

C100
HDS
Installation Guide

Solid State Logic
S O U N D | | V I S I O N

C100 *HDS*

Digital Broadcast Console

Installation Guide

Version 1.1.0

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Solid State Logic

S O U N D | | V I S I O N

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Section I – Introduction

The object of this manual is to provide purchasers of the CI00HDS™ Console, Blackrock™ processor and RIO stageboxes with information in the following areas:

- Safety considerations
- Installation requirements
- Items supplied: – Main components and optional items
- Installation: – Physical assembly
 - Electrical connections and cabling
 - System options
- Specifications and Physical dimensions
- Pinouts of standard connectors

The information provided by this manual is relevant to all of the versions of the CI00HDS.

Those aspects of the CI00HDS system which may be subject to specific customisation – Master Channel layout and meter panel as examples – will be documented in the Custom Specification information for a specific console.

The Custom Specification information, which details the actual console as built, will be found in Section I0 of the console's Service Manual.

Section2 – Safety Considerations

This section contains definitions and warnings, and practical information to ensure a safe working environment. Please take time to read this section before undertaking any installation work.

Definitions

'Maintenance'

All maintenance must be carried out by fully trained personnel.

Note: It is advisable to observe suitable ESD precautions when maintaining electronic assemblies.

'Non-User Adjustments'

Adjustments or alterations to the equipment may affect the performance such that safety and/or international compliance standards may no longer be met. Any such adjustments must therefore only be carried out by fully trained personnel.

'Users'

This equipment is designed for use solely by engineers and competent operators skilled in the use of professional audio equipment.

'Environment'

This product is a class A product intended to form an integrated component part of a professional audio recording, mixing, TV, radio broadcast or similar studio wherein it will perform to specification providing that it is installed according to professional practice.

Electrical Safety Warning

When installing or servicing any item of SSL equipment with power applied, when cover panels are removed, HAZARDOUS CONDITIONS CAN EXIST.

These hazards include:

- High voltages
- High energy stored in capacitors
- High currents available from DC power busses
- Hot component surfaces.

Any metal jewellery (watches, bracelets, neck-chains and rings) that could inadvertently come into contact with uninsulated parts should always be removed before reaching inside powered equipment.

Installation Instructions

Voltage Selection and Fusing

All CI00HDS systems use auto-ranging power supplies. These are designed to operate at input voltages in the range 100 to 240VAC ($\pm 10\%$) so do not require setting to suit the local supply.

If, where fitted, it is ever necessary to replace a blown mains-fuse, then always use the correct rating and type of replacement. If a correctly rated fuse continues to blow, then a fault exists and the cause should be investigated or the unit returned to SSL for repair/replacement as appropriate.

Details of mains settings and correct fuse ratings can be found in Appendix A of this manual.

Safety Earth Connection

Any mains powered item of SSL equipment that is supplied with a 3-core mains lead (whether connectorised or not) must always have the earth wire connected to the mains supply ground. This is the safety earth and grounds the exposed metal parts of the racks and cases and should not be removed for any reason.

Mains Supply and Phases

To ensure safe operation of this equipment, connect only to an ac. power source that contains a protective earthing (PE) conductor. This equipment is designed for connection to single phase supplies with the neutral conductor at earth potential – category TN or TT – and is fitted with a protective fuse in the live conductor only. This equipment is not designed for use with live and neutral connections reversed or where the neutral conductor is not at earth potential (IT supplies). This equipment should not be connected to a power system that switches open the return (neutral) lead when the return lead also functions as the protective earth (PE).

All mains powered assemblies must be connected to the same mains phase. In particular, note that as PSU redundancy is standard, the two input leads must NOT be connected across different phases of a 3-phase supply.

Mains cables will be coded with either of the following colour schemes:

	1	or	2
LIVE:	Brown		Black
NEUTRAL:	Blue		White
EARTH:	Yellow/Green		Green

The ratings label, which details the console power requirements, is located adjacent to the mains inlet connectors on the power input panel beneath the rear of the console.

Mains Isolation and Over-Current Protection

An external disconnect device (switch) is required for this equipment which must be installed according to current wiring regulations. A detachable power cord, if fitted to this equipment, is a suitable disconnect device, otherwise an approved disconnect switch is required – the rating of which is defined in the product specification (Appendix A) and on the equipment itself.

An external over-current protection device is required to protect the wiring to this equipment which must be installed according to the current wiring regulations. The fusing or breaking-current is defined in the product specification. In certain countries this function is supplied by use of a fused plug.

Some units (specifically, those fitted with PSU Redundancy) utilise multiple power sources. This is clearly marked on the equipment. The finished installation must also be clearly marked to ensure that all sources of power are removed before servicing work begins.

Physical Safety

The console surface is too heavy for one person to move, ensure sufficient manpower is available when positioning the console. Take particular care when removing a fully populated RIO chassis from the equipment rack.

If the console trim is removed for any reason then there may be sharp edges exposed on the frame metalwork.

CE Certification

CE The CI00HDS system is CE compliant. Note that the majority of cables supplied with SSL equipment are fitted with ferrite rings at each end. This is to comply with the current regulations and these ferrites should not be removed.

If any of the console metalwork is modified in any way – particularly the addition of holes for custom switches etc. – this may adversely affect the CE certification status of the product.

FCC Certification

FC This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Instructions for Disposal of WEEE by Users in the European Union



The symbol shown here, which is on the product or on its packaging, indicates that this product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste equipment by handing it over to a designated collection point for recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or where you purchased the product.

Section 3 – Pre Installation Information

Physical installation of the console is normally carried out by a specialised transportation company. In some cases this will have been arranged by the local SSL office, in other cases by the facility.

Before the console is installed all building work should be completed and the environment **MUST** be clean otherwise the warranty will be rendered invalid.

Before commissioning can take place the following must be completed:

- Air Conditioning installed, tested, blown-through and working
- Lighting installed and tested
- Cable Trunking installed
- Wall and floor finishes completed
- Power Distribution installed and tested
- Cables installed and tested
- Monitor loudspeakers installed and working
- Other utilities (telephone, water etc.) available

The cables that run between console and processor can be shipped in advance of the console in a separate kit (the pre-install kit). These cables should be installed by the facility engineers. Instructions for installing these cables are found on pages 25 to 35 of this manual.

Cables that may be required for the connection of ancillary functions – meters, talkback or any custom switching etc. – are NOT supplied by SSL and will need to be provided by the facility. Refer to pages 38 to 41 for cabling information.

Services Provided by SSL

Commissioning

All C100HDS systems include on-site commissioning by an SSL engineer. This is usually expected to take from 2 to 4 days depending on system size, configuration and options. Large systems, or consoles split for shipment, may require an additional 1–2 days of commissioning time.

You will be contacted by your local SSL office or agent shortly before delivery to arrange a commissioning date.

Training

Three days of standard operator training are provided with each C100HDS system. If required, this is scheduled to take place immediately following the commissioning period and is usually carried out by the commissioning engineer. A further day of advanced operator training is available at additional cost.

On-site maintenance training is also available at additional cost. Training duration can be either one day for a basic overview or two days to progress to a more advanced level.

Training should be requested at the time of order. For all training we recommend that no more than five persons attend each session. If the use of an interpreter is necessary the training period may need to be extended (at additional cost). Note that travel and subsistence costs are not normally included. For further information please contact SSL's training department at: support@solid-state-logic.com.

Warranty

All systems normally include 13 months warranty from date of shipment. This does not include consumable items such as magnetic media, disks etc. Further details may be found in SSL's Conditions of Trading (printed on the reverse of all SSL invoices).

Physical Requirements

Console Control Surface

The console control surface consists of a single Master section (usually called the Centre Section) and channel bays containing 8 faders each. Consoles can be specified to have from 24 to 64 channels so the size and weight will vary considerably. A dimensioned footprint drawing showing the channel layout for a specific console control surface can be provided by SSL's Project Engineering Department. See page 46 for the drawing of a standard 32-channel footprint.

Consoles can be built with a split point at any 8-channel profile. The console can then be separated at this point into smaller sections to simplify installation into client's premises. A split console will require additional commissioning time; reassembly will be by SSL engineers.

The side panels of the console are flat to reduce the overall width and to simplify the location of adjoining furniture. Contoured side arms are available as an option for installations where the console is freestanding.

The console surface is connected to its processing rack using two standard Ethernet cables. These cables provide all the data for control, metering and touchscreen display information. These cables are supplied with each system.

Cable sets are available in 10, 15, 20, 25, 50 and 100m standard lengths; 100m is the maximum distance between the console and its computer rack.

Refer to Appendix A for weights and power consumption information.

Rack Mounting Equipment – Blackrock and RIO

All audio processing functions are provided by a separate 2U rack mounted computer unit referred to as the 'Blackrock'. The system's DSP resource, Madi interfacing and file handling is all contained within the Blackrock unit. Connections are made to the rear of the rack.

Systems may be specified to have processor redundancy for on-air or critical operations. These systems will feature a second Blackrock chassis unit so an additional 2U of rack space will be required.

All input and output for the CI00HDS is made using remote input/output racks referred to as 'RIOs'. A RIO is a 7U rack mounting unit with slots for up to five plug-in I/O cards. Each RIO is connected to the Blackrock processor using industry standard fibre Madi cables.

A 19" equipment rack will almost certainly need to be provided into which the Blackrock and/or RIO units can be mounted. Note that when locating remote RIO units that all connections are made to the front. See page 10 for service clearance diagrams.

The SSL MORSE Router and remote Stageboxes may also be specified to form part of the CI00HDS system. These are either 3U or 6U rack units.

Blackrock and RIO units must be supported on shelves fitted to the equipment rack and not solely by the rack 'ears'.

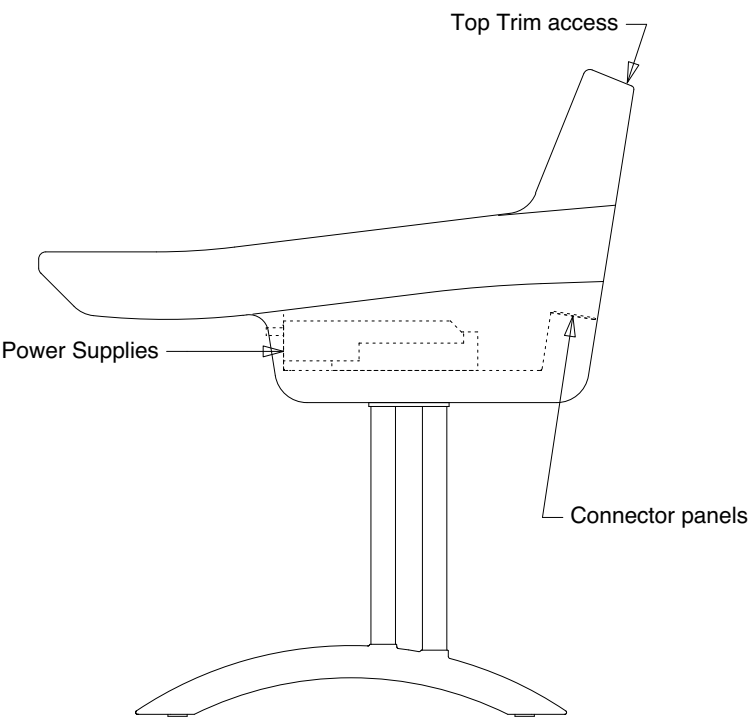
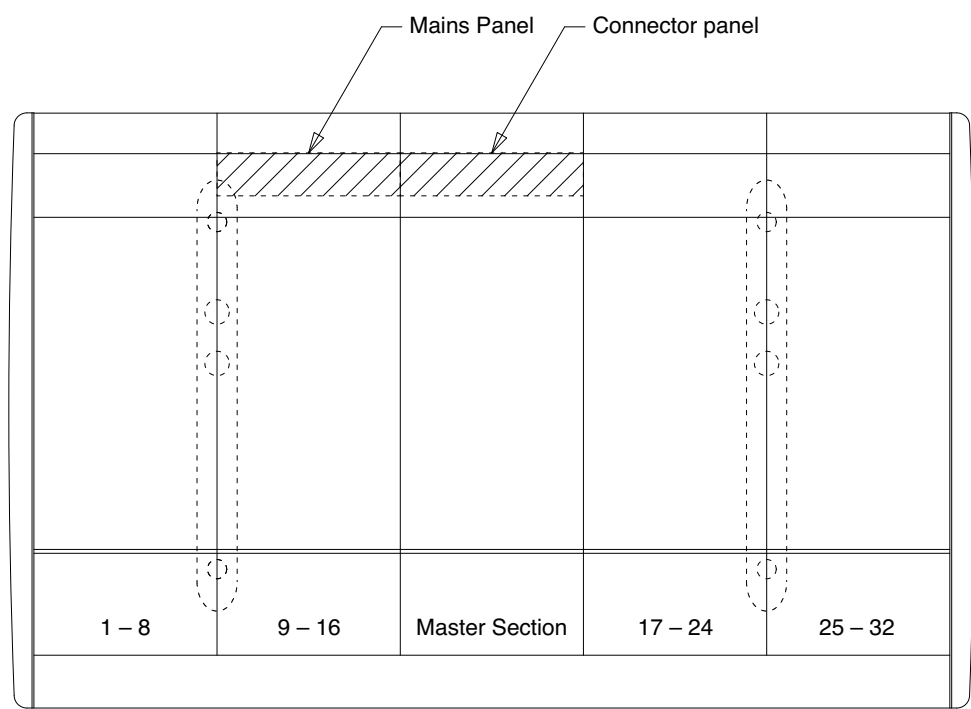
Acoustic Isolation

The Blackrock processor is fitted with cooling fans and is expected to be housed in a separate 'machine' room. Adequate noise isolation should exist between the machine room and control room/recording areas.

The RIO chassis is fitted with low-noise fans and requires a lower degree of noise isolation.

Noise figures for individual units are given in Appendix A.

Connector Panels and Power Supplies



Refer to page 46 for console dimensions

Air Conditioning Requirements

Air conditioning will almost certainly be required for both the Machine and Control rooms in order to maintain the temperature and humidity to within the required levels.

Power dissipation figures for console control surface and equipment rack are listed in Appendix A.

Appendix E contains the environmental specification for SSL equipment.

Cable Ducting

Cable ducting will be required between the console and the Machine room (as well as to any outboard racks and the recording areas). The ducting provided should be of sufficient size such that approximately 50mm x 35mm is available for console surface connection. This should be sufficient for the analogue and digital cabling for metering and the T/B Mic etc. in addition to the console connections.

