Networking Audio Systems

LAWO

mc²66 MKII

Technical Manual

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Important Safety Instructions

Warning

⚠ Warning

Exposure to excessive sound pressure levels can lead to impaired hearing and cause damage to the ear.

Please read and observe *ALL* of the following notes:

- Check all of the hardware devices for transport damage.

- Any devices showing signs of mechanical damage or damage from the spillage of liquids *MUST NOT* be connected to the mains supply or disconnected from the mains immediately by pulling out the power lead.

- All devices *MUST* be grounded. Grounding connectors are provided on all devices. In addition, all low-voltage devices external to the system must also be grounded before operation.

- For Scandinavian countries, *ALWAYS* use a grounded mains connection, to prevent the device from being grounded through Ethernet or other signal connections.

- All devices *MUST* be connected to the mains using the three-cord power leads supplied with the system. Only supply electrical interfaces with the voltages and signals described in these instructions.

- Do *NOT* use the system at extreme temperatures. Proper operation can only be guaranteed between temperatures of 10° C and 35° C and a maximum relative humidity of 85%.

- Neutrik PowerCon and Harting connectors must *NOT* be disconnected under load.

- Only service staff may replace batteries.

- Servicing of components inside a device *MUST* only be carried out by qualified service personnel according to the following guidelines:

  o Before removing parts of the casing, shields, etc. the device *MUST* be switched off and disconnected from all mains.

  o Before opening a device, the power supply capacitor *MUST* be discharged with a suitable resistor.

  o Components that carry heavy electrical loads, such as power transistors and resistors, should *NOT* be touched until cool to avoid burns.

- Servicing unprotected powered devices may only be carried out by qualified service personnel at their own risk. The following instructions *MUST* be observed:
  - *NEVER* touch bare wires or circuitry.
  - Use insulated tools *ONLY*.
  - *DO NOT* touch metal semi-conductor casings as they can bear high voltages.

Defective Parts/Modules

Warning

Warning

The control surface panels, and individual card components contain no user-serviceable parts. Therefore do not open the devices other than to perform the procedures described in this manual.

In the event of a hardware defect, please send the system component to your local service representative together with a detailed description of the fault. We would also like to remind you to please check carefully whether the failure is caused by erroneous configuration, operation or connection before sending parts for repair. We recommend contacting our service department before sending parts for repair.

First Aid (in the case of electric shock):

Warning

Warning

- *DO NOT* touch the person or his/her clothing before power is turned off, otherwise you risk sustaining an electric shock yourself.
- Separate the person as quickly as possible from the electric power source as follows:
  - Switch off the equipment.
  - Unplug or disconnect the mains cable.
  - Move the person away from the power source by using dry insulating material (such as wood or plastic).
- If the person is unconscious:
  - Check their pulse and reanimate if their respiration is poor.
  - Lay the body down and turn it to one side. Call for a doctor immediately.
- Having sustained an electric shock, *ALWAYS* consult a doctor.

About This Manual

How To Use This Manual

This manual covers the hardware installation, servicing and software configuration of Lawo's MKII **mc²66** mixing console.

Before reading this manual, it is strongly recommended that you review the **mc²66** Operator's Manual for an overview of console operation.

Chapter 1 introduces the technical components of the system with an overview of the HD Core, DALLIS and Console control surface.

Chapter 2 covers installation of the hardware.

In Chapter 3 you can learn about the AdminHD software which is used to configure, control and diagnose HD Core systems.

Chapter 4 covers system servicing, including details on servicing hardware components and software diagnostics tools. At the end of the chapter you will also find a Trouble Shooting section to help fault find any problems.

Use the Table of Contents at the beginning of the manual or Index Directory (Page 300) to locate help on a particular topic. Appendices, Technical data, a Glossary of terms and the Index Directory are provided at the end of the manual.

Note that further technical data may be found in the Lawo Data Sheets produced for each hardware component. These contain a full specification for the component: dimensions, weight, power, spare parts, etc. To help locate the relevant data sheet, you will find a list of part numbers for the principle system components in Appendices A, B and C.

You can also access more information by registering on the Lawo website at http://www.lawo.de. By registering you will be kept up to date with the latest news and releases for your product. You can also download software updates and documentation.

Conventions

Throughout this manual we will be using a number of conventions:

Topics

Every new topic or subtopic is clearly identified in large, bold font.

Specific procedures are written as a sequence of numbered instructions which guide you through the task. The result of the operation is written in *italic* letters giving you the chance to identify errors at an early stage. For example:

⯈ Replacing a Power Supply Unit

1. On the rear of the DALLIS, disconnect the mains from either the **PSU 1** or **PSU 2** IEC mains connector as appropriate:
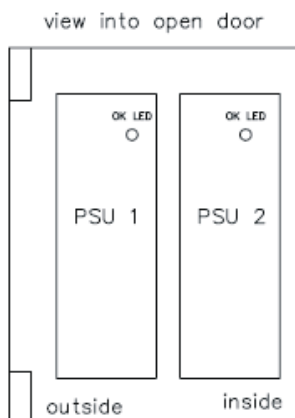
2. Unfasten the two screws on the right hand side of the hinged PSU cage door.

The door will swing open providing access to the PSU docking bays.

3. Remove the relevant power supply unit and replace with the spare.

4. Replace the cage door and fasten the two screws.

5. Re-apply the mains to the PSU IEC mains connector.

Marginal notes

The following marginal symbols are used to draw your attention to:

User Tips – useful tips and short cuts.

Tip

Notes - useful points or cross references which apply to an operation.

Note

Warning

Warnings – alert you when an action should always be observed.

Warning

Software Functions

When working with the AdminHD software application on your computer, windows are referred to inside single quotation marks, while actions are written in **bold**. In addition assume that you use the left mouse button to click or select a button/menu option unless otherwise stated – for example, to view the 'Core Browser' window, click on **Window** from the main menu bar and select **Core Browser** from the drop-down menus.

Chapter 1: System Overview

Introduction

This chapter introduces the technical components of the MKII **mc²66** mixing console with an overview of the principal hardware components.

Hardware Overview

The system consists of three principal components:

- **Console control surface** - operator interface.

- **HD Core** – DSP/routing matrix core with integrated control system.

- **DALLIS I/O interfaces** – offering a range of input and output cards which may be connected remotely to the system (up to 2km from the core using multimode fibre or 8km using single mode fibre).
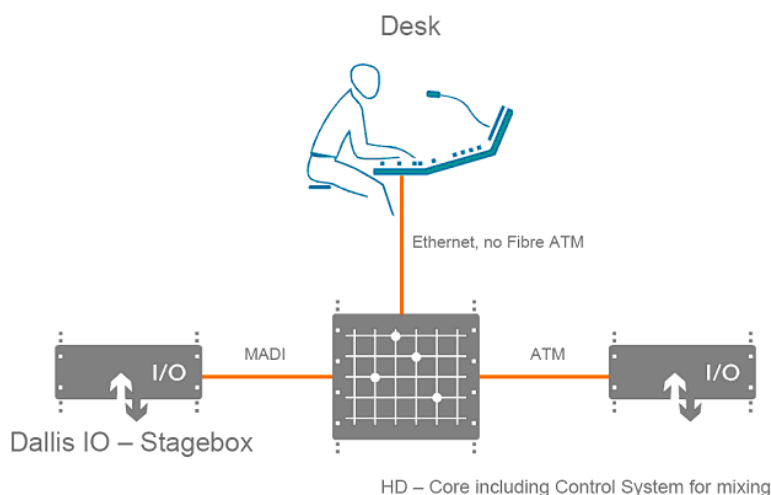
The exact hardware specification of your system will define how many analogue and digital connections are available for external equipment, and how much DSP processing is available for input channels, monitor return channels, groups, sums (main mix outputs) and auxiliary sends.

Console Control Surface

The **mc²66**'s control surface is constructed in 8-fader sections, with sizes scaling from 16 channel faders + 8 masters up to 96 channel faders + 8 masters. The example below is a 16+8+16 configuration:

Within each channel section, you will find 8 dedicated fader strips providing level, mute and AFL/PFL monitoring. Four assignable rotary controllers (free controls) offer additional local channel control to adjust EQ, Dynamics, auxiliary sends, etc. The lower free control (FC4) may be switched to control level and mute for the second layer of channels. A fifth upper controller is dedicated for input gain. In addition, every 8-fader channel section houses a high resolution TFT display providing feedback on channel metering and bus assignments.

The centre section houses the central control screen with space on the right of the overbridge for external metering (optional). Around and below the control-screen, the Central Control Section offers direct control of *all* settings for the selected DSP channel – input control, equalisation, dynamics processing, panning, auxiliary sends, etc.

Monitoring touch-screen

On the right is the Monitoring touch-screen with source selection, level control and other monitoring functions. The area below offers space for up to 3 user panels. Options include Dynamic Automation Control, Machine Control and a range of User Button or Intercom panels.

At the bottom of the centre section are 8 main fader strips ideal for master VCAs, groups, etc. And on the right, a range of controls for bus and fader strip assignment, layering access, joystick panning and SCREEN CONTROL navigation.
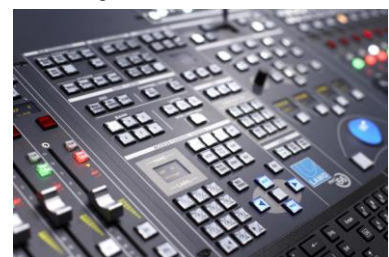
Access/Assign and Screen Control

Console Power Supply

The control surface power is provided by an external PSU. As a result there are no fans within the control surface.

The external power supply unit is normally sited within the same 19" rack as the HD Core:

The maximum cable run from the surface is 10m.

The PSU has two mains supply terminals at the rear. It is recommended that each terminal be connected to a different phase to realise phase redundancy.

Internally, the PSU is equipped with three power supplies running in parallel. For correct operation, only two supplies are required; the third is for redundancy.

For more details on installing or servicing the console and its power supply, see Chapters 2 and 4.

HD Core

The HD Core forms the central routing matrix for the system and, within the **mc²66**, contains the DSP for the console's signal processing.

The core is a 10RU, 19" rack mounted unit designed with modular card slots and dual redundant power supplies. All modules are hot-pluggable.

Front

The front of the frame houses the:

- **Router Module (MKII)** - two central slots are available for a main and redundant Router Module. The Router Module (MKII) contains the router and console Control System. Two TCP/IP Ethernet ports are provided: port A connects to the control surface; port B can be used to connect a network or external PC for configuration, maintenance or remote control.

- **I/O and DSP Modules** - 16 slots, 8 either side of the Router modules, are available for plug-in I/O or DSP modules. I/O options include AES/EBU, MADI and ATM. Further formats can be realised by connecting MADI or ATM to remote DALLIS or 3rd party I/O interfaces.

- **Power Supply Units** - 2 slots are available for main and redundant power supply units.

Rear

The rear of the frame houses the:

- **Synchronisation Ports** - accepting:
  - Word clock
  - AES/EBU (AES3-id)
  - Video Black Burst - PAL or NTSC.

- **Alarm and control contacts** – including the global alarm.

- **AES3 breakout panels** – up to 8 connector panels (depending on the format – D-Sub or BNC) may be fitted for direct access to front mounted AES3 module signals.

- **5 cooling fans** - hot-pluggable and easily accessible from the rear of the frame.
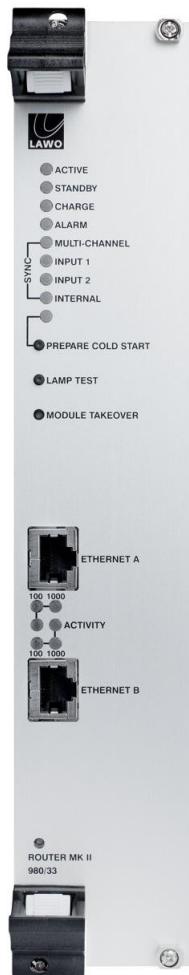
The Router Module (MKII)

The MKII Router Module (980/33) contains the summing matrix for the HD Core and console Control System. Every HD Core must be fitted with a main Router Module. A second module may be fitted for redundancy.

The Router Module defines the capacity of the routing matrix:

- **980/33** - $8k^2$ capacity router offering 8192 x 8192 matrix crosspoints (at 48kHz).

Note that when running at 96kHz, the system uses twice as much resource as lower sample rates, therefore the capacity of the router is halved. See Page 22 for more details.

The Control System controls the functionality of the entire system. It runs on an embedded Linux operating system for speed and increased reliability. For increased security, two compact flash cards are used to store the application software and user data separately enabling system recovery from data corruption.

All system connections, other than sync, are made to and from the Router Module via Ethernet (TCP/IP):

- **Ethernet A** – connects to the $mc^2$56 control surface.

- **Ethernet B** – can be used to connect to a larger system network or external PC for configuration, maintenance or remote control.

For a quick reference guide to all the connections and LEDs on the Router Module, please see Page 34.

HD Core Module Options

16 slots, 8 either side of the main and redundant Router modules, are available for plug-in I/O or DSP modules:

AES3/
MADI   MADI   MADI
                          SMF   ATM   DSP
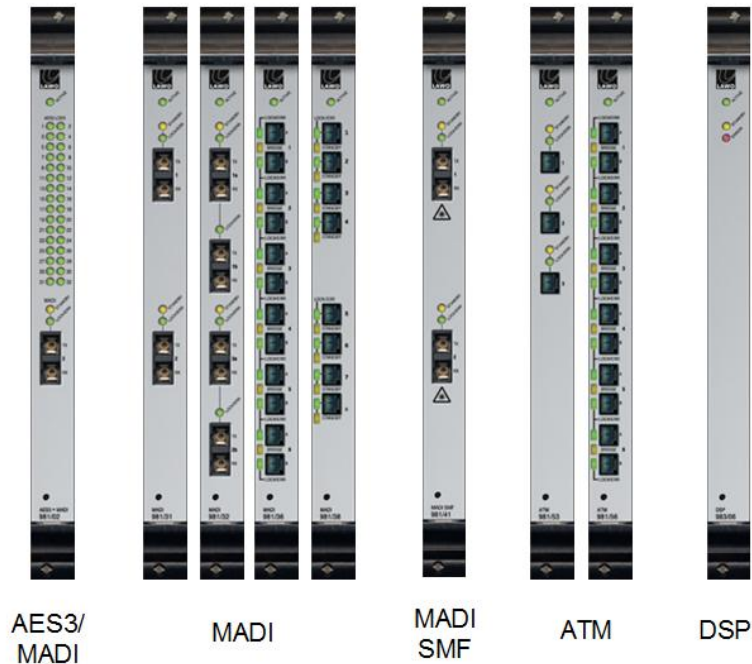
- **AES/EBU (AES3)** – providing AES inputs and outputs directly from the core saving valuable space within the installation. Input and output D-Sub or BNC connections are directly accessible from the rear of the core.

- **MADI (AES10)** – front connections to external equipment or DALLIS I/O interfaces. A range of module options are available offering different numbers of ports and multimode or single mode fibre.

- **ATM** – front connections to external equipment or DALLIS I/O interfaces. A range of module options are available offering different numbers of ports.

- **DSP** – up to 8 DSP boards may be fitted providing DSP resources for the mc^{2}66 console, and/or the routing system.

Further I/O formats can be realised by connecting MADI or ATM to remote DALLIS or 3rd party I/O interfaces.

All plug-in modules are hot-pluggable enabling individual I/O modules to be replaced without affecting other aspects of the system. Each module includes an **ACTIVE** LED to help identify any faults.

For details on HD Core module options, see Appendix A. For details on installing or servicing the HD Core, see Chapters 2 and 4.

DALLIS

To expand the I/O of the system and create remote I/O breakout units, the system utilises Lawo's DALLIS (Digital And Line Level Interface):

Each DALLIS may be either 3RU (shown above) or 6RU in height and provides up to 60 (MADI) or 80 (ATM) channels of audio. Each unit houses:

- **DALLIS I/O cards** – up to 18 slots are available for Lawo's tried and tested DALLIS interfacing system offering a range of input and output cards for connection to external equipment.

- **DALLIS Master Board** – 2 slots are available for a main and redundant master board. There are different master board options providing single fibre or redundant fibre MADI or ATM connections to the HD Core. Also within the master board, is an amount of DSP. This may be utilised for additional DSP resources such as matrix summing within a Nova 73.

As for the HD core, all cards are hot plug-able, with the exception of Phantom Power; and each unit can be fitted with redundant power supplies.

Note

Please note that the maximum analogue level of the whole system is defined by the DALLIS card with the lowest GDA (General Device Address) – this is the DALLIS card with the lowest address fitted to the DALLIS frame connected to the lowest port number of the first HD Core. Consult the Operator's Manual for more details on operating levels.

Front

The 19" rack mounted DALLIS frame is available in 3RU or 6RU heights, each of which may house up to 18 I/O cards (Slot 1-18) plus main and redundant DALLIS master boards (Slot M1 and M2):

Within a 3RU frame, shown above, 18 *single* width card slots are available. Double width I/O cards (8GU) occupy two slots; single width I/O cards (4GU) occupy one slot.

Within a 6RU frame, shown below, 18 *double* width card slots are available plus a dedicated slot for phantom power. Double width I/O cards (8GU) occupy the whole slot; single width I/O cards (4GU) must be fitted on the left of the slot and a dummy plate fitted to the right to close the gap.

All available plug-in cards may be used in both frames. However, for systems using large numbers of double width cards (8GU), you will achieve a greater I/O capacity from a 6RU frame.

Rear

The rear of the frame provides access to power and alarm connectors:
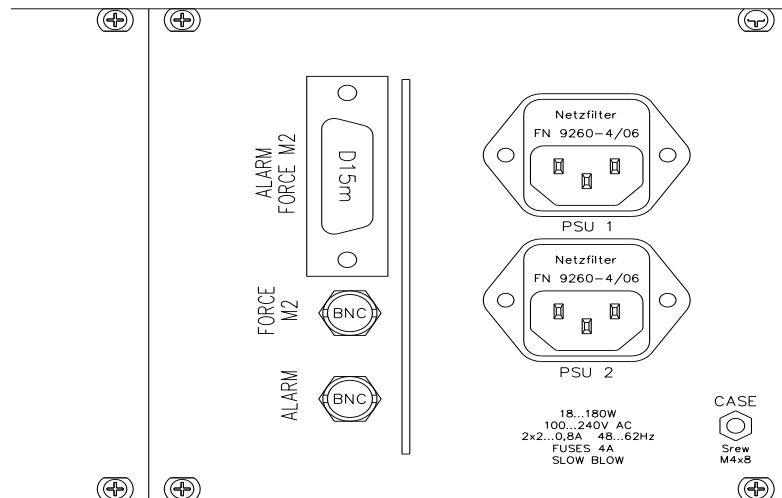
1	**PSU 1** **IEC Power Connector**	Main power supply unit fitted as standard on all systems.
2	**PSU 2** **IEC Power Connector**	Redundant power supply unit (optional).
3	**CASE** **Grounding Screw**	Use the M4 screw to ground the DALLIS Unit. The DALLIS must be on the same potential as all other system devices.
4	**ALARM FORCE M2**	15-pin D-Sub connector – carrying the global alarm signal. (The Force M2 signal is unused within $mc^2 66$ or Nova 73 systems, and is included for compatibility with Lawo's zirkon or Nova17 systems).
5	**FORCE M2**	BNC connector – unused within $mc^2 66$ or Nova 73 systems.
6	**ALARM**	BNC connector carrying the global alarm signal.

DALLIS I/O Interfaces

A wide range of I/O plug-in cards are available for connecting to external audio equipment including the following options:

- Analogue Mic/Line, electronically or transformer balanced

- Analogue Line In/Output, electronically or transformer balanced

- AES - inputs with switchable SRC; outputs optionally with SRC.

- HD/SD SDI (audio embedder/de-embedder). Embedding/de-embedding of 1 or 2 groups, 4 channels each. Controllable delay up to 240ms. HD formats are supported.

- GPI (opto-coupler, VCA-inputs and relays)

- Data transfer RS422, RS232, MIDI

- Intercom (BNC) for Riedel Artist connection

- ADAT

- TDIF (with external MADI converter).

All plug-in cards are hot-pluggable enabling individual I/O cards to be replaced without affecting other aspects of the system. Each card includes an **ACTIVE** LED to help identify any faults.

For more details on DALLIS card options, see Appendix C.

For details on installing or servicing a DALLIS, see Chapters 2 and 4.

Configuration: AdminHD

In addition to physical components, every **mc^{2}66** system requires a system configuration.

The configuration is an essential part of the system as it is this which defines the hardware and sets default parameters. If a hardware component is not defined within the configuration, then it will not be visible to users even if it is powered and connected. In other words, the configuration is always the 'master' of the system, regardless of what physical components are added or removed.

Configuration files are created offline as follows:

- **Console Control Surface** – due to the flexibility of the 66's control surface, this part of the system is factory configured.

- **HD CORE and DALLIS** – these components are configured using a software application called **AdminHD**. Once programmed, the configuration can be uploaded to the console's Control System, via Ethernet, where it is stored within the Control System (on the Router Module).

AdminHD is used when a system is first installed to configure the cards and settings within the HD Core and DALLIS I/O units. It can also be used at any time to update the system. For example, if a DALLIS Stagebox is hired in for a production, then the unit can be added to the configuration.

In addition to configuration, AdminHD may run online to control matrix cross points, adjust signal labels or I/O parameters. For example, you could use AdminHD to control the mic preamp gain on a mic input within a DALLIS Stagebox. You can also reset connections and I/O parameters by saving and loading snapshots from your computer.

Finally, AdminHD provides a number of useful tools for system diagnostics and documentation.

For more details on AdminHD please refer to Chapter 3.

Offline Setup/Remote Control (mxGUI)

Lawo's **mxGUI** (Matrix GUI) is a software programme which can run the mc^2 graphical user interface on an external computer. The programme may be run either on or offline with any mc^2 system (**mc²56**, **mc²66**, **mc²90**) or **Nova73** to provide:

- **Offline Setup** - mxGUI allows you to prepare mc^2 settings ahead of an event. Productions, Presets and Custom Function assignments can be stored on your mxGUI computer and then transferred to the console at a later date; thus saving valuable setup time before a show.

- **Remote Operation** - mxGUI can run online by connecting to the mc^2 Control System via its control network (Ethernet). This may be used to provide additional screen displays, or remote operation for a second engineer.

Whereas AdminHD is used to prepare the system configuration, mxGUI is an operational tool which can prepare Productions (including snapshots or automation mixes), Presets and Custom Function Assignments.

If you wish to prepare a complete system ahead of an event, then you can connect AdminHD to mxGUI. This allows you to configure the system hardware using AdminHD, transfer the configuration files to an mxGUI, and then prepare console settings within an mxGUI production.

For more details on mxGUI, please refer to the "mc²66 Operator's Manual". For information on connecting AdminHD to mxGUI, see Chapter 3.

Internal Sample Rate

The mc^{2}66 may operate at a choice of internal sampling rates including 96kHz, 88.2kHz, 48kHz and 44.1kHz.

The option to run at higher (96kHz or 88.2kHz) or lower (48kHz or 44.1kHz) sample rates is defined within the system's AdminHD configuration. There are 2 different options available:

- **HD Core 8k (48kHz)** - 8k capacity router operating at sampling frequencies up to 48kHz.

- **HD Core 4k (96kHz)** – 4k capacity router operating at sampling frequencies up to 96kHz.

Note

Note that having defined the maximum sampling frequency, it may be adjusted, for example to 44.1kHz, from the console's **System Settings** display:
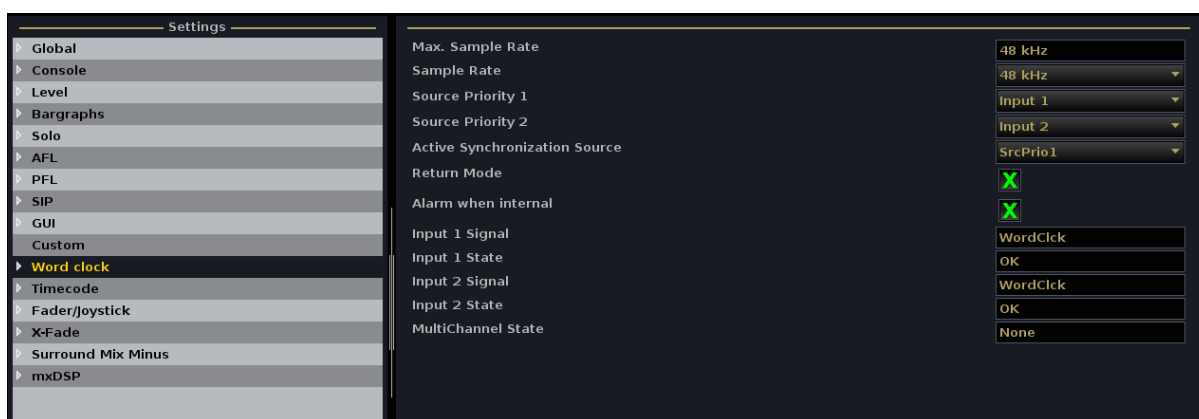
For more details on configuring lower or higher sample rate operation, see Chapter 3: AdminHD.

For details on changing the sample rate from the console's **System Settings** display, please refer to the mc^{2}66 Operator's Manual.

System Clock

The HD Core offers a fully redundant clock source structure with two independent clock inputs, an internal sync generator and the ability to lock to sync from an incoming multi-channel signal. This allows the console to be clocked from a variety of sync sources and recover from loss of external sync.

The sync source selection is defined from the console's **System Settings** display:

Settings		
Global	Max. Sample Rate	48 kHz
Console	Sample Rate	48 kHz
Level	Source Priority 1	Input 1
Bargraphs	Source Priority 2	Input 2
Solo	Active Synchronization Source	SrcPrio1
AFL	Return Mode	X
PFL	Alarm when internal	X
SIP	Input 1 Signal	WordClck
GUI	Input 1 State	OK
Custom	Input 2 Signal	WordClck
Word clock	Input 2 State	OK
Timecode	MultiChannel State	None
Fader/Joystick		
X-Fade		
Surround Mix Minus		
mxDSP		

Here you can define a main clock source (**Source Priority 1**) and a redundant one (**Source Priority 2**) from any of the following options:

- **Input 1** – HD Core Sync Input 1 (Wordclock, Video or AES3)

- **Input 2** – HD Core Sync Input 2 (Wordclock, Video or AES3)

- **Multichannel Sync** - ATM or MADI as defined within the system configuration using AdminHD.

If sync is lost or a signal of an incorrect frequency appears on Source Priority 1, the system automatically switches to Source Priority 2. Similarly, if sync is lost on Source 2, the system automatically switches to internal sync.

In addition, you can activate the **Return Mode** option so that the system will switch back to Source Priority 1 sync when it returns. The system even checks whether the return sync is valid and will not switch until the sync source matches the chosen operating frequency of the console.

For more details on Sync, please see Chapter 2: Installation.

Redundancy

One of the strengths of the **mc²66** system is its ability to withstand component failures, and every component is designed with fault tolerance in mind.

Star² Technology

All components within the system utilise Lawo's Star² technology:
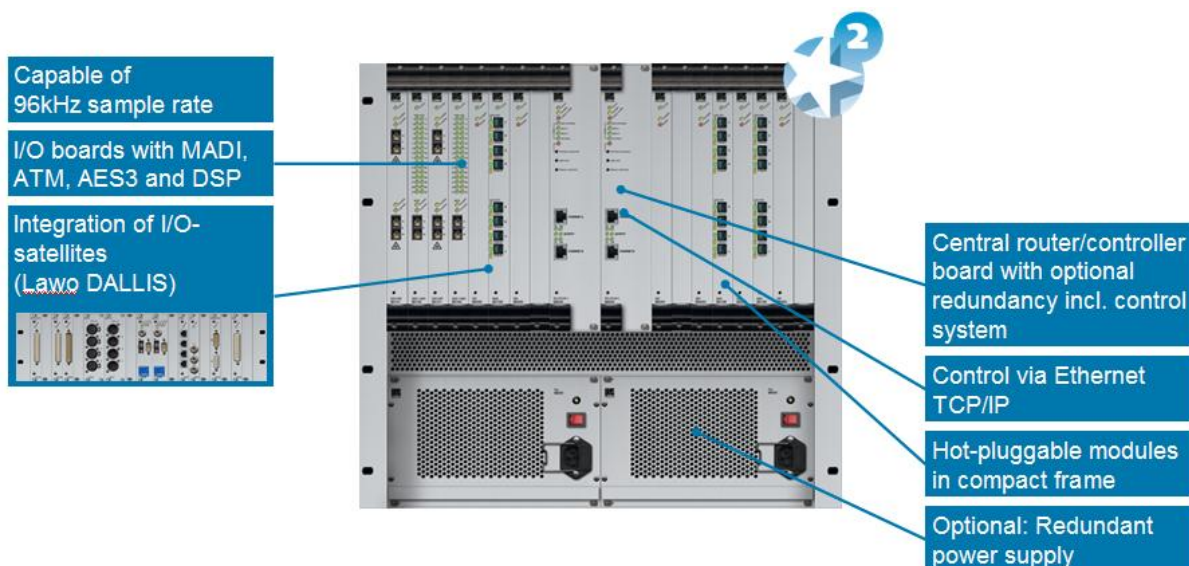
- **Point-to-point connections** – with point-to-point connections, a fault will only affect that part of the system, unlike a TDM bus architecture where a fault may disrupt everything connected to the bus!

- **Dual star topology** – with redundant Router Modules fitted to the HD Core, and redundant Master Boards in every DALLIS, then components connect in a dual 'star' mode. This protects signal paths from any single point-of-failure. All I/O Modules/Cards connect to both main and redundant boards simultaneously. In the event of a failure, the system automatically switches to the redundant path.

- **Hot-swappable Modules/Cards** – every plug-in card or module can be hot-swapped without affecting the rest of the system enabling online maintenance of the system.

- **Redundant Power Supply Units** – both HD Core and DALLIS units can be fitted with dual redundant power supplies which can be isolated and exchanged from the front or rear.

- **Passive backplanes** – the frame backplanes are entirely passive. With no active components, this increases reliability.

Redundant Router Module/DALLIS Master Board

When fitted, you will see the status of the redundant Router Module or DALLIS Master Board on its front panel. The spare board is shown in Standby.

In the unlikely event of a failure, the system automatically switches all routes from the faulty board to the spare; the faulty board may then be safely removed and replaced. The replaced board will now act as a spare until further action is taken.

You can force a module takeover manually from the front panel by pressing the **Module Takeover** depressed button.

Note that a brief interruption to audio will occur while routes are reconfigured. When you switch to the redundant Router Module, you also switch to the redundant Control System.

Note

Fibre Redundancy and Port Redundancy

For crucial interconnections between DALLIS and HD Core units, you can specify:

- **Fibre Redundancy** – two fibre connections are made between the DALLIS and HD Core to provide a main and redundant fibre link.

- **Port Redundancy** - alternatively, you can specify port redundancy, where the main and redundant fibre links from the DALLIS connect to a different port (preferably on a different Module) within the HD Core:

Simple connection

Redundant fibre

Redundant star,
Single mode fibre
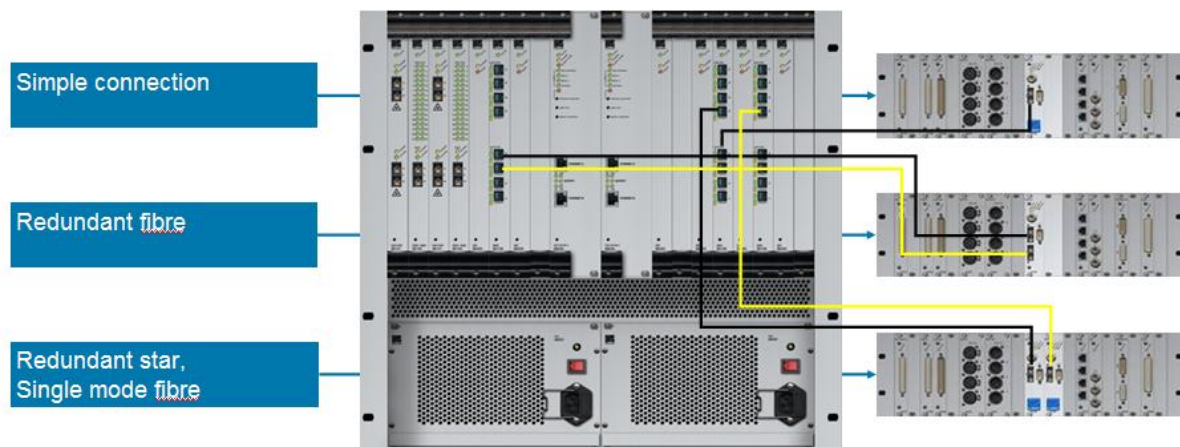
Port redundancy enables the system to recover from an error with the master board of the interface system, a defective fibre link, or a failure of the HD core interface card. The system will switch automatically to the redundant signal path if there is a:

- Malfunction of the HD Core Module (or port).

- Failure of the active fibre link.

- Malfunction of the active DALLIS master board.

Control System

The console's Control System is integrated within the MKII Router Module of the HD Core. This means that the console surface may be powered off without loss of user data or audio! This is also where all user and system data are stored.

Following switch-off, power is provided to the Control System for a further 18 seconds in order to save all current settings to flash memory. This is called the console's warm start data. You will hear eight tones signaling that the shutdown operation has been successfully completed. The system is shutdown when the blue LED of the trackball is off. This warm start data is automatically loaded when the system restarts.

Note that the Router Module MKII also contains a backup power unit which provides up to 3 seconds of backup power to deal with short interruptions to mains (AC) power.

Data Recovery

To increase the fault tolerance of the system, the $mc^2$66 includes the ability to recover from corrupted data.

Within the Control System, two flash cards are used to store the system's application software (**System Flashcard**) and user data including AdminHD configuration, warm start data and productions (**Data Flashcard**):
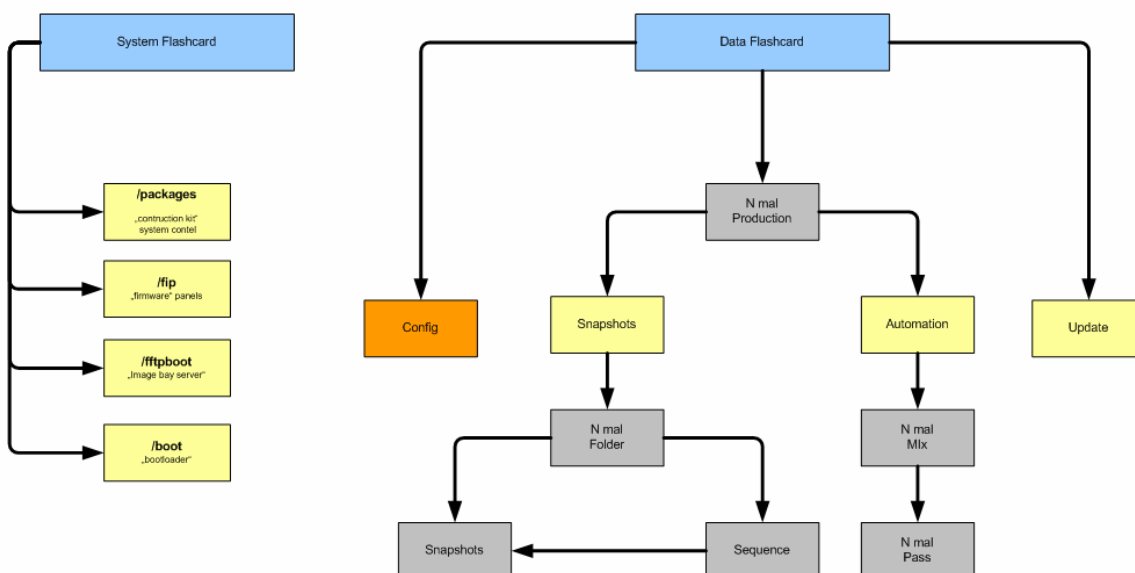
As the console's application software is stored separately from the user data, this allows you to boot the system without loading user data if there seems to be an error with the stored production, configuration or warm start data.

For more details, see Chapter 4: Service and Maintenance.

Control System Redundancy

In order to provide Control System redundancy, your HD Core must be fitted with two MKII Router Modules (980/33): one main and one redundant.

The redundant Control System is automatically activated if, internally, a loss of connection is noticed by the redundant system. This could be due to a software failure, hardware error or reboot of the main Control System.

Note that if the Ethernet connection between the control surface and Router Module fails, then an automatic takeover does not occur, as the failure may be deliberate (e.g. you disconnect the Ethernet cable). Instead the operator is presented with an error message allowing them to decide whether to switch to the redundant control system.

A manual takeover can be initiated from the **System Settings** display, or by pressing the **Module Takeover** button on the front of the redundant Router Module.

For more details on configuring a redundant Router Module, see Chapter 3: AdminHD.

For further details on how Control System redundancy is managed, see Page 262.

DSP Redundancy

Any number of DSP modules fitted to the HD core may be reserved to provide redundant processing in the unlikely event of a DSP module failure. You can investigate whether you have a redundant board from the console's **DSP Config** display:

Number Of DSP Boards 1 2 3 **4** 5 6 7 8

Inputs	TinyInputs	Sums	TinySums	Monitors	Groups	Auxes	TinyAuxes	Index
164	20	12	36	0	8	8	24	4.10
152	24	8	40	0	16	16	16	4.11
148	28	12	36	0	16	16	16	4.12
144	24	8	40	0	24	16	16	4.13
136	32	16	32	0	24	16	16	4.14
120	40	16	32	0	32	24	8	4.15
120	24	8	40	0	48	16	16	4.16
120	32	16	32	24	16	16	16	4.17
120	32	8	40	32	8	24	8	4.18
112	16	8	24	48	16	8	24	4.19
104	40	16	32	24	24	24	8	4.20
104	16	8	16	64	8	8	24	4.21
96	32	8	24	64	0	24	8	4.22
96	32	16	16	64	0	16	16	4.23
88	24	8	8	48	32	16	16	4.24

Active

Cards	Inputs	TinyInputs	Sums	TinySums	Monitors	Groups	Auxes	TinyAuxes		Index
2	1...56	57...72	1...8	9...18	1...8	1...16	1...8	9...16	17...32	2.12

Selected

Cards	Inputs	TinyInputs	Sums	TinySums	Monitors	Groups	Auxes	TinyAuxes	Index
4	1...136	137...168	1...16	17...48	0	1...24	1...16	17...32	4.14

If, for example, your HD core is fitted with 3 DSP boards and the Active Configuration uses 2 DSP-Boards, then the third board will provide redundancy in the event of a failure.

This can also be seen on the HD core front panel where the spare board is shown in Standby. Note that the system uses boards from right to left across the HD core.

In the unlikely event of a failure, the system automatically switches all DSP resources and settings from the faulty board to the spare; the faulty board may then be safely removed and replaced.

Note that the replaced board now acts as the spare board either until the HD core is restarted or a new DSP configuration is loaded. Following the reconfiguration, boards are utilised from right to left across the HD core.

Console Surface Redundancy

Within each channel or centre section bay, individual panels connect via USB to an Ethernet Bay Server. Each Bay Server then connects back to the Control System within the HD Core in a 'star'-like architecture. Each TFT display connects via LVDS to its Ethernet Bay Server for high resolution graphics.
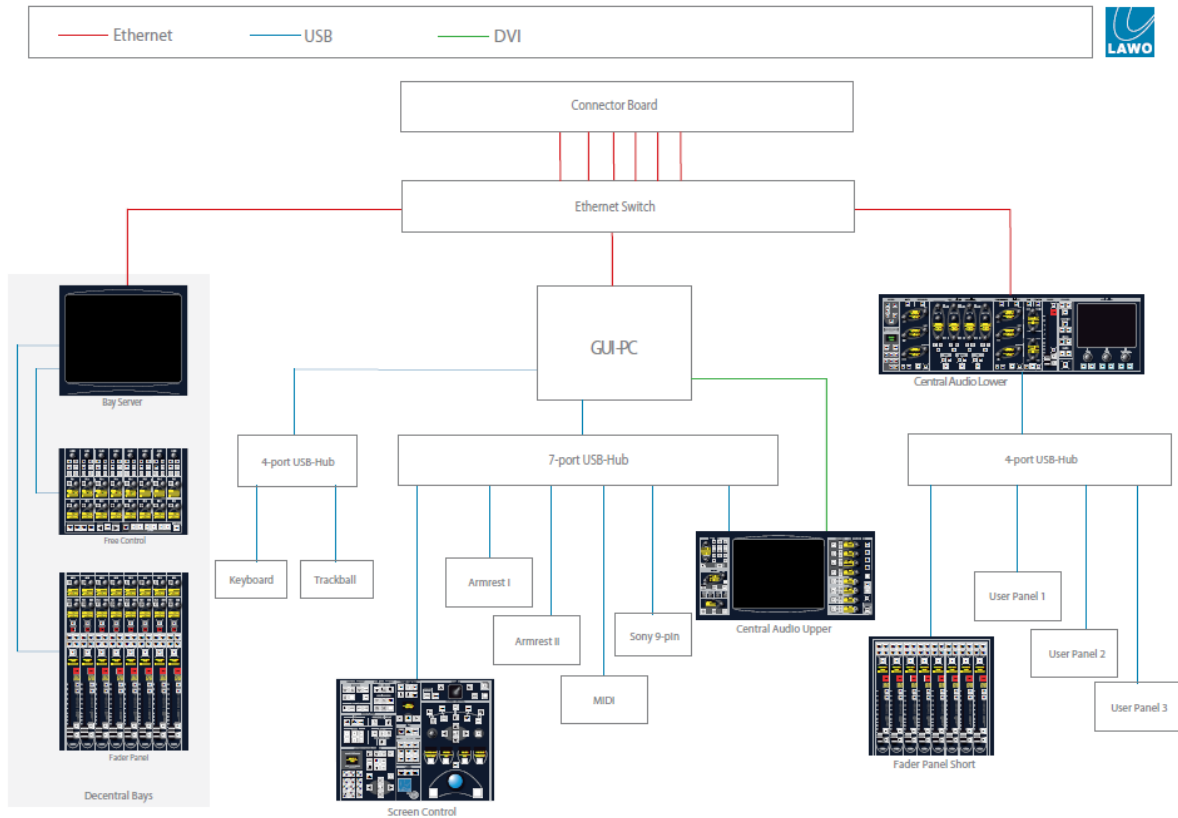
Point-to-point Ethernet connections provide fault tolerance, and allow any channel or centre section bay to be remote from the main console if desired. All control surface panels are hot-pluggable making them easy to service.

