HYDRA SYSTEM PLUS

AUDIO NETWORKING SYSTEM
TECHNICAL SPECIFICATIONS

ISSUE 7

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INTRODUCTION

The Hydra Audio Networking system provides a powerful network for sharing of I/O resources and control data between Calrec digital mixing consoles. Hydra I/O Racks, with up to 96 inputs/outputs, analogue or digital, may be connected onto the network, providing remotely located sources and destinations that can be used by any or all mixing consoles. The system is designed for use in television and radio production studios and outside broadcast vehicles where the devices connected to the network may be fixed or variable.

Gigabit Ethernet fabric is used as it is by far the highest speed network fabric commonly available and offers a clear evolutionary path. Very high bandwidth and scalable, flexible architecture allows the networking system to be tailored precisely to the requirements of each installation.

The Hydra Audio Networking system is highly-reliable because of its use of proven technology and scope for 100% redundancy. Control of the network is remarkably user-friendly, as it is a natural and logical extension of the existing operational screens used by Alpha, Sigma and Zeta consoles.

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

This understanding of the real issues of broadcast operations is one of the many reasons why operators and management alike prefer Calrec. The Hydra Audio Networking system is designed to ensure this level of confidence will continue in the digital era.

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 and RAB 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.

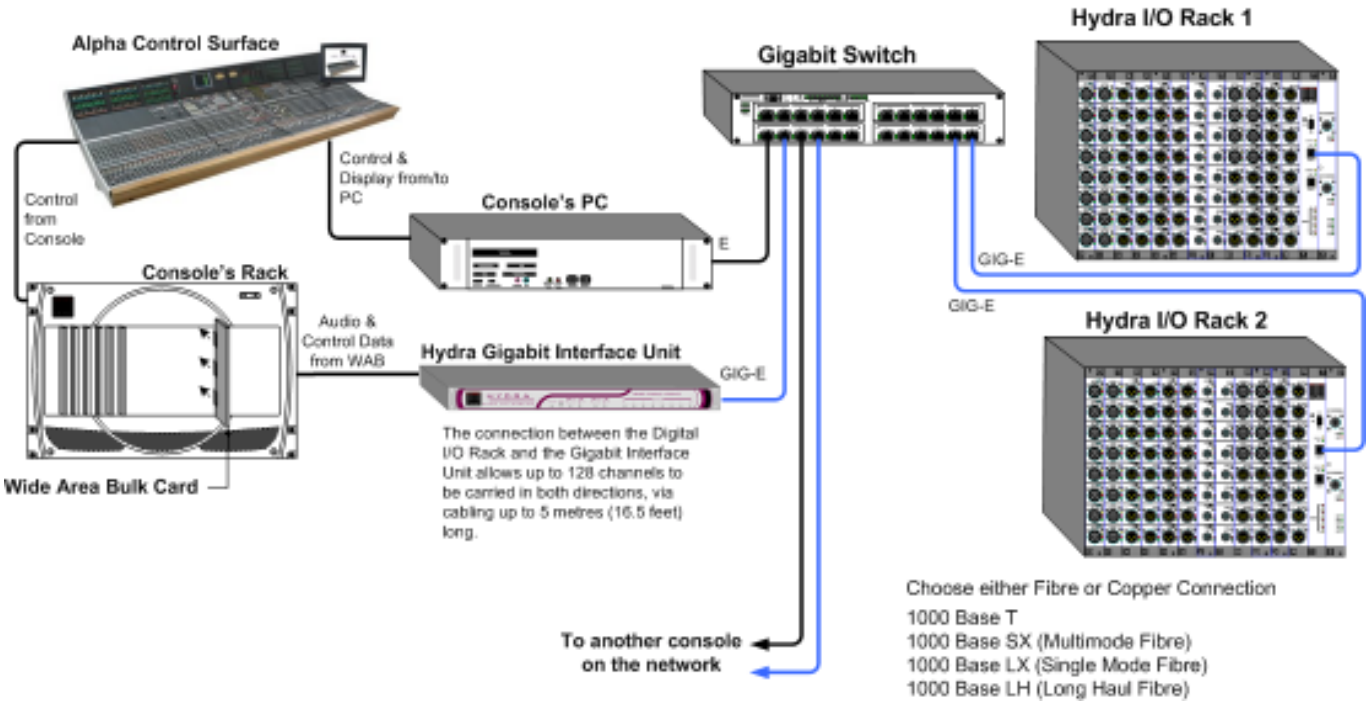
Overview

TECHNOLOGY

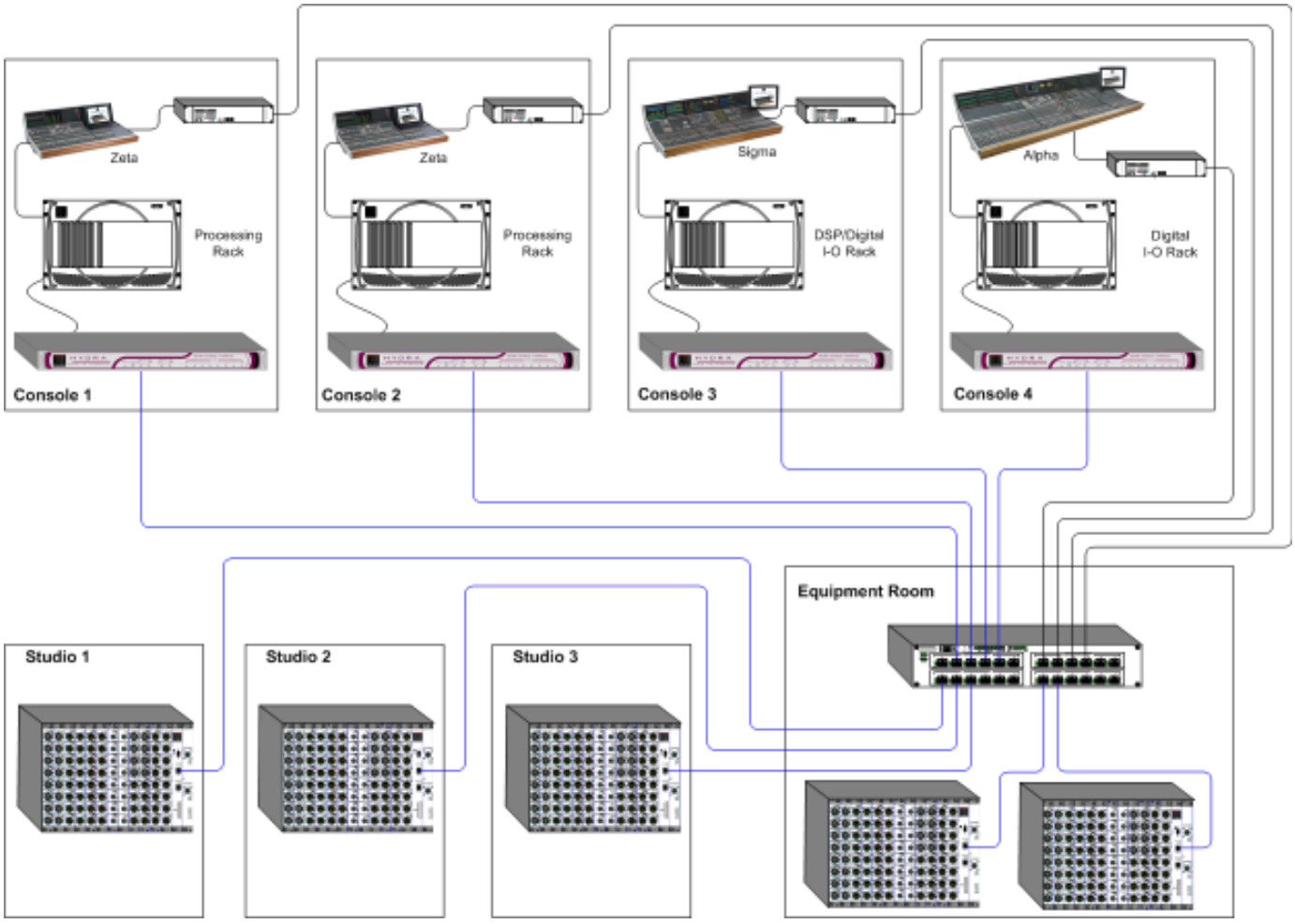
Gigabit Ethernet is founded on key principles of preceding Ethernet technologies and provides a data rate of 1000 Mbps over copper or optical fibre. Data is transferred using the Ethernet frame format over switched media in a network constructed from standardised structured cabling.

The Hydra Audio Network fabric is constructed using low-cost off-the-shelf hardware. The network topology is similar to that of an office LAN, being created out of a central switch with connections to each mixing console, in a star formation. Connections may be made with Category 5e UTP, up to 90 metres, or with optical fibre, to several kilometres.

There are many commercially available Gigabit switches, repeaters and media converters that can be used to build the network, however some proprietary hardware is required to interface the consoles and Hydra I/O Racks to the network. The diagram below shows a console and racks connected to a network via a Wide Area Bulk Card and Hydra Gigabit Interface Unit. 2 Hydra I/O Racks are also shown, each with up to 96 inputs/outputs available to any console on the network.



TYPICAL HYDRA NETWORK EXAMPLE



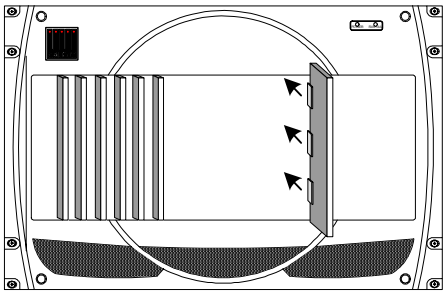
The above diagram shows 4 control rooms, each with a Calrec digital console. The Gigabit interface unit for each console transmits and receives audio data to and from the Hydra I/O Racks, via a Gigabit switch located in the Equipment Room. The console racks and Gigabit interface unit could also be in the Equipment Room if this was more suitable.

Consoles sharing sources must be synchronised (e.g. to station sync or video). The Hydra I/O Racks synchronise to one of the consoles via the network.

In order to guarantee fully deterministic performance, it is necessary to apply the restriction that the network must be kept private. This means that it must not be made to carry any data other than that generated by the audio network.