The connectors for all control and interface cables are located beneath the console's Centre Section. The connector panels are orientated so that cables will exit downwards at the rear of the desk. It is not possible to route cables through the console legs.

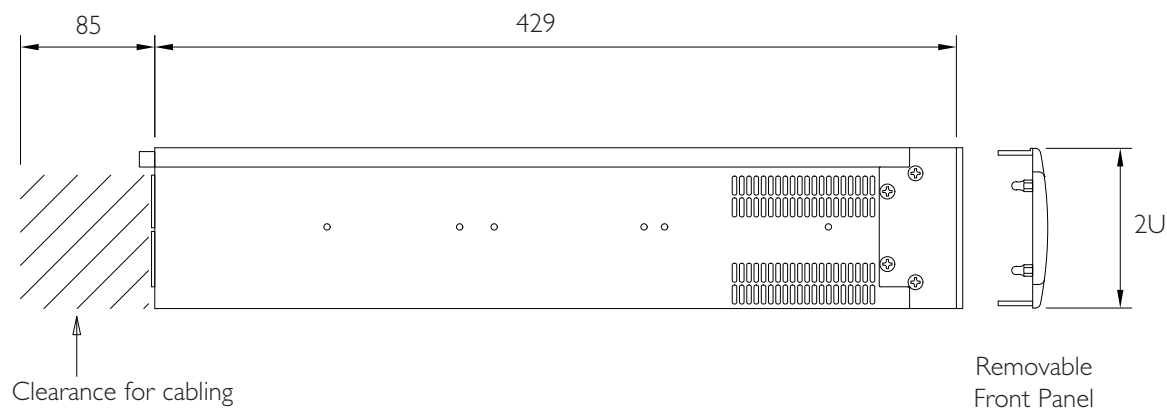
The mains input connectors are located on a separate panel. This panel is normally positioned in the bay to the left of the Centre Section.

Service Access

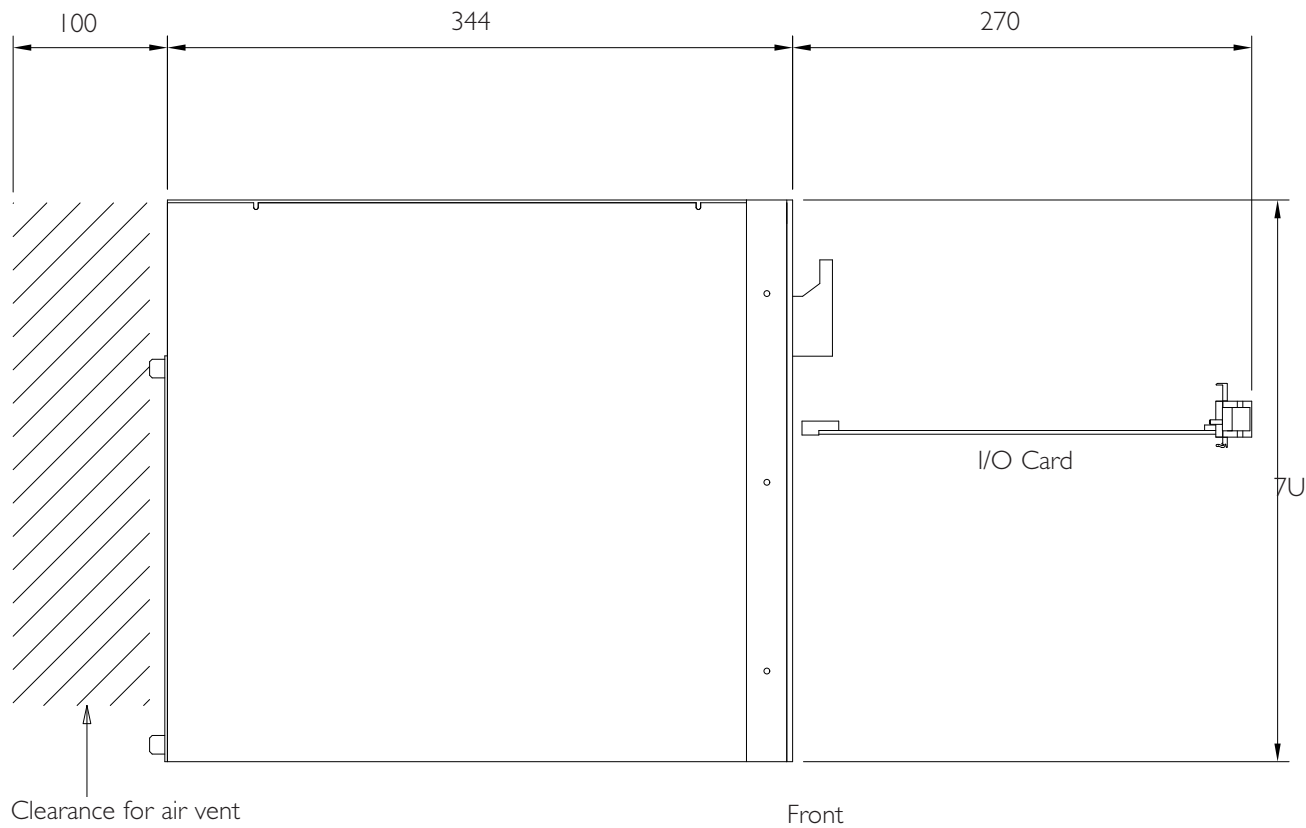
Access to all electronic assemblies within the frame is from either the front or above the console. The power supplies are located in the knee panel area. There are PCB assemblies located behind the channel TFT meter screens. To remove a TFT screen it will be necessary to remove the top trim. This trim is secured using screws along the rear of the top edge. If the console is being built into restricted space – as in some mobile installations – then allow sufficient clearance above the top trim for access to the fixing screws.

Clearance for service access will also be required in front of and behind the rack into which the Blackrock processor is installed so that cards can easily be removed. See the drawing on page 10 for minimum clearances.

Blackrock Processor Chassis (side view) Showing Clearances



RIO Chassis (side view) Showing Clearances



Dimensions in mm

Technical Requirements

Sync Source

The Blackrock Processor requires a feed of sync in order to operate. Video, Wordclock or AES3id can be used as the sync reference.

The video sync requirement is 75Ω 1V(pk-pk) black-and-burst. The standard can be either PAL (625 line, 50Hz), NTSC (525 line, 59.94Hz or 60Hz). Composite sync may also be used.

Tri-level sync cannot be used.

Other studio peripherals (digital recorders, routers, editors and picture recorders) will also require a feed of video sync. Depending on the studio configuration, a suitable video distribution amplifier may also be required.

The Blackrock processor does not provide internal sync generation or distribution.

Power Connections – Mains Input Voltage & Current

Both the console control surface and the Blackrock processor rack are fitted with auto-sensing power supplies and will function at any voltage from 100 to 240 volts without adjustment.

The console is supplied with detachable IEC-type mains leads. These leads are 2m in length and the cable diameter is approximately 6mm. The free end of each lead is unterminated and will need to be connected to a suitable outlet beneath the console. CI00HDS systems are supplied as standard with dual redundant power supplies for 'on-air' use so is therefore fitted with two separate IEC mains input connectors.

The inrush current present when powering the console can be significant – typically ten times the steady current – so the use of 'slow' or 'motor' rated fuses/circuit-breakers is recommended.

See Appendix A for equipment specifications.

The console power rating label will be located between the two mains input connectors beneath the rear of the console.

Computer for File Management and Software Updates

It will be necessary to have access to a computer with an Ethernet interface to be able to update the Blackrock's system software and also to archive or backup operator projects. SNMP status information is also available over the IP network.

The machine used for communication with the Blackrock can either be connected via the facility's Ethernet network or can be a direct Ethernet connection. (Note that if connecting directly then the cable must be of the 'crossover' type).

The computer used must have an SSH terminal client installed – 'PuTTY', for example, if using a PC. Macintosh users can use The 'Terminal' utility included with OSX.

The Blackrock does not support wireless networking.

Grounding

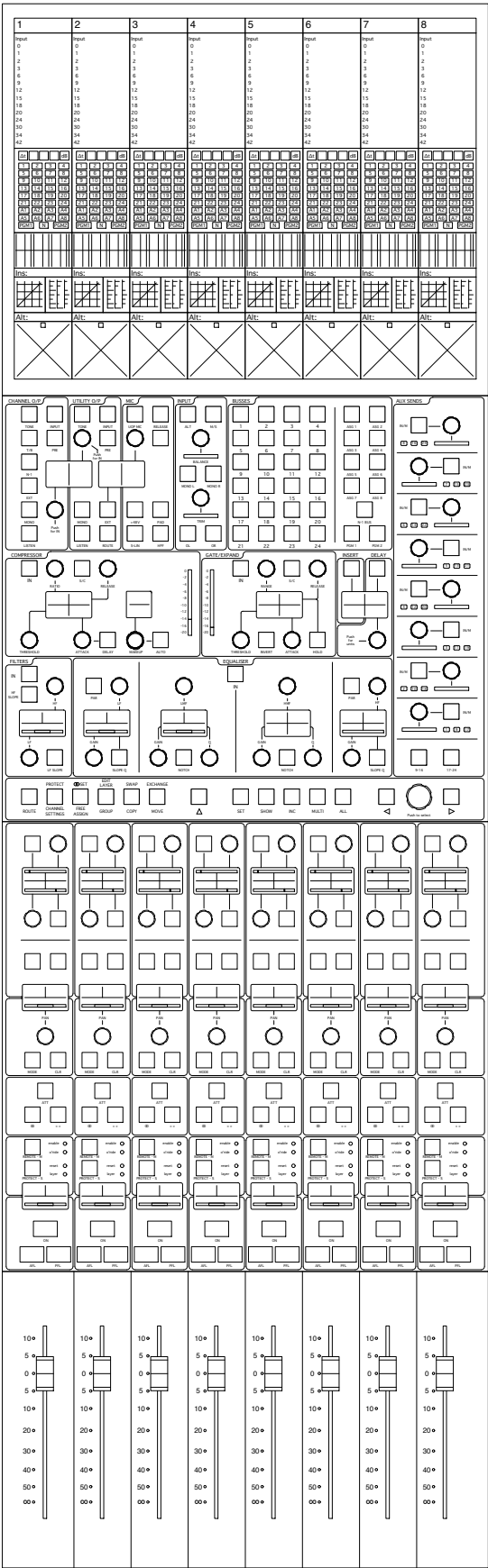
A standard system should not require any additional grounding over and above that supplied by a correctly installed mains supply. All rack unit chassis are permanently bonded to mains earth. A mains earth connection via the mains inlet must be provided.

If due to the quality of the mains wiring within an installation it is deemed necessary to improve upon the mains earthing, a chassis ground connection point is provided as follows:

- Console chassis ground can be accessed via a stud located on the mains power connector panel.

All audio connectors, both analogue and digital, have their screen pins connected directly to the chassis at the point of entry to comply with AES/EBU EMC grounding standards.

CI00HDS Channel Bay Layout



LCD Meter panel

Bay Control (Master Channel) Tile

Channel Control Tile

Fader Tile

Section 4 – System Components

This section provides greater detail about the main units in the system. See Appendix A for specifications and Appendices B and C for connector details and pinouts.

CI00HDS Console

Each console control surface will consist of the Centre Section and can be specified to have from 16 to 64 channel faders in groups of 8. (Note: A group of 8 faders and controls and its frame is termed a 'bay'). Refer to page 46 for frame dimensions.

The number of physical faders fitted to a console surface does not limit the number of processing channels available; this is determined solely by the quantity of DSP resource fitted to the Blackrock processor. DSP processing is available in quantities of 64, 96 or 128 channels.

Each console channel bay comprises four individual sections: Faders, Channel Control tile, Master Channel tile and TFT meter panel. The Master Channel tile provides physical access to all operational controls and can be assigned to any of the channels in the console. As a minimum it is only necessary to have one Master Channel tile fitted to a console as this can be used to access any DSP channel specified, although, for convenience and additional flexibility, Channel Master tiles can be fitted to any bay.

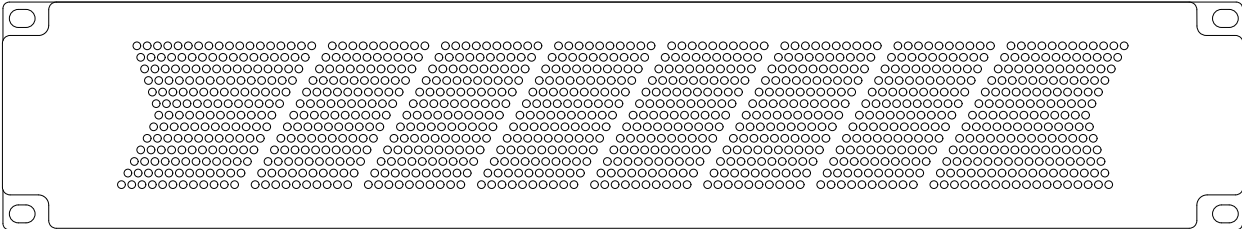
Fitting a Master Channel to either side of the Centre section will allow full channel control to be retained even if one of the two console control cables becomes disconnected.

The Centre Section is always fitted with two analogue mechanical meters; these are VU scale as standard but can be specified to be PPM. Additionally, there is space available into which a 6 or 8-channel LCD phase-scope can be fitted. There are three types available: RTWI0830 (8ch analogue plus 8ch digital), MSD600C (6ch digital) or the MSD600M (modular customisable).