The external power supply unit provides n+1 redundancy for the control surface.

Remote Operation

For any HD Core system, settings within the matrix may be controlled remotely from:

- an external PC running either the ControlHD or AdminHD software programmes.

- an external PC running the mxGUI software programme.

- a 3rd party control system using Lawo's Remote MNOPL protocol.

ControlHD/AdminHD

ControlHD is a subset of the AdminHD configuration software, and is used to ControlHD Core systems from remote PC.

Up to eight clients may be connected to the system via TCP/IP Ethernet and may control all, or a subset, of the matrix:
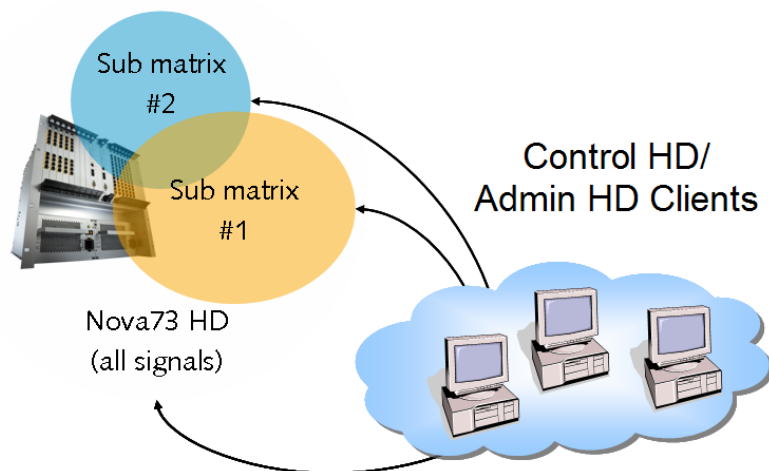
Once running online, you can use ControlHD's 'Connect Manager' to:
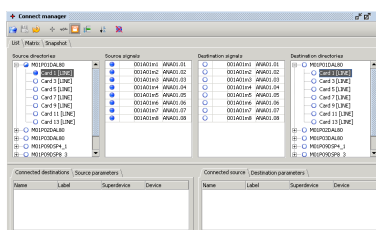
- **Set Matrix crosspoints** – connections from any system input to any system output.

- **Edit signal labels** – online renaming of signal labels.

- **Control I/O parameters** – for example, to adjust microphone preamp gain, high pass filter switching, etc.

- **Save and recall snapshots** – to reset any number of signals, with partial or global recalls.

For details, please refer to the "ControlHD Operator's Manual" or Chapter 3: AdminHD.

mxGUI

mxGUI is a software programme which runs the mc^2 graphical user interface on an external computer. It can be used for remote control of virtually all console settings.

One mc^2 system is able to support up to 16 mxGUI clients simultaneously.

For details, please refer to the "mc^{2}66 Operator's Manual".

3rd Party Control Systems

In addition, the system supports 3rd party matrix control via Lawo's Remote MNOPL protocol.

A typical application is to provide 3rd party matrix control so that crosspoints within the **mc^{2}66** routing matrix can be controlled by external control systems such as VSM and Jupiter. Note that if your preferred supplier does not support the protocol, then please ask them to contact Lawo for further details.
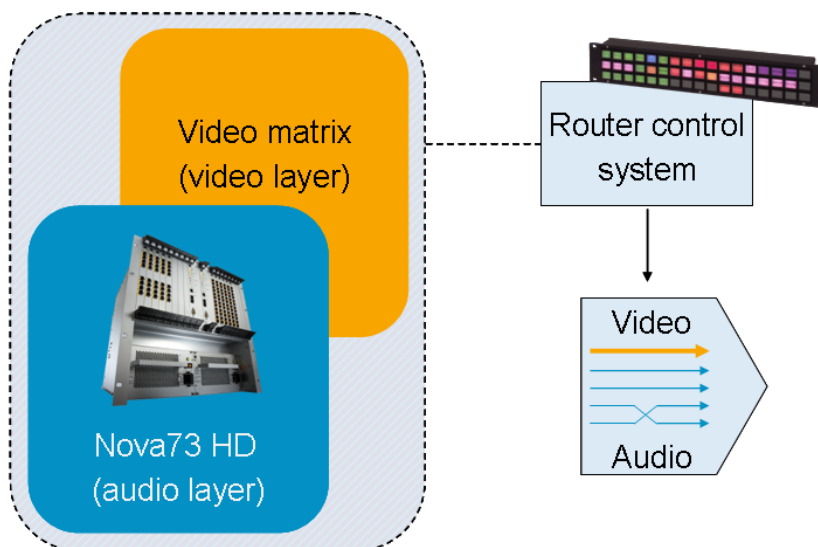
Within your AdminHD configuration, each signal may be given a mapping address; up to 16 different mapping tables can be defined so that different control systems can be supported simultaneously.

For details on implementation, please refer to Chapter 3: AdminHD and to your 3rd party controller's documentation.

Networking

mc^2 and Nova73

Two or more **mc^2** consoles may be networked to distribute I/O resources. In addition, the mc^{2}66 may be networked with the Nova73 Routing matrix:
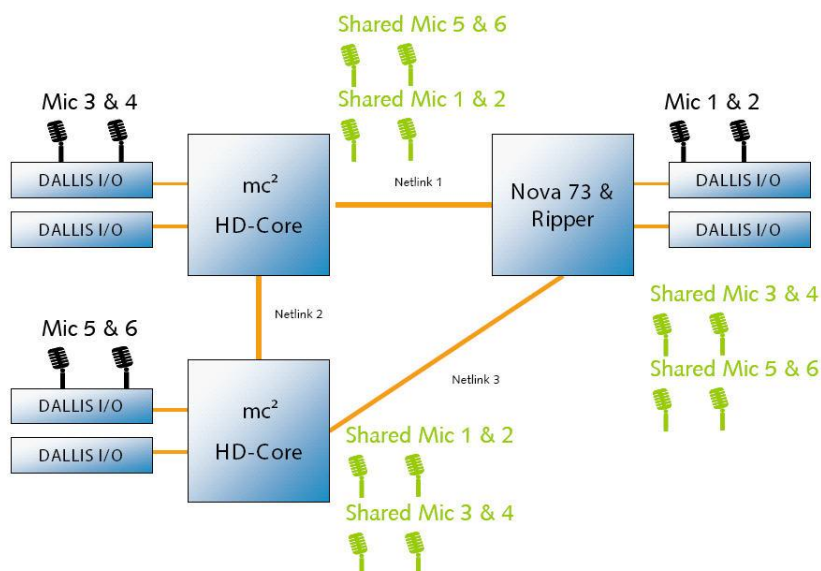
In our example above, a Nova73 and two mc² series desks are networking together to share all parameters within the Network.

Each 'Netlink' is an audio connection which may be MADI, ATM, AES or Analogue audio, and signals are dynamically allocated as each operator makes routes from the Signal List display.

The Nova73 is almost identical to a mc^{2}66 system, with the only differences being that it has no control surface. Routes within the Nova73 matrix can be controlled in a number of ways:

- From a remote PC running ControlHD or AdminHD software.

- From a remote PC running mxGUI software.

- From an external control system using Lawo's Remote MNOPL protocol.

Any number of sources may be distributed depending on the physical limitations of your network.

For more details on operating with shared and imported sources/destinations, please see the "mc^{2}66 Operator's Manual".

Nova73 Dual Self-Healing Star

Taking our redundant signal path a stage further, the Nova73 can be implemented in a dual star topology to form a self-healing architecture. This type of system is known as the Nova73 DSHS (Dual Self-Healing Star):

Dual Self-Healing Star Structure
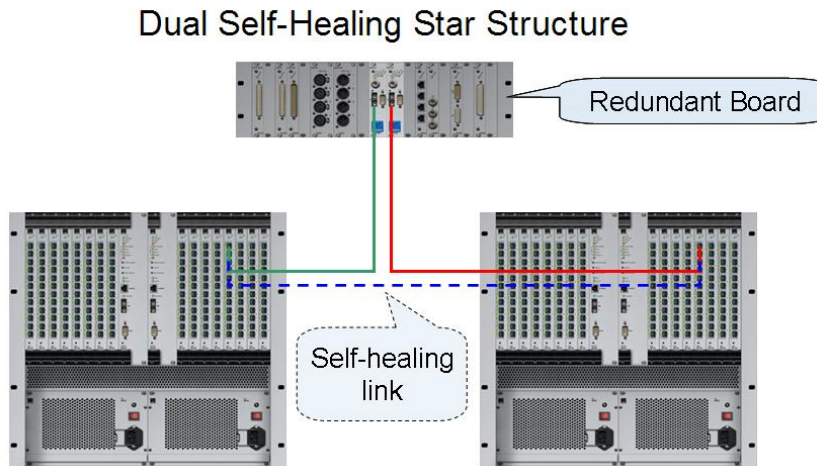
In this example, one HD core is active and the other passive. In the case of a component failure, the system will switch to the redundant signal path.

Product Compatibility

From version 4.0.2.2 onwards, all Lawo products have adopted a consistent software release numbering system to indicate networking compatibility:

The first three digits of the software revision number must be identical to ensure networking compatibility.

For example, a Nova73 running Version 4.0.2.2 can be networked to a mc^{2}66 running Version 4.0.2.4. However, if the software revisions were 4.0.2.2 and 4.0.4.0, then they are not network compatible.

For more details on networking of Lawo systems, please consult your local Lawo representative.

Quick Reference Guides

MKII Router Module:

The MKII Router Module (980/33) provides the following front panel connections and functions. Please refer to the data sheet for further details.

ACTIVE LED	Flashes green when the control system is running. The **ACTIVE** LEDs across all modules should flash in sync with each other. If an LED is out of sync, then the module is not synchronised to the rest of the system.
STANDBY LED	Illuminates in yellow when the module is running in redundant mode.
CHARGE LED	Illuminates when the backup power unit is charging. Off = unit is fully charged.
ALARM LED	Illuminates in red when the global alarm is triggered. See Chapter 4 for more details.
SYNC LEDs	These four LEDs indicate the current sync source (flashing green) and available redundant sync sources (solid green).
PREPARE COLDSTART	Press this button (the LED illuminates) to prepare a cold start. Having activated the button, the system will cold start on the next power cycle or restart.
LAMP TEST	Press this button to test all the LED lamps within the HD Core modules.
MODULE TAKEOVER	Press this button to force a takeover from the Active Router Module. (Functions only when two Router Modules are fitted.)
ETHERNET A	Connects to the mc^{2}66 control surface.
ETHERNET B	Connects to a system network or external PC for configuration, maintenance or control.
	Both connections are RJ45.
	The **ACTIVITY** LEDs flash green when data is being transferred.
POWER Button	This recessed button will power on or off the module (and Control System).
	Note that this button should only be used as a last resort if all other restart methods fail. Please see Page 250 for recommended shutdown and restart procedures.

DALLIS Master Board:

A choice of DALLIS Master boards are available determining the type of connection to the HD Core (MADI or ATM, multimode or single mode fibre) and whether the connection has redundancy. All versions of the board provide similar functions:

ACTIVE LED	Flashes green when the card's internal control system is running. The **ACTIVE** LEDs across all cards should flash in sync with each other. If an LED is out of sync, then the card is not synchronised to the rest of the system.
WCLK OK	Illuminates in green when the system is receiving a valid Wordclock sync signal, and the fibre connection to/from the HD Core is valid.
POWER OK	Illuminates in solid green when the DALLIS PSU is running normally; flashes if there is a PSU error.
ALARM	Illuminates in red when any of the following error conditions are triggered: PSU error; internal health error (such as high temperature); sync error; MADI (or ATM) link error; rack configuration error.
WCLK	The DALLIS may be synchronised to an external wordclock reference connected to the **WCLK** BNC.
MADI or ATM Ports	A range of the DALLIS master board options are available:

- 947/05 (shown opposite) – Provides a single MADI port connection using multimode fibre.

- 947/07 – Provides one main (MADI A) plus one redundant (MADI B) port using multimode fibre.

- 947/15 – Provides a single MADI port connection using single mode fibre.

- 947/03 – Provides a single ATM port connection using multimode fibre.

On some cards, LEDs show the status of the signals arriving at the connection.

CTRL (RS422)	Serial connection to PC for Lawo service.
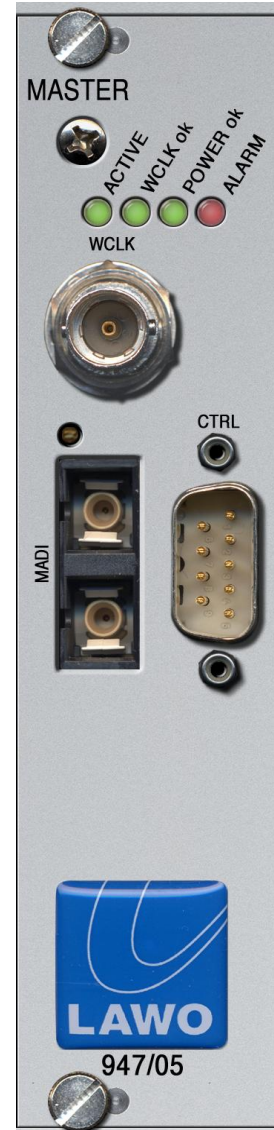
Chapter 2: Installation

Introduction

This chapter deals with the hardware installation of the system components, starting with the HD Core, DALLIS, mc²66 control surface and console power supply unit.

Installing the HD Core

The HD Core is designed to be mounted in a 19" rack.

All plug-in connectors are located at the front or rear of the unit. Therefore, when using 19'' racks with front doors please leave enough room for the cables.

Cables plugged into the front of the unit can be ducted backwards underneath the unit for distribution within the rack.

Warning

Use the rack-rails supplied to mount the HD Core. The 19" frame *MUST NOT* carry the complete weight of the unit.

Dimensions and Weight

HD Core:	Frame
Width	19" 483mm (front plate) 440mm (body)
Height	10RU
Cable Duct	1RU below the frame is required for cable ducting and ventilation.
Depth (including rear connectors and system locking devices)	510mm
Weight (without cards)	11.5 Kg

Ambient Conditions

Proper operation of the HD Core can only be guaranteed at an ambient temperature between 10° C and 35° C and a relative humidity between 15% and 85% (not condensing).

When the HD Core is out of action, it can be stored at a temperature between 0° C and 40° C and a relative humidity between 10% and 85% (not condensing).

Air Conditioning

The HD Core is cooled actively by built-in fans. The housing of the HD Core is perforated at the top and at the bottom to guide air flow in and out of the unit; the air stream is guided from bottom front to top rear. Ensure that the cooling air stream is guided to cool the unit efficiently.

The air-flow rate depends on the mounted components. To calculate the air conditioning required, assume a maximal air-flow rate of approximately 200 m³/h.

The life cycle of a fan is typically 70.000 operating hours (at a maximum ambient temperature of 40° C). For details on fan replacement, please see Chapter 4: Service and Maintenance.

Warning

When mounting the HD Core, take care that no devices or cables obstruct the flow of air thereby hindering cooling.

Warning

Frame (980/02)

Frame 980/02, front view
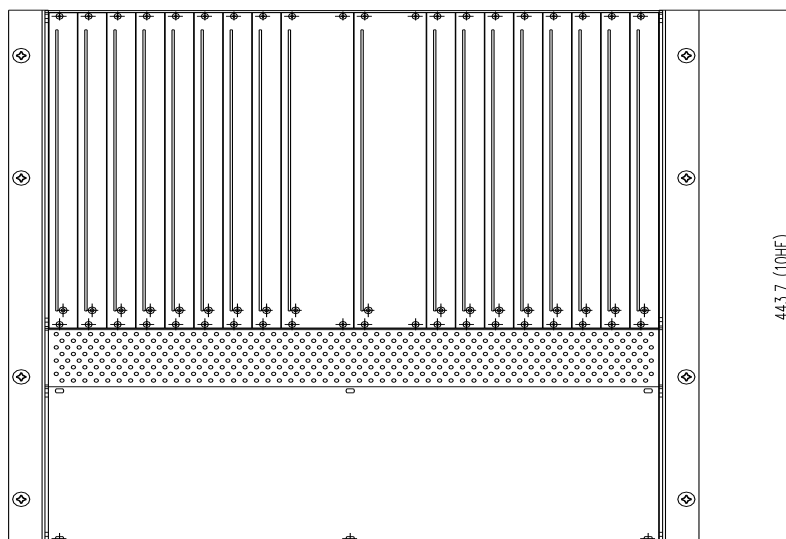
Frame 980/02, side view
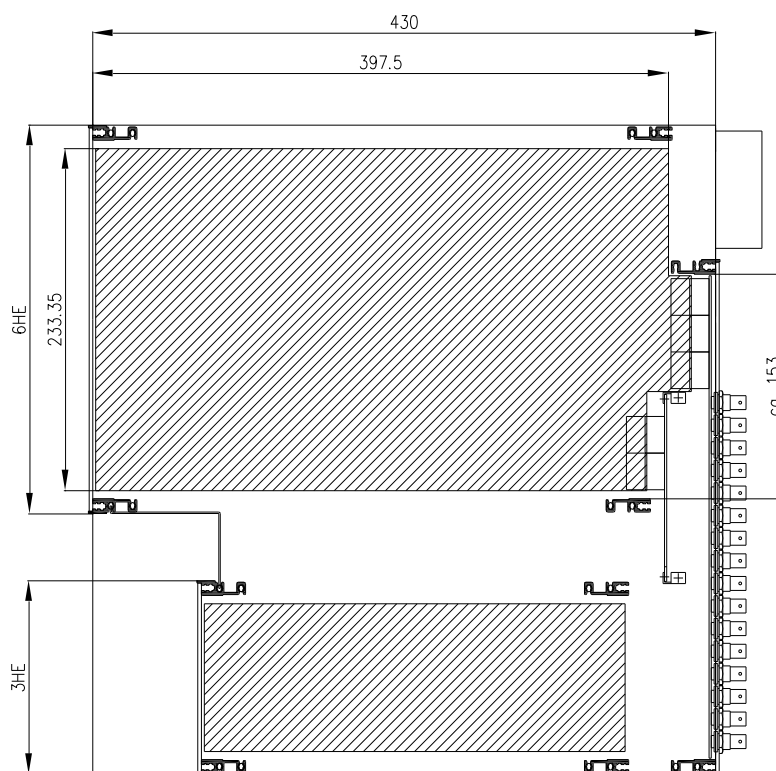
Grounding

Although operator protection is guaranteed (the HD Core is connected via the IEC Power Connectors to the ground of the power supply system) it is best to establish an additional ground for EMC reasons.

1. Fasten the grounding cable to the M4 CASE grounding bolt on the rear panel:

HD Core Frame, rear view
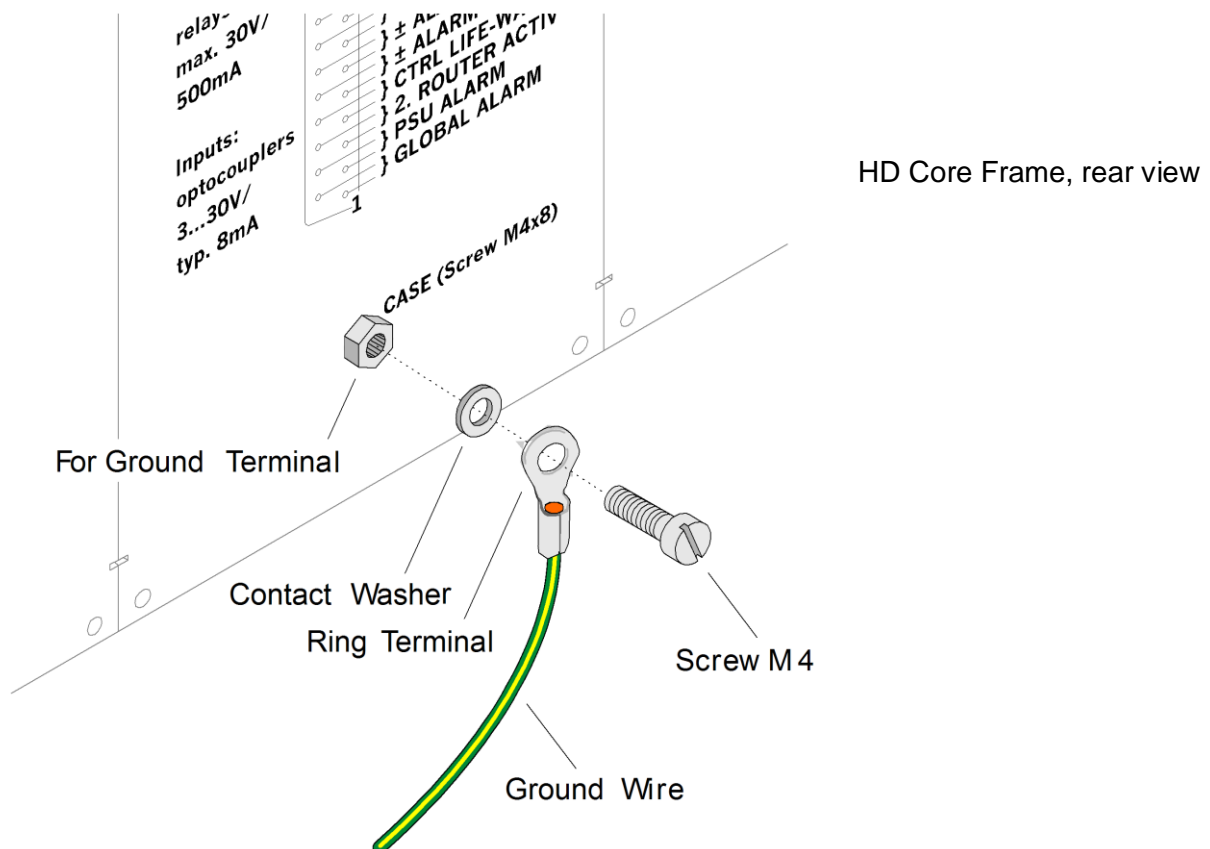
Warning

Warning

The HD Core must be on the same potential as all other system devices/modules.

For Scandinavian countries, *ALWAYS* use a grounded mains connection, to prevent the device from being grounded through Ethernet or other signal connections.

Power

The HD Core frame offers two slots for the installation of power supply units. To operate the HD Core, one PSU is sufficient. Optionally a second PSU can be fitted for redundancy, in which case the load is shared between the two supplies.
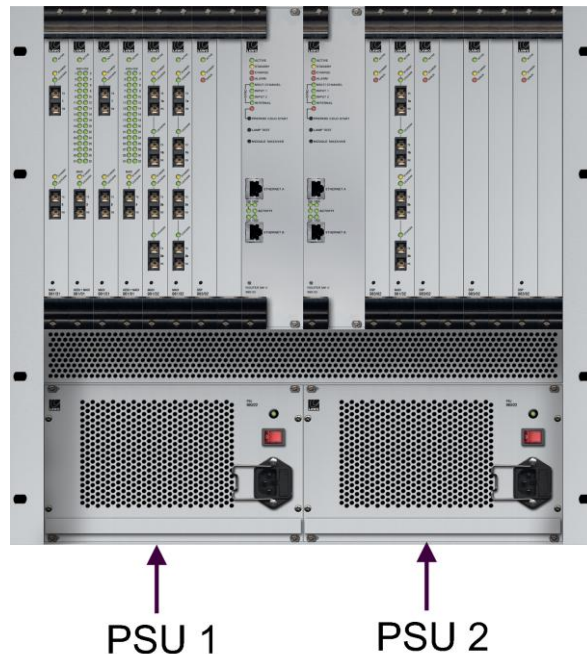
The PSUs are hot pluggable. See Chapter 4 for details on changing a PSU.

Warning

All devices *MUST* be connected to the mains using the three-cord power leads supplied with the system.

When running with two mains supplies (PSU 1 and PSU 2), make sure that both circuits lie on the same ground potential. Otherwise, an internal bridge of two ground wires will lead to a ground loop!

For air conditioning reasons, a HD Core in operation requires both PSU slots to be occupied. If you do not wish to have a redundant PSU, then please insert a dummy housing (Type 980/21).

Power Consumption

The power consumption of the HD Core varies from a minimum of 60W to a maximum of 1000W, depending on the voltage and the amount of modules and PSUs fitted.

Electrical Voltage

PSU specification (type 980/25):

- Input: 100-240 VAC (PFC)/ 47–63 Hz/ max. 8,2 A

- Output: 48 VDC / 23 A

For further details on the HD Core frame or power supplies, please refer to the relevant data sheet.

Mounting the Plug-in Cards and Connector Panels

Normally the HD Core will ship with the plug-in modules and rear connector panels fitted within the chassis. However, if you need to fit additional cards or re-arrange the layout for any reason, follow these instructions.

Rear Frame Connector Panels

Before mounting plug-in cards at the front of the frame, you must fit any connector panels required. For example, modules such as AES3, require breakout connector panels fitted to the rear of the HD Core frame:

Depending on their width it is possible to insert between 4 and 8 connector panels. The following connector panels are available, and can be mixed:

- **Type 980/14 D-Sub, 8HP** - for connection of AES3, balanced 110 Ω

- **Type 980/15 BNC, 16HP** - for connection of AES3-id, unbalanced 75 Ω

Warning

Where no connector panels are required please cover the rear of the frame with dummy plates of the type 980/13.

►► Mounting the Rear Connector Panels

Mount the connector panels progressing from right to left (seen from the rear), filling up any empty slots with dummy plates:

1. Establish the first free slot (seen from the right) at the rear of the frame.

2. Remove the existing dummy plate if fitted.

Note that dummy plates are 8HP wide. If you want to mount a connector panel with a width of 16HP you will need to remove two dummy plates.

3. Position the connector panel so that the inscription is legible!

4. Fasten the connector panel with its 4 screws.

5. Repeat for every connector panel/dummy plate.

For further details on specific connector panels, please refer to the relevant data sheet.

Equipping the Front of the Frame

All modules are hot-pluggable enabling individual I/O or DSP modules to be replaced without affecting the rest of the system.

▸▸ Plugging in the Modules

⚠ Warning

Warning

The HD Core plug-in Modules carry highly sensitive electronic components, and therefore should only be handled by authorized personnel, and with the utmost care.

ALWAYS observe the following procedures:

1. Discharge yourself before touching a plug-in card.

2. Wear conductive safety-shoes and grounding wristbands to reduce the risk of electrostatic charging.

3. *DO NOT* bend the cards.

4. Make sure that all rear connector panels are mounted before inserting the respective plug-in card.

5. When fitting a new card, make sure that it glides smoothly into the top and bottom guide-rails.
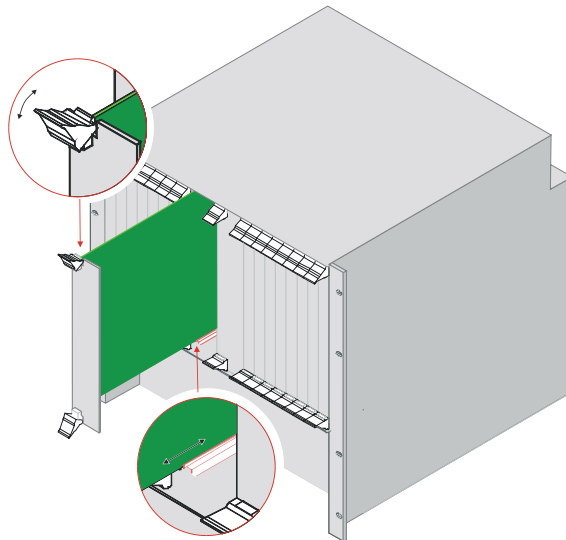
When fitted correctly, it will lock into place.

6. *ALWAYS* fasten the front panel screws in order to fix the card in place. This protects the operator from contact with live parts; protects the card from being pulled out unintentionally; and reduces the emission of electro-magnetic radiation.

Tighten the screws carefully to a maximum torque of 0.25 Nm; we recommend using a dynamometric screwdriver.

7. When you have fitted all the plug-in cards for your system, close any empty slots with dummy plates.

⊮ **Module Order**

18 module slots are available within the HD Core frame:

				HD Core / Slot No.				
1	3	5	7	A	9	11	13	15
2	4	6	8	B	10	12	14	16
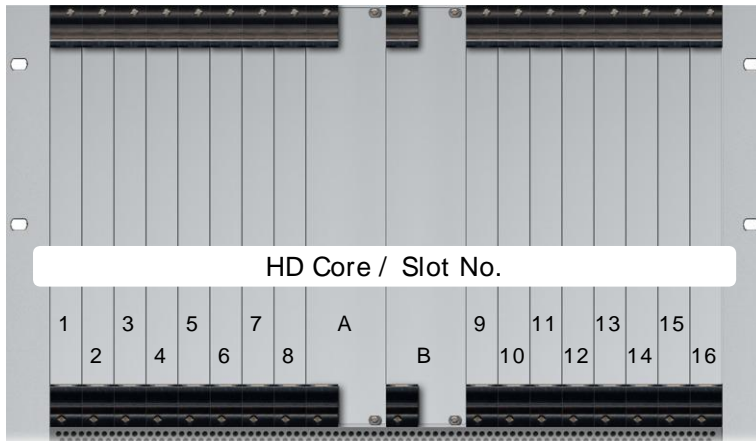
- Slot A – fit the main Router Module MKII (part number 980/33) here.

- Slot B – reserved for a redundant Router Module.

Note that the HD Core will only work once slot A is fitted with a Router Module. When fitting a redundant Router Module, it must be of the same type fitted to slot A.

- Slots 1-16 – used for I/O interface and DSP cards.

To ensure efficient cooling, you should spread the modules evenly within the HD Core.

Warning

Not every I/O or DSP module can be used in every slot so it is best to check your configuration with AdminHD before fitting the physical modules.

Also:

1. Mount any modules of type **981/02** AES3 from left to right filling up the slots predetermined by the rear connector panels – i.e. mount each module so that it is right-aligned to the rear connector panel (view from front).

Note that if a module has been fitted incorrectly, then you may see its **AES3 LOCK 1** LED blink. If this is the case, check you selected the correct slot to match the rear connector panel.

2. Insert DSP modules of type **983/02** or **983/03** from right to left filling up the odd slots 15, 13, 11, 9, 7, 5, 3, 1.

Note

Note that the logical numbering of the DSP cards follows the mounting order described above (DSP card 1 in slot 15, DSP card 2 in slot 13, etc.):
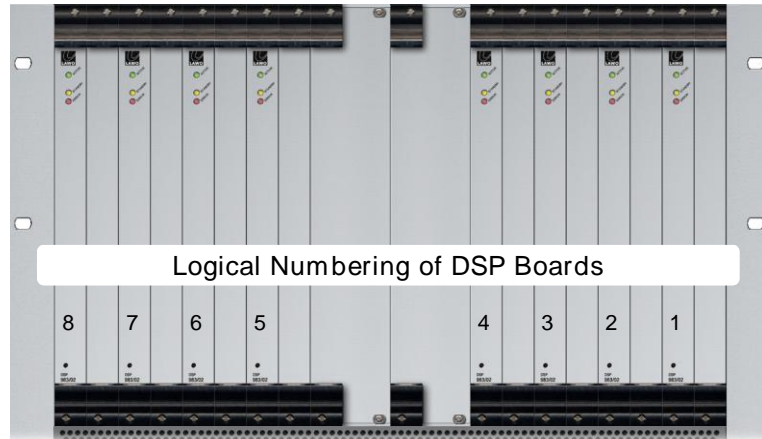
A 983/03 DSP module can be configured as a mxDSP card by updating the system configuration and the module's firmware. Please see Page 218 for details.

For more details on the available plug-in module options, please refer to Appendix A.

Installing the DALLIS Unit(s)

Each DALLIS is designed to be mounted in a 19" rack and comes in a choice of frame heights: 3RU or 6RU.

All plug-in connectors, with the exception of power and alarm, are located at the front of the unit. Cables can be ducted backwards underneath the unit for distribution within the rack.

Dimensions and Weight

DALLIS:	3RU Frame	6RU Frame
Width	19" 483mm (front plate) 440mm (body)	19" 483mm (front plate) 440mm (body)
Height	132.5mm	265mm
Cable Duct	1RU below the frame is required for cable ducting and ventilation.	1RU below the frame is required for cable ducting and ventilation.
Depth (of unit)	433mm	433mm
Weight (without cards)	7.15 Kg	11 Kg

Air Conditioning

The DALLIS needs a constant air stream with a maximum exhaust air temperature of 32° C. Thus installation in a 19" rack is recommended.

The housing of the DALLIS is perforated at the top and at the bottom to guide air flow in and out of the unit. Ensure that the cooling air stream is guided to cool the unit efficiently.

To calculate the air conditioning required, assume a power consumption of 200 Watts.

Warning

Use the rack-rails supplied to mount the DALLIS. The 19" frame *MUST NOT* carry the complete weight of the unit.

ALWAYS leave IRU below the DALLIS frame for ventilation and cable ducting. Take care that no devices or cables obstruct the flow of air thereby hindering cooling.

ALWAYS observe the minimum distances at the front and rear of the unit to allow for ventilation and cable ducting (see next page).

Minimum Distances for DALLIS Installation
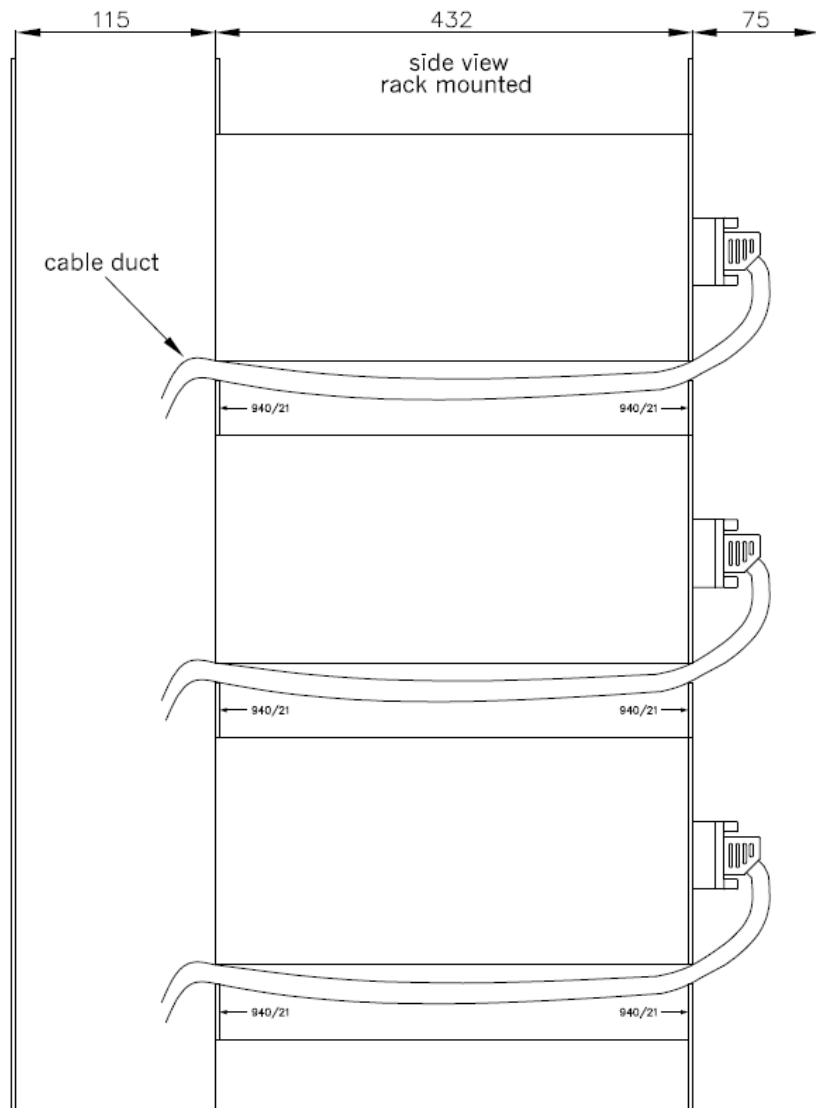
3RU Frame (940/03)
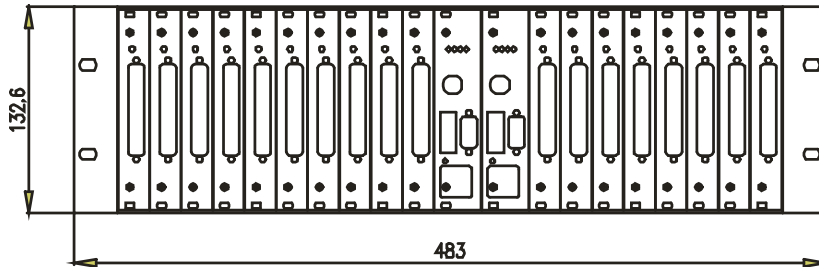
Frame 940/03, front view
(cards fitted as example)
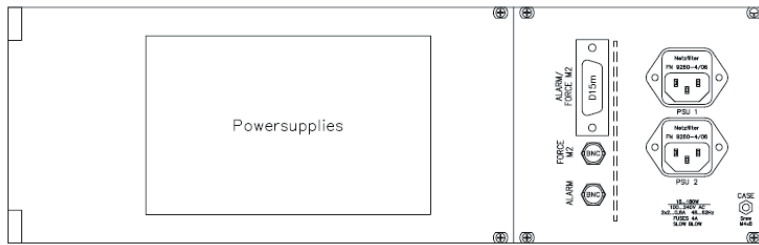
Frame 940/03, rear view
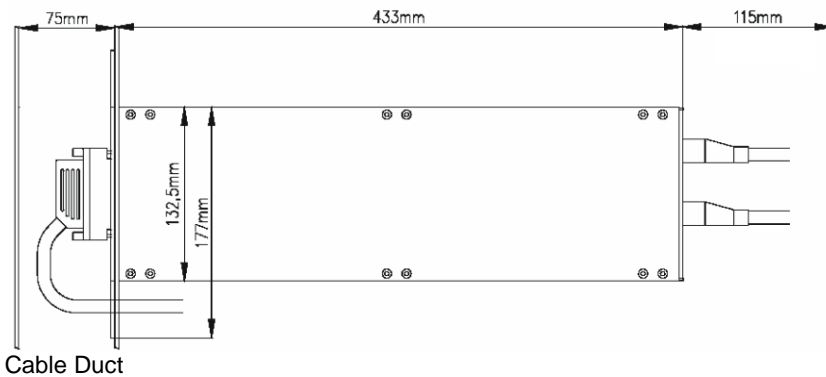
Frame 940/03, side view

Cable Duct

6RU Frame (940/06)

Frame 940/06, front view
(cards fitted as example)

265.2

482.8
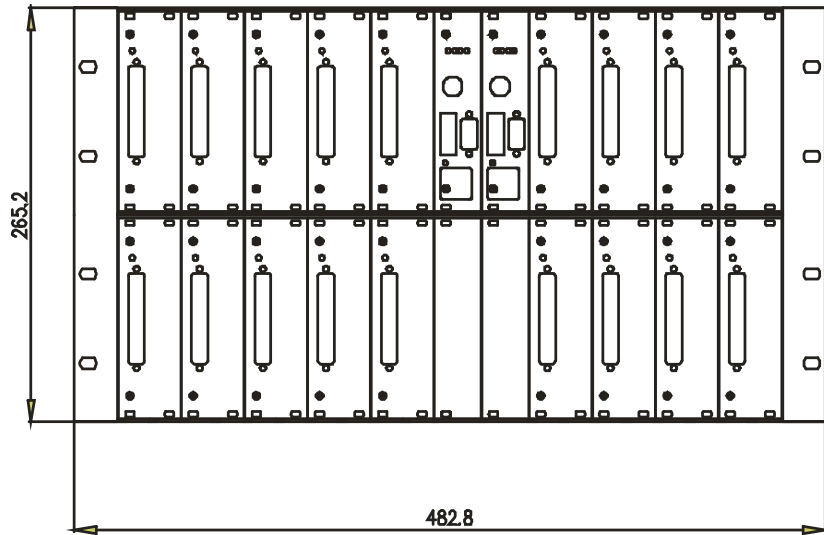
Frame 940/06, side view

435.5

623

Cable Duct
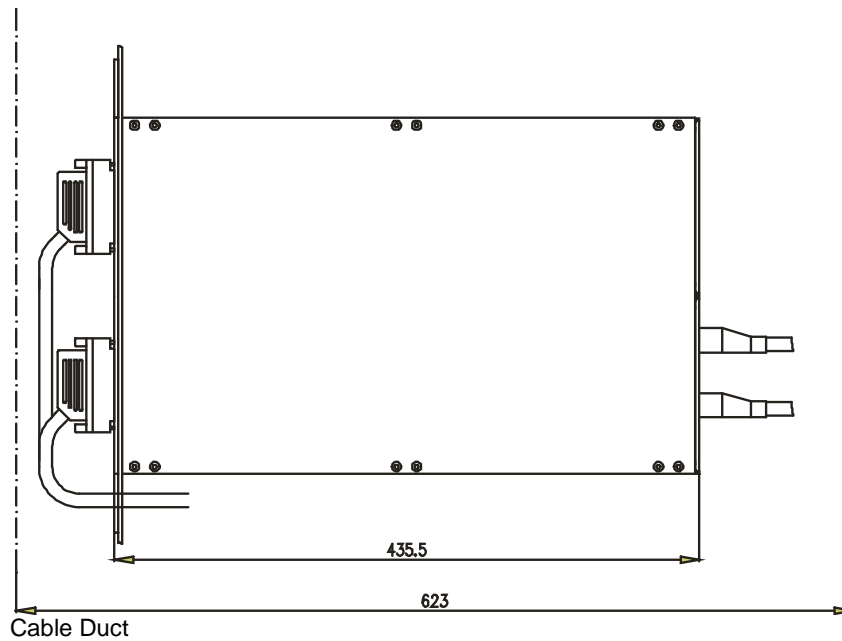
Grounding

Although operator protection is guaranteed (the DALLIS is connected via the IEC Power Connectors to the ground of the power supply system) it is best to establish an additional ground for EMC reasons.