Local I/O in the console's own racks can be used for connections to routers, monitoring, talkback, inserts, etc. It is not networked to the other consoles.

HARDWARE



Wide Area Bulk Card

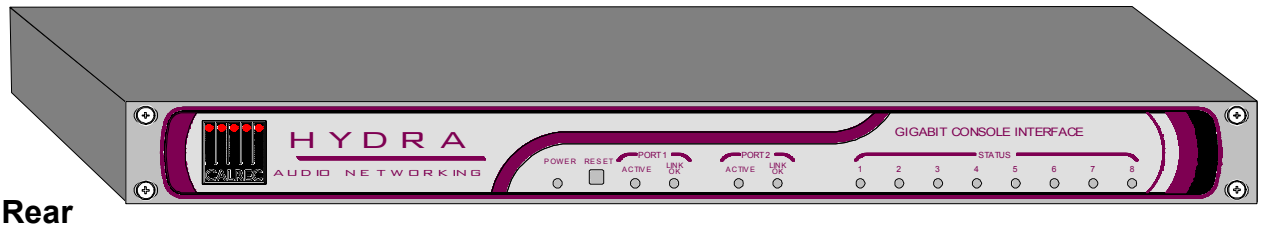
A Wide Area Bulk (WAB) card is inserted into the the digital I/O rack of an Alpha, Sigma or Zeta console. The function of the WAB is to transfer digital audio samples and control data between the backplane in the console and the Gigabit interface unit. 128 inputs and outputs are carried between the WAB card and the Gigabit interface unit via 36 way SCSI-style cabling up to 5 metres (16.5 feet) long.

Gigabit Interface Unit

The Gigabit interface unit provides the console with a connection to the network. It drives a full-duplex connection to the Gigabit switch. The unit runs at Gigabit speed all the time, and may not be connected to switch ports that run at lower speeds. The second Gigabit port is not used.

Dimensions	1U X 482mm (19 inch)
Depth (not including mating connectors)	195mm (7.7 inches) behind the front panel
Depth including mating connectors	265mm (10.4 inches) behind the front panel
Weight	2.6 Kg (5.5125 lb)

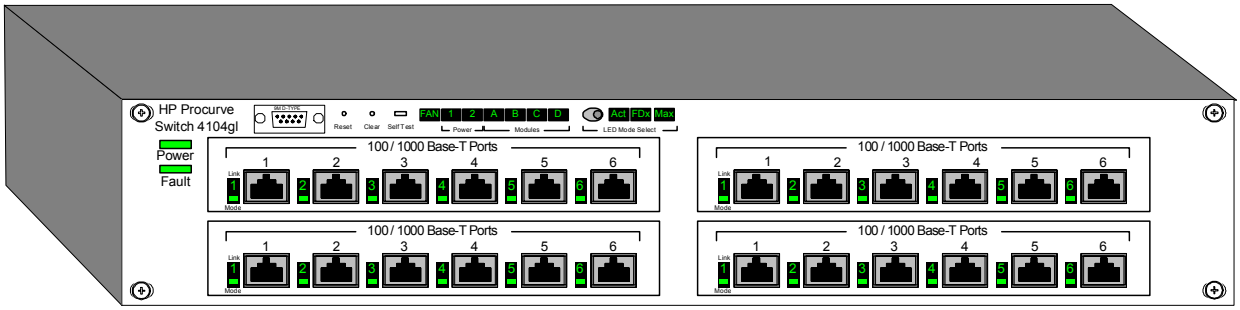
Front



Rear

Gigabit Switch

A commercially available Gigabit switch is used to network consoles and Hydra I/O boxes together. The switch serves to route traffic directly from source to destination. It is capable of continuously receiving data at one port and routing it to another at the maximum data rate, irrespective of what traffic other ports are handling.

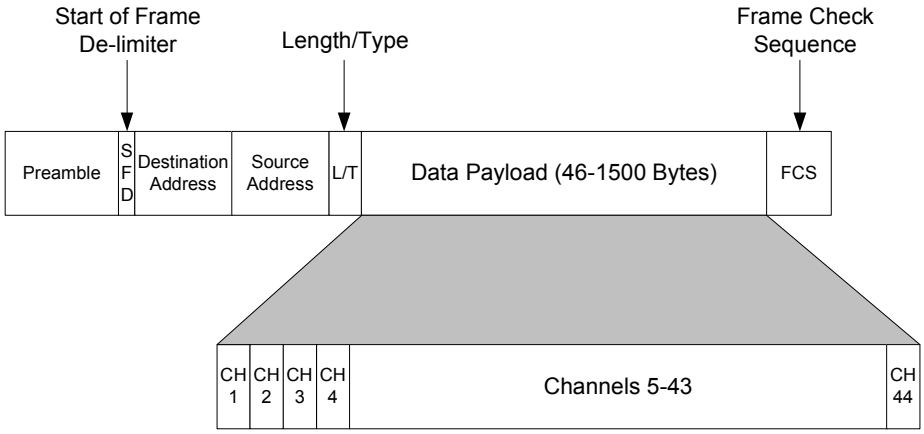


Although the console and racks boot from power on in less than 20 seconds, the switch may take longer, Therefore, networked I/O may take slightly longer to become available on power up, or after a switch reset. It is recommended that the switch is powered using an un-interruptible power supply.

PACKETISATION AND LATENCY

Packetisation

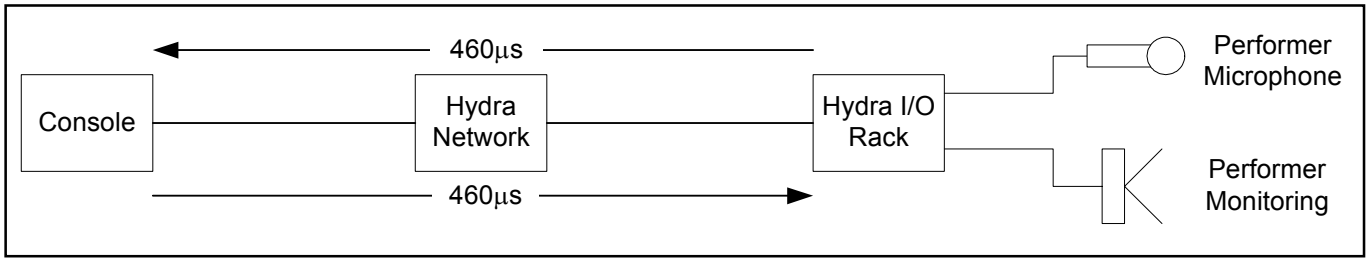
In any scheme for moving digital audio over a packet-based network, some amount of audio data has to be packed into a frame, transmitted and then unpacked into its original form. To make best use of the bandwidth, the ratio of payload data to header data is maximised by abandoning much of the protocol baggage of standard networks, making available the largest possible payload of 1500 bytes.



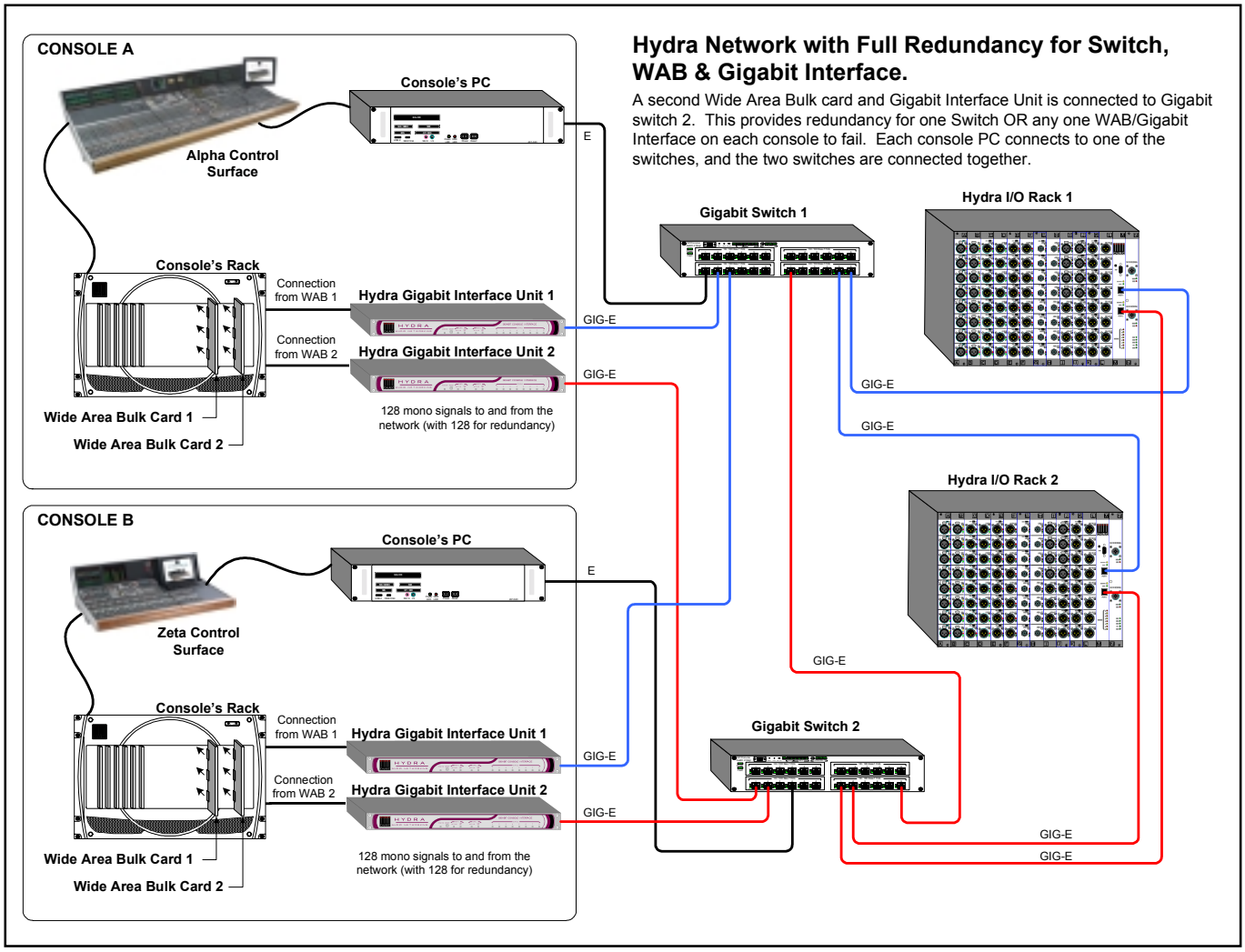
Groups of signals for the same destination are routed together, rather than individually. Therefore, multiple audio signals can be grouped into the same packet, maximising the payload data and minimising latency. The Hydra network uses a variable frame size into which are packed eight 32-bit samples of anything from 1 to 44 audio channels, depending on network demand. It follows that it should be possible for a single Gigabit ethernet connection to transport in excess of 600 channels of 48kHz digital audio. In practise, a somewhat lower maximum load is prudent, to allow for some non-audio communication. The Hydra network can successfully manage loads of 585 audio channels, in the presence of heavy control (non-audio) traffic.

