allows the operator to load a show and have the system appear exactly how it was when the show was last used.

New and Default Shows

The console is supplied with a set of default shows that can be used as a basis for creating and organizing further shows.

To create a new show go to the MEM section and the MEMORY LOAD SAVE screen as shown in Figure 1. Touch the NEW SHOW button and a dialog box will appear. This popup contains a number of pages and will step through the process of creating a new show. See Figure 2.

The first page allows the user to choose a default show on which to base the new show. Select from the list of default shows and touch the NEXT button. Be sure to choose a show with the correct sample rate.

The next three pages allow the name of the Client, Series and Show to be named. After entering the desired names in each page, continue by touching the NEXT BUTTON. The new show will now be ready for use.

Opening shows

To open an existing show, from the MEMORY LOAD SAVE screen touch the OPEN SHOW button. A dialog will appear that lists the shows available on the console as shown in Figure 3. Select the show to load and touch the LOAD button. Touch the CANCEL button to leave the dialog without loading a different show.

Loading a new show unloads the previous show from the console and changes console settings. The previous show is not lost and can be re-loaded at any time.

It is not possible to load a show that is already in use. Attempting to do so will result in a dialog appearing informing the user that the show is already loaded.

Save show as...

The current show can be saved as a different show with a different name and different user and series assignments. From the MEMORY LOAD SAVE screen, touch the SAVE SHOW AS button. A dialog will appear as shown in Figure 4, that allows the user to choose from existing user and series data, or to enter new data.

Creating Default Shows

Selecting CONVERT TO DEFAULT will save the currently selected Show as a default template, allowing it to be chosen as the base for creating a new show. New shows created will include any user memories that were saved under the original show at the time of the conversion to default. Converting to default does not remove the original show from the loadable shows list.

Backing up shows

Shows saved in the console can be backed up to an external USB device. This is performed in the MEM section on the SHOWS LIST screen. The shows stored in the console are listed at the top of the screen. See Figure 5.

Connect an external storage device to the USB port on the surface and touch the SHOWS button to bring up a standard Windows explorer dialog. Browse to a location on the storage device where the shows should be backed up to. Once this location has been selected the list at the bottom of the screen will display any shows the have previously been backed up to this location.

Select the show(s) to be backed up from the top list and then touch the BACKUP

FIGURE 3 - OPEN SHOW DIALOG

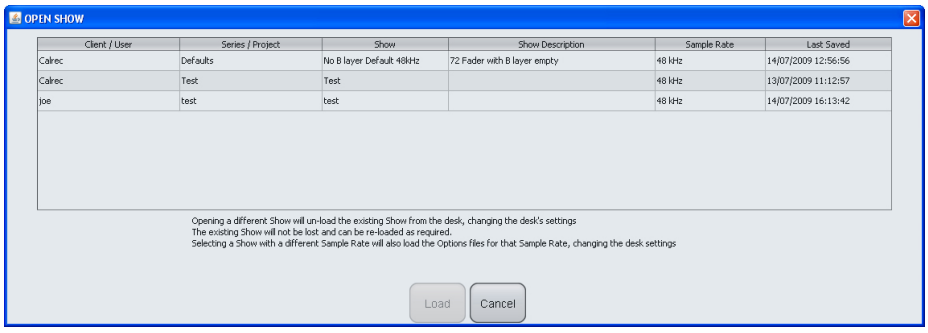
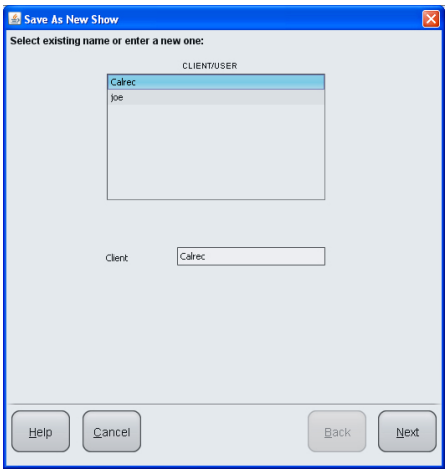


FIGURE 4 - SAVE SHOW AS DIALOG



button. When the backup process is complete the bottom list should reflect the additions.

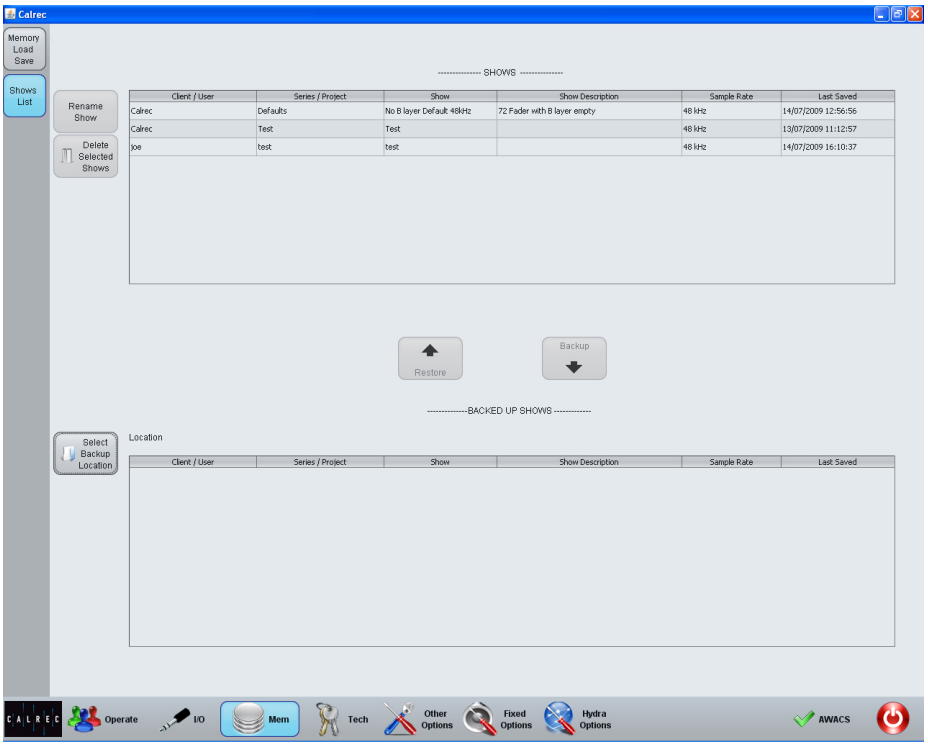
Restoring shows

Restoring shows is performed in a very similar way to backing up shows. First find the backed up shows on an external storage device by pressing the SHOWS button and browsing to the correct location. Select the show or shows to be restored in the bottom list and then touch the RESTORE button. Once the shows have been restored they should appear in the top list.

Renaming shows

If for any reason the name of a show needs to be changed, go to the MEM section and the SHOWS LIST screen. In the list of shows available on the console (at the top of the screen) select the show that is to be renamed and touch the RENAME SHOW button. A dialog box will appear that details the selected show and provides input areas to alter the name and description. Once the correct details have been entered touch the SAVE button to commit the changes, or touch the CANCEL button to leave the dialog and reject any changes.

