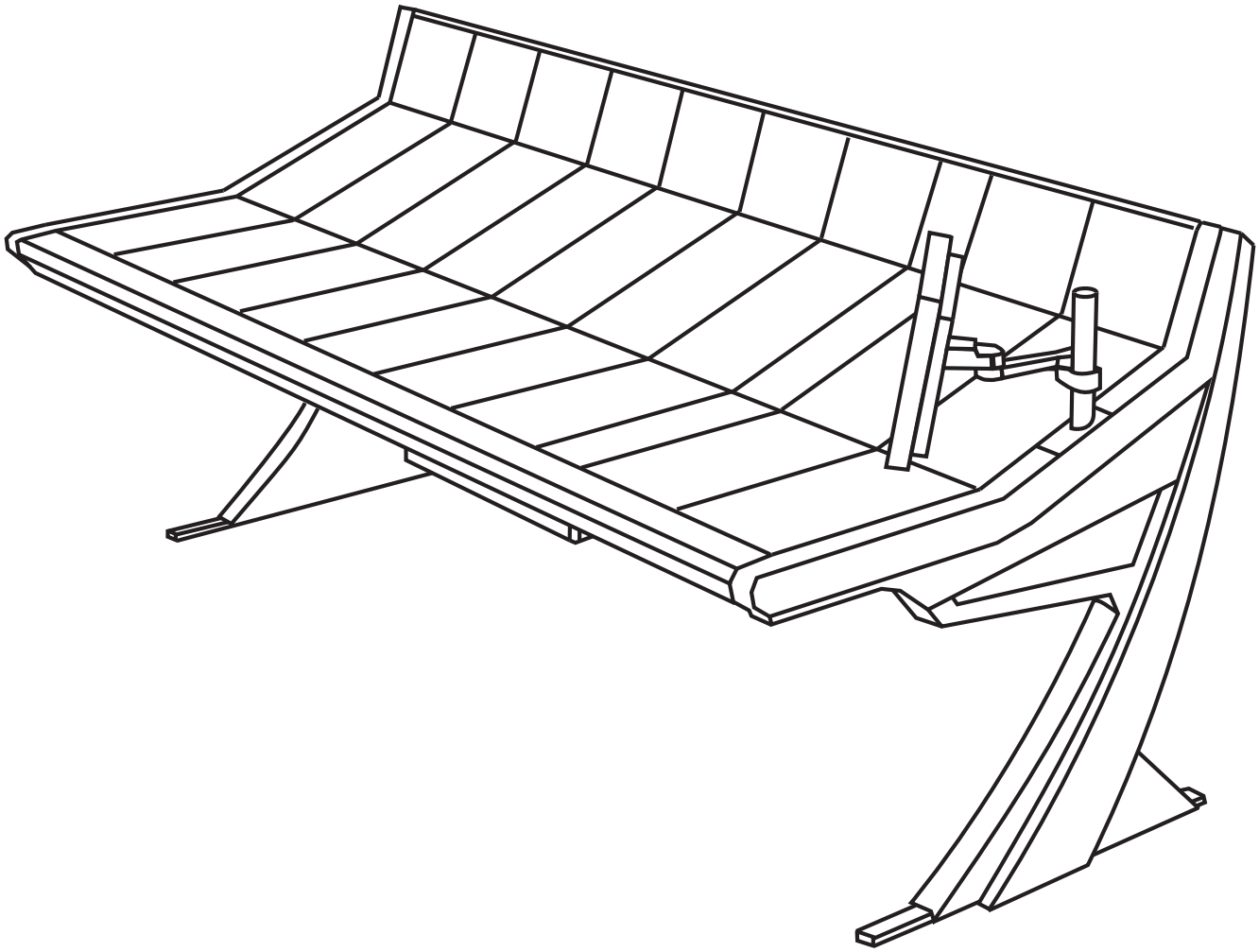
APOLLO INSTALLATION MANUAL



Digital Broadcast Production Console

CALREC

Putting Sound in the Picture

calrec.com

Calrec Audio Ltd
Nutclough Mill
Hebden Bridge
West Yorkshire
England UK
HX7 8EZ

Tel: +44 (0)1422 842159
Fax: +44 (0)1422 845244
Email: enquiries@calrec.com

calrec.com

APOLLO
CONTENTS

APOLLO
INFORMATION

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.

Third Party Equipment
Integrating third party equipment into a Calrec system may compromise the product's ability to comply with the Class B radiated emission limits set in the EMC (Electro Magnetic Compatibility) standard EN55022.

Calrec Audio Limited can not be responsible for any non-conformities due to use of third party equipment. If in doubt, please contact Calrec Audio Limited for guidance prior to integrating any third party equipment.

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: 2000 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.

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).

FIGURE 1 - DANGEROUS VOLTAGES

FIGURE 2 - IMPORTANT INSTRUCTIONS

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 using the information 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.

FIGURE 1 - CONTACT INFORMATION

Address	Customer Support Calrec Audio Ltd Nutclough Mill Hebden Bridge HX7 8EZ England UK
Telephone	+44 (0) 1422 842159
Fax	+44 (0) 1422 845244
Email	support@calrec.com
Website	www.calrec.com

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.

APOLLO
SURFACE AND RACK

SURFACE DIMENSIONS AND ASSEMBLY

The Apollo surface can be customized in terms of width and fader count and can be provided with a number of stand and trim options.

The surface can be mounted on a floor stand or supplied for desk top mounting.

Floor stand

Figure 1 shows the end elevation measurements for the Apollo surface when mounted on a floor stand.

Desk top mounting

The desk top mounting end elevation is shown in Figure 2. Exact mounting point locations can vary according to the specific installation and should be requested from a Calrec project manager.

Regardless of the size and arrangement of the surface, the end elevation dimensions will remain the same for each mounting type.

Leg measurements

Figure 3 illustrates the internal and external (including trim) leg spacing for a 56 fader surface.

Surface width

Figure 4 illustrates the total width of the surface including the 50mm end trim at each end. A slightly narrower surface can also be provided with only a 10mm trim at each end when space is at a premium.

Depending on the frame size of the console, these dimensions may vary and should be confirmed with a Calrec Project Engineer.

Surface sizes

Apollo surface sizes are given in the number of fader modules they can contain. The standard module is 250mm [9.84"] wide and can contain eight faders across its width. The half width module is

FIGURE 1 - FLOOR STAND END ELEVATION

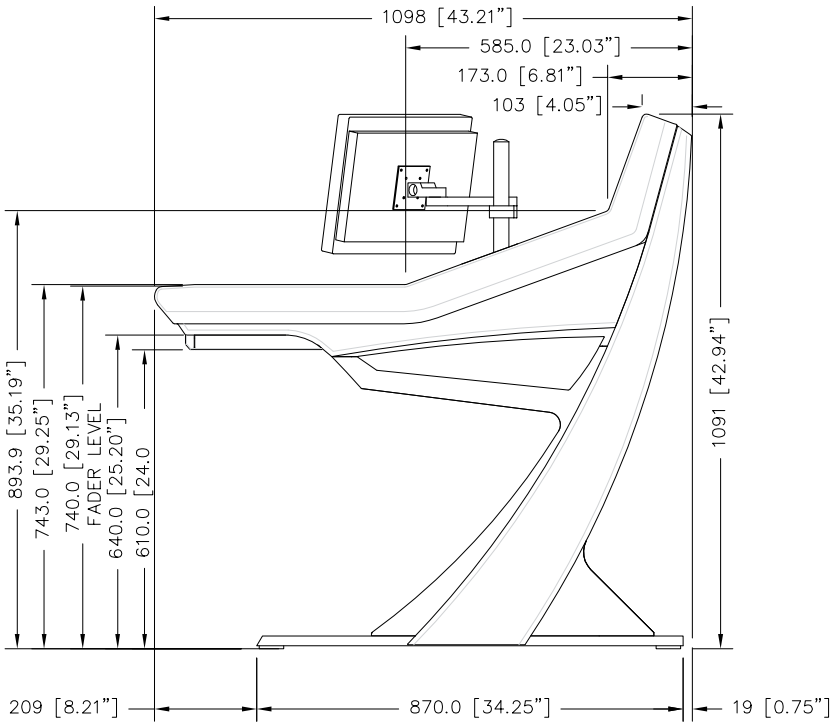
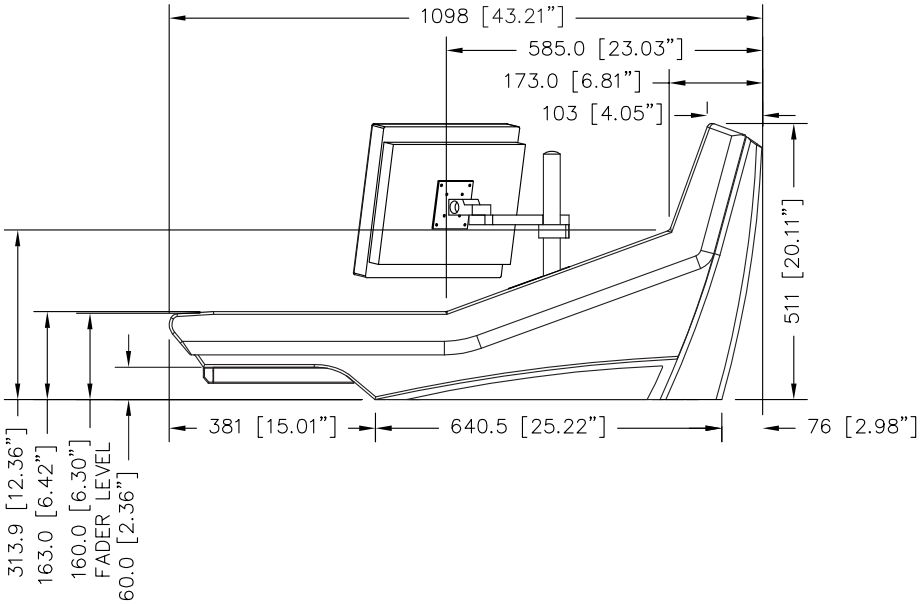


FIGURE 2 - DESK TOP STAND END ELEVATION



130mm [5.12"] wide. Therefore a surface which is 6.5 modules in width will contain six 250mm modules and one 130mm module.

Each surface is made up of a number of frames. Standard frame sizes are 2, 2.5 and 3 modules wide each. Each frame is as wide as the modules it can contain, plus a 2.5mm [0.098"] bulkhead at either end.

Typical surface measurements

Measurements for typical surface widths are shown in Figure 5. These include the 50mm trim at each end and the half width modules. For the desk top mounting, the leg dimensions may be discarded although the external measurements still apply.

FIGURE 3 - LEG MEASUREMENTS

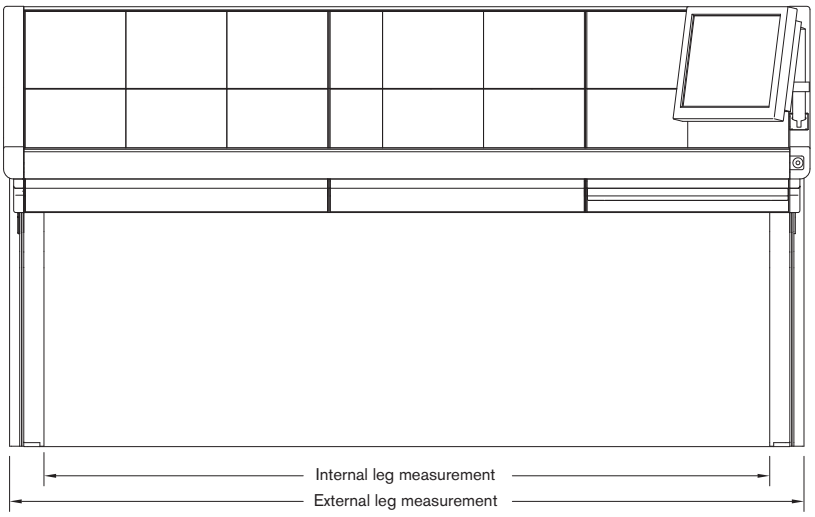


FIGURE 4 - TOTAL SURFACE WIDTH

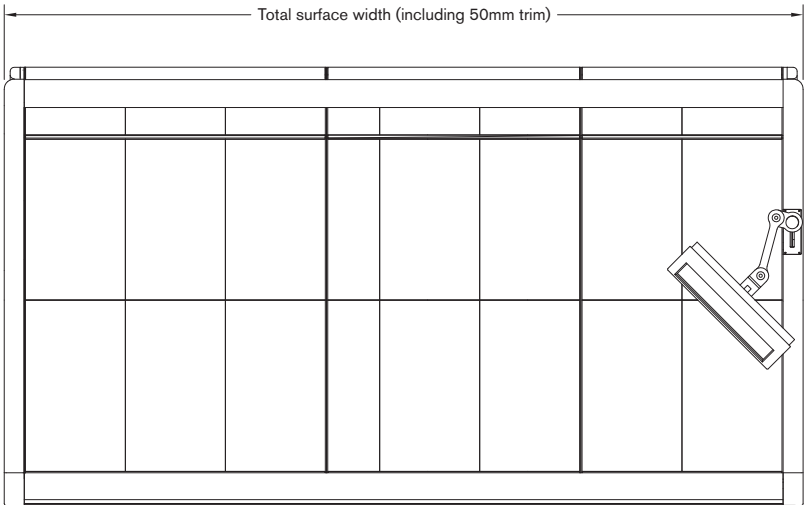


FIGURE 5 - TYPICAL SURFACE MEASUREMENTS

Modules	Frame sizes	Max Surface Width including 50mm trim at each end	Max Surface Width including 10mm trim at each end	Internal Leg	External Leg
6.5	2, 2.5, 2	1748mm [68.82"]	1668mm [65.67"]	1548mm [60.94"]	1718mm [67.64"]
7.5	3, 2.5, 2	1998mm [78.66"]	1918mm [75.51"]	1798mm [70.79"]	1968mm [77.48"]
8.5	3, 2.5, 3	2248mm [88.50"]	2168mm [85.35"]	2048mm [80.63"]	2218mm [87.32"]
9.5	2, 3, 2.5, 2	2504mm [98.58"]	2424mm [95.43"]	2304mm [90.71"]	2474mm [97.40"]
10.5	2, 3, 2.5, 3	2754mm [108.43"]	2674mm [105.28"]	2554mm [100.55"]	2724mm [107.24"]
11.5	2, 3, 2.5, 2, 2	3010mm [118.50"]	2930mm [115.35"]	2810mm [110.63"]	2980mm [117.32"]
12.5	2, 3, 2.5, 3, 2	3260mm [128.35"]	3180mm [125.20"]	3060mm [120.47"]	3230mm [127.17"]

Access to surface connections

All power and data connections to the surface are made through a small cut-out at the lower left of the rear of the surface. Power is supplied to the surface via two IEC connectors above this cutout. These are shown in Figure 6.

Access to surface internals

The rear of the surface is hinged to provide access to internal surface components. The hinged panels are fixed by screws along their upper edges as shown in Figure 6. Once unscrewed they can be carefully lowered. They will support their own weight at the end of their travel and require a certain amount of space at the rear of the surface for access as shown in Figure 7.

FIGURE 6 - SURFACE REAR

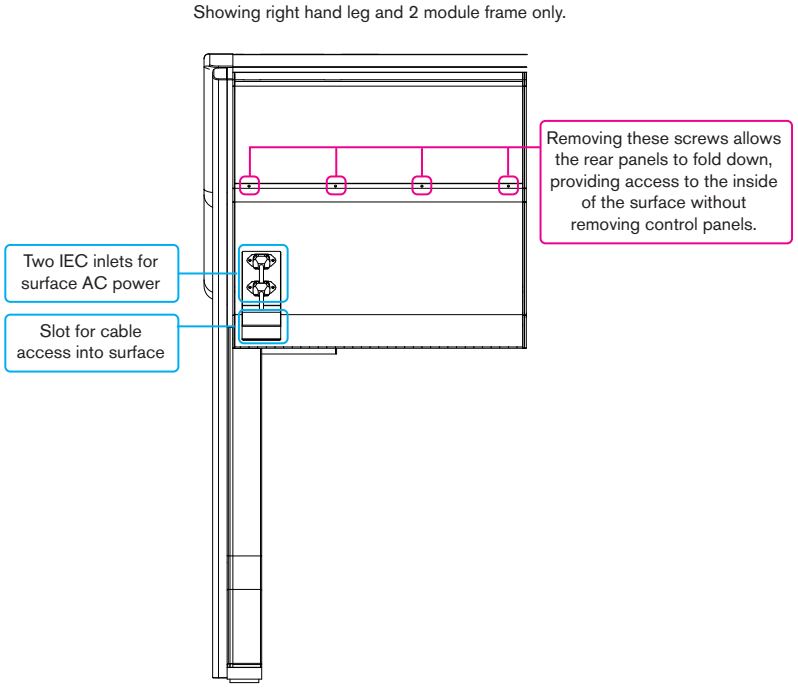
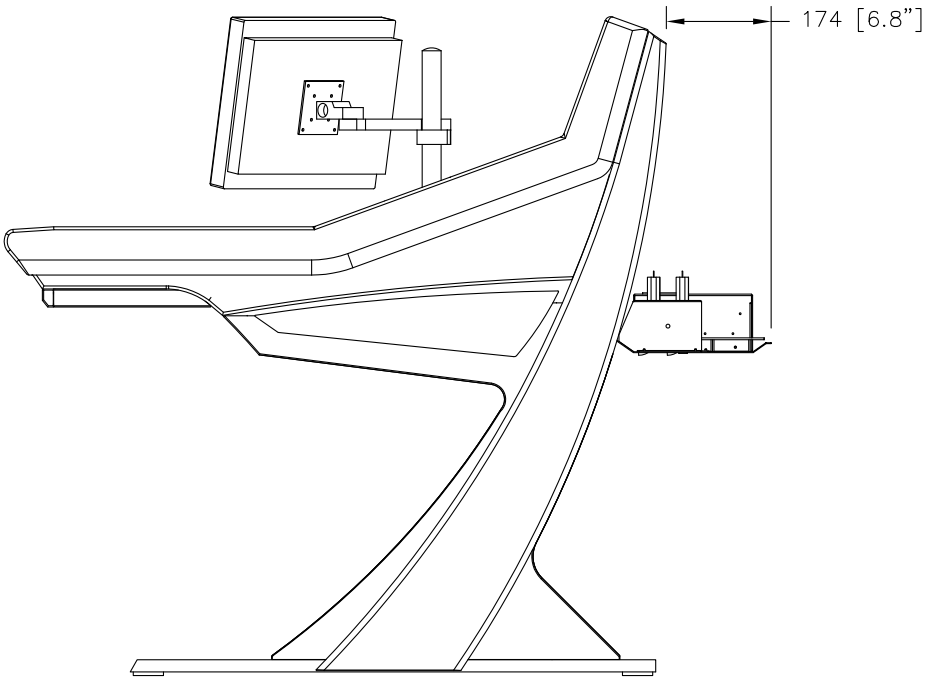


FIGURE 7 - ACCESS SPACE REQUIRED BEHIND SURFACE



FLOOR STAND LEG ASSEMBLY

The floor stand legs are made up of a number of structural components and external trims.

Figure 1 illustrates each component that makes up the left and right surface floor stands. The same colors and labels are used in the assembly procedure shown in Figures 2-10.

FIGURE 2 - STAND ASSEMBLY STEP 1

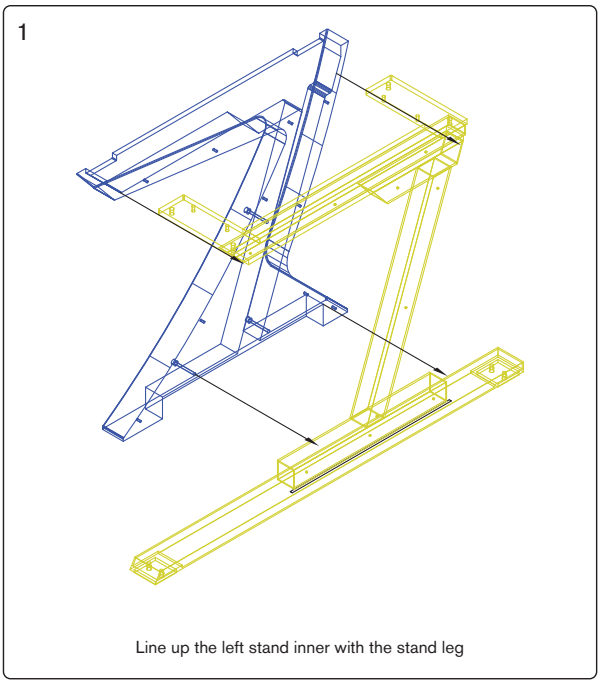


FIGURE 1 - STAND COMPONENTS

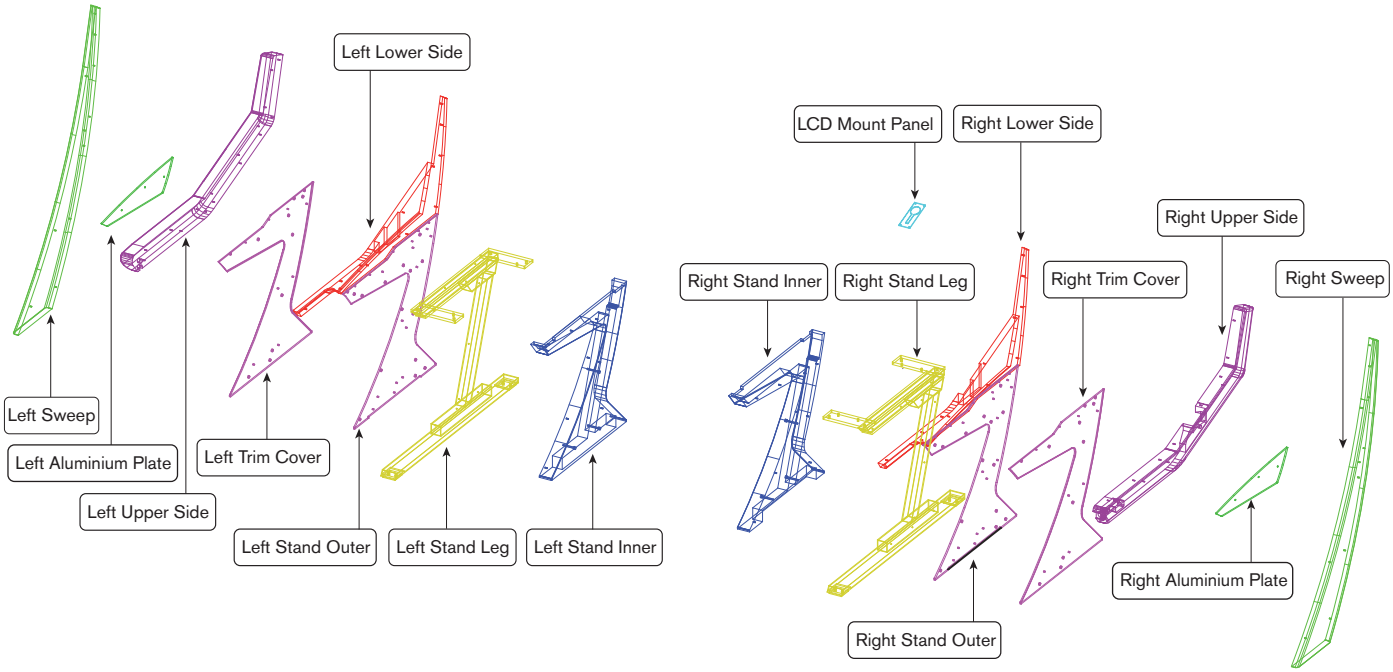
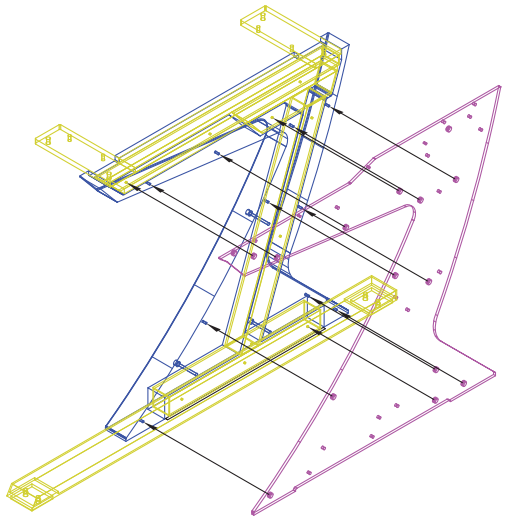