1. Fasten the grounding cable to the M4 CASE grounding bolt on the rear panel:
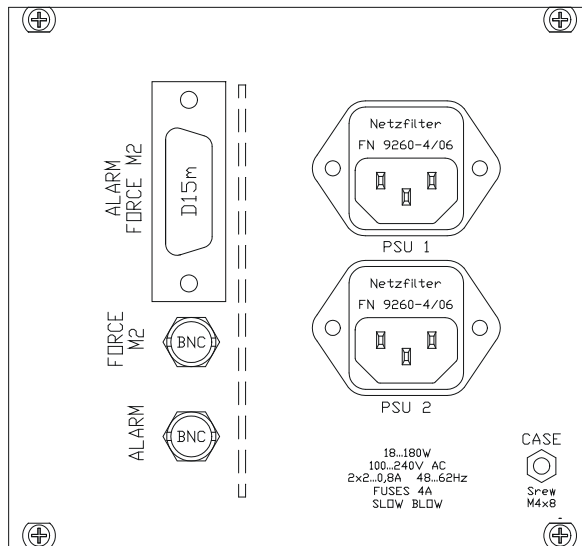
DALLIS Frame, rear view
(close up of PSU panel)

Warning

The DALLIS must be on the same potential as all other system devices/modules.

For Scandinavian countries, *ALWAYS* use a grounded mains connection, to prevent the device from being grounded through Ethernet or other signal connections.

Grounding of Audio Interfaces

For compliance with AES3, digital interfaces should be connected to a field ground.

For connecting microphones, guide the ground connection from the DALLIS to the microphone directly via the cable shielding, otherwise phantom power cannot be transferred. Take care that the shielding does not lie on the field ground. This way you will prevent interference and loss of signal quality.

Power

Depending on your system specification, each DALLIS may be delivered with single or dual redundant power supply units (PSUs). When a redundant PSU is fitted (type 940/16), the load is shared between the two supplies. The PSUs are hot pluggable. See Chapter 4 for details on changing a PSU.

⚠ Warning

Warning

All devices *MUST* be connected to the mains using the three-cord power leads supplied with the system.

When running with two mains supplies (PSU 1 and PSU 2), make sure that both circuits lie on the same ground potential. Otherwise, an internal bridge of two ground wires will lead to a ground loop!
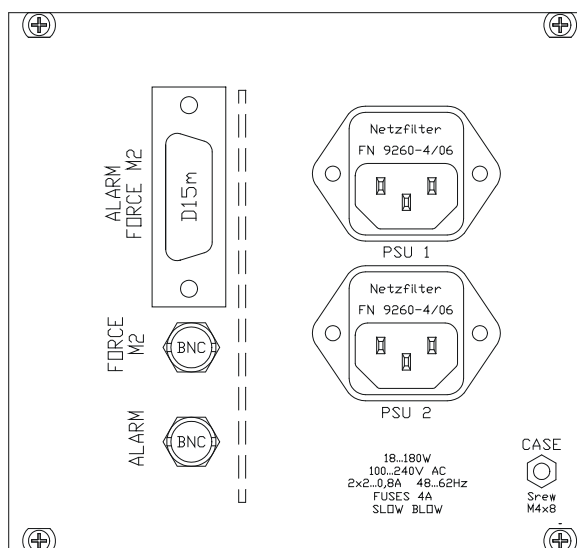
1	**PSU 1** **IEC Power Connector**	When running with a single PSU, connect mains to the **PSU 1** IEC power connector according to the electrical input voltage specified overleaf.
2	**PSU 2** **IEC Power Connector**	When running with main and redundant power supplies, feed the **PSU 1** and **PSU 2** mains inputs from separate circuits taking care that they both lie on the same ground potential!
3	**CASE** **Grounding Screw**	Use the M4 screw to ground the DALLIS. The DALLIS unit must be on the same potential as all other system devices.

For details on the ALARM and FORCE M2 connectors, see Chapter 4.

Power Consumption

The power consumption of the DALLIS varies from a minimum of 70W to a maximum of 180W, depending on the amount and type of I/O cards fitted, and whether there are dual power supplies.

Electrical Voltage

3RU frame, PSU specification:

- Input: 100-240 VAC (PFC)/ 48-62 Hz/ 1.6-2 A
- Output: 12 VDC / 8.3-11 A

6RU frame, PSU specification:

- Input: 100-240 VAC (PFC)/ 48-62 Hz/ max. 2A
- Output: 12 VDC / 11 A

For further details on the DALLIS frame, please refer to the relevant data sheet.

Mounting the Plug-in Cards

Normally the DALLIS will ship with the plug-in I/O and master board cards fitted within the chassis. However, if you need to fit additional plug-in cards or re-arrange the layout for any reason, follow these instructions.

⯈ Plugging in the Cards

With the exception of the Phantom Power card, all cards are hot-pluggable enabling individual I/O cards to be replaced without affecting other aspects of the system.

Warning

Warning

To avoid any unpleasant clicks or pops, the system resets when a Phantom Power card is replaced. Therefore, you should only perform this operation when off air!

Warning

Warning

The DALLIS plug-in cards carry highly sensitive electronic components, and therefore should only be handled by authorized personnel, and with the utmost care.

ALWAYS observe the following procedures:

1. Discharge yourself before touching a plug-in card.

2. Wear conductive safety-shoes and grounding wristbands to reduce the risk of electrostatic charging.

3. *DO NOT* bend the cards.

4. To remove an existing card, unfasten the front panel screws and pull out the card.

Note

Note that some DALLIS I/O cards include DIP switches to set certain features of the cards. Therefore, when replacing cards, check the DIP switch settings before inserting the new card! For details on these settings please consult the relevant data sheet.

Note also that the DALLIS master board provides a switch to set whether the board performs a cold or warm start when powered on. You may need to set this switch to cold start to initialise the system. For details please consult the relevant data sheet.

5. When fitting a new card, make sure that it glides smoothly into the top and bottom guide-rails.

When fitted correctly, it will lock into place.

6. *ALWAYS* fasten the front panel screws in order to fix the card in place. This protects the operator from contact with live parts; protects the card from being pulled out unintentionally; and reduces the emission of electro-magnetic radiation.

7. When you have fitted all the plug-in cards for your system, close any empty slots with dummy plates (For single width slots use part number 940/31, and for double width slots use 940/33. Use part number 940/32 to blank the second master board slot).

Equipping the 3RU Frame

18 single width DALLIS I/O card slots are available within the 3RU frame. Double width I/O cards (8GU) occupy two slots; single width I/O cards (4GU) occupy one slot.

Depending on the specification, each DALLIS can provide up to 60 channels of audio. The plug-in cards should be fitted as follows:

- Slot M1 – fit the main master board here.

- Slot M2 – reserved for a redundant master board.

Note that the DALLIS will only work once the M1 slot is fitted with the master board.

- Slots 1-18 – used for interface cards:

Note

Warning

Warning

Not every interface card can be used in every slot. As a general rule, if an interface card is permitted within the AdminHD configuration software, then it can be fitted to your system. See Chapter 3 for details on AdminHD.

For details on the available plug-in card options, please refer to Appendix C.

Remember to fit a phantom power card if you have specified a transformer balanced mic card.

Tip

Equipping the 6RU Frame

18 double width DALLIS I/O card slots are available within the 6RU frame plus one single width slot reserved for Phantom Power. Double width I/O cards (8GU) occupy the whole slot; single width I/O cards (4GU) must be fitted on the left of the slot and a dummy plate fitted to the right to close the gap.

Depending on the specification, each DALLIS can provide up to 60 channels of audio. The plug-in cards should be fitted as follows:

- Slot M1 – fit the main master board here.

- Slot M2 – reserved for a redundant master board.

Note

Note that the DALLIS will only work once the M1 slot is fitted with the master board.

- Slot 19 – reserved for Phantom Power – if specified, fit the Phantom Power card (part number 947/10) here.

- Slots 1-18 – used for interface cards:

Warning

Warning

Not every interface card can be used in every slot. As a general rule, if an interface card is permitted within the AdminHD configuration software, then it can be fitted to your system. See Chapter 3 for details on AdminHD.

For details on the available plug-in card options, please refer to Appendix C.

Tip

Remember to fit a phantom power card if you have specified a transformer balanced mic card.

Installing the Control Surface

Overview

Each control surface consists of the following components:

- Frame (with extender if required)
- Stand (for studio versions)
- Crossbar (inserted in the stand)
- Control Surface Panels
- Overbridge fitting (optional)
- Integrated keyboard (for chosen language)
- Integrated headphone and USB connections
- Manuscript tray (optional)

The size of the frame determines the appropriate profile (crossbar) for the stand. Large consoles require an additional middle stand.

For specific details please refer to the "HTML-Documentation mc^{2}66" guide which contains mechanical drawings, data sheets and information on all console, HD Core and DALLIS options. You can download the "HTML-Documentation mc^{2}66" guide by registering at http://www.lawo.de/en/website/login.html and then following the links to the **Download Centre** -> **mc^{2}66**.

Note

Console Options

The main options include:

‣ Frame Size

The **mc²66** control surface comes in a range of frame sizes scaling from 8+8+8 (16 channel plus 8 main faders) up to 48+8+48 (96 channel plus 8 main faders):

The position of the central control section may be freely specified.

Any frame may be expanded by fitting a stand-alone extender (8, 16 or 24 faders). This allows the console to take more faders, or to be divided into separate sections for easy transportation.

Note that expansion bays (extenders) support 8-fader decentral panels only. Centre section panels (962/10, 962/11, 962/12 or 962/13) cannot be fitted into an extender.

Extenders are available for both studio and OB frame versions.

Large consoles with a frame extension require an additional middle stand.
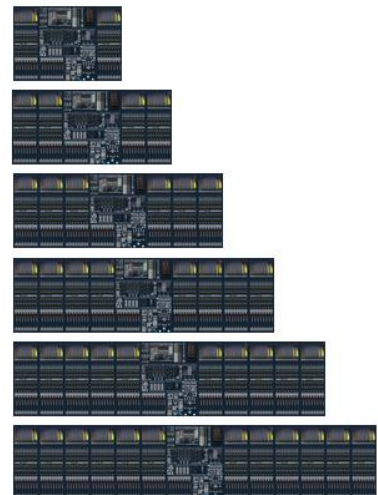
⤏ **Frame Version**

Different frame versions are available for:

- **Studio Installation** - comes with detachable legs and stand allowing it to be free standing. Two different stand heights are available (European and Asian).

- **OB Installation** - designed for mounting onto a cross bar (not supplied) to save weight.

⤏ **Dummy Panels**

You may order a larger frame and fit dummy panels to allow for future expansion.

For a list of control surface panels, please see Page 284.

Note that you must order at least as many Fader panels as Free Control Panels because the Free Control panels are controlled via the Fader panels.

⤏ **User Panels or 19" Integration**

To the right of the FC PRESET and SNAPSHOT/SEQUENCE controls is an area which may house up to three user panels or a 19" integration kit:

The options include:

- 40 USER KEYS - 40 additional user buttons (one slot).

- 80 USER KEYS - 80 additional user buttons (two panel slots).

- INTERCOM - talkback speaker and microphone (one slot).

- AUTOMATION - dynamic automation controls (one slot).

- 8 ROTARY CONTROLS – 8 assignable rotary controls (one slot).

- REMOTE MACHINE CONTROL panel (two panel slots).

- 19" integration kit (occupies all three user panel slots).

Note

Note that only one 40 User Key panel may be fitted; for more keys, use the 80 User Key panel.

User buttons can be factory-configured or edited from the **Custom Functions** display.

▸▸ Overbridge Metering

The overbridge may be fitted with an external meter or a dummy panel. The components of the overbridge fitting are delivered with the relevant cabling.

▸▸ Console Keyboard

The console keyboard is available in English or German – see Page 65 for details on how to change the language version.

▸▸ Cables

Ethernet and the PSU connecting cables are available in a variety of lengths and must be ordered separately.

▸▸ Script Tray

One or more removable script trays may be ordered separately.

▸▸ Headphone Connections

To use the headphone jacks mounted in the arm rest of the console frame, you must order one DALLIS 942-61 card, connected via D-Sub (37 pin), to provide the audio feeds.

▸▸ Monitor Outputs

For monitor section outputs you must order one of the following transformer-coupled DALLIS I/O cards depending on the required level and connector type:

Part Number	Revision	Outputs	Level	Connector Type
942/02	294.2020	4 x Line out	15dBu	D-Sub
942/04	294.2040	4 x Line out	24dBu	D-Sub
942/06	294.2060	4 x Line out	18dBu	D-Sub
942/12		4 x Line out	15dBu	XLR

▸▸ Operating Level

Please note that the maximum analogue level of the whole system is defined by the DALLIS card with the lowest GDA (General Device Address) – this is the DALLIS card with the lowest address fitted to the DALLIS frame connected to the lowest port number of the first HD Core.

Note

Dimensions and Weight

⇥ Studio Version (with stand):

Frame Spec & (Part Number)	Width	Height	Weight (fully fitted)
24-8-24 (962-70)	2454.9 mm	1029 mm	150.50 Kg
24-8-16 (962-71)	2174.9 mm	1029 mm	146.87 Kg
16-8-16 (962-72)	1894.9 mm	1029 mm	135.03 Kg
16-8-8 (962-73)	1614.9 mm	1029 mm	122.66 Kg
8-8-8 (962-74)	1334.9 mm	1029 mm	110.30 Kg

⇥ OB Version (no stand):

Frame Spec & (Part Number)	Width	Height	Weight (fully fitted)
24-8-24 (962-70)	2316 mm	364 mm	132.55 Kg
24-8-16 (962-71)	2036 mm	364 mm	119.67 Kg
16-8-16 (962-72)	1756 mm	364 mm	107.83 Kg
16-8-8 (962-73)	1476 mm	364 mm	95.46 Kg
8-8-8 (962-74)	1196 mm	364 mm	83.10 Kg

⇥ Extenders:

Frame Spec & (Part Number)	Width	Height	Weight (fully fitted)
8 (OB Version) (962-75)	280 mm	364 mm	13.11 Kg
16 (OB Version) (962-76)	560 mm	364 mm	26.82 Kg
24 (OB Version) (962-77)	840 mm	364 mm	39.93 Kg

For dimension drawings and details on panel options please refer to the "HTML-Documentation mc^{2}66" guide.

Ambient Conditions

Proper operation of the control surface can only be guaranteed at an ambient temperature between 10° C and 35° C and a relative humidity between 15% and 85% (not condensing).

Air Conditioning

The control surface is convection cooled; there are no fans within the surface. Ensure that the cooling air stream is guided to cool the unit efficiently.

Installing the Frame

When installing the console, note that all plug-in connectors are located at the rear of the frame.

For the OB frame version, please ensure that you have ordered the relevant cross bar mounting kit. Note that the cross bar is not included and must be supplied by the customer.

Note

For the studio frame version, the console is normally shipped separately from its stand.

When installing the console, note that all plug-in connectors are located at the rear of the frame.

Warning

Warning

ALWAYS observe the minimum distances around the console frame to allow for ventilation and cable ducting (see next page).

Minimum Distances for mc²66 (Studio Frame)
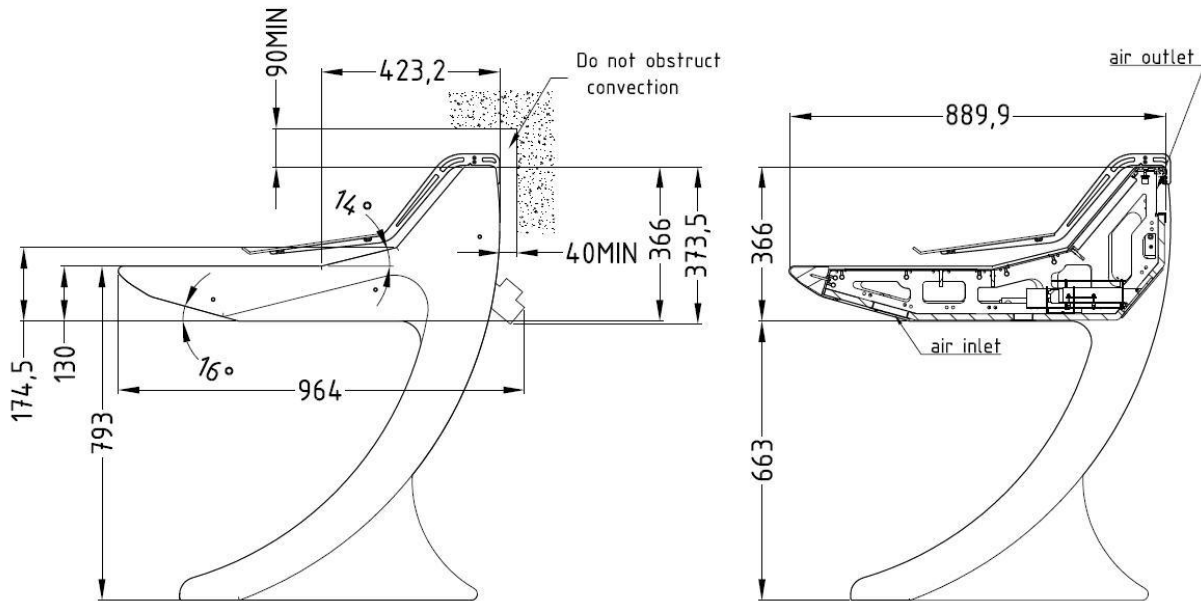
Minimum Distances for mc²66 (OB Frame)
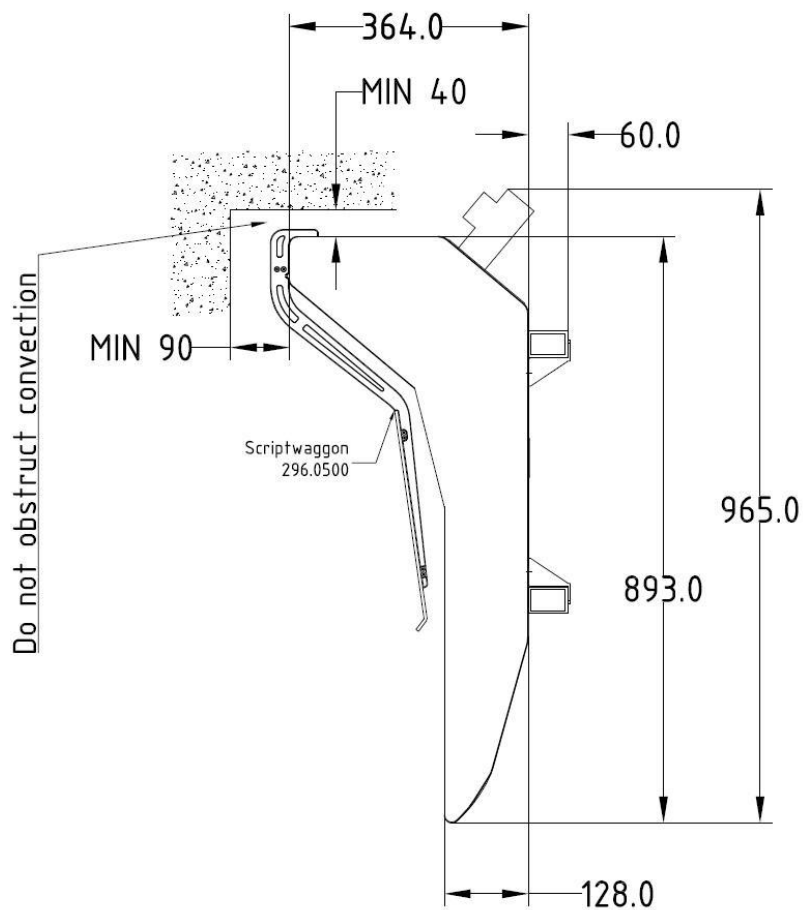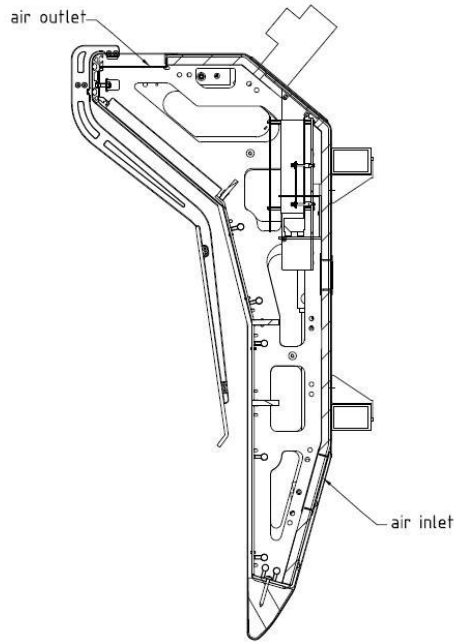
Power

The console control surface power is provided by the external console PSU (see Page 68).

A single PSU can power up to 48 fully fitted channels (24+8+24). Extender frames share the power from the external PSU using daisy-chain wiring. Therefore, depending on the size of your console and the number of extender frames, you may require multiple PSUs (up to 4).

Warning

Warning

Harting power connectors must *NOT* be disconnected under load.

Console Keyboard Driver Installation

The console keyboard is available in different language layouts. To change the keyboard driver from say German to English, you will need to open a Telnet session to the console's control system. We recommend using Tera Term Pro Web 3.1.3, a free telnet client for windows, which can be downloaded from http://www.ayera.com/teraterm/

    1. Open the Tera Term Pro telnet client.

To configure the IP Address of your console open TCP/IP from the Setup menu, and add the TCP/IP address of your console to the host list:

Note
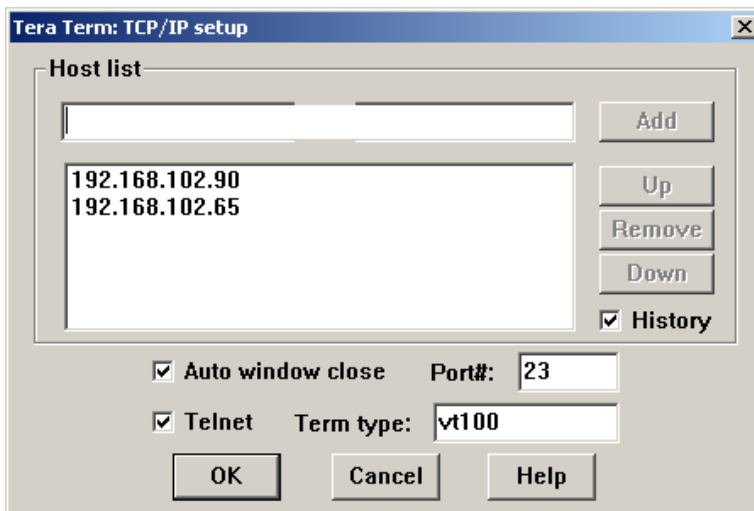
The default TCP/IP address of a mc^{2}66 system is 192.168.102.65.

    2. Now set up a new telnet connection using **File -> New connection:**
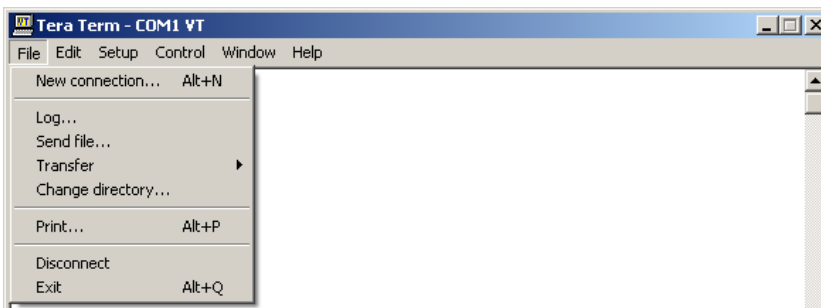
3. Choose the TCP/IP Host address of your desk:
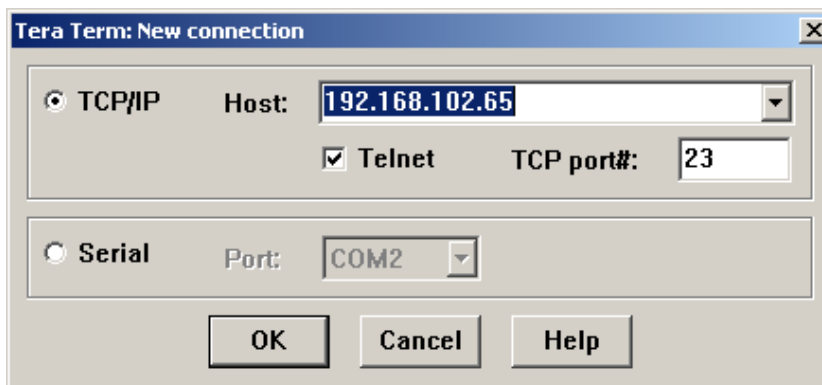
4. Enter the login name: **root** and the password: **hong**

Tera Term PRO opens a telnet session to the console's control system:

All parameters in the **mc²66** are administered from here.

5. Now type: **cd /data/config/sysconfig** into the Tera Term Pro window, and press **Enter**.
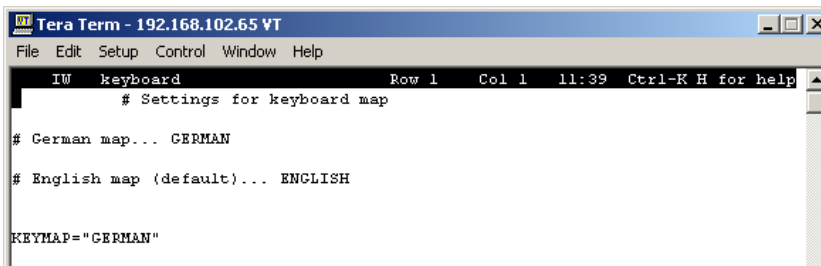
Note that the string must be written in lower case letters.

Note

You are now in the correct directory to change the keyboard configuration. This is done by opening the keyboard configuration file with a little text editor called joe, as follows:

6. Type joe keyboard and press Enter:

```
kronos:~ # cd /data/config/sysconfig/
kronos:/data/config/sysconfig # joe keyboard
```
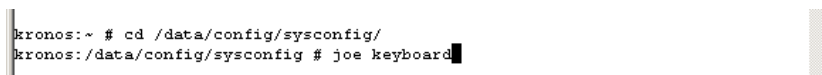
The following should appear:

```
Tera Term - 192.168.102.65 VT                              _ □ ×
File  Edit  Setup  Control  Window  Help
     IW    keyboard              Row 1    Col 1   11:39  Ctrl-K H for help
              # Settings for keyboard map

# German map... GERMAN

# English map (default)... ENGLISH


KEYMAP="GERMAN"
```

7. Choose the parameter by typing **KEYMAP="ENGLISH"** (or **KEYMAP="GERMAN"**) as required.

8. Then close the editor and save the file by pressing **CTRL** + **K** + **X** on the keyboard.

The new Keyboard driver is now configured, and after the next reboot will be active.

9. You can reboot from the telnet client by typing **reboot**.

The console reboots, and the keyboard will be available in your configured language.

Installing the Console Power Supply Unit

The control surface power is provided by an external PSU with n+1 redundancy.

A single PSU can power up to 48 fully fitted channels (24+8+24). Extender frames share the power from the external PSU using daisy-chain wiring. Therefore, depending on the size of your console, and the number of extender frames, more than one external PSU may be required.

The external PSU is normally sited near the console surface. The maximum cable run from the surface is 10m.

Dimensions and Weight

External PSU:	Frame
Width	19"
Height	3RU
Depth (including handles and connectors)	500mm
Additional rack space required for power cables	150mm
Weight	9.25 Kg

Ambient Conditions

This PSU works with convection cooling (no fans) if the ambient temperature is below 25° C and the load does not exceed 25 A at the mains supply lines. For temperatures or loads exceeding these conditions, the unit's fan will be started once the internal temperature exceeds 56° C. The fan will continue to operate until the internal temperature falls below 42° C when it will switch off.

Note that if only two of the three internal supplies are active, then the fan will operate once the ambient temperature exceeds 25° C.

A yellow LED on the front of the unit illuminates when the fan is active.

Air Conditioning

The PSU is convection cooled providing that the ambient temperature is below 25° C and the load does not exceed 25 A at the mains supply lines.

The housing of the PSU is perforated at the front and rear to guide air flow in and out of the unit; the air stream is guided from bottom front to top rear. Ensure that the cooling air stream is guided to cool the unit efficiently.

Warning

When mounting the PSU, take care that no devices or cables obstruct the flow of air thereby hindering cooling.

Grounding

Although operator protection is guaranteed (the PSU is connected via the IEC Power Connectors to the ground of the power supply system) it is best to establish an additional ground for EMC reasons.

1. Fasten the grounding cable to the M4 CASE grounding bolt on the rear panel:
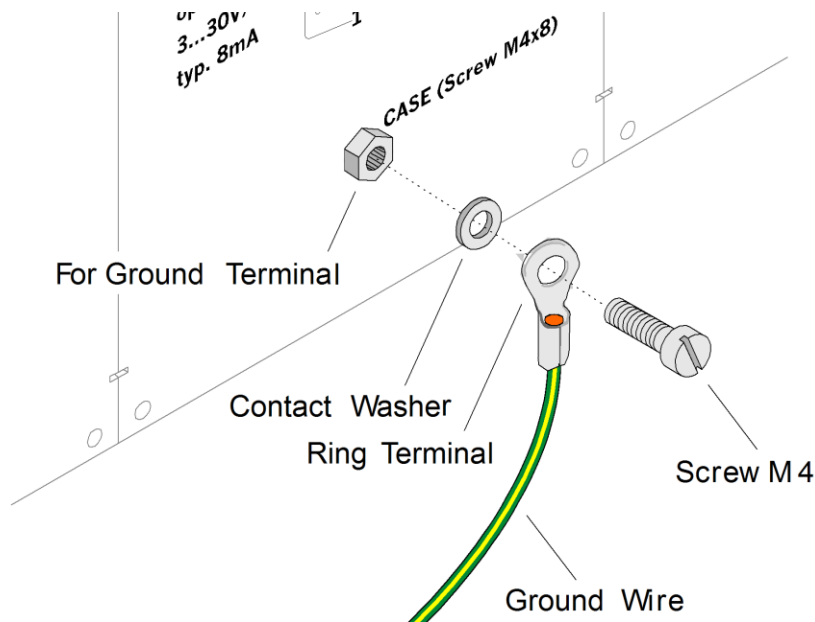
PSU Frame, rear view

Warning

The PSU must be on the same potential as all other system devices/modules.

For Scandinavian countries, *ALWAYS* use a grounded mains connection, to prevent the device from being grounded through Ethernet or other signal connections.

Connections

The PSU has two mains supply terminals at the rear. Therefore, it is possible to realise phase redundancy if each terminal is connected to a different phase. Only one mains input is required to operate the system. However, if you intend to use only a single phase, then it should be connected to both mains terminals in order to avoid system error messages and a red LED on the front panel.

A single cable runs from each PSU to the control surface. The bay server to the right of the GUI display usually contains the direct connection to the PSU.

Warning

All devices *MUST* be connected to the mains using the three-cord power leads supplied with the system.

Harting power connectors must *NOT* be disconnected under load.

Make sure that *ALL* circuits lie on the same ground potential. Otherwise, an internal bridge of two ground wires will lead to a ground loop.

Status Monitoring

Internally, the PSU is equipped with three power supplies running in parallel. For correct operation, only two supplies are required; the third is for redundancy. If more than one of the internal supplies fails, then the complete PSU rack must be replaced. Please send the defective rack to Lawo for repair.

LEDs at the front of the unit indicate the status of each mains connection and internal supply. From Version 4.8 software onwards, the console GUI also offers status monitoring for the external PSU. See Chapter 4 for details on status monitoring.

Power Consumption

The maximum power consumption for an external PSU rack is:

- Current (max): 8 A

- Power consumption (max): 528 Watts

- Power dissipation: ca. 60 Watts

- Inrush current (max): 40 A

These figures apply to a fully fitted 24+8+24 frame layout. Consoles with fewer panels requires less current and power.

Consoles with larger frame configurations require more than one external PSU.

Electrical Voltage

PSU specification:

- Input: 100-240 VAC (PFC)/ 47–63 Hz

- Output: 13 VDC / 33 A (max)/ 468 Watts (max)

For further details, please refer to the relevant data sheet.

System Connections

Having installed the HD Core, DALLIS units, control surface and its power supply, it's time to connect up the system.

Wiring from the Console

A single Ethernet connection and power are required to run the mc^{2}66 as a stand-alone system:

1. Connect one of the console's **ETHERNET** ports to the HD Core Router Module (**ETHERNET A**) using a straight (1:1) network cable:

Desk

Ethernet

HD – Core including Control System
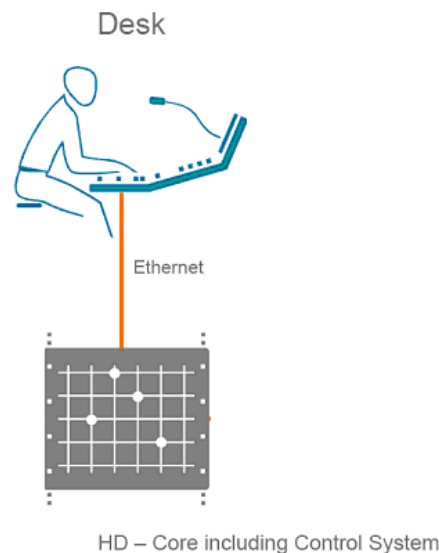
If two Router Modules are fitted to the HD Core, then run a second Ethernet connection to the redundant module (ETHERNET A).

2. Connect power from the external PSU using the cable(s) provided.

A single power cable connects each external PSU to the console; multiple PSUs may be required for larger frames.

Wiring from the HD Core

All essential system connections come to and from the HD Core's Router Module:

- **ETHERNET A** – connects to the mc^{2}66 control surface.

- **ETHERNET B** – connects to the control network for configuration, maintenance or remote control.

If two Router Modules are fitted to the HD Core, then run Ethernet connections from both the main and redundant modules (ETHERNET A to the console surface; ETHERNET B to the control network).

Ethernet B (Control Network)

The **ETHERNET B** port, on the MKII Router Module, can connect directly to a configuration/service PC. However, more commonly a network switch is used, in order to connect to a wider control network. (A 3com network switch is provided with every system on delivery.)

1. Connect the **ETHERNET B** port to the control network (TCP/IP Ethernet) to support the following applications:

* Control from an external controller system.

* Control or configuration from an AdminHD, ControlHD or mxGUI PC.

* Networking with other Lawo systems. For example, additional mc^2 consoles or Nova73 routing matrices.

* Support of the 'dial-up router' option for remote maintenance.

Connect each device's **ETHERNET** port to the network switch using a straight (1:1) network cable (STP-CAT 5 with RJ45 connectors on both sides).

Warning

Only use the network switch provided; do not connect via a network hub. Keep your Lawo network separate from other network traffic within your installation.

2. To establish communication between the devices, you may need to configure the TCP/IP settings.

We recommend using the default IP addresses where possible as this will simplify remote maintenance:

Device	Port	IP Address	Notes
Router Module Slot A	ETHERNET A	192.168.105.1	Fixed address.
Router Module Slot A	ETHERNET B	192.168.102.65	Default address of the mc^{2}66 Control System. This address can be modified (e.g. to network multiple consoles).
Router Module Slot B (redundant Router Module, optional)	ETHERNET A	192.168.106.1	Fixed address.
Router Module Slot B (redundant Router Module, optional)	ETHERNET B	192.168.102.66	This address is always one digit higher than that of the main Control System, and is set automatically by AdminHD.
Ethernet Switch	-	192.168.102.250	Default address.
ISDN Dialup Router (optional)	-	192.168.102.200	Default address.

You can find more information on changing system component TCP/IP addresses in Chapter 3: AdminHD.

Warning

Warning

Where fitted, a redundant Router Module must have a different IP address to the main Router Module. This is set automatically by AdminHD when a redundant router module is configured.

If you having problems establishing a network connection please follow the trouble shooting tips in Chapter 4: Service and Maintenance.

Connecting I/O

Connect your I/O devices to the HD Core via the I/O modules fitted to the system. I/O options include AES/EBU, MADI and ATM. Further formats can be realised by connecting MADI or ATM to remote DALLIS or 3rd party I/O interfaces.

For details on the breakout connections to and from HD Core I/O Modules, please refer to Appendix B.

For details on DALLIS I/O cards, please refer to the relevant data sheet as listed in Appendix C.

Switching on the Power

Having installed and connected all the essential system components – Ethernet, Power and I/O - the system can now be switched on.

Note

To start the system, turn on the external PSU unit and HD Core. Note that you may power the console and HD Core before other interfaces if desired. This enables you to begin setting up the console before your remote Stageboxes are connected.

At the end of the boot-up, the control system normally loads the console's warm start data; this is the status of the console as stored when the system was last shut down. This means that when you turn on the power you will get back to wherever you were when the console was last shutdown.

Note that the system can be set to cold start on boot-up from the console's **System Settings** display. See Page 250 for more details.

To check that the HD Core and DALLIS units are operating normally, you can look at the console's **Signal Settings** display – all cards should be grey:
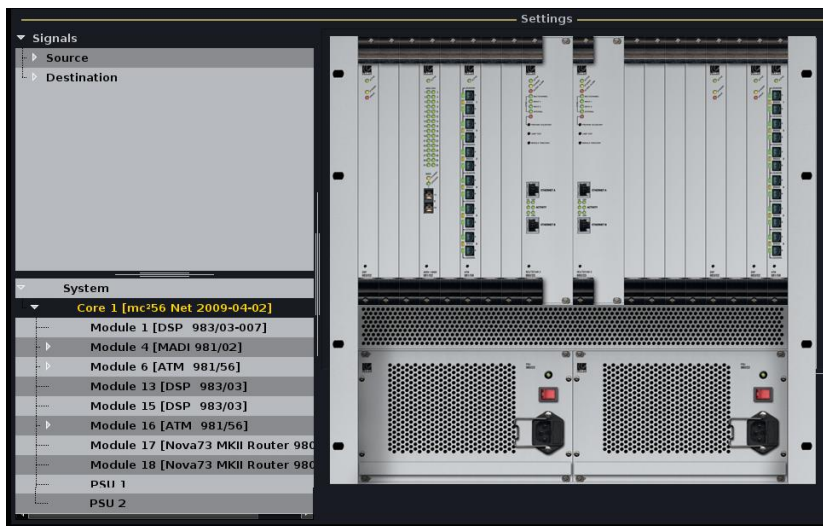
Or check the status LEDs on each unit's front panel. Within the HD Core and DALLIS, the **ACTIVE** LED on each module or card should blink in time with all other **ACTIVE** LEDs, at approximately 1Hz. This shows that the card is synchronous to the rest of the system.