Latency

Low network latency is crucial, especially where a performer is listening to a mix which includes their own contribution. The network latency across the Hydra network is equal to two lots of frame buffering delays, one at the transmitting end and one at the receiving end, amounting to 360µS. In addition to this, delays from the network interface circuit to the console audio backplane must be taken into consideration. Experimental measurements have show the total latency from a Hydra I/O Rack to a console to be around 460µs. In the case shown below, the signal makes two trips across the network, one from the Hydra I/O Rack to the console, and one from the console to the Hydra I/O Rack as part of a foldback mix. The net additional delay will be less than 1ms.



NETWORK REDUNDANCY



The system can offer redundancy, such that it is protected in case of failure of any connector, cable, or even a Gigabit switch. An additional Wide Area Bulk card, Gigabit interface unit and Gigabit switch are fitted to the system. The control system tests end to end connectivity, detecting what can be "seen" from each console and works out how to reach each Hydra I/O Rack. In the event of the system detecting any failures, the signals affected by the failure are automatically re-routed using the redundant hardware. This will happen quickly but there will be a brief audio interruption, typically 3-4 seconds.

Alpha systems can have up to 5 Gigabit interface units, and Sigma and Zeta systems can have up to 3. During set up, the user can decide how many of the system's Gigabit interfaces will be available for redundancy. The bandwidth chosen for redundancy will be reserved for use by the redundancy system, and will not be used during normal operation.

Each console uses just one port on each Hydra I/O Rack, which is used for both audio and control data. The Hydra I/O Racks have a second port, which allows a second connection to the network to be made. This second port has its own IP address. Two consoles on the same network may use different ports on the same Hydra I/O Rack. They can each still have a redundant path to the other port.

In addition, Gigabit switches are available with redundant power supplies.

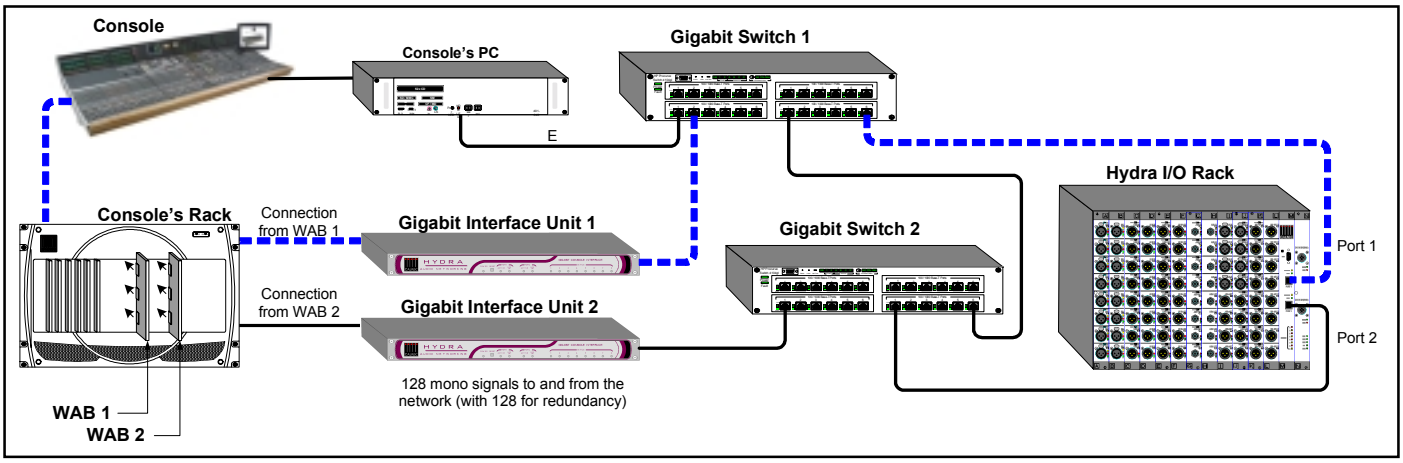
Automatic Fault Detection

Once powered, the Hydra I/O Racks broadcast “heartbeats” to advertise their presence. When a Gigabit interface unit detects the presence of a Hydra I/O Rack, it begins to “echo” each of the Hydra I/O Rack’s two ports. In this way, it can be determined which Hydra I/O Rack ports can be “seen” from the Gigabit interface unit. When two device echo responses have been missed, the network connection to that port is assumed to have failed. AWACS will then report to the console that a Gigabit port on a Hydra I/O Rack is no longer available.

At the console end, echo messages are periodically sent to each of the Gigabit interface units in its configuration. If a Gigabit interface unit does not respond, that path to the network is assumed to have failed.

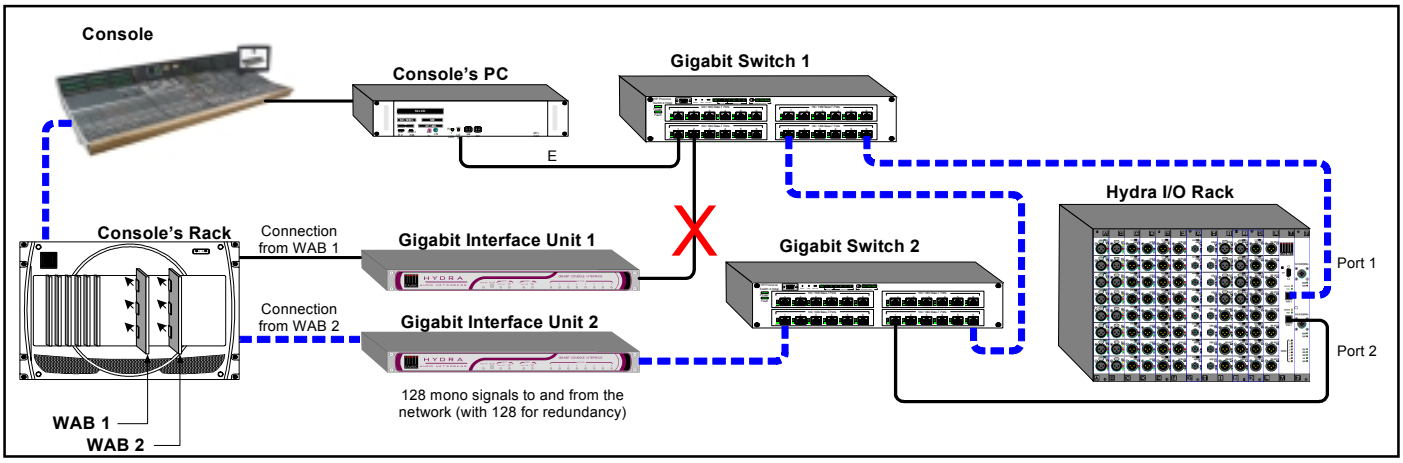
Automatic Re-routing of Audio and Control Signals

The diagram below shows a system during normal operation. The dotted lines show an example of the passage of audio and control data between the console and a Hydra I/O Rack across the network. If a fault occurs where there is an alternative redundant path, then take over will happen. Each console manages the re-routing of its own audio. Only those audio paths affected by a failure will be re-routed.



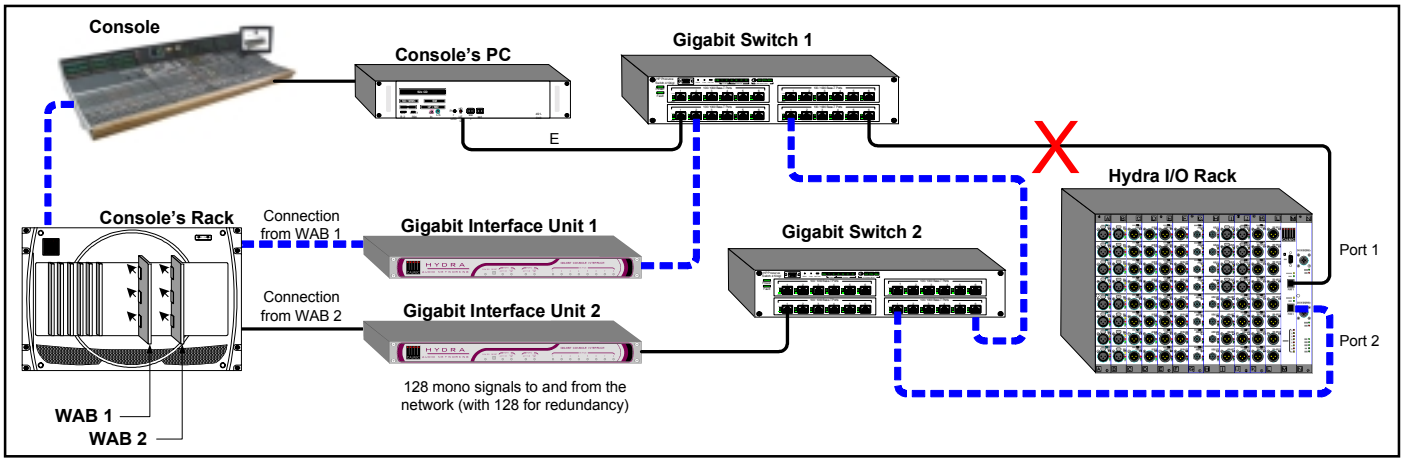
Example 1 - Loss of Connection between Gigabit Interface 1 and Gigabit Switch 1

In the example below, the connection between the Gigabit interface unit and Gigabit switch 1 has been lost. The system re-routes the audio and control data to Gigabit switch 1 using Gigabit interface unit 2 and WAB 2, through Gigabit switch 2.