FIGURE 5 - SHOWS LIST SCREEN



MEMORIES

Unlike shows, which consolidate relevant memories and point to certain files containing console settings, memories store operational details such as IO patching, the layout of paths on the surface (including layers) and path settings such as dynamics, EQ and routing parameters.

Memory screen

The MEMORY LOAD SAVE screen in the MEM section of the configuration PC (Figure 1) shows the available memories in a list at the bottom of the screen. Selecting a memory in this list updates the SELECTED MEMORY area to clarify which memory is about to be loaded or saved.

When a new show is created, a new default memory is also created and set as the current memory. The LAST MEMORY LOADED area shows the current memory in use.

Loading a memory

To load the selected memory touch the LOAD button. This will load all the settings stored in the memory into the console. The LAST MEMORY LOADED area will now update to show the current memory. Loading a different memory will alter the console settings and update the LAST MEMORY LOADED area to reflect the changes.

Saving a memory

To save the current state of the console to a memory, select a memory from the list at the bottom of the MEMORY LOAD SAVE screen then touch the SAVE button. A dialog will appear as shown in Figure 2 that provides two options.

The currently selected memory can be overwritten by touching the OVERWRITE button. Alternatively a new memory can be created by touching the SAVE AS NEW button, filling in the name and description of the new memory and then touching the SAVE button.

FIGURE 1 - MEMORY LOAD SAVE SCREEN

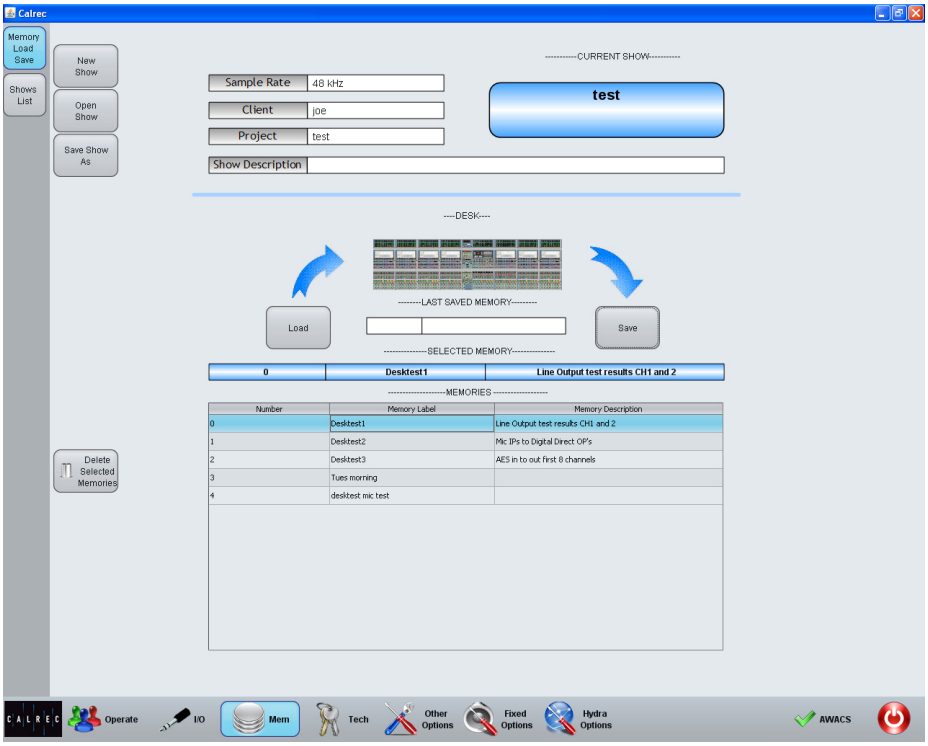
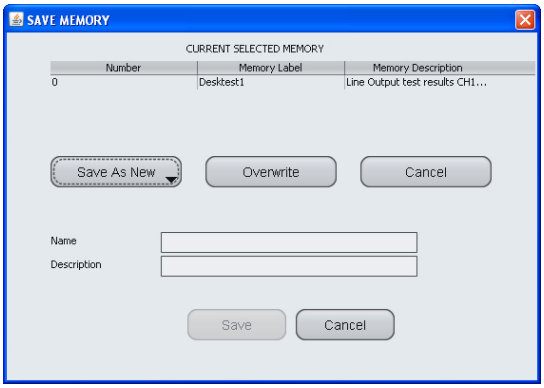


FIGURE 2 - SAVING A MEMORY



OPTION FILES

Option files contain settings which are not saved in memories. They may relate to certain show settings, studio settings or surface settings that the user does not want to change each time they load a memory.

System options appear in three areas of the main application accessible from the menu bar at the bottom of the screen. These are:

- Other
- General
- Network

Other

The Other section contains a number option of files relevant to shows, for example user splits and TFT setups. Different settings for each of these options can be saved into files. Shows can then load different files depending on the configuration required.

Network

The Network section contains option files with settings relevant to the Hydra2 network. Port lists and labels, GPIO settings and the availability of IO boxes are all stored in these files. Again as with Other options, there can be multiple files for each set of options allowing different shows to load different configurations.

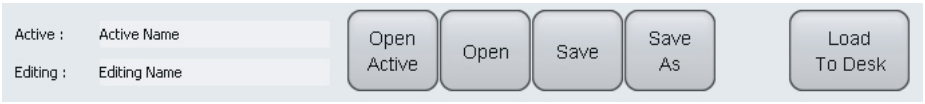
General

The General options section contains the remaining options that do not relate directly to shows or the network. Generally once they are set they shouldn't need to be altered often. There is only one set of these options in the system. Multiple option files cannot be saved.

Saving and loading option files

Where multiple option files can be saved or loaded, the screen in the main application will display the controls shown in Figure 1.

FIGURE 1 - SAVE/LOAD BUTTONS



The ACTIVE text field displays the name of the option file currently loaded into the system. The EDITING text field displays the name of the file currently being edited on the screen.

There are two options for opening files. The OPEN ACTIVE button opens the file currently in use by the system for editing The OPEN button brings up a dialog in which the user may open any previously saved options file for editing. Once a file has been selected in the dialog, there are two options; OPEN and LOAD. Touching OPEN opens the file for editing, whereas touching LOAD loads the file into the system.

Once any editing is complete, the file can be saved. The SAVE button overwrites the file which was opened for editing. The SAVE AS button brings up a dialog allowing a new file name to be specified for writing to a new file.

The LOAD TO DESK button saves the currently open file and then loads the settings into the system.

MEMORY ISOLATION

Memory isolation allows certain paths and ports to have all or some of their settings protected from any memory load operations.

Isolate settings are stored in the continuous memory of each show, therefore each show may have different isolate settings.

Basic path isolation

Paths may be isolated using the MEM ISO button in the button cells above each fader as shown in Figure 1. With this function selected on a fader, the paths on that fader will keep their current settings when a new memory is loaded.