FIGURE 3 - STAND ASSEMBLY STEP 2

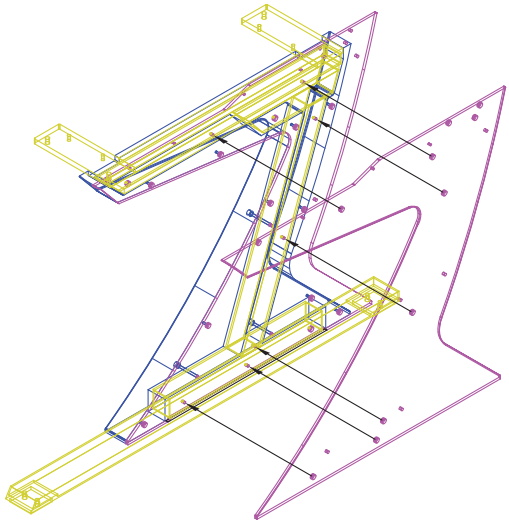
2



Fasten stand outer.
M4x10mm pozi pan **x13**

FIGURE 4 - STAND ASSEMBLY STEP 3

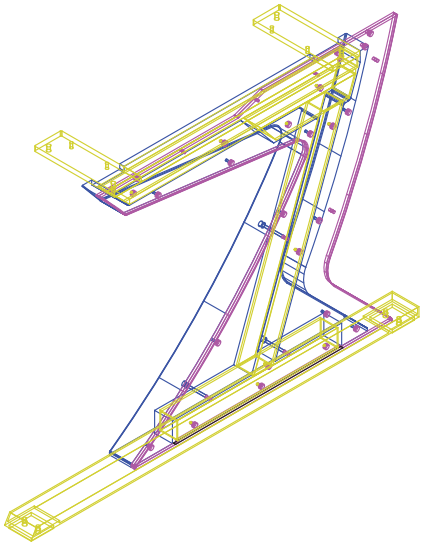
3



Fasten trim cover.
M4x16mm pozi pan **x7**

FIGURE 5 - STAND ASSEMBLY STEP 4

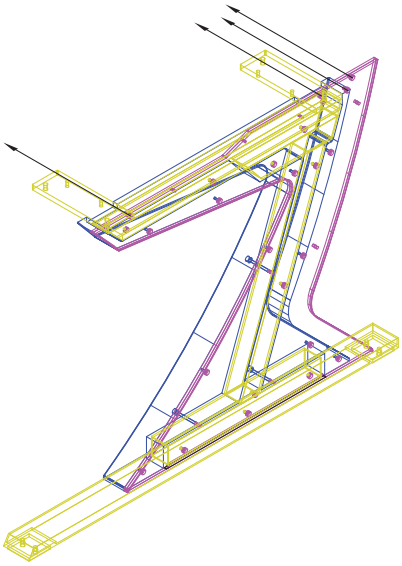
4



The stand unit is now complete. If breaking down the desk, never separate the trim and leg assembly below this state.

FIGURE 6 - STAND ASSEMBLY STEP 5

5



Fasten trim cover to desk bulkhead with
M4x30mm socket head **x4**

FIGURE 7 - STAND ASSEMBLY STEP 6

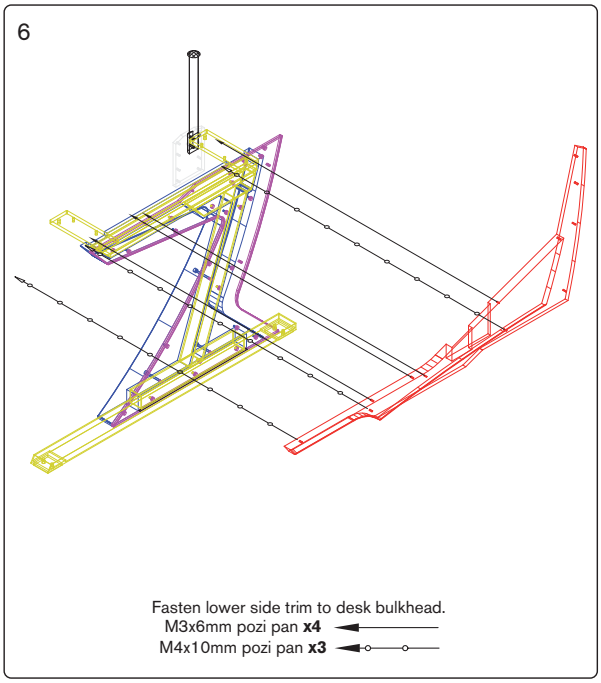


FIGURE 8 - STAND ASSEMBLY STEP 7

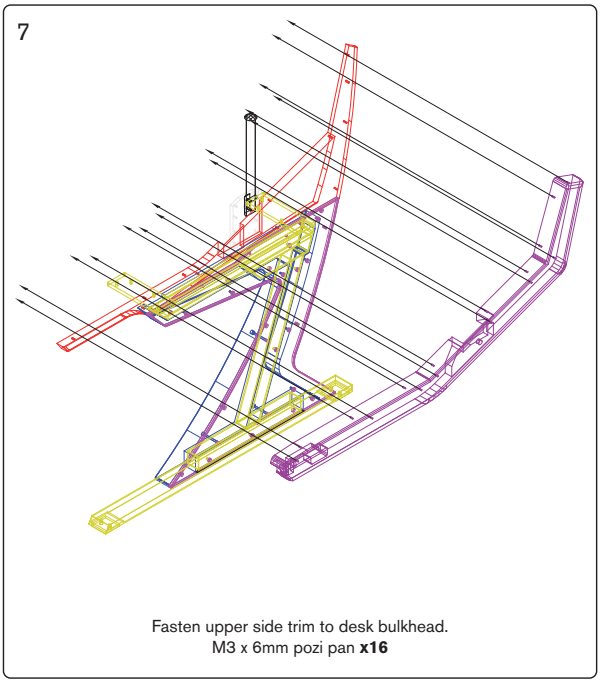


FIGURE 9 - STAND ASSEMBLY STEP 8

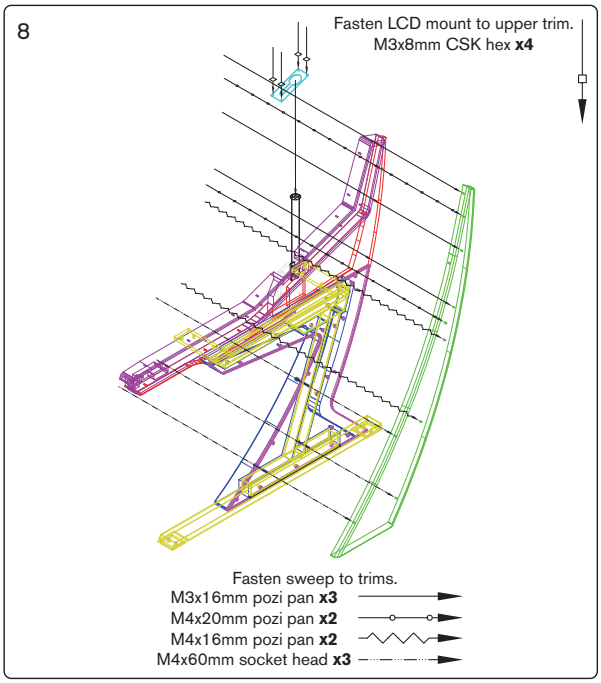
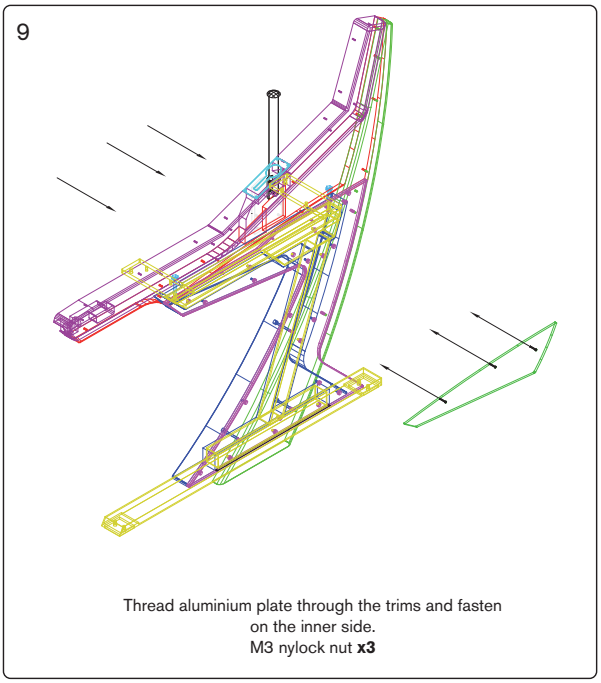


FIGURE 10 - STAND ASSEMBLY STEP 9



INTERNAL SURFACE COMPONENTS

There are a range of components within the surface. This section explains how these components are connected, receive power and communicate with one another.

Surface switch

The surface switch, shown in Figure 1 provides the link between the Control Processor in the rack and the POE switches in the surface. There are two surface switches within the surface to provide full redundancy. The MAC7 socket on Control Processor 1 connects to the 'A' socket on the first surface switch. Control processor 2 connects to the 'A' socket in the second surface switch.

The S1 and S2 ports on each POE Switch are connected to the same PS (1-6) port on both surface switches. These should be connected according to their physical location from left to right, for example the left most POE switch would connect its S1 and S2 ports to the PS1 port on both surface switches. The POE switches will be numbered in the software according to their surface switch port location.

The surface switches receive power through the PR1 and PR2 inputs. These should both be connected to provide full redundancy. Power is fed to these from the SPR1 and SPR2 ports on any POE switch. Connections from two different POE switches should be made to maintain redundancy.

POE (Power Over Ethernet) switch

Data received from the rack via the surface switches is distributed to all connected POE switches. A POE switch distributes both power and control data over Ethernet to a maximum of six panels in the surface. The POE switch is shown in Figure 2.

Dual IEC inlets are provided for AC power redundancy and are connected to the internal AC power distribution. The 'POWER GOOD' LEDs indicate the presence of the required AC supply to both AC input 1 and 2.

The collection of Ethernet ports marked 'A' provide connectivity between surface panels and the surface switches. Ports marked S1 and S2 connect to surface switches 1 and 2 respectively.

The collection of Ethernet ports marked 'B' provide power and reset message connectivity. The AP1-4 ports provide ancillary power to panels which may require it. The dual fader panel, for example, requires a secondary power

FIGURE 1 - SURFACE SWITCH

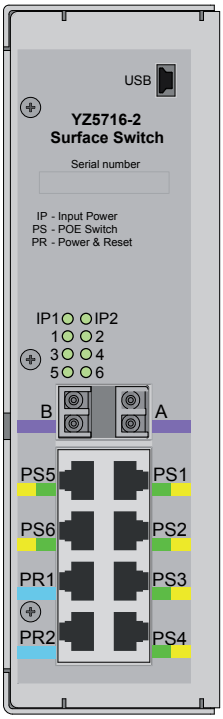
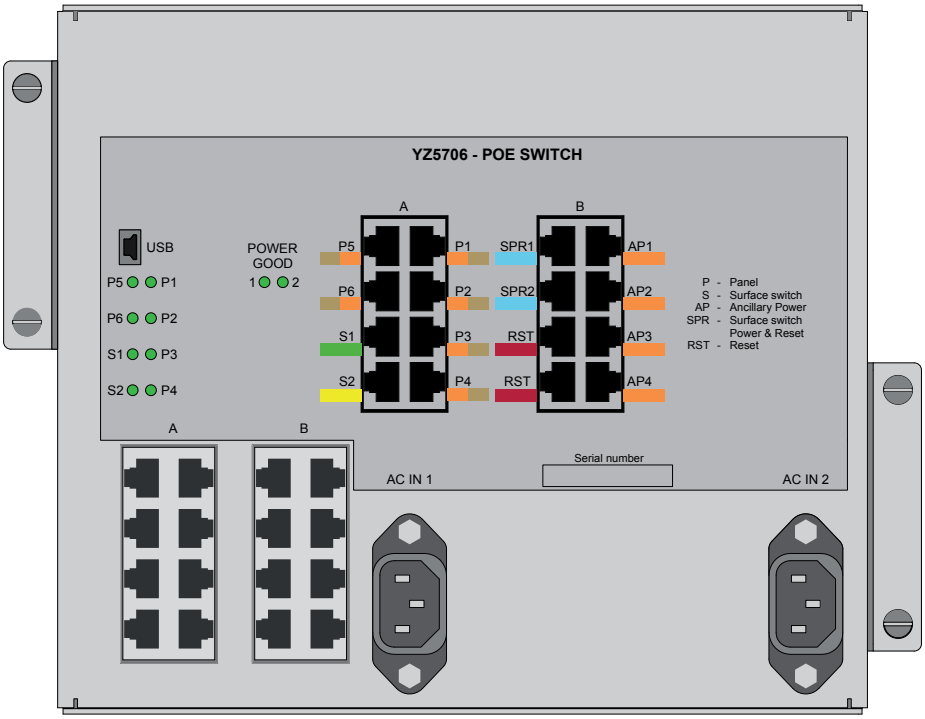


FIGURE 2 - POE SWITCH

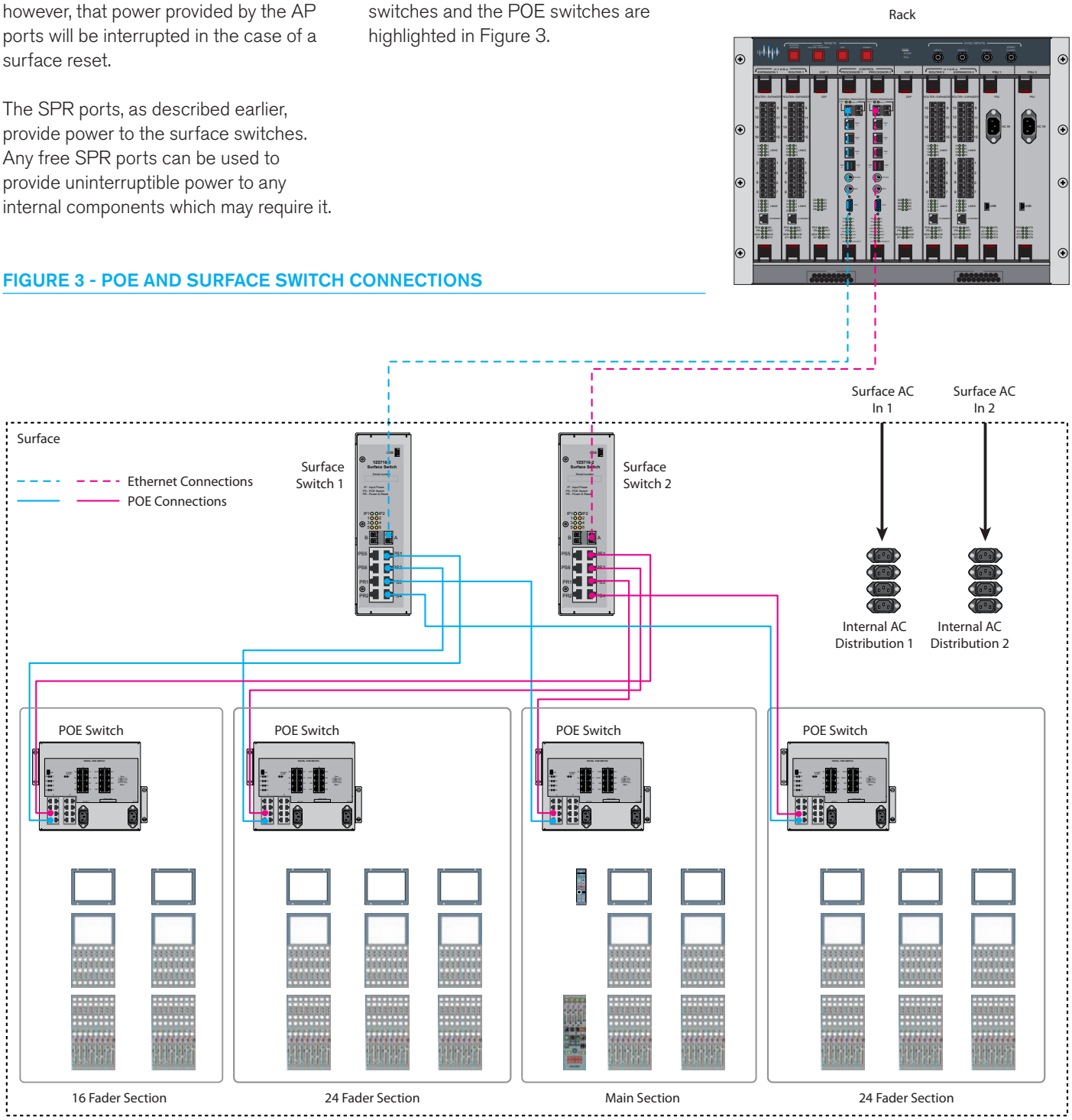


connection form one of these AP ports to drive the second row of faders. Note however, that power provided by the AP ports will be interrupted in the case of a surface reset.

The SPR ports, as described earlier, provide power to the surface switches. Any free SPR ports can be used to provide uninterruptible power to any internal components which may require it.

Connections between the rack and surface switches, and the surface switches and the POE switches are highlighted in Figure 3.

FIGURE 3 - POE AND SURFACE SWITCH CONNECTIONS



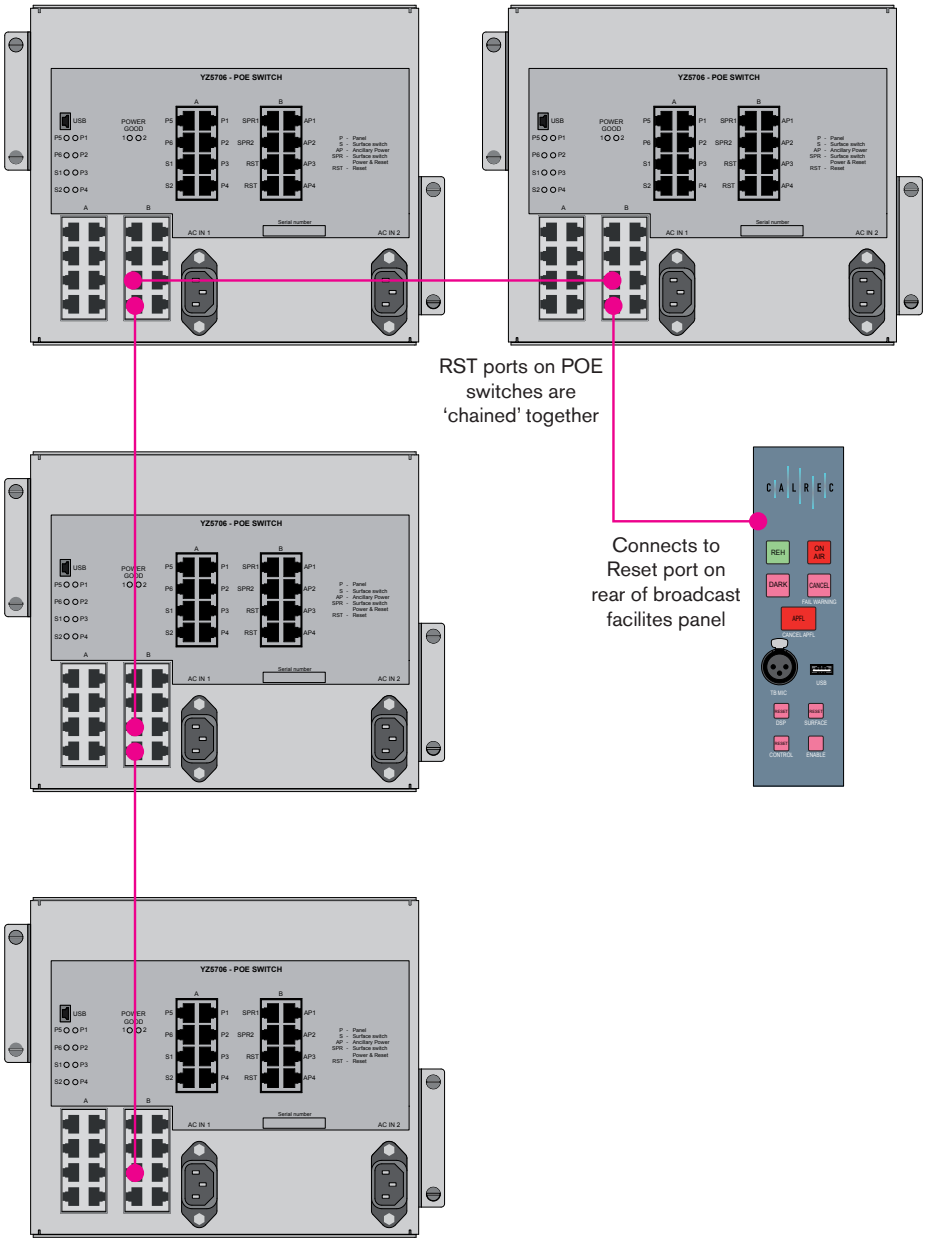
Reset connections

The RST ports are used to connect and route reset messages through the system. The broadcast facilities panel has two connections on the rear, one to be connected to the normal panel ports (labelled P1-6) which provides control data and power, and the other which sends out reset messages when any reset buttons are pressed. This should be connected to one of the RST ports on a POE switch.

The second RST port is used to link the reset signals to another POE switch, which in turn creates a chain to the other POE switches.

Reset signal connections are shown in Figure 4.