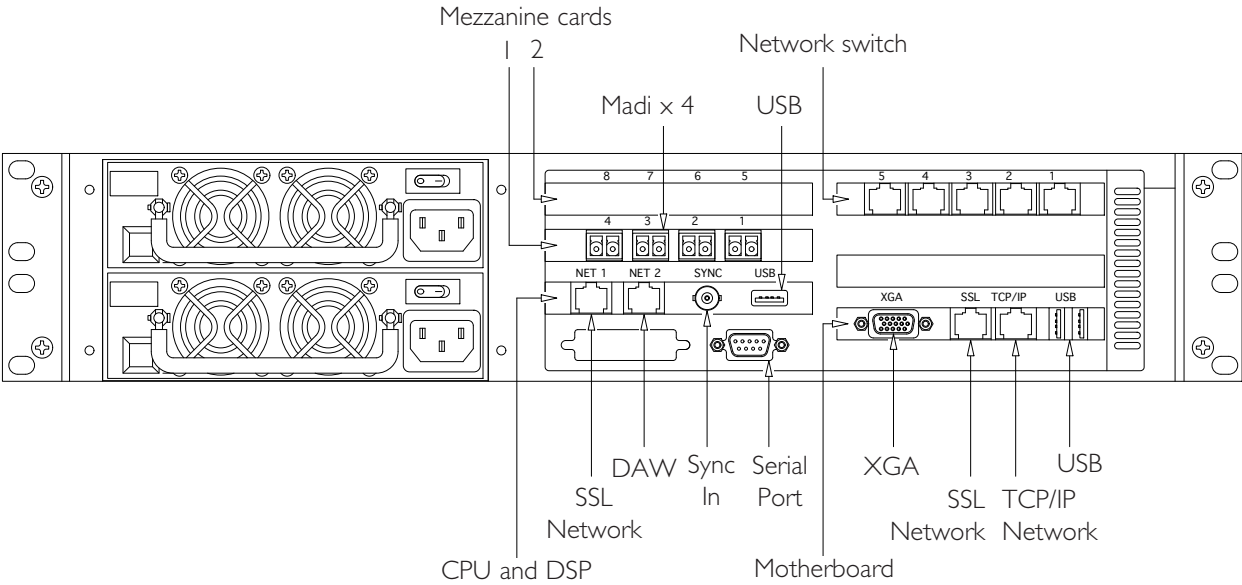
Note that the console frame is supplied without moulded side arms as standard to reduce the overall width. Contoured side arms are available but need to be specified as an option. These will add 72mm to the overall console width.

A dxf CAD drawing of the 32 channel frame layout can be downloaded from the CI00HDS area of SSL's website.

Blackrock Processor Front



Blackrock Processor Rear



Rear View

The Blackrock Processor

The Blackrock processor is a 2U high 430mm deep (excluding connectors) rack unit. The unit is based on an industry standard industrial PC chassis running SSL's operating software. There are no 3rd party licensing requirements.

Behind the removable front panel are one or two swappable SATA drives, the filters for the cooling fans and a protected mains switch. At the rear of the rack are the removable PSU units, the console network and terminal connections, the optical Madi ports for I/O and a serial port.

Power supplies

The unit is fitted with two removable power supplies, either of which is capable of powering the Blackrock chassis so as to provide fault redundancy. The units are autoranging and are fitted with a standard IEC male connector for mains input.

Motherboard

This card is the processor for the system files and for project storage and also functions as the interface for remote diagnostic servicing and storage capability when connected to an IP network.

The Motherboard is fitted with the following connectors:

<i>TCP/IP Network</i>	IP network connection – will need to be connected to the facility's TCP/IP (Internet) service to facilitate remote diagnostics (SNMP), project backup and system file management.
<i>SSL Network</i>	Console network connection – must be linked to the built-in hub. <i>Note that the SSL network is used to transfer control surface data which is not TCP/IP protocol. Do not combine this network with the TCP/IP network.</i>
<i>DAW</i>	<i>Reserved for the implementation of IP MIDI – Not currently available.</i>
<i>USB 1&2</i>	Standard peripheral USB – can be used for direct connection of a keyboard and mouse to facilitate file management.
<i>XGA</i>	Standard analogue video output – combined with above, can be used for direct connection of an analogue XGA monitor to facilitate file management and backup functions.
<i>Serial Port</i>	RS232 D9 female for serial connection to Probel routers to facilitate router name transfer.

CPU and DSP

This single PCIe card performs all the system DSP and processing functions. It can be specified as one of three versions to support 64, 96 or 128 full-function channels at 48kHz simultaneously. Processors specified with less than 128 channels can be subsequently expanded via a license upgrade.

The DSP card is fitted with the following connectors:

<i>Network 1&2</i>	Console network output connectors. Connector 'Net 1' must be linked to the built-in hub.
<i>Sync in</i>	BNC input connector for system reference. A feed of sync must be supplied. The following are suitable sources: Analogue Video (black&burst 1Vp-p or composite), Wordclock or AES3-id 75Ω .
<i>USB</i>	SSL Service use only.

Mezzanine 1&2

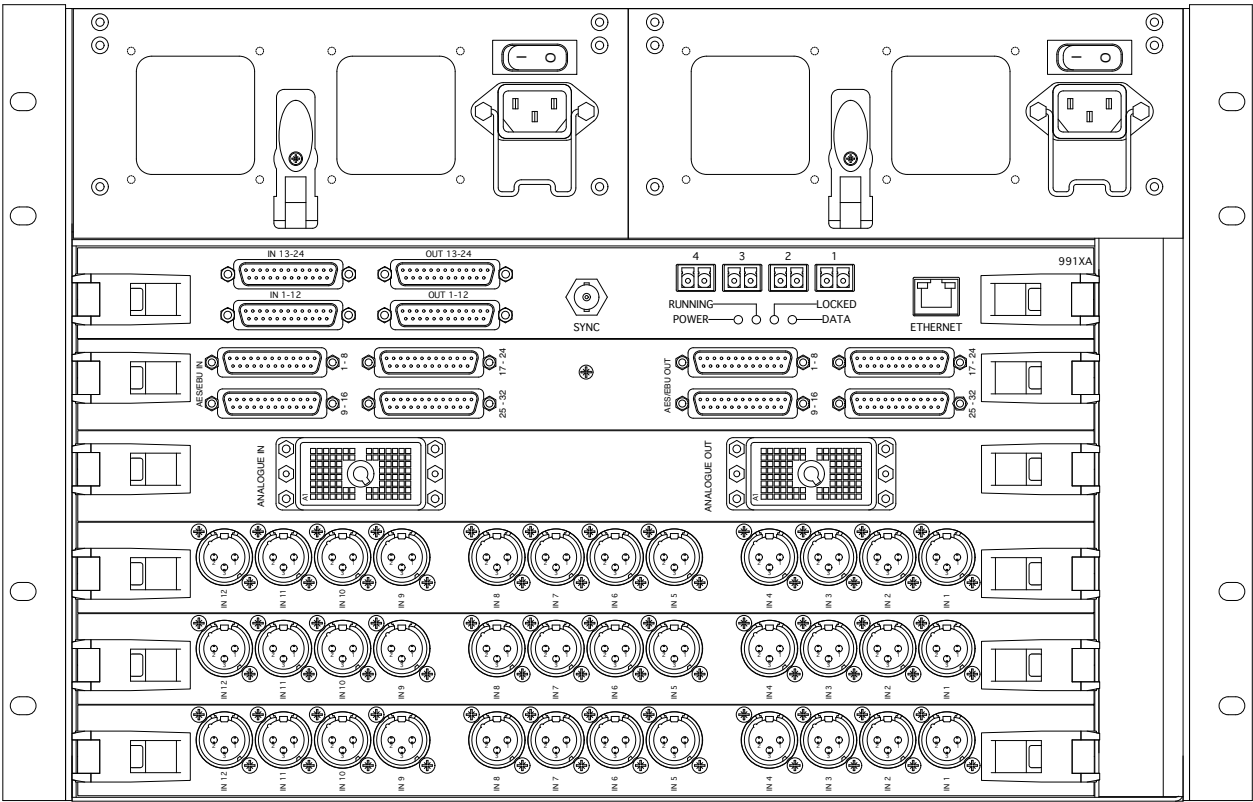
A Madi interface card fitted with four off SFP fibre sockets. Each of these sockets can be equipped with a duplex LC fibre interface adapter for connection to a remote I/O unit. Each Madi port provides up to 64[†] audio channels.

The fibre multiplexers fitted as standard are the 50/125 multimode version which will function at cable lengths of up to 550m. 9/125 singlemode multiplexers which can function at distances of up to 2km are available to order at additional cost.

One mezzanine card (ports 1–4) is included as standard and a second card (ports 5–8) can be specified to provide access to up to 512 I/O channels.

[†] The signal capacity of the first Madi link connected to any RIO is reduced to 62 as two channels are reserved for control and status information. This restriction does not apply to subsequent links connected to the same RIO.

RIO Rack (front view)



I/F
1
2
3
4
5

Remote I/O Rack (RIO)

All console audio input and output signals are provided by separate input/output racks. These racks are referred to as 'RIOs'.

The RIO is a 7U high 344mm deep 19" rack unit. Each RIO requires its own mains power supply and fibre optic cable connection to the Blackrock processor. A maximum of four RIOs can be connected to each CI00 system.

All plug-in cards and connectors are accessed via the front of the RIO making it suitable for installation into equipment racks where space is limited. The unit is cooled from front to back using temperature controlled low-noise fans so space for ventilation must be provided behind the rack. A standard 600mm rack provides adequate ventilation space.

RIOs can be fitted with one or two removable power supplies. A single PSU unit has sufficient capacity to supply a fully fitted RIO thus full PSU redundancy can be achieved by fitting two units.

Below the power supplies is space for six plug-in cards. The uppermost slot is always fitted with the RIO Interface Card. This card is fitted with four fibre MADI interface ports for connection to the Blackrock processor.

Note that although each MADI link has capacity for 64 channels (at 48kHz) the first link is limited to 62 audio channels because two channels are reserved for sync and status information; the remaining three links can access all 64 channels of bi-directional audio data. The maximum I/O capacity for a single RIO unit is therefore 254 audio channels.

The interface card is also equipped with 24 channels of general-purpose opto-isolated input and 24 outputs are available via relay closures. Refer to page 35 for contact ratings.

A sync output connector is included which provides a feed of the system's Wordclock reference.

I/O Daughter Cards

Below the interface card are five available slots into which a range of input/output cards can be fitted.

Cards are available with the following functions: 24-channel analogue I/O, 64-channel digital I/O – with either fibre or copper connection – and 12 channel microphone input. Cards can be fitted in any combination. Cards must be installed starting with slot one, directly below the Interface card, and added in order. See the following page for I/O card details.

Unused slots must be fitted with a blanking panel (supplied) to maintain the correct airflow through the rack.

Fibre Connection

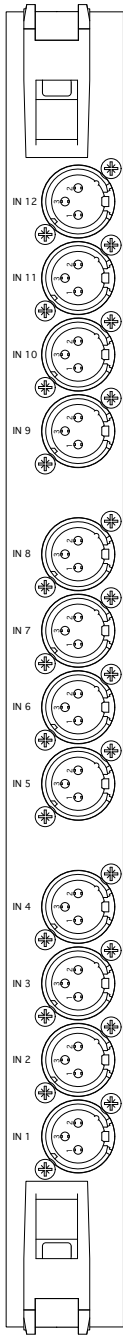
RIO units are connected to the Blackrock processor using duplex fibre optic cabling. The connectors required at each end are duplex LC type – flat end, not APC.

The fibre interfaces are available in two versions: singlemode and multimode. The fibre specification chosen determines the maximum distance that the cable can be run without loss of data. Singlemode and multimode interfaces and connectors are almost identical in appearance but are operationally incompatible – the standards must not be mixed within a system. Generally, singlemode cables are coloured yellow and multimode cables are coloured orange.

Unless specified otherwise the RIO and Blackrock interface adaptors will be fitted with the multimode version.

Console systems are supplied with one 2m multimode fibre cable for each RIO to Blackrock link. It is the responsibility of the facility to provide longer or additional fibre cables necessary to connect the Blackrock processor to the RIO units.

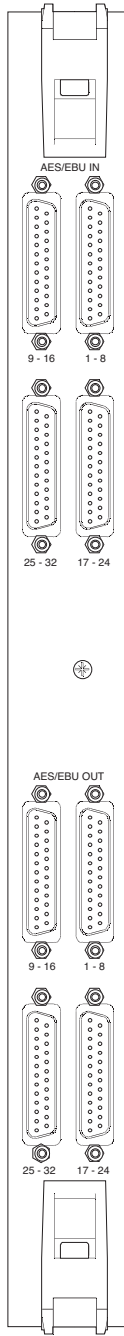
Standard	Cable specification	Maximum cable length	Note
Multimode	LC – LC duplex 50/125µ	550m (1,800ft)	Default fitment
Singlemode	LC – LC duplex 9/125µ	2,000m (6,560ft)	Cost option



**Mic Input
Card**



**Analogue I/O
Card**



**Digital I/O
Card**

RIO – Micamp Card

The microphone input card provides 12 input channels accessible via standard XLR 3-pin female connectors.

The card has been specifically designed to operate in a broadcast environment and meets recognised performance standards. The card is fitted with RF input filtering, a high-speed analogue limiter and features high input CMRR.

Phantom power is available.

RIO – Analogue I/O Card

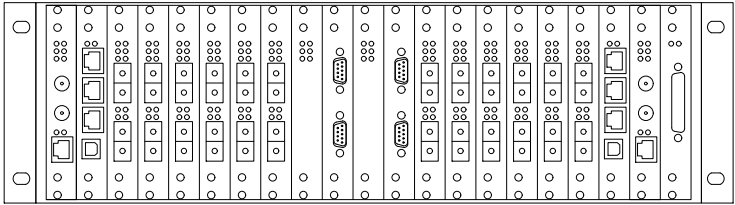
The analogue card provides 24 channels of balanced line-level input and output. At least one analogue card will need to be included if analogue monitor amplifiers are being used. The connectors used for input and output are Canon DL96 types. Mating connector kits and a contact crimp tool can be supplied (as cost options).

Refer to page 54 for the DL pinout.

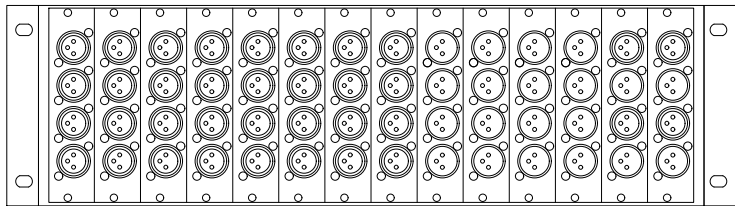
RIO – Digital I/O Card

The digital I/O card is available in two versions: 110Ω and 75Ω. Both types provide 64 channels – 32 AES/EBU pairs – of digital input and output. The 110Ω card provides balanced output signals whereas the 75Ω card is unbalanced for correct matching to coaxial cables. Sample rate conversion is available on every input so the card can accept input rates from 32kHz to 96kHz. The connectors are all D-25 type females and mating connectors can be supplied (as a cost option).

A breakout panel is available for the 75Ω card. This panel converts the I/O card's D-25 connectors to chassis BNC plugs and can be ordered with 1m or 3m interconnecting leads. Do not attempt to extend the panel interface leads beyond the 3m maximum as doing so could increase the risk of data corruption.



MORSE Router



MORSE 3U Stagebox

MORSE System (option)

The MORSE (MODular Resource Sharing Engine) system provides a cost-effective, scalable solution for the sharing of local or remote audio I/O and managing control data. The system is specifically designed for on-air reliability and features optional redundancy on all data links and fault tolerant proprietary software.