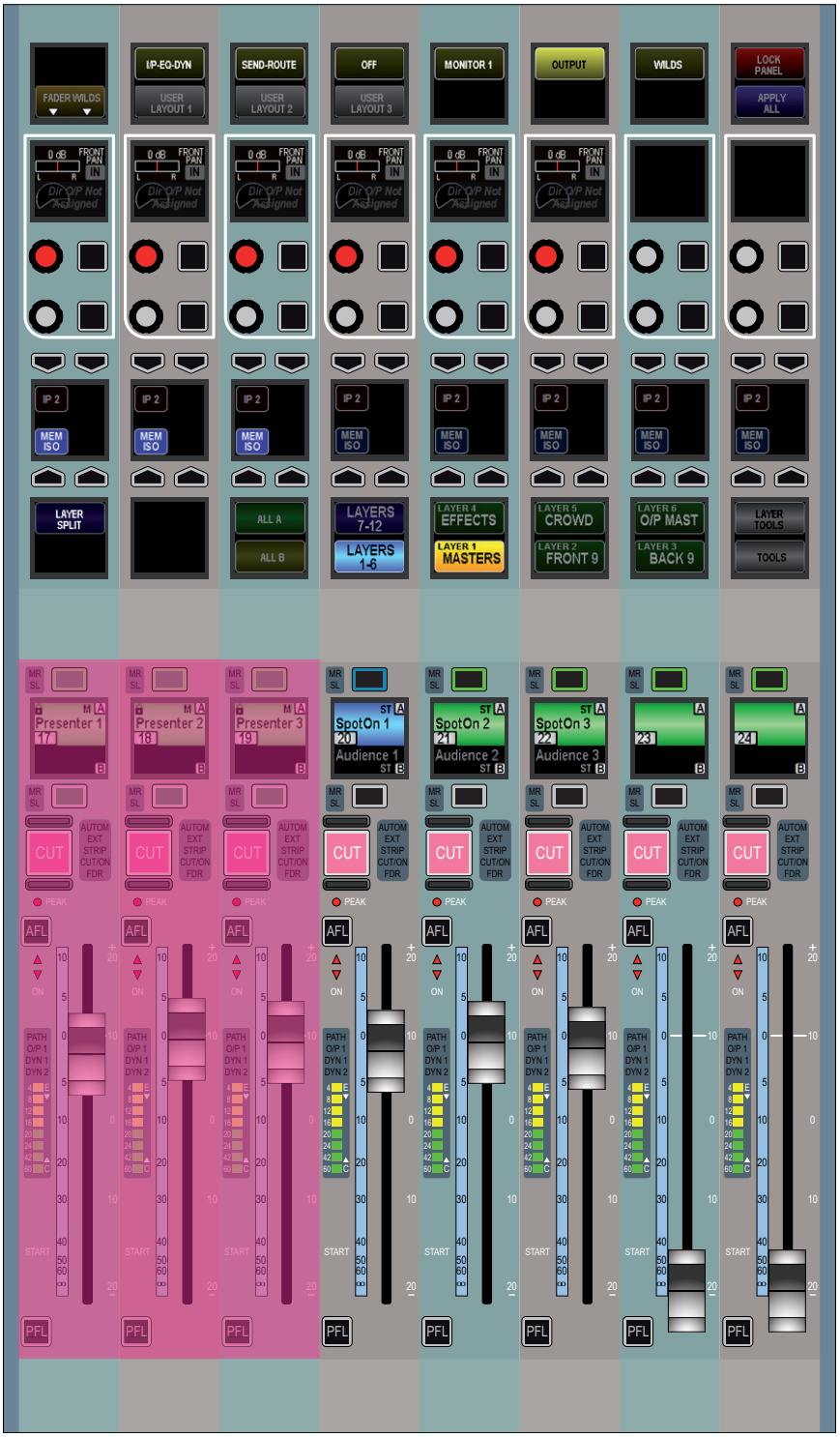
Figure 2 illustrates this function. The MEM ISO function on the first three faders have been activated. These faders have been highlighted to indicate that they will not be altered by any memory load operations.

Setting the scope of path memory isolation

Isolating a path does not necessarily mean that all settings associated with the path are isolated. It is possible to only isolate the EQ settings on a certain path, just the EQ and input settings, or maybe all or some of its routing.

FIGURE 1 - MEM ISO BUTTONS

FIGURE 2 - MEM ISO APPLIED TO FADERS



To set the scope, touch the LAYER TOOLS button on the layers row. This will update the row above as shown in Figure 3. Now press the button above the SET MEM ISO graphic on the modes row. This will set the wild assign panel above it into Memory Isolate mode as shown in Figure 4 (apart form the mode title, the TFT screen appears blank in this mode). On entering this mode, the modes row and layers row return to their default state and the MEM ISO buttons are visible again.

The lower two rows of control cells on the wild assign panel will now display the elements of the path which can isolated. They relate to the currently assigned path. These elements may vary depending on the type of path assigned, for example input and input port settings are not applicable to groups.

Press the relevant button to toggle the elements which should be isolated when the assigned path is isolated. The selected elements will illuminate. The SET ALL ISOLATES and CLEAR ALL ISOLATES buttons in the button cells below switch all elements on or off respectively.

The PART ISO button in the button cells toggles partial memory isolation on or off for the assigned path. When a path has been partially isolated, the button cell above the fader on the fader panel will show the green PART ISO indicator instead of the fully isolated blue MEM ISO indicator.

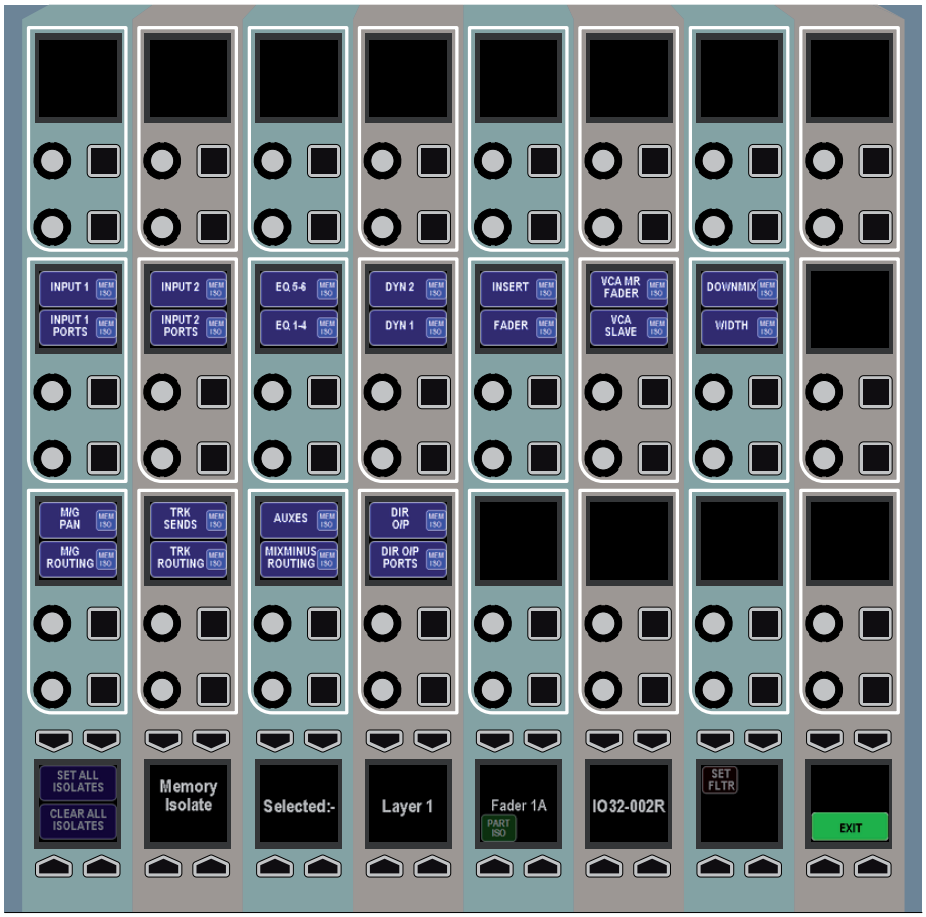
Once the required isolate elements have been set, press the EXIT button on the wild assign panel to return it to the previously used mode.