FIGURE 4 - RESET CONNECTIONS



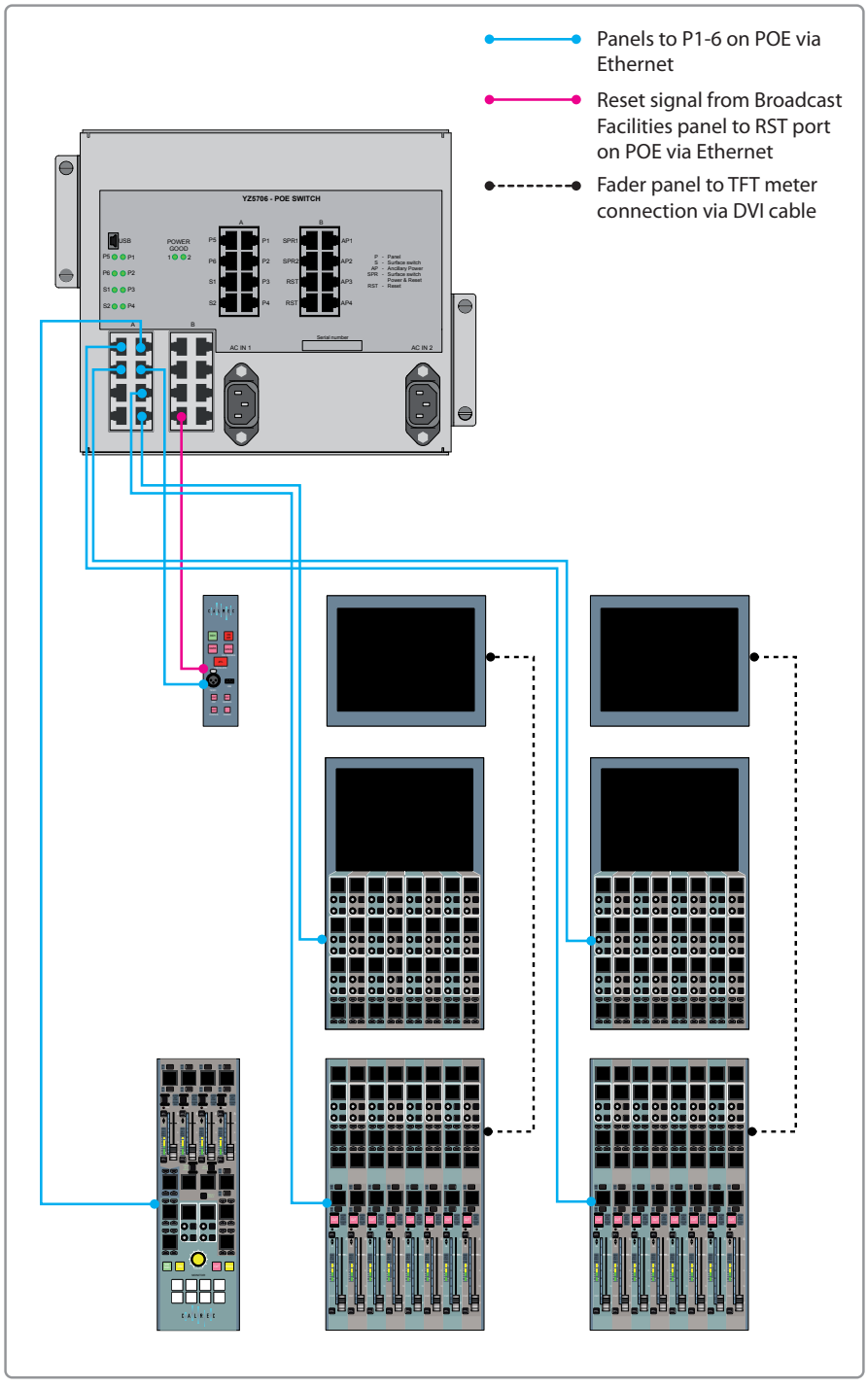
Panel connections
Surface panels connect to ports P1-P6 which provide both power and data.

TFT meters receive power and data via a DVI cable connected to a Fader panel.

Note that this is not a true DVI signal, and as such should not be connected to any true DVI equipment.

These connections are shown in Figure 5.

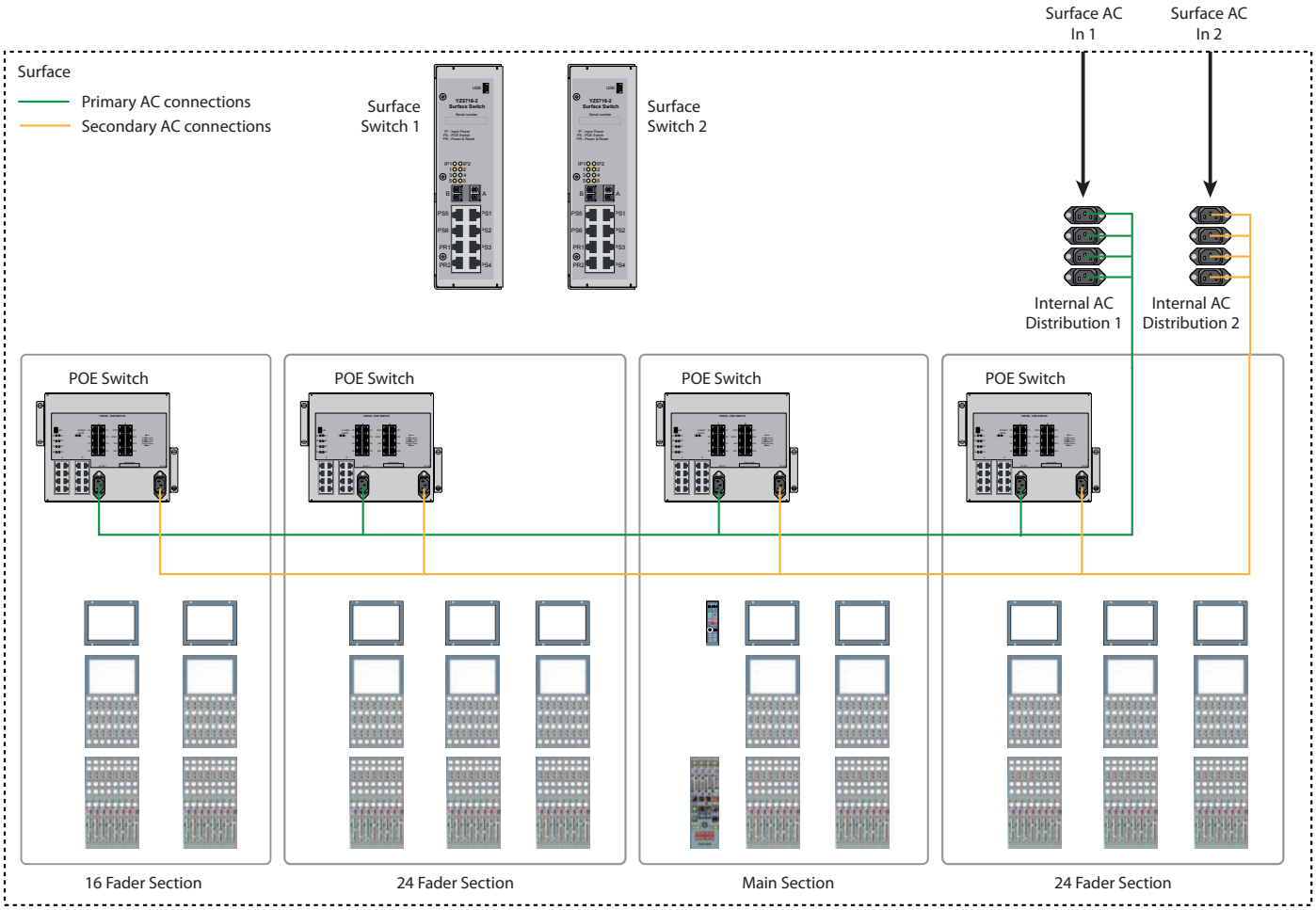
FIGURE 5 - PANEL CONNECTIONS



Surface power connections

Apollo uses distributed AC power supplies and so there are no bulky power connections from surface to rack. Each surface has two IEC inlets on the rear. These feed into the internal power distribution which powers all POE switches in the surface directly. Figure 6 illustrates this.

FIGURE 6 - SURFACE AC POWER CONNECTIONS

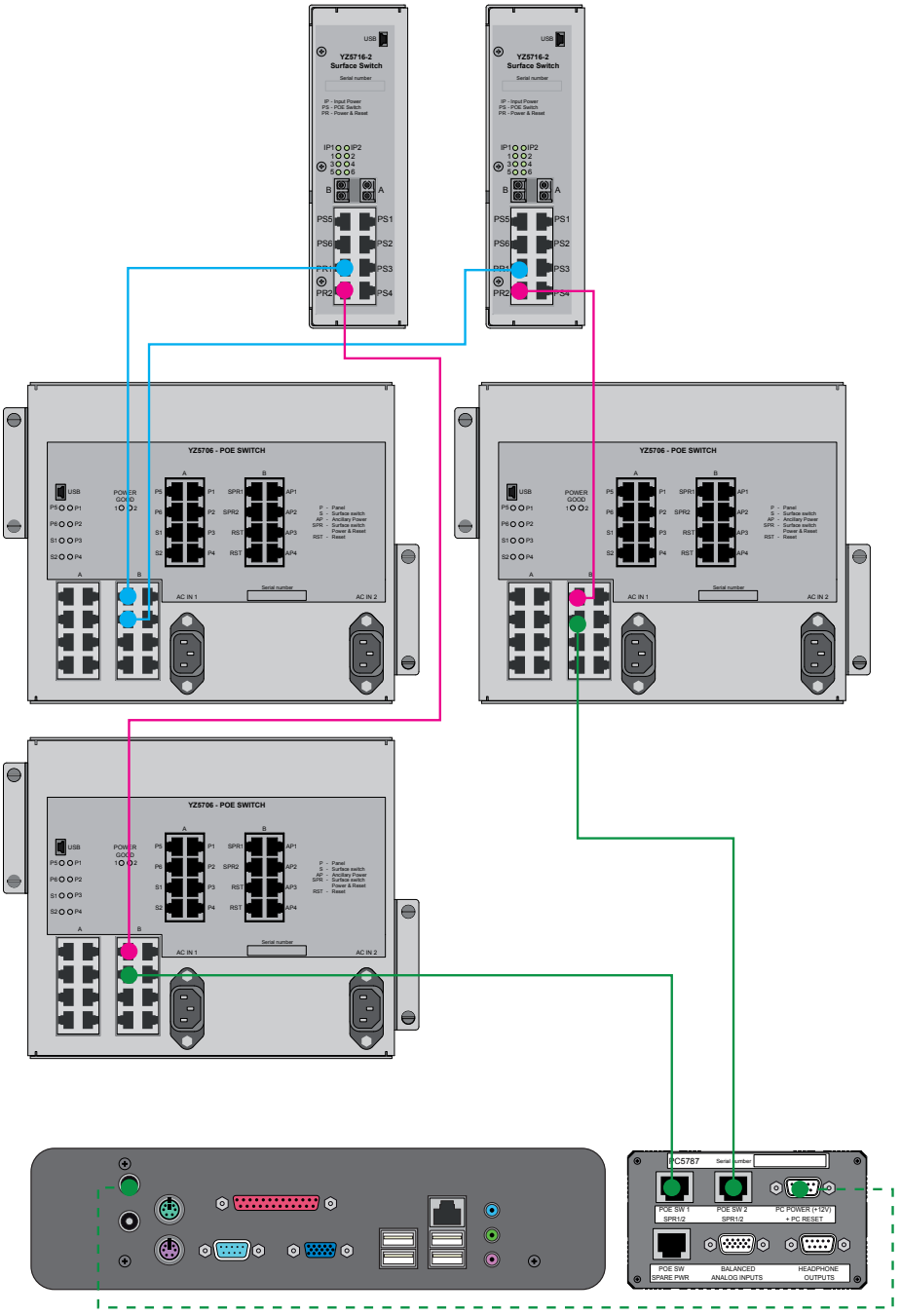


The surface switches and configuration PC are powered over Ethernet from SPR sockets on the POE switches as shown in Figure 7.

The surface switches receive power via their PR1 and PR2 sockets. The configuration PC receives power via the POE SW 1 SPR1/2 and POE SW 2 SPR1/2 sockets. These should all be connected to SPR1 and SPR2 sockets on the POE switches.

Two connections should be made to each surface switch and the configuration PC for redundancy and it is advisable to connect these two inputs to different POE switches. If both power inputs on a single surface switch are connected to the same POE switch, then no backup is provided in the case of failure in that POE switch.

FIGURE 7 - SURFACE SWITCH AND PC POE POWER CONNECTIONS

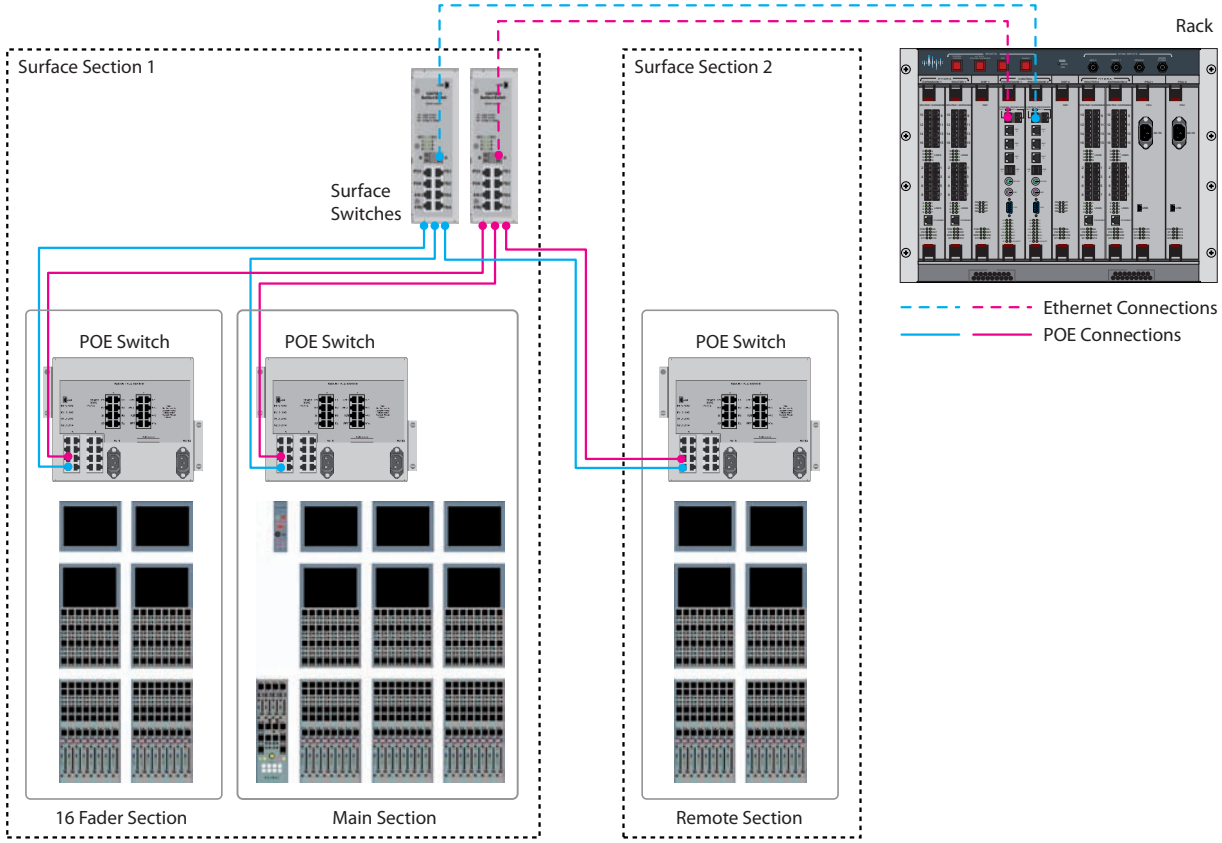


Multiple surface sections
The surface can be extended with multiple sections as shown in Figure 8.

POE switches in a second separate section can be connected directly to empty surface switch ports in the main surface section. The secondary console section does not need surface switches and even though it is physically separate from the main section, both surfaces still appears as one large surface to the software. User splits allow the surfaces to be split up in the software for use by separate operators. The POE switches in the secondary receive AC power locally. The connection between surface sections is a copper interface and so maximum copper connection distances apply.

Maximum connection distances for copper and fiber connections can be found in the Connection Considerations section of this document.

FIGURE 8 - MULTIPLE SURFACE CONNECTIONS



Cable color coding

The connecting cables inside the surface have been fitted with color coded collars for easier identification and to provide simpler connectivity.

Cables connected in each bucket of the console frame will be prefixed with a letter: A for bucket 1, B for bucket 2 etc. numbered from left to right.

Please refer to the table in Figure 9 for the color coding information.

FIGURE 9 - CABLE COLLAR COLOR CODING

Color	Start with Number	Function
Brown	1	Panel connections from POE switch P1-P6 sockets (coded A11 for first panel, A12 for second panel etc.).
Red	2	Reset cables. Daisy chained around the POE switches in RST sockets.
Orange	3	Auxiliary power. Not connection specific.
Yellow	4	Connections from POE switch S1 to surface switch 1 PS1-PS6 sockets (coded A4, B4 etc.).
Green	5	Connections from POE switch S2 to surface switch 2 PS1-PS6 sockets (coded A5, B5 etc.).
Blue	6	Power connections between surface switches and POE switches (coded 61,62 etc. Connect to any SPR sockets on any POE switch and PR sockets on surface switches).
Violet	7	Connections between rack control processor MAC 7 sockets and surface switch A sockets (coded 71 and 72)

CONFIGURATION PC

The configuration PC is mounted inside the surface. This reduces rack space requirements and the number of external connections. It is used for system configuration and is not relied upon for system operation.

Figure 1 illustrates the connections on the configuration PC. The configuration PC is paired with the PC power supply converter unit shown in Figure 2. The headphone connectors on this unit are detailed in the Headphones section of this document.

Configuration PC reset button

The configuration PC starts automatically when the surface receives power. The PC is on a separate reset system to the rest of the surface and so will remain in operation should the surface be reset. A reset button is located at the rear of the keyboard tray should the configuration PC need to be reset manually. This is connected to the 9 pin D-type connector on the PC power supply converter unit. The pin assignment can be found in Figure 3 and a diagram illustrating the connections is shown in Figure 4.

Configuration PC power

The configuration PC receives it's power over Ethernet via the PC power supply converter unit as shown in Figure 2. This unit is mounted inside the surface near the configuration PC. SPR outputs on two POE switches are connected to the two RJ45 power inlets on the PC power supply unit for redundancy. In this unit the signal is converted to the required 12V supply. The 9 pin D-Type connector sends the converted 12V signal to the configuration PC. The pin assignment can be found in Figure 3 and a diagram illustrating the connections is shown in Figure 4.

FIGURE 1 - CONFIGURATION PC CONNECTIONS

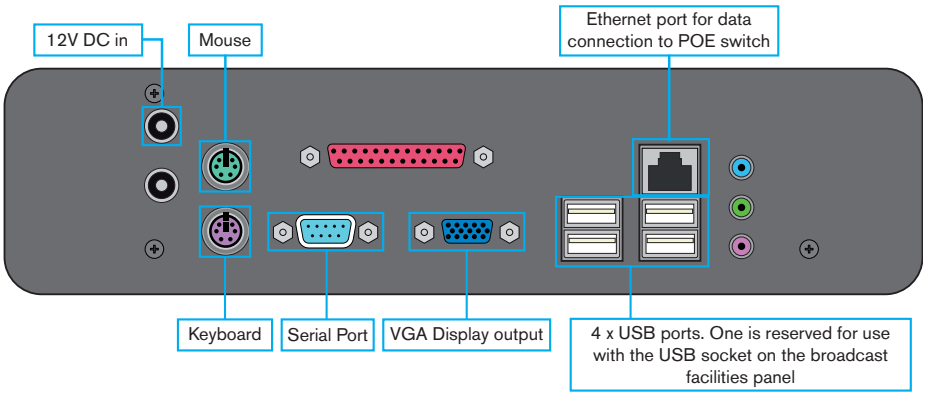
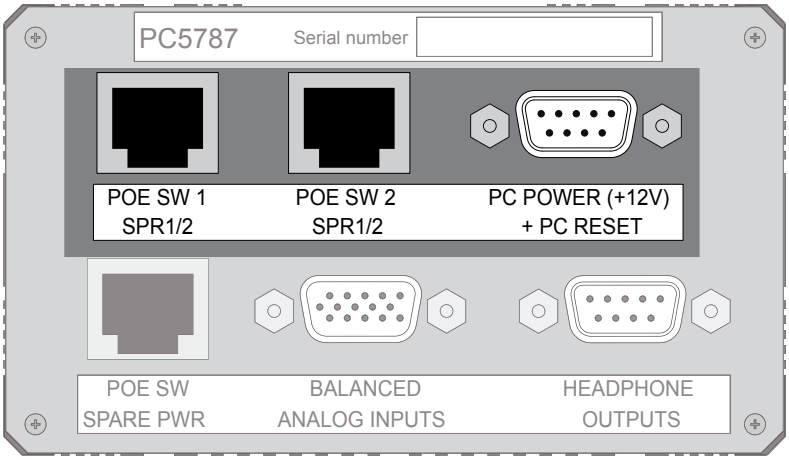


FIGURE 2 - CONFIGURATION PC POWER SUPPLY CONVERTER



Data connection

The configuration PC communicates with the rest of the Apollo system over Ethernet in a similar way to the surface panels. The Ethernet port on the PC connects to any empty PS1-6 port on a POE switch.

Note that the signal output by a POE switch is a Power Over Ethernet signal, and as such carries a DC voltage in addition to the data. The configuration PC accepts this voltage. Other equipment may not cope with the voltage and so should not be connected in this way.

Keyboard and mouse

The Keyboard and mouse/trackball are locate in the pull-out tray underneath the surface and connect to the PS/2 ports as shown in Figure 1.

Shutdown

The configuration PC should be shutdown before power to the surface is switched off. Touch the red power button in the lower right corner of the main application to exit the software. Then select SHUT DOWN from the Windows start menu.

Connecting to an external network

Two Ethernet ports are available on the configuration PC to allow connection to external computer networks. The secondary Ethernet port is available via a USB to Ethernet adaptor located next to the configuration PC. Please refer to the LAN and Internet Connections section of this document for more information.

Please note that this connection does not allow control over the Apollo system, it simply provides a network link to the configuration PC for file, LAN or internet access.

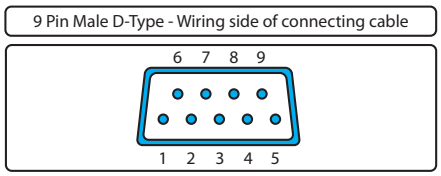
Touchscreen

The TFT touchscreen receives graphics output from the VGA connector on the configuration PC and sends its touch data back to the serial port. The touchscreen power supply should be connected to a spare IEC outlet within the surface.

Software Supplied

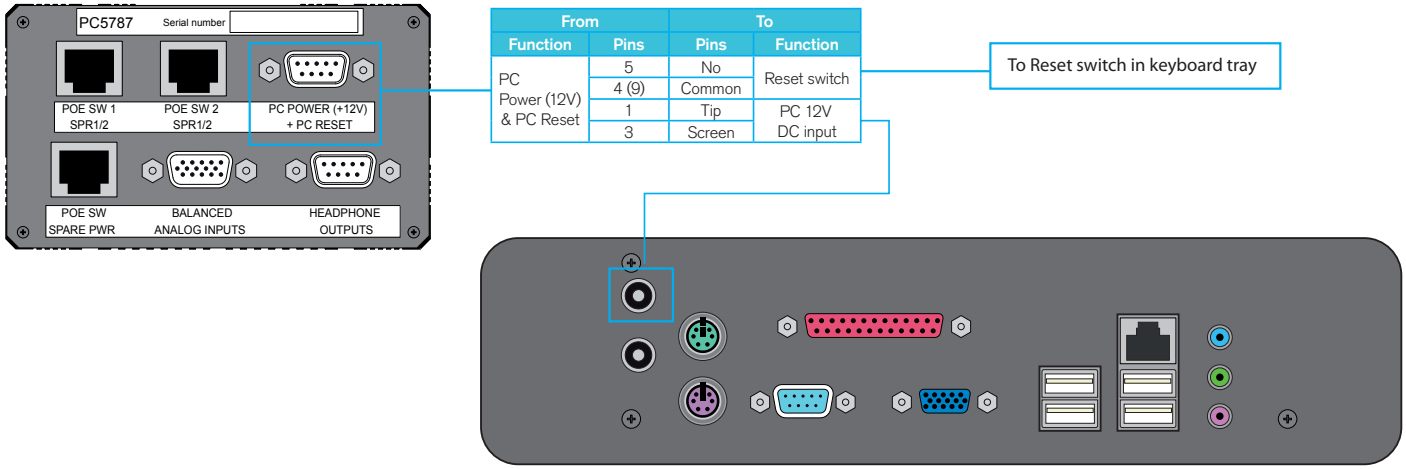
A Windows XP Operating System license is supplied with each console. The operating system and the Apollo software are pre-installed. Backups are provided in

FIGURE 3 - PC POWER SUPPLY PIN ASSIGNMENTS



Signal	Pin
+12V	1
	6
	2
	7
0V	3
	8
	4
	9
PC Reset Switch	5

FIGURE 4 - PC POWER AND RESET CONNECTIONS DIAGRAM



the unlikely event that software needs to be re-installed.