The system comprises a central router to which remote stageboxes and consoles may be connected via optical MADI links to provide a resource sharing solution. The router is available as a 3U rack with up to 24 individual links available or as a 6U rack with up to 48 links.

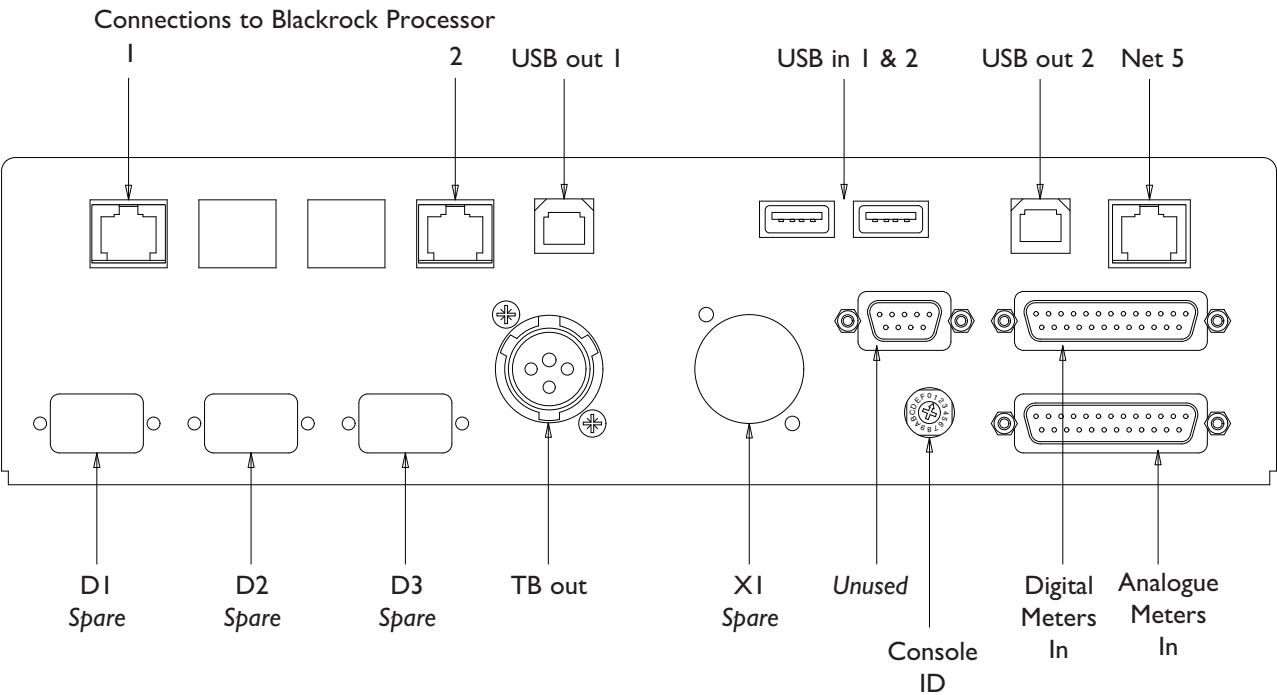
Stageboxes can be connected to the router so that any I/O signal is then able to be allocated to any Blackrock processor connected to the router. If however resource sharing is not a requirement stageboxes can be directly connected to the processor.

Each stagebox can each can be fitted with up to 56 channels of I/O. Plug-in modules are available for: Microphone level input, line level analogue I/O, AES, MADI and SDI. A 2nd redundant power supply can be fitted. Stageboxes are connected to the router or console using one or two duplex optical MADI links.

The fibre links between the Blackrock and the MORSE router are available as multimode type only. The morse fibre connector standard is duplex SC. Blackrock to MORSE fibre leads are therefore LC – SC duplex multimode.

The MORSE system is more fully described in a separate SSL document 'Morse Specification Guide' part number: 82S6SMO10A.

Location of Console Bellypanel Connectors



System Options

External Keyboard

There is an inbuilt software keyboard included in the C100 system; this is accessed via the centre section touch screen.

Alternatively an external USB computer keyboard and or USB mouse/trackball may be connected to the audio connector panel using the connectors provided ('USB1' and 'USB 2'). The diagram opposite shows the location of these connectors.

Script Tray

The script tray is an 8-channel wide movable transparent panel which fits over a channel bay. It has rollers fitted to allow it to move along the length of the desk.

The script tray does not require modifications to the console and can be added to existing consoles.

Loudspeaker Shelf

A flat secure shelf is available for the positioning of loudspeakers, monitors etc. Each shelf is 400mm wide by 253mm deep. A shelf is securely attached by locating under the front of the top trim and then screws are used to fix to the console's back panel.

TFT External Input

This option adds an input switcher to any of the channel bay TFT screens so that it can then be switched to display the signal from an external XGA (1024x768) video input. The switchover may be effected either by a GPI closure triggered from a free button or by one of the unused latching switches located on the meter panel (see page 43).

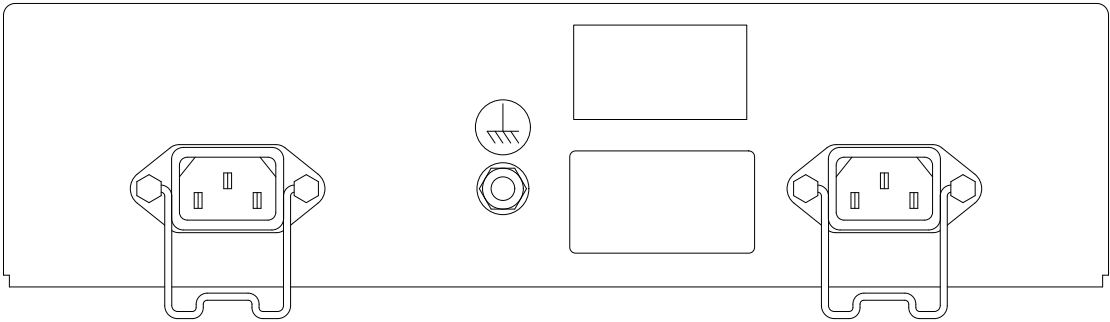
Because it is necessary to install additional hardware within the console frame when adding this option, a maximum of three of the four channel screens on the 32-channel console can be modified.

LCD Phasescope

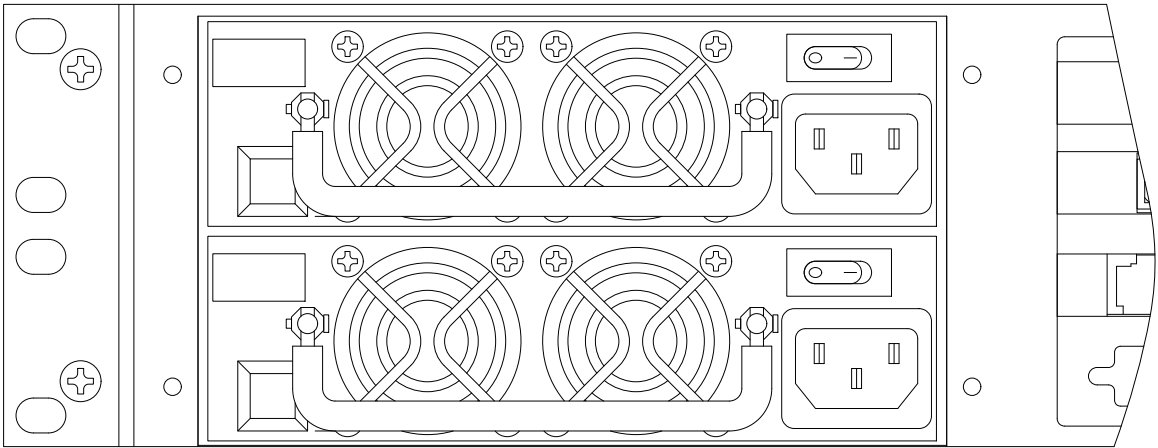
The Centre Section of the console has space reserved specifically for an LCD phasescope surround monitor. Three versions of phasescope are available to order: The RTWI0830 which features 8 channels of digital and 8 channels of analogue input with loop-through outputs; the DK Audio MSD600C with 6 channels of digital input and the MSD600M which can accommodate varying input and output options by using plug-in modules.

The RTW and the MSD600C units are provided in standard configurations. The MSD600M meter can be adapted to suit specific applications so its installation options should be discussed with SSL's Project Engineering department.

Console Mains Inlet Panel



Blackrock Power Supplies



Section 5 – Installation Wiring

This section provides the information necessary to connect the system components.

Power Supply Connections

- a) Connect both the console's IEC mains leads to a suitable mains supply outlet. These leads are supplied unterminated to simplify connection to the facility's preferred distribution system.

For live transmissions work it is recommended that one of the power feeds should be from an uninterruptable source.

THE MAINS SAFETY EARTH MUST BE CONNECTED.

THE TWO POWER SOURCES MUST NOT BE FROM DIFFERENT PHASES OF A 3-PHASE SUPPLY.

The console is fitted with auto-ranging power supplies which will accept mains voltages which range from 100 to 240V without adjustment. The mains rating label is located adjacent to the earth bolt on the power inlet panel.

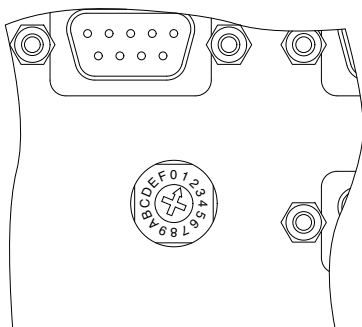
- b) Connect both the Blackrock's IEC mains leads to appropriate mains supplies. Refer to the notes above for suitable supply provision.

Console Address

It is only necessary to refer to the console address switch setting if more than one CI00HDS console is being connected to the same Ethernet network.

The address switch is located on the console connector panel – it is a 16-position rotary switch. Its function is to identify different consoles connected to the same Ethernet network. The default setting for this switch is '1'.

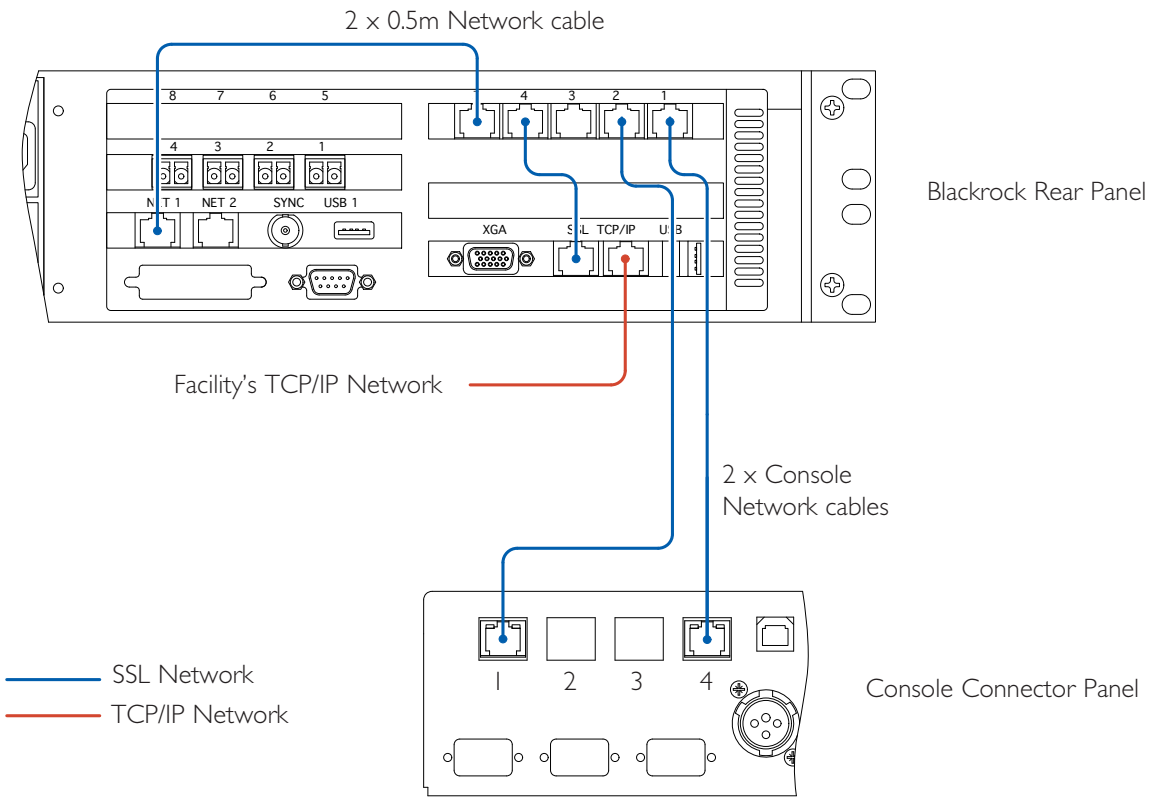
If a second console is added to a network then the switch should be set to the '2' position – and subsequent positions for additional consoles. Address '0' is not used.