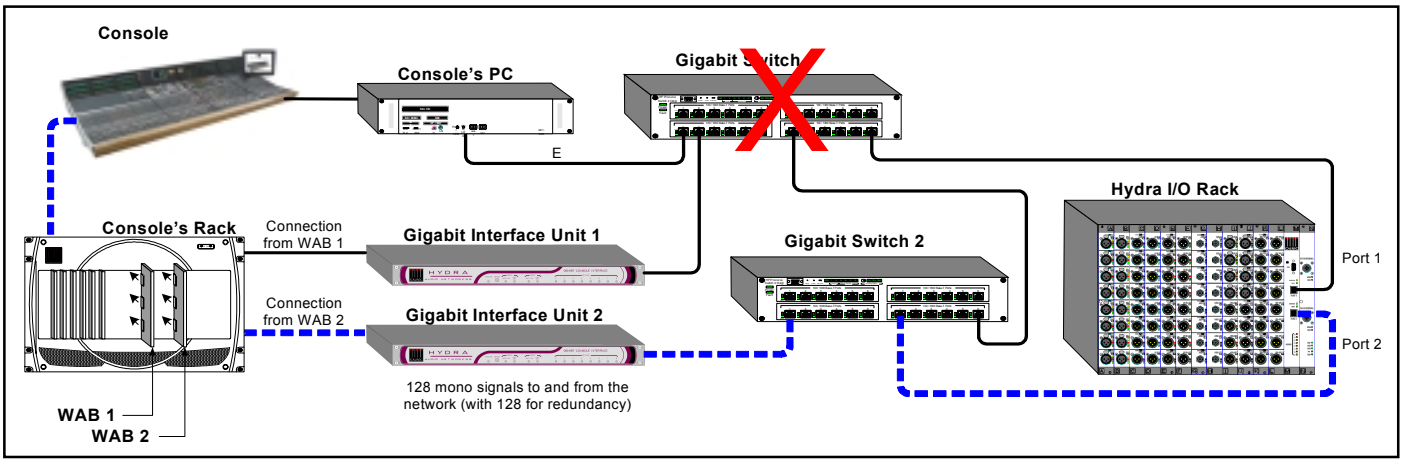
Example 2 - Loss of Connection to the Hydra I/O Rack Port

In the example below, the connection between Gigabit Switch 1 and the Hydra I/O Rack's port has been lost. The system re-routes the audio and control data through Gigabit Switch 2 to the Hydra I/O Rack's alternative port.



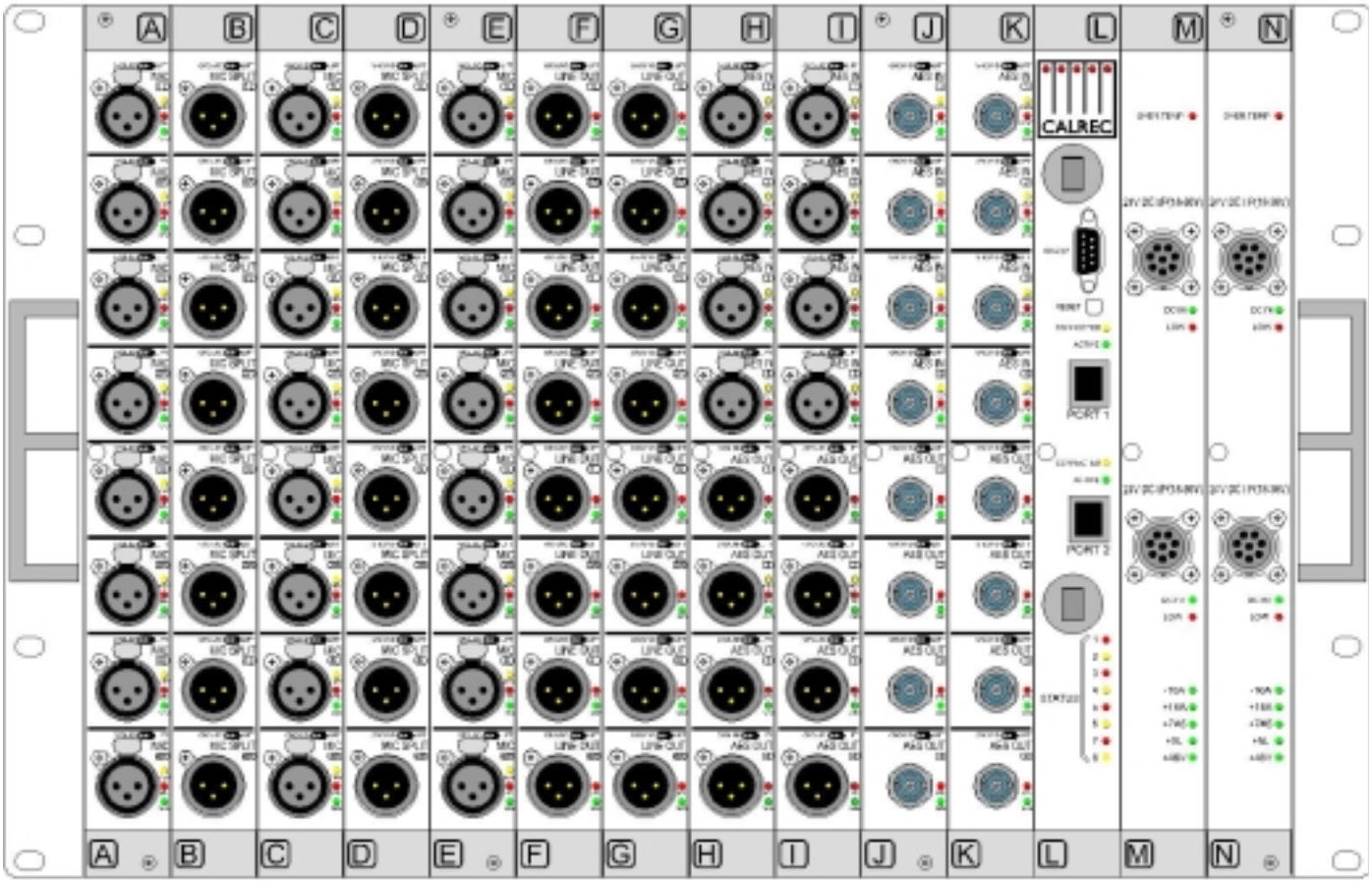
Example 3 - Loss of Gigabit Switch 1

If Gigabit switch 1 fails, the system re-routes the audio and control data using the second Gigabit interface unit and WAB, through Gigabit switch 2, to the Hydra I/O Rack's alternative port.



Hydra I/O Rack

HYDRA I/O RACK



The Hydra I/O Rack offers the ability to carry mic/line input and line output circuits; and digital inputs and outputs via the networking system to one or more Calrec digital consoles.

Modular Structure

There are 14 modular slots across the width of the unit, labelled A to N. Input, output, processor and DC PSU modules fit into these slots, in accordance with the requirements of the installation. Input and output modules receive and transmit either analogue or digital audio signals, dependant on type, to the Gigabit interface processor via a 32 bit TDM buss.

All 14 slots may be used by any of the modules in any combination. However, it is advised that the three slots at the right hand side of the unit are best occupied by a processor control unit and provision for two DC PSU modules, the second of which would be the optional hot-spare. If no spare DC PSU is present, either a blank panel must be fitted or the processor unit could move into slot M allowing a twelfth input or output module to be fitted into slot L.

Dimensions	7U X 482mm (19 inch)
Depth	265mm (10.4 inches)

Each modular unit is 1.2 inches (30.48 mm) wide.

Module Extraction
In some applications, it is envisaged that modules within the Hydra I/O Rack could occasionally be changed according to changing requirements. To aid this operation, a module extraction hole is located on the module front panels. The module slides into the Hydra I/O Rack on two runners, one each at the top and bottom of the rack. The rear interface connector on the module then locates into the appropriate connector located on the backplane. To aid accurate plugging-up, some guide strips are located between the three interface connectors on the backplane.

External Connections
All external connections are located on the front face of the Hydra I/O Rack. Space must be allowed in excess of the box dimensions to feed cables to the front interface from any rear access routes.

Mounting
The Hydra I/O Rack is mounted in place using 4 fixing screws on each side angle bracket. No additional support is necessary.

Fan Operation
To dissipate the heat, 3 low-noise fans are located in the rear of the Hydra I/O Rack. They are controlled from the DC power supply unit. The rack's rear panel has venting holes which must not be obstructed in any way.

If the ambient temperature within the rack is below 50°C (122°F) the fans are inactive.
Between 50°C (122°F) and 55°C (131°F) they are operating at slow speed.
Between 55°C (131°F) & 60°C (140°F) the speed increases to fast.

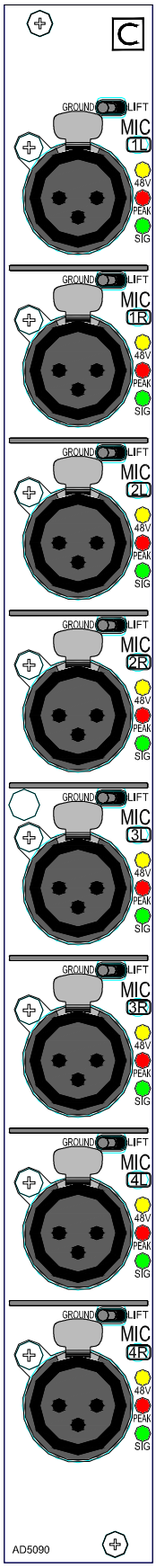
When the internal ambient temperature reaches 60°C (140°F), the OVER TEMP red LED on the DC power supply unit will light.

Over 70°C (158°F) the DC power supply unit is disabled, but the fans will continue to function.

Earthing
The box is fitted with an external earth stud on the rear, for connection to an external earthing system. No AC mains power is contained within the rack. All power connections should be unplugged prior to removing the earth connection.

Optional Rack-Mounted AC Power Supply Unit
A 2U rack-mounted power supply is available to provide the DC power for the Hydra I/O Rack. This holds up to four AC PSU modules. One module could provide power for a fully populated Hydra I/O Rack, with a second providing redundancy. Two other modules could be fitted to power a second Hydra I/O Rack.