USB port

A USB port is provided on the surface reset panel as shown in Figure 5. This port can be used for saving and restoring user settings and Shows to a portable USB drive.

It is designed for portable flash based USB memory devices and as such may not provide power for larger USB hard drives.

The USB port on the front of the Broadcast facilities panel is a simple pass-through connection which links to another USB port on the rear of the panel. This rear socket should be connected to a free USB socket on the configuration PC.

3rd Party Software

Even though the PC is not required for operation of the system, Calrec does recommend that the PC is regarded as an integral control device for the system. It should not be used as a general purpose PC. If 3rd party software is installed on the PC, care must always be taken to ensure that it does not interfere with the normal performance of the PC. The installation of inappropriate software on the PC may invalidate the console warranty.

PC Specification

The specification table for the PC is shown in Figure 6. The PC makes use of a fan-less cooling system and as such is effectively a silent unit.

FIGURE 5 - USB PORT

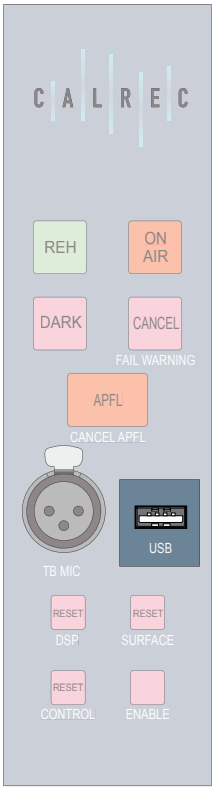


FIGURE 6 - CONFIGURATION PC SPECIFICATIONS

Unit dimensions (d/h/w)	224 x 232 x 57mm (8.82 x 9.13 x 2.24")
Unit construction	Aluminium and steel (typically >70% recycled materials)
System heat sink	Aluminium with custom heat pipe cooling system (TranCool3)
CPU	64 bit ready Intel Atom 330 (1.6GHz) Dual Core with HT
Chipset	Intel 82945GC Northbridge + ICH7 Southbridge
Graphics	Intel Extreme (GMA950)
Memory	1x DDR2 533/667MHz (up to 2GB)
HDD	2.5" SATA (3GBs) 150GB capacity
Front panel	Power switch and Power / HDD activity LEDs
Rear panel	12V DC power in / 4x USB2.0 / 10.100.1000 LAN / Audio In / Audio Out / Mic In / RS232 / Parallel / PS2 (K&M) / VGA
Weight	Base unit (net) 4Kg
Power supply	12V DC from Configuration PC Power Supply Converter
Working temp	Maximum 48°C ambient
Power consumption	from 28W (base unit)
Acoustics	17dBA

RACK

The 8U rack enclosure houses all the processing, power and network modules in the Apollo system.

The example in Figure 1 shows the full system with complete redundancy, containing two of each module type. The duplication of each module is to ensure that, should a primary module fail, the console can switch over automatically to the secondary module. Primary and secondary cards of the same type are known as neighbors, even if they are not physically next to each other.

DSP module

The DSP module processes all audio in the console, including but not limited to all EQ, dynamics, panning and routing.

Processor module

The Processor module is the central hub of the console. It links together and communicates with all other aspects of the system. Connection to the surface is made with a single Fiber or Ethernet cable (with a recommended second cable from the backup processor for redundancy).

Router and IO Expansion modules

The Router module, along with the Expansion module, handles all connections with other Hydra2 equipment. This includes any Hydra2 IO boxes and any other Calrec systems with Hydra2 capabilities.

FIGURE 1 - TYPICAL RACK LAYOUT

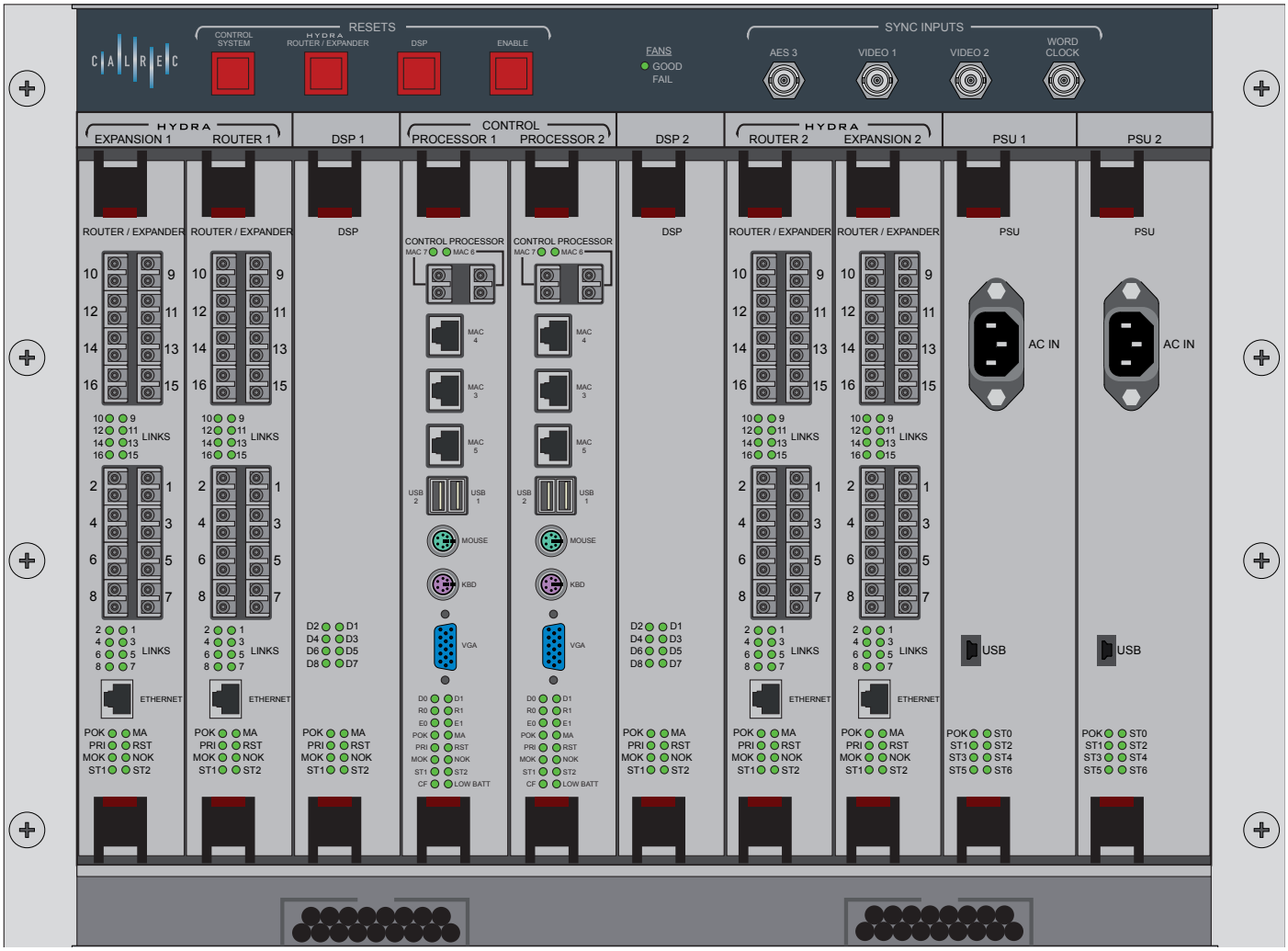


FIGURE 2 - RESET BUTTONS

FIGURE 3 - FAN STATUS LEDS

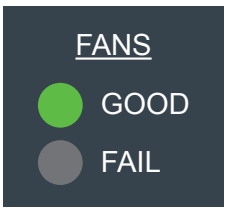
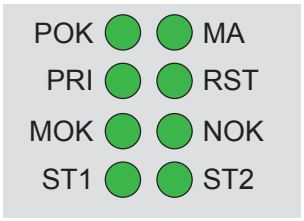


FIGURE 4 - COMMON STATUS LEDS



PSU module
The PSU module receives AC power and manages and distributes power to the rest of the rack. See Figure 8.

Reset
The reset buttons at the top of the rack allow various components of the Apollo system to be reset in the event of a failure. The three systems that can be reset are:

- Control system
- Hydra Router/Expander
- DSP

To reset a component in the system, hold the ENABLE button then press the relevant component button.

The surface may also be reset which is achieved using reset buttons on the surface itself. These are detailed in the Apollo Operator Manual.

Be extremely cautious when resetting the Hydra2 Router/Expander system. If any other consoles on the same network are accessing signals on your system, they will experience signal loss during the reset period.

Sync Inputs
External synchronization signals can be patched into Apollo via the four BNC connections at the top of the rack. More detail is provided in the Synchronization section of this document.

Fans and airflow
There are six fans at the top of the rack enclosure. Air enters the enclosure through the space beneath the modules and is drawn up through the modules by the fans. Air exits via the exhausts at the top of the rear of the enclosure. It is important that these airways are not obstructed in any way.

Figure 3 shows the fan status LEDs. If one of the fans in the rack is not performing correctly, the FAIL LED will illuminate.

Noise
A fully populated rack has been measured to produce <40dB acoustic noise (A-weighted at 1 metre from front).

Status LEDs
The DSP, Control Processor and Router/Expander modules all include the same array of status LEDs. These are shown in detail in Figure 4. They indicate the following properties:

- POK - Power OK. Indicates that the module is receiving the required power input.
- MOK - Module OK. Indicates that the module is functioning correctly but is not necessarily the active primary module. Should always be on for both modules in good state.
- NOK - Neighbor OK. Indicates that the duplicate version of the same card is functioning correctly. If both DSP cards were functioning correctly, both would have the NOK LED illuminated.
- MA - Module Active. Indicates which is the active of a pair of modules.
- PRI - Indicates whether the module is inserted into slot 1 of the two available for each module. For example DSP 1 rather than DSP 2.
- RST - Reset. Indicates that the module is currently being reset.

Any time the abbreviation ST is used, it indicates that the LED is reserved for future use or is specific to a module, in which case it will be documented in Figures 5-8.

Cable tidies
There are two cable tidies in the space beneath the modules. Ensure all cables that pass through this space are contained within these conduits. Failure to do so may impede airflow to the modules above.

Module details
Figures (5-8) detail the purpose of the connections on the front of each module.

Multiple Console Sections
Two surfaces can be connected directly to the SFP ports on the Control Processor module. It is possible to connect more surface sections to the same rack by connecting POE switches in one surface section to surface switches in a different section. This process is detailed

in the Surface Internals section of this document.

Installing and removing modules
To remove a module from the rack, take hold of the handles at the top and bottom of the module. Push in the red latch on each handle and pull the handles out and apart. Carefully pull the module out from the rack.

To install a module in the rack, again take hold of each of the handles and depress the red latch. Insert the module into the correct slot, gently locate it into the rear connectors and then move the handles towards each other while pushing to seat the connection.. A click should be heard when the module is seated fully.

Be sure to depress the red latches when removing or installing modules. Failure to do so may result in damage to the latching mechanism.

FIGURE 5 - CONTROL PROCESSOR

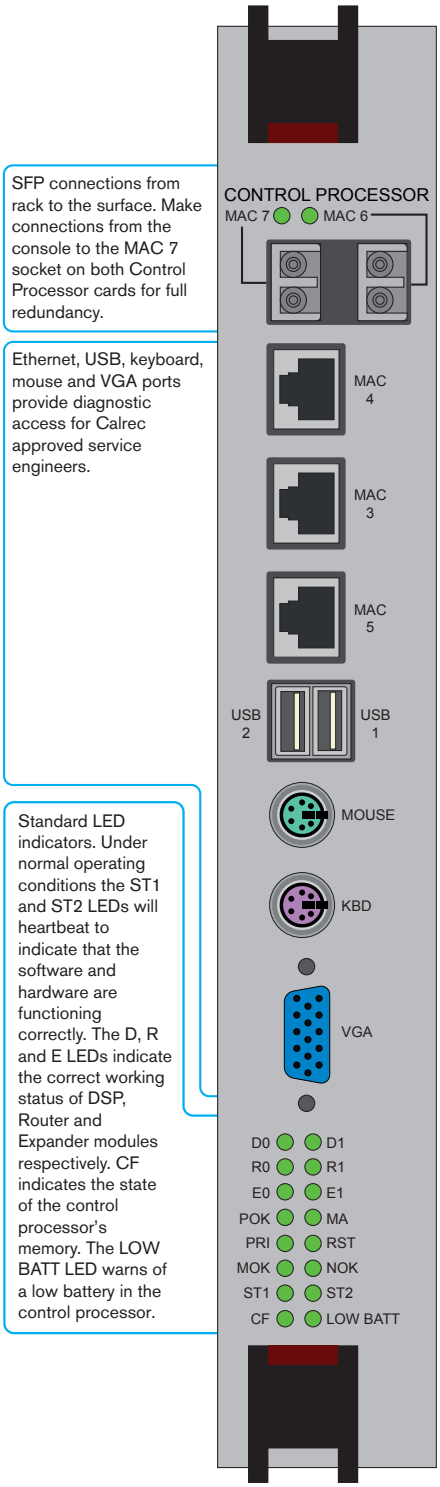


FIGURE 6 - DSP

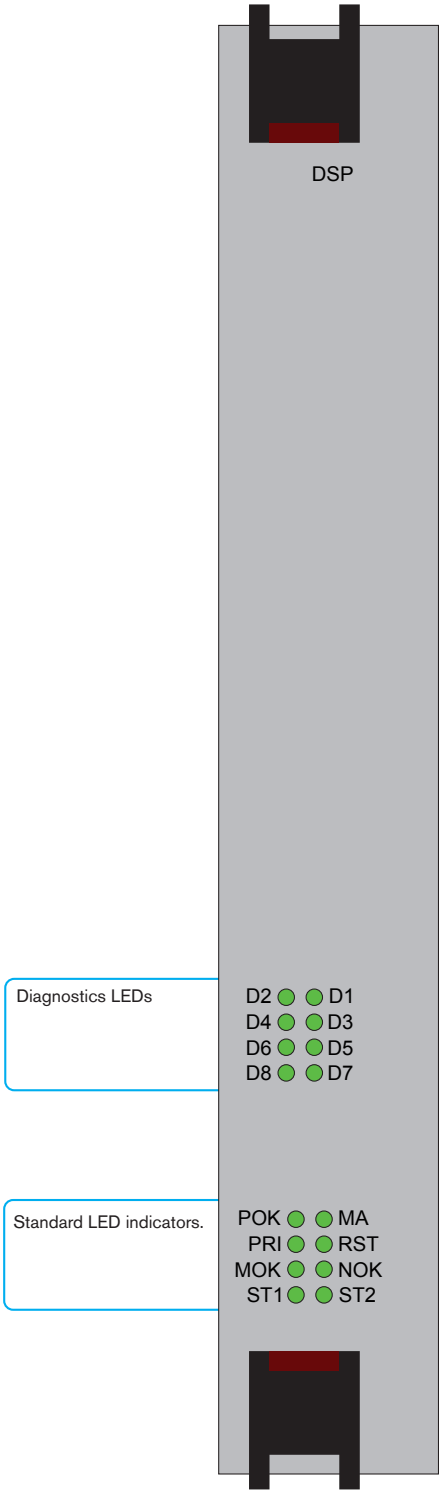
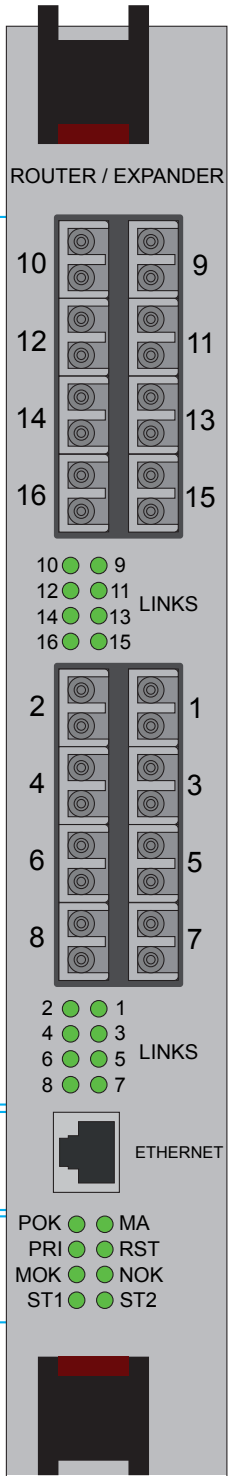


FIGURE 7 - ROUTER/EXPANDER



SFP sockets provide connections to Hydra2 IO boxes. IO boxes should be connected to both primary and secondary Router/Expander cards to provide full redundancy.

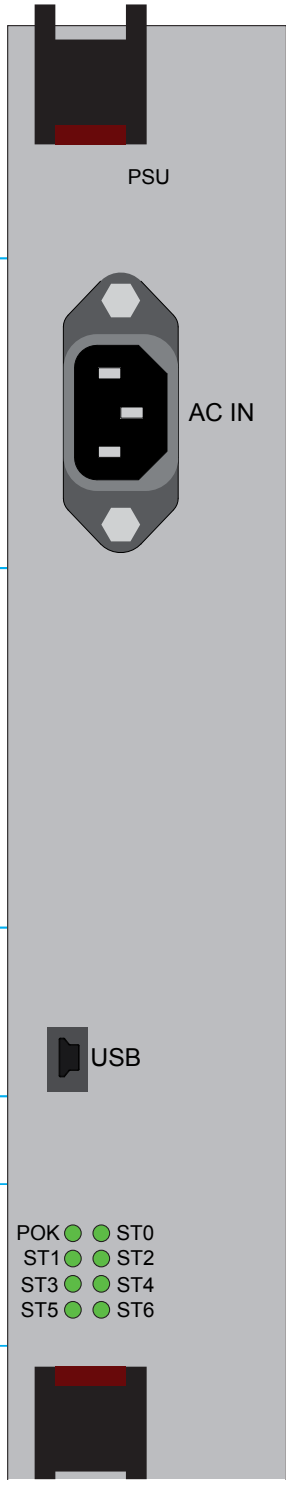
LED indicators illuminate when connection is active.

Note that Hydra1 based I/O boxes, switches or consoles can not be connected to these inputs.

Ethernet socket providing diagnostics access for Calrec approved service engineers.

Standard LED indicators.

FIGURE 8 - PSU



AC power inlet.

USB port providing diagnostics access for Calrec approved service engineers.

LED Indicators. POK indicates that the required power is present at the module. ST LEDs are reserved for future use.

SYNCHRONIZATION

Apollo accepts up to four external sync inputs or it can sync to its own internal clock located in the active router card in the rack.

External sync sources are connected to Apollo using the four 75 Ohm BNC connectors located at the upper right of the rack front panel (Figure 1). Apollo requires that it can derive a 48kHz clock from a sync input (Note that video is divided down to provide a 48kHz clock).

It is strongly recommended that all items of digital equipment connected digitally to the console, are synchronised to the same sync signal. Failure to do so will result in audio artefacts.

It is also recommended that backup sync sources are connected at all times. In the event that the primary source fails and the system has no backup to switch to, system sync will be lost and audio quality reduced.

Sync source order

The source options are:

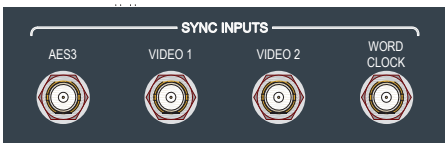
- Video 1 (Analog Video, Tri-level)
- Video 2 (Analog Video, Tri-level)
- AES3
- TTL Word Clock
- Internal Clock (48kHz)

If a source fails or is missing, the system will automatically switch to use the next source in the list as illustrated in Figure 2.

Source frequency variation

Each sync input will tolerate a frequency variation of up to 100ppm (parts per million) of the sync frequency. For a 48kHz sync frequency this variation is ±4.8Hz.

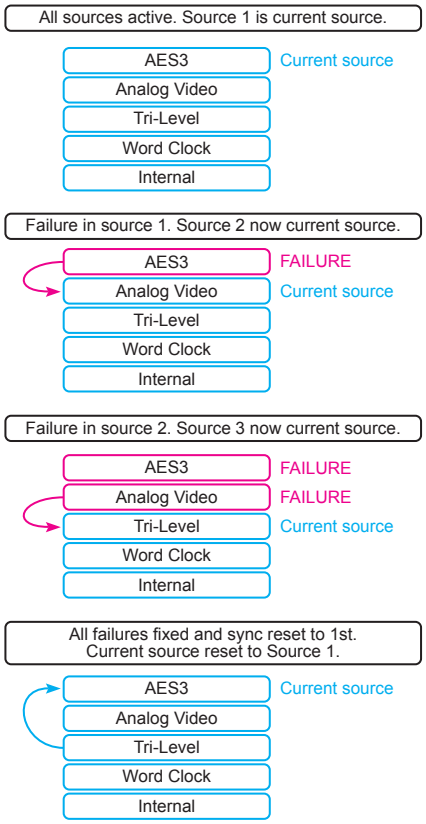
FIGURE 1 - SYNC INPUTS



There are four sync input ports on the router frame and these, together with an internal reference, provide the five options for synchronization are assigned under the FIXED OPTIONS on the configuration PC.

The two video input ports can be used interchangeably with their functions set on-screen, though some earlier racks have Video 1 marked “Analog Video” and Video 2 as “Tri-Level”.

FIGURE 2 - SOURCE FAILURE



APOLLO
HYDRA2 IO BOXES

CALREC

Putting Sound in the Picture

HYDRA2 UNIT OVERVIEW

Hydra IO boxes provide all input and output connections for Artemis. The boxes are available in Mic/Line, AES3 and MADI versions, each having a range of boxes with different numbers of input and output ports.

Mic/Line IO is provided via XLR or EDAC/ELCO connectors. The impedance of Mic/Line input ports auto-switches depending on whether a mic or line signal is accessed from that port. AES3 IO is provided on BNC connectors, and MADI IO is provided on BNC or fiber connectors.

Power redundancy

Hydra2 boxes are fitted with dual IEC inlets for AC power redundancy (highlighted in Figure 1). All units also feature internal PSU redundancy.

Connection redundancy

Each Hydra box has dual SFP ports on the rear for full connection redundancy (highlighted in Figure 1). These ports accept plug-in GBIC modules to allow connections with CAT5e/CAT6 copper interfaces and single or multimode fiber interfaces. For connection distances please refer to the Connection Considerations section of this document.