For more details on these LEDs or for tips on fault finding, please see Chapter 4: Service and Maintenance.

Switching off the Power

The system should be shut down by powering down the external PSU unit (control surface) and the power to the HD Core.

Warning

NEVER disconnect Harting power connectors from the control surface before switching off the external PSU.

Following switch-off, power is provided to the Control System for a further 18 seconds in order to save all current settings to flash memory. This is called the console's warm start data. You will hear eight tones signaling that the shutdown operation has been successfully completed. The system is shutdown when the blue LED of the trackball is off.

You may switch off the power to other system components – the DALLIS units - at any time.

Other System Connections

Connections on the rear of the HD Core frame are also provided for:

- **Synchronisation** - options include:
    - o Word clock
    - o AES/EBU (AES3-id)
    - o Video Black Burst - PAL or NTSC
- **Alarm and control contacts** – including the global alarm.

System Clock

The HD Core offers a fully redundant clock source structure with two independent clock inputs, an internal sync generator and the ability to lock to sync from an incoming multi-channel signal. This allows the console to be clocked from a variety of sync sources and recover from loss of external sync.

The sync reference options are:

- **Wordclock** – connected to the INPUT 1 or INPUT 2 ports on the rear of the HD Core.
- **AES3-id** – connected to the INPUT 1 or INPUT 2 ports on the rear of the HD Core.
- **Video black burst** – connected to the INPUT 1 or INPUT 2 ports on the rear of the HD Core. The system supports either PAL 625 lines/50Hz or NTSC 525 lines/59.94Hz**.**
- **ATM** - incoming ATM assigned within the system configuration using AdminHD.
- **MADI** - incoming MADI assigned within the system configuration using AdminHD.

For more details on configuring an ATM or MADI multi-channel sync reference, please see Chapter 3: AdminHD.

Synchronisation Ports

Connect your Wordclock, AES or Video sync source to the **INPUT 1** or **INPUT 2** ports at the rear of the HD Core:

FRAME
980/ 01 HD CORE

Sync inputs (Input 1/ 2) accept WORDCLOCK, VIDEO or AES/ EBU (AES3).

Ensure the proper termination of the inputs with 75 Ohm on the looped-through outputs (Thru 1/ 2).

INPUT 1   **INPUT 2**

SYNCHRONISATION

THRU 1   **WCLK OUT**   **THRU 2**
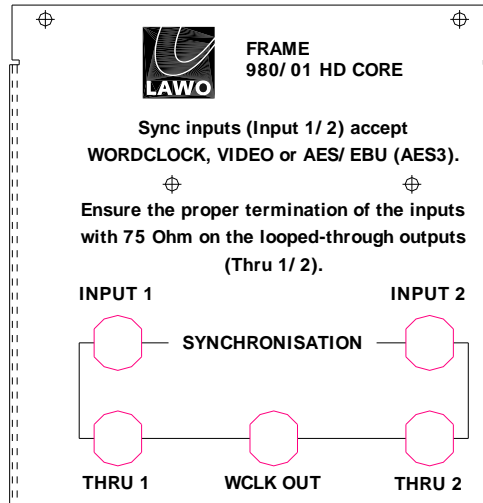
INPUT 1 and INPUT 2	Sync inputs accepting Wordclock, AES3-id or Video black burst as described above.
THRU 1 and THRU 2	Use the **THRU** ports to distribute the sync signal supplied at **INPUT 1** or **INPUT** 2 to other equipment. Note that this provides a looped-through signal and does not follow the sync switching of the system.
WCLK OUT	The current system clock can be picked up at the **WCLK OUT** (word clock) output. This follows the redundant sync source switching of the system.

Warning

⚠️ Warning

- The HD Core supports only one video format at a time. Thus, if both inputs are supplied with video signals, only signals of the same type will be used (either PAL or NTSC).

- When running the system referenced to Wordclock, the frequency of the sync source must match the internal operating sample rate of the system.

- When no further component is connected to THRU 1/2 it is essential to terminate the THRU ports using a resistor of 75 Ω. Terminating resistors designed as BNC connectors are included in delivery.

A star-like clock distribution via a distribution amplifier offers better signal quality and should be preferred to that of a passive daisy chaining.

💡 Tip

Selecting the Clock Source

Within the mc²66 you may define a main clock source (**Source Priority 1**) and a redundant one (**Source Priority 2**) from the console's **System** display. These settings are then stored within the console's Production.

Select the **System Settings** display and focus on the **Wordclock** topic:
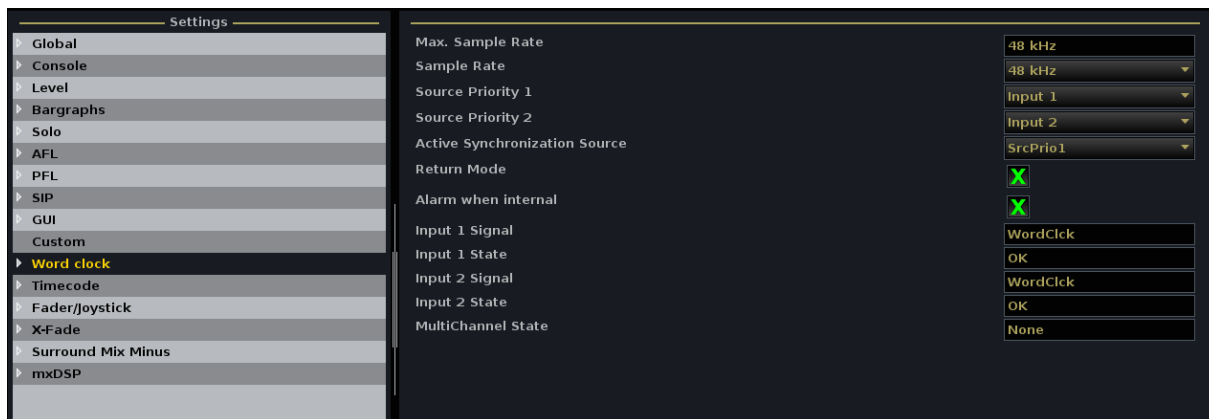
⇥ Source Priority 1 and 2

These two options allow you to select the main and redundant clock source for the system. If sync is lost or a signal of an incorrect frequency appears on Source Priority 1, the system automatically switches to Source Priority 2. Similarly, if sync is lost on Source 2, the system automatically switches to internal sync.

You can set each of the options to:

- **Input 1 –** HD Core Sync Input 1 (Wordclock, Video or AES3)

- **Input 2 –** HD Core Sync Input 2 (Wordclock, Video or AES3)

- **Multichannel Sync** - ATM or MADI as defined within the system configuration using AdminHD.

⇥ Active Synchronization Source

This option displays and sets the active sync source for the system:

- **Src Prio 1** – the input selected as Source Priority 1.

- **Src Prio 2** – the input selected as Source Priority 2.

- Internal.

If sync is lost or a signal of an incorrect frequency appears on Source Priority 1, the system automatically switches to Source Priority 2. Similarly, if sync is lost on Source 2, the system automatically switches to internal sync.

⏵⏵ Return Mode

This option activates a return mode so that the system will switch back to Source Priority 1 (or 2) when it returns. The system even checks whether the return sync is valid and will not switch until the sync source matches the chosen operating frequency of the console.

- **Return Mode** (On) - activates the return mode.

- **Return Mode** (Off) - deactivates the return mode.

To force the system to run on internal sync, deactivate the return mode and set the **Active Source** to Internal.

Note

⏵⏵ Alarm when internal

This option activates an alarm when the system is running on internal sync:

- **Alarm when internal** (On) - activates the alarm.

- **Alarm when internal** (Off) - deactivates the alarm.

The alarm triggers on-screen Warning flag and illuminates the red LED on the front panel of the HD core router card.

⏵⏵ External Sync Input Status

The next five options are for display purposes only and show the status of the external and multi-channel sync signals.
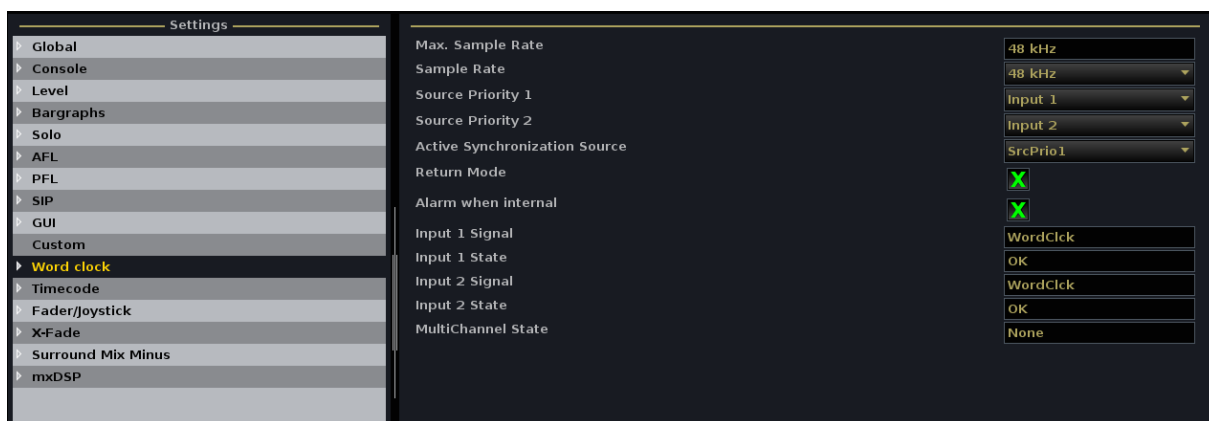
The example above shows that a valid Wordclock signal is connected to external inputs 1 and 2, and the **Active Synchronisation Source** is Src Prio 1 = Input 1.

Alarm Messaging System

Various alarm contacts are provided on both the HD Core and DALLIS rear panels.

HD Core Alarm Contacts

On the rear of the HD Core are two GPI 25-pin D-Sub connectors carrying input and output alarm messaging signals. In addition, a single BNC outputs the GLOBAL ALARM:
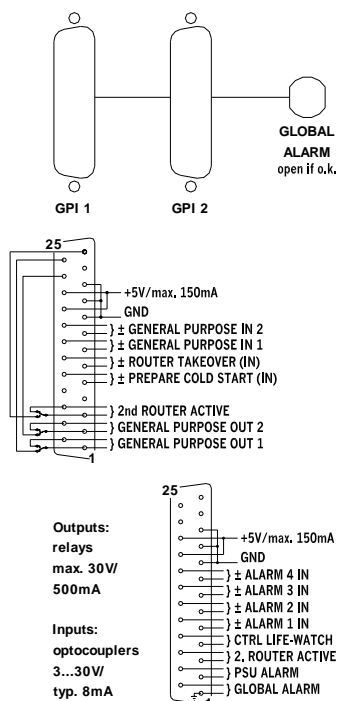
⊶ **Inputs**

The GPI inputs are opto-couplers; accept voltages of 5 V…24 V; draw current of typically 3 mA; and are floating and galvanically isolated.

- **ROUTER TAKEOVER** – use this input to force a takeover to the redundant Router Module, if fitted. The takeover is triggered by a positive edge at the input.

- **PREPARE COLDSTART** – this input can be used in the same way as the front panel Prepare Coldstart button. When turning on the HD Core, supply a voltage at the input to perform a cold start.

- **ALARM IN 1-4** - these inputs may be used to monitor peripheral equipment such as devices from other manufacturers. Within the AdminHD configuration, you can assign an error message (text) for each input and define whether the input will activate the global alarm. Predefined standards are:

  o **ALARM 1 IN** - failure of the external clock supply (activating the global alarm).

  o **ALARM 2 IN** - failure of the external power supply (activating the global alarm).

  o **ALARM 3 IN** - failure of the external I/O system (activating the global alarm).

  o **ALARM 4 IN** – the external device exceeds its operating temperature (activating the global alarm).

The alarm is triggered by an applied voltage. When the input is open or grounded, the alarm is cancelled.

- **GENERAL PURPOSE IN 1-2** – these inputs may be used for project-specific applications.

‣ Outputs

The GPI outputs are relays; output a maximum of 30V/500mA; and are floating and galvanically isolated.

- **CTRL LIFE WATCH** – this is a project-specific contact which can be used to report the loss of a connection to another control system. Please contact your local Lawo representative or email service@Lawo.de for more details.

- **2nd ROUTER ACTIVE** – this contact reports the activation of the redundant Router Module, if fitted. (closed status)

- **PSU ALARM** – this contact reports the failure of the PSUs (closed status).

- **GLOBAL ALARM** – this is a collective alarm contact which signals the occurrence of any failure (closed status).
  The contact is output in parallel via BNC and D-Sub.

- **GENERAL PURPOSE OUT 1-2** – these outputs may be used for project-specific applications. Please contact your local Lawo representative or email service@Lawo.de for more details.

Note that the Global Alarm state is triggered when any of the following conditions are satisfied:

Within the HD Core:

- Malfunction of a Router module.

- High temperature on a Router module – triggered if the temperature exceeds 45° C.

- Too high or too low a voltage to a Router module.

- Malfunction of an I/O module in the HD Core.

- Malfunction of a PSU.

- Malfunction of a fan.

- Active External Control Input – the global alarm can be triggered by a control input (e.g. GPI).

From an I/O Port (e.g. DALLIS):

- If the port is not supplied with a valid signal.

- Malfunction of a DALLIS master board.

- Malfunction of a DALLIS I/O card.

- Malfunction of a DALLIS PSU.

‣ Voltage feed

At the GPI 1 and GPI 2 D-Sub connectors it is possible to pick up +5V with a maximum current of 150mA. (short-circuit proof).

DALLIS Alarm Contacts

The DALLIS offers two rear panel connectors for transmitting alarm signals:

- **ALARM FORCE M2** 15-pin D-Sub - outputs a number of alarm contacts allowing you to distinguish between a system and PSU failure.

- **ALARM** BNC – triggered by the global alarm only.

➤ The ALARM FORCE M2 Connector

The following contacts are accessible via the **ALARM FORCE M2** (15-pin D-Sub) connector:
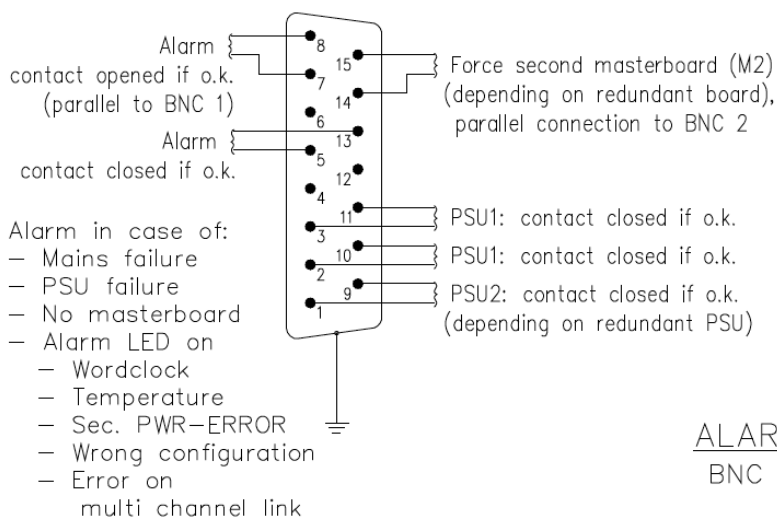
- **Global Alarm** (Pins 7&8) - this contact is open when the DALLIS is running normally, and closes in the event of a DALLIS error.

- **Global Alarm Inverted** (Pins 5&13) – this contact is closed when the DALLIS is running normally, and opens in the event of a DALLIS error.

- **PSU 1** (Pins 3&11, Pins 2&10) – these contacts are closed when PSU 1 is active and open if PSU 1 fails.

- **PSU 2** (Pins 1&9) – this contact is closed when PSU 2 is active and opens if PSU 2 fails.

- **Force second masterboard (M2)** (Pins 14&15) – can be used to force a takeover to the redundant master board, if fitted.

➤ The ALARM Connector

The **ALARM** (BNC) connector also carries the Global Alarm signal (in parallel with the **ALARM FORCE M2** D-Sub connector) described above.
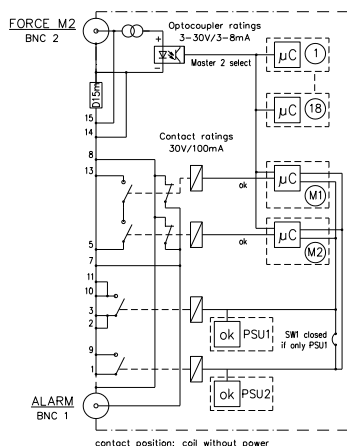
Chapter 3: AdminHD

Introduction

Having installed the physical hardware components of the system, the next task is to programme and upload the system configuration.

AdminHD is the software application used to configure all HD Core systems including the **Nova73** routing matrix, **Nova73 Dual Self Healing Star** (DSHS) and **mc^2** mixing consoles. This chapter is written to cover all products so look out for notes relating specifically to your system.

AdminHD is used when a system is first installed to configure the cards and settings within the HD Core and DALLIS I/O units. It can also be used at any time to update the system configuration.

In addition to configuration, AdminHD may run online to control matrix cross points, adjust signal labels or I/O parameters. You can also reset connections and I/O parameters by saving and loading snapshots from your computer.

AdminHD also provides a number of useful tools for system diagnostics and documentation.

AdminHD and mxGUI

From Version 4.8 software onwards, another programme – **mxGUI** – is available to complement **AdminHD**. The two programmes should be used as follows:

Note

- **AdminHD** – to prepare and upload system configuration files (i.e. define the hardware).

- **mxGUI** – to control or prepare user settings.

Both programmes can run online to remotely control a real system. AdminHD offers control of matrix cross points, signal labels and I/O parameters only. mxGUI emulates the GUI displays of the mc^2 consoles, and therefore provides control of virtually any user parameter.

Both programmes can also run offline to prepare a complete system ahead of an event. Use AdminHD to define the system configuration and transfer the configuration to the mxGUI control system on your computer. Then use mxGUI to prepare and save user settings by saving productions. Once connected to the final system, you can use mxGUI to transfer the AdminHD configuration and any productions from your PC to the mc^2/Nova73 system.

For more details on mxGUI, please refer to the "mc^2 Operator's Manual" or "mxGUI User Guide for Nova73". This chapter deals with AdminHD.

Topic Finder

To find information on a particular topic, use the following links:

- Overview – Page 87.

- Software Installation - Page 96.

- Getting Started

  - Basic Operation – Page 102.

  - Files & Organisation – Page 113.

  - Connecting to the System – Page 118.

  - System Configuration – Page 121.

- Signal Lists – Page 159.

- The 'Connect Manager' – Page 177.

- Systems Diagnostics – Page 180.

- Documenting Your System – Page 187.

- System Configuration: Reference Section – Page 191.

- Nova73 DSHS Configuration: Additional Notes - Page 207.

- mc^2 Configuration: Additional Notes – Page 212.

- AdminHD Preferences – Page 227.

- AdminHD Quick Reference Guide – Page 233.

Overview

AdminHD and ControlHD

When you install the AdminHD software, you may choose to install either of two applications – **AdminHD** and/or **ControlHD**.

AdminHD is the administration programme and has three primary uses: configuration, control and system diagnostics.

ControlHD is a subset of the AdminHD software. It looks and operates in an identical manner, but can only be used for control and system diagnostics. So, for example, users can adjust settings such as matrix cross points or I/O parameters using ControlHD, but they cannot modify the hardware configuration.

By choosing to install only ControlHD on some computers and AdminHD on others, you can set up different computers for different users within the facility.

Note that all the operations of ControlHD are available from AdminHD. For details, please see the "ControlHD Operator's Manual".

AdminHD Modes & Compatibility

AdminHD is used to configure all HD Core systems including the Nova73 routing matrix, Nova73 Dual Self Healing Star (DSHS) and mc^2 mixing consoles.

To ensure that you are not able to configure HD or DALLIS cards which are not released for your product, the programme works in one of three modes:

- **mc^2 console** – $mc^2$56, 66 and 90 consoles.
- **Nova73 HD** – Nova73 stand alone routing matrix.
- **Nova73 DSHS** – Nova73 Dual Self-Healing Star system.

When new hardware options or software features are released for any of these systems, then a new version of AdminHD is issued to enable their configuration.

Note that configurations created for one type of system are not compatible with another. For example, you cannot open a mc^2 configuration with an AdminHD working in Nova73 HD mode.
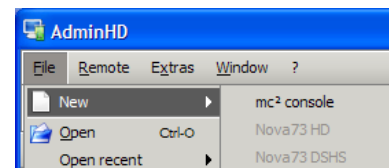
Advantages of AdminHD

The configuration files created by AdminHD are an essential part of the system. If a hardware component is not defined within the configuration, then it will not be visible to users even if it is powered and connected. In other words, the configuration is always the 'master' of the system, regardless of what physical components are added or removed.

This brings a number of advantages to the systems engineer:

- The configuration is always controlled by AdminHD.

- You can configure components which may not be permanently connected (e.g. Stageboxes) so that routes can be made to/from these devices without relying on a physical hardware connection.

- You can easily test changes to the configuration offline. If a component or parameter is not available within the AdminHD software, then it is 'illegal'. This allows you to prepare configuration updates offline, and upload them to the system with confidence.

- AdminHD allows you to upload configuration changes in one of two ways – either permanently to the cold start data (requires a system restart), or temporarily to the online system (no restart required). This allows you to make temporary changes online, and then later perform a cold start to reset the system for its normal configuration.

- AdminHD can connect to the control system of mxGUI. This allows you to open mxGUI using a pre-prepared configuration in order to create user settings ahead of an event.

What Can Be Configured?

AdminHD is used to create two separate configuration files:

⊷ config.tcl

This is the main system configuration. It defines:

- **The System** – the individual hardware components of the system such as the HD Core, DALLIS Units, etc.

- **System Parameters** – system-wide parameters such as the sampling frequency of the HD Core, analogue and digital reference levels and synchronisation options.

- **Signal Parameters** – for each individual signal, the Lawo system address (HLSD), signal name, signal label, I/O DSP and silence detect settings, and Group/Map settings (for use with external controller systems).

⊷ gui_config.tcl

This is the Signal List configuration. It defines the organisation of signals within the Directories and Subdirectories of the system's **Signal List** display:
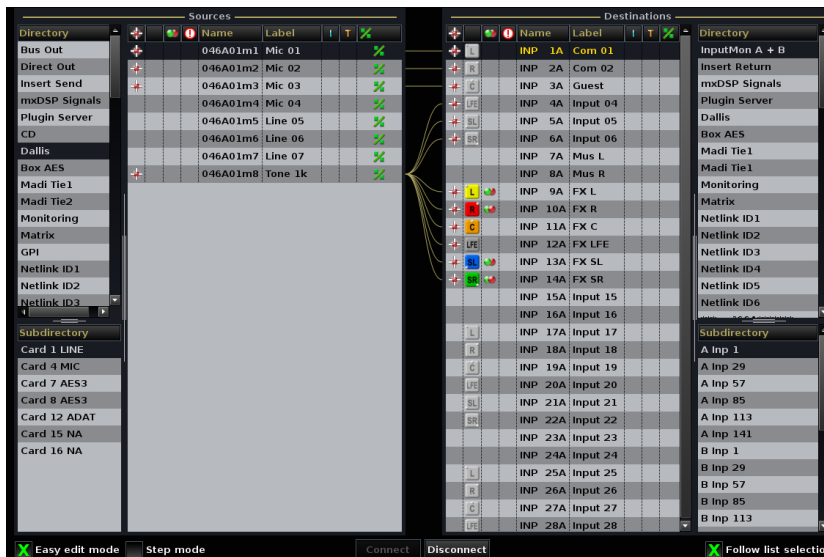
Uploading Configuration Data

Having programmed a configuration on your computer, data is *uploaded* to the mc^2, Nova73 or mxGUI control system via TCP/IP Ethernet:
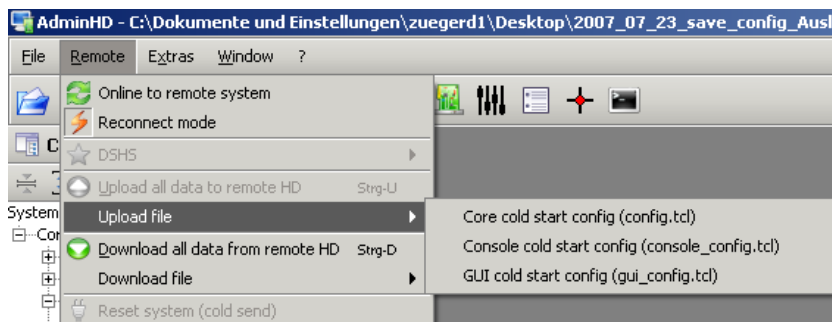
Configuration data may be uploaded in one of two ways: either permanently to the cold start data (requiring a system restart), or temporarily to the online system (no restart required):

Cold Start Data

To change the cold start configuration, you must upload the new configuration files (config.tcl, gui_config.tcl) from AdminHD. Then cold start the system for the changes to take affect.

Cold start data is designed to reset the system back to a default state. i.e. with no user data loaded or latest settings. The configuration files stored within this area of the system should be used as the default configuration. This is the configuration which you can revert to at the end of a production to refresh the system for a "clean" setup.

Warm Start Data

Alternatively, temporary changes can be made to the online configuration without a restart. This method updates only the online configuration (held in memory) and does not affect the cold start data described above.

If the system shuts down, then the online configuration is stored as part of the system's warm start data. (Warm start data is what is normally loaded following a power on or reboot.) This means that providing you do not cold start the system, any changes made will remain intact.

Cold Start vs Online Configuration

When choosing which method to use, bear in mind the following points:

Warning

Warm start data is temporary. Therefore, if the system is 'cold started', any updates to the online configuration are lost.

Only the system configuration can be modified online. To modify the Signal List configuration, a new gui_config.tcl file must be uploaded and a cold start performed.

As a result we recommend the following:

* *ALWAYS* upload to the cold start data for permanent changes to a system configuration.

* To modify the GUI's **Signal List**, you must upload a new gui_config.tcl file and perform a cold start. Therefore, any accompanying system configuration changes should be made to the cold start data (by uploading a new config.tcl file).

* If the system configuration is updated online (without a restart), then any new signals can be controlled from the Connect Manager or remote MNOPL, but not from the GUI's **Signal List** (see above).

Downloading Configuration Data

To help modify existing configurations, you can also transfer files in the opposite direction – from the system to AdminHD. This process is called a *Download*.

If you are updating an existing configuration, it is good practice to download the existing configuration to your AdminHD computer, and then modify it. This way you can be sure that you are editing the latest data.

Within a networked installation, you can *upload* to or *download* from any system on the network, providing convenient control of updates from any network access point.

Working with mxGUI

You may also upload or download files to or from the local Control System of mxGUI. This allows you to transfer configuration data to mxGUI so that you can prepare user settings to match.

Make sure that any productions you create are stored together with the accompanying AdminHD configuration data in mxGUI's shared folder. For more details on mxGUI, please refer to the "mc^2 Operator's Manual" or "mxGUI User Guide for Nova73".

Online Control – The 'Connect Manager'

In addition to configuration, AdminHD can be used for control:
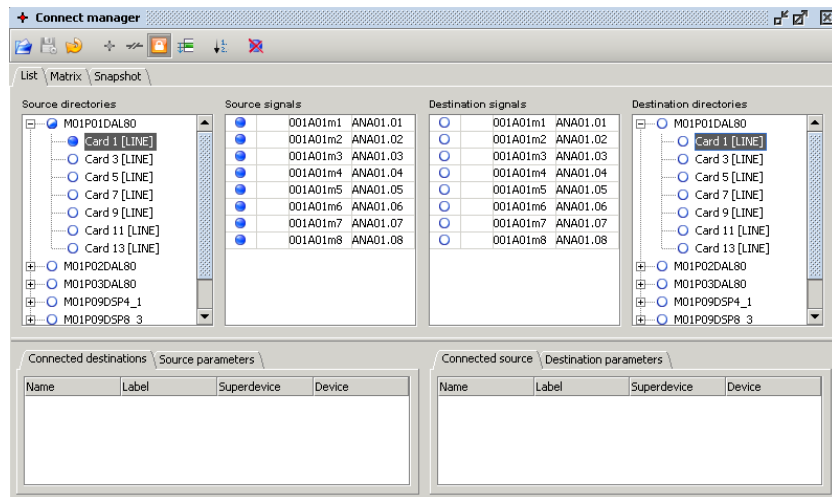
The AdminHD computer must be connected to the system via TCP/IP Ethernet. Once you have downloaded the system's configuration and switch to online mode, you may use the 'Connect Manager' window to control:

- **Matrix crosspoints** – from any input to any output.

- **Edit signal labels** – online renaming of signal labels.

- **Control I/O parameters** – for example, to adjust microphone preamp gain, high pass filter switching, etc.

- **Save and recall snapshots** – to reset any number of signals, with partial or global recalls. A snapshot stores connections to or from a signal, the signal's label and I/O parameter values.
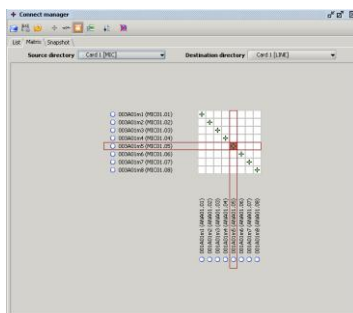
Matrix Control | I/O Parameter Control | Snapshots
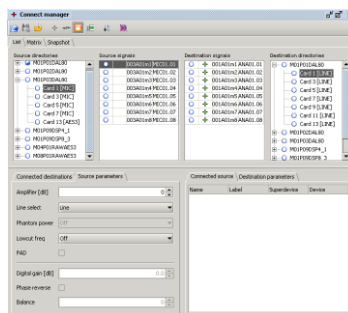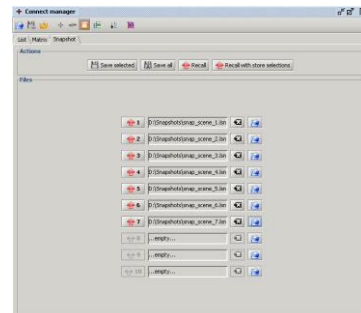
Note that the features of the 'Connect Manager' are covered separately within the "ControlHD Operator's Manual".

Note

Note also that from Version 4.8 software onwards, mxGUI provides an alternative interface for these parameters and more. Please refer to the "mc^2 Operator's Manual" or "mxGUI User Guide for Nova73".

Signal Lists

Within AdminHD, you can choose whether the 'Connect Manager' has access to all signals within the system, or a subset. For example, you may wish to provide different ControlHD users with access to different parts of the routing matrix. This can be achieved by creating a signal list for each ControlHD client.

A signal list is an AdminHD file which orders source and destination signals into Directories and Subdirectories. It can be used for one of two purposes:

- In AdminHD or ControlHD, a signal list can be opened within the 'Connect Manager' in order to view signals in custom named Directories and Subdirectories, or to limit the signals to a subset of the matrix.

- In mc^2 or Nova73 systems, the signal list configuration (gui_config.tcl) generates the GUI's **Signal List** display.

Signal lists are created by the 'Signal List Editor' and stored as separate **.slx** files to the main configuration (**.csv** file):
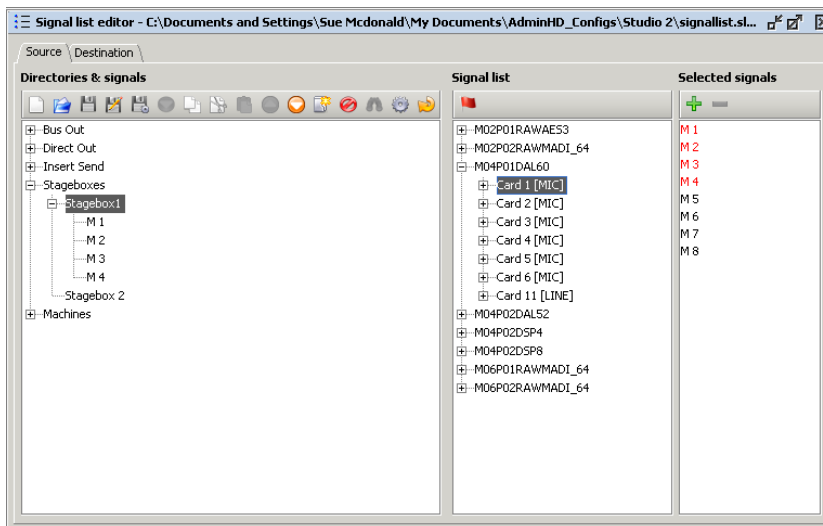
You may create multiple signal lists which all relate to the same configuration if you wish. For example, you may issue different signal lists to different ControlHD clients around the facility. Each ControlHD client can then open their signal list within the 'Connect Manager' to control a subset of the matrix.

System Diagnostics

When running online, AdminHD can also help monitor the status of the hardware within a system.

Note that this feature is also available in ControlHD.

The AdminHD computer must be connected to the system via TCP/IP Ethernet and operating in online mode. Once online, you can use the 'Core Browser' and 'Graphic View' windows to monitor the actual status of hardware components within your system:
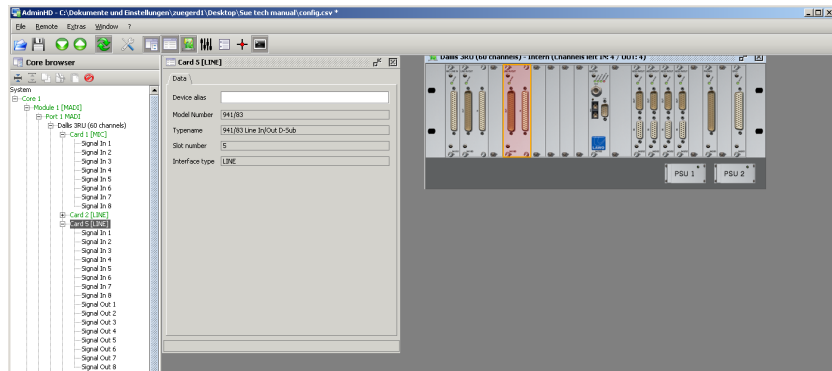
Components in red are faulty; components in green are operating normally.

Documenting Your System

Finally, AdminHD can help you document your system once you have programmed your configuration.
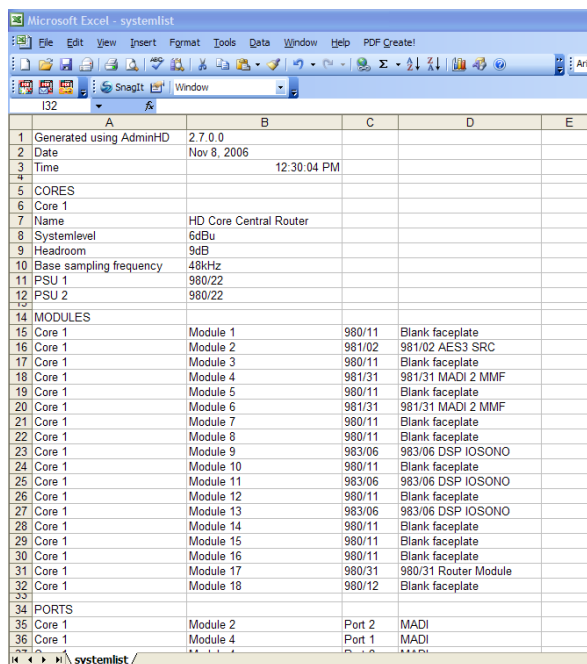
Save Images

You can save the 'Graphic View' of system components such as the HD Core and DALLIS units. In mc^{2}66 mode, you can also copy the 'Console Panel' which shows the layout of the control surface. These images can then be distributed to other users or staff within the facility:

Export a Component Parts List

You can export a component parts list as a **.csv** file. This can be opened in a 3rd party editor, such as MS Excel, to produce a parts list of all system components:

Software Installation

This section describes the system requirements for your AdminHD/ControlHD computer, and guides you through the software installation process.

Note that when you install the software, you may choose to install ControlHD, AdminHD or both. This allows you to set up different computers for different users within the facility.

System Requirements

The software is designed to be used with a PC. To install and run the software, your computer must meet or exceed the following requirements:

- Hardware: Pentium® -PC 500MHz or higher
- Operating System.:   Windows XP, Vista, Windows 7 or MAC OS X
- Hard Disc: 200 MB free space
- Operation: Keyboard and mouse
- Interface: Ethernet 10/100Mbit

Installing the Software

AdminHD is delivered in a compressed format. In order to run the programme, the Installation Wizard installs the programme files on your PC.

Warning

Before you start the installation, make sure the system requirements mentioned above are met.

To install the programmes onto your computer:

1. Insert the Software CD into your CD-ROM drive.

2. In the file system, open the AdminHD folder.

3. Double click on the application "**install.exe**" (Windows) or "**install.bin**" (Linux) to start the installation.

The Installation Wizard is decompressed and starts as follows:
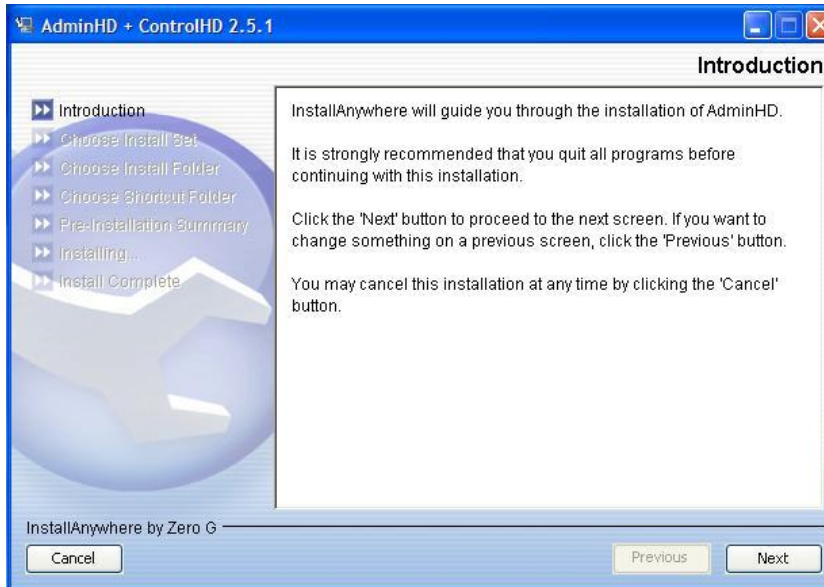
4. Read the on-screen instructions and proceed by clicking on **Next**.

5. Choose whether you wish to install AdminHD, ControlHD or both programmes by making a selection – in our example, **AdminHD** - and click on **Next**:

You are now asked to choose an install folder:

By default, files are installed in the location: 'C:\Program Files\Lawo/AdminHD'.

6. Select **Choose** if you wish to select a different install folder, or click on **Next** to continue.

Next you are asked to select a location for the programme shortcut:

Note

By default, the programme will be added to a new Program Group called **AdminHD**. Note that for the remainder of this manual, we will assume that you have chosen the default location.

7. Choose one of the alternatives if you wish, or click on **Next** to continue.

The Install Wizard gives you an overview of the specified data:

Select **Previous** if you want to change any of these settings.