MIC/LINE ADC MODULE (AD5090)



This module provides either 4 stereo mic/line or 8 mono mic/line circuits. There are 8 XLR-3 pin sockets (female) on the front of the module.

To maintain compatibility with AES inputs and the displays on the console, labels are 1L, 1R, 2L through to 4R running down the module which are back lit.

This module is available with or without ground lift switches. On modules with switches fitted, the ground is lifted if the switch is toggled to the right.

Input Gain, Impedance and Phantom Power are controlled from any console on the network which has ownership of the input.

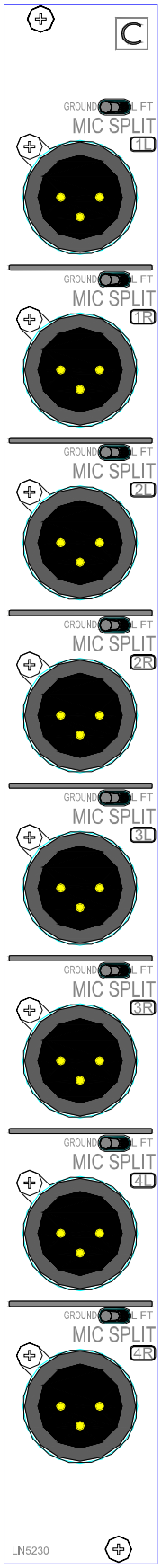
Input Gain is adjustable from -18dB to +78dB in 0.2dB steps. Impedance switches from line to mic above 18, 20, 22 or 24dB of gain, selectable on the console screens.

Status LEDs

Adjacent to each connector are three LEDs which are:

YELLOW	=	48V - Phantom power.
RED	=	PEAK - Signal within 3dB of clipping.
GREEN	=	SIG - Signal present.

MIC/LINE SPLITTER MODULE (LN5230)



This module provides 8 split outputs which are at the same level as the mic/line input being split. The panel must be situated adjacent to the right hand side of the mic/line input panel that it is splitting. If extra splits are required of the mic/line input more splitter modules can be placed to the right of the first splitter, up to a maximum of 11 splitter units.

The front panel has eight XLR 3 pin plugs (male).

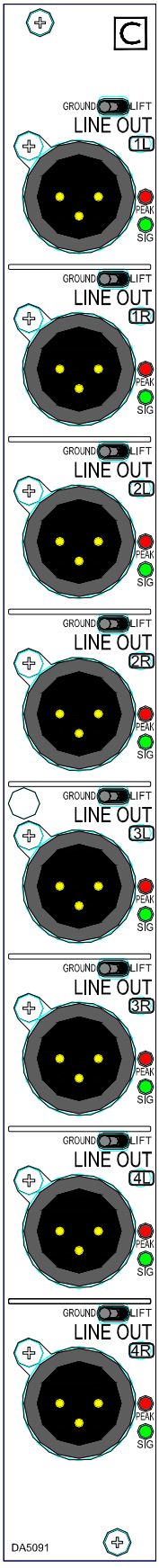
To maintain compatibility with the mic/line input module, labels are 1L, 1R, 2L through to 4R running down the module which are back lit.

This module is available with or without ground lift switches. On modules with switches fitted, the ground is lifted if the switch is toggled to the right.

The splitter outputs can drive a level of +27dBu into 10kΩ, and +25dBu into 1kΩ. Output impedance is 200Ω and the minimum load is 1kΩ.

This module is protected against being accidentally plugged into a phantom powered input.

DAC MODULE (DA5091)



This module provides either 4 stereo or 8 mono output circuits. There are 8 XLR-3 pin plugs (male) on the front of the module.

To maintain compatibility with AES outputs and the displays on the console, labels are 1L, 1R, 2L through to 4R running down the module which are back lit.

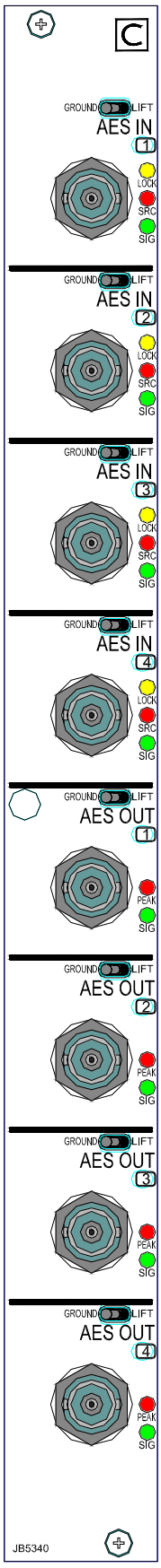
This module is available with or without ground lift switches. On modules with switches fitted, the ground is lifted if the switch is toggled to the right.

Status LEDs

Adjacent to each connector are two LEDs which are:

RED	=	PEAK - Signal within 3dB of clipping.
GREEN	=	SIG - Signal present.

AES BNC INPUT/OUTPUT MODULE (JB5340)



This module provides 4 AES inputs & 4 AES outputs.

It has eight 75Ω BNC insulated sockets (female) down the front panel for inputs 1-4, followed by outputs 1-4.

Labels are AES IN 1-4, AES OUT 1-4 running down the module which are backlit.

This module is available with or without ground lift switches. On modules with switches fitted, the ground is lifted if the switch is toggled to the right.

Each input has a sample rate converter. It is switched in and out by any console on the network which has ownership of the input.

Status LEDs

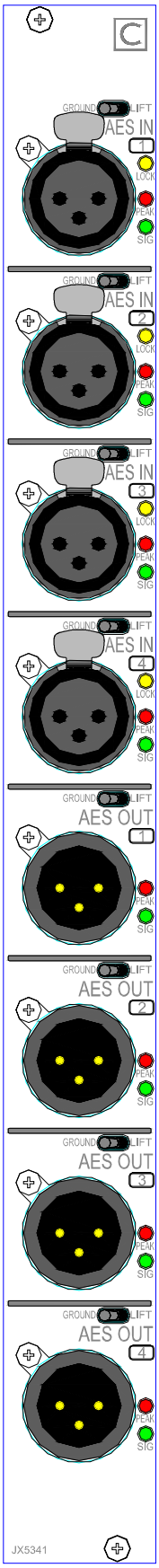
Adjacent to each Input connector are three LEDs which are:

YELLOW = LOCK - Signal locked (lit)
RED = SRC - Sample Rate Converter in circuit (lit)
GREEN = SIG - Audio content present (lit).

Adjacent to each Output connector are two LEDs which are:

RED = PEAK - High level audio content (lit).
GREEN = SIG - Audio content present (lit).

AES XLR INPUT/OUTPUT MODULE (JX5341)



This module provides 4 AES inputs and 4 AES output circuits.

It has 8 XLR 3 pin sockets down the front panel. The first four from the top are inputs 1-4 these are XLR 3 pin sockets (female), followed by outputs 1-4, which are XLR 3 pin plugs (male).

Labels are AES IN 1-4, AES OUT 1-4 running down the module which are back lit.

This module is available with or without ground lift switches. On modules with switches fitted, the ground is lifted if the switch is toggled to the right.

Each input has a sample rate converter. It is switched in and out by any console on the network which has ownership of the input.

Status LEDs

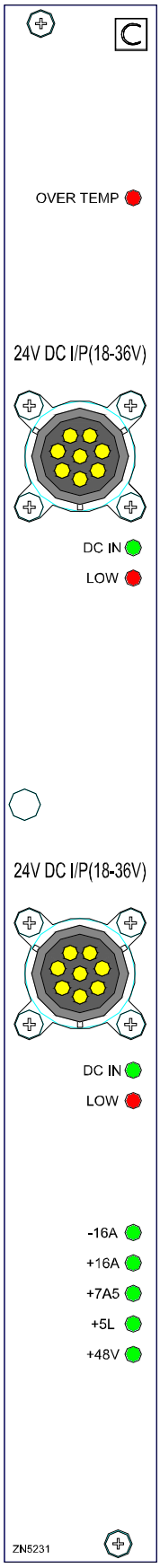
Adjacent to each Input connector are three LEDs which are:

YELLOW	=	LOCK -	Signal locked (lit).
RED	=	SRC -	Sample Rate Converter in circuit (lit).
GREEN	=	SIG -	Audio content present (lit).

Adjacent to each Output connector are two LEDs which are:

RED	=	PEAK -	High level audio content (lit).
GREEN	=	SIG -	Audio content present (lit).

DC POWER SUPPLY MODULE (ZN5231)



This module is the primary DC power supply for the Hydra I/O Rack. It has two input connectors, which offer partial redundancy. However for full redundancy and greater security, a second DC power supply unit would be fitted into the rack adjacent to the primary DC power supply unit and an input connection wired to each module.

There are two DC input connectors on the module front panel which are 8 way plugs (male) with 4 contacts fitted in each connector. The power inputs are isolated from ground and internal ORing diodes are fitted.

This module is designed to function with voltages in the range of 18 to 36 volts. Any input(s) can be powered externally from a battery source, possibly as a back up feed.

Status LEDs

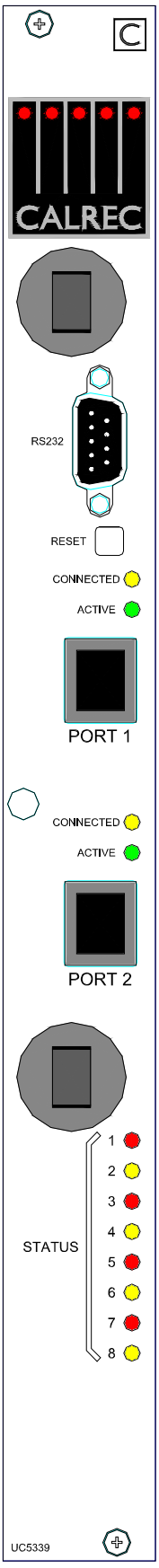
The LEDs shown adjacent to each input connector are:

GREEN	=	DC IN - DC input power present, not necessarily within the required 18-36V range (lit).
RED	=	LOW - Indicates an input voltage of 20V or below (flashing).

The other LEDs shown are:

RED	=	OVER TEMP - Indicates when internal box temperature has reached >60°C (140°F) (flashing).
GREEN	=	-16A Power output present (lit).
GREEN	=	+16A Power output present (lit).
GREEN	=	+5A Power output present (lit).
GREEN	=	+5L Power output present (lit).
GREEN	=	+48V Power output present (lit).