Sample Rate Conversion (SRC)

SRC is provided on all Hydra2 AES3 inputs. SRC on a given path can be toggled on and off using the input controls available on the surface. Information on these controls can be found in the Operator Manual.

Assigning addresses

Each Hydra IO box in the network must be assigned a unique address. The address is made up of two parts, the first being a fixed address unique to the system and the second being unique to a single IO unit. Units connected to the same system must have unique unit-specific address components. Units connected to different systems may share the same unit-specific address component as their system address will be different, resulting in an combined unique address.

An 8 way DIL switch is provided on the rear of the unit for setting the unit specific part of the address using binary notation. Figure 2 shows the decimal value that each DIL switch represents. To get the full decimal number from a binary number, simply add together every decimal number represented by a DIL switch that is set to 1. Figure 3 shows an example of this process.

For an in depth description of binary numbers refer to the Audio Primer document.

If a unit is to be replaced, the address of the new unit must match that of the old unit in order for the system to continue normal operation.

FIGURE 2 - ADDRESS SWITCHES

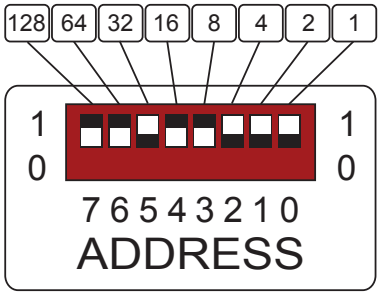


FIGURE 3 - ADDRESS EXAMPLE

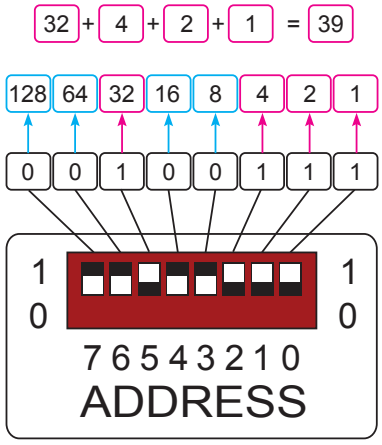
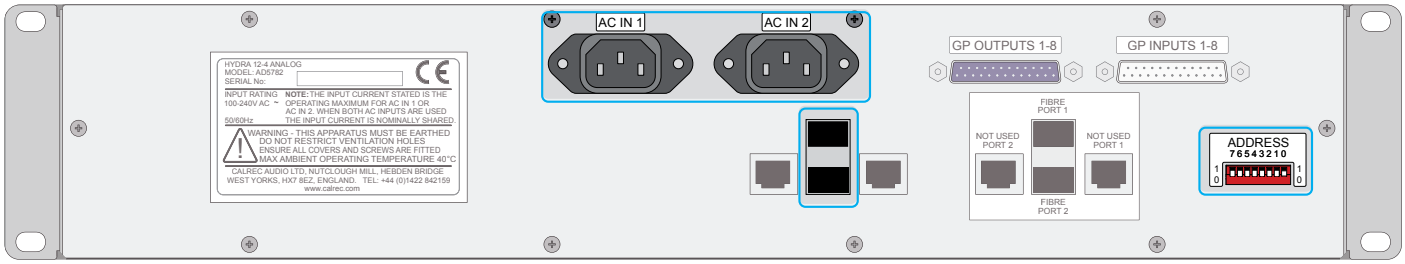


FIGURE 1 - COMMON IO BOX CONNECTIONS



Rack connections

Connections from IO boxes to the Apollo rack are made via the Router or Expander modules. For full connection redundancy, each IO box should be connected to both primary and secondary router or expander modules as shown in Figure 4.

Diagnostics

Each Hydra box provides access to an RS232 connection for system diagnostics which can be performed by a Calrec approved engineer. This connection is available through a 9 pin D-type connector on the front of each unit.

Operation LEDs

There are six LEDs on the front of each Hydra2 unit that indicate various high level operational aspects. These are shown in Figure 5.

The green PSU LED will be lit constantly when both power supplies are functioning correctly. Should one or both of the supplies fail, the LED will go out.

The red FAN LED will flash in the event of a fan failure in the unit. Under normal conditions this LED will not be lit.

The yellow CON LEDs under PORT 1 and PORT 2 will be lit constantly when a physical connection is made between the relevant port and a Hydra2 router. The green ACT LEDs will flash whenever any kind of activity is detected over the relevant connection.

Status LEDs

There are eight status LEDs present on the front panel of every Hydra2 unit which can aid with software level debugging of the units. These are shown in Figure 6. The functions of these LEDs are described in the following paragraphs and summarized in Figure 7.

FIGURE 4 - CONNECTIONS FROM RACK TO IO BOX

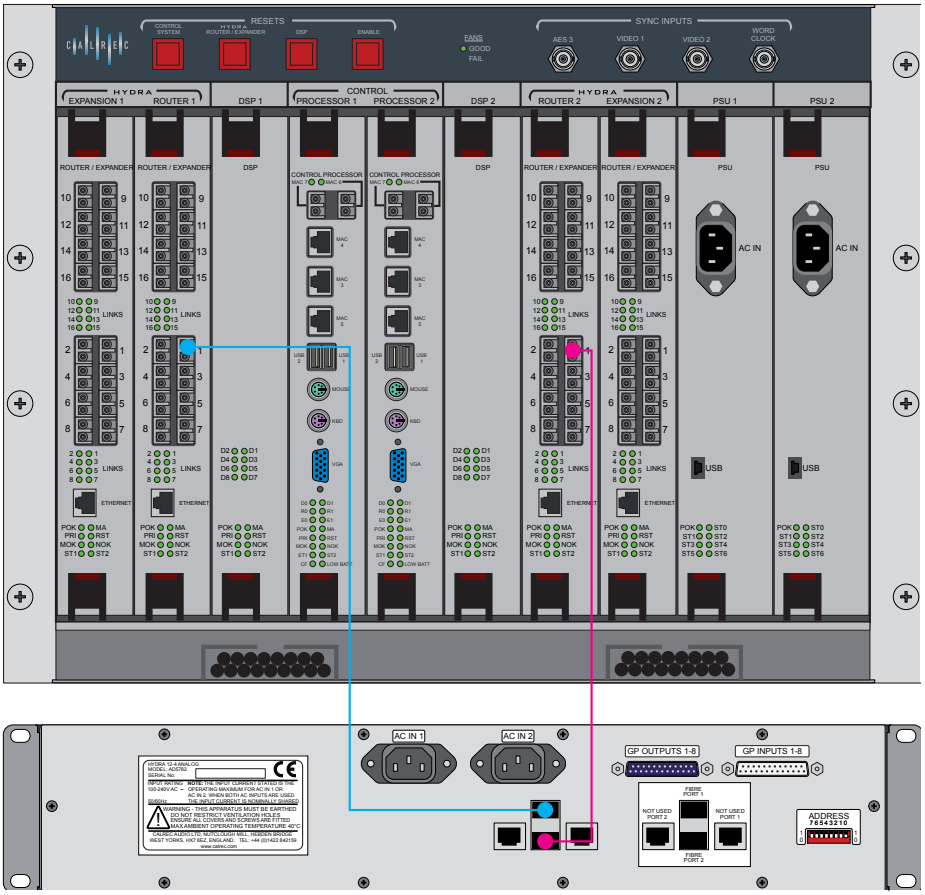
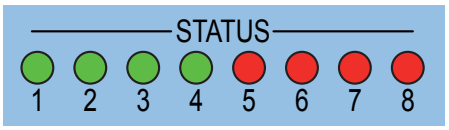


FIGURE 5 - UNIT OPERATION LEDS

LED 1: Shared by Hydra2 ports1 & 2 and indicates the state of the network ports on the back of the unit. An active LED indicates that both ports are physically enabled.

LED 2: Used to indicate Heartbeat activity between Hydra2 port 1 and an attached Router. This signal LED flashes approx twice a second to indicate a valid low level IO/Router comms link.

FIGURE 6 - HYDRA2 STATUS LEDS



LED 3: Used to indicate Heartbeat activity between Hydra2 port 2 and an attached Router. This signal LED flashes approx twice a second to indicate a valid low level IO/Router comms link.

LED 4: Spare.

LED 5: Used to indicate a valid control link comms path between Hydra2 port 1 and an attached Router. This LED will be active if control of the IO box is available e.g. Phantom power, Mic gain, SRC.

LED 6: Used to indicate a valid control link comms path between Hydra2 port 2 and an attached Router. This LED will be active if control of the IO box is available e.g. Phantom power, Mic gain, SRC.

LED 7: Used to indicate the source of audio sync and output audio from the Hydra2 network to the box. If active then output audio and audio sync is being sourced from Hydra2 port 1.

LED 8: Used to indicate the source of audio sync and output audio from the Hydra2 network to the box. If active then output audio and audio sync is being sourced from Hydra2 port 2.

Note: LEDs 7 & 8 should never be active (On) simultaneously. They may be inactive (Off) simultaneously e.g. a Hydra system reset or failed connections.

FIGURE 7 - HYDRA2 STATUS LEDS

LED No.	Color	Indication	Status
1	Green	On	Hydra2 ports enabled
		Off	Hydra2 ports disabled/reset
2	Green	Flash	Heartbeat port 1 active
		Steady Off/On	Heartbeat port 1 inactive
3	Green	Flash	Heartbeat port 2 active
		Steady Off/On	Heartbeat port 2 inactive
4	Green	Off	Unused
5	Red	On	Control link port 1 active
		Off	Control link port 1 inactive
6	Red	On	Control link port 2 active
		Off	Control link port 2 inactive
7	Red	On	Output audio/sync source port 1 active
		Off	Output audio/sync source port 1 inactive
8	Red	On	Output audio/sync source port 2 active
		Off	Output audio/sync source port 2 inactive

ANALOG UNITS

Analog IO, consisting of mic/line inputs and line outputs, is available on XLR or EDAC /ELCO connectors.

Mic/line impedance switching

Both mic and line level signals can be connected to the inputs of any analog IO unit. The impedance of the input is switched automatically depending on the signal type present.

48V

All mic/line inputs feature an LED to indicate the presence of 48V phantom power.

XLR units

Figures 1-3 show the different units with front mounted XLR connectors. They are available in the following sizes:

- 12 mic/line inputs, 4 line outputs (2U)
- 24 mic/line inputs, 8 line outputs (2U)
- 48 mic/line inputs, 16 line outputs (4U)

FIGURE 1 - 12 MIC/LINE INPUTS, 4 LINE OUTPUTS

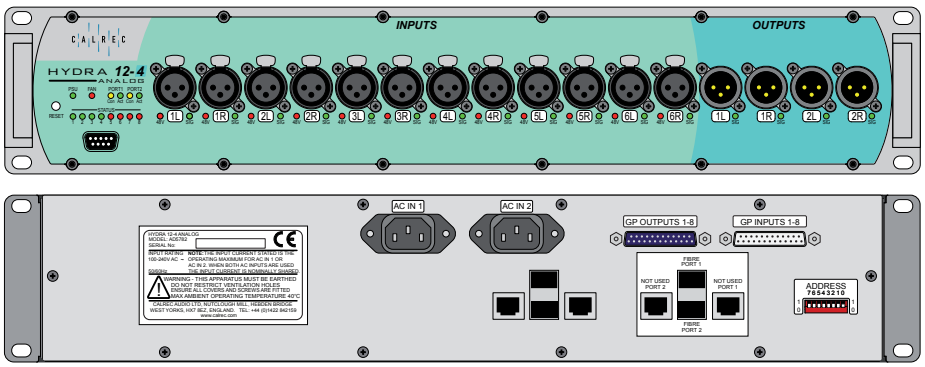


FIGURE 2 - 24 MIC/LINE INPUTS, 8 LINE OUTPUTS

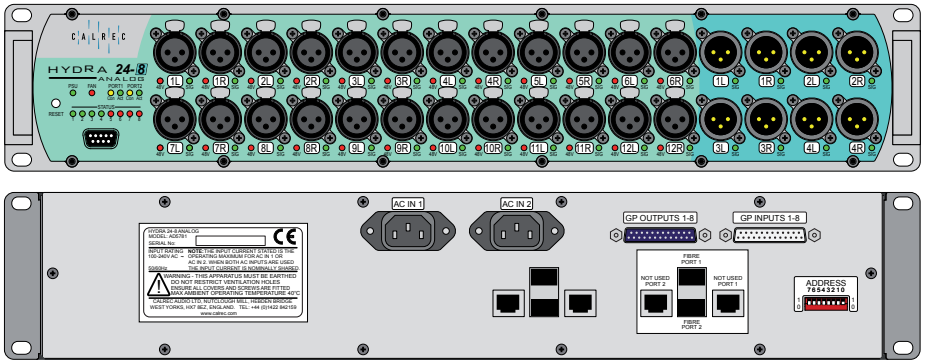


FIGURE 3 - 48 MIC/LINE INPUTS, 16 LINE OUTPUTS

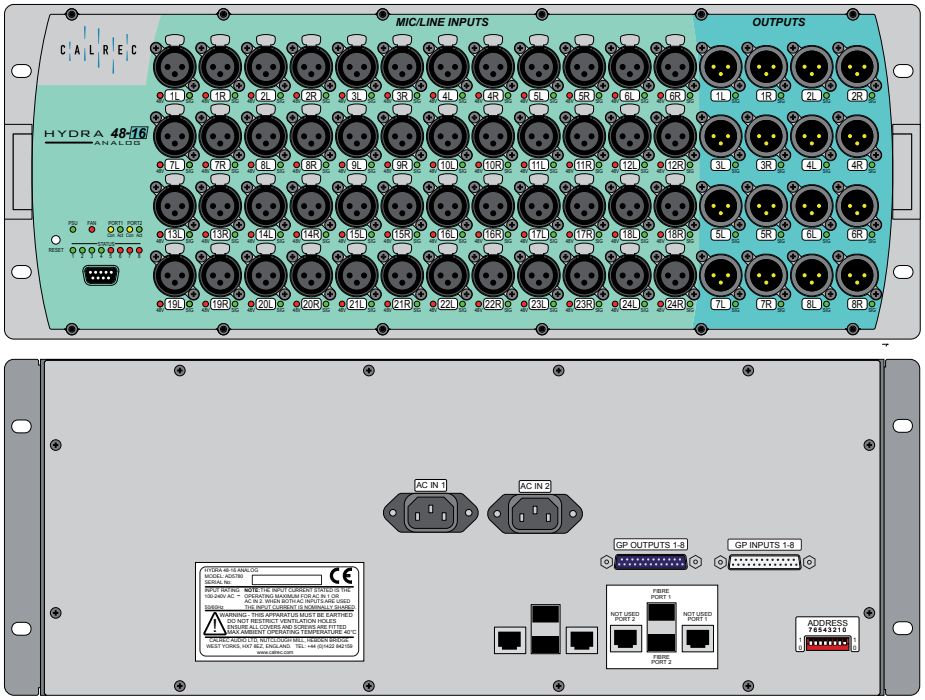


FIGURE 4 - 32 EDAC/ELCO MIC/LINE INPUTS, 32 EDAC/ELCO LINE OUTPUTS

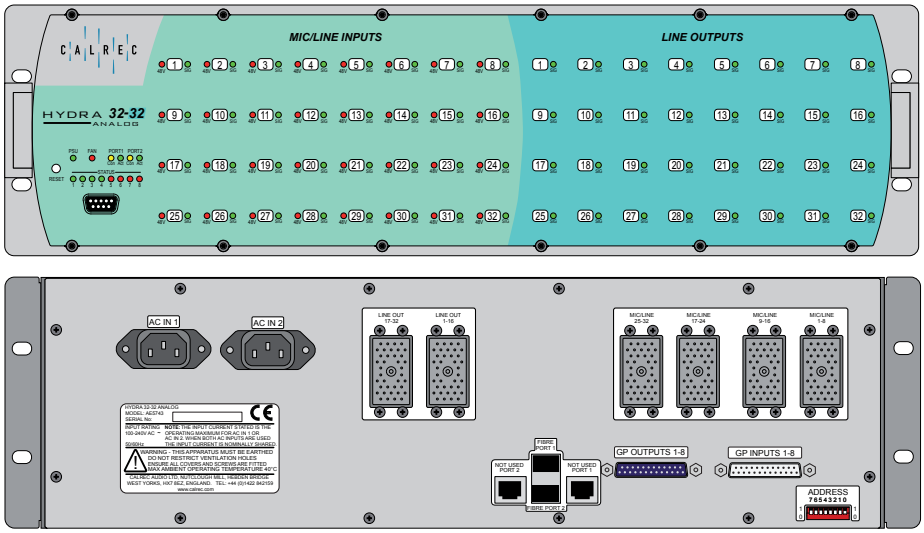
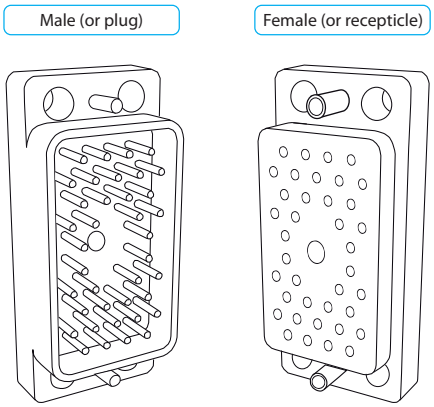


FIGURE 5 - EDAC/ELCO CONNECTOR SEXING



EDAC/ELCO unit

A high density analog unit is available with EDAC/ELCO connectors on the rear. This unit provides 32 mic/line inputs and 32 line outputs in a compact 3U chassis and is shown in figure 4.

EDAC/ELCO sexing

The connectors on the rear of the EDAC/ELCO unit are male connectors. To be sure that the connecting cables are terminated with the correct sex of connector, please refer to Figure 5.

Connector part numbers are listed in Figure 6.

EDAC/ELCO connector information

The 32 inputs are split between 4 connectors and the 32 outputs are split over 2 connectors. Figure 7 shows the connecting cable wiring for each input and output connector.

Redundancy and GPIO

All units are fitted with redundant power supplies and IEC inlets as standard and may be fitted with the optional GPIO moduile.

FIGURE 6 - EDAC/ELCO PART NUMBERS

Component	Calrec part	EDAC/ELCO part
38 way socket	400-040	516-038-000-401
38 way metal hood	400-037	516-230-538
Crimp pin	400-024	516-290-590
Solder pin	400-025	516-290-500
Pin extractor tool	-	516-280-200

FIGURE 7 - EDAC/ELCO UNIT PINOUT INFORMATION

All connecting cables should be terminated in female (recepticle) type connectors

Pin	Input connectors				Output Connectors	
	Input 1	Input 2	Input 3	Input 4	Output 1	Output 2
A	Ground	Ground	Ground	Ground	Output 1 +	Output 17 +
B	Ground	Ground	Ground	Ground	Output 1 -	Output 17 -
C	Ground	Ground	Ground	Ground	Output 2 +	Output 18 +
D	Ground	Ground	Ground	Ground	Output 2 -	Output 18 -
E	Input 1 +	Input 9 +	Input 17 +	Input 25 +	Output 3 +	Output 19 +
F	Input 1 -	Input 9 -	Input 17 -	Input 25 -	Output 3 -	Output 19 -
J	Input 2 +	Input 10 +	Input 18 +	Input 26 +	Output 4 +	Output 20 +
K	Input 2 -	Input 10 -	Input 18 -	Input 26 -	Output 4 -	Output 20 -
L	Ground	Ground	Ground	Ground	Output 5 +	Output 21 +
M	Ground	Ground	Ground	Ground	Output 5 +	Output 21 +
N	Ground	Ground	Ground	Ground	Output 6 +	Output 22 +
P	Ground	Ground	Ground	Ground	Output 6 -	Output 22 -
R	Input 3 +	Input 11 +	Input 19 +	Input 27 +	Output 7 +	Output 23 +
S	Input 3 -	Input 11 -	Input 19 -	Input 27 -	Output 7 -	Output 23 -
T	Input 4 +	Input 12 +	Input 20 +	Input 28 +	Output 8 +	Output 24 +
U	Input 4 -	Input 12 -	Input 20 -	Input 28 -	Output 8 -	Output 24 -
V	Ground	Ground	Ground	Ground	Ground	Ground
W	Ground	Ground	Ground	Ground	Ground	Ground
X	Ground	Ground	Ground	Ground	Ground	Ground
Y	Ground	Ground	Ground	Ground	Ground	Ground
Z	Input 5 +	Input 13 +	Input 21 +	Input 29 +	Output 9 +	Output 25 +
AA	Input 5 -	Input 13 -	Input 21 -	Input 29 -	Output 9 -	Output 25 -
BB	Input 6 +	Input 14 +	Input 22 +	Input 30 +	Output 10 +	Output 26 +
CC	Input 6 -	Input 14 -	Input 22 -	Input 30 -	Output 10 -	Output 26 -
DD	Ground	Ground	Ground	Ground	Output 11 +	Output 27 +
EE	Ground	Ground	Ground	Ground	Output 11 -	Output 27 -
FF	Ground	Ground	Ground	Ground	Output 12 +	Output 28 +
HH	Ground	Ground	Ground	Ground	Output 12 -	Output 28 -
JJ	Input 7 +	Input 15 +	Input 23 +	Input 31 +	Output 13 +	Output 29 +
KK	Input 7 -	Input 15 -	Input 23 -	Input 31 -	Output 13 +	Output 29 +
MM	Input 8 +	Input 16 +	Input 24 +	Input 32 +	Output 14 +	Output 30 +
NN	Input 8 -	Input 16 -	Input 24 -	Input 32 -	Output 14 -	Output 30 -
PP	Ground	Ground	Ground	Ground	Output 15 +	Output 31 +
RR	Ground	Ground	Ground	Ground	Output 15 -	Output 31 -
SS	Ground	Ground	Ground	Ground	Output 16 +	Output 32 +
TT	Ground	Ground	Ground	Ground	Output 16 -	Output 32 -
H	Chassis Ground	Chassis Ground	Chassis Ground	Chassis Ground	Chassis Ground	Chassis Ground
LL	Chassis Ground	Chassis Ground	Chassis Ground	Chassis Ground	Chassis Ground	Chassis Ground

AES UNITS

Hydra2 AES units are available with either 16 or 32 inputs and outputs in a 2U or 3U enclosure respectively. The units are shown in Figures 1 and 2.

All inputs and outputs use the AES 3 standard unbalanced interface via 75 ohm BNC connectors.

Both units are fitted with redundant power supplies and IEC inlets as standard and may be fitted with the optional GPIO module.