8. Click on **Install** to confirm your settings and start the installation.

The software is installed on your PC. This may take a few minutes:
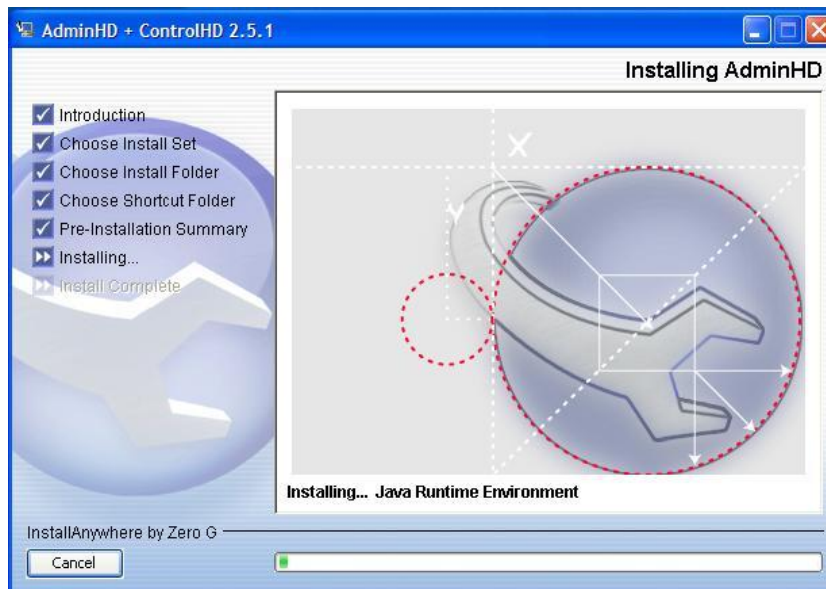
When the installation is complete, the following window appears:
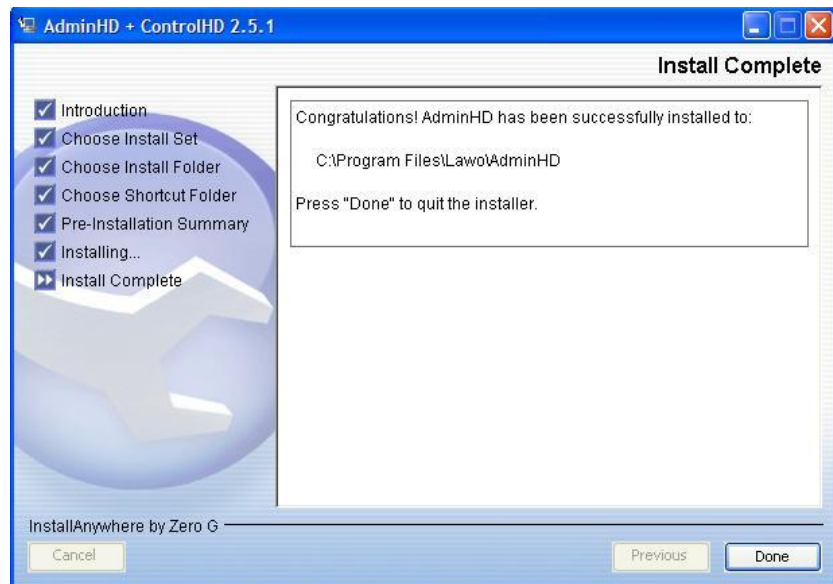
9. Click on **Done** to exit the Install Wizard.

Your selected programme is completely installed and ready to use. There is no need to restart your computer.

If you have any problems installing the software, then please contact your local Lawo representative or email service@Lawo.de.

Uninstalling the Software

If you wish to uninstall AdminHD or ControlHD, then use the "Add or Remove Programs" option within the Control Panel of your operating system.

Getting Started

The next four sections will guide you through:

- **Basic Operation** – how to start AdminHD and navigate around an existing configuration.

- **Files & Organisation** – how to organise the files created by AdminHD and where they are stored.

- **Connecting to the System** – how to connect your AdminHD computer to the system or mxGUI.

- **System Configuration** – how to download, edit, and upload a system configuration.

Note that these sections apply to all Lawo products (Nova73, Nova73DSHS and mc^2) and aim to get you using the software as quickly as possible.

Note

For further details, please see:

- **System Configuration** – Page 191 – reference section covering all system configuration parameters.

- **Nova73DSHS Configuration** - Page 207 – additional notes for DSHS users.

- **mc^2 Configuration** – Page 212 – additional notes for $mc^2$56, $mc^2$66 and $mc^2$90 users.

If you already have a system configuration and want to learn more about the following applications, then follow these links:

- **Signal Lists** – Page 163 – how to create a signal list using the 'Signal List Editor'.

- **Systems Diagnostics** – Page 180 – how to fault find components online, use the 'Remote Log' window, and download system message logs.

- **Documenting Your System** – Page 187 – how to copy images of the system or export a parts list.

- **Online Control** – Page 177 - how to use the 'Connect Manager'.

For an overview of all AdminHD's menu options and Toolbars, see the Quick Reference Guide at the end of the chapter - Page 233.

Getting Started: Basic Operation

Starting the Programme

1. Start the software, by selecting **START** -> **Program Files** -> **AdminHD** -> **AdminHD**, or clicking on the shortcut icon.

The 'Operating Console' opens. This is the main operating window for the AdminHD software and will appear blank until you open a configuration:
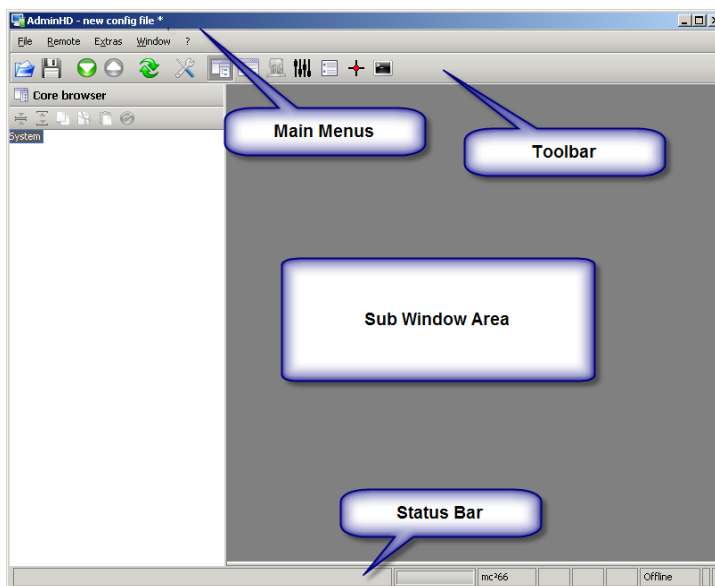
The 'Operating Console' consists of:

- **Main Menus** - access to the **File**, **Remote**, **Extras**, **Window** and **?** menus.

- **Toolbar** – fast access to the programme's most common functions and sub windows. Note that many functions are not available until you have opened a configuration; some functions are only available once AdminHD is running online.

- **Sub Window Area** - beneath the Toolbar is the main area of the Operating Console in which you can open a variety of sub windows such as the 'Core Browser', 'Remote Log', etc.

- **Status Bar** - at the very bottom of the display you will see the Status Bar. This shows information relating to the programme such as the AdminHD mode and whether AdminHD is online or offline.

Note that depending on the settings within the **Extras** -> **Preferences** -> **Startup** pop-up, the 'Core Browser' or 'Remote Log' sub windows may open automatically when you start AdminHD. See Page 227 for details.

Opening a Saved Configuration

Many of the menu and Toolbar functions remain unavailable until you have opened a configuration.

If you don't have a configuration on your computer, then go to Page 121 for details on programming your first configuration.

1. Click on the Open existing config button from the Toolbar.

Alternatively, press **CTRL + O** on your computer keyboard, or select the **File** -> **Open** option from the main menu bar.

2. Choose the filename of your configuration – in our example **TVProduction_Config.csv**.

The configuration opens and you will see the structure of the system appear within the 'Core Browser' on the left hand side of the display; the AdminHD mode is shown within the Status bar:
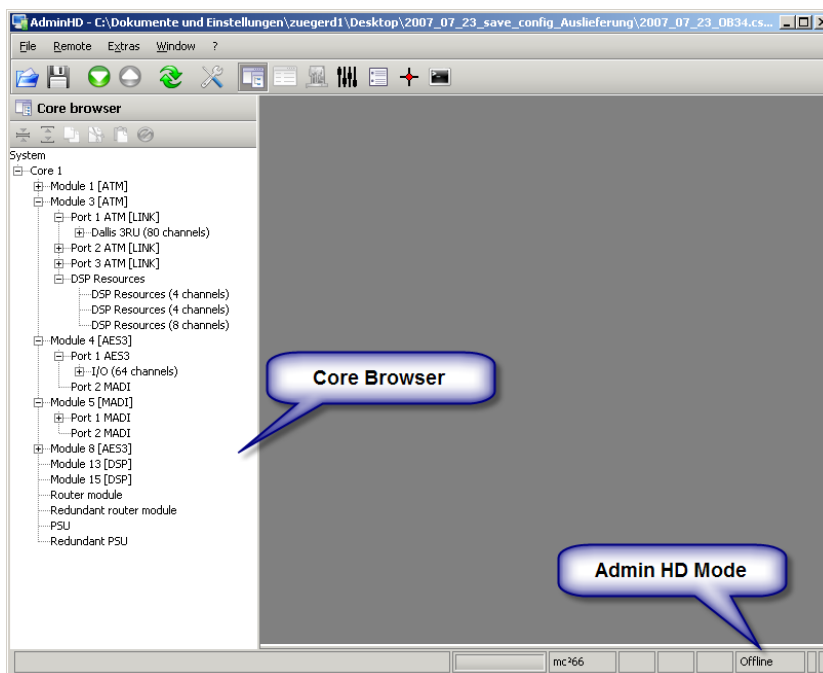
3. If you can't see the 'Core Browser' then open it by clicking on the appropriate button from the Toolbar.

Rather than **File** -> **Open**, you can use **File** -> **Open recent** to select a recently opened configuration:
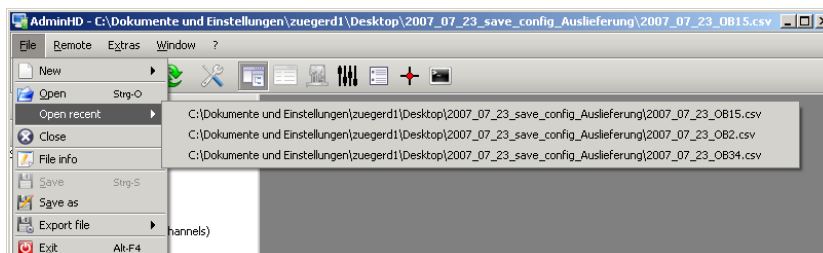
The System

Within the 'Core Browser', the hardware of your system is represented using a tree-like structure:

1	**System**	At the top of the tree is the **System**. Each configuration consists of a single **System** which contains all the hardware components for your installation.
2	**Core**	Within the **System**, you may define the type of HD **Core**.
		Note that in Nova73 or mc^{2}66 mode, each system consists of a single Core. In Nova73 DSHS mode, you can add up to two Cores representing one side of the 'star'.
3	**Modules**	Next, you fit the **Core** with **Modules**. In the example opposite, **Core 1** is fitted with an AES 3 Module in slot 2, a MADI Module in slot 4, etc.
		Note that any standard components, such as the **Router module**, main **PSU** and **Redundant PSU** are added automatically when you define the Core.
4	**Ports**	Each **Module** can then be opened to view its I/O **Port**s.
		In the case of an AES 3 Module, this provides access to the AES inputs and outputs on the module.
		In the case of a MADI or ATM module, then the ports can be connected to ancillary devices, known as Super-Devices, such as a DALLIS unit.
5	**Cards**	Super-devices, such as the DALLIS, are fitted with **Card**s. In our example, **Card 1** is a Mic/Line card providing 4 signal inputs.
6	**Signals**	At the lowest level of the system tree are the signals themselves – in our example, **Signal In 1** to **4**.

Note

The component options which can be added to the system are governed by the AdminHD software release and the AdminHD mode. This ensures that you can never add or configure 'illegal' components or parameters!

The 'Core Browser'

The 'Core Browser' is used to navigate around, and add components, to your configuration:

1. To show or hide the 'Core Browser', click on the appropriate button from the Toolbar, press **Ctrl** + **SHIFT** + **B** on your computer keyboard, or select the **Window** -> **Core Browser** option from the main menu bar.

Note that the 'Core Browser' may be set to open automatically, when you start AdminHD, within the **Extras** -> **Preferences** -> **Startup** menu. See Page 227 for details.

Depending on how the configuration was last saved, some of the **System** branches may already be open.

2. Click on the **+** sign next to an entry to open up a branch of the system.

The sub components within that branch become visible.

3. Click on the **–** sign next to an entry to close the branch.

The branch collapses condensing the overview.

4. Click on the **Collapse** or **Expand** buttons, on the 'Core Browser' toolbar, to show or hide entries within a branch.

You can also navigate around the system tree using the arrow keys on your computer keyboard:

- Up arrow = up

- Down arrow = down

- Left arrow opens a branch

- Right arrow closes a branch

⮞ Adding System Components

When programming a configuration, you can use the Core Browser to add components as follows:

1. Select a component – e.g. **System** – and right-click.

A drop-down menu appears listing the available options. In our example, we can select the type of HD Core we wish to add to the system.

2. Make the selection.

The Core is added to the System tree.
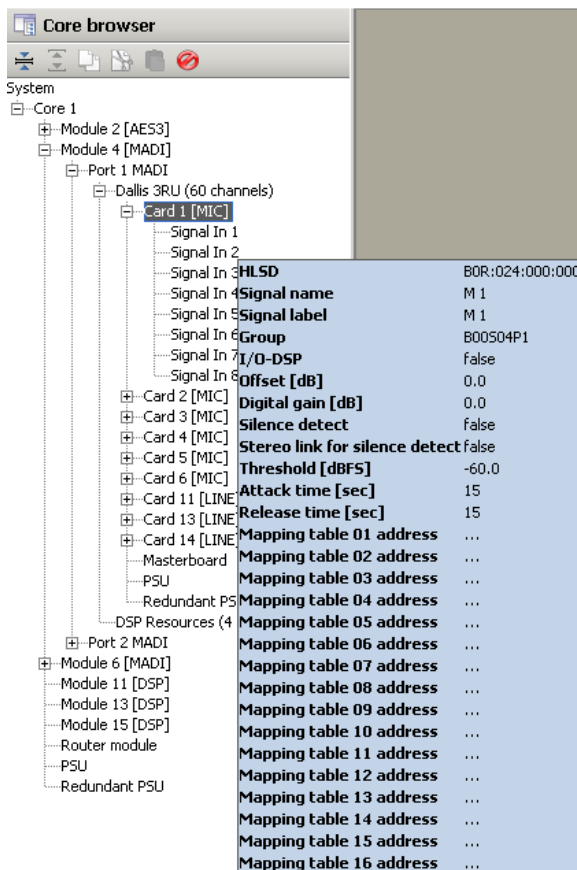
For more details on using the 'Core Browser' to configure a system, see Page 121.

For a quick guide to the 'Core Browser' Toolbar, see Page 233.
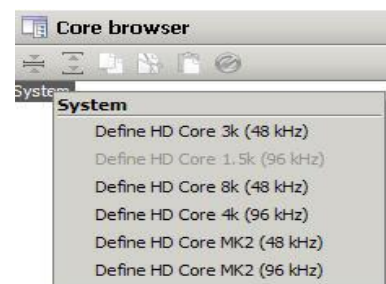
▸▸ **Signal Summary**

1. If you open up all the branches of the system tree you can view the signals.

2. Point your mouse over a **Signal In** or **Signal Out** and a summary will appear showing all the parameters for that signal:

The Operating Console Sub Windows

The 'Core Browser' is just one of seven sub windows which can be opened from the **Toolbar**, from the **Window** main menu, or using a keyboard shortcut.

1. Click on **Toolbar** buttons 7 to 13 to open or close a sub window as follows:

7		**Core Browser -** here you can navigate around the system and add system components.
8		**Parameter Box -** this window is used to display or enter settings for the component or signal selected within the 'Core Browser'.
9		**Graphic View -** this window shows a graphical representation of the hardware component selected within the 'Core Browser'.
10		**Console Panel** – only available in mc^{2}66 mode, this window is used to configure the console control surface.
11		**Signal List** – here you can create signal lists for use with the 'Connect Manager' or mc^{2}66.
12		**Connect Manager –** here you can control the system online to set matrix cross points, edit signal labels, control I/O parameters or save/recall snapshots.
13		**Remote Log -** this window logs all the messages generated by AdminHD or the HD Core.

Note that some of the Toolbar buttons may be unavailable (greyed out). For example, 'Graphic View' is not available unless a suitable hardware component, such as a Core or DALLIS, is selected within the 'Core Browser', while the 'Console Panel' is only available in **mc^{2}66 HD** mode, etc.

Toolbar buttons 1 to 6 are used for file management and upload/download functions. See Page 236 for details.

The seven sub windows are rarely used in isolation and tend to be used in different combinations depending on the application.

For example, during configuration you will most likely work with the 'Core Browser', 'Graphic View' and 'Parameter Box':
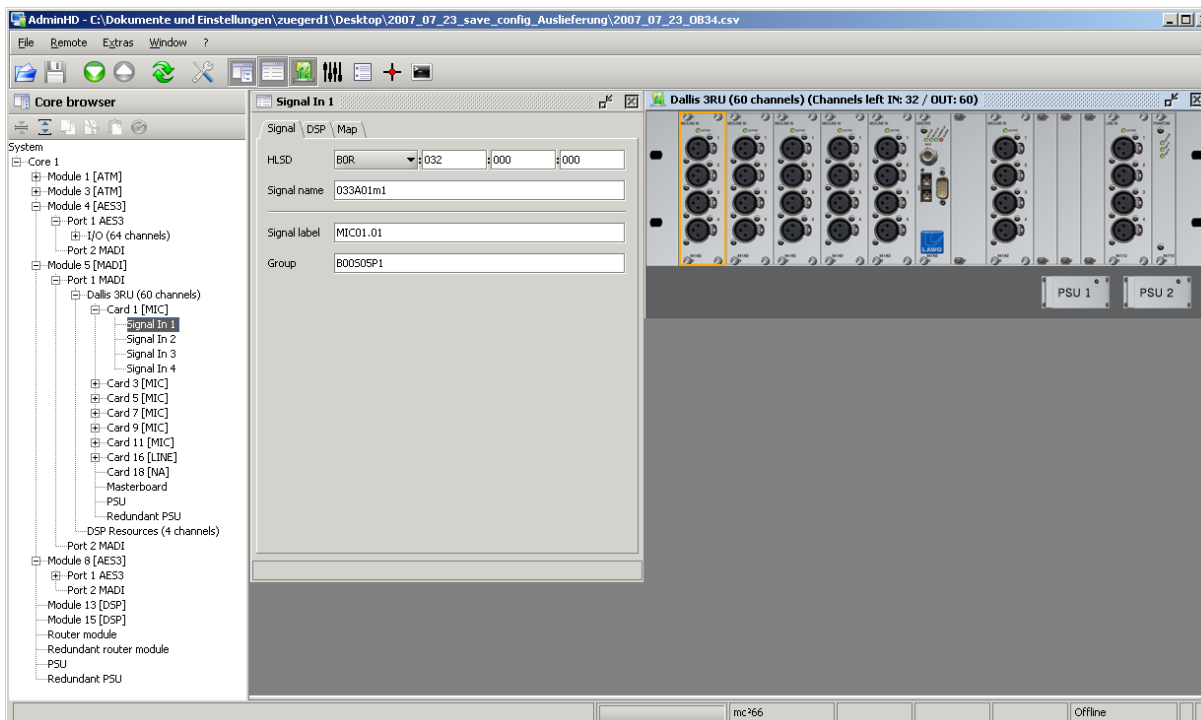
To control the system online, you might combine the 'Connect Manager' with the 'Remote Log':
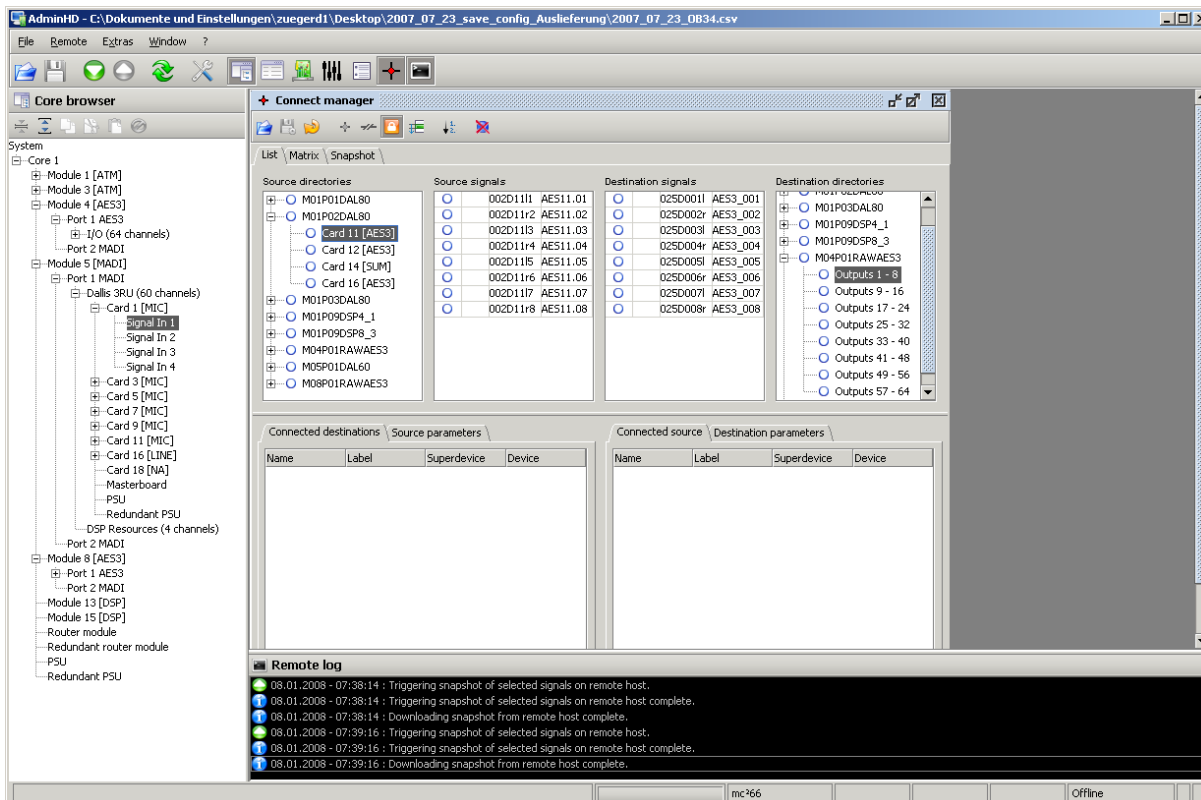
Arranging the Sub Windows

AdminHD allows you to close, minimize, resize or move windows as follows.

Note that not all options are available for all windows. For example, the 'Core Browser' cannot be minimized or moved, while the 'Graphic View' cannot be resized.

Note

1. Click on the [X] button to close a window:

2. Click on the button to minimise a window.

Minimized windows are reduced to a button, for example:
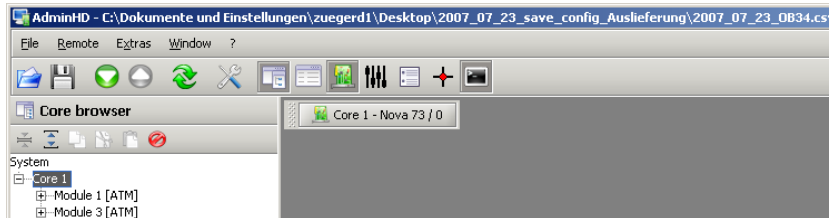
3. Click on the button to restore the window to its original size and position.

4. To change the width of a window, point to the left or right margin of the window. When the pointer is displayed as horizontal double-headed arrow you can drag the margin to the left or right.

5. To change the height of a window, point to the upper or lower margin of the window. When the pointer is displayed as vertical double-headed arrow you can drag the margin up or down.

6. To change the height and width at the same time, point to one of the corners of the window. When the pointer is displayed as diagonal double-headed arrow you can drag the margin in any desired direction.

7. Some windows can be moved within 'Operating Console' – for example, the 'Graphic View'. To do so, place the mouse pointer over the title bar of the window, left click and hold the mouse button down while you drag the window to its new position. Release the mouse button to release the window.

Let's take a closer look at some of the sub windows:

'Graphic View'

The 'Graphic View' window shows a graphical representation of the hardware component selected within the 'Core Browser', and can display any type of HD Core or DALLIS unit:
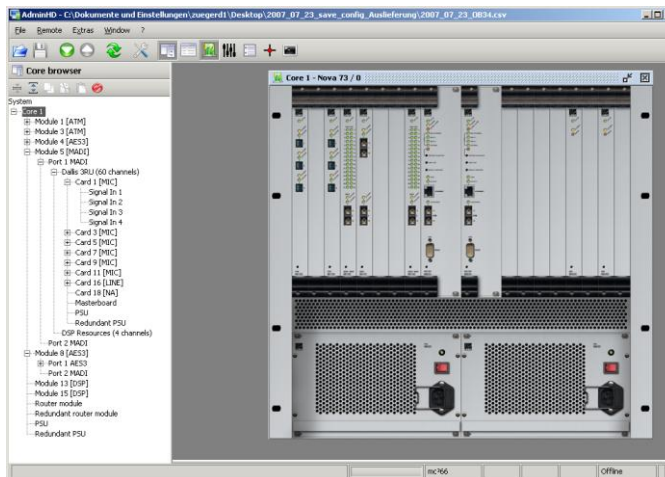
1. To show or hide the 'Graphic View', click on the appropriate button from the Toolbar, press **Ctrl** + **SHIFT** + **F** on your computer keyboard, or select the **Window** -> **Frame editor** option from the main menu bar.

Note that the 'Graphic View' cannot be opened unless a valid hardware component is selected in the 'Core Browser' – in other words, you *MUST* select a component within the HD Core, or within a DALLIS, before the 'Graphic View' becomes available.

2. As you navigate around the system configuration using the 'Core Browser', the 'Graphic View' updates to show the selected component.

If you select an entry in the 'Core Browser' for which no graphical view is available (e.g. **System**), then the 'Graphic View' closes automatically.
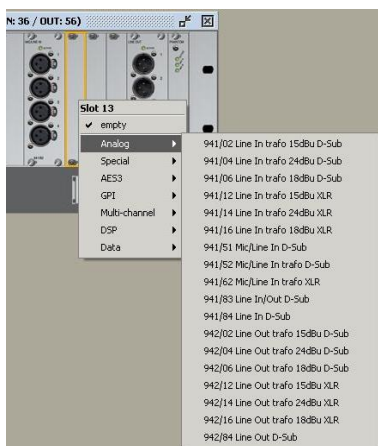
⏵ Fitting Modules or Cards

When programming a configuration, you can use the 'Graphic View' to add modules to a Core or cards to a DALLIS as follows:

1. Select a card slot and right-click.

A drop-down menu appears listing the available options. In our example, we are selecting an analog mic card for the DALLIS.

2. Make the selection.

The card is added to the DALLIS within the 'Graphic View' and 'Core Browser' on the left of the display.

For more details on using the 'Graphic View' to configure a system see Page 121. Or for system diagnostics see Page 180.

The 'Parameter Box'

The 'Parameter Box' is used to display or enter settings for the component or signal selected within the 'Core Browser':
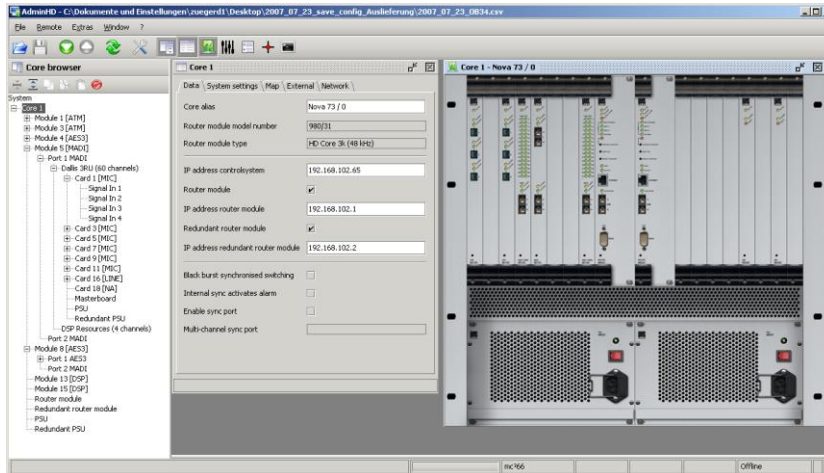
1. To show or hide the 'Parameter Box', click on the appropriate button from the Toolbar, press **Ctrl** + **SHIFT** + **P** on your computer keyboard, or select the **Window** -> **Parameter Box** option from the main menu bar.

The 'Parameter Box' can also be opened directly from the 'Core Browser' by double-clicking on the component.

2. Now navigate through the system components using the 'Core Browser' and note how the 'Parameter Box' updates to show the settings for the currently selected component.

Note that for some components, there are multiple pages of parameters – in our example, **Data**, **System Settings** and **Map**.

3. Click on the tabs at the top of the 'Parameter Box' to change between pages.

Grey parameter fields (e.g. **Router module type**) are for information purposes only and cannot be modified.

White parameter fields can be edited and saved within the configuration.

The Remote Log

This window logs all the messages generated by AdminHD, and the system when AdminHD is running online. It is normally used to check for errors but can also be useful for confirmation of operations such as uploads or downloads:
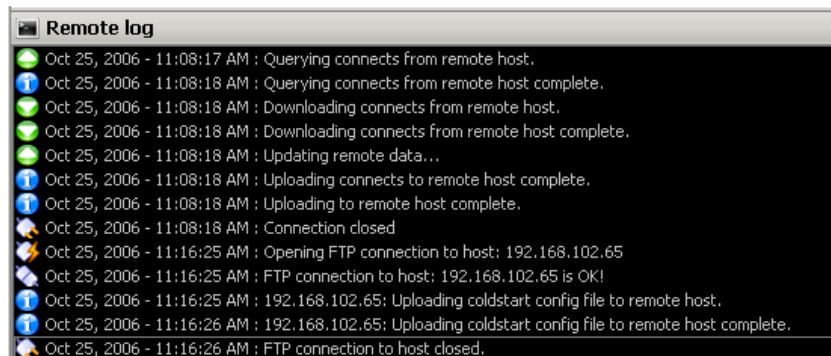
1. To show or hide the 'Remote Log', click on the appropriate button from the Toolbar, press **Ctrl** + **SHIFT** + **L** on your computer keyboard, or select the **Window** -> **Remote Log** option from the main menu bar.

Note that the 'Remote Log' may be set to open automatically, when you start AdminHD, within the **Extras** -> **Preferences** -> **Startup** menu. See Page 227 for details.

The 'Remote Log' logs all messages while AdminHD is running. If you exit AdminHD and re-open it, then the previous log is lost.

You can save the 'Remote Log' at any time as a text file. For example, you may be asked to do this by a Lawo service engineer. You can also choose to clear the 'Remote Log' to get a better overview of an event or operation. See Page 183 for details.

That completes our tour of the main configuration sub windows. Follow these links for details on:

- **The Console Panel Configurator** – Page 213.

- **The Signal List Editor** – Page 163.

- **The Connect Manager** – Page 177.

Getting Started: Files & Organisation

AdminHD can be used to create a number of files relating to the system. This section looks at how these files are created and where they are stored.

Admin HD Configuration Files
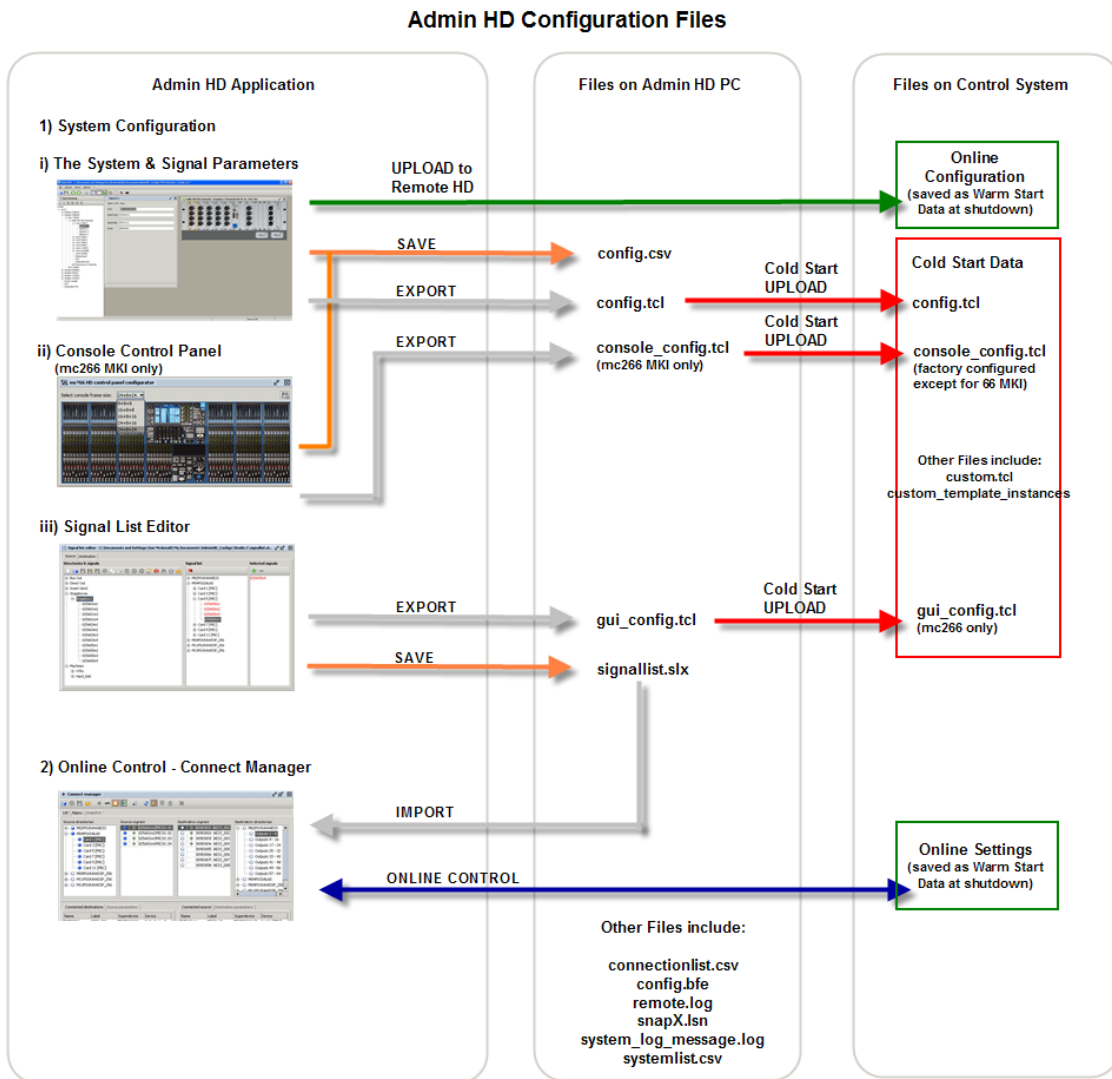
Files Stored on the System

Depending on whether your product is a **Nova73** or **mc²** console, each control system holds a number of configuration files within its cold start data:

- **config.tcl -** this is system configuration file and is what defines the HD Core, DALLIS and their signal parameters. This file can be edited by AdminHD.

- **gui_config.tcl** – this is the Signal List configuration file which defines the GUI's **Signal List** display. This file can be edited by AdminHD.

- **console_config.tcl** – this is the console configuration file which defines the layout of the control surface. In MKI mc²66 consoles, this file can be edited by AdminHD. For all other systems, it is factory-configured.

- **custom.tcl** – this file stores customer-specific functions such as fader starts, etc. It is factory-configured and must be edited by the Lawo configuration team.

- **Custom_template_instances** – this folder stores the custom functions programmed from the GUI's **Custom Functions** display. Each function is stored as a separate .tcl file within this folder. The **Custom Functions** display can be accessed from the console GUI or mxGUI providing the display is enabled. Please refer to the "mc² Operator's Manual" or "mxGUI User Guide for Nova73" for more details.

All settings stored within the system configuration (**config.tcl**) may also be uploaded to the online configuration. However, if the system is "cold started", then this data is lost and you will need to upload the data again from AdminHD.

Note

Note that the Signal List configuration (**gui_config.tcl**) can *ONLY* be uploaded to the cold start data. Therefore, to update the **Signal List** display, you must be prepared to cold start the system.

Files Stored on Your AdminHD Computer

AdminHD creates a number of files which you will need to organise on your computer:
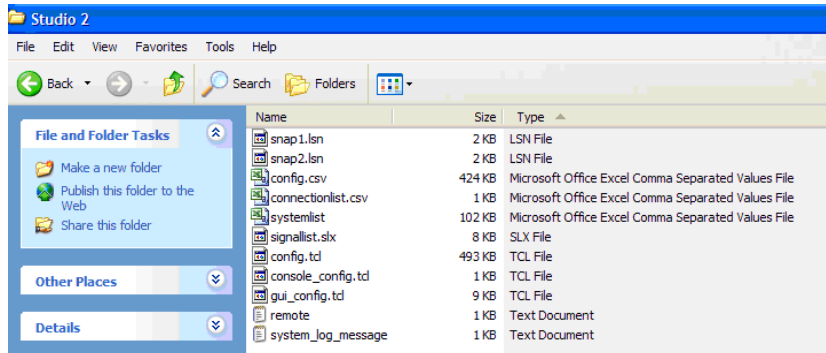
If you are working within a networked installation and have different configurations for the different studios/OBs, then you should create a separate folder for each system on your computer. This will help keeps all files relating to each individual system together in one location.

Config.csv

This file is created when you save the current AdminHD configuration on your computer (using **File** -> **Save** or **File** -> **Save As**). It is a .csv file which can be opened by AdminHD, ControlHD or imported into a 3rd party editor such as MS Excel.

You can give this file any name as long as it keeps the .csv suffix, so choose something descriptive – e.g. **OB1Config.csv**. It is a good idea to keep the word Config in the name to distinguish this file from other AdminHD .csv files.

Remember to save all your configurations as config.csv files so that they may be opened and uploaded at a later date.

Tip

.tcl Files

The **config.tcl** and **gui_config.tcl** files are exported from AdminHD before you upload them to the system. This ensures that you keep a backup copy of all .tcl files on your computer.

DO NOT rename the files, otherwise they cannot be read by the system! *DO NOT* edit the .tcl files under any Windows application except AdminHD as this may damage the files.

You should only ever have one current cold start configuration for each system as this is your default system starting point. However, it is a good idea to keep backup copies of 'older' configurations, especially your factory configuration, on your PC. So store them in a subfolder or change the filename.

Tip

Signallist.slx

This file is created when you save a Signal List within the 'Signal List Editor'. It is a .slx file which can only be opened by AdminHD or ControlHD. You will need to copy this file to other AdminHD or ControlHD computers if you wish to open the Signal List within the 'Connect Manager'.

You can give the file any name you like as long as it keeps the .slx suffix. If you are creating multiple signal lists for different ControlHD/AdminHD users, then choose something descriptive – for example, **AudioControl.slx**, **VideoGallery.slx**.

The **GUI_Config.tcl** file is created by exporting the signal list.

Systemlist.csv

This file can be exported from AdminHD and saved on your computer if you wish to generate a parts list for all the hardware within your configuration. Having exported the file, you can open it within a 3rd party editor such as MS Excel, in order to print or view all the components.

Connectionlist.csv

This file can be exported from AdminHD's 'Connect Manager'. Having exported the file, you can open it within a 3rd party editor such as MS Excel, in order to print or view all matrix crosspoints set within the system.

Config.bfe

This file can be exported for use with a BFE controller system. This feature is project-specific, so please contact your local Lawo representative or email service@Lawo.de for more details.

Remote.log

This file can be exported if you wish to save a copy of the 'Remote Log' window (system diagnostics) as a text file:
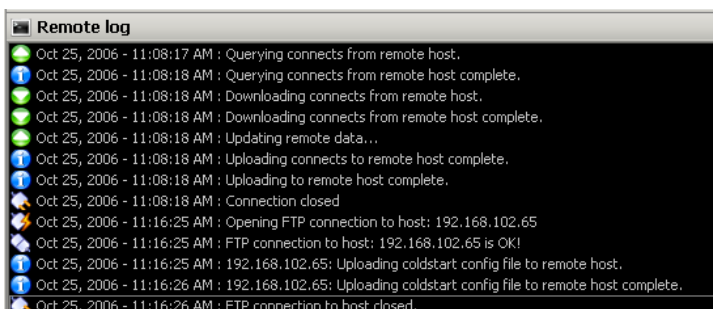
You may be asked for this file if you request assistance from the Lawo service department.

System_log_message.log

In addition to AdminHD's Remote log, the system itself generates and stores error messages. These can be downloaded from the system and saved on your computer as a text file.

SnapX.lsn

You can save and recall snapshot files from your AdminHD or ControlHD computer in order to reset matrix crosspoints or I/O parameters online via the 'Connect Manager'.

If you are creating snapshots for multiple systems, then store them within separate folders on your computer.

Getting Started: Connecting to the System

When you programme a configuration, you do not need to be connected to the system. However, to upload or download configuration data, or to control the system online, you will need to connect to the Control System of your console or Nova73.

Note

Note that you can upload or download data to/from mxGUI by starting the mxGUI programme on your computer, and entering its virtual IP address (192.168.56.101) during the upload or download procedure. See Pages 122 and 153 for details.

For mc^2 or Nova73 systems, connect your AdminHD computer to the system's Ethernet network, and configure its TCP/IP settings as follows:

Network Connection

Your AdminHD computer must be connected to the **ETHERNET** port of the control system. Depending on your product, the control system may be located on the Router Module of the HD Core, within the console control surface or within an external matrix control server (ripper PC). For specific details, please refer to Chapter 2: Installation: System Connections.

For connection to multiple computers via a network switch, use a straight (1:1) network cable (STP-CAT 5 with RJ45 connectors on both sides).