Applying isolation scope to multiple paths

Instead of applying the isolate settings to just the assigned path, it is possible to

FIGURE 3 - ACCESSING THE SCOPE OF THE MEMORY ISOLATE FUNCTION

FIGURE 4 - MEMORY ISOLATE MODE



quickly apply the settings to a number of paths at the same time.

To do this, press the SET FILTER button on the bottom row of the wild assign panel. This will change the appearance of the row to that shown in Figure 5. The elements to be isolated can now be selected as usual. Hold down the APPLY SEL button and press the assign buttons of the paths to which the settings should be applied.

While holding the APPLY SEL button, the path assign buttons may be in one of three states:

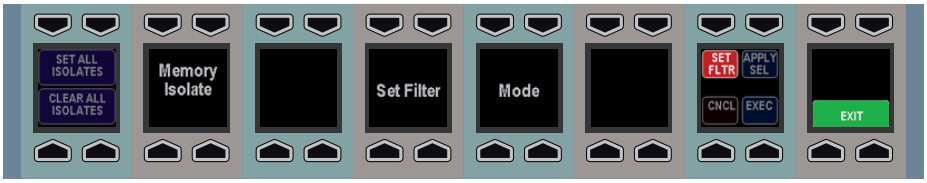
- Button not illuminated. The path has no isolate elements applied to it.
- Button illuminated continuously. The path already has some isolate elements applied to it. Not necessarily the current configuration of elements.
- Button illuminated but strobing. The user has pressed the assign key to assign the current configuration of isolate elements to the path. If the same assign button is pressed again, it will return to one of the above states depending on the path's previous state.

Once the necessary changes have been made the APPLY SEL button can be released. To apply the settings press the EXEC button, or to cancel them press the CNCL button.

Elements available for isolation

- Input 1 Settings
- Input 1 Ports
- Input 2 Settings
- Input 2 Ports
- Direct Output Levels
- Direct Output Ports
- Track Send Levels + Pan
- Track Routing
- Aux Send Levels and Routing
- Fader Level and Settings

FIGURE 5 - WILD ASSIGN ROW IN SET FILTER MODE



- Pan to Mains and Groups
- Routing to Mains and Groups
- Insert
- EQ Bands 1-4
- EQ Bands 5-6
- Dynamics Unit 1 (comp/lim, exp/gate)
- Dynamics Unit 2 (comp/lim)
- VCA Master Fader
- VCA Slave
- Stereo Width
- Downmix
- Mix Minus Routing

Most of these settings are self explanatory. The two which may require further explanation are VCA Master Fader and VCA Slave.

Isolating the VCA Master Fader element isolates the fact that a fader is a VCA master. If the fader is a master then any memories loaded will not change the fact that it is a master or alter any of its master settings (level, cut). Conversely, if the fader is not a master and this element is isolated, any memories loaded will not change it to become a master. This element does not isolate any slaves of the master in any way. If all slaves of this master are removed by a memory load, then the master has to be removed by default. It cannot exist without slaves. Also, if there is a slave path on the same fader (see the VCA Style Groups section for more details), and all other slave faders are removed, the master's settings are coalesced onto the same fader slave to preserve the mix detail.

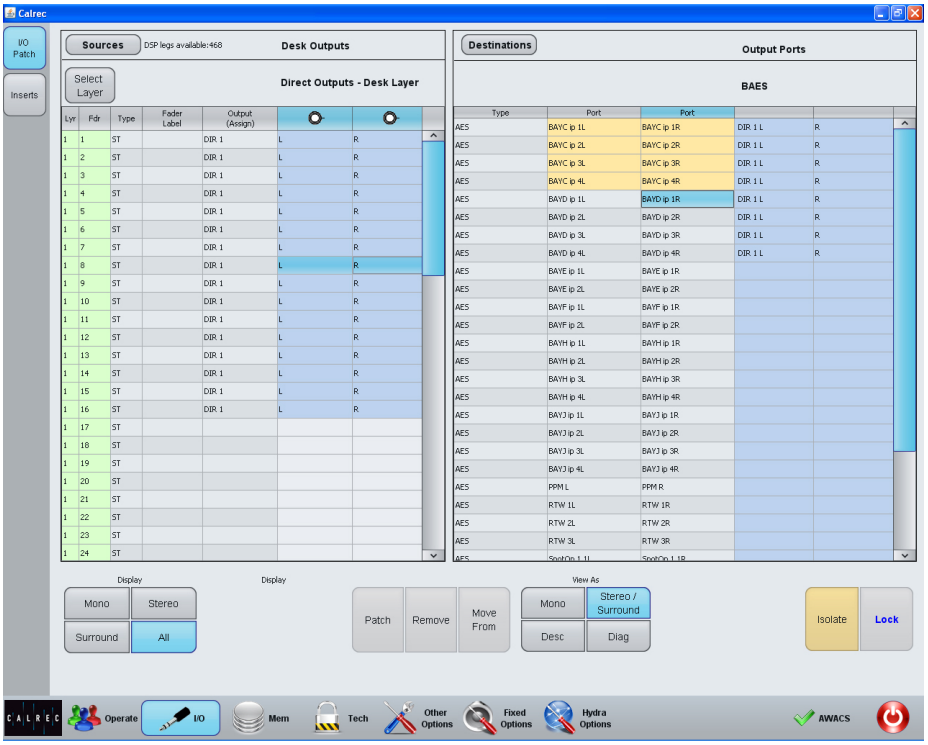
VCA Slave isolates the fact that the fader is a slave. It maintains its link to a certain master if that master still exists after a memory load (the master must be isolated individually). Similarly to the VCA Master Fader element, it also prevents the fader from becoming a slave due to a memory load operation if it is not one already.

Output port isolation

In addition to isolating paths (and possibly their associated ports) from memory load operations, output ports can have their patching isolated. To do this, select an output port and touch the ISO button as shown in Figure 6. It will be highlighted in a yellow color as an indication that it is now isolated.

Repeat the process to remove the isolation.

FIGURE 6 - ISOLATING OUTPUT PORTS



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CONSOLE FACILITIES

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ON AIR AND REHEARSE MODES

In addition to the normal mode of operation, the console can be switched into one of two modes which impose restrictions on certain console operations.

The broadcast facilities panel contains two buttons labelled REH (Rehearse) and ON AIR. Pressing either of these buttons sets the console to run in the relevant mode.

External interfaces can also trigger the console into switching these modes on or off with a signal sent via the console's general purpose inputs. For GPIO configuration please refer to the GPIO section.