PROCESSOR MODULE WITH COPPER INTERFACE (UC5339)



This module is designed to be the network interface and processing unit within the Hydra I/O Rack.

The RS232 connector is a 9-way D-type plug (male). This is a computer connection port to allow box identification and programming.

A recessed RESET switch is located below the RS232 connector.

The RJ45 connector sockets are used for the networking connections. There are two on the front panel. This allows one for the main primary connection and a secondary for a back up connection via a second Gigabit switch.

The RJ45 connectors are 8 contact, modular single port jacks with integrated 1000 Base T magnetics, side-entry with full shielding.

Status LEDs

The LEDs shown adjacent to each network connector are:

YELLOW = CONNECTED - Indicates a valid connection.
YELLOW = ACTIVE - Indicates bi-directional data being passed (lit).

Status LEDs 1-8 are for diagnostic purposes & have no operational function.

Address Labels

IP address and friendly name labels for both of the network connections will be located on the box rack angle label holders.

Set Up and Operation

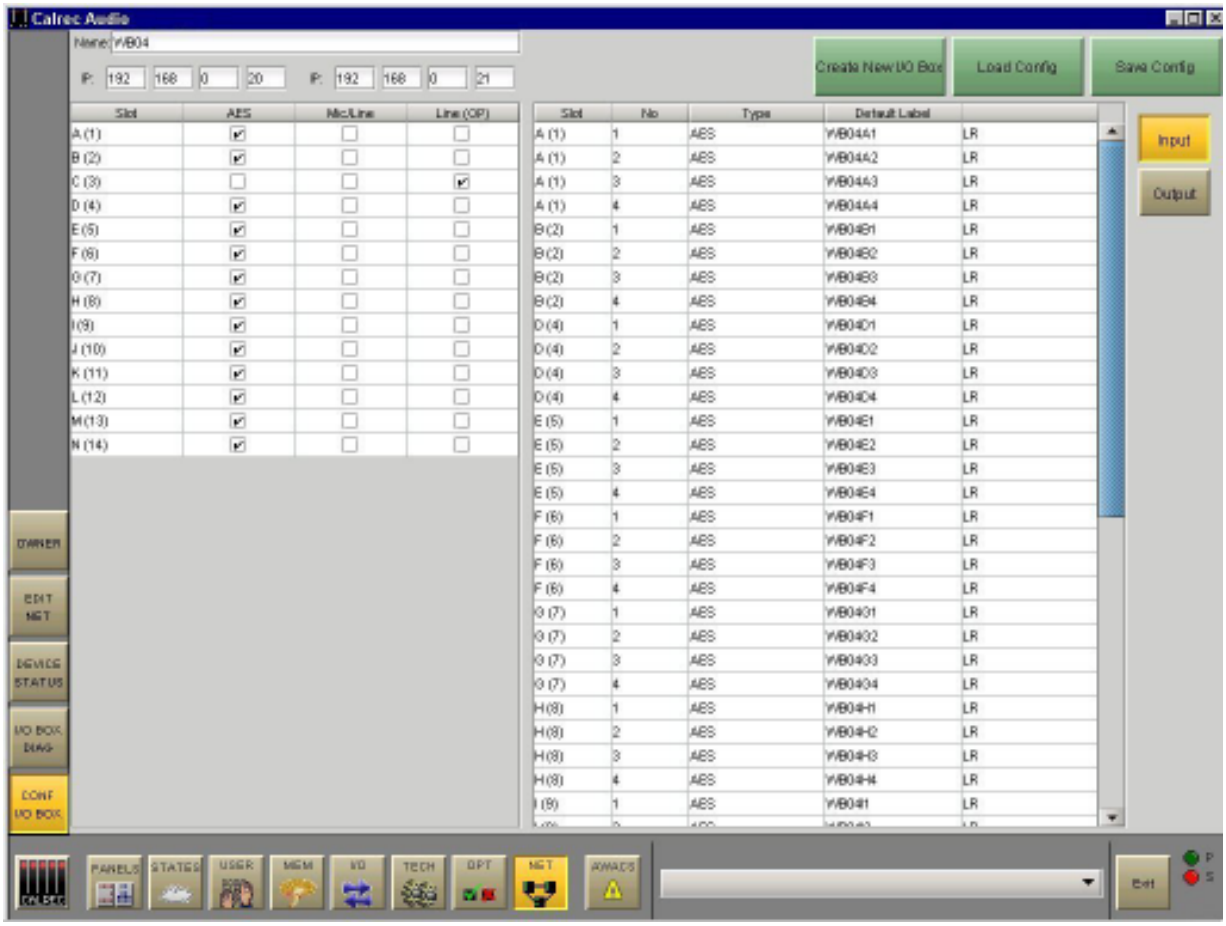
NETWORK EDITOR 

For a network to be truly useful, it must be easy to use and maintain. The system's control software constantly monitors the network, performing essential administration functions, leaving the user free to creatively exploit network resources as easily as if they were locally connected. The Network Editor consists of a set of screens for :

- Configuration of Hydra I/O Racks
- Offline editing of Hydra I/O and Audio Network
- Graphical representation of the devices on the network
- Utility for forcing ownership to be dropped

The Network Editor can be run independently of the Front End (console application), allowing the Hydra I/O Racks and network to be configured offline. During this time, any operations which require a console are disabled.

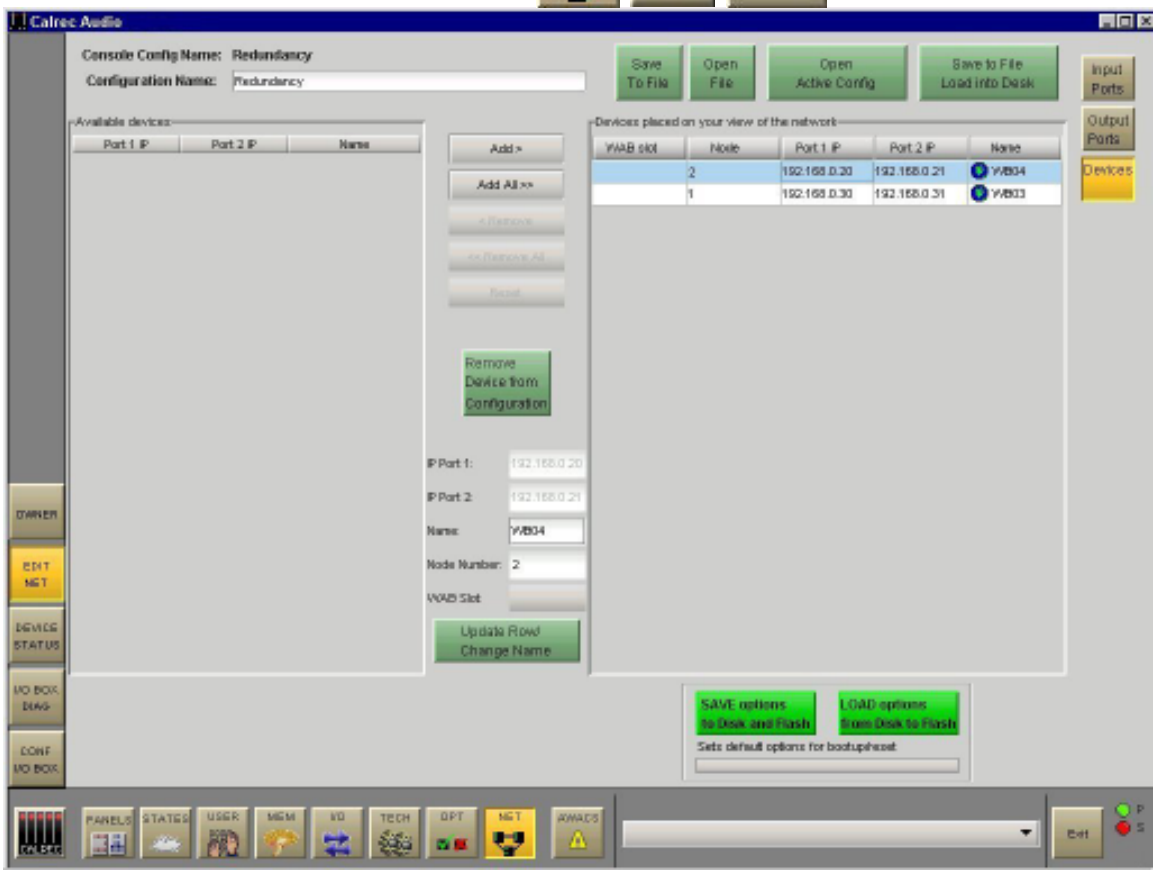
HYDRA I/O RACK CONFIGURATION 



This screen allows the user to manually setup the type of input and output modules occupying each slot in a Hydra I/O Rack. In some situations, it may be necessary to reconfigure Hydra I/O Racks to meet the requirements of each program. This can be done offline, and the configurations can be saved and loaded, when online again.

The Hydra sources can be grouped into lists to make them easier to access either on the front end (FE) application or on the I/O matrix port assigment controls on the control surface (if available). This is done using the EDIT NET-INPUT PORTS screen (page 26).

NETWORK CONFIGURATION



This screen allows the network to be configured. The window on the left side of the screen shows the devices available to the console. These devices will have been loaded via the CONF I/O BOX screen. The window on the right side of the screen shows the devices the user selected for this session. The Add and Remove buttons are used to add or remove devices to and from the session. Once the required devices are added, the input and output lists may be setup using the EDIT NET-INPUT PORTS screen. Configurations can be saved and restored, to allow use on a job by job basis. This allows multiple setups to be configured offline, and stored for later use.

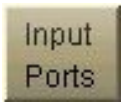
Changes to the network configuration will not take effect until “Save to File, Load Into Desk” is selected. Then, the changes become active and the configuration is saved to the hard disk. If any subsequent changes are made, the “Save to File, Load Into Desk” button will flash to indicate that the configuration on the screen does not match the active configuration.