Note that you must use a network switch (included with the system) and *NOT* a Hub.

TCP/IP Configuration

To establish communication, you will need to configure the TCP/IP settings for your computer's Network Interface card.

You can find information on configuring TCP/IP settings within Windows from www.microsoft.com.

For a direct connection, set the IP Address and Subnet Mask as follows:

IP Address

Depending on your Lawo product, the default TCP/IP address of the system varies as follows:

- **Nova73** = 192.168.102.1
- **mc²56** = 192.168.102.56
- **mc²66MKI** = 192.168.102.65
- **mc²66MKII** = 192.168.102.65
- **mc²90** = 192.168.102.90

If a redundant control system is fitted then its address will be one digit higher than that of the main control system.

The IP Address of your computer's Network Interface card must be unique, and set within the same range as that of the system. So, for example, to connect to a new mc²66, you could set the computer's IP Address to 192.168.102.69.

Take care when setting the IP address of the system. If there is an IP conflict within the network, then the Nova73 or mc² system may not operate correctly.

Note

Subnet Mask

The Subnet Mask of your computer's Network Interface card should be identical to that of the system. For all products, the default Subnet Mask is 255.255.255.0.

In a networked installation, it is likely that you will be connecting via an Ethernet switch, so please consult your network administrator for further details.

Checking the Connection

If you are new to AdminHD and have no configuration loaded within the programme, then the easiest way to check your network connection is to download the configuration from your system. Details on this operation can be found on Page 122.

Alternatively, if you have a configuration for the system open, then you can simply enable online mode as follows:

1. Click on the appropriate button from the Toolbar, or select **Remote** -> **Online to remote system** from the main menus:
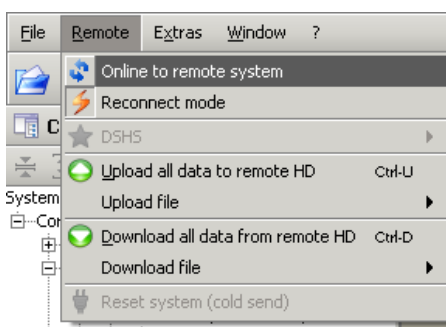
*AdminHD connects to and synchronises with the system. The **online** status is displayed in the Status bar:*
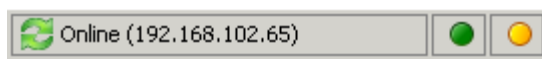
If there is a problem with the connection, check the 'Remote Log' as this will show that the connection has timed out.

If this occurs, check your connections and the TCP/IP settings.

Note that you may need to disable your computer's firewall to make the connection.

You can also test your network connection to the system using a 'Ping' command – see Chapter 4 for details.

Getting Started: System Configuration

In this section you will learn how to download, edit, and upload a new configuration.

There are two approaches you can take when creating a new configuration:

The easiest method, if you can connect to your system, is to download the existing configuration data from the system and then edit it offline.

Alternatively, if you don't have a connection to your system yet, then you can create a configuration from scratch.

In either case, it is vital that your system configuration matches that of your physical hardware in order for the system to operate correctly.

Let's look at each approach.

Downloading a Configuration

If you have established a connection between your AdminHD computer and the system, then the easiest way to create a new configuration is to download the existing data and update it!

Note

Note that when you download the configuration, you will download the current data (stored in online memory). Therefore, to download the cold start configuration, reset the system by performing a cold start.

Then follow the same instructions as you did to check your network connection:

1. Close your current AdminHD session by selecting **File** -> **Close** from the main menus.

2. Open a New configuration by selecting **File** -> **New** and choose your system from the drop-down menu:

- **mc² console** – to open a mc²56, 66 or 90 configuration

- **Nova73 HD** – to open a Nova73 configuration

- **Nova73 DSHS HD** – to open a "dual self healing star" configuration.
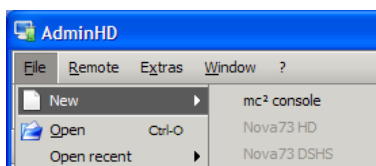
When connecting to mxGUI, choose the correct option for your mxGUI emulation. For example, if mxGUI is running in mc^{2}56 mode, select the **mc^2 console** option.

Warning

Warning

Please note that configurations created for one type of system are not compatible with another, and you *CANNOT* change the mode later. So make sure you select the correct system for your installation!

3. Click on the Download button from the Toolbar, or select Remote -> Download all data to remote HD from the main menus:
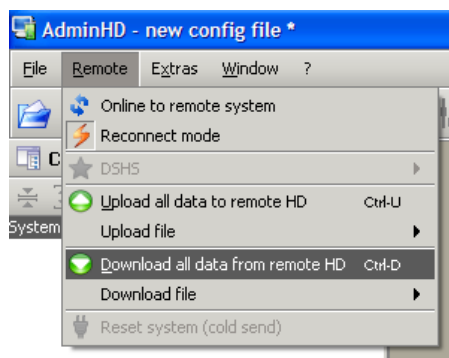
*A pop-up appears asking you to confirm the TCP/IP address of
the system from which you wish to download:*

4. Enter the TCP/IP address of the system you wish to
connect to.

The default TCP/IP address is automatically entered so you will
only need to edit it if your system has a different IP address.

To connect to the local Control System of mxGUI, enter
192.168.56.101 – this is the virtual IP address of mxGUI.

Note that the 'Remote connection' pop-up will vary depending
on your product.

5. Then click Connect.

AdminHD now downloads the configuration from the system.

When the download is complete the 'Remote Log' report that
the download has been successful, and any open windows
such as the 'Core Browser' update with the new system:
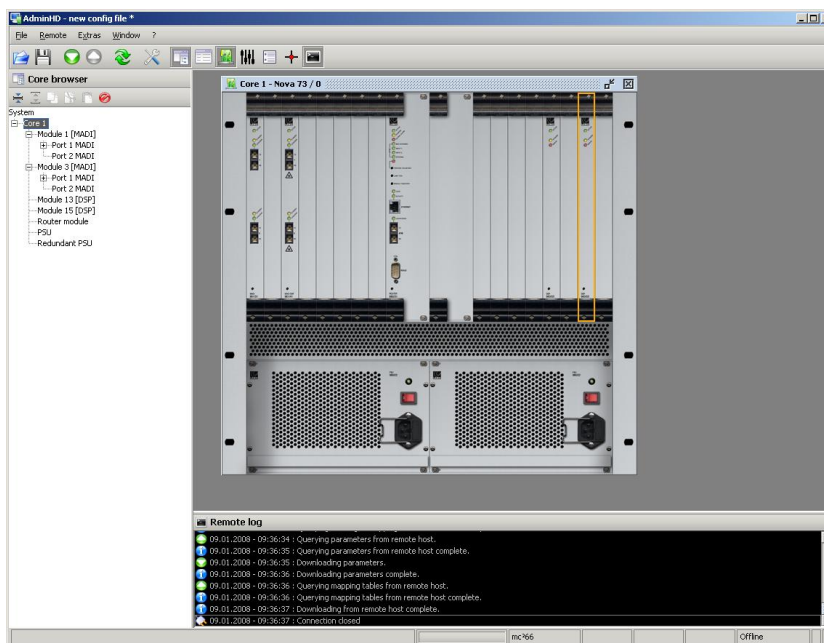
If there is a problem with the download, check your connections
and the TCP/IP settings. Or try disabling your computer's
firewall.

Creating a New Configuration

If you do not have a connection to the system, then you will need to create a new configuration from scratch as follows:

1. From the File menu, select New:
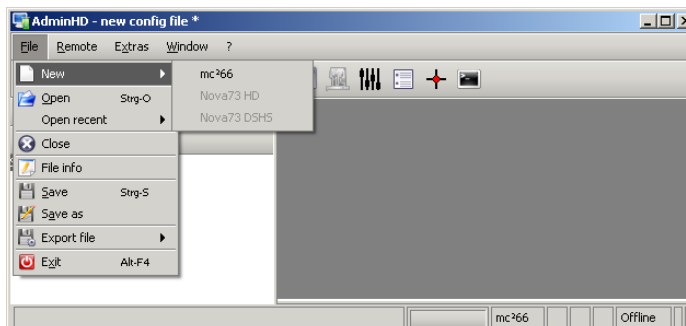
2. Choose one of the options from the drop-down menu:

- **mc² console** – to create a mc²56, 66 or 90 configuration

- **Nova73 HD** – to create a Nova73 configuration

- **Nova73 DSHS HD** – to create a "dual self healing star" configuration.

When creating a new configuration to run within mxGUI, choose the correct option for your mxGUI emulation. For example, to create a configuration to run in mc^{2}56 mode, select the **mc^2 console** option.

Warning

Please note that configurations created for one type of system are not compatible with another, and you *CANNOT* change the mode later. So make sure you select the correct system for your installation!

After creating the new configuration, you will see the entry **System** *within the 'Core Browser' window and confirmation of the AdminHD mode in the status bar:*
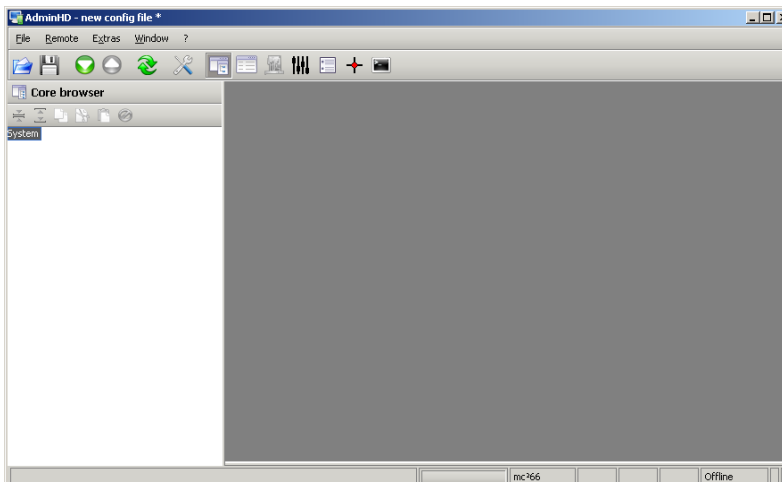
Defining the System

The AdminHD configuration defines the hardware components of your system. We will assume that you are building a new configuration from scratch, but the same principles apply to updating an existing configuration.

When building a new configuration you will need to add the system components in the following order:

- Add the HD Core.

- Fit Modules to the Core.

- Define the Module Ports.

- Add a DALLIS or Tie-Line.

- Fit Cards to your DALLIS units.

Warning

Before you begin, make sure that you have the specification of your physical installation to hand as it is important that all the components you specify match that of your physical installation.

If they don't and you need to modify them later, you can only do this by deleting and adding the component. This will mean that you will lose any sub components and parameters which you may have programmed!

Adding a HD Core

The first step in any system configuration is to add the HD Core:

1. Select the **System** entry in the 'Core Browser' and right-click.

A drop-down menu appears listing the available options:
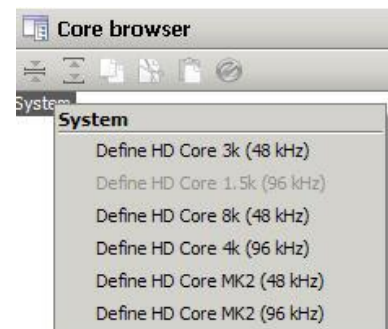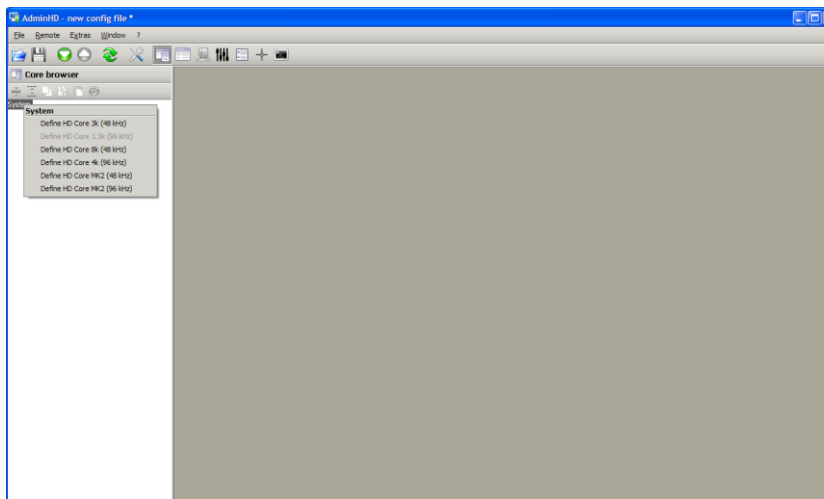
Depending on your AdminHD mode, you can select from the following HD Core types:
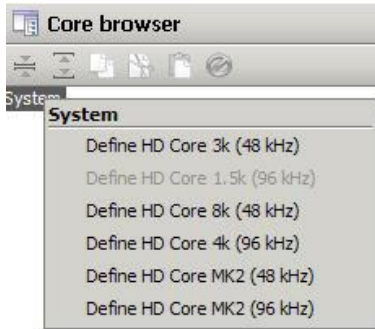
- **HD Core 3k (48kHz)** – 3k capacity MKI router operating at sampling frequencies up to 48kHz.

- **HD Core 1.5k (96kHz)** – 1.5k capacity MKI router operating at sampling frequencies up to 96kHz.

- **HD Core 8k (48kHz)** - 8k capacity MKI router operating at sampling frequencies up to 48kHz.

- **HD Core 4k (96kHz)** – 4k capacity MKI router operating at sampling frequencies up to 96kHz.

- **HD Core MK2 (48kHz)** – 8k capacity MKII router operating at sampling frequencies up to 48kHz.

- **HD Core MK2 (96kHz)** – 8k capacity MKII router operating at sampling frequencies up to 96kHz.

2. Select the required Core capacity and maximum system clock frequency by making a selection.

Warning

The HD Core selection defines the **Router module** which in turn defines the functionality of the system. Once you have defined the Core, you *CANNOT* change the Router module type at a later stage. So make sure you select the correct option for your installation.

*The Core is added to the **System** tree.*
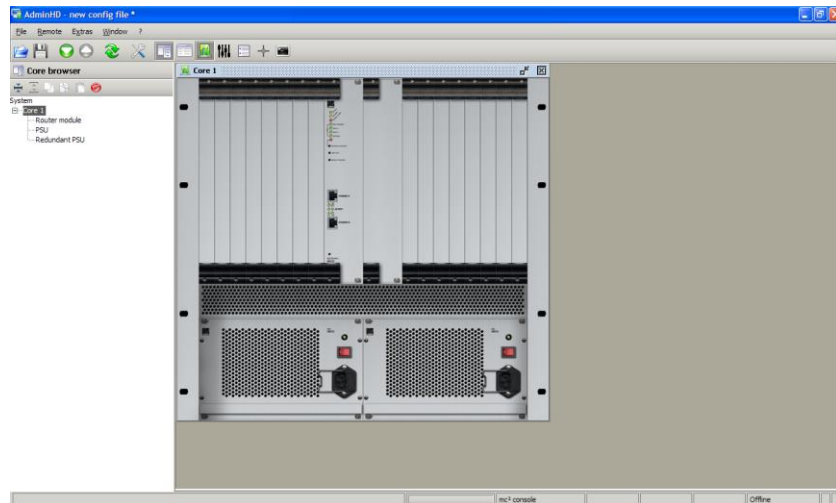
You will also see any default Core components appear within the 'Core Browser' – for example, the **Router module**, main **PSU** and **Redundant PSU**.

Depending on the settings within the **Extras** -> **Preferences** -> **Common** pop-up, the 'Graphic View' will also automatically appear. See Page 227 for details.

Fitting Modules to the Core

Next, fit modules to the core using the 'Graphic View' as follows:

1. Point your mouse over a card slot – e.g. **Slot 2**.

The slot is outlined in orange.

2. And right-click.

A drop-down menu of module options appears.
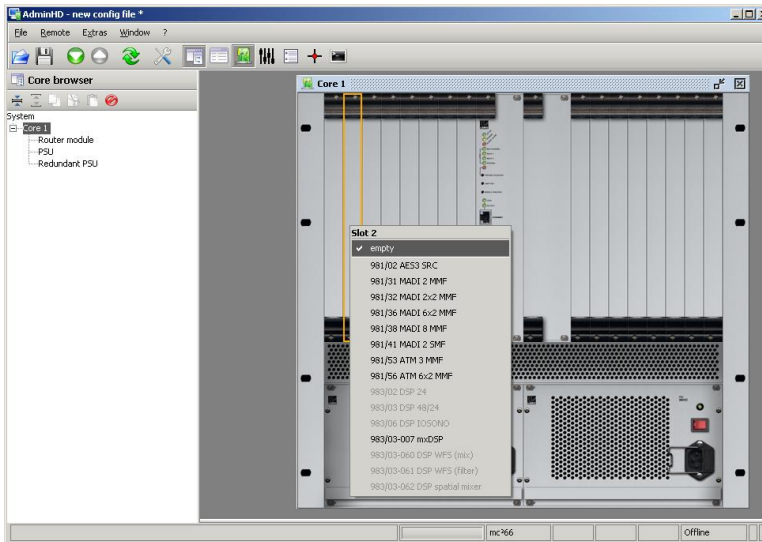
3. Make a selection from the list and remember to fit modules exactly as they installed within the HD Core.

Note

Note that the available options depend on the selected slot, your AdminHD mode, and the current capacity of the Core. Options not available for the selected slot are greyed out.

For specific details on each module, please refer to its data sheet. See Appendix A for details.

The fitted module appears within the 'Graphic View' and 'Core Browser':

Fitting a Redundant Router Module

In addition to fitting DSP and I/O modules, you can also add a redundant router module:

1. Point your mouse over the redundant router module slot.

The slot is outlined in orange.

2. And right-click:

3. Select the available option.

The redundant router module appears within the 'Graphic View' and 'Core Browser':

Note that you can also add or remove a redundant router module from the 'Core Browser':
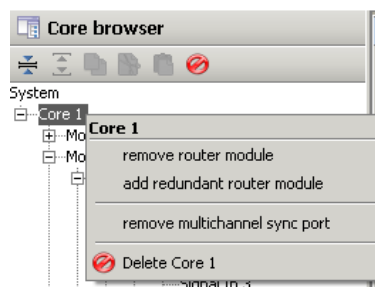
Or, from the Core's 'Parameter Box', see Page 192 for details.

To configure a redundant MKII Router Module (980/33), select the **HD Core 8k** (48kHz), or **HD Core 4k** (96kHz), option. Although the graphical overview of AdminHD shows a Mk I Router Module, this configuration also support MKII cards.

Defining the Ports

Each module can now be opened within the 'Core Browser' to view its ports. The 'port' represents an interface type. For example, on a 981/02 AES card, Port 1 provides access to 64 channels of AES inputs and outputs, while Port 2 accesses the MADI interface on the card.

Depending on the type of port, you can either open it within the 'Core Browser' to gain access to signals – for example, in the case of an AES Port:
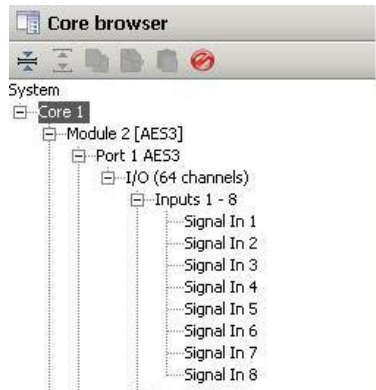
Or, you will need to define where/how the port is connected – in the case of a MADI or ATM Port:
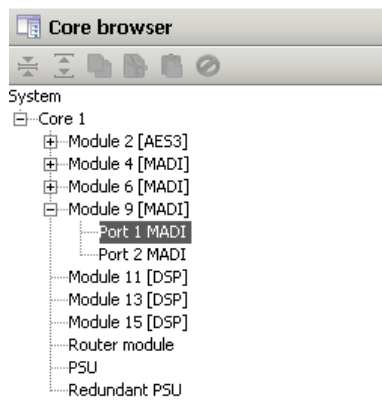
Note that:

- DSP modules do not have audio ports.

- Ports may be used for redundancy, see Page 136.

Adding a DALLIS or a Tie-Line

In the case of a MADI or ATM port, you must define how the port will be used. You can choose between the following options:

- **Define a Tie-Line** – a multi-channel connection.

- **Define a DALLIS** – a connection to a DALLIS unit.

Note that each of these options is known as a 'Super-Device' within AdminHD.

1. Select the appropriate port (e.g. Module 2 Port 2 MADI) and right-click:
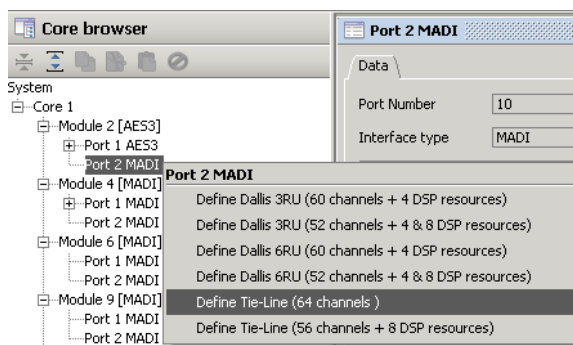
2. Make a selection – for example, Define Tie-line (64 channels)

The tie-line signals are added to the configuration, and can be accessed from the 'Core Browser.

3. Alternatively, select a DALLIS – e.g. DALLIS 3RU (80 channels):
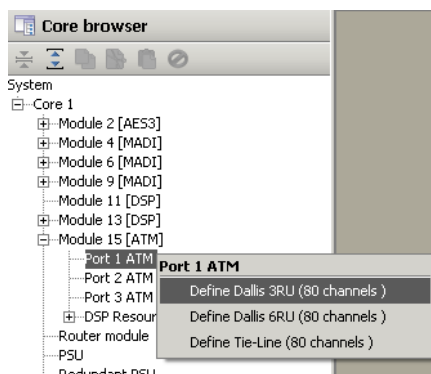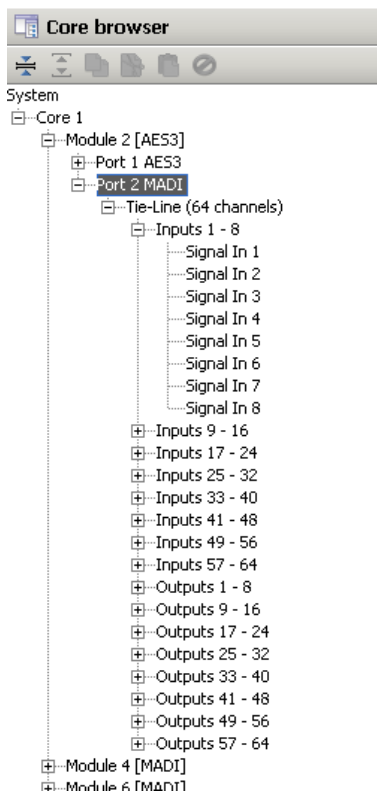
The DALLIS is added to the configuration:
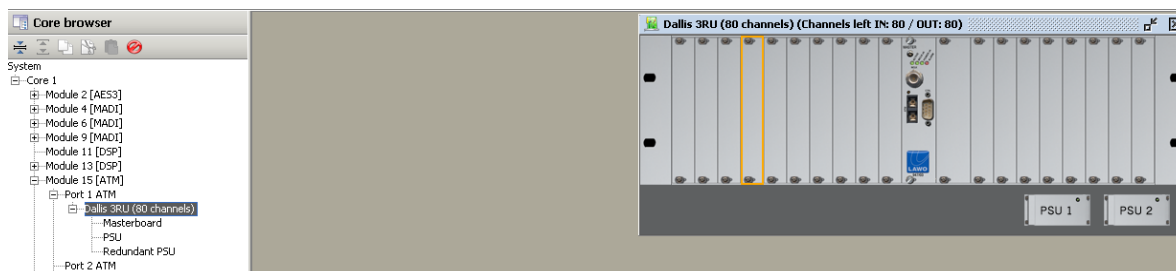
Fitting Cards to a DALLIS

You can now fit cards to the DALLIS using the 'Graphic View':

  1. Point your mouse over a card slot – e.g. **Slot 1**.

The slot is outlined in orange.

  2. And right-click.

A drop-down menu of card options appears:
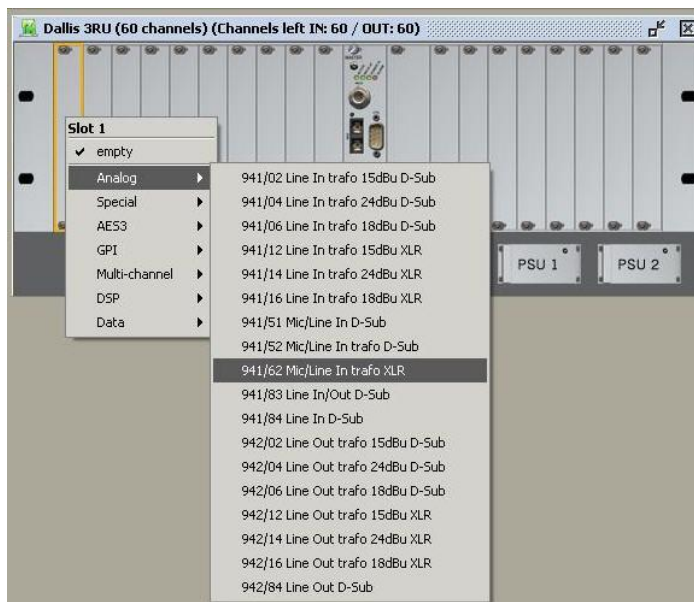
  3. Make a selection from the list and remember to fit
       modules exactly as they installed within the DALLIS.

Note that the available options depend on the selected slot and the current capacity of the DALLIS; options which are unavailable are greyed out.

The card appears within the 'Graphic View' and its signals are added to the 'Core Browser':
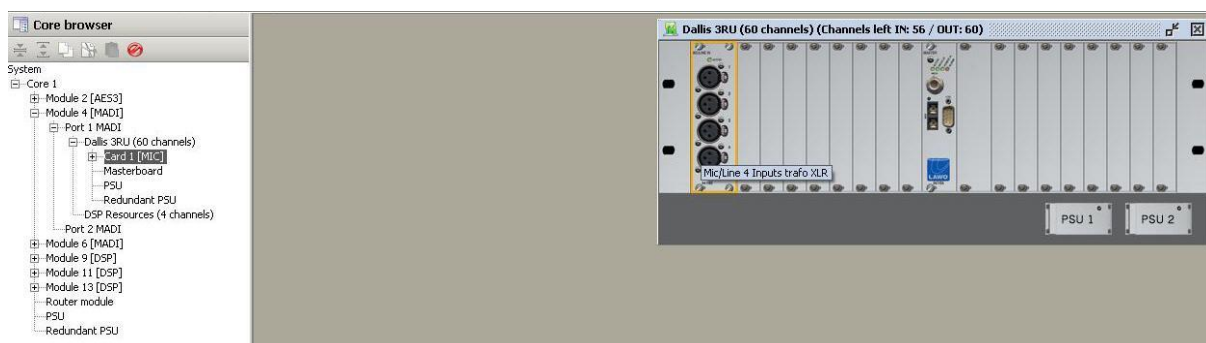
Copying DALLIS Cards

If you are fitting several cards of the same type to a DALLIS, then you can copy and paste a card as follows:

Tip

1. Point your mouse back over the card slot – e.g. **Slot 1** - and right-click.

This time the additional options of Copy and Cut appear at the bottom of the drop-down menu:

2. Select Copy.

Device 1:1:4:1:1:1:0
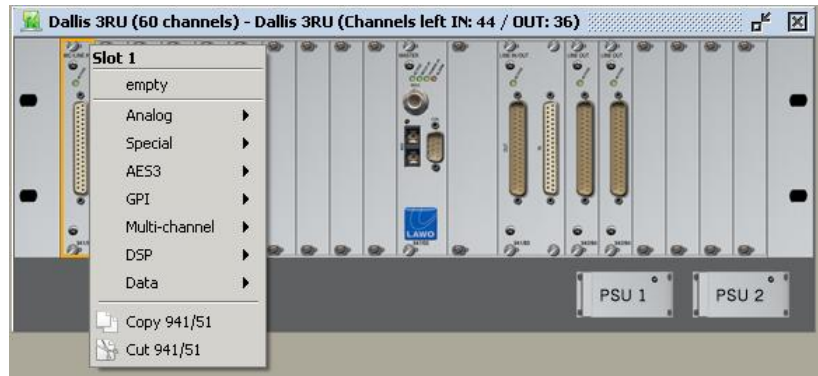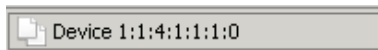
The card is copied to AdminHD's clipboard; the address of the card is shown in the status bar at the bottom of the display.

3. Now select the card slot where you wish to copy to:
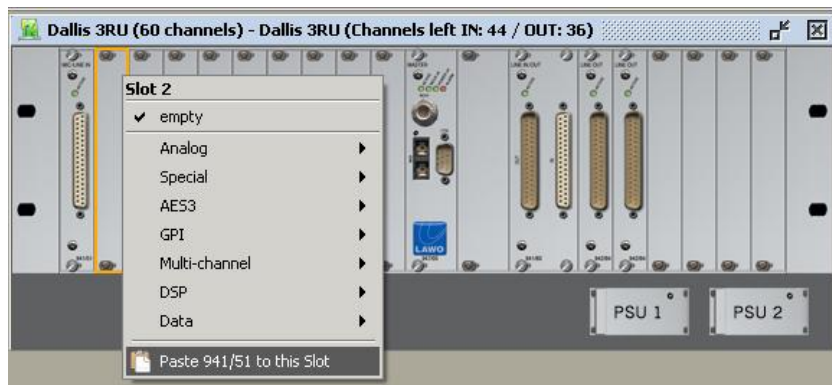
4. Right-click and select Paste.

The card is pasted into the configuration.

5. Repeat steps 3 and 4 to quickly assign the same card to a number of slots.

Note

Note that the Paste function only becomes available when you select a valid destination. If the DALLIS runs out of capacity, then you will not be able to Paste the card.

You can check how many audio channels are left for configuration in the title bar of the DALLIS.

Copying DALLIS Units or Tie-Lines

If you have several DALLIS units with a similar card configuration, then you can use the Copy and Paste functions to copy a complete DALLIS.

Tip

Note

1. Select the DALLIS you wish to copy from the 'Core Browser' and right-click:
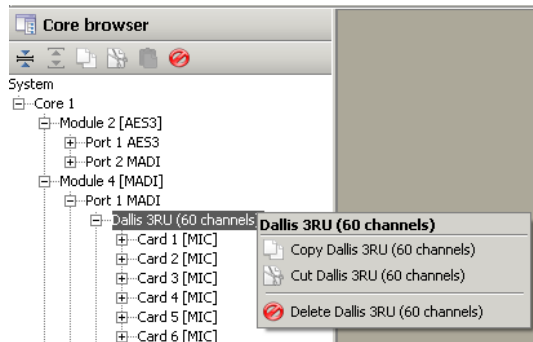
2. Select Copy DALLIS from the drop-down menu.

The DALLIS is copied to AdminHD's clipboard; the address of the DALLIS is shown in the status bar at the bottom of the display:

Superdevice 1:1:4:1:1:0:0
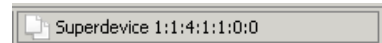
3. Now select the **Port** where you wish to copy to:
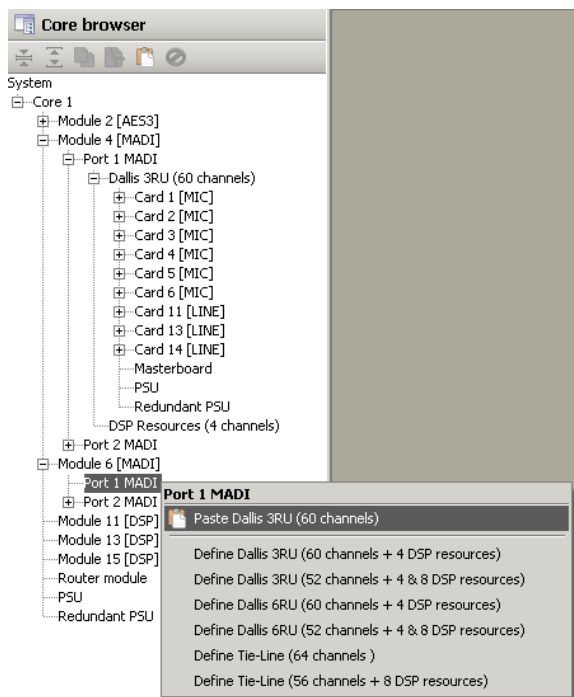
4. Right-click and select Paste DALLIS.

The DALLIS is pasted into the configuration.

Note that the Paste function only becomes available when you select a valid destination – in our example, an unassigned MADI port.

Note

Deleting Components

Depending on the component, it can be deleted or changed either from the 'Core Browser' or 'Graphic View'.

⚠ Warning

Warning

Deleting or changing a component will delete any sub components and parameters.

To delete a **Core**, or a **Tie-Line** or **DALLIS**, then:

1. Select the component – for example **DALLIS** – within the 'Core Browser' and right-click:
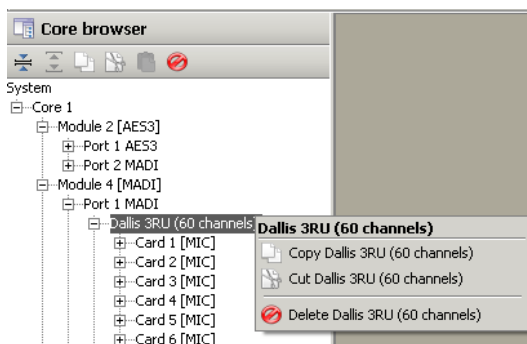
2. Select Delete DALLIS from the drop-down menu.

3. Confirm the deletion.

The DALLIS is deleted from the configuration.

To change or delete a **Module** or a **DALLIS card**:

1. Point your mouse over the module or card slot within the 'Graphic View'.

The slot is outlined in orange.

2. And right-click:

3. Select the **empty** option to remove the module.

4. Or select a different module.

5. Confirm the change.

The Module and any connected components are deleted from the system.
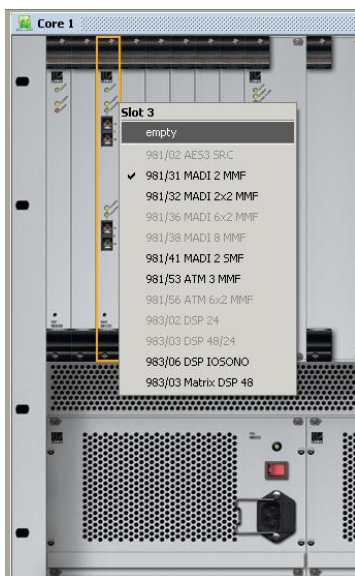
Fibre Redundancy

The type of master board fitted to your DALLIS is automatically defined by the type of Module which you fitted to the Core earlier.

For example, if you fitted a 981/32 (2 x 2 MMF) MADI Module to your Core, and then connect this to a DALLIS, then the DALLIS is automatically fitted with a redundant fibre master board:
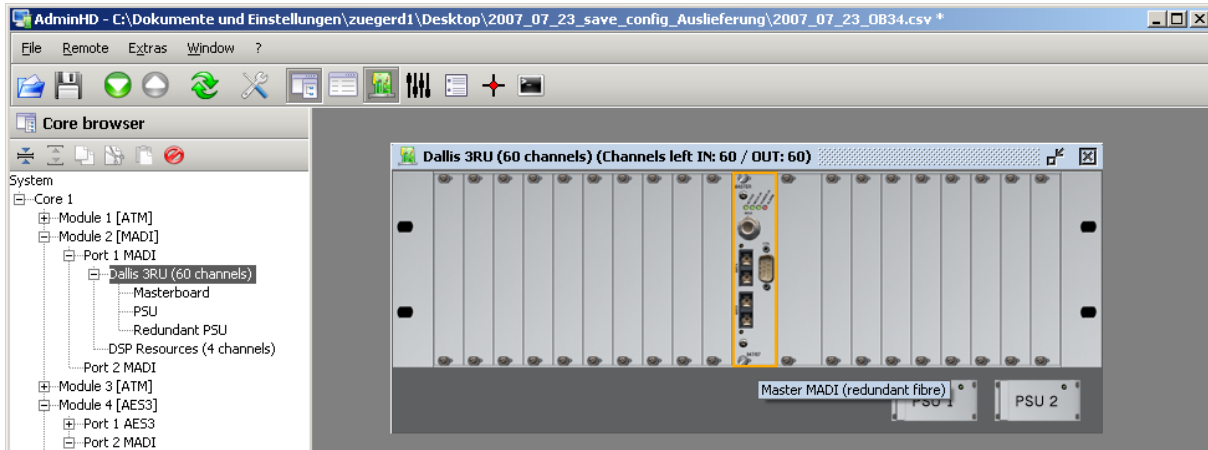
However, if the connection to the DALLIS is added from a 981/31 (2 MMF) Module, then the DALLIS is fitted with a single fibre master board:
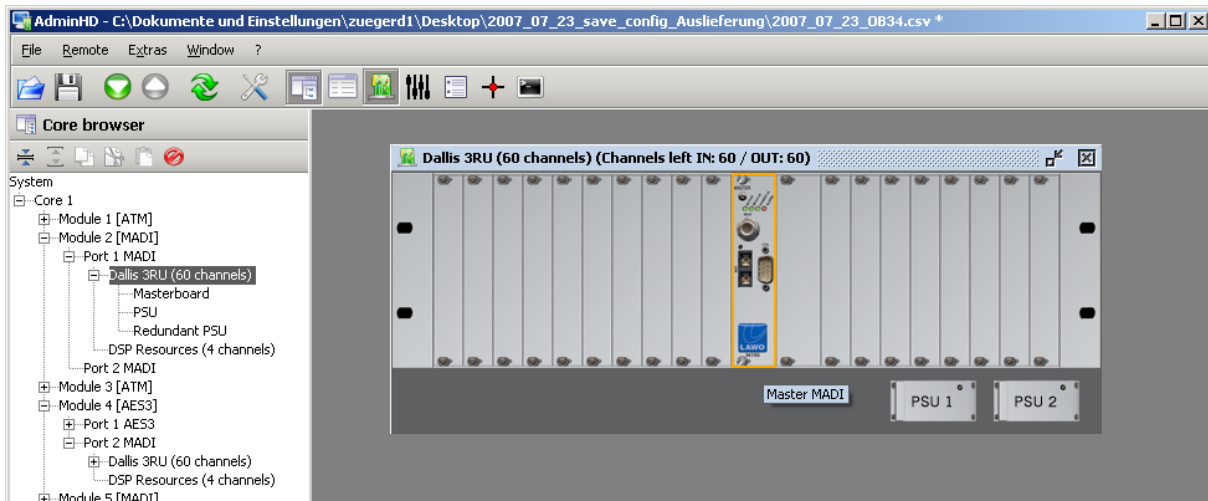
Just remember to always specify the type of Module and DALLIS which is fitted to your system and you can't go wrong!

Tip

Port Redundancy

Alternatively, your system may employ port redundancy, where each master board within the DALLIS connects to a different port (preferably on a different Module) within the HD Core:

Redundant boards

Redundant fibre

Single link
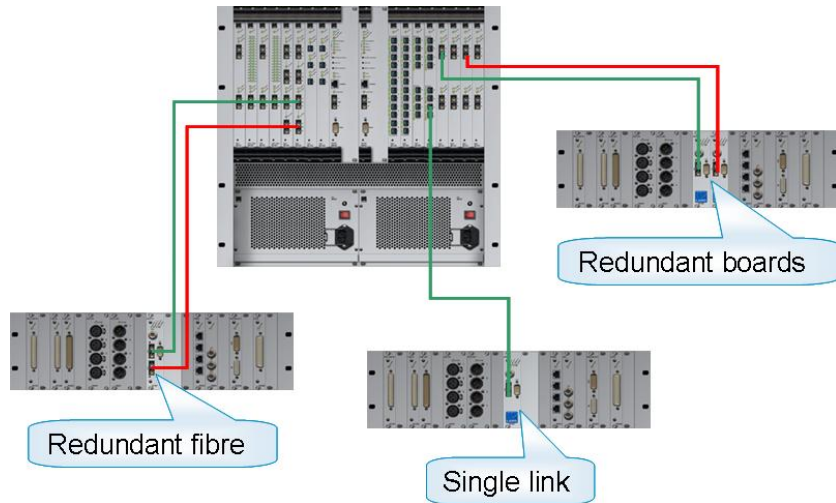
Let's take an example, where the main connection to a DALLIS is from Module 4 Port 1. We have a spare port on Module 8 Port 1 which we now want to use for the redundant connection:
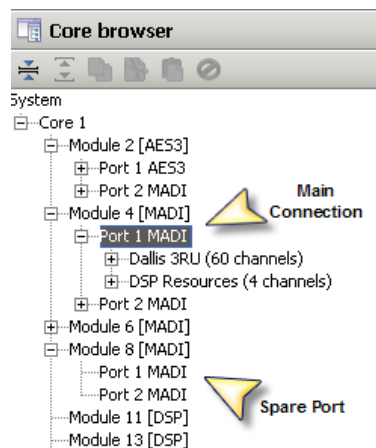
1. Select **Module 4 Port 1** and double-click to open its 'Parameter Box':
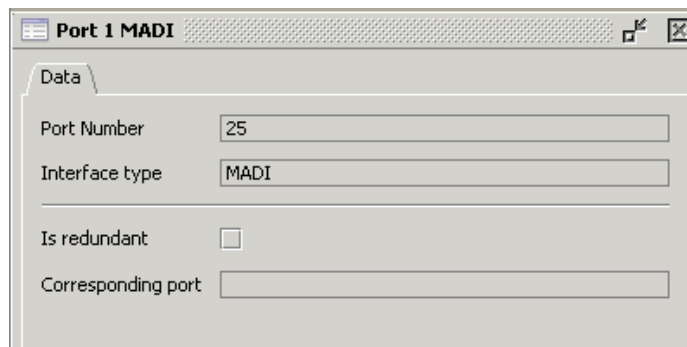
2. Tick the **Is redundant** box.