On Air

On Air mode prevents the operator from performing certain actions that could be disastrous to the continued output of intended programme material. It currently imposes the following restrictions:

- Talkback to main outputs is disabled
- All other talkback dims control room loudspeakers
- All tone is disabled

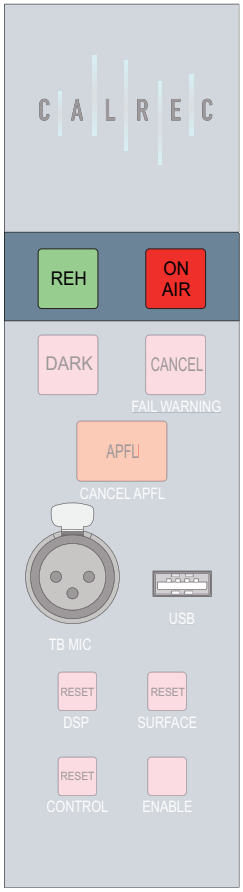
It can also be used to control an external interface (such as an On Air light in the studio) via the console's general purpose outputs. In this case, when the console was switched into On Air mode, the restrictions would be put in place and the On Air light would be lit.

Rehearse

The Rehearse mode provides similar functionality to the On Air mode but imposes a different and usually less severe set of restrictions on the console.

Currently Rehearse mode sets all talkback to dim the control room loudspeakers.

FIGURE 1 - BROADCAST FACILITIES PANEL



It also allows control over a separate external interface via GPOs than the On Air mode, such as a Rehearse light.

Neither mode selected

Restrictions can also be put in place when neither mode is selected. Currently the restrictions are the same as for rehearse mode.

SYSTEM RESET

In the unlikely event that a failure should occur at any point in the Apollo system, the fail component may be reset individually from the other system components.

Fail warning indicator

AWACS (Automatic Warning and Correction System) will detect any errors in the system and issue a warning to the operator. One warning indicator, the FAIL WARNING button, is located on the Broadcast Facilities Panel. This will flash when an error is detected. It can be pressed to acknowledge the error and will stop flashing, but will remain lit until the error has been corrected.

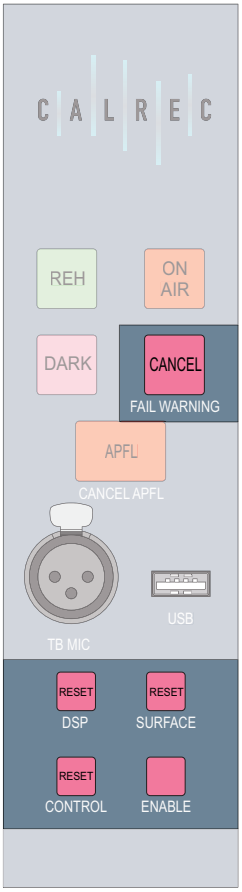
Reset buttons

Buttons on the Broadcast Facilities Panel allow the DSP, surface and control systems to be individually reset. To do this hold the appropriate button for the failed component and then press the ENABLE button.

Similar buttons are also available on the rack, with the addition of the Hydra2 reset button.

Be extremely cautious when resetting the Hydra2 Router/Expander system. If any other consoles on the same network are accessing ports on your system, they will experience signal loss during the reset period.

FIGURE 1 - BROADCAST FACILITIES PANEL



TECHNICIAN MODE

Technician Mode provides access to extra areas of the main application and allows certain restrictions to be placed upon operators.

For example, technicians may lock certain output ports to ensure the patches are never overridden by an operator.

Supervisors, Technicians and Users

There is a hierarchy of three user types in the system. Users are the lowest in the hierarchy and have normal access rights to operational and system settings. Technicians are given access to more critical system settings and operational features and can change their passwords once logged in. Supervisors have the same access as technicians, but also have the ability to create and delete other supervisors and technicians.

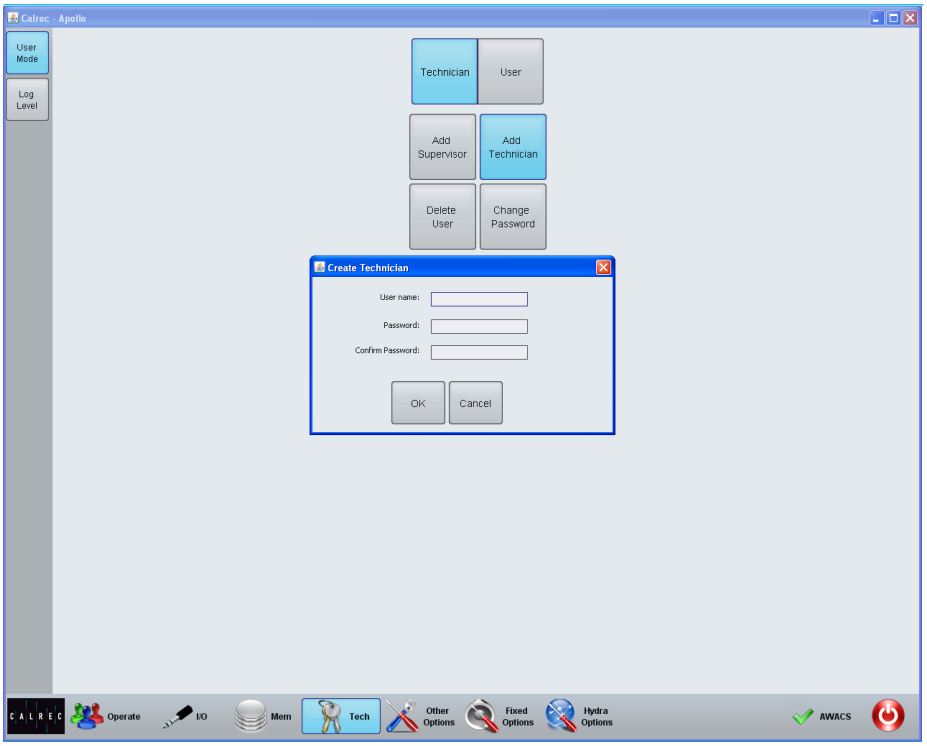
Accessing Technician Mode as a supervisor or technician

To access Technician Mode, navigate to the TECH section of the main application as shown in Figure 1. When in normal user mode, the USER button should be highlighted.

To log into Technician mode, touch the Technician button to bring up a dialog box requesting a username and password. Enter these details for any existing supervisor or technician account and touch the OK button.

If this is the first time that Technician mode has been accessed, or no supervisors have been configured yet, you will be prompted to create a supervisor account by entering a new username and password.

FIGURE 1 - TECHNICIAN MODE



Once this has been done, you should now be logged in to Technician Mode. As an indication of this, the TECHNICIAN button should now be highlighted and the TECH button on the main menu should be flashing.

Managing technician and supervisor accounts

There are three buttons on the USER MODE screen which are available to supervisors:

- ADD SUPERVISOR - Supervisors may create other supervisors. Touching this button will bring up a dialog prompting the new supervisor's details to be entered.
- ADD TECHNICIAN - Supervisors may create new technician accounts. Touching this button will bring up a dialog prompting the new technician's details to be entered.
- DELETE USER - Touching this button will bring up a dialog allowing the supervisor to select a user to delete.