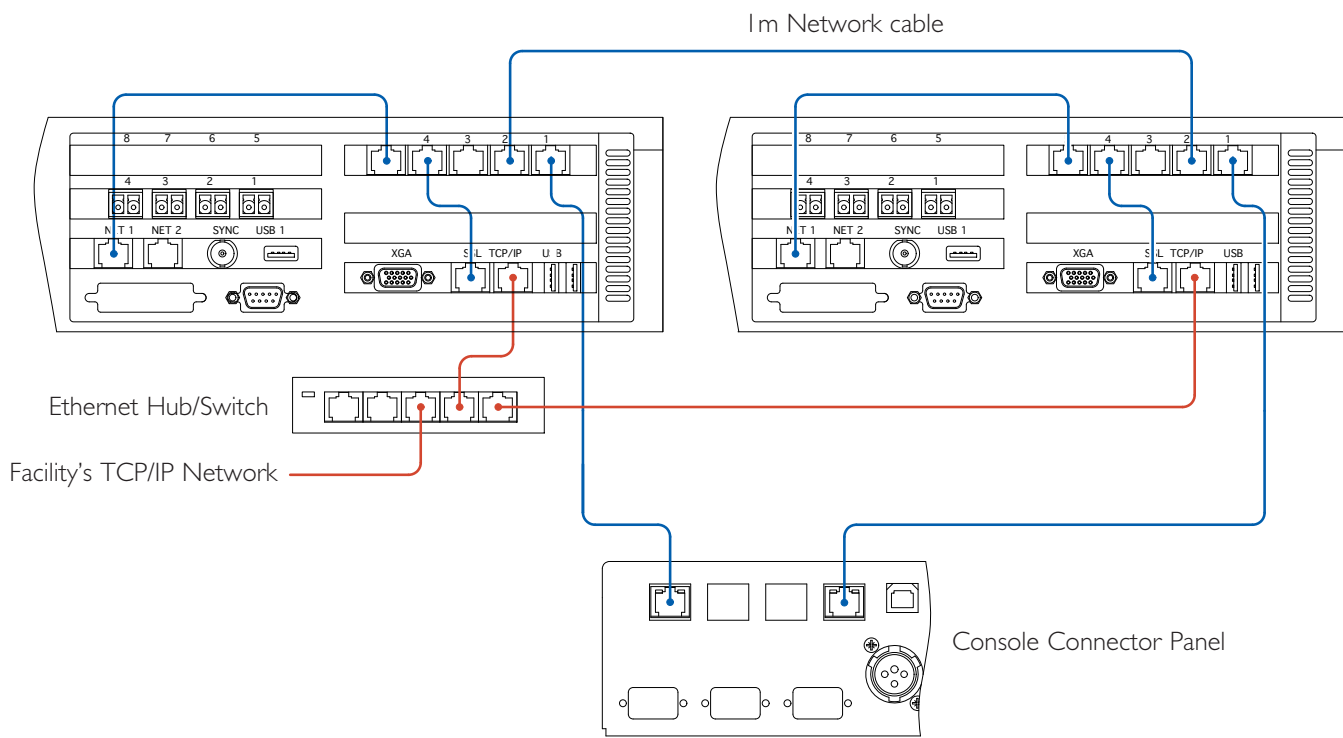
Console Address Switch

Default setting

Control Surface Wiring Diagram – Single Blackrock



Control Surface Wiring Diagram – Redundant Blackrock



Blackrock to Console Surface Connection

Network Cables

The Blackrock processor is equipped with two separate network connections. Both use standard RJ45 termination and cabling but are different protocols so must be kept separate at all times.

The first is labelled 'SSL' and is reserved for the connections to the console control surface and the optional redundant Blackrock processor. The second connection is a standard TCP/IP Ethernet port which should be linked to a PC within the facility's internet network. This machine can then be used for project backup, software updates and for SNMP status reporting and maintenance support.

The SSL network connection is the only data link required between the Blackrock processor and the C100HDS console. The recommended configuration is to use two separate data cables in parallel.

Single Blackrock Systems

- a) Connect the two off 0.5m network cables supplied to the Blackrock rear panel as shown opposite.
- b) Connect the two off console network cables supplied as shown opposite. Length will be as specified at time of order.
- c) Connect the Blackrock TCP/IP port to the Ethernet network port of a suitable PC. If using a direct connection then a network cable of the 'crossover' type will be necessary. If the connection is via a standard network switch or hub then standard pin-pin cables can be used.

Refer to page 37 for further details of configuring the PC for file transfer.

Systems with Redundant Blackrock

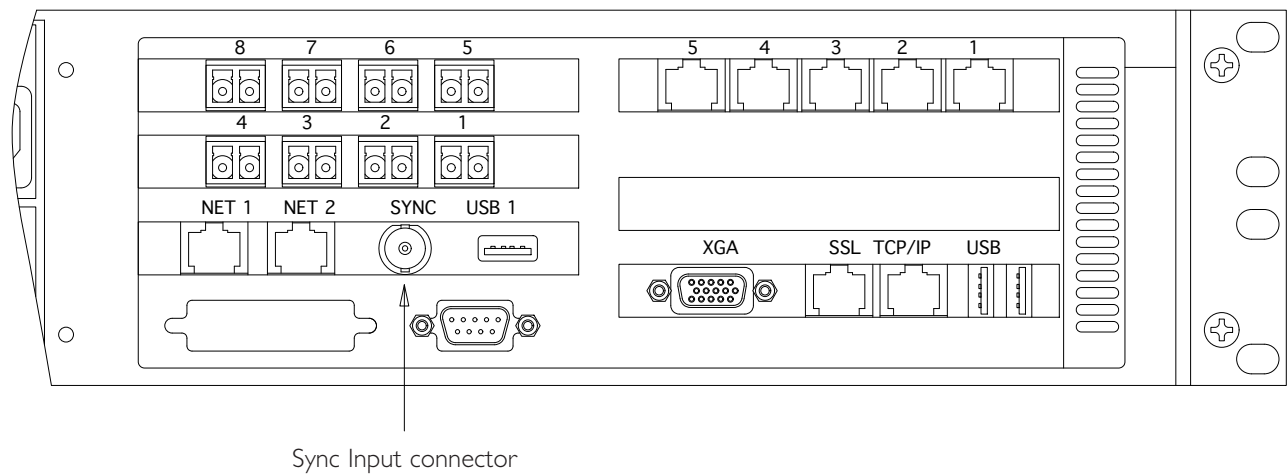
- a) Connect the two off 0.5m network cables supplied to both the master and redundant Blackrock rear panels as shown opposite.
- b) Connect the two off console network cables supplied to each Blackrock processor as shown opposite. Length will be as specified at time of order.
- c) Connect the supplied 1m SSL network cable between both Blackrock processors.
- d) Connect the TCP/IP ports from both Blackrock processors to an Ethernet hub or switch (not supplied). The PC being used for project backup etc. will need to be connected to the same network.

Alternatively, If a PC is not being used or a hub/switch is not available, then the TCP/IP ports of the Blackrock processors must be linked together using a single 'crossover' type Ethernet lead.

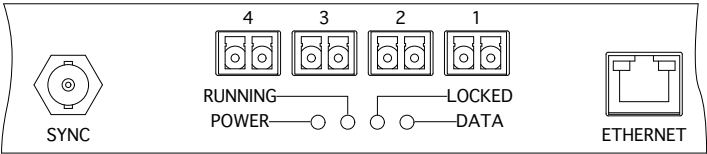
Refer to page 37 for further details of configuring the PC for file transfer and project backup.

If for either system a MORSE router has been specified then this must also be linked to the SSL network and can optionally be linked to the TCP/IP network.

Blackrock Rear Panel



RIO MADI Ports



Sync Source

The Blackrock processor must be provided with a source of sync input in order to function. Suitable sources of sync are:

Video black-burst or composite
Wordclock
AES3id – unbalanced

The sync input provides internal 75Ω termination.

RIO – MADI Fibre Links

The Blackrock processor is supplied with four MADI ports as standard but may be expanded to provide eight ports (as shown opposite). The RIO unit is always equipped with four ports.

Connections between the Blackrock and RIO units are made using industry standard multimode (50 micron) duplex LC fibre cable assemblies. Multimode fibre is suitable for cable runs of up to 550m. Suitable fibre cable assemblies are widely available from cable suppliers.

Singlemode fibre multiplexers can be specified for the Blackrock and RIO as a cost option. These will require matching singlemode connectors and cable assemblies. Singlemode cable is suitable for distances of up to 2km.

The first MADI connection between the Blackrock and any RIO will provide 62 channels of bi-directional audio (two channels are used to transfer sync and status information). Subsequent connections added to the same RIO will extend the capacity by 64 channels for each lead.

A maximum of four RIO units can be connected to a Blackrock processor.

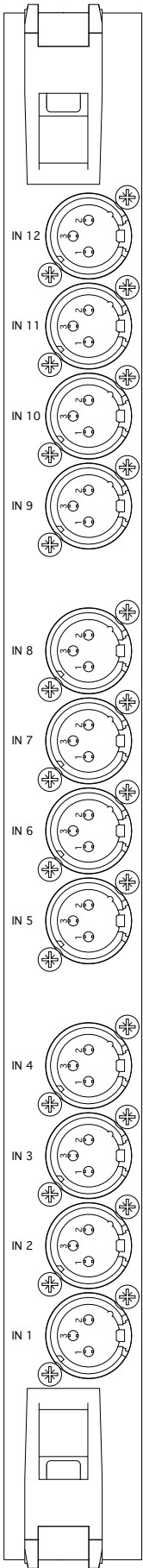
For additional security, a redundant fibre link can be connected between the Blackrock and the RIO. The backup fibre cables should be connected to the port directly above the primary port (1 and 5, 2 and 6 etc.)

RIO – Sync Output

The 'Sync' connector fitted to the front of the RIO interface card provides an output of Wordclock at the system's clock rate.

RIO – Ethernet

The Ethernet connector on the RIO interface card is non functional so does not need to be connected to either the SSL or TCP/IP networks.



Micamp Input Card

Mic Input Connectors
XLR-3 female



Analogue I/O Card

Analogue Input Connector
DL96 female

Analogue Output Connector
DL96 female

I/O – MicAmp Card (SSL ref. 968)

Each micamp input card provides 12 high quality microphone circuits. The inputs are accessed via standard XLR-3 female connectors.

Refer to Appendix C for the connector pinouts.

SSL is able to supply mating connectors if requested, (at additional cost).

It is always highly recommended that the 48V phantom power is switched off (via the console control surface) before connecting any microphones.

I/O – Analogue input/output Card (SSL ref. 944)

The analogue card provides 24 circuits of electronically balanced input and output. These circuits are accessed via Canon DL 96-way female connectors; mating connectors are available to order.

Refer to Appendix C for the connector pinouts.

The default line-up level for analogue I/O is 0dBFS = +18dBu. This level may be globally altered and can range from +9dBu to +24dBu. The value can be adjusted from a setup screen to match the standard operating level for the facility.

When assigning analogue card output channels as insert sends, the routing system will automatically assign the same input channel number as the corresponding return. It is therefore necessary to physically wire outboard equipment so that circuit allocation follows this arrangement.



Digital I/O Card

AES/EBU Input Connectors
25-pin D-type female

AES/EBU Output Connectors
25-pin D-type female

I/O – Digital Input/Output Card 110Ω (SSL ref. 942XF)

The digital input card provides 32 balanced AES/EBU signal pairs of input and output. All circuits are accessed via 25-pin D-type female connectors. All inputs and outputs are balanced at 110Ω and cables with the correct matching impedance must be used.

Refer to Appendix C for the connector pinout for this card.

Mating connector kits can be ordered for the card.

When assigning digital card output channels as insert sends, the routing system will automatically assign the same input channel number as the corresponding return. It is therefore necessary to physically wire outboard equipment so that circuit allocation follows this arrangement.

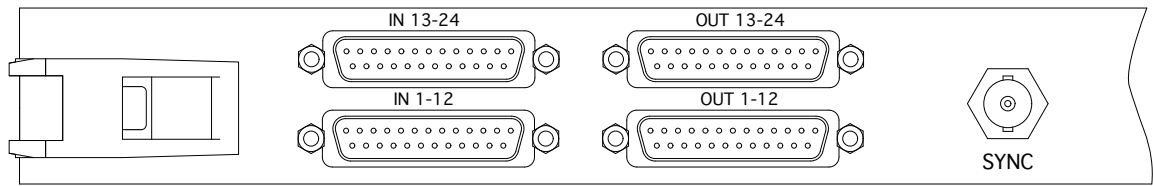
I/O – Digital Input/Output Card 75Ω (SSL ref. 942XJ)

This version of the Digital I/O card is externally identical to the 110Ω version (apart from its designation number). The Impedance of each input and output circuit however, is now 75Ω and unbalanced for correct matching to installations using co-axial cabling.

A separate BNC interface panel is available as a cost option. This panel is 2U high and is fitted with 64 chassis mounted BNC plugs – 32 input and 32 output. One-metre length D25–D25 interconnecting looms are provided. A 3m loom is available to order at additional cost. These looms must not be extended as the signals are unbalanced – doing so will give rise to errors in the data.

When assigning digital card output channels as insert sends, the routing system will automatically assign the same input channel number as the corresponding return. It is therefore necessary to physically wire outboard equipment so that circuit allocation follows this arrangement.

GP I/O – RIO Interface Card



GPI Input Connectors
25-way D-type Male

GPI Output Connectors
25-way D-type Female

GPI I/O

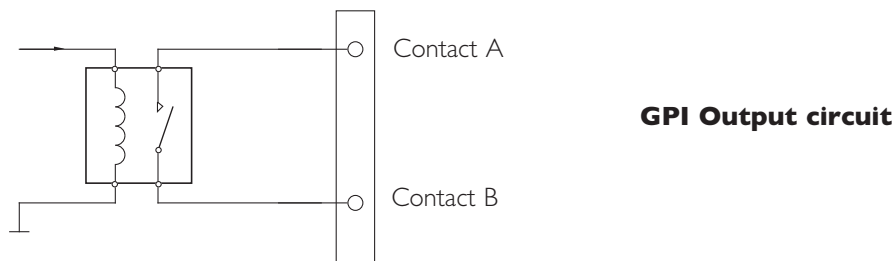
The Interface card fitted to each RIO unit is equipped with 24 circuits of GPI I/O. Each input is opto-isolated and is accessed via 25-pin D-type male connectors. Outputs are via relay-closure and are accessed via 25-pin D-type female connectors. Mating connector kits are available to order.

Both the input and the output circuits are fully isolated from the RIO electronics. On output connectors, there is a protected source of +15V available and a 0V reference is available on input connectors.

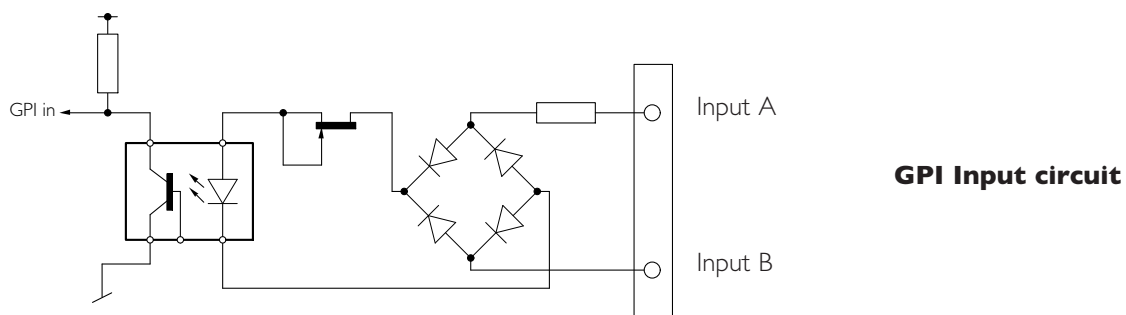
The input and output signals can be either latching or momentary; this is individually assigned in software using the touch screen. When set to momentary, the input signal trigger duration must be greater than 50mS.