The following pop-up will appear:
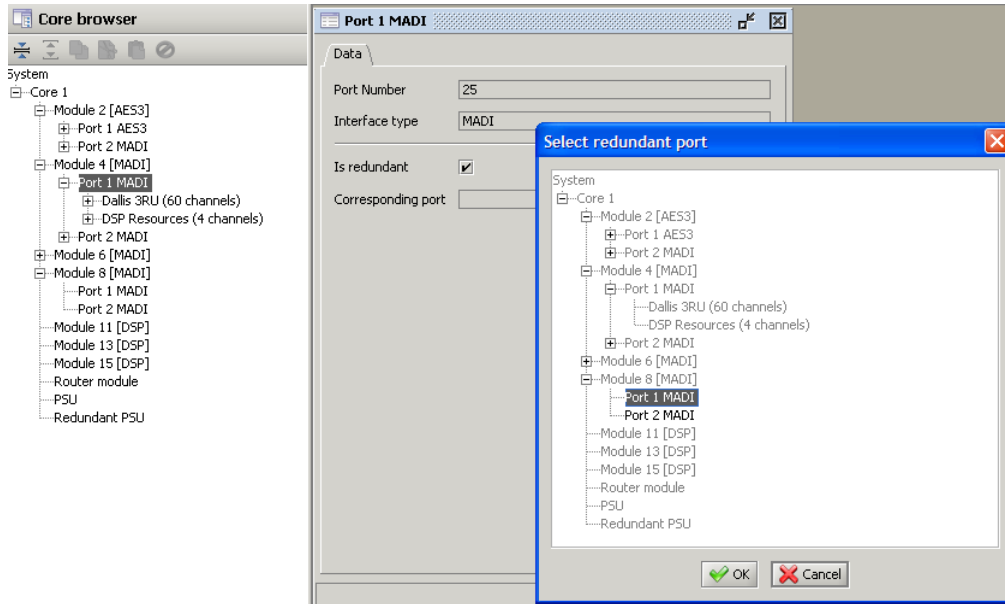
3. Select the redundant port – in our example, **Module 8 Port 1** and click **OK**.

The ports are now linked as indicated in the 'Core Browser':
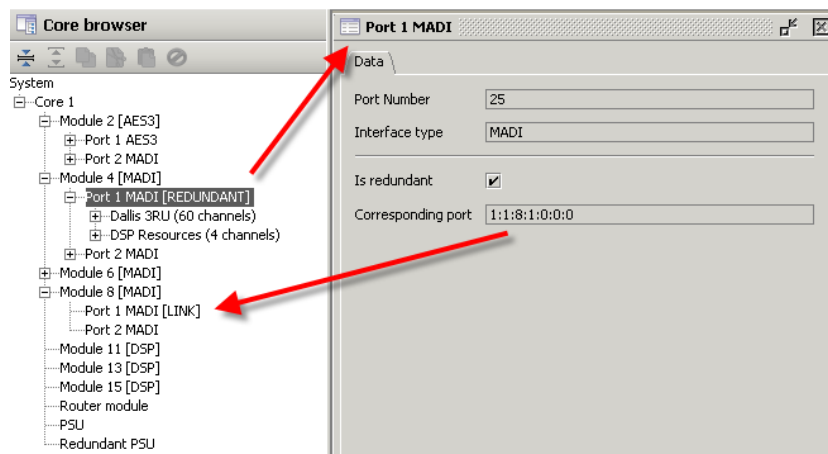
In addition, the 'Parameter Box' for Module 4 Port 1 shows the address of the linked port within the **Corresponding port** box. This is described as a system address:

4. In addition, if you now select the DALLIS and look at its 'Graphic View', you will see that a redundant master board has been fitted:

Tip

You can configure the redundant port from the DALLIS 'Graphic View' shown above:

5. Right-click on the redundant board slot and select or unselect **available** to add or remove the link to the redundant port.

Port DSP Resources

When you define a Tie-line or DALLIS which is 60-channels or less, you automatically configure an amount of DSP resource:

This is DSP which is located on the port (i.e. within the HD Core module), and can be used to create additional mix matrices – e.g. 4x4 or 8x8.

The selection of your Super-Device defines how many channels of DSP Resource are left for configuration. In our example, a 52-channel DALLIS leaves two blocks of DSP Resources (4-channels and 8-channels).

To configure the application of the DSP Resources:

1. Select the DSP Resources - e.g. DSP Resources (4 channels) - and right-click:

A drop-down menu appears listing the available options:
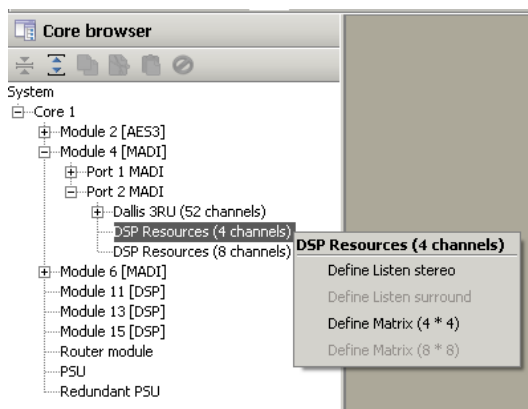
2. Make your selection from the following:

- **Define Listen stereo** – used for stereo monitoring in the mc^{2}66.

- **Define Matrix (4 * 4)** – This option creates a summing matrix with 4 inputs and 4 outputs.

Alternatively, if you select **DSP Resources (8 channels)** then the following options become available:

- **Define Listen surround** – used for surround monitoring in the mc^{2}66.

- **Define Matrix (8 * 8)** – This option creates a summing matrix with 8 inputs and 8 outputs.

For details on the matrix summing capabilities, please refer to the data sheet for the DALLIS card. See Appendix A.
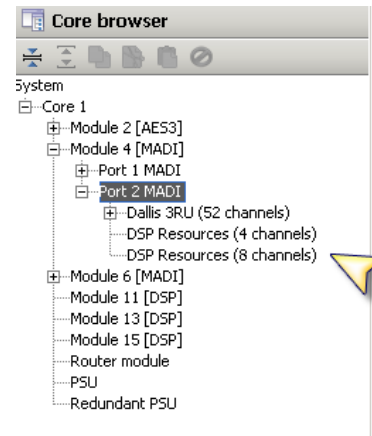
Editing Parameters

Having defined the hardware of your system, you can now adjust the default system and/or signal parameters:

- **Signal Parameters** – for each individual signal you can edit the Lawo system address (HLSD), signal name, signal label, I/O DSP and silence detect settings, and Group/Map settings (for use with external controller systems).

- **System Parameters** – you can also set system wide parameters such as the sampling frequency of the HD Core, analogue and digital reference levels and synchronisation options.

Whether you want to change the operating frequency of the HD Core or rename a signal, the operation is essentially the same:

1. Double-click on the component within the 'Core Browser' to open its 'Parameter Box' – for example, **Signal In 1**:
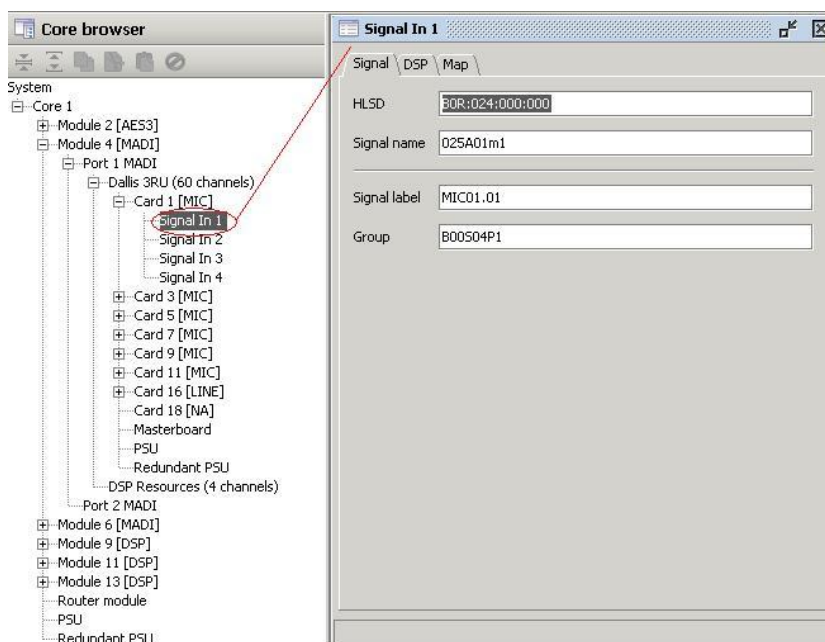
2. Select the parameter page using the tabs at the top of the 'Parameter Box' – for example, **Signal**, **DSP**, **Map**.

3. Enter your new parameter or enable a check box.

Note

Note that grey parameter fields are for information purposes only and cannot be modified. White parameter fields and check boxes can be edited and saved within the configuration.

You can find full details on all parameter options on Page 191. In this section, we will cover some common applications.

Signal Names and Labels

For each individual signal, you can edit the:

- **Signal Name** – this is the system name of the signal and should be unique. It can only be defined by AdminHD and should be used to describe the physical location of the signal.

- **Signal label** – this is the default user label. Note that the signal label can be changed later, either within the GUI's **Signal List** display, or within AdminHD's 'Connect Manager' window. However, it is a good idea to programme a default label as this is what the system will reset to after a cold start.

Note that both the Signal Name and Signal Label are limited to a maximum of 8 characters.

Note

Editing a Signal Name or Label

To edit a name or label:

1. Open up the branches of the 'Core Browser' so that you can see the signal you wish to edit.

If you've got the 'Graphic View' open, then simply click on the card to navigate to the correct group of signals. Or, you can use the following short cuts on your computer keyboard to navigate through the system tree:

Tip

- Up arrow = up

- Down arrow = down

- Left arrow opens a branch

- Right arrow closes a branch
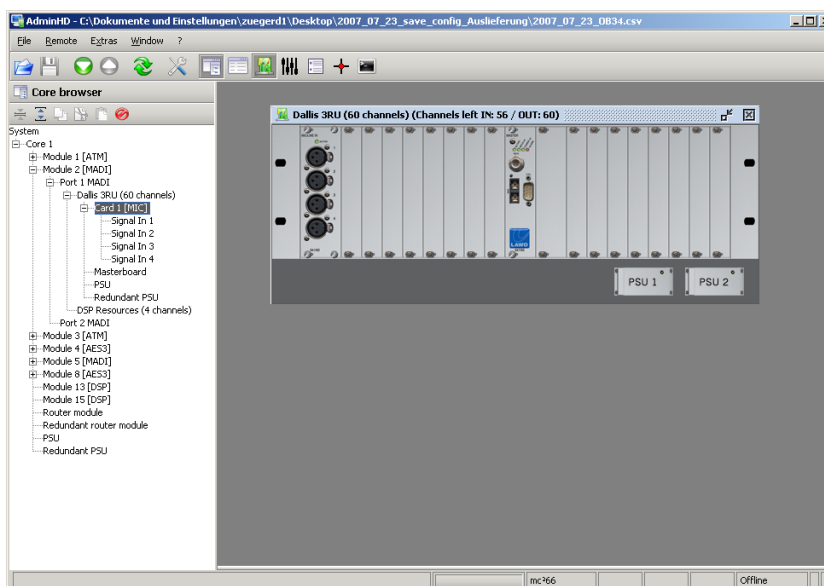
2. Double-click on the first signal you wish to rename – for example, **Signal In 1**.

The 'Parameter Box' opens:
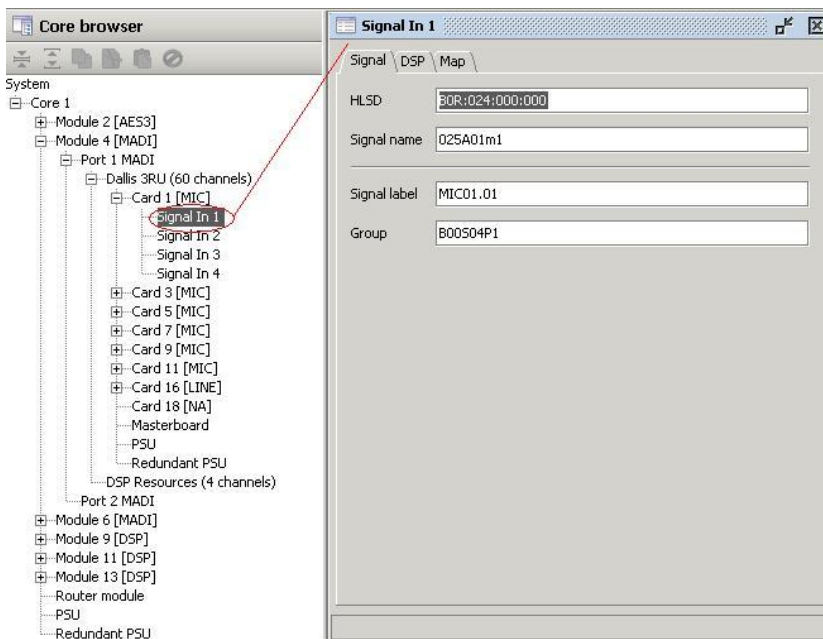
3. Click in the **Signal label** field and type in the new name.

4. Press Enter to confirm the name.

Editing a Range of Signal Names or Labels

Once the 'Parameter Box' is open you can use the **PAGE UP** or **PAGE DOWN** keys on your computer keyboard to navigate up or down the system tree while retaining the selected field. This allows you to quickly step through and name a range of signals.

Alternatively, if you want to name a range of signals with the same suffix – for example, PRES_1, PRES_2, PRES_3, etc. then you can use AdminHD's automatic naming feature:

1. Name the first signal as above – for example, **PRES_1**:
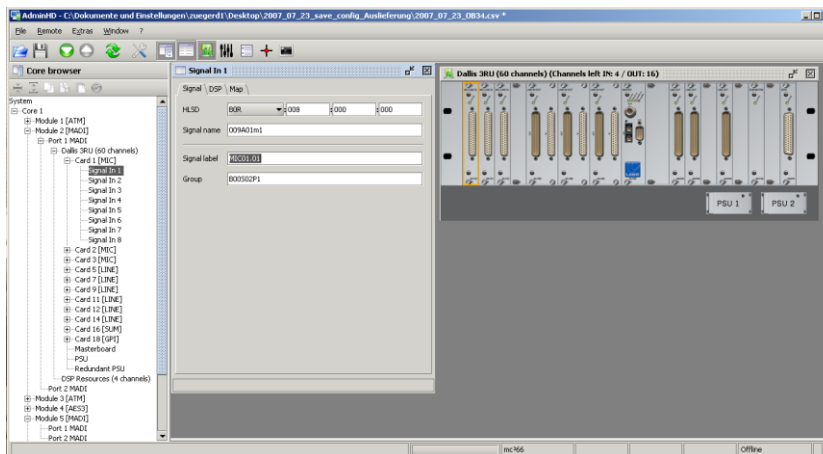
2. Now press CTRL + SHIFT + PAGE DOWN on your computer keyboard.

AdminHD steps down to the next signal in the system tree and automatically increments the name to PRES_2:
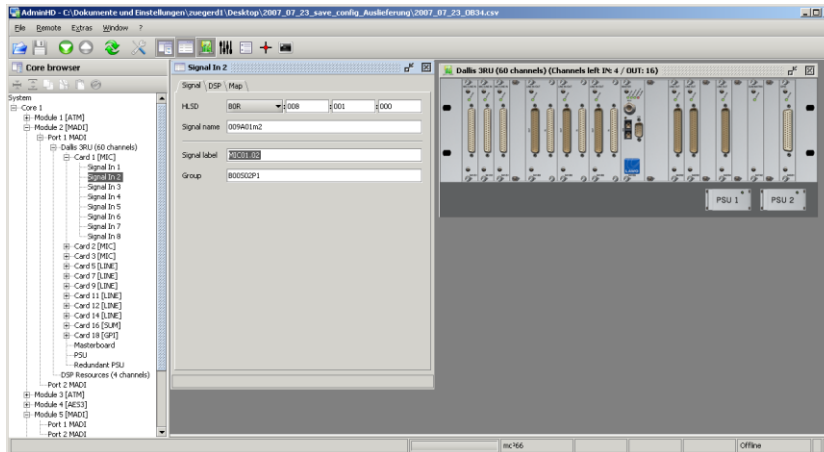
3. Repeat step 2 for all signals you wish to name in the range.

For details on other Signal Parameters, see Page 200.

System Parameters

In addition to signal parameters, there are a number of system-wide options:
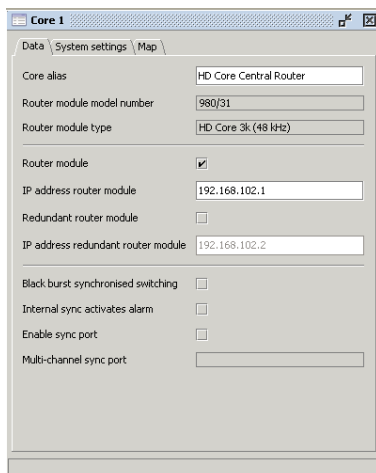
TCP/IP Address Configuration

This parameter sets the TCP/IP address for your system and is used whenever you make a connection – for example, to upload or download data, or to run online.

When you select your AdminHD mode, the default IP address is automatically entered for your system, so you will only need to edit these parameters if you are not using the default.

To connect to the local Control System of mxGUI, enter 192.168.56.101 – this is the virtual IP address of mxGUI.

Note that the IP address parameters vary depending on your AdminHD mode. Our example shows a Nova73 system which communicates directly with the HD Core Router module. For details on mc^2 consoles, see Page 212, or for a Nova73 DSHS system, see Page 207.

1. Double-click on the **Core** within the 'Core Browser' to open its 'Parameter Box' and go to the **Data** page.

2. Tick the **Router module** box to enable communication to the HD Core.

3. Enter the IP address of the HD Core's main router module in the **IP address router module** field.

The default IP address is shown opposite.

4. If the HD Core is fitted with a redundant router module, then enter its IP address within the **IP address redundant router module** field.

Multi-channel Sync

The system allows you to sync the HD Core to a multi-channel sync source.

Note that for mc^2 consoles, the system's sync options may be adjusted from the console's **System Settings** display. For the Nova73 this sync option must be set within the AdminHD configuration.

Note

1. Double-click on the **Core** within the 'Core Browser' to open its 'Parameter Box' and go to the **Data** page:

2. Click on the Enable sync port box.

A pop-up appears where you can select the multi-channel sync source:
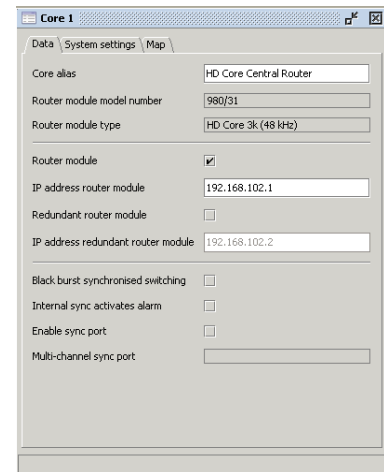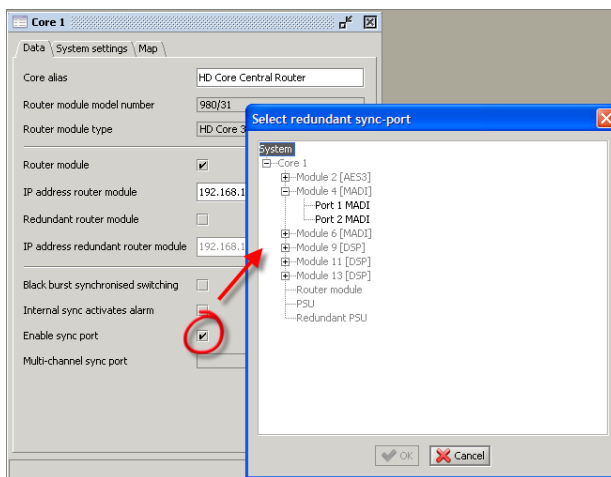
3. Select your sync source – for example, **Module 4 Port 1 MADI** - and click on **OK**.

*The source is set and displayed within the **Multi-channel sync port** box as a system address – for example:*
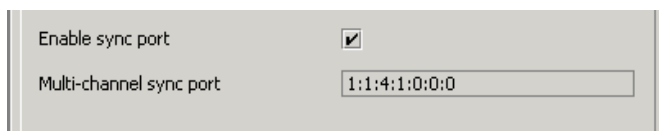
For more details on synchronisation, please see Chapter 2: Installation.

Operating Levels

You can use AdminHD to specify the operating levels for your system.

Note

Note that for mc^2 consoles, these levels may be adjusted from the console's **System Settings** display. For the Nova73 these levels must be set within the AdminHD configuration.

There are three level settings which interact to define the internal and analogue-to-digital operating levels of the system according to the following equation:

➤ **Analog full-scale level = Reference level + Headroom**

- **Analog full-scale level (dBU)** – This is the analogue level which you wish to correspond to digital full scale level (0dBFS). You can select from 12, 15, 18, 21 or 24 dBU.

- **Reference Level (dBU)** - This is the internal system reference level and sets the 0dB operating point for the system. The maximum reference level is 24dBU.

- **Headroom (dB)** - This is the amount of internal headroom.

Normal settings for EBU operation are: Analog full-scale level = +15dBU and Reference Level = +6dBU. Therefore, the Headroom = +9dB.

Normal settings for US operation are: Analog full-scale level = +22dBU and Reference Level = +4 dBU. Therefore, the Headroom = +18 dB.

Note

Note that your system may be fitted with fixed level DALLIS analogue I/O boards. You may set the operating levels as you wish. However, if you were to set a Reference Level of say +24 dBU, there may be clipping at a fixed level +15dBU analogue output board.

To set the levels for the system:

1. Double-click on the **Core** within the 'Core Browser' to open its 'Parameter Box' and go to the **System settings** page:
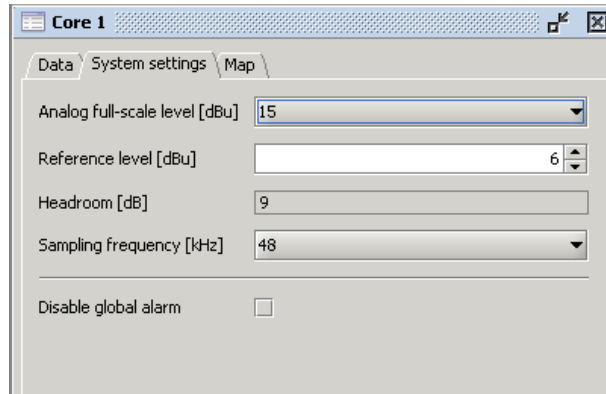
2. Select the Analog full-scale level from the drop-down menu options.

3. Then select your Reference level by clicking on the up and down arrows.

The resultant Headroom is calculated automatically.

Internal Sampling Frequency

The HD Core supports internal sampling frequencies up to 96kHz. However, to operate at 96kHz the capacity of the Core is divided in half.

Since this affects the components of the system, the maximum required sampling frequency (48kHz or 96kHz) must be defined at the beginning of the configuration, and is set when you define your type of Core, see Page 125.

Having defined the maximum sampling frequency, you may then choose from the following options:

- For higher capacity/lower sampling frequency HD Cores, you may operate at 44.1kHz or 48kHz.

- For lower capacity/higher sampling frequency HD Cores, you may operate at 44.1kHz, 48kHz, 88.2kHz or 96kHz.

Note

Note that for mc^2 consoles, the system's sample rate may be adjusted from the console's **System Settings** display. For the Nova73 the sample rate must be set within the AdminHD configuration.

1. Double-click on the **Core** within the 'Core Browser' to open its 'Parameter Box' and go to the **System settings** page:
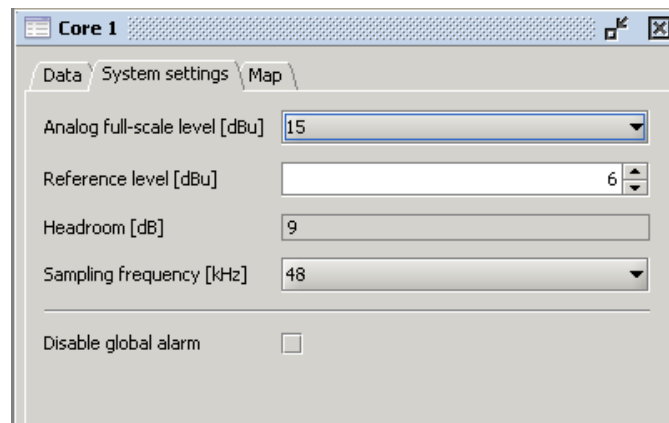
2. Select the Sampling frequency (kHz) from the drop-down menu options.

The available options are defined by your choice of HD Core.

3rd Party Control Systems (Mapping Tables)

Within your system, each signal may be given a mapping address so that it may be mapped to an external controller. For example, to be controlled by a 3rd party system such as the Thomson Jupiter, Broadcast Solutions VSM, BBC Colledia, etc.

The control protocol used is Lawo's Remote MNOPL. This is a freely available protocol implemented by several manufacturers of leading control systems. If your preferred supplier does not support the protocol, then please ask them to contact Lawo for further details.

Within AdminHD, up to 16 different mapping tables can be defined so that different control systems can be supported.

Configure each mapping table (1 to 16) for each of your external control systems as follows:

1. Double-click on the **Core** within the 'Core Browser' to open its 'Parameter Box' and go to the **Map** page:
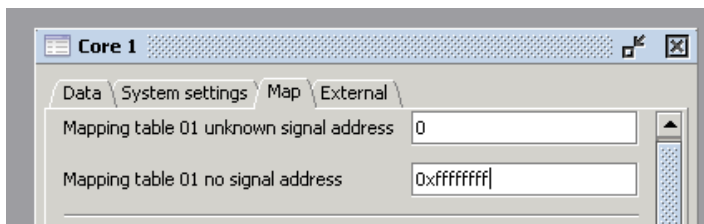
2. For your chosen mapping table (01 to 16), in the **unknown signal address** box, enter the address which will be submitted to the external control system when a signal is disconnected.

3. In the **no signal address** box, enter the address which will be submitted to the external control system when an undefined source is connected to a defined destination.

Refer to your external control system's documentation for details on how to enter these addresses. Our example shows the addresses for a Lawo zirkon control system.

Note

4. Now double-click on the first signal which you wish to map to the controller.

This will open the signal's 'Parameter Box'.

5. And select the Map page:
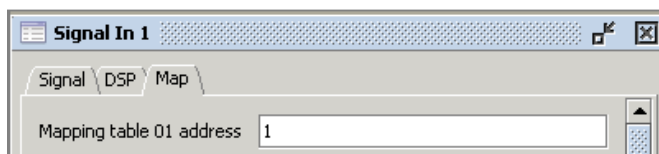
6. For your chosen mapping table (01 to 16), assign the **Mapping table address** for the selected signal.

Note

The format of the address will be specified by your external control system.

7. Repeat for all other signals within the system which you wish to make available to the external controller.

8. You can get an overview of the assignments within each mapping table by selecting **Extras** -> **Show Mapping Table** -> **Show mapping table x** from the main menus
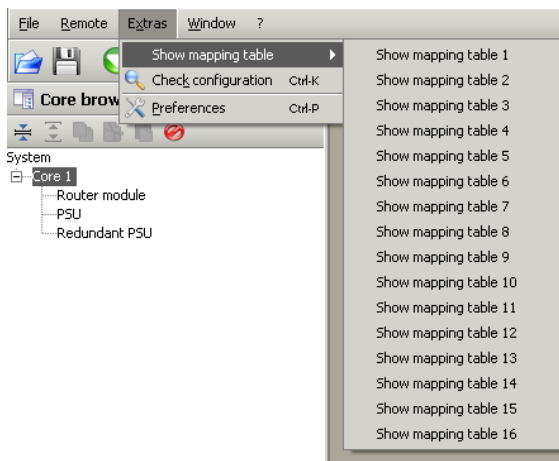
9. For example, Mapping table 1 is assigned for control from a Lawo zirkon system:

Mapping table 1		⊠
Core		0xffffffff
Core		0
001A01m1 MIC01.01	B0R:000:000:000	1
001A01m2 MIC01.02	B0R:000:001:000	2
001A01m3 MIC01.03	B0R:000:002:000	3
001A01m4 MIC01.04	B0R:000:003:000	4
001A01m5 MIC01.05	B0R:000:004:000	5
001A01m6 MIC01.06	B0R:000:005:000	6
001A01m7 MIC01.07	B0R:000:006:000	7
001A01m8 MIC01.08	B0R:000:007:000	8
001A02m1 MIC02.01	B0R:000:008:000	9
001A02m2 MIC02.02	B0R:000:009:000	10
001A02m3 MIC02.03	B0R:000:010:000	11
001A02m4 MIC02.04	B0R:000:011:000	12
001A02m5 MIC02.05	B0R:000:012:000	13
001A02m6 MIC02.06	B0R:000:013:000	14
001A02m7 MIC02.07	B0R:000:014:000	15
001A02m8 MIC02.08	B0R:000:015:000	16

Checking Your Configuration

Having completed your configuration, it is a good idea to check it for programming errors. This will avoid any problems later when you upload to the system.

1. Select **Extras** -> **Check Configuration** from the main menus, or press **CTRL + K** on your computer keyboard.

AdminHD analyses your configuration.

The configuration is checked for the following errors:

- **Signal HLSD Conflicts** – if two signals have the same HLSD.

- **HLSD Syntax** – if there is an invalid HLSD in the configuration.

- **Signal Name Conflicts** – if two signals have the same name.

- **Mapping Table Address Conflicts** – if you have assigned the same mapping table address to different signals.

The result of the check is displayed within the status bar of the display:
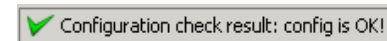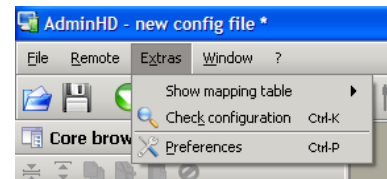
Saving Your Configuration

While programming, you should always save your configuration regularly.

Save

If this is a new unsaved configuration, then save it for the first time as follows:

1. Click on the **Save** button within the Toolbar, or select **File** -> **Save** from the main menus:
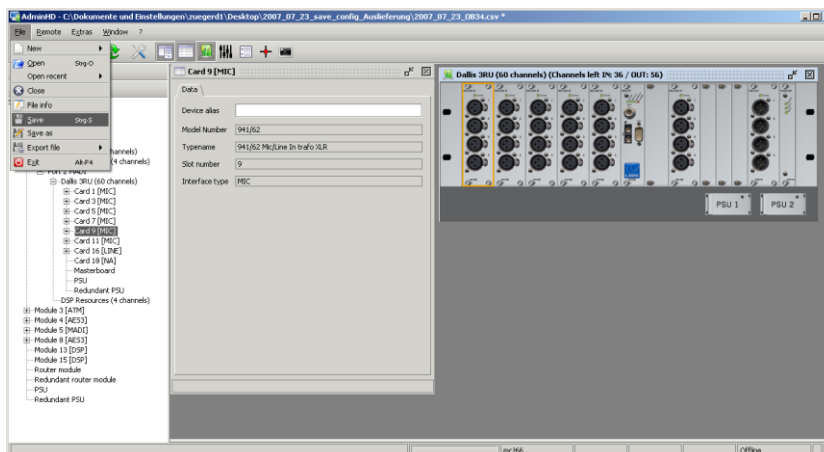
A 'Save As' file selection box appears:
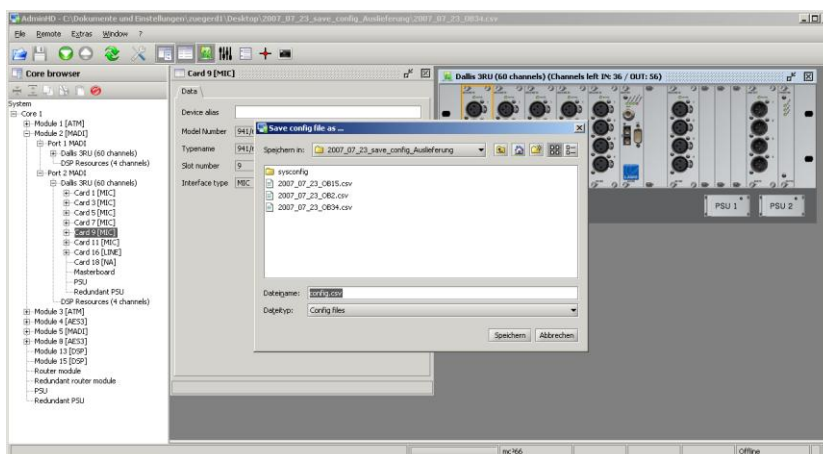
2. Select the directory in which you wish to save the file and enter a filename.

Tip

You can specify a default directory for your configuration files within the **Extras** -> **Preferences** menu, see Page 227 for details.

3. Click Save.

*The configuration is stored as a **.csv** file and the name and path are shown in the ''Operating Console' title bar.*

4. From hereon, you can save any subsequent changes instantly by clicking on the **Save** button.

Save As

Alternatively, if you are editing an existing file, you may wish to save your changes under a different name.

Repeat as above but select **File** -> **Save As** from the main menus.

Uploading a Configuration

With your configuration saved as a .csv file on your AdminHD computer, you can upload it to the system at any time. Remember that you can upload to either the cold start data or online memory.

Note that you must be running in online mode in order to upload a configuration to the system. This is to prevent any accidental uploads!

Note

When uploading to mxGUI, you should treat the mxGUI Control System like any real mc^2 or Nova73. In other words, you must be running in online mode. And to see the affects of changing the cold start configuration, you must cold start mxGUI.

Upload to the Cold Start Data

For permanent changes to the configuration, you should upload the configuration to the cold start data. There are three stages to the process:

- Export the system configuration as a cold start file (config.tcl).

- Upload the cold start file to the system.

- Cold start the system.

Proceed as follows:

1. If not already open, open your configuration into the AdminHD session.

2. To export the configuration, select the File -> Export file -> Core cold start config (config.tcl) option from the main menu bar:
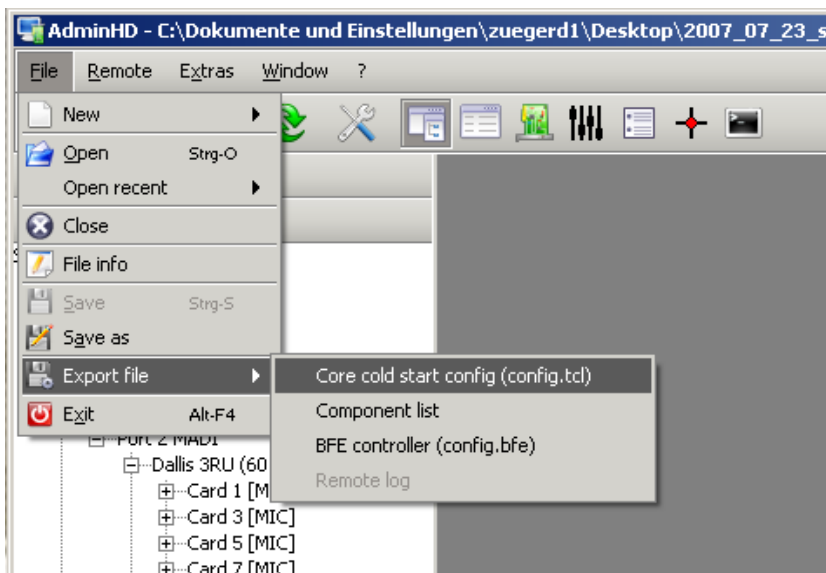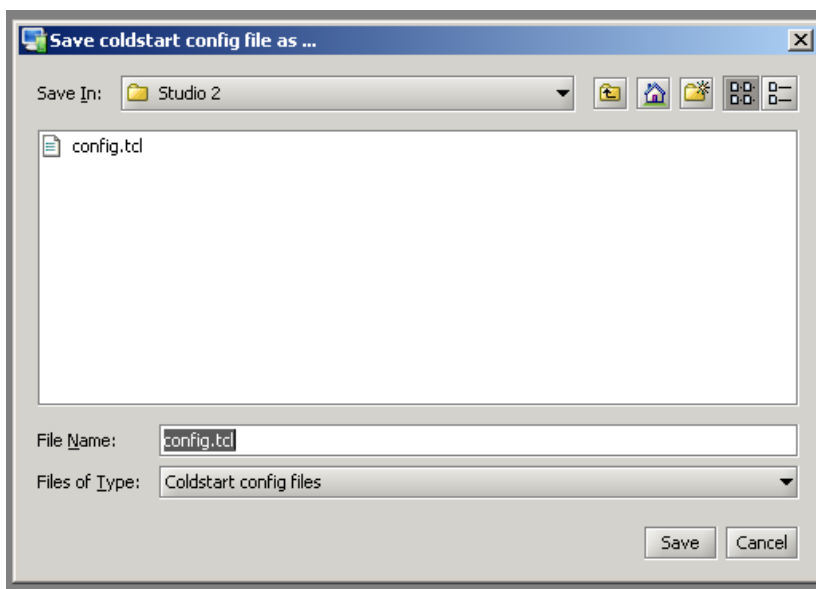
A 'Save As' file selection box appears:

3. Select the directory on your AdminHD PC where you wish to store the file and click **Save**.

Note

DO NOT rename the file; it must be named **config.tcl** in order to be read by the system.

Tip

You can specify a default directory for your configuration files within the **Extras** -> **Preferences** menu, see Page 227 for details.

The system configuration is stored as a cold start file on your computer.

4. Next, connect and configure your computer so that it is communicating with the system as described on Page 118.

5. And enable online mode, by clicking on the Online button from the Toolbar or selecting **Remote** -> **Online to remote system** from the main menus:
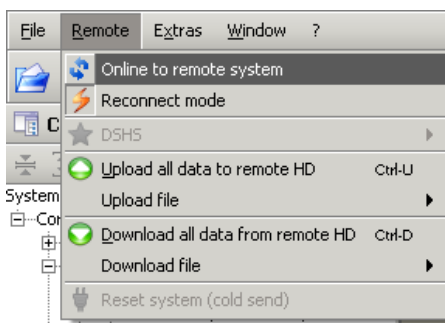
*ControlHD connects to and synchronises with the system and the **online** status is displayed in the Status bar.*

Once online, any changes you make will action changes within the system. If there is a problem communicating with the system, then the connection will time out after about 10 seconds. Check your connections and TCP/IP settings.