Both supervisors and technicians have access to the CHANGE PASSWORD button which brings up a dialog in which a new password can be entered.

Exiting Technician Mode

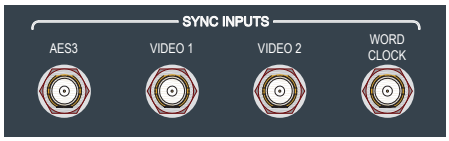
To exit technician mode, touch the USER button. Attempts to enter Technician Mode again will require entering a username and password.

SYNCHRONIZATION SOURCES

It is strongly recommended that the Apollo console is locked to the same external sync source as all the external equipment connected to Calrec digital IO to prevent audible interruptions to audio data. The Apollo can run on its own synchronization clock if no external source is provided and there are switch-able sample rate convertors on all digital inputs to adjust the sample rate of the incoming signal to match that of the console if required. If the console cannot receive the same sync source as the connected equipment, it is important to check the SRC's are switched in on the inputs of the equipment fed by Apollo outputs.

General rules of good practise dictate that all equipment in a facility are locked to the same house reference. For systems where multiple Apollo or Artemis consoles are connected together via a Hydra2 network, this becomes of paramount importance. **Each console and any standalone router racks must all be connected and locked to the same derived reference source to ensure the online status of the associated IO.**

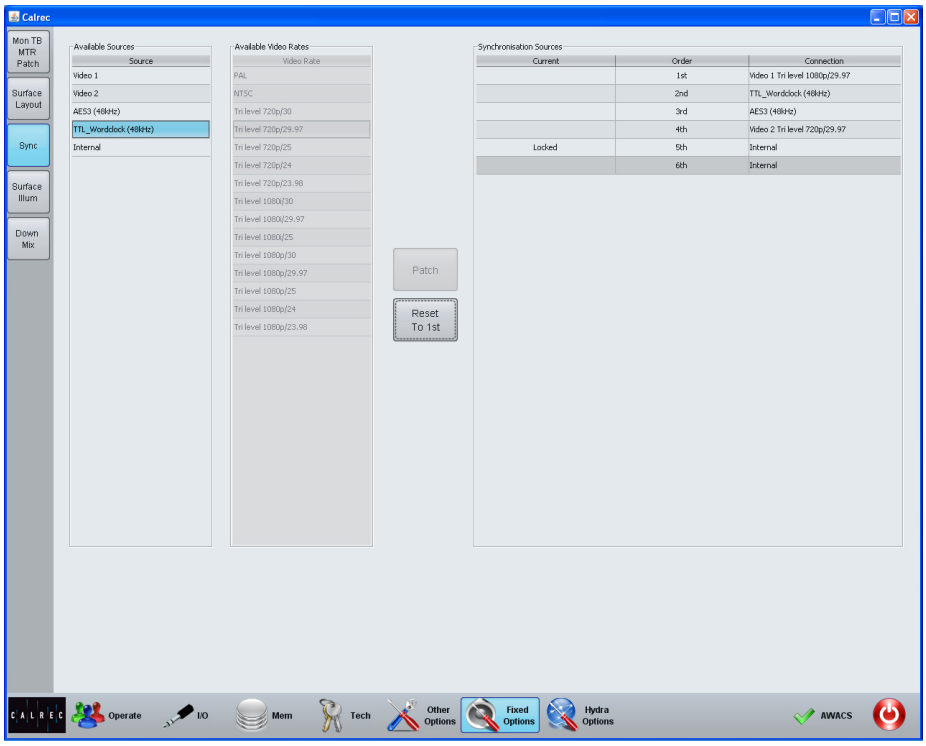
FIGURE 1 - SYNC INPUTS



Each console has external sync input connectors at the top of the front of their processing rack. Four inputs are provided on BNC connectors.

To select or change the console synchronization settings, the Main Application must be in technician mode (Select the Tech page, click on Technician at the top of the screen and enter a valid username and password. Whilst in Tech mode, the Tech page selector icon should flash).

FIGURE 2 - TECHNICIAN MODE



Sync settings are on the Fixed Options>Sync page. If not in tech mode, the "keys" icon will be displayed in the upper left and settings cannot be changed.

The available sync sources are displayed on the left. The selected sync sources are displayed in a list on the right. Only one sync source can be active at any given time and this is displayed as "Locked" by the Main Application.

On boot up or reset, the system will attempt to sync to the 1st source, at the top of the selected sync sources list. If it cannot lock to this source it will move down the list one at a time until a source is found that can be locked to. The last item in the selected sources list cannot be changed, this is fixed as internal to ensure that if no suitable external sync can be found that the console will run on its own reference clock.

The connectors on the rack are labelled for the format required on each. There is an input for TTL Wordclock, one for AES digital audio reference as well as two video inputs. Both video inputs can take analogue or digital video in PAL, NTSC or a variety of HD / Trilevel formats. When selecting video as a sync source, the video format should be selected from the centre of the sync screen for each instance of "video" in the selected list on the right.

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EXTERNAL INTERFACING

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Opto isolated General Purpose Inputs can be configured to allow the console to respond to external control signals. Conversely, the console can output control signals via relays to control external equipment.

Assigning GPIs

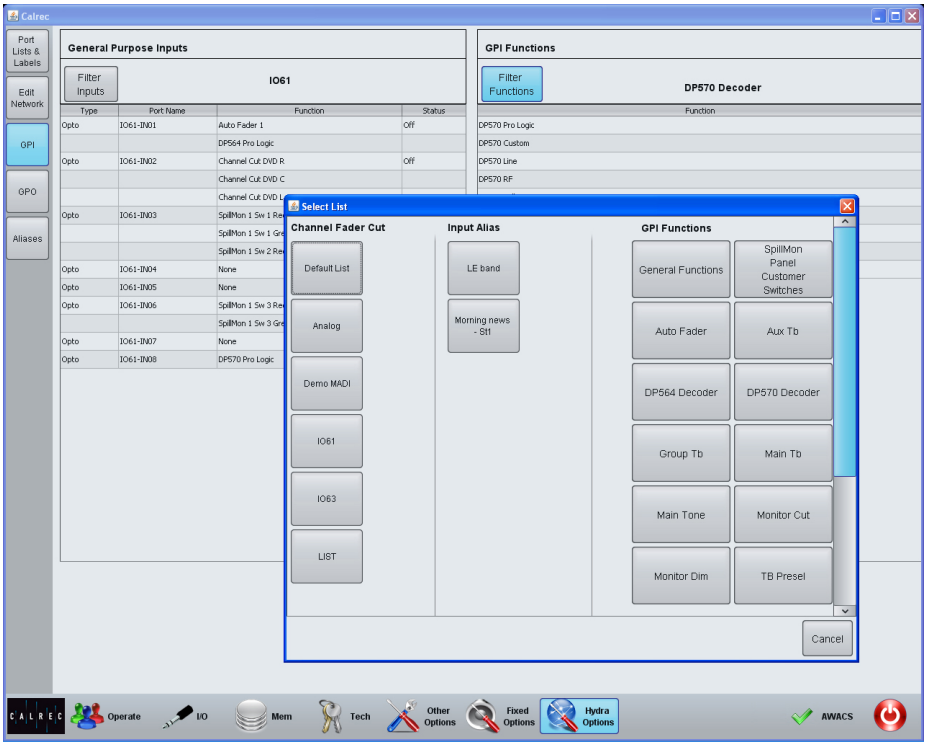
In the main application on the configuration PC, the HYDRA OPTIONS section contains a screen labelled GPI. The available GPI opto inputs are listed on the left hand side of this screen as shown in Figure 1. FILTER INPUTS allow rapid access to specific Hydra IO boxes.