FIGURE 1 - 16 AES INPUTS, 16 AES OUTPUTS

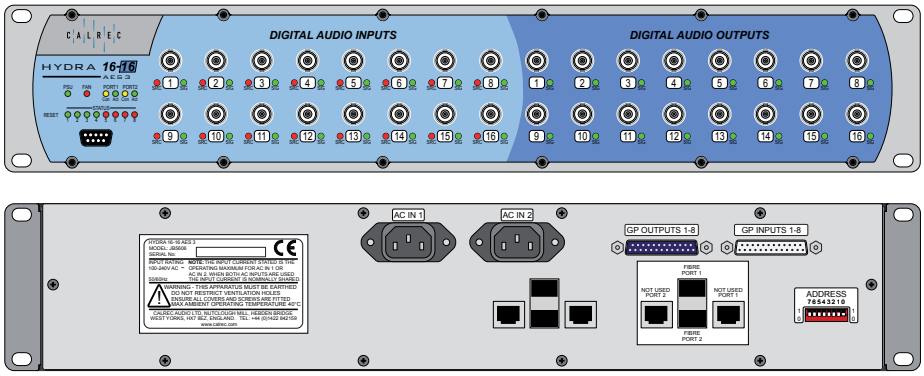
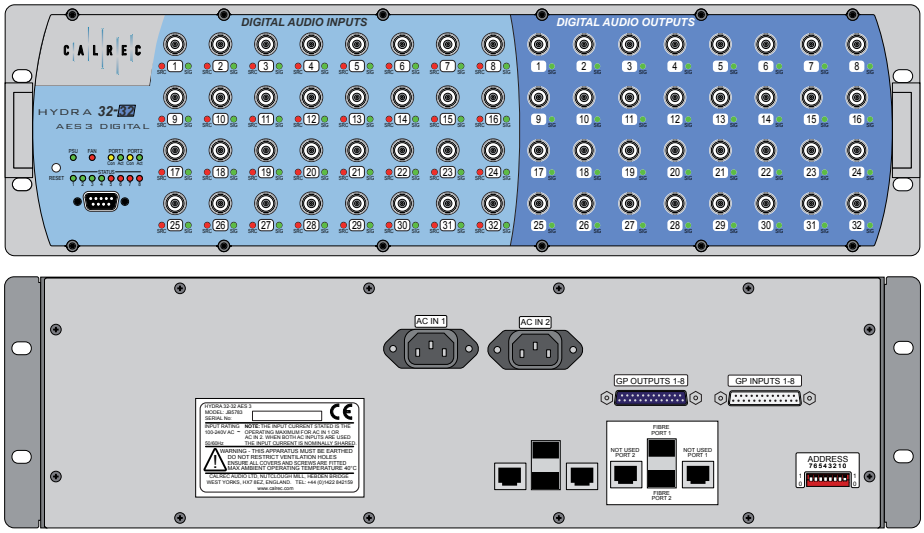


FIGURE 2 - 32 AES INPUTS, 32 AES OUTPUTS



MADI UNIT

The Hydra2 MADI unit provides two MADI interfaces in a compact 1U enclosure.

Channel count

Each interface in the MADI unit can operate in either 56 or 64 channel mode. Switches on the front of the unit allow selection for each interface.

Interface medium

The unit can transmit over a coaxial (copper) AND optical (fiber) medium. It can receive over coaxial OR optical medium. Switches on the front panel allow selection of the receiving medium.

Three different versions of the MADI unit are available depending on the fiber interface required. Fiber interfaces may be single-mode (SC fiber connectors) or multi-mode (SC or ST fiber connectors) and must be specified upon purchase.

When using the fiber to interface with external equipment, please refer to Figure 2 to ensure that your equipment can transmit and receive within the range of supported wavelengths.

For detailed information on fiber interfaces and connections, please refer to the 'Fiber Optic Interfaces' section of this document.

Note:

There is no sample rate conversion available on MADI inputs or outputs. It is therefore vital to ensure that any equipment connected vis MADI is synchronized to the same source as the Apollo system.

FIGURE 1 - MADI UNIT PROVIDING TWO MADI INTERFACES

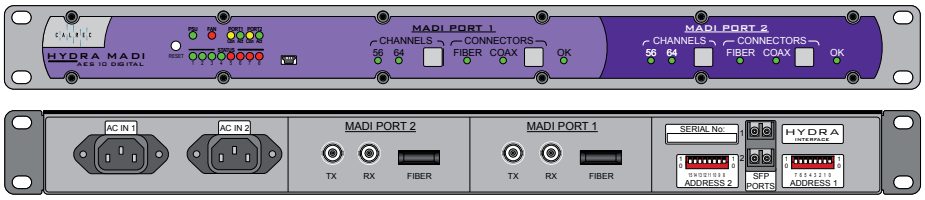


FIGURE 2 - FIBER INTERFACE SPECS

	Single-Mode	Multi-Mode
Fiber Connector Options	SC	SC, ST
TX Wavelength	1260-1360nm	1270-1380nm
RX Wavelength	1260-1360nm	1270-1380nm
Nominal Center Wavelength	1300nm	1310nm

MODULAR STAGE BOX

The Hydra2 Modular Stage Box is a 3U high rack mount system allowing a wide variety of combinations of analog, AES, SDI and GPIO ports to be housed in a single unit.

System

The processor frame can house up to 20 single width IO modules as well as the central slot dedicated to the Hydra2 interface module taking the SFP modules for copper or single or multi-mode fiber connections to the router.

A stage box can handle up to 512 bi-directional signals (at 48kHz) and power supply redundancy is provided with facilities for separate mains feeds to each.

A BNC output of word clock derived from the sync reference used by the router is available to sync other devices.

UJ5836 Interface

The address switches are located on the PCB and to adjust them, the card must be removed from the card frame. The address is set in a similar way to the other Hydra2 wallboxes.

AD5840 4 Mic/line inputs

Both mic and line level signals can be connected to the XLR3 inputs. The input impedance is switched automatically from the console depending on the input gain setting.

All inputs feature an LED to indicate the presence of 48V phantom power and a signal present LED.

JB5860 4 AES3 inputs

The 4 BNC connectors provide inputs to the AES-3id specification, using 75 ohm unbalanced connections. Each input has indicators to show if the sample rate converter is switched in and that valid AES data is being received.

FIGURE 1 - MODULAR STAGEBOX

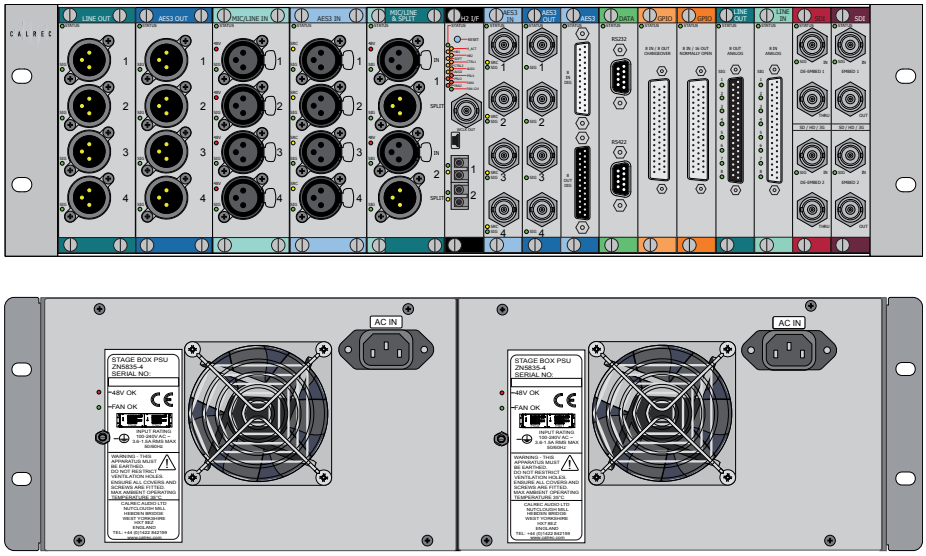


FIGURE 2 - MODULAR INTERFACES

Module	Description	Connector	Width (slots)
AD5840	4 Analog mic/line	XLR	2
AD5838	8 Analog in	DB37	1
DA5867	4 Analog out	XLR	2
DA5839	8 Analog out	DB37	1
JB5860	4 AES in	BNC	1
JB5837	4 AES out	BNC	1
JD5842	8 AES in/out	2 x DB25	1
VO5841	Dual SDI de-embedder	BNC	1
VI5872	Dual SDI embedder	BNC	1
WY5858	8 GPI / 8 GPO	DB50	1
UJ5836	Hydra2 interface		1

JB5837 4 AES3 outputs
The 4 BNCs provide outputs to the AES-3id specification, using 75 ohm unbalanced connections. Each output has an indicator to show if the port currently has a source routed to it.

VO5841 Dual SDI de-embedder
Each of the two de-embedders can receive SDI video signals at SD, HD or 3G data rates. The status LED strobes to indicate the local firmware is running and lights solidly when communication is established with the rack interface. The SIG indicator shows that serial data is being received. A buffered feed of the input is available on the THRU connector.

VI5872 Dual SDI embedder
Each of the two embedders can receive incoming SDI video signals at SD, HD or 3G data rates. These feeds should normally not carry audio data and signals assigned by the Hydra2 network router can be inserted onto that incoming stream and emerge at the output BNC socket.

AD5838 8 Line inputs
Line level signals connect via the DB37 panel mounted female connector. The LED SIG indicator shows the presence of an audio signal.

DA5839 8 Line outputs
Line level signals are available from the DB37 panel mounted male connector. The LED SIG indicator shows the presence of an audio signal.

NETWORK CONFIGURATION

Once the Hydra2 network has been installed, the configuration PC can be used to configure the network. This includes adding and removing devices and naming and organizing the ports for identification by operators.

Adding/Removing boxes from the console's view

When a Hydra2 box is connected to a network it is made visible to all consoles connected to the same network. For a user to make use of a connected Hydra2 box, it must be made accessible to their system.

On the EDIT NETWORK screen in the HYDRA OPTIONS section of the main application (Figure 1) there are two main areas. The left area lists all Hydra2 boxes that are available on the network. The right area lists Hydra2 boxes that have been made accessible to the user's system.

To make a box accessible to a user's system it should be selected from the list of available boxes in the left area. Pressing the ADD button in between the areas will copy it over into the list of accessible boxes in the right hand list. The reverse can be performed to make a box inaccessible to a certain user's system.

Input and output ports

A port is an input to, or output from the Hydra2 network. Each input socket on a Hydra2 box provides one or more input or output ports to the Hydra2 network. For example an mic/line input socket provides one port on the network. One physical AES3 input connection provides two ports on the network.

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.

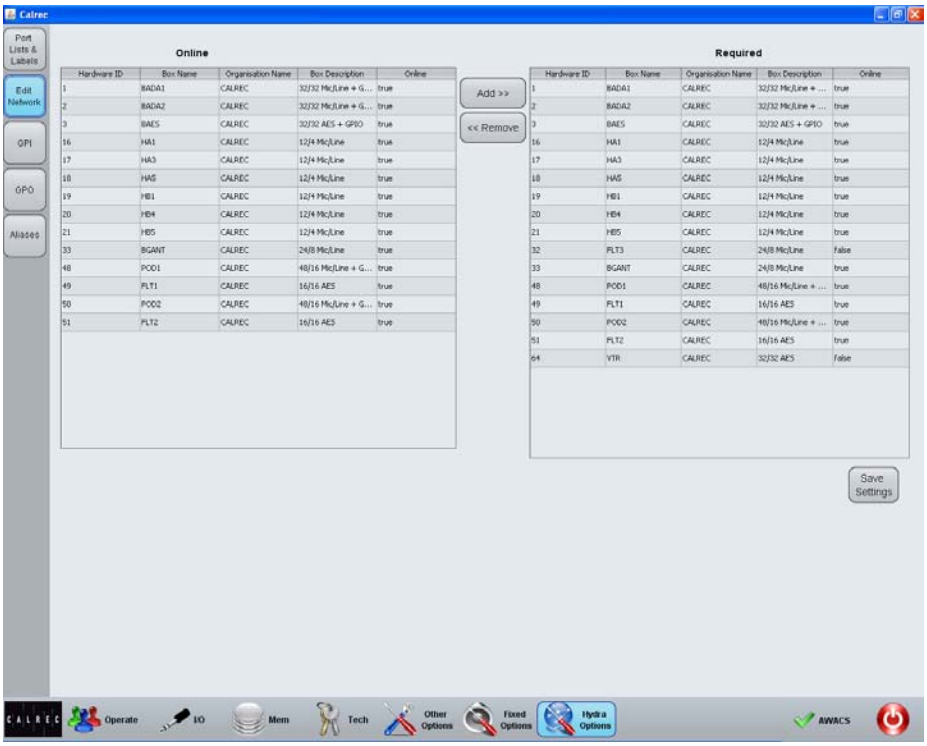
Outputs from any other Apollo console connected to the same network can also be patched back into the input of any console. This again is handled by the Hydra2 network. When two or more consoles are connected together via their routers, all of their outputs become available to the other consoles as input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

FIGURE 1 - EDIT NETWORK SCREEN



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

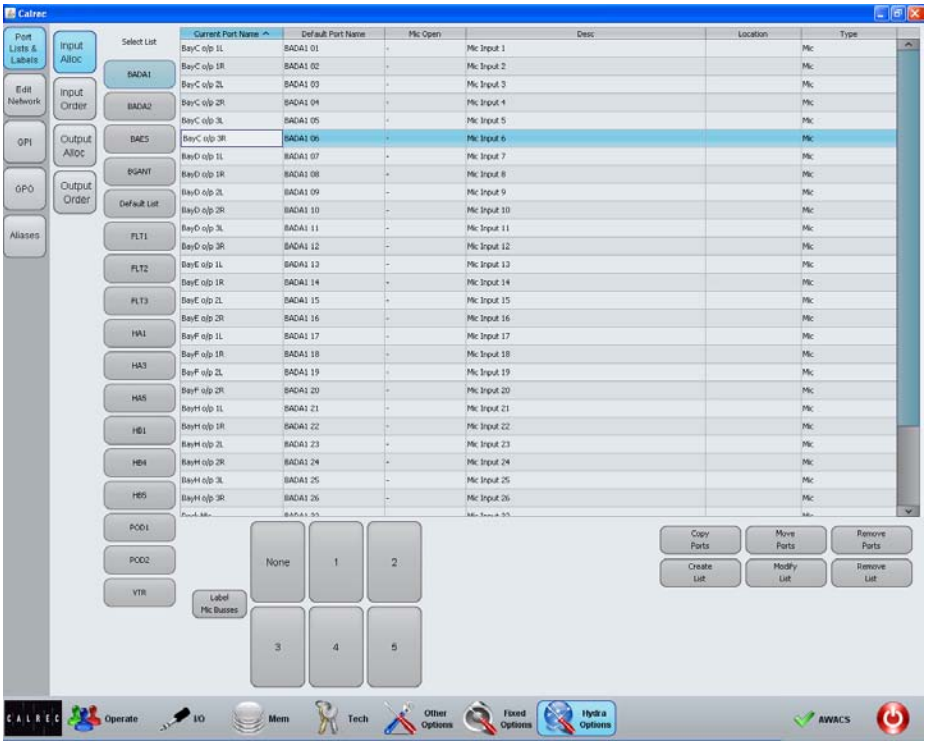
To access ports lists, go to the PORT LISTS & LABELS screen in the HYDRA OPTIONS section of the main application (Figure 2). Select the INPUT ALLOC or OUTPUT ALLOC button at the left of the screen to work with input or output ports respectively. The screen will show all available port lists just to the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

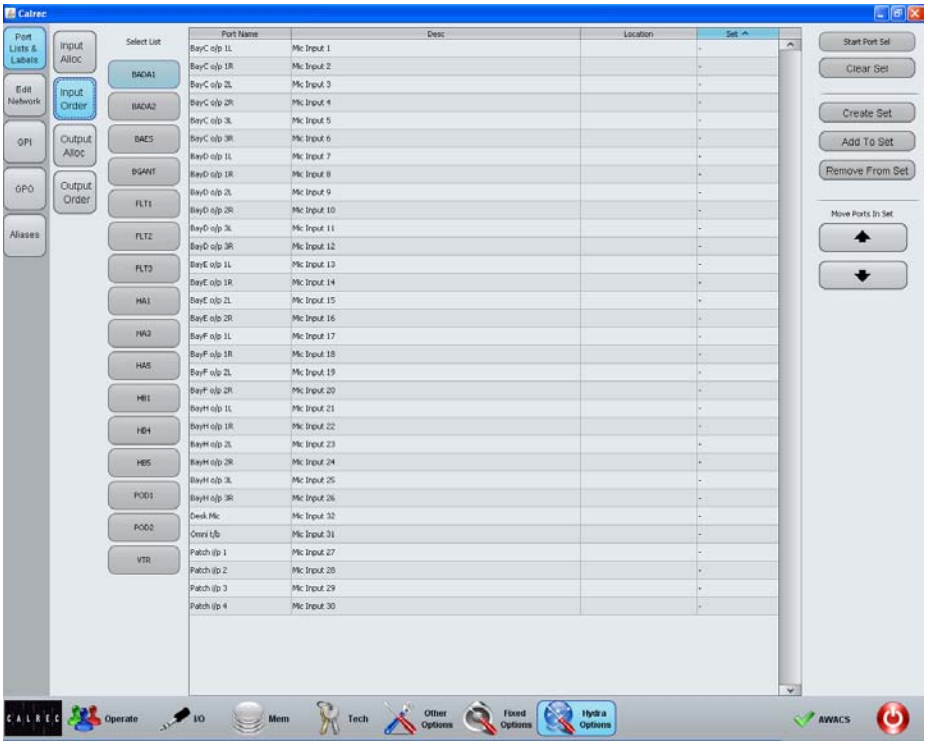
Ports can be added to an existing set by selecting them and touching the ADD TO SET button. This will bring up a popup dialog which allows the user to select the destination set.

Alias files

Sets might often be configured as part of the installation process, to simplify production tasks for operational staff. A further level of port groupings is provided by the input alias system which allows multiple input resources to have names assigned and saved as an input alias file.

Matching name sets can also be applied to alternative sets of input resources and saved in a different input alias file. A console can then rapidly have an entire set of input resources assigned to it by enabling one or other input alias file. Typically this might be used to assign the particular resources needed for a production to come from Studio A or from Studio B. Output alias files can also be created in a similar way. The full process is described in the Operator Manual.

FIGURE 4 - SETS



GPIO

Apollo GPIO connections are available on the rear of Hydra IO boxes fitted with optional GPIO cards.

Where a Hydra box has been fitted with an SW5739 GPIO card, it will also be fitted with two 25 pin D-type connectors. One of these provides access to eight opto isolated inputs, the other provides access to eight relay outputs. The connectors are shown in Figure 1.

GPIO modules can be fitted to Hydra2 boxes of 2U or greater.

GPI pin assignments

The GPI connector on the GPIO card is a 25 pin female D-Type. A 25 pin male D-Type connector on the connecting cable should be wired as shown in Figure 2.

Opto Input Specification

DC - 5 to 25 volts, positive or negative, AC - 5 to 25 volts peak, 50 - 60 Hz.

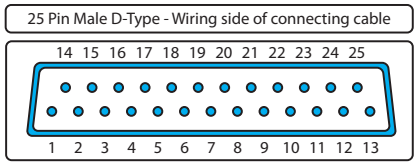
GPO pin assignments

The GPO connector on the GPIO card is a 25 pin male D-Type. A 25 pin female D-Type connector on the connecting cable should be wired as shown in Figure 3.

Relay output specifications

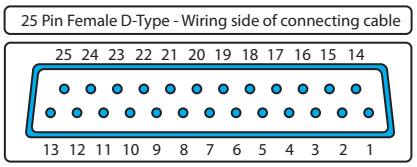
100mA maximum switch current, 30V maximum voltage.

FIGURE 2 - GPI CONNECTING CABLE PIN ASSIGNMENTS



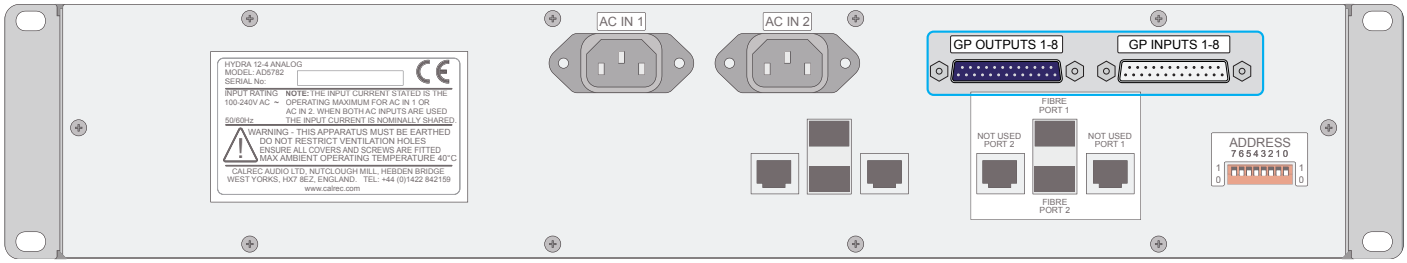
Function		Pin
Opto 1	+	1
	-	14
Opto 2	+	15
	-	3
Opto 3	+	4
	-	17
Opto 4	+	18
	-	6
Opto 5	+	7
	-	20
Opto 6	+	21
	-	9
Opto 7	+	10
	-	23
Opto 8	+	24
	-	12
+5V		2
		5
		8
		11
Ground		16
		19
		22
		25
		13

FIGURE 3 - GPO CONNECTING CABLE PIN ASSIGNMENTS



Function		Pin
Relay 1	Common	1
	Normally Open	14
	Normally Made	2
Relay 2	Common	15
	Normally Open	3
	Normally Made	16
Relay 3	Common	4
	Normally Open	17
	Normally Made	5
Relay 4	Common	18
	Normally Open	6
	Normally Made	19
Relay 5	Common	7
	Normally Open	20
	Normally Made	8
Relay 6	Common	21
	Normally Open	9
	Normally Made	22
Relay 7	Common	10
	Normally Open	23
	Normally Made	11
Relay 8	Common	24
	Normally Open	12
	Normally Made	25
Ground		13

FIGURE 1 - GPIO CONNECTIONS



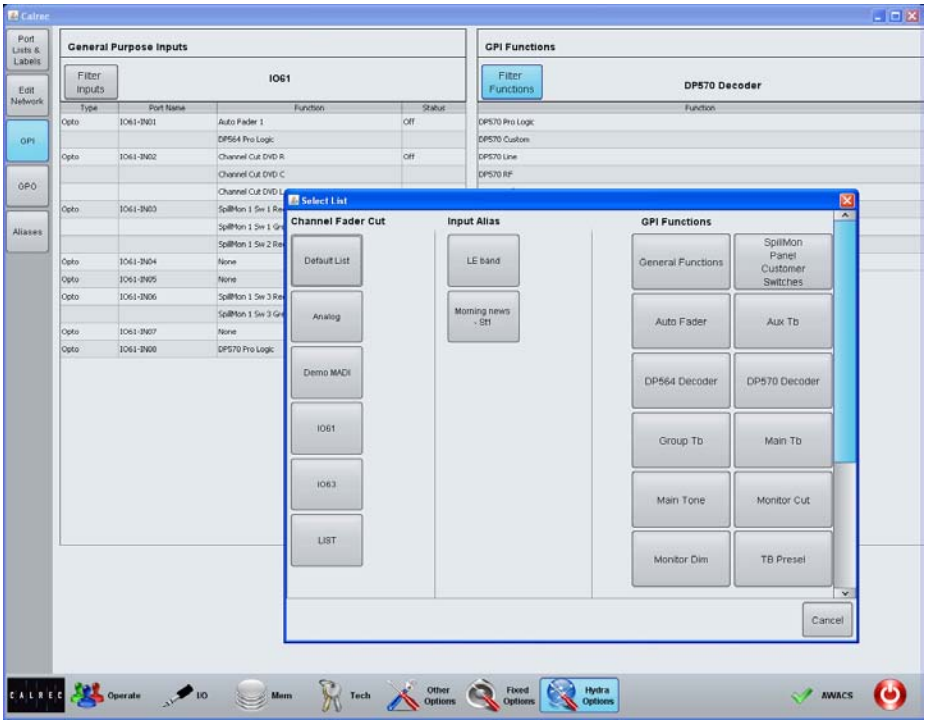
Assigning GPIs

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 4. 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 ports can be filtered using the FILTER PORTS 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 above.