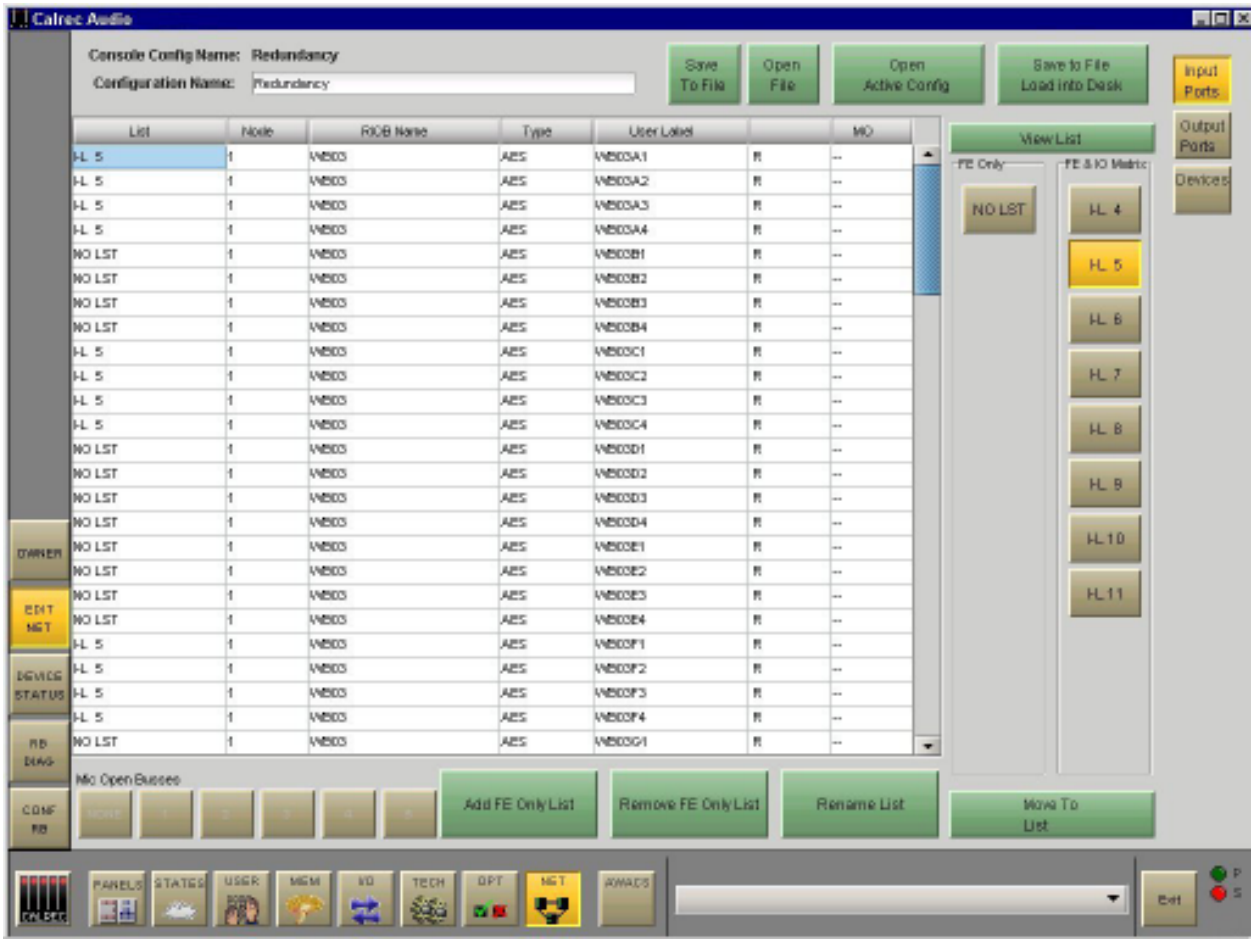
Open File allows a previously saved configuration to be opened. When opened, the configuration will be loaded onto the screen, but will not take effect until “Save to File, Load Into Desk” is selected. The button flashes to indicate that the configuration on the screen is different to the active configuration. The console checks that the configuration is compatible with the system. If there are discrepancies, an “Error Showing Active Config” message will appear.

“Save to File” saves the configuration to the hard disk without loading it onto the console. “Open Active Config” retrieves the settings that the system is currently using and displays them on the screen, replacing the current configuration being viewed.

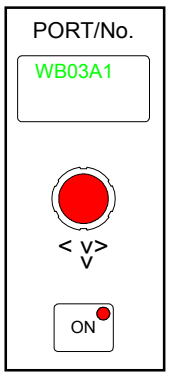
Network configurations are not saved with the user memories, so it is important to save the options to disk and flash once the network is configured using the buttons at the bottom of the screen. If they are not saved, the next time the desk boots up the console will revert to its previous settings, which could mean that a different network configuration is loaded. This could cause problems should the console have to be reset during a live broadcast. It does however allow changes to be tried out without losing the original settings and these original settings can be restored without having to re-boot the system.

HYDRA I/O SOURCE LISTS





This screen allows the user to allocate the sources from the the Hydra I/O Racks into lists to allow similar I/O to be grouped together for selection. This also makes them easier to access either on the front end (FE) application or on the I/O matrix port assigment controls on the control surface (if available).



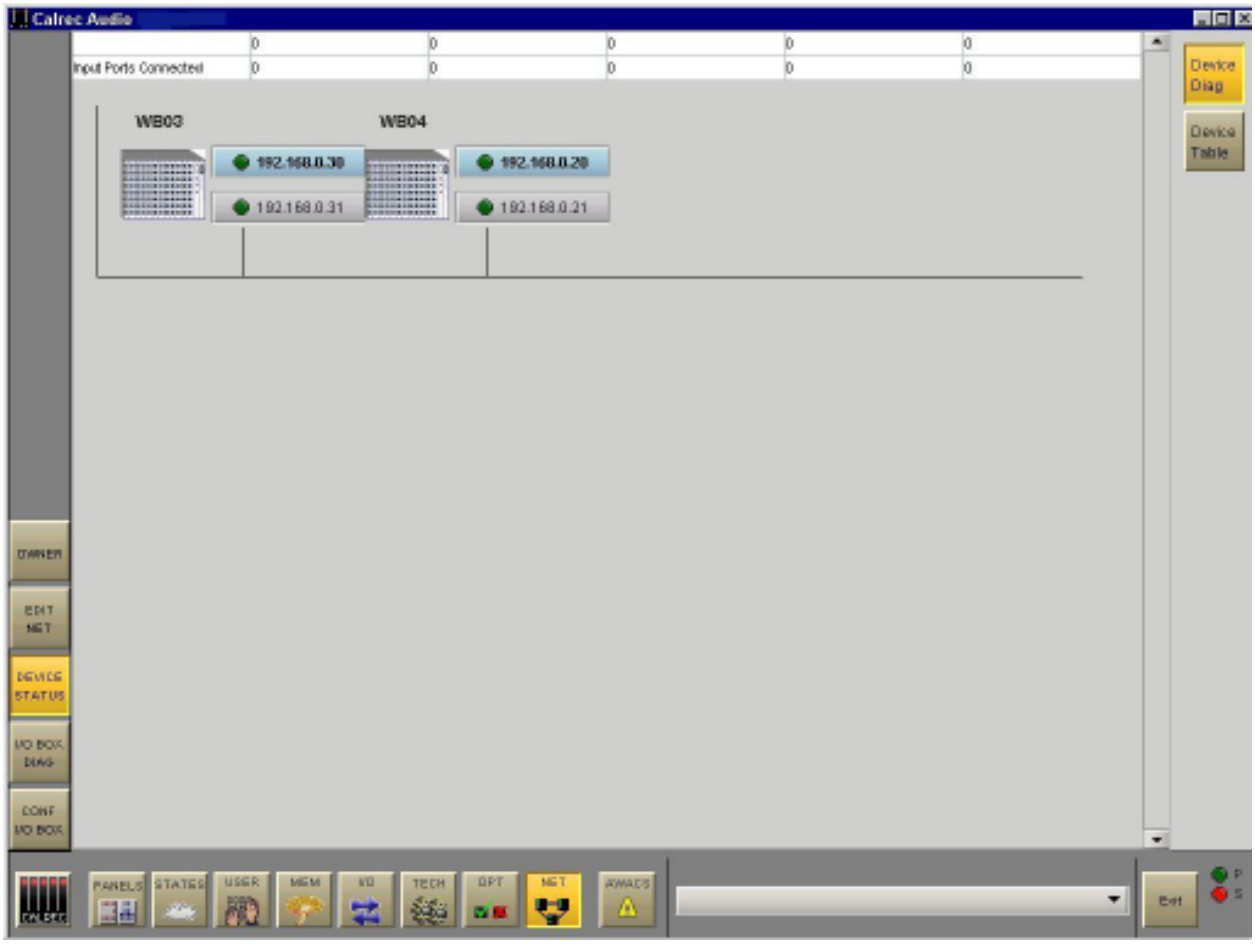
There are two types of lists, those which will appear on the FE screens only, and those available on the FE screens and the I/O matrix controls on the control surface (if available). Allowing lists to be accessed on the control surface, means that the user can still access the Hydra I/O without the use of the PC.

Lists of Hydra I/O are kept separate from the lists of local I/O. There can be up to 64 pairs of ports in a Hydra I/O list.

Hydra ports are always treated as pairs. They can be used for two mono signals, a stereo signal, or as part of a surround signal. Hydra port labels consist of the 4 character unit name (user-defined) plus the module letter (A-N), plus the port number (1-4), plus L or R.

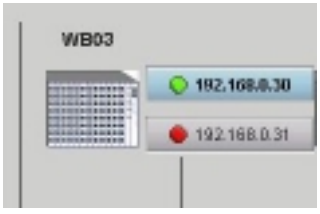
A similar screen is used for output list allocation.

DEVICE STATUS

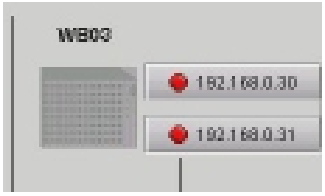


The Device Status screen provides a graphical overview of the status of all devices configured on the network. Each port has a green indicator, which will “heartbeat” (flash bright green) to indicate that the unit is running and can be reached. If the device is not “heartbeating” then it cannot be reached and its graphic will be greyed out.

In the case of Hydra I/O Racks using both ports (for redundancy), each port will have its own heartbeat indicator. The preferred port will be highlighted. If a port is not heartbeating, its indicator will light red (But the device could still be in use through the other port).