The console functions which can be controlled by the optos are shown on the right hand side of the screen. Select an opto input and a console function and touch the PATCH button to make a connection between the two.

The list of GPI input ports can be filtered using the FILTER INPUTS button above the ports list. This will bring up a popup window showing the available port lists. Selecting a list will re-populate the post list using the selected filter.

The list of console functions can be filtered using the FILTER FUNCTIONS button. CHANNEL FADER CUT allows a GPI to mute any channel fader to which that port is routed. Other console functions that can have GPI control assigned to them include TX status (found under the GENERAL FUNCTIONS filter) and a variety of talkback, tone and monitor functions under the appropriate filter buttons.

FIGURE 1 - ASSIGNING GPI OPTOS TO CONSOLE FUNCTIONS



In addition to functions that control the console, the eight CUSTOMER SWITCHES at the base of the Monitor/ Spill panel all have colored indicators which can be assigned from GPIs.

GPIs can be assigned to control more than one function which can allow the CUSTOMER SWITCH indicators to have up to three different color states.

Assigning GPOs

The GPO screen in the HYDRA OPTIONS section provides a similar method of assigning console functions to a GPO relay. The list of console functions is shown on the left of the screen and is again organized into various sections. These sections may be accessed by using the FILTER FUNCTIONS button.

The CHANNEL FDR OPEN button beneath the functions list allows selection of any fader on the surface to use its fader open function as a GPO trigger. The OTHER FUNCTIONS includes GENERAL FUNCTIONS such as the ON AIR light and the SPILL MON panel button allows the general purpose switches beneath the monitor level control on the Spill/Monitor panel to be assigned to control outputs.

The CHANNEL FDR OPEN button beneath the functions list allows selection of any fader on the surface to use its fader open function as a GPO trigger.

GPO signal type

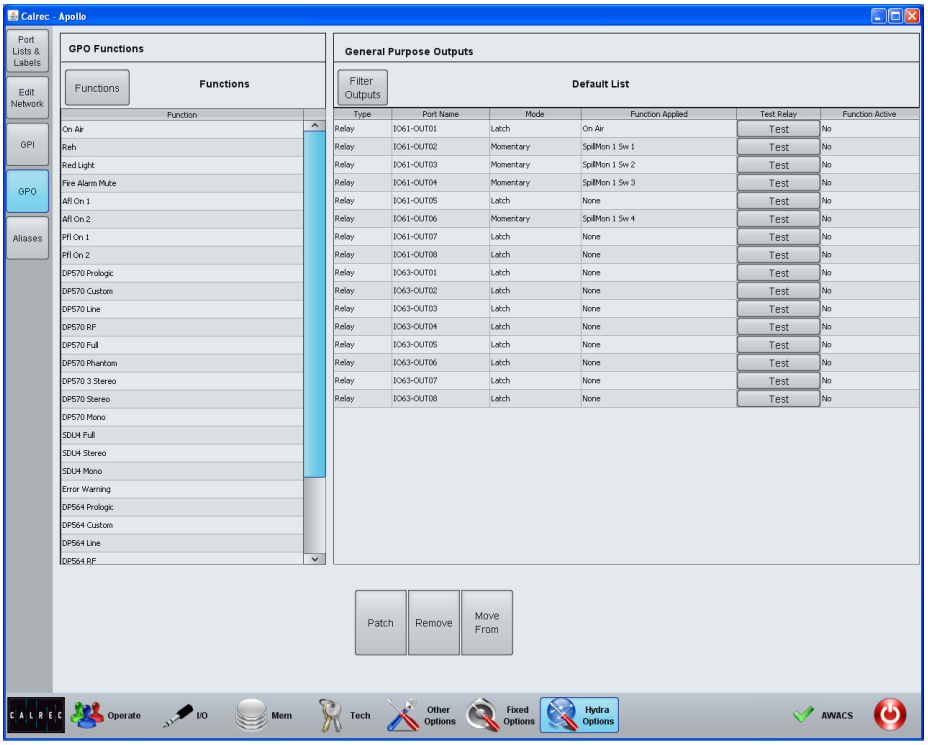
When patched from most control outputs, GPO signals are set to Latch mode. Latch mode causes the relay to remain activated indefinitely. For example, a relay controlled by a fader open function will remain activated the entire time that fader is open.

Assigning GPOs to the Spill/Mon switches changes their mode from Latching to Momentary so the relay is activated only for a fraction of a second each time the button is pressed. Continuing to hold the button down has no effect on the relay operation.

Test GPO

A test button is present on every GPO output to manually trigger the GPO signal.

FIGURE 2 - ASSIGNING CONSOLE FUNCTIONS TO GPO RELAYS



EXTERNAL INPUTS

Apollo provides 176 mono external input resources for use in the monitoring and metering systems.

As with other resources in the system, this pool of mono resources can be used to make up any path width from mono to surround. A 5.1 input would use up six of the available mono resources.

Configuring external inputs

To set the width for an external input, navigate to the MON MTR EXT I/P screen in the OTHER OPTIONS section of the main application. Select one or more external inputs from the list and then select the required width from the buttons below, as shown in Figure 1.

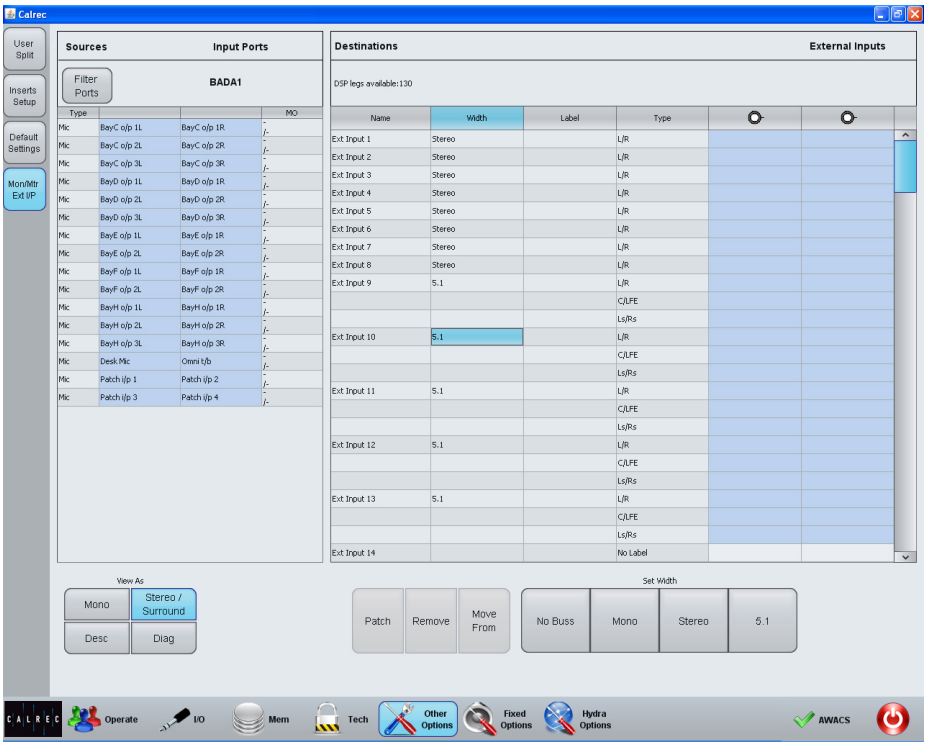
Patching external inputs

Once the external input resources have been configured, patching is preformed in the same was as all other patching in the system. Use the FILTER PORTS button in the SOURCES list to select the required input ports, then select the required external input and touch the PATCH button.