When used for discrete track arming with associated tally, the tally must return to the same number input as the arming output signal, (ie. the tally for GPI Out 1 will be on GPI In 1).

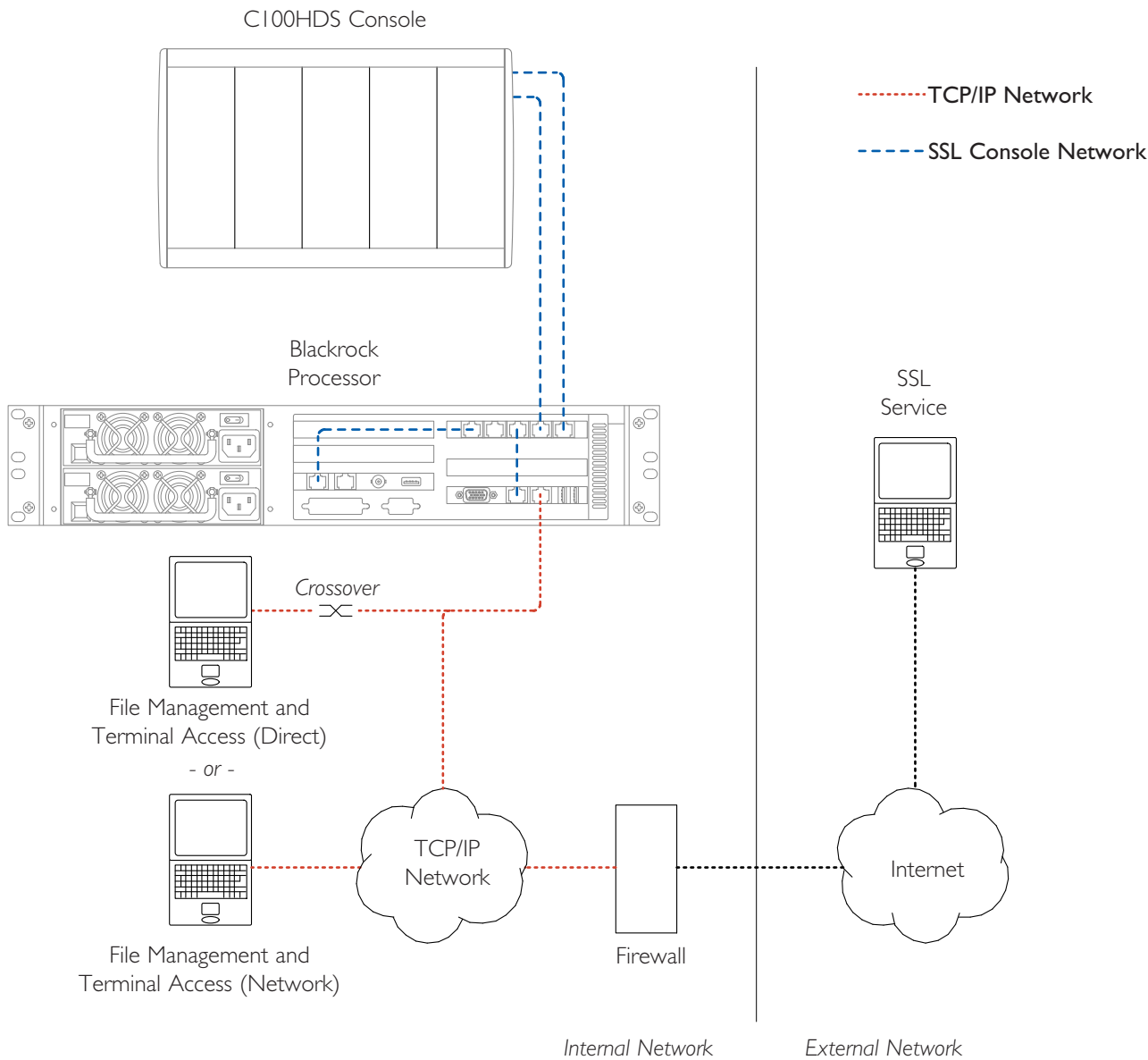
The switch closure is by DIL relay. Contact rating is 100Vdc, 125Vac, 100mA max. Do not use the output contacts to directly switch capacitive or reactive loads; always use an external relay with a suitable contact rating.



The input is triggered by an AC or DC voltage between 4V and 30V. The current drawn is approximately 10mA.



NetBridge Installation



File Management

In order to manage and update the Blackrock's operating software it will be necessary to have access to a computer with an Ethernet connection. The computer selected can be an existing machine within the facility connected remotely via an Ethernet switch; it would be an advantage if the computer used was in the same room as the Blackrock processor. Alternatively a computer may be connected via a direct Ethernet link; note that the cable used for this arrangement will need to be of a 'crossover' variety. Connection should be made to the TCP/IP port.

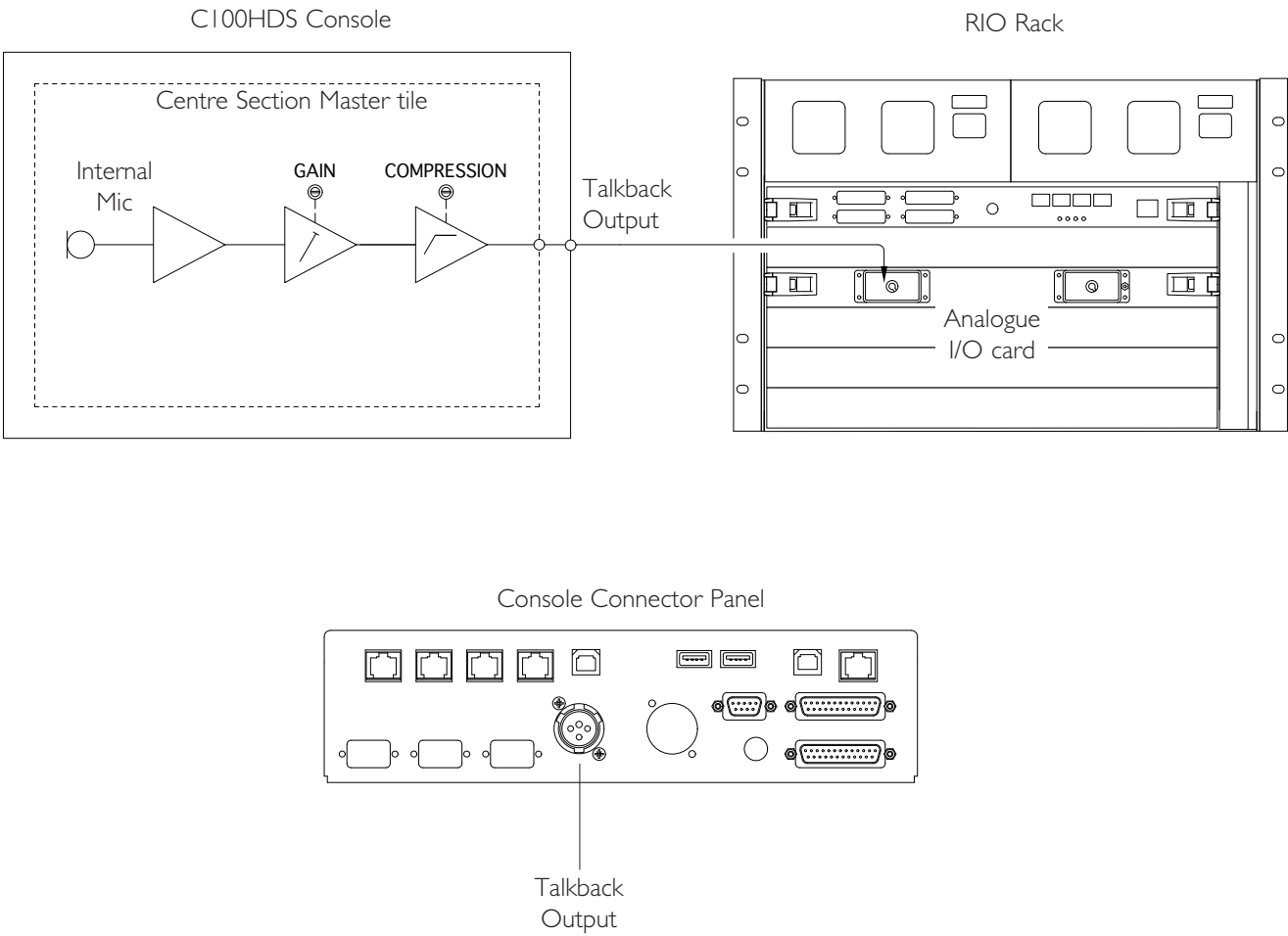
IP Address

To initially determine the IP address of the Blackrock motherboard's TCP port it will be convenient to have access to a VGA monitor and USB keyboard; these should be connected to the Blackrock motherboard's VGA and USB ports. Once booted, the motherboard will be running a Linux graphical desktop. Present on the desktop will be an application called '*Terminal*'. Run the application and type the command '`my_blackrock`' followed by the Return key. The application will respond with the IP addresses of both the internal SSL console network and the internet TCP IP addresses.

Remote Diagnostics

The external access to the Blackrock processor via an IP network allows access to remote diagnostics using SNMP. Many of the console's and Blackrock's operating parameters are available to allow monitoring and interrogation.

Talkback System



Talkback and Oscillator

Talkback Connection

The CI00HDS console contains a built-in talkback microphone and amplifier. The microphone is located on the Centre Section master tile adjacent to the main monitor pot. The Mic amp circuit features an inbuilt compressor and the output signal is balanced and at line level. The TB output signal is available on an XLR 3-pin male mounted on the console connector panel.

It will be necessary to install a single balanced audio cable between the talkback output connector on the console and the analogue input DL connector in the RIO. The circuit chosen can then be assigned as the talkback source via the console's routing system.

Oscillator Connections

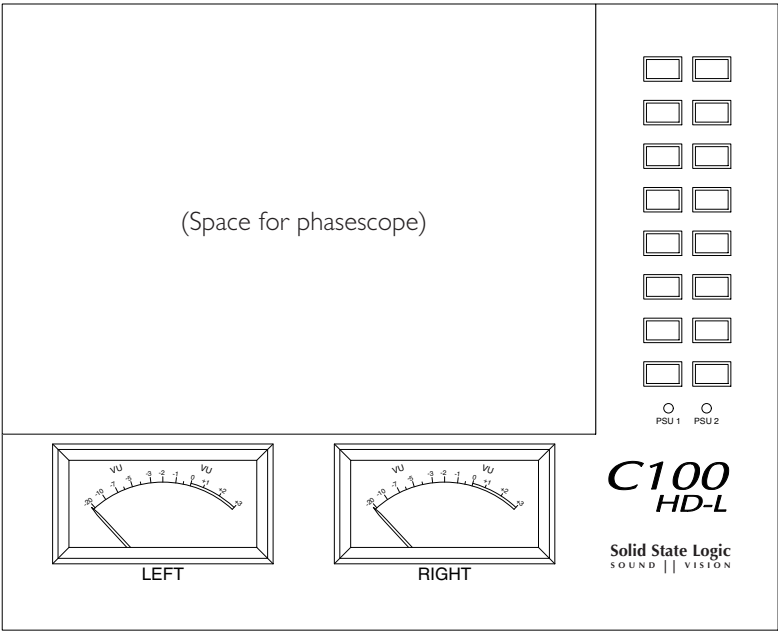
The CI00HDS features an inbuilt software oscillator. This signal can be assigned to any output without additional cabling.

Alternatively, an external oscillator (either analogue or digital, mono or stereo) may be used. In this instance one or two circuits should be allocated on the appropriate input card; these signals can then be allocated via the touchscreen.

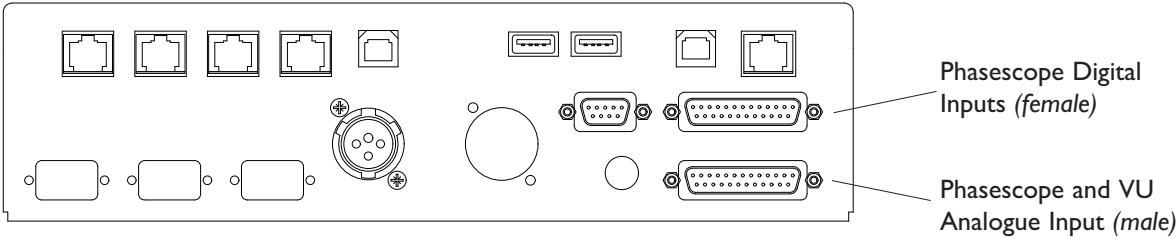
Refer to Appendix C for connector pinouts.

It is the responsibility of the facility to ensure that any cabling necessary to make use of the talkback and oscillator functions is installed prior to the console being commissioned.

Centre Section Meter Panel



Meter Input Connectors



Meters and Phasescope

The Centre Section of the CI00HDS console is fitted with two off analogue moving-coil meters. The meters supplied as standard are VU scale but PPM versions can be specified. In addition, the Master Section can also be fitted with an LCD phasescope. Three standard phasescope types are available to order: the DK Technologies MSD600C-5.1 or MSD600M++ or the RTWI0830 SurroundMonitor.

The RTW I0830 has eight digital input signals (with loop-through outputs) and eight analogue input signals plus a remote control port. Note that two of the analogue input signals will be split inside the console and also be used to feed the left and right mechanical meters.

The MSD600C-5.1 phasescope has inputs for 6 digital signals (3 AES/EBU pairs) plus a serial diagnostic port.

The MSD600M++ uses the same display panel as the 600C meter but has slots at its rear into which a range of input and output interface cards can be fitted. Cards are available in different combinations of analogue and digital I/O. It is therefore important to discuss individual requirements with SSL's Project Engineering Department prior to order; some combinations of I/O may not be able to be accommodated due to limited connector availability.