FIGURE 4 - ASSIGNING GPI OPTOS TO CONSOLE FUNCTIONS



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.

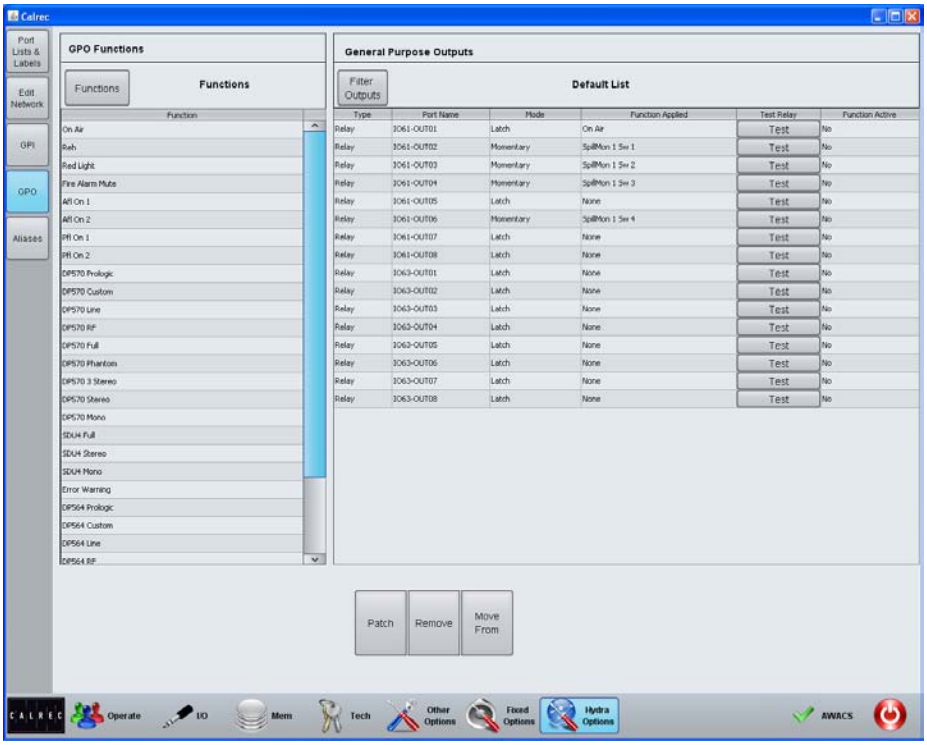
GPO signal type

GPO signals are currently fixed to Latch mode. Latch mode sends a constant voltage while the function is active

Test GPO

A test button is present on every GPO output to manually trigger the GPO signal.

FIGURE 5 - ASSIGNING CONSOLE FUNCTIONS TO GPO RELAYS



DOLBY UNIT CONTROL

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 as described in the Operator Manual. 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.

Console software V1.4CTA and later has specific touch screen controls and indicators for three different models of Dolby unit. Although 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.

GPIO assignment

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.

The Dolby DP570 and DP564 have 9 modes with GP control. To control all of these needs 9 GPO ports; more than the 8 provided on each SW5739 card. Controlling all 9 modes can therefore need the control to be split across two Hydra2 boxes.

Configuring the external device

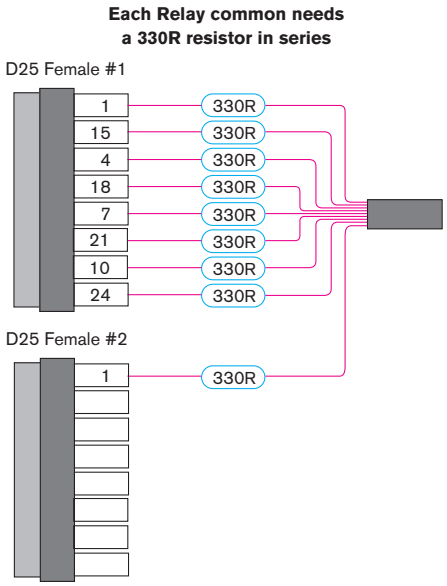
It is important always to refer to the detailed manual for the device you are using and any comments here can only be of a general nature.

Many devices have configurable GPIO. On a Dolby DP570 press SETUP to access the configuration menus and use the up/ down arrow keys to scroll through sub-menus, then the ENTER key to select the required one. There are separate menus for GPI and GPO and within these are options for trigger, polarity and a function. Use the ESCAPE key to back out of menus. Settings are automatically saved.

The DP564 has similar configuration options.

Set all the GPIs you are using on the Dolby unit to use edge triggering and positive / high polarity. All GPOs should be set to level triggering and positive / high polarity.

It is recommended that 330 ohm (or similar) current limiting resistors are fitted in series with the relay commons to protect the supply from the Dolby unit.



APOLLO
CONSOLE FUNCTIONS

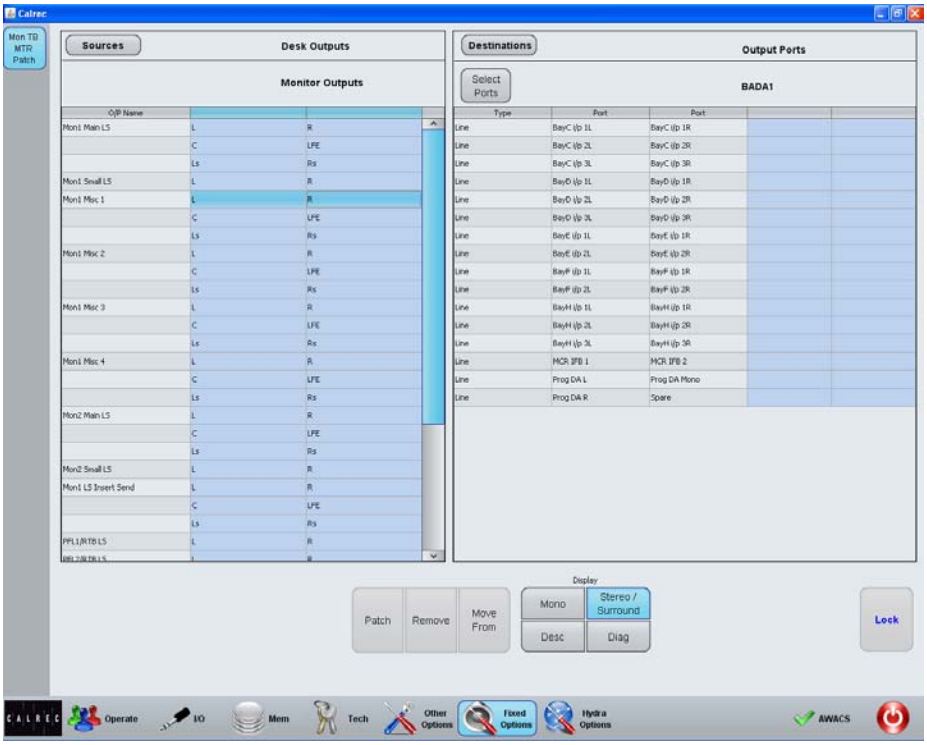
MONITOR SETUP

As all Apollo IO is provided via Hydra2 boxes, monitors should be connected to available Hydra2 output ports and then patched within the main application.

The monitor patching is performed in the MON TB MTR PATCH screen in the GENERAL section as shown in Figure 1.

The FILTER button above the sources list on the left hand side of the screen can be used to select LOCAL MONITOR OUTPUTS as the source. Select the required monitor output or outputs from this list, then select one or more output ports from the list on the right and press the PATCH button.

FIGURE 1 - MONITOR PATCHING IN THE MAIN APPLICATION



METERING

A range of metering solutions can be integrated into the flexible Apollo system.

Calrec TFT meters

As a standard option Calrec supply high resolution TFT metering. If your console is fitted with these meters they will be located in the surface upstand and are connected to the meter buss for data and power. Configuration of these meters is described in the Apollo Operator Manual.

Calrec Moving Coil meters

Optional PPM and VU meters can be installed in the surface upstand. These meters take their power from an AP (interruptible at reset) or SPR (non-interruptible) socket on a POE switch.

The meters accept both analog and 110 ohm digital input signals connected via a 9-pin female D-type connector. The pinout information of the connecting cable is shown in Figure 1. Hydra2 output ports should be reserved for this purpose.

Third party meters

Meters from DK and RTW may also be integrated into the surface. Power to the meters will be provided internally. Signals are sent to third party meters from Hydra2 output ports which need to be allocated for that purpose.

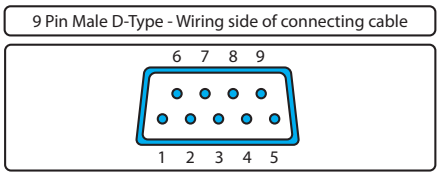
For detailed connection and pinout information for third party meters, please refer to the manufacturer's documentation.

Sending signal to external meters

The signal to be metered should be routed to a physical output port which can then be connected to the meter input. This patching is performed in the MON TB MTR PATCH screen in the GENERAL section as shown in Figure 2.

The FILTER button above the sources list on the left hand side of the screen can be used to select LOCAL EXT METER OUTPUTS as the source. Select the required meter output or outputs from this list, then select one or more output ports from the list on the right and press the PATCH button.

FIGURE 1 - MOVING COIL METER INPUT CONNECTOR



Analog Input

Signal	Pin
Analog In Left +	1
Analog In Left -	6
Analog In Right +	2
Analog In Right -	7
Screen	3
Screen	5

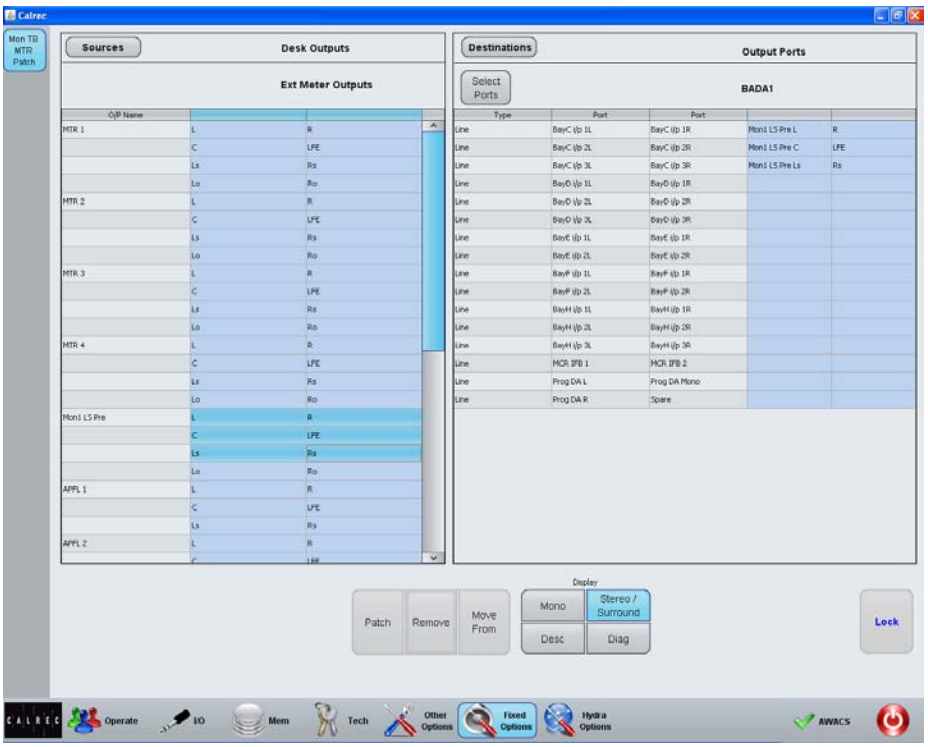
Balanced AES input (110 Ohm)

Signal	Pin
AES +	4
AES -	9
Screen	5

Unbalanced AES input (75 Ohm)

Signal	Pin
AES signal	8 + 4
Screen	9 + 5

FIGURE 2 - EXTERNAL METER PATCHING IN THE MAIN APPLICATION



TALKBACK CONNECTIONS

Talkback microphone

The talkback microphone connects to the XLR socket on the front of the surface reset panel as shown in Figure 1. A male XLR socket is present on the rear of the reset panel and should be connected to a physical mic/line input port on a Hydra2 IO box.

Reverse talkback

Microphones feeding the reverse talkback function should also be connected to any input on a Hydra2 unit.

Patching connections

The MON MTR EXT I/P screen in the OTHER section of the Main Application allows the talkback microphone and any reverse talkback microphones that are connected to Hydra2 units to be patched to the relevant inputs in the Apollo system. Select the input port from the list on the left and the required system input from the right list then press the patch button.

This screen is shown in Figure 2.

Talkback source controls

In the TONE & TALKBACK list on the right of the screen there are various options for controlling the source feeding the talkback inputs. If an analog source is connected the gain may be altered or its polarity reversed. If a digital source is connected, sample rate conversion may be applied.

FIGURE 1 - TALKBACK MICROPHONE CONNECTION

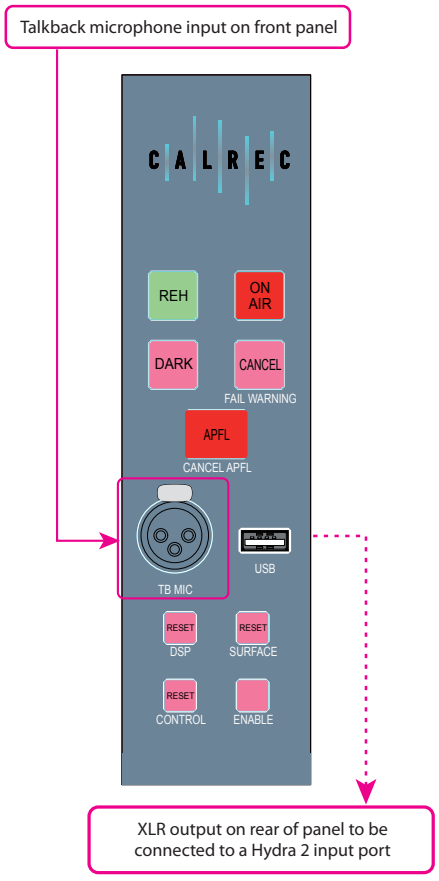
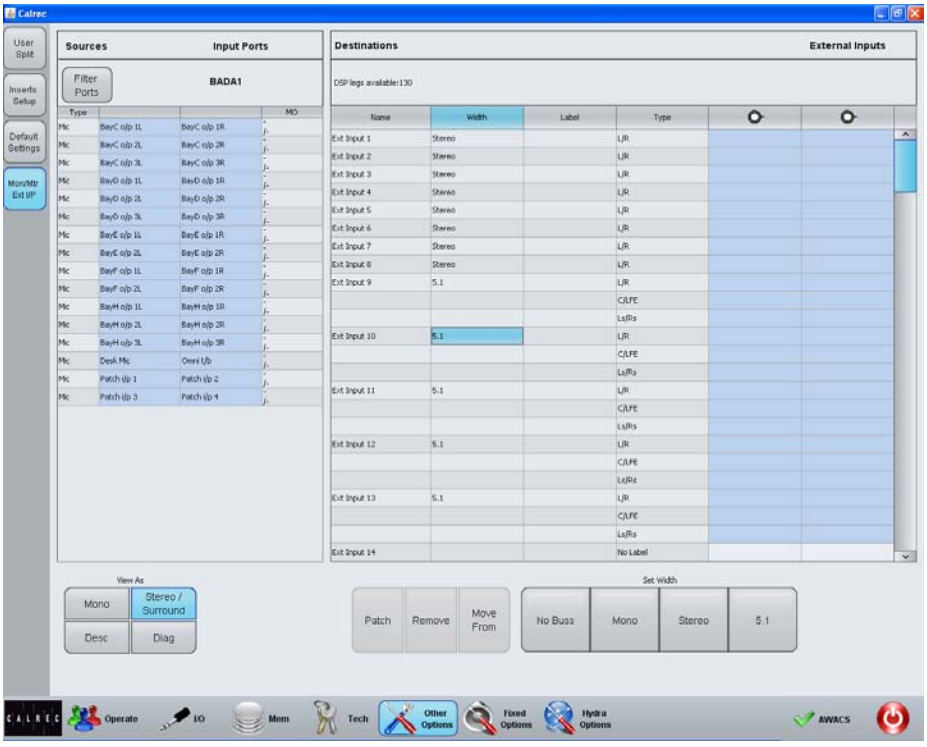


FIGURE 2 - PATCHING TALKBACK CONNECTIONS



HEADPHONE CONNECTIONS

Headphone connections are made in a similar way to the talkback connections but in reverse.

Apollo can provide up to three stereo headphone output connectors, each able to receive an individual feed.

Connecting the headphones

As shown in Figure 1, a headphone output is sent from a mic/line output port on a Hydra2 IO box and connected to a 15 pin D-type HD connector on the headphone amplifier module in the configuration PC PSU unit. The pin assignments of the connecting cable is shown in Figure 2. The configuration PC PSU unit is located inside the surface next to the configuration PC.

The amplified headphone signal is sent back out of the headphone amp module via a 9 pin D-Type connector. The pin assignments of the connecting cable are shown in Figure 3.

This signal is then routed to the headphone jack which, depending on the system configuration, may be located in the front of the surface side trims.

Powering the headphone amplifier

The headphone amplifier receives power over Ethernet from a spare SPR (uninterruptible) or AP (interruptible) socket on any POE switch. This power outlet is connected to the POE SW SPARE POWER socket on the headphone amplifier.

FIGURE 1 - HEADPHONE CONNECTIONS

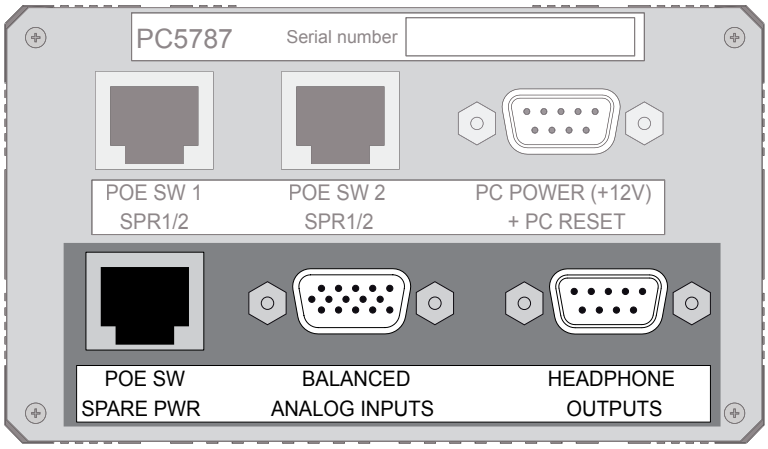
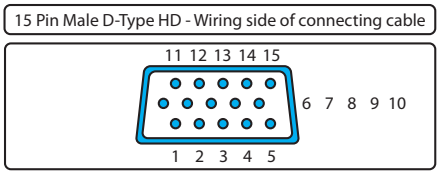
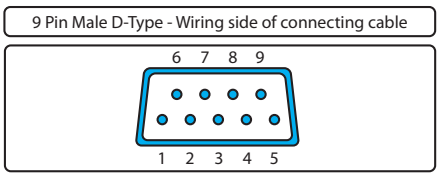


FIGURE 2 - HEADPHONE INPUT PIN ASSIGNMENT



Signal		Pin
Input 1	Left +	14
	Left -	15
	Right +	10
	Right -	5
	Earth	4
Input 2	Left +	9
	Left -	13
	Right +	8
	Right -	3
	Earth	12
Input 3	Left +	2
	Left -	7
	Right +	1
	Right -	11
	Earth	6

FIGURE 3 - HEADPHONE OUTPUT PIN ASSIGNMENT



Signal		Pin
Output 1	Left	1
	Right	6
	Common	2
Output 2	Left	7
	Right	3
	Common	8
Output 3	Left	4
	Right	9
	Common	5

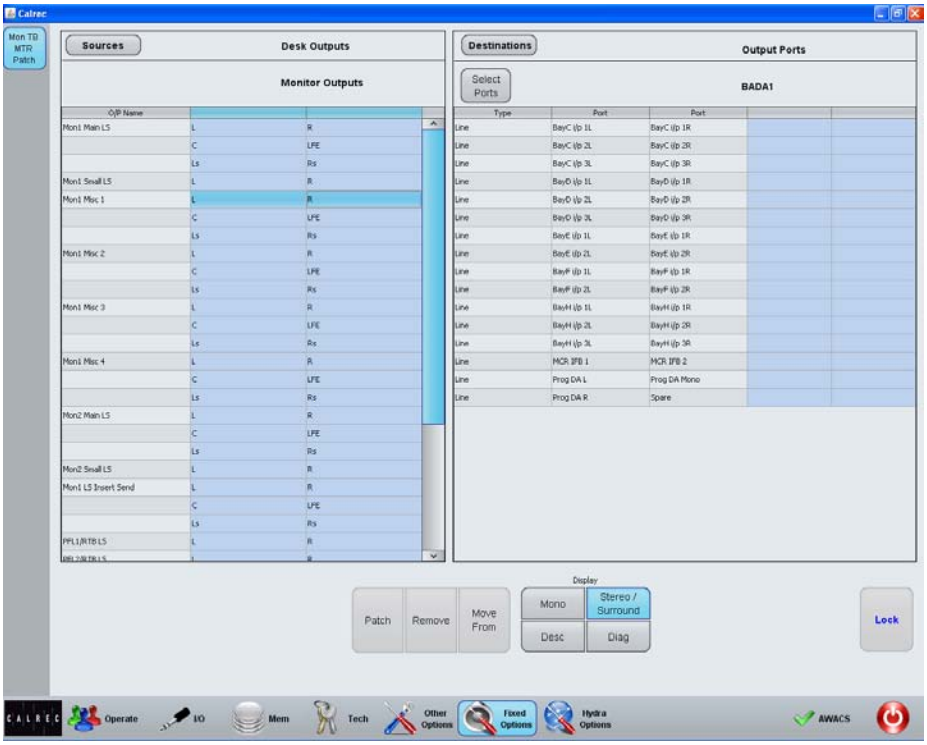
Patching the headphone output
Navigate to the FIXED OPTIONS section then the MON MTR TB PATCH screen of the Main Application, as shown in Figure 4.

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.

The Misc Monitor control relating to the misc output you selected in the sources list will now provide level control and source selection for the headphones. For more information on source selection and the Monitor controls please refer to the Operator Manual.

FIGURE 4 - PATCHING HEADPHONE CONNECTIONS



APOLLO
CONNECTION INFORMATION

CONNECTION TYPES

The majority of external connections in a Apollo system are made using SFP GBICs (Small Form-factor Pluggable Giga-Bit Interface Converters).

These converters allow the system design to be agnostic of connector type and connection medium. GBICs can be provided for copper or fiber connections. The two connection mediums are detailed in the following sections.

Copper connections

Copper connections can be made using screened Category 5e or Category 6 cable. The cable MUST be screened in order to comply with EMC requirements. Details are given in the 'Category 5e and6 Cables' section of this document.

Fiber connections

Fiber GBICs convert the Gigabit Ethernet data into light waves using a Laser Diode to transmit into a Fiber Optic Cable and a Photodiode receiver to convert the light waves back into electrical signals. Details are provided in the 'Fiber Optic Interfaces' section of this document.