Monitoring external inputs

External inputs appear in the monitor selection area of the wild assign panel touchscreen in Monitor mode. The signals may be monitored in the same way as any other signal in the system. Please refer to the Monitoring section of this document for more information.

FIGURE 1 - EXTERNAL INPUTS



APOLLO
AWACS

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AWACS

Apollo features an Advanced Warning And Correction System which reports warnings, faults and information to the user.

The AWACS system monitors all system components and connections

AWACS notifications

Under normal operating circumstances, the AWACS icon in the menu bar at the bottom of the main application will show a green tick or check indicator.

In the event that a message needs to be displayed to the user, a red cross or warning indicator will appear. Touching this icon will bring up the AWACS screen as shown in Figure 1.

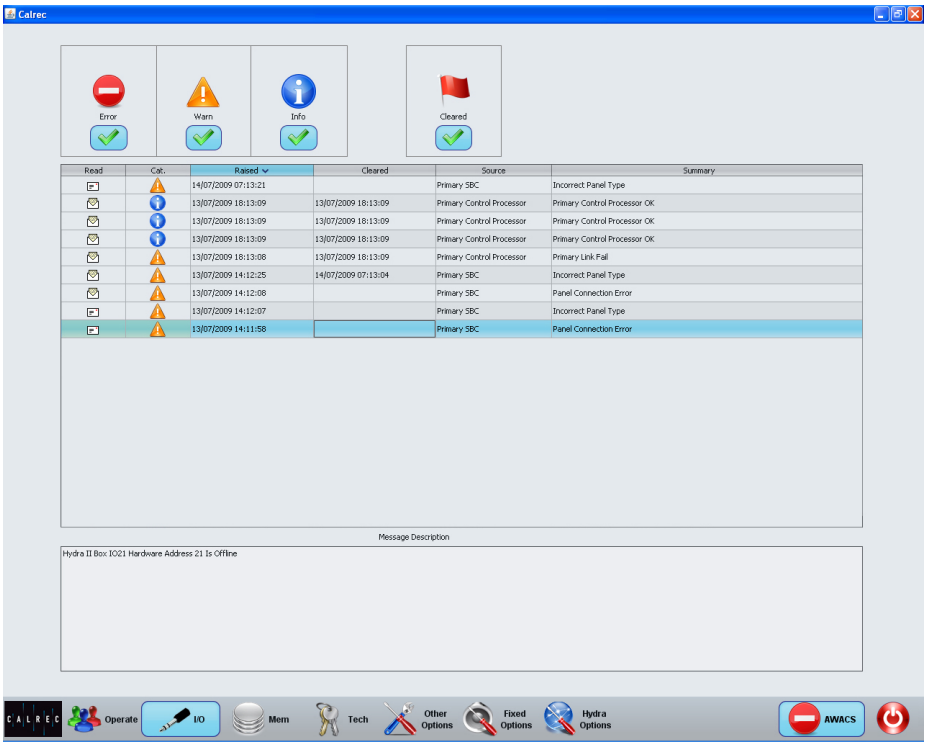
Message types

Three types of message are reported by AWACS:

- Information Messages - Inform the user when certain actions take place. They do not report errors, and no action needs to be taken to respond to them
- Warning Messages - Indicate where the system has located a fault or failure, but will still operate without intervention from the user. The message should be checked as the system may be running on its secondary components.
- Error Messages - Report a serious error that could cause, or has caused the system to fail. Normally requires user intervention to correct the problem before operation can continue.

The messages are reported in a list, as shown in Figure 1. Each message in the list has an associated icon shown in the left column. This identifies the type of message to the user. Message types can be filtered using the buttons above the list.

FIGURE 1 - AWACS SCREEN



Selecting a message in the list will update the MESSAGE DESCRIPTION area below to show the message in greater detail.

Clearing messages

Information messages can be cleared by selecting them and then leaving the AWACS screen.

Warning and Fatal Error messages can only be cleared by correcting the error and restoring the system to its normal operational state.

Surface indication

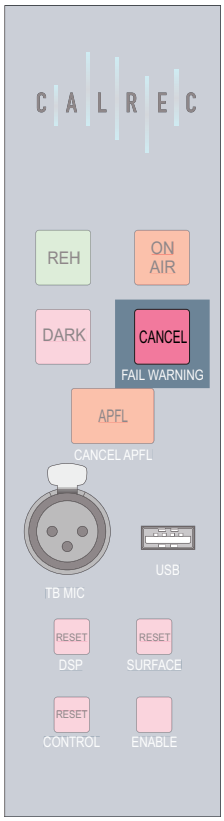
In addition to the main application displaying an AWACS indicator when a message is created, the FAIL WARNING button on the broadcast facilities panel will also flash. This is shown in Figure 2. Pressing this button when it is flashing will cause it to stop flashing and remain illuminated. This will let the system know that the user has acknowledged the error but has not necessarily cleared it.

External indication

It is also possible to set an external indicator to flash when an error message is reported. The FAIL WARNING GPO function should be patched to the relevant GPO port to which the required indicator is connected.

For a more detailed explanation of the GPIO functions of the system, refer to the GPIO section of this document.

FIGURE 2 - SURFACE FAIL WARNING INDICATOR



APOLLO
VERSION CHANGES

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SOFTWARE RELEASE FEATURES

Please note that some version numbers are not generally released for all products, and are therefore not documented here.

V1.3
- Second compressor/limiter in all path dynamics processing units.
- Downmix controls
- Partial memory isolates
- Processing independence for surround spill controls
- VCA style groups
- Surround channel input delay
- Autofaders
- Support for the joystick panel

V1.4
- External tone input enabled
- Monitor panel buttons for GPIO
- Channel cut from GPI
- User defined TFT meter layout

V1.4CTA
- Dolby unit control using GPIO
- Monitor insert
- Alias file support added
- Port labels and device names exchanged via Ember. EMBER client may read and edit IO box and port labels.
- Multi-router software with redundancy.
- Backup of 3rd party routes.
- Basic SWP-08 port patching and tally (TCP/IP). Patching of input ports to output ports.
- New sync screen and Tri Level sync inputs to allow sync priority to be defined.
- PFL to small LS

V1.5
- Selectable LoRo or LtRt downmixes on main outputs.
- Support for IC5717 dual fader panel.

V1.6
- BILITS tone ident added to oscillator
- EQ available in dynamics sidechain
- Bus output delay
- Saving shows as defaults.
- M/S switching on meter selectors

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