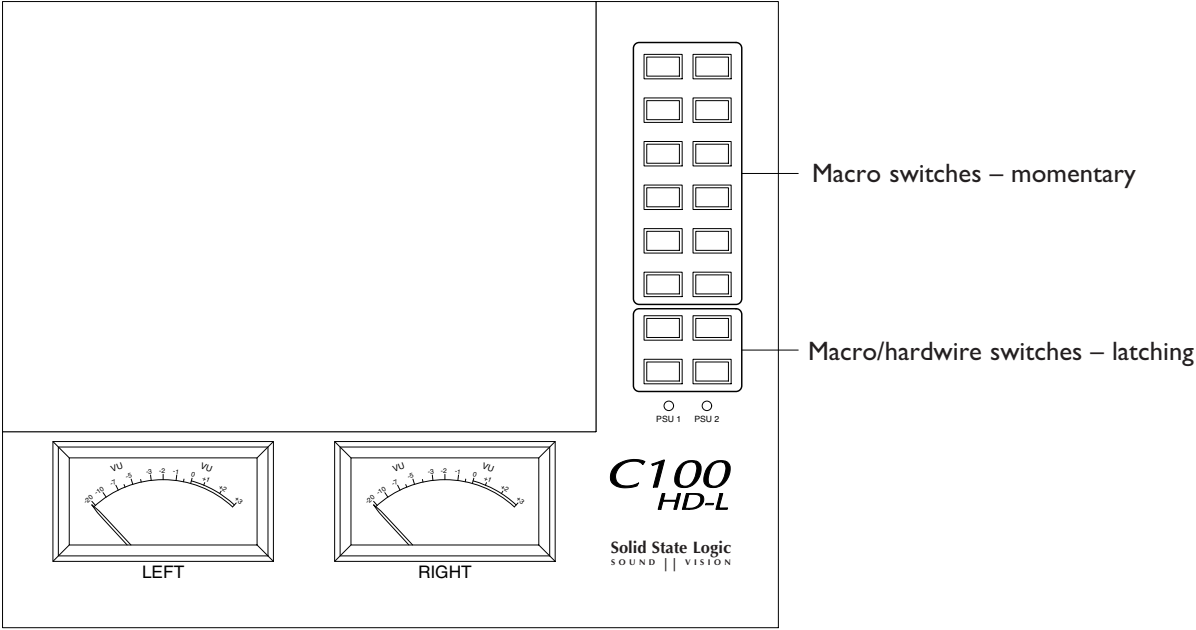
The inputs to the meters are accessed via two 25-pin D-type connectors mounted on the connector panel. The analogue inputs use a male connector and the digital inputs use a female. Cable connections to the meters and phasescope will need to be run between the RIO and the Console. Both balanced analogue and 110Ω digital cables may be necessary depending on configuration. These cables are not supplied by SSL.

The signals used to feed the meters could be paralleled from the console main output busses or independent feeds from the appropriate output card.

Refer to pages 51 and 52 for the meter connector pinouts.

It is the responsibility of the facility to ensure that all cabling required to enable correct operation of the VU and phasescope meters is installed prior to the console being commissioned.

User Definable Macro Switches



User Option Switches

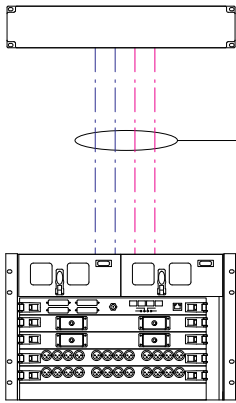
The meter panel in the Centre section is fitted with 16 switches which are available for user defined functions.

The switches are linked to the console's macro system so that each switch can be assigned to a range of internal console functions. They can also be programmed to operate a relay closure on the RIO Interface card.

The lower four positions are fitted with physically latching switches. This enables them to be used for internal switching functions such as external TFT input switching (see page 23).

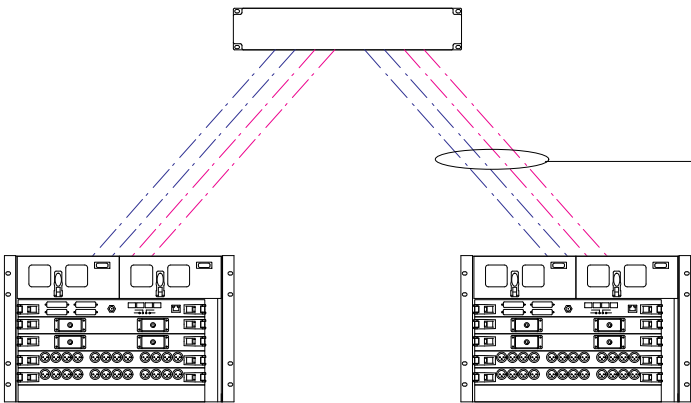
It is possible to engrave custom labels for user option switches – contact SSL's Project Engineering Department for details.

It is the responsibility of the facility to ensure that all cabling required to enable correct operation user option switches is installed prior to the console being commissioned.



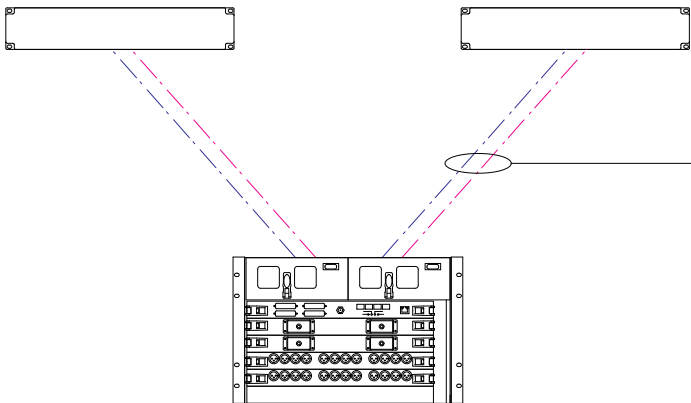
Blackrock with Single RIO

254 channels
or 126 channels with redundant links



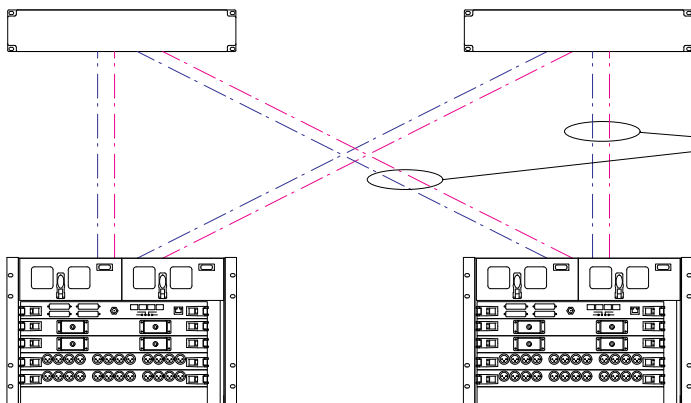
Blackrock with dual RIO

254 channels
or 126 channels with redundant links



Redundant Blackrock

126 channels
or 62 channels with redundant link



Redundant Blackrock with Dual RIO

126 channels
or 62 channels with redundant link

Remote I/O (RIO) Chassis and Blackrock Processor On-Air Redundancy

In its simplest implementation, a CI00 HDS will have a single Blackrock processor and a single RIO unit, connected by fibre MADI cables with a bandwidth of up to 254 bi-directional audio channels plus control and status data. This arrangement does not offer any hardware redundancy if either unit (or any of the cables between them) is lost. However, it can be expanded and configured to provide several levels of redundancy for the audio interface, audio connection and processor core to suit a facility's particular requirements.

Redundant RIO link

To protect against the possible loss of a RIO fibre cable, both of the MADI cables between the RIO the and Blackrock processor can be configured to have a redundant spare, which will automatically become the backup for the primary fibre cables. This configuration provides a maximum audio channel count of 126 between the RIO and Blackrock, including the redundant links.

Dual RIO units

If a second RIO rack is required for additional I/O, this can be accommodated without restricting the capacity of a first RIO. Adding a second Mezzanine card to the Blackrock core will provide sufficient MADI ports for four ports to link to each RIO (pictured). If the Blackrock is fitted with a single Mezzanine card only two MADI ports will be available to connect to each RIO.

Redundant Blackrock Processor

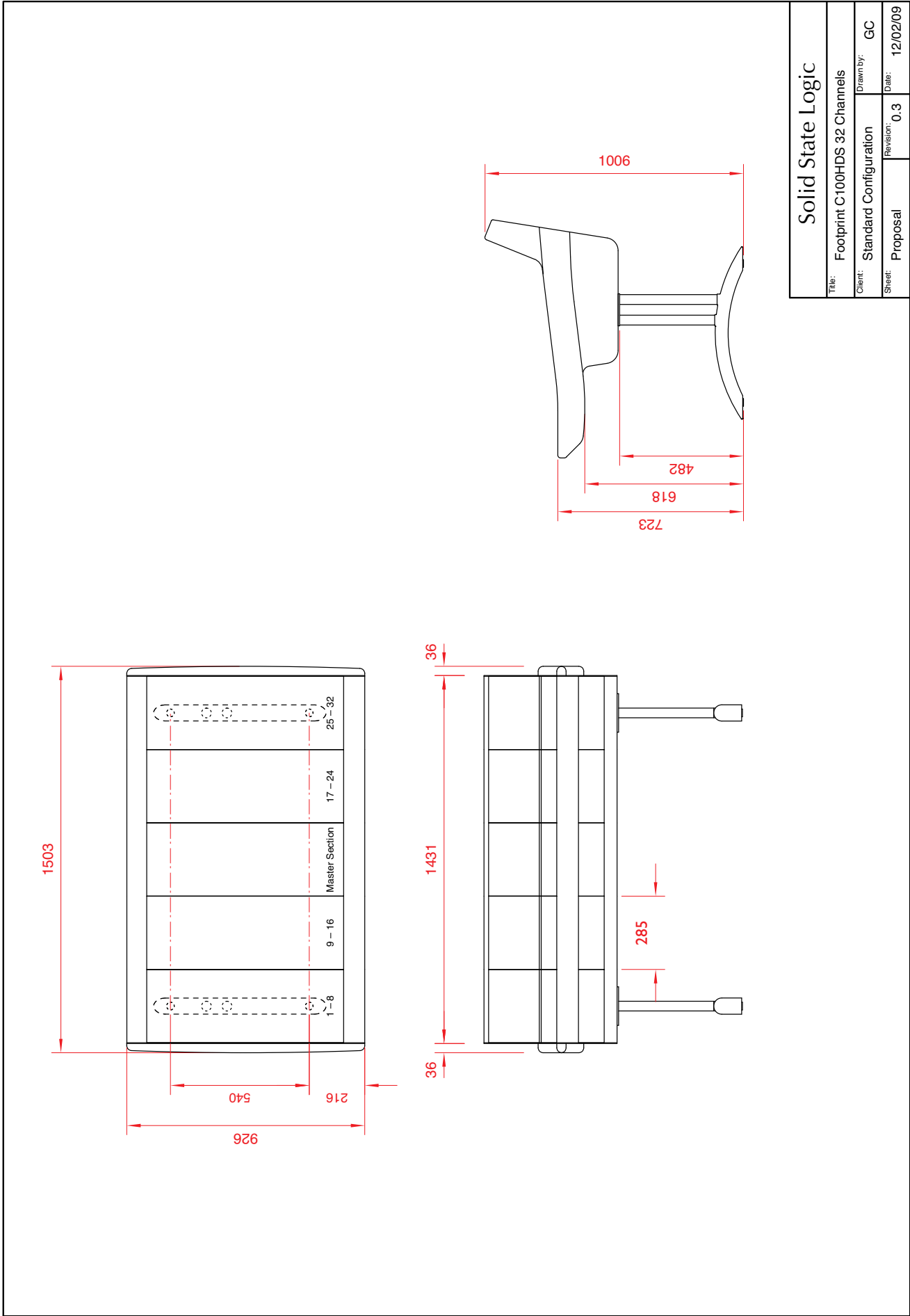
For mission-critical reliability a second Blackrock processor can be used as a redundant spare, and connected to a single RIO if that is all the audio I/O that is required. This will allow the console to continue in the unlikely event that the primary Blackrock processor is lost. Note that the RIO must now connect to each Blackrock using only two MADI fibres, thereby limiting the number of audio channels to 126 without redundant link, or 62 channels with redundant link.

Redundant Blackrock Processor and Dual RIO units

In this scenario, the limited I/O capacity of a system with Blackrock redundancy and one RIO can be expanded with a second RIO unit. Two of each RIO's four MADI connections feed each of the Blackrock cores. When MADI link redundancy is configured, the system is resilient enough to allow loss of up to 4 MADI connections and one complete Blackrock core without any loss of console capability or audio.

Any MADI links not used for connection to an SSL RIO may be used instead for connection to any other MADI equipment, including other manufacturers' Routers and I/O interfaces that comply with the AES10 specification for MADI. This includes redundant links to those pieces of equipment that support this mode of operation

Console Footprint Drawing



Appendix A: Specifications

CI00HDS Console				
Parameter	Condition	Value	Unit	Notes
Height	To top of meter trim	1006	mm	
Height adjustment		-0 +10	mm	
Width	32 channels with flat end trims	1431	mm	Add 36mm each side
	8 channel bay (add/subtract)	285	mm	
	Contoured side trims	72	mm	
Depth		926	mm	
Weight	32 channels with 2 legs	123	kg	
	8 fader bay (add/subtract)	26	kg	
	Additional leg	6.5	kg	
Heat Dissipation	32 channels	400	W	Approximately
	8 fader bay (add/subtract)	80	W	Approximately
Voltage	Range	100 – 240	V	±10%, AC only
Current	32ch. max. over voltage range	3.2 – 1.3	A	
	48ch. max. over voltage range	5.1 – 1.9	A	
Power Factor		0.95		Approximately
Fusing	No user-accessible fuses			
Noise	Fanless			
Connectors	Power in Main/Backup	IEC 3-pin male 10A		
	Network control 1–5	RJ45 100 baseT		
	USB in 1–2	USB A female		
	USB out 1–2	USB B female		
	Meters/Phasescope in – Analogue	25-way D-type male		
	Phasescope in – Digital	25-way D-type female		
	T/B audio output	XLR 3-way male		

Blackrock Processor				
Parameter	Condition	Value	Unit	Notes
Height		2	U	
		89	mm	
Width	Case only without rack ears	19	in	
		449	mm	
Depth		429	mm	<i>Excludes connectors/cables</i>
Weight (†)		14	kg	
Heat Dissipation		200	W	<i>Shared between two PSUs</i>
Voltage	Range	100 – 240	V	<i>±10%, AC only</i>
Current	Maximum over voltage range	2.1 – 0.9	A	<i>Maximum</i>
Power Factor		0.95		<i>Approximately</i>
Fusing	Thermal current trip. No fuses			
Noise	Front	50	NR	<i>Two PSUs operating</i>
	Rear	55	NR	<i>Two PSUs operating</i>
Connectors	Power in 1 and 2	IEC male		
	Network/TCP IP	RJ45 100 baseT		
	Sync in	BNC 75Ω		
	Madi 1–4 (5–8)	Duplex LC fibre multimode		
	Video out	HDI5 female		

† Blackrock processors must be supported on rack shelves. Do not rely on the rack ears alone.