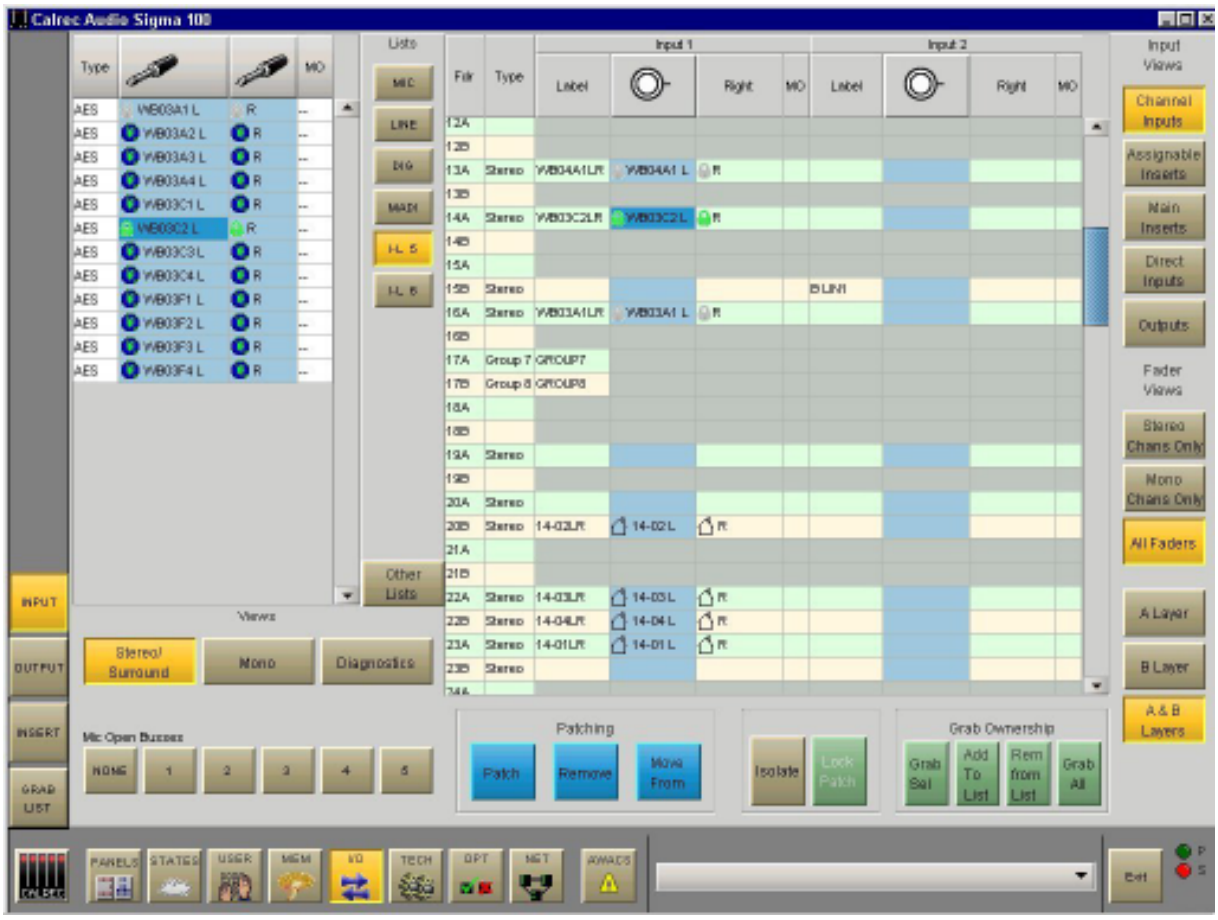


If neither port is heatbeating, then the device is no longer available, and its graphic is greyed out.



If the device does not appear to be heartbeating, but it is not greyed out, then the console can access the device, but the PC cannot. This situation could arise in redundant systems, where the PC is connected to just one of two switches, and the connection between the switches has failed. The PC will only be able to “see” the devices connected to the same switch as itself. As the console will be connected to both switches, normal operation can continue.

PATCHING HYDRA SOURCES



Once set up, Hydra sources are selectable on the I/O screens just like local sources, and can then be patched to faders on the console in the same way. A Hydra I/O list can be selected from the list selector buttons, just like local lists. “Other Lists” is used to access the FE only lists. When selected, the Hydra sources will be displayed on the left side of the screen. These sources can then be patched to faders on the console on the right side of the screen.

Sources have icons to denote their type, they are as follows:

House - A source which is local to the console

World - A Hydra source on a Hydra device which is heartbeating

World with a red cross - A Hydra source on a Hydra device which is not heartbeating

Green Padlock - The console has ownership of this Hydra source

Grey Padlock - Another console has ownership of this Hydra source

Black Padlock - The source has been added to a grab list.

The network has a system for source control prioritisation, to prevent several consoles gaining control over the same source at the same time.

Like local sources, networked sources and their settings are saved with the memories.

Patching
Assignment is made by selecting a source,  and an input or output,  and selecting Patch. 

By selecting the label cell on the screen, the source's name can be edited using the keyboard. The new name is stored with the channel input and replaces the source label on the fader display.

Multiple Patching - It is possible to patch regions of sources.

- Select a list of input ports using the trackball by dragging down the column
- Select the fader to start patching to
- Select Patch

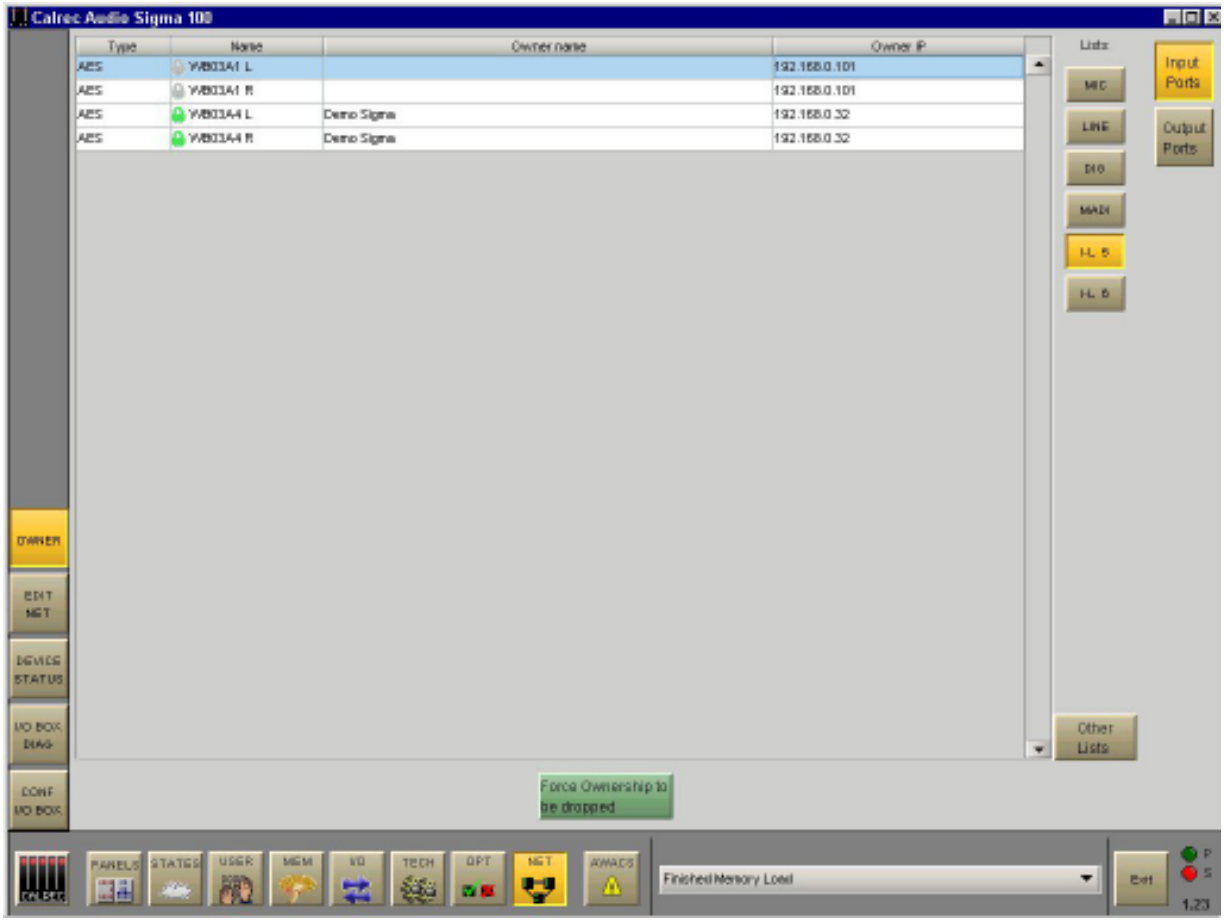
Please note that Hydra inputs cannot be patched to Hydra outputs.

Once patches are made, they can be removed when selected by clicking REMOVE. Connections can be moved between channel inputs when selected using the MOVE FROM button. The Input 1 or 2 field will be highlighted and the PATCH, REMOVE and MOVE FROM buttons will be replaced with MOVE TO, and CANCEL. Upon selection of a new patch point, pressing MOVE TO will move the connection. CANCEL will cancel the operation.

Grab Ownership
When a networked source is patched, ownership of it assigned to the console. In the case where several consoles share sources on the same network, the console that connects to the source first will be given control (ownership) over that source. Other consoles that subsequently connect the same source will not be able to control it. In circumstances when the ownership needs to be overridden, the grab buttons allow the console to grab ownership of the network sources, either altogether, individually, or by adding them to a "Grab List". When one or more hydra sources are added to the grab list, the "Grab All" button changes to "Grab List".

The grab list can be viewed on the Grab List screen, accessed on the left side of the I/O screens.

SOURCE OWNERSHIP



When a Hydra port is patched, ownership of it assigned to the console. The console that connects to the source first will be given control (ownership) over that source. Other consoles that subsequently connect the same source will not be able to control it.

There are circumstances when the ownership needs to be overridden, (ie when a microphone is needed for the next show but has not be released from the previous show). The Force Ownership to be dropped function allows this.

NOTES

(926-086 Iss.7)