CATEGORY 5E AND 6 CABLES

Interconnecting Cat5e cables MUST have an overall foil shield over the 4 twisted pairs, this is often referred to and marked as FTP. Unshielded UTP cable MUST NOT be used. Shielded cable is essential for EMC (Electro Magnetic Compatibility) to comply with the Class B radiated emission limits set in the standard EN55022. Shielded cable also improves the immunity and reliability of the equipment from interference sources.

Cable manufacturers strongly recommend adhering closely to the installation practises outlined for their cable specification.

Some important issues to consider during installation

Do not exceed the cable manufacturer's specified cable pulling tension and avoid sharp bends in the cable, as it will alter the lay of the pairs within it. Cable manufacturers recommend that cable bend radius should be no less than 4 times the diameter of the cable (post installation). The minimum cable bend radius during installation is 8 times the cable diameter. In practise, this means that where a 25 mm radius would be appropriate within a rack, the conduit leading to it would require minimum bends of 50 mm radius.

Avoid compressing the cables by over-tightening any cable ties (tie-wraps). This problem is most likely to occur in large bundles of cables, where the cables on the outside of the bundle are exposed to more compression than those on the inside. Over-tightening deforms the twisted pairs within the cable, and can affect their performance. The cable ties should only be tight enough to sufficiently support the cable bundle, and not to deform the outer cable sleeve/jacket. One solution can be to use the hook and loop (Velcro) cable ties. When any number of cables are bundled together in long parallel lengths, the capacitive coupling of pairs in different cables in the bundle with the same twist rates can cause cross-talk interference to increase. The best way to avoid this is to minimise the length of long parallel runs, and to install cables as they lie rather than trying to straighten them out into perfectly aligned bundles.

When pulling cables from the reels, be conscious of the occasional tendency of the cable to kink. If the cable kinks, it should be regarded as damaged, and replaced. Do not try to straighten the kink out of the cable.

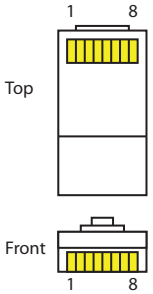
At the point of cable termination, remove only the minimum amount of cable sleeve/jacket. This ensures that the twist rate and lay of the core pairs within the cable are maintained for as much of the transmission path as possible. The twist rate of each pair of cable cores should also be maintained to as close as possible to point of termination within the connector.

These are general rules to follow, and if in doubt, always refer to the cable manufacturer's recommendations.

Cat5e connector information

Should you be required to make up Cat5e cables and are unsure of the connector wiring, please refer to Figure 1 which details the wire colors and contact numbers.

FIGURE 1 - CAT5E CONNECTOR INFO



From		To	
Color	Pins	Pins	Color
O-W	1	1	O-W
O	2	2	O
G-W	3	3	G-W
B	4	4	B
B-W	5	5	B-W
G	6	6	G
Bn-W	7	7	Bn-W
Bn	8	8	Bn

FIBER OPTIC INTERFACES

There are two types of Fiber in common use, Multimode Fiber and Singlemode Fiber, the choice of which to use is based on how far away the IO boxes need to be placed.

Calrec recommends that Singlemode connections be used where possible as these allow for greater distances which may be important for OB stagebox type applications and they are more reliable due to their higher power budget, however there are cost implications which will need consideration.

If the Fiber infrastructure is already in place it may be Multimode and the distances will become important.

What about losses?

See Figure 1. The Optical Power Budget column gives an indication of the maximum loss that is allowable for enough light from the transmitter to reach the receiver for the system to work satisfactorily. The losses occur in 3 areas Fiber Loss, Splice loss and Connector loss. The Maximum Distances column is a guide based on operating at Gigabit Ethernet rates and having a Fiber cable with no splices and a connector at either end. The Splice loss is typically better than 0.3dB/splice and the connector loss is typically better than 0.5dB/connector pair. Fiber losses vary from 3.5dB/km in Multimode down to 0.4dB/km in Singlemode.

The installer should be able to provide certified attenuation figures based on EN 50173.

If the Optical Power Budget less the combined losses of Connectors/Splices and Fiber is a positive number then the system will work.

What is the construction of a fiber cable?

When installing Fiber cable, it is important to use a type which gives enough protection to the fiber for the environment in which it is to be used. The cladding/core of these fibers are made out of glass and are about the thickness of a human hair, so to give the fiber protection, various coatings and layers are added using materials like silicone and Nylon or PVC, and often a layer of Kevlar is added to ruggedize the construction. When fiber cables are to be installed in external environments, additional protection may be necessary. In this case number of individual ruggedized elements are often stranded around a central strength member such as high tensile steel, bound with paper tape and an external sheath applied on top of an aluminium tape moisture barrier.

What problems can arise during installation?

Precautions are necessary during installation to protect against the following:

- Moisture. If moisture gets into the cable sheath and freezes it can cause the fibers to crack.
- Temperature changes causing expansion and contraction stresses.
- Strain especially during the installation process which can cause the fibers to break.
- Abrasion and friction damage when a cable is pulled in.
- Crushing and cracking if a cable is bent beyond its safe bending radius or crushed by heavy objects or over-enthusiastically tie wrapped etc.
- Chemicals which can eat through or dissolve the sheathing.
- Rodents chewing on the cables.

All these factors should be borne in mind during the installation process, many of which are equally valid when installing fiber cabling in internal environments such as in underfloor trunking.

The other important aspect to the use of Fiber Optics is to employ the correct cleaning and maintenance regime to ensure optimum reliability and system performance. These relate to cleanliness of the connector ends of the fiber and the optical transceiver ports, for example the receptacles at the Laser Transmitter and Photodiode Receiver that the fiber connectors plug into.

Why do we need preventive maintenance of fiber optic cables and optics?

Small oil micro-deposits and dirt/dust particles on fiber optic cable optical surfaces cause a loss of light or degraded signal power which may ultimately cause intermittent problems in the optical connection.

Laser power density eventually burns contaminants into the optical surfaces

FIGURE 1 - FIBER CONNECTION DETAILS

Type of Cable	Maximum Distance	Connector	GBIC Type	Optical Power Budget
Copper Cat 5e/6 Ethernet	90m	RJ45	N/A	N/A
Fiber 62.5/125µm Multimode	275m	SC Duplex	SX	7.5dB
Fiber 50/125µm Multimode	550m	SC Duplex	SX	7.5dB
Fiber 8/125µm Singlemode	10km	LC Duplex	LX	8dB
Fiber 8/125µm Singlemode	70km	LC Duplex	LH	23dB

Note.
If connection redundancy is required, two duplex fiber cable runs will be needed per connection.

causing the fiber to produce inaccurate results effectively rendering it unusable.

By extension, contaminated cable connectors may often transfer contaminants and particulates into the “Optical Sub-Assembly" (OSA) barrels of the Optical Module they are inserted into.

It is especially important to watch out for this in Outside Broadcast environments.

Safety precautions during maintenance

General safety precautions are discussed here, but care should be taken to follow any specific optical device guidance as well as the safety precautions outlined for chemicals and tools used.

WARNING

Never look into the end of an optical interface while the device is operational.

Laser radiation can be harmful to the human eye and injury may occur with prolonged exposure.

Cautions

- Do not remove transceiver covers when operating.
- Ensure the unit power is turned off during cleaning.
- Ensure that other power/light sources are disabled during the cleaning of optical interfaces.
- Do not install any unauthorized modifications to the optical devices.

CLEANING FIBER OPTIC INTERFACES

The following tools are used for cleaning:

Compressed air
Clean Dry Air is essential to ensure the aerosol stream is free of dust, water and oil. Use filtered compressed air or canned compressed air, available at any laboratory supplier or camera shop.

Lens paper
A long fiber, low ash content type; having no chemical additives is recommended to minimize particulates and the chance of streaking and/or scratching the optical surfaces.

Lens paper is widely available at any laboratory supplier or camera shop.

Isopropyl alcohol or methanol
Cleaning solutions are available at any laboratory supplier. Isopropyl Alcohol is also available at local pharmacies, or camera shops. Special care should be practiced when using chemicals and it is important to follow the manufacturer's product guidelines.

Inspection microscope
A 200 x (for multimode) or 400 x (for Singlemode) magnification Inspection Scope is necessary tool for inspecting the connector ends of fiber cabling and Optical Sub-Assemblies for cracks and depositsof oil and dirt. These Inspection Scopes are available from various fiber optic suppliers.

Note. Ensure that the device is not operational before examining it through this device.

Cleaning fiber optic cables and connectors
There are multiple ways to clean fiber-optic cables and connectors.

Included below are some helpful tips to properly clean fiber optic cables.

- Do not allow the end of the fiber optic cable to make contact with any surface including fingers.
- Do not excessively bend the fiber cable. Bending the cable may cause internal breaks along the fiber resulting in poor performance or instability.
- Optics and optic coatings are easily chipped and/or scratched. Use of finger cots or powder free surgical gloves while handling fiber optic cables, will help ensure cleanliness.
- Only fresh (dry) spectroscopic grade Isopropyl Alcohol should be used as a cleaning solvent.
- Ensure that the module power is off and that other light sources are disabled.

Cleaning procedure
1. Blow the fiber surface with a stream of Clean Dry Air, this will dislodge larger loose particles.
2. Place 1-3 drops of spectroscopic grade Isopropyl Alcohol in the centre of a lens tissue.
3. Hold the fiber by the connector or cable, place the wet portion of the lens tissue on the optical surface and slowly drag it across.
4. Examine the surface of the fiber end under high intensity light using a direct magnifying inspection microscope or an indirect video inspection tool if available. If streaks or contaminants still remain, repeat the process using a fresh lens tissue.
5. Immediately install a protective cover over the end of the cable to avoid re-contamination or insert the fiber back into the previously cleaned receptacle for immediate use.

Additional notes
Do not tip the can of Clean Dry Air whilst aerosol spraying as liquid may be released contaminating the surface of the fiber.

Do not use lens paper dry as dry lens paper is extremely abrasive.

Do not use Acetone as a cleaning solvent on the fiber optical surfaces.

To ensure the purity of the Isopropyl Alcohol, do not insert the lens tissue, swabs, etc into the liquid, instead, drip the liquid on to the material.

Cleaning optical transceivers
The best way to clean a transceiver port is to remove particles using a stream of Clean Dry Air.

Included below are some helpful tips to properly clean fiber optic modules.

- Always handle optical GBIC modules in an ESD safe manner using the proper safety precautions.
- Ensure that the module power is off and handle the modules with care.
- Always use Clean Dry Air or an approved canned compressed air supply.
- Always hold the can of compressed air upright. Tipping may release liquids into the air stream.
- Do not touch the inner surfaces of the module including the Optical Sub-Assemblies (OSA), or insert any foreign objects into the ports.
- Use of finger cots or powder free surgical gloves are not required but may be used for cleanliness.

Cleaning procedure

1. With the clean dry air, blow the inner barrel of the Transmitter and Receiver Optical Sub-Assemblies (OSA). This will dislodge loose particles.
2. Examine the surface of the OSA lens under high intensity light using the inspection microscope. If contaminants still remain, repeat the process.

Following these guidelines should provide a successful installation and ensure optimum reliability and system performance.

For further information or advice please feel free to contact Calrec.

LAN AND INTERNET CONNECTIONS

Apollo is provided with two extra Ethernet connections. One is internal and intended for a permanent connection to the facility LAN. The second may be connected externally to the surface for a simple ad hoc internet or laptop connection.

Two USB to Ethernet adaptors (Calrec stock code: 491-179) are provided with Apollo. An adaptor is shown in Figure 1. The adaptors are required as the configuration PC has only one Ethernet socket which is taken up with the PC connection to the Apollo control system.

Permanent connection to facility LAN

The PC has four USB sockets, one of which is used to provide a USB link to the reset panel. Another one is used to connect one of the USB to Ethernet adaptors. This adaptor is mounted near to the configuration PC and is intended to provide an installed connection to the facility LAN. The rear panels, or surface panels need to be removed to gain access to this adaptor.

This connection (shown in Figure 2) can be used to backup and restore Apollo user data such as shows and memories, to provide access to files on the facility LAN and to provide Apollo with an internet connection for use with remote updates.

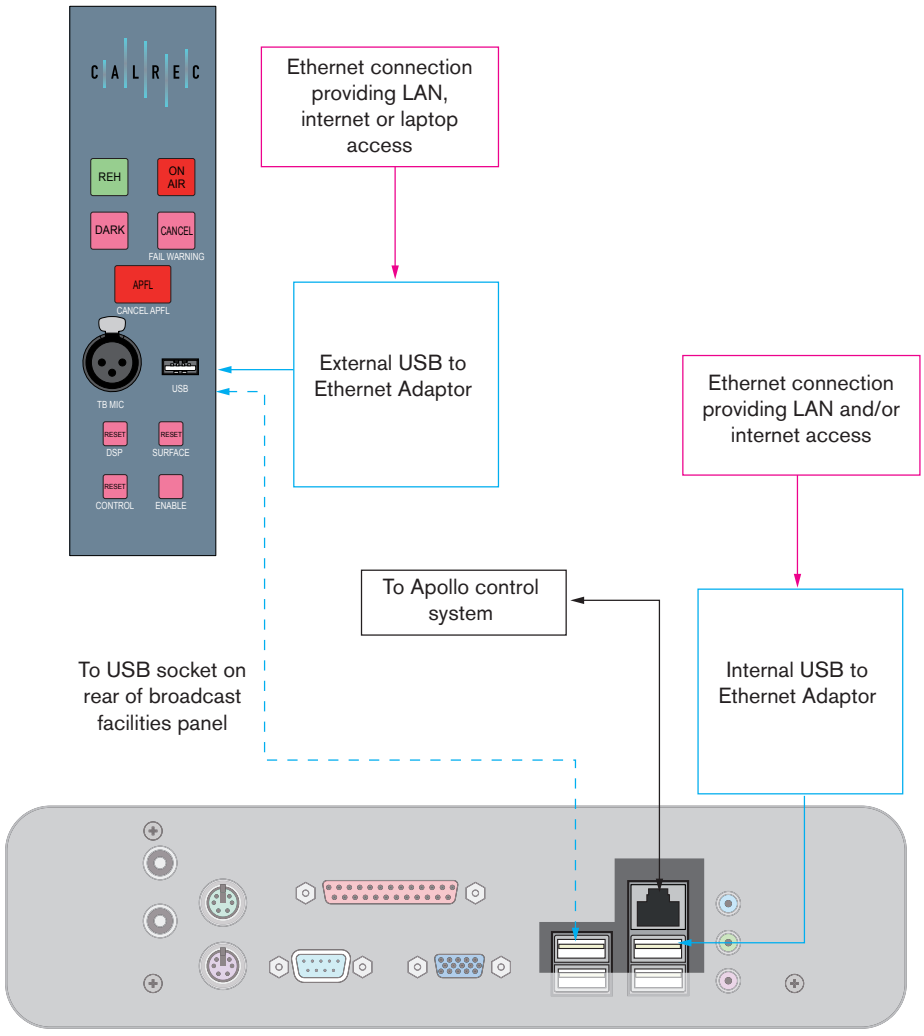
Note: in order for Calrec to perform remote software updates and provide diagnostic facilities, it is essential that an internet connection to the system is provided.

Temporary, easy access Ethernet connection

If a permanent LAN connection is not required, or the Apollo may be mobile, the second adaptor may be used to provide a quick temporary Ethernet connection.

FIGURE 1 - USB TO ETHERNET ADAPTOR

FIGURE 2 - CONNECTION DIAGRAM



It may also be used to provide a simple connection to a laptop.

The USB cable on the adaptor should be connected to the USB socket on the Broadcast Facilities Panel. The LAN, internet or laptop connection should be made to the RJ45 socket on the other end of the adaptor. This connection is shown in Figure 2.

Remote updates

If remote updates are necessary, Calrec will connect with the system through a secure SSL connection. Updates and diagnostics should be possible as long as the available internet connection allows browsing of secure websites (HTTPS), regardless of whether a firewall is in place or not.

APOLLO
SPECIFICATIONS

CALREC

Putting Sound in the Picture

OPERATIONAL SPECIFICATION

Hydra2 networked IO box specifications are detailed in Figure 1.

Apollo surface specifications are detailed in Figure 2.

The Apollo rack specifications are detailed in Figure 3.

General
Equipment with input power >100W (Console & DSP/Router Rack) employs high efficiency power supplies with active power factor correction.

FIGURE 1 - HYDRA2 NETWORKED IO BOX SPECIFICATIONS

Powering	The 1U, 2U, 3U and 4U Racks have two AC power inlets each powering an internal PSU. Although the racks will operate with one inlet supply we recommend both inlets are powered. This will ensure continued operation should a PSU or AC source fail. The operating AC supply voltage is 100V - 240V +/-10%. The peak inrush current is limited (cold start). Figures are available for all units. This reduces the chance of a nuisance trip or fuse blow from power up. The RMS quiescent current figures are available for all types of I/O rack.
Power Factor	All rack units have less than 75W of input power. The internal power supplies fitted have passive filtering (as opposed to active power factor correction) to reduce the harmonics to within the limits of the standard EN61000-3-2. At the time of writing the standard does not apply to equipment <75W. If the lower limit is ever reduced the units will be compliant and as such are future proof.
Heat Output & Efficiency	The Heat output from the racks depends on the supply voltage and loading. Typically it is 0.55 times the RMS VA (Volts x Amperes) at 230V and 0.7 times the RMS VA at 115V. The heat output figures are available for all types of I/O racks. The low power PSU efficiency again is dependant on supply voltage and loading, generally >70%.
Cooling	The 2U, 3U & 4U racks keep their operating temperature under control with fan assistance. Operation is not dependant on the fan; it is there to extend the operating life of the unit. There is an 80mm low power, low speed and low noise fan mounted in the right side of the racks from front. The fan is speed monitored so if it slows down or stops a warning is given. The air intake is at the left side of the racks viewed from front and the air outtake on the right. At least 50mm (2") clearance must be maintained for these vents. The 1U I/O racks have sufficient surface area to radiate the heat out so no fan is required. Any racks may be mounted in an open bay providing the ambient air temperature is within limits (see below). The racks may also be housed in any air conditioned bay.
Operating Ambient Air Temperature	0°C - 35°C
Relative Humidity	5% – 80% Non-condensing

FIGURE 2 - APOLLO SURFACE SPECIFICATIONS

Powering	The console has two AC power inlets feeding two sets of internal power supplies. Although the console will operate with one inlet supply we recommend both inlets are powered. This will ensure continued operation should a PSU or AC source fail. The operating AC supply voltage is 100V - 240V +/-10%. The inrush current is actively limited to 13A peak at 230V (6.5A at 115V) per internal PSU. This much reduces the chance of a nuisance trip or fuse blow from a hot start after a momentary brownout or blackout of the AC power. The total peak inrush current and quiescent current can be specified for any size of console. There is a peak operating current when the motorised faders move. The worst case is if all the faders move end to end where the peak power will be 5 Watts per fader for <120ms. Active PFC (Power Factor Correction) is employed in the power supplies and the PF (Power Factor) is greater than 0.9 under all operating conditions.
Heat Output & Efficiency	The Heat output from the console is nominally 0.93 times the RMS VA (Volts x Amperes). These figures can be provided for any size of console. The PSU efficiency under all operating conditions is greater than 85%, typically >87% at 230V.
Cooling	The console keeps its operating temperature under control by natural convection. The air intake is on the underside of the console and the outtake is along the top rear of the console. At least 50mm (2") clearance must be maintained for these vents.
Operating Ambient Air Temperature	Short Term: 5°C - 35°C Long Term: 15°C - 30°C
Relative Humidity	5% – 80% Non-condensing

FIGURE 3 - APOLLO RACK SPECIFICATIONS

Powering	The 8U Rack has provision for two AC input power supply modules. Although the rack will operate with one power supply we recommend both modules are fitted and powered. This will ensure continued operation should a PSU or AC source fail. The operating AC supply voltage is 100V - 240V +/-10%. The inrush current is actively limited to 13A peak at 230V (6.5A at 115V) per power supply module. This much reduces the chance of a nuisance trip or fuse blow from a hot start after a momentary brownout or blackout of the AC power. The quiescent current can be specified for any configuration of rack. Active PFC (Power Factor Correction) is employed in the power supplies and the PF (Power Factor) is greater than 0.9 under all operating conditions.
Heat Output & Efficiency	The Heat output from the rack is nominally 0.93 times the RMS VA (Volts x Amperes). These figures can be provided for any rack configuration. The maximum possible heat output in a fully loaded 8U rack is 320W.
Cooling	The rack keeps its operating temperature under control by fan assisted convection. There are 6 x 120mm low power, low speed and low noise fans mounted in the top of the rack. The fans are speed monitored so if any fan slows down or stops a warning is given. The air intake is along the bottom front of the enclosure and the exhaust is along the top rear of the enclosure. At least 50mm (2") clearance must be maintained for these vents. The rack may be mounted in an open bay providing the ambient air temperature is within limits (see below). The rack may also be housed in an air conditioned bay providing the air pressure is negative. Consult factory for positive air pressure systems.
Operating Ambient Air Temperature	0°C - 35°C
Relative Humidity	5% – 80% Non-condensing

AUDIO PERFORMANCE SPECIFICATION

The following tables provide the audio performance specification for Apollo audio system.

- Figure 1 provides AES3 input specs
- Figure 2 provides AES3 output specs
- Figure 3 provides analog input specs
- Figure 4 provides analog output specs
- Figure 5 provides analog and AES3 performance data
- Figure 6 provides the supported sync inputs

FIGURE 1 - AES3 INPUT SPECS

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

FIGURE 2 - AES3 OUTPUT SPECS

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

FIGURE 3 - ANALOG INPUT SPECS

Analog - Digital Conversion	24 Bit
Input	Electronically Balanced
Input Impedance	2k Ohms for Mic Gains 10k Ohms for Line gains
Sensitivity	+18 / -78dB on Mic/Line Inputs
Equivalent Input Noise	-127dB (150 Ohm source)
Distortion	-1dBFS @ 1kHz - Better than 0.003% -20dBFS @ 1kHz - Better than 0.006% -60 dBFS @ 1kHz - Better than 0.3%
Frequency Response	20Hz to 20kHz +/- 0.5dB on Mic/Line Inputs
Input CMR (Common Mode Rejection)	>75dB (Typical 85dB) on Mic/Line inputs
Notes	Analog input for 0dBFS can be pre-set globally to +28, +24, +22, +20, +18 or +15dBU Pre-fader headroom on mic inputs is adjustable globally from +24 to +36dB in 2dB steps

FIGURE 4 - ANALOG OUTPUT SPECS

Digital - Analog Conversion	24 Bit
Output Balance	Electronically Balanced, 20Hz to 20kHz. Better than -35dB, typically -45dB
Output Impedance	<40 Ohms
Distortion	-1dBFS @ 1kHz - Better than 0.006% -20dBFS @ 1kHz - Better than 0.003% -60 dBFS @ 1kHz - Better than 0.3%
Frequency Response	20Hz to 20kHz +/- 0.25dB
Notes	Analog output for 0dBFS matches input setting into >1kOhms (+24dBu max into 600 Ohms)

FIGURE 5 - AUDIO PERFORMANCE DATA

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

FIGURE 6 - SYNCHRONIZATION INPUTS

48Hz Synchronization	NTSC/PAL Video Tri-Level Internal Crystal Reference TTL Wordclock (48kHz) AES/EBU (AES3) Digital Input (48kHz)

Calrec Audio Ltd
Nutclough Mill
Hebden Bridge
West Yorkshire
England UK
HX7 8EZ

Tel +44 (0)1422 842159
Fax +44 (0)1422 845244
Email Enquiries@calrec.com

calrec.com

(926-136 Iss.3)