Remote I/O Chassis				
Parameter	Condition	Value	Unit	Notes
Height		7	U	
		665	mm	
Width	Case only without rack ears	19	in	
		449	mm	
Depth		344	mm	Excludes connectors/cables
Weight (†)		17 – 21	kg	Depending on I/O fitted
Heat Dissipation	5 Mic cards	500	W	Maximum
	1 Mic, 2 analogue, 1 digital card	350	W	Typical
Voltage	Range	100 – 240	V	±10%, AC only
Current	Maximum over voltage range	5.6 – 2.3	A	
Power Factor		0.95		Approximately
Fusing	Thermal current trip. No fuses			
Noise	Front	45 – 55	NR	Variable speed fans
	Rear	45 – 60	NR	
Connectors	Power in 1 and 2	IEC male		
	Network	RJ45 100 baseT	(unused)	
	Sync out	BNC 75Ω	(Wordclock)	
	Madi 1–4	Duplex LC fibre multimode		
	GPI Input	25-way D-type male		
	GPI Output	25-way D-type female		

† RIO units must be supported on rack shelves. Do not rely on the rack ears alone.

Appendix B: Connector Details

XLR 3-Pin

Dimensions: 19 x 60mm (approx.)
Cable Dia: 8-12mm (typical)

Pinout for balanced audio:

Pin 1	Screen/Ground
Pin 2	Hot (+ve)
Pin 3	Cold (-ve)

Plug

Socket

Connectors Viewed From Wiring Side

D-Type Multipin

25-way

Dimensions: 55 x 15mm (approx.)
Cable Dia: 8mm (typical)

Connectors Viewed From Wiring Side

Plug

Socket

DL 96-Pin

Hood

68

70

Plug

Socket

Connectors Viewed From Wiring Side

Dimensions: 29mm x 69mm

Appendix C: Connector Pinouts

Connector Pinouts – CI00HDS Console

TB Out		
Location:		Connector panel
Connector Type:		XLR 3-pin male
Pin	Description	Notes:
1	Chassis (screen)	
2	+ signal	
3	- signal	

Meter Inputs – Analogue				
Location:		Connector Panel		
Connector Type:		25-way D-type male		
Pin	Description		Notes: VU or PPM only	Notes: RTW10830
1	Circuit 1 input	+	Left meter	Input 1 And Left VU/PPM meter
14	Circuit 1 input	-		
2	-			
15	Circuit 2 input	+	-	Input 2 And Right VU/PPM meter
3	Circuit 2 input	-		
16	-			
4	Circuit 3 input	+	Right meter	Input 3
17	Circuit 3 input	-		
5	-			
18	Circuit 4 input	+	-	Input 4
6	Circuit 4 input	-		
19	-			
7	Circuit 5 input	+	-	Input 5
20	Circuit 5 input	-		
8	-			
21	Circuit 6 input	+	-	Input 6
9	Circuit 6 input	-		
22	-			
10	Circuit 7 input	+	-	Input 7
23	Circuit 7 input	-		
11	-			
24	Circuit 8 input	+	-	Input 8
12	Circuit 8 input	-		
25	-			
13	-			

Note. If both the RTW phasescope and mechanical meters are fitted refer to the RTW circuit allocations.

Meter Inputs – Digital				
Location:		Connector panel		
Connector Type:		25-way D-type female		
Pin	Description		Notes: MSD600C–5.1	Notes: RTW10830
1	Circuit 1 input	+	AES/EBU in 1/2	AES/EBU out 7/8
14	Circuit 1 input	-		
2	n/c			
15	Circuit 2 input	+	AES/EBU in 3/4	AES/EBU out 5/6
3	Circuit 2 input	-		
16	n/c			
4	Circuit 3 input	+	AES/EBU in 5/6	AES/EBU out 3/4
17	Circuit 3 input	-		
5	n/c			
18	Circuit 4 input	+	-	AES/EBU out 1/2
6	Circuit 4 input	-		
19	n/c			
7	Circuit 5 input	+	-	AES/EBU in 7/8
20	Circuit 5 input	-		
8	n/c			
21	Circuit 6 input	+	-	AES/EBU in 5/6
9	Circuit 6 input	-		
22	n/c			
10	Circuit 7 input	+	-	AES/EBU in 3/4
23	Circuit 7 input	-		
11	n/c			
24	Circuit 8 input	+	-	AES/EBU in 1/2
12	Circuit 8 input	-		
25	n/c			
13	n/c			

Phase Scope* (Diagnostics and Control)				
Location:		Connector panel		
Connector Type:		9-way D-type female		
Pin			Notes: MSD600	Notes: RTW10830
1			Chassis	Switch common
6			-	Mode
2			Rx Data	Select
7			-	Memo
3			Tx Data	Gain
8			-	Reset
4			-	Shift
9			-	-
5			-	-

*Connector will be fitted to one spare cutout on connector panel (DI–D3). Refer to console specification manual for actual location

Connector Pinouts – RIO

GPI Inputs 1–12 (13–24)		
Location:		RIO – Interface card
Connector Type:		25-way D-type male
Pin	Description	Notes:
1	Input 1A	
14	Input 1B	
2	Input 2A	
15	Input 2B	
3	Input 3A	
16	Input 3B	
4	Input 4A	
17	Input 4B	
5	Input 5A	
18	Input 5B	
6	Input 6A	
19	Input 6B	
7	Input 7A	
20	Input 7B	
8	Input 8A	
21	Input 8B	
9	Input 9A	
22	Input 9B	
10	Input 10A	
23	Input 10B	
11	Input 11A	
24	Input 11B	
12	Input 12A	
25	Input 12B	
13	0V	

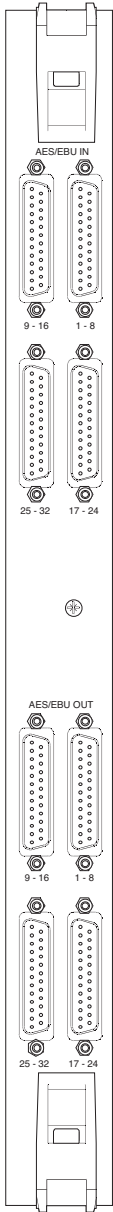
GPI Outputs 1–12 (13–24)		
Location:		RIO – Interface card
Connector Type:		25-way D-type female
Pin	Description	Notes:
1	Output 1A	450mA total across all connectors
14	Output 1B	
2	Output 2A	
15	Output 2B	
3	Output 3A	
16	Output 3B	
4	Output 4A	
17	Output 4B	
5	Output 5A	
18	Output 5B	
6	Output 6A	
19	Output 6B	
7	Output 7A	
20	Output 7B	
8	Output 8A	
21	Output 8B	
9	Output 9A	
22	Output 9B	
10	Output 10A	
23	Output 10B	
11	Output 11A	
24	Output 11B	
12	Output 12A	
25	Output 12B	
13	+15V	

Analogue I/O Card (‘944)



Analogue In / Out				
Location:		944 Analogue Card		
Connector Type:		DL96 female		
Cct	Hot	Cold	Screen	Notes
1	A1	B1	C1	All other pins unused
2	A2	B2	C2	
3	A3	B3	C3	
4	A4	B4	C4	
5	A5	B5	C5	
6	A6	B6	C6	
7	A7	B7	C7	
8	A8	B8	C8	
9	D1	E1	F1	
10	D2	E2	F2	
11	D3	E3	G1	
12	D4	E4	G2	
13	D5	E5	G7	
14	D6	E6	G8	
15	D7	E7	F7	
16	D8	E8	F8	
17	L1	K1	J1	
18	L2	K2	J2	
19	L3	K3	H1	
20	L4	K4	H2	
21	L5	K5	H7	
22	L6	K6	H8	
23	L7	K7	J7	
24	L8	K8	J8	

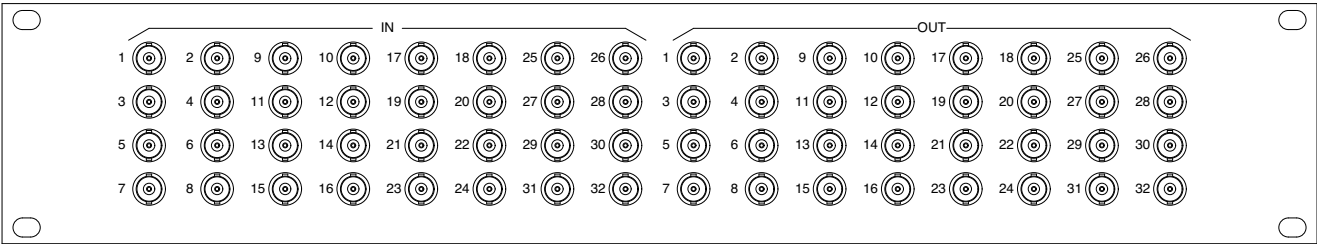
Digital I/O Card ('942)



AES/EBU In 1-8 (9-16, 17-24, 25-32)				
Location:		942 DIO		
Connector Type:		25-way D-type female		
Cct	Hot	Cold	Screen	Notes
1	24	12	25	Pin 13 unused
2	10	23	11	
3	21	9	22	
4	7	20	8	
5	18	6	19	
6	4	17	5	
7	15	3	16	
8	1	14	2	

AES/EBU Out 1-8 (9-16, 17-24, 25-32)				
Location:		942 DIO		
Connector Type:		25-way D-type female		
Cct	Hot	Cold	Screen	Notes
1	24	12	25	Pin 13 unused
2	10	23	11	
3	21	9	22	
4	7	20	8	
5	18	6	19	
6	4	17	5	
7	15	3	16	
8	1	14	2	

BNC Breakout Panel (For 75Ω card version)



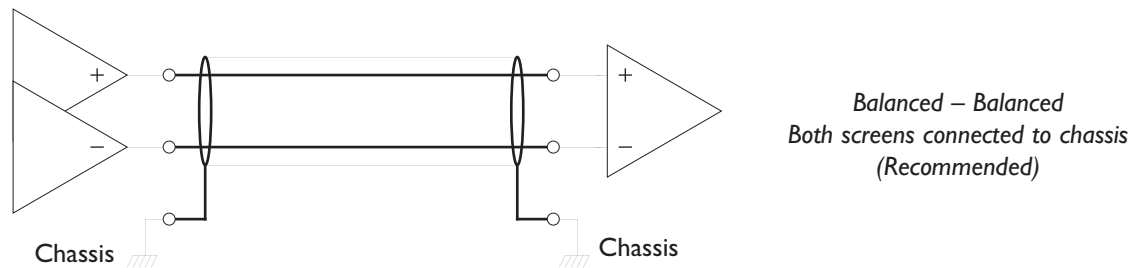
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Appendix D: Audio Interfacing

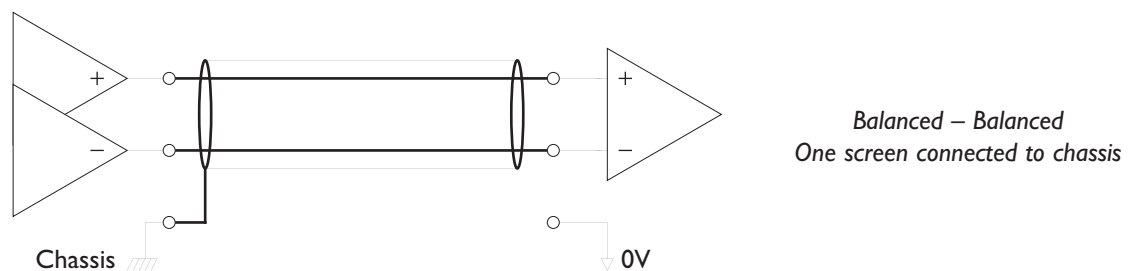
All analogue audio inputs and outputs are electronically balanced. The screen pins are all directly connected to the chassis at the point of entry to comply with AES/EBU grounding and EMC recommendations.

Balanced Circuits

It is strongly recommended that balanced connections are used wherever possible using high quality screened cable. The following diagram shows the recommended connection with both screens connected to the chassis:



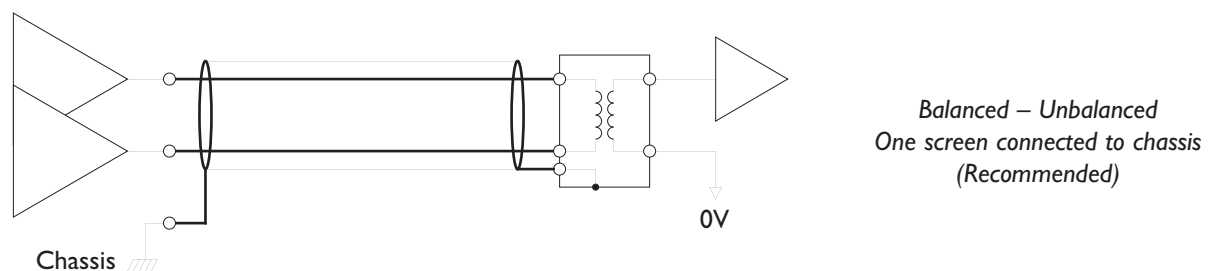
On some older items of equipment the screen connection may still be referenced to the circuit 0V rather than the chassis. In these cases it may be advantageous to disconnect the screen at this connection. Note however that this practice will degrade the EMC performance.



Connecting to Unbalanced Equipment

Connecting to unbalanced equipment can be much more problematic. It is quite likely that induced RF earth currents will become referenced to the audio 0V which will give rise to audible hum and buzz.

The recommendation for connection of balanced to unbalanced equipment is to isolate unbalanced connections by using a balancing transformer.



1 inch = 25.4mm (exactly)

1m = 3' 3" (roughly)

1 mile = 1,600m (roughly)

1Kg = 2.2 Pounds (roughly)

Appendix E: Environmental Specification

Temperature	Operating:	5 to 30 Deg. C
	Non-operating:	-20 to 50 Deg. C
	Max. Gradient:	15 Deg. C/Hour
Relative Humidity	Operating:	20 to 80 %
	Non-operating:	5 to 90 %
	Max. wet bulb:	29 Deg. C (non-condensing)
Vibration	Operating:	< 0.2 G (3 - 100Hz.)
	Non-operating, power off:	< 0.4 G (3 - 100Hz.)
Shock	Operating:	< 2 G (10mSec. Max.)
	Non-operating:	< 10 G (10mSec. Max.)
Altitude (Above sea level)	Operating:	0 to 3000 m
	Non-operating:	0 to 12000 m