6. Now upload the file by selecting Remote -> Upload file -
> Core cold start config (config.tcl):
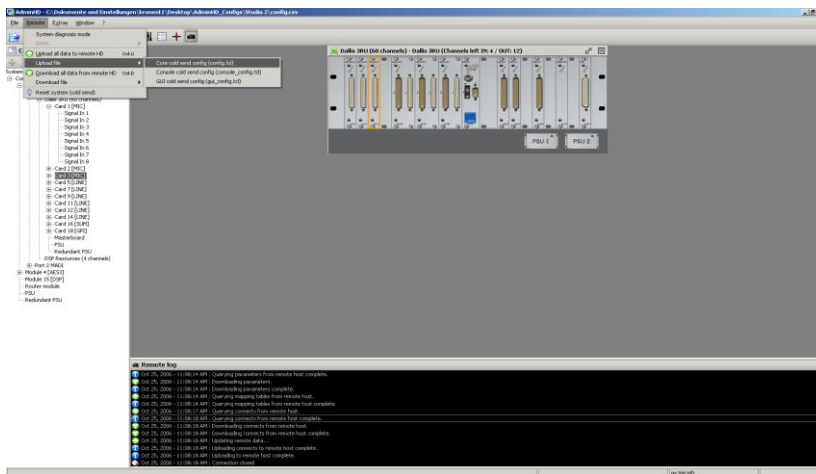
7. And, select the file you wish to upload:
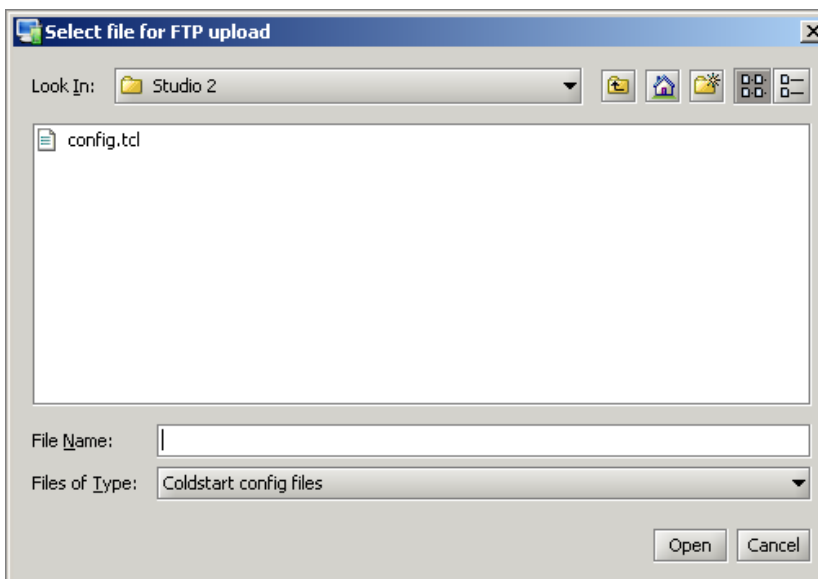
The file is uploaded to the system.

8. You can check whether the file has uploaded
successfully within the 'Remote Log'.

9. Finally, cold start the system to see the changes.

Note that when you perform a cold start, you will lose any online
data within the system.

Note

Upload a Cold Start Configuration (Redundant Control Systems)

If your system is fitted with a redundant Control System, then both main and redundant Control Systems must hold the same information and mirror each other.

User data (productions and warm start data) are always mirrored to facilitate auto takeover. However, the cold start configuration is only synchronised when the Control System boots up. This has implications if you wish to upload a new cold start configuration:

Let's take an example where your main Control System is called A and redundant Control System is called B. If you upload your new configuration or software to Control System A and then cold start it, the following will occur:

- The system responds to the cold start of the main Control System by automatically switching to the redundant Control System (B).

- At the end of the cold start, data from the active Control System (B) is copied back to the redundant Control System (A). In other words, your new data is overwritten!

To avoid this, and upload a new configuration successfully:

1. Disable the redundant Control System.

This can be achieved by releasing the locking catches which are fitted to the top and bottom of the redundant Router Module (see opposite). This unlocks the module from the HD Core and automatically disables it. Note that it is not necessary to pull out or remove the module.

2. Now upload your new AdminHD configuration to the active Control System and cold start.

The system restarts using the new configuration data.

3. Once the main Control System is running the updated configuration, lock the redundant Router Module back into place to reactivate it.

The redundant Router Module boots up, and all data from the main Control System is copied to it, ensuring that both modules are running the new data.

4. Cold start the system once more, and check the new configuration.

During steps 2 and 4 the system can be cold started by selecting the **Prepare Coldstart** option from the **System Settings** display, and then powering off and on the main PSUs of the HD Core.

Remember you will lose any online data when you cold start the Control System.

Note
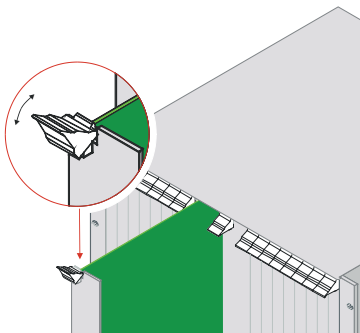
Upload to the Online Configuration

For temporary updates to the configuration, you can upload to the online memory. This allows you to update the configuration without restarting the system.

1. If not already open, open your configuration into the AdminHD session.

2. Connect and configure your computer so that it is communicating with the system as described on Page 118.

3. Click on the **Upload** button from the main Toolbar or select **Remote** -> **Upload all data to remote** HD from the main menus:
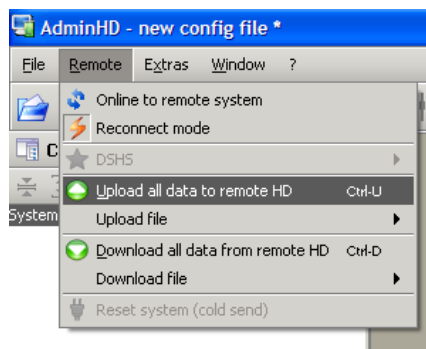
Note that you must be running in online mode to perform the Upload.

AdminHD now connects to the system and compares the existing system configuration to the one open within AdminHD:
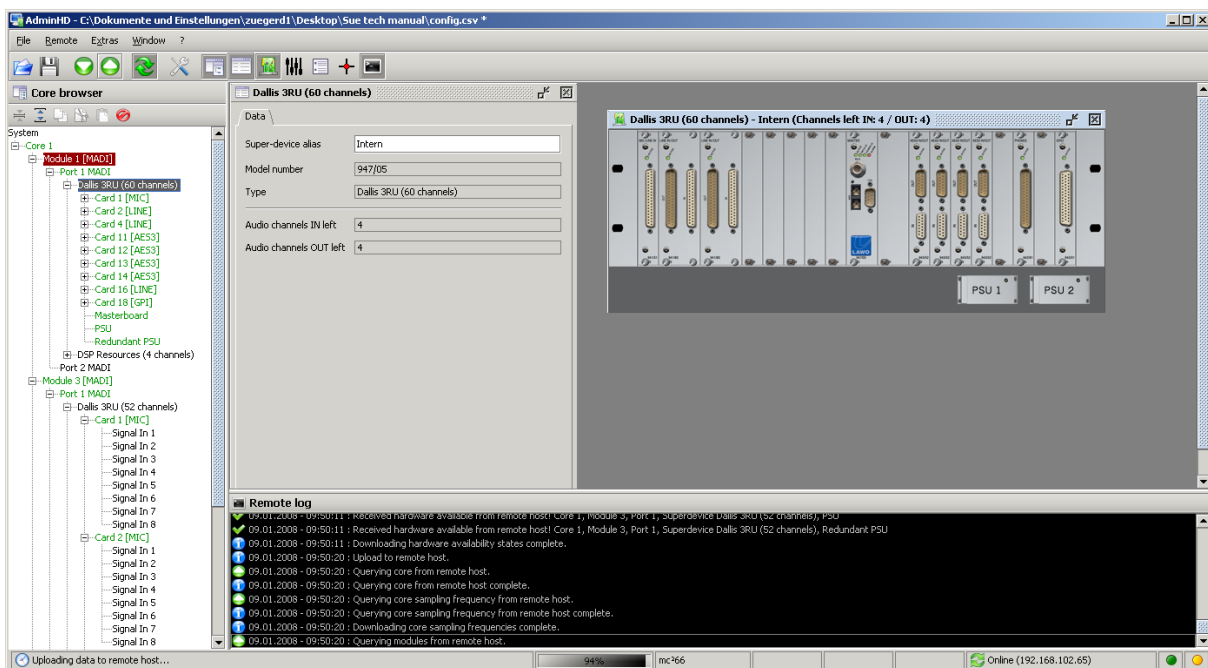
When the analysis is complete, the following window appears:
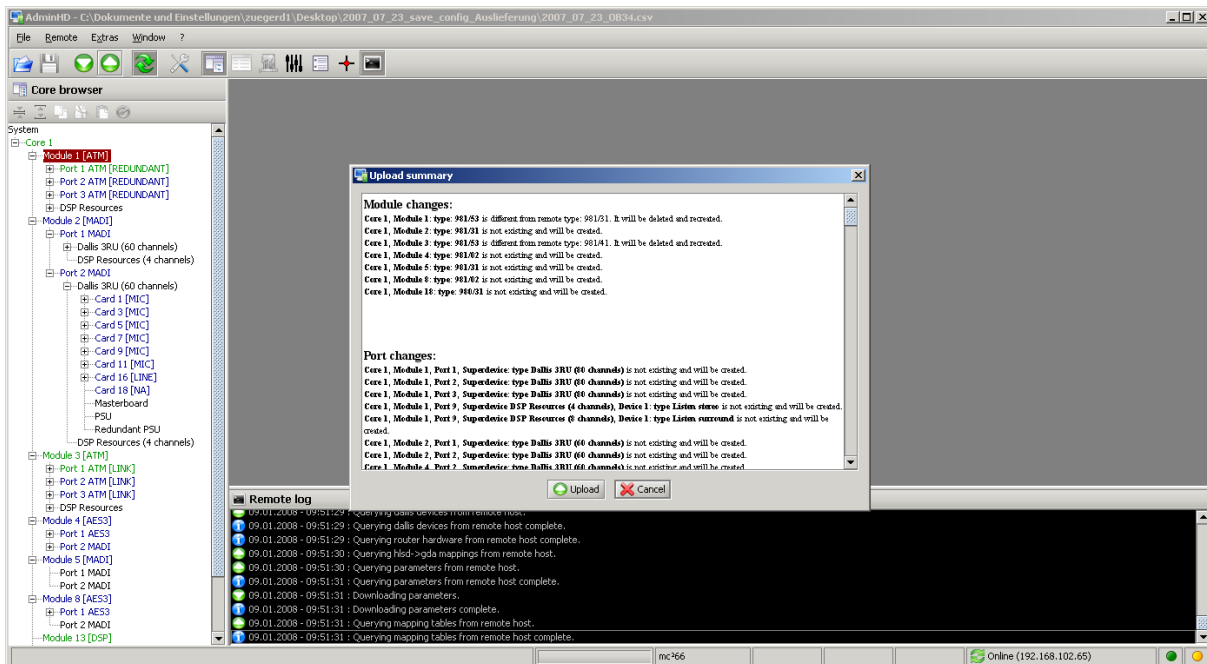
This list allows you to review the changes which you are about to make *BEFORE* you continue with the Upload.

4. Read through the list and click on **Confirm** to continue or **Cancel** to abort the Upload:

When the configuration upload is complete, the system updates to reflect the changes.

The 'Remote Log' within AdminHD will also report the success of the Upload.

Congratulations - you have successfully programmed and uploaded your first AdminHD configuration! If you would like more details on configuration parameters, then please see Page 191.

For an overview of all AdminHD's menu options and Toolbars, see the Quick Reference Guide on Page 233.

The next few sections deal with configuring Signal Lists, using AdminHD for Online Control and System Diagnostics/Documentation.

Signal Lists

A signal list is an AdminHD file which orders the source and destination signals within your system configuration into Directories and Subdirectories.

A signal list can be exported (as a gui_config.tcl file) and uploaded to the system to define the **Signal List** display:
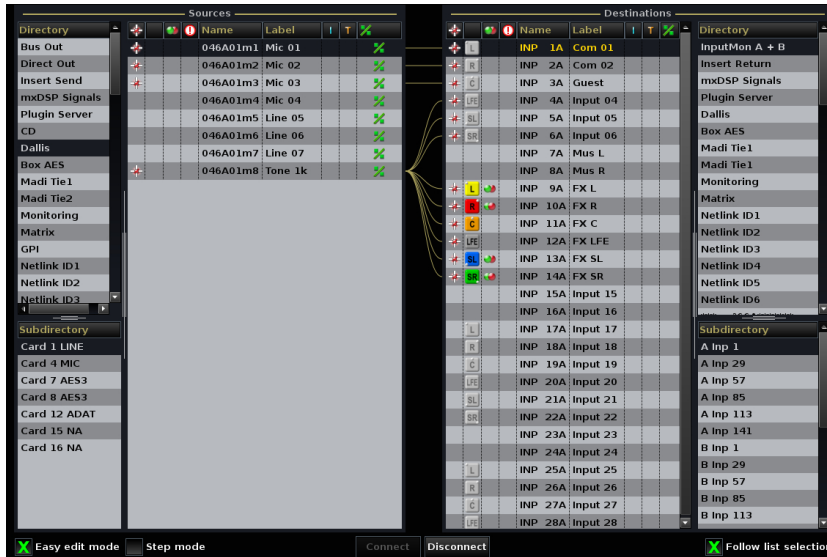
Note that the gui_config.tcl can *ONLY* be uploaded to the cold start data. Therefore, to modify the configuration of the **Signal List** display you must be prepared to modify the cold start configuration and perform a system cold start.

In AdminHD or ControlHD, a signal list can also be opened within the 'Connect Manager' in order to view signals in custom named Directories and Subdirectories, or to limit the signals to a subset of the matrix.

Just as with the system configuration, it is much easier to edit an existing signal list. So, if you can connect to your system, download its signal list and then edit it offline.

Alternatively, if you don't have a connection to your system, then you can create a signal list from scratch.

For details on using the 'Signal List Editor' to create or edit a signal list, please see Page 163. First, we will deal with uploading and downloading files to/from the control system.

Downloading a Signal List from the Console

If you are modifying a signal list, it is good practice to download the existing signal list to your AdminHD computer:

1. Connect and configure your computer so that it is communicating with the control system as described on Page 118.

2. Open the 'Signal List Editor' window by clicking on the appropriate button from the Toolbar, pressing **Ctrl** + **SHIFT** + **S** on your computer keyboard, or selecting the **Window** -> **Signal list editor** option from the main menu bar.

AdminHD automatically creates a new 'empty' signal list:
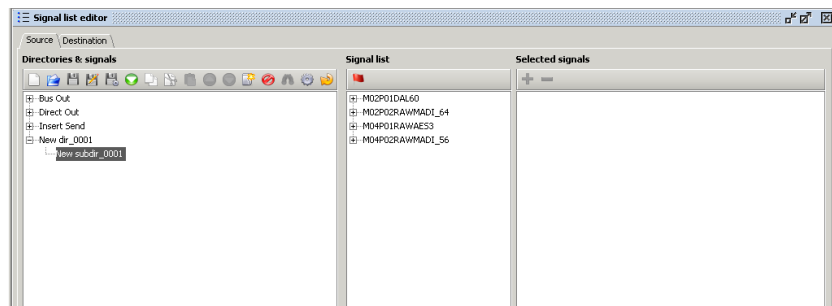
Tip

It is a good idea to open the 'Remote Log' so that you can monitor the progress of the download.

3. From the 'Signal List Editor' Toolbar click on the **Download GUI Signal List Config** button to download the current signal list from the system to your AdminHD computer:

The 'Remote Log' will show the progress of the download, and when complete, the 'Signal List Editor' updates:
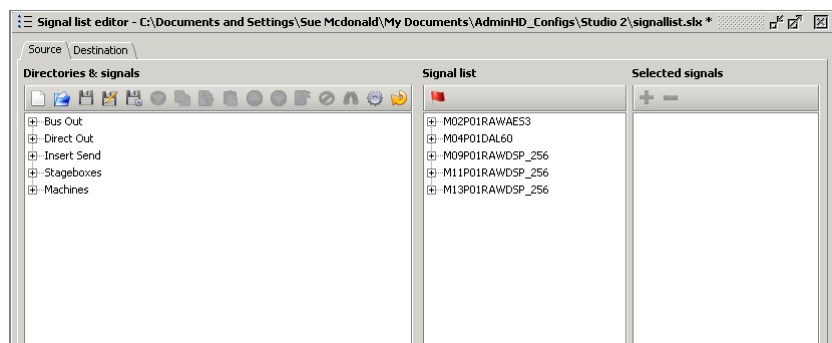
You can now use this window to make changes to the list as described on Page 163.

Uploading a Signal List to the Console

Having edited the signal list, it can be uploaded to the system's cold start data. There are three stages:

- Export the signal list from the 'Signal List Editor' as a cold start file (gui_config.tcl)

- Upload the cold start file to the system.

- Cold start the system.

Proceed as follows:

1. Export the signal list by clicking on the **Export config** button from the 'Signal List Editor' Toolbar:
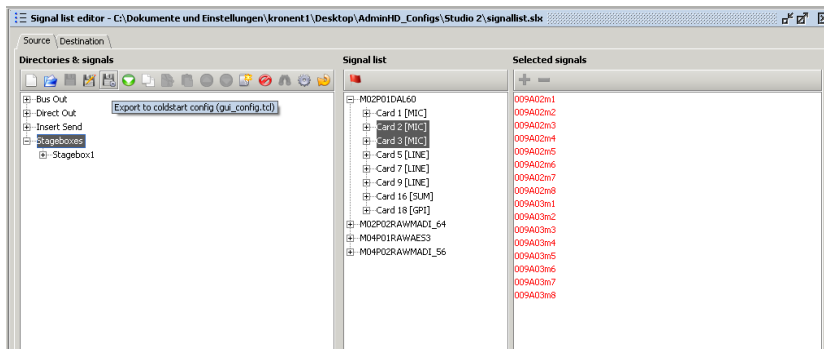
2. Select the directory on your AdminHD PC where you wish to store the file and click **Save**:
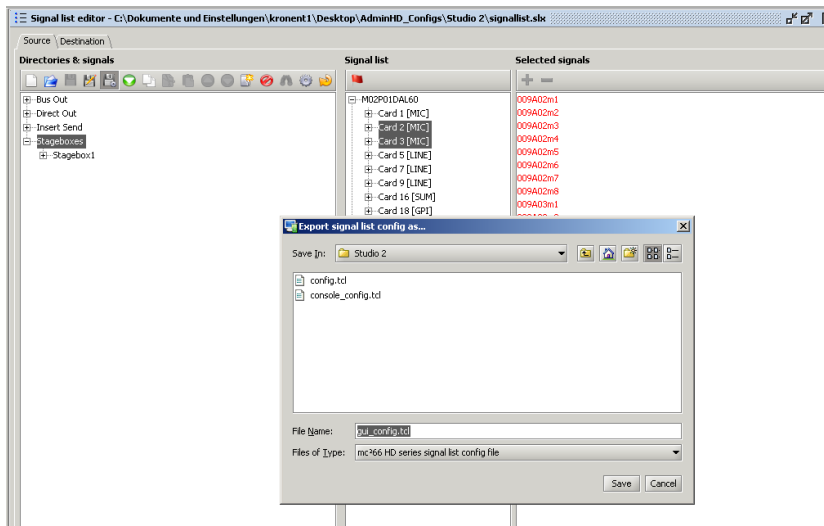
The signal list is stored as a cold start file on your computer.

DO NOT rename the file; it must be named **gui_config.tcl** in order to be read by the system.

3. Next, connect and configure your computer so that it is communicating with the system as described on Page 118.

Tip

It is a good idea to open the 'Remote Log' so that you can monitor the progress of the upload.

4. Now upload the file by selecting Remote -> Upload file -> GUI cold start config (gui_config.tcl):
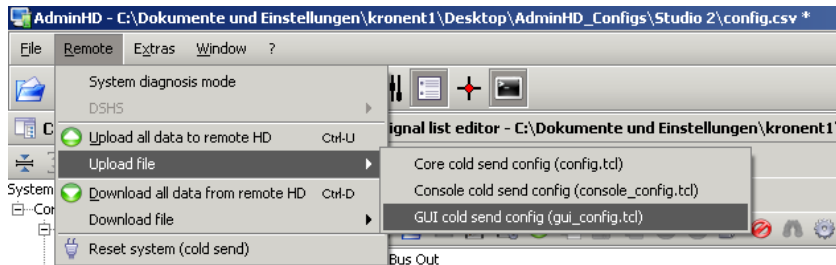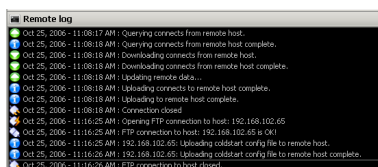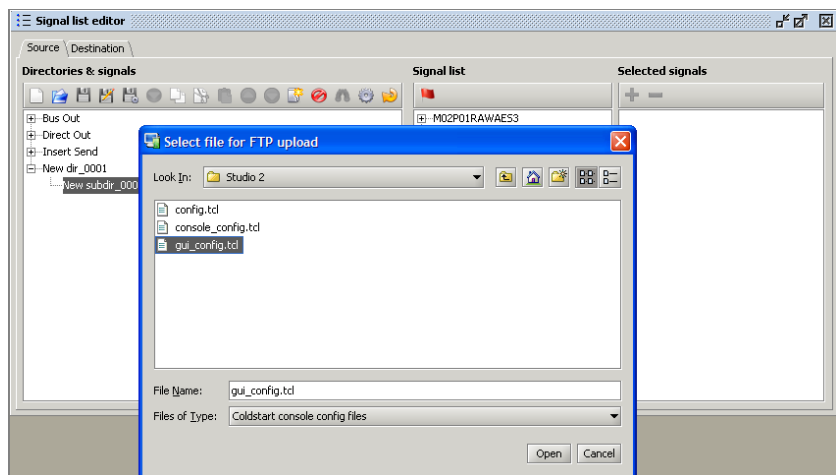
5. And, select the file you wish to upload:

The file is uploaded to the system.

6. You can check whether the file has uploaded successfully within the 'Remote Log':

7. Finally, cold start the control system.

Note

Note that when you perform a cold start, you will lose any warm start data within the system. Therefore, make sure that you have saved the current user data in a production, and any warm start configuration updates within AdminHD *BEFORE* you perform this operation!

Also note that if you have a redundant Control System fitted, you will need to disable it in order to update the cold start configuration. See Page 156.

The 'Signal List Editor'

The 'Signal List Editor' can be used to create, edit, upload and download signal lists.

1. To show or hide the 'Signal List Editor', click on the appropriate button from the Toolbar, press **Ctrl** + **SHIFT** + **S** on your computer keyboard, or select the **Window** -> **Signal list editor** option from the main menu bar.

AdminHD analyses your current configuration and then opens the 'Signal List Editor' window:
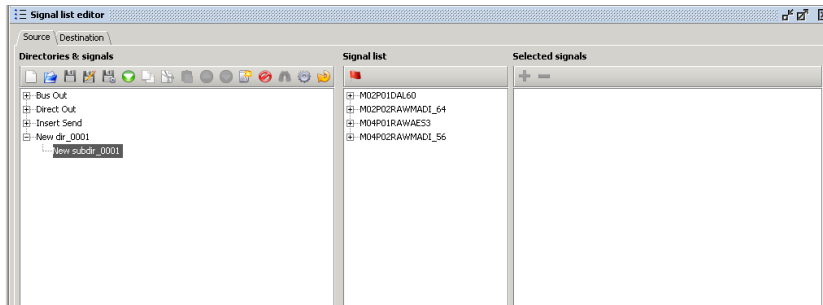
Note that AdminHD creates a new 'empty' signal list each time you open the 'Signal List Editor'. If you wish to edit an existing signal list, you will need to open a file (see Page 166) or download a signal list from the system (see Page 160).

The 'Signal List Editor' is divided into two pages – **Source** and **Destination**.

2. Click on the **Source** or **Destination** tabs at the top of the window to change between pages:
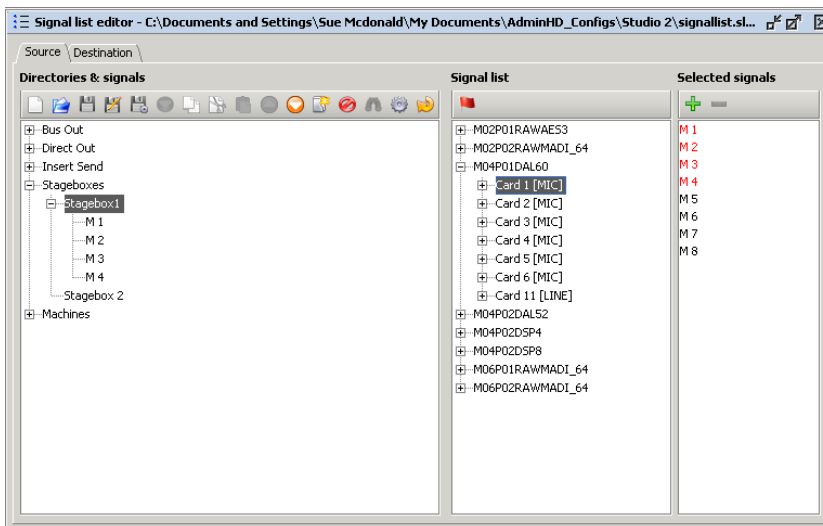
Within each page, there are three columns:

1	**Directories & signals**	This column displays the configured signal list.
		Signals are organised into directories and subdirectories which may be added and named as you wish.
2	**Signal list**	This column lists all the signals within your current AdminHD configuration. The list follows the tree-like structure of the configuration using default names.
		The names describe the system component as follows – for example, **Mo1Po1DAL52**:
		• **Mo1** – indicates the HD Core Module (e. g. Module 1)
		• **Po1** – indicates the port on the Module (e. g. Port 1)
		• **DAL52** - indicates the device on the port (e. g. DALLIS Device with 52 channels)
3	**Selected signals**	This column displays signals selected from the **Signal list** and is used to add signals to each subdirectory.

The 'Signal List Editor' also has its own Toolbar, below **Directories & Signals**, which access all the signal list functions. For a quick guide to the 'Signal List Editor' Toolbar, see Page 233.

3. Use the **+** and **–** signs to open and close branches of the **Directories & signals** column to interrogate the configured signal list:
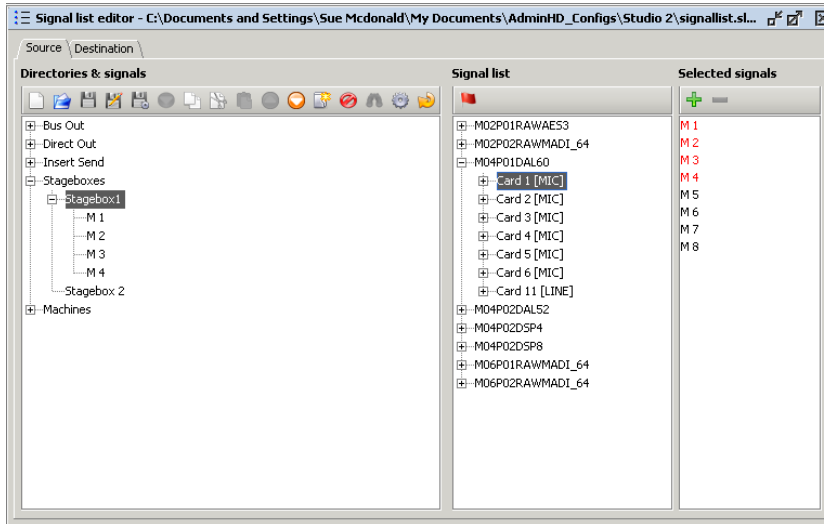
4. Use the **+** and **–** signs to open and close branches of the **Signal list** column to interrogate the available signals.

Signals shown in red are added to a subdirectory; those in black have not been added to a subdirectory.

Locating a Signal within the 'Signal List Editor'

To quickly locate the hardware position of a signal:

1. Select the signal from the Directories & signals column.

2. Click on the **Locate** button from the 'Signal Editor' Toolbar:
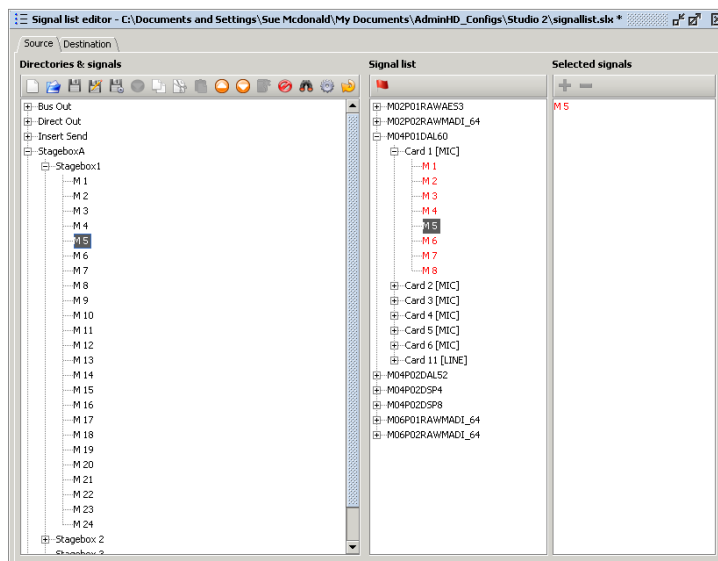
*The **Signal list** opens to show the hardware location of the signal.*

Creating a New Signal List

A new signal list is created each time you open the 'Signal List Editor' window. However, if you already have a signal list open and want to create a new one, then:

1. Click on the **New Signal List Config** button within the 'Signal List Editor' Toolbar.

A new list is created:
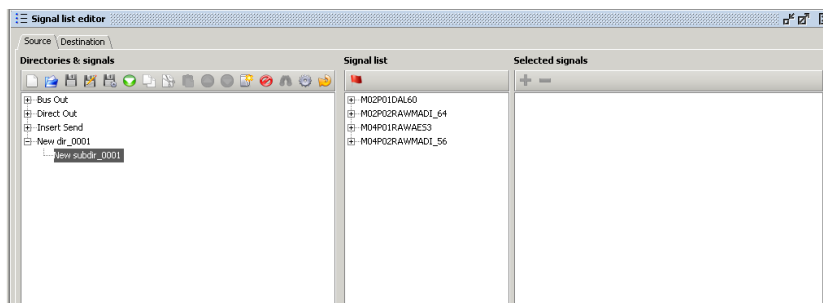
You will see a new signal list in the **Directories & Signals** column including an unnamed directory (**New dir_0001**) and subdirectory (**New subdir_0001**) to get you started.

Note that the signal list above is for a mc^2 configuration, and therefore includes some default directories, such as **Bus Out**, **Direct Out** and **Insert Send**, which hold the console's DSP signals. You can define which DSP signals are included in the 'Signal List' when it opens, within the **Extras** -> **Preferences** menu described on Page 227. These signals are not available when running in Nova73 or Nova73 DSHS mode.

In the **Signal List** column, you will see all the signals available within your system configuration.

Opening an Existing Signal List

Alternatively, you may wish to edit or add to an existing signal list:

1. Click on the **Open Signal List Config** button within the 'Signal List Editor' Toolbar.
2. Select a file (.slx) and click on OK.

Note that if you try and open a signal list which contains signals not supported in the current AdminHD configuration, then some parts of the signal list may not load.

If you are running online, then you can download the current signal list from the system using the **download GUI signal list config** button. See Page 161 for details.

Editing a Signal List

You can generate a signal list automatically from the configuration, see Page 175. However, it is more likely that you will want to create and configure your own directories and subdirectories.

The signal list is edited as follows:
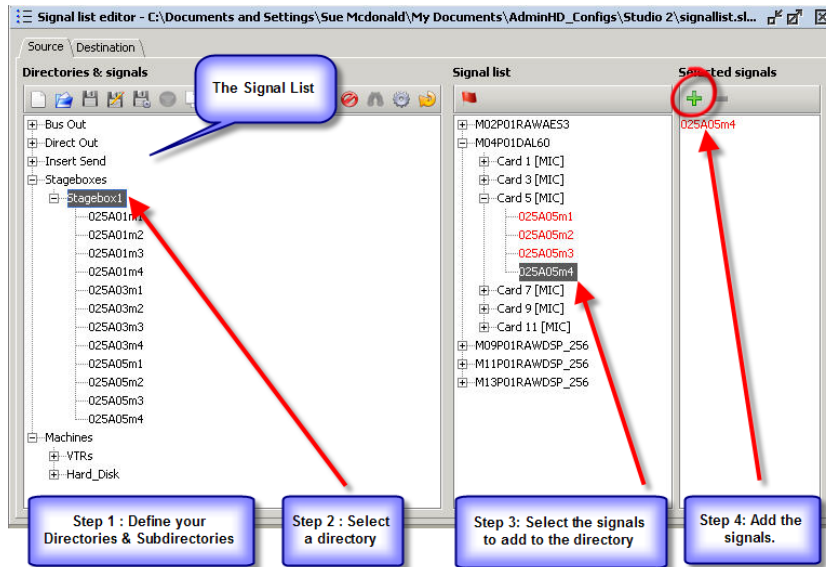
Note that you can only add signals to a subdirectory, and not a directory.

Also note that you can add a signal to more than one subdirectory if you wish. For example, you might place the test tone in subdirectories called "Service" and "Line-up". Signals highlighted in red in the **Signal list** column have already been added to a directory.

Remember to define both source and destination signals using the **Source** and **Destination** tabs at the top of the editor window.

Let's look at these operations in more detail:

Adding a Directory or Subdirectory

To add a new directory or subdirectory:

1. Select the position in the **Directories & signals** column where you wish to add the new directory or subdirectory – for example, select **Stageboxes**:
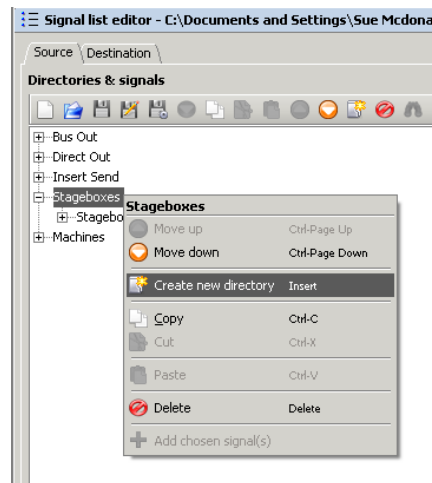
2. Right-click and select Create new directory.

The new directory or subdirectory is added to the signal list below your selection.

Renaming a Directory or Subdirectory

You can rename it as follows:

1. Double-click on the name of the directory or subdirectory.

The name is highlighted:
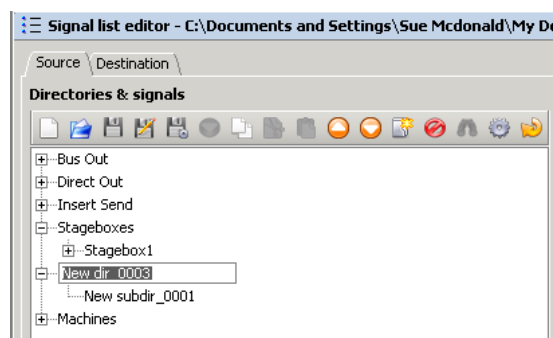
2. Type in the new name on your computer keyboard and press Enter.

Adding Signals to a Subdirectory

Having created and named your directories and subdirectories, next add your signals:

1. First select the subdirectory from the **Directories & signals** column – for example, **Stagebox1**.

The name is highlighted.

2. Next, use the **Signal list** column to select the signals you wish to add – you can select an individual signal, or a complete card, as shown below:
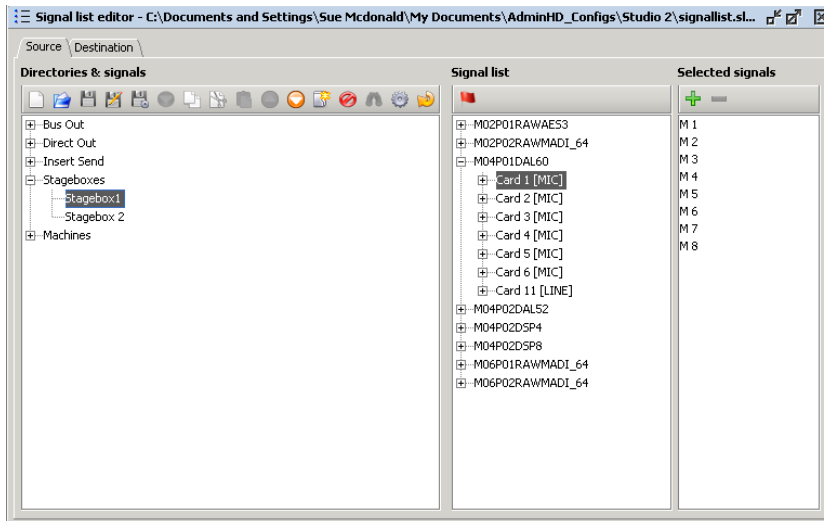
*The selected signals are shown in the **Selected signals** column.*

3. Then add all the signals in one operation by clicking on the **Add chosen signals** button:
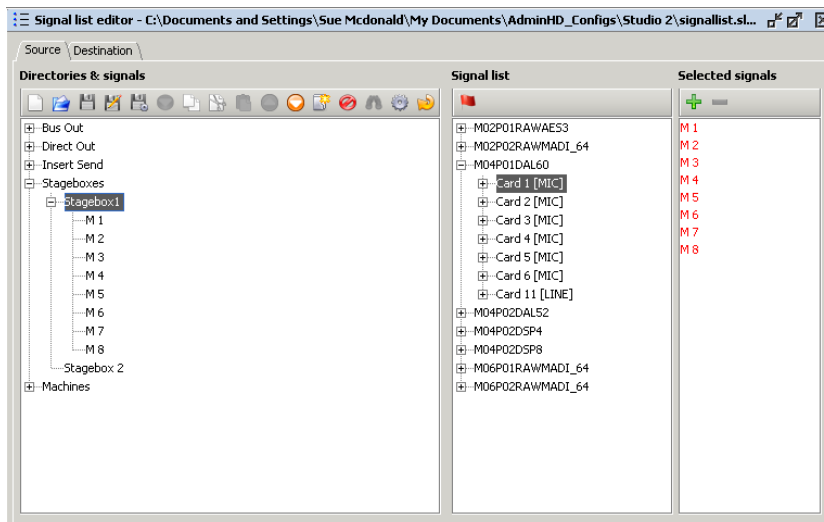
This adds all of the selected signals to the selected subdirectory. The selected signals turn red to indicate that they are now used within a subdirectory.

When adding signals, there are a few tips and tricks you can use to edit your selections:

Tip

1. To select all the signals from a card, click on the card within the **Signal List** column.

2. To select a range of signals or cards, select the first signal; then press and hold the **Shift** button on your computer keyboard and select the next signal. This selects all signals within the range, or all cards within the range:
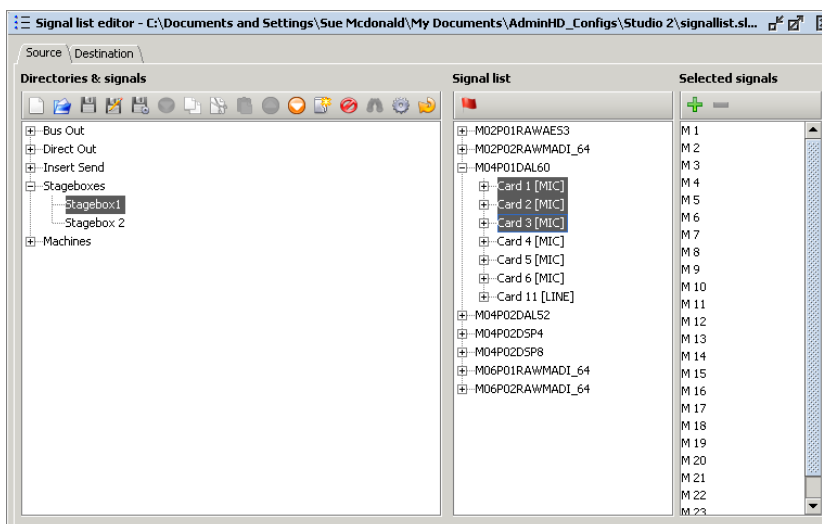
3. To select non-consecutive signals or cards, press and hold the **Ctrl** button on your computer keyboard and then make your selections. As long as hold the **Ctrl** button, your selections are accumulated within the **Selected signals** list:
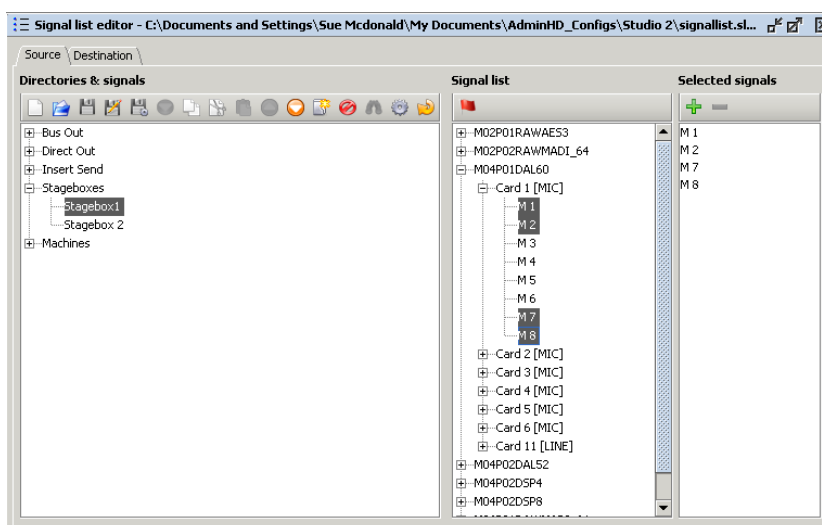
4. If you add the wrong signal to the **Selected signals** column, you can remove it by selecting the signal and clicking on the **Remove chosen signal button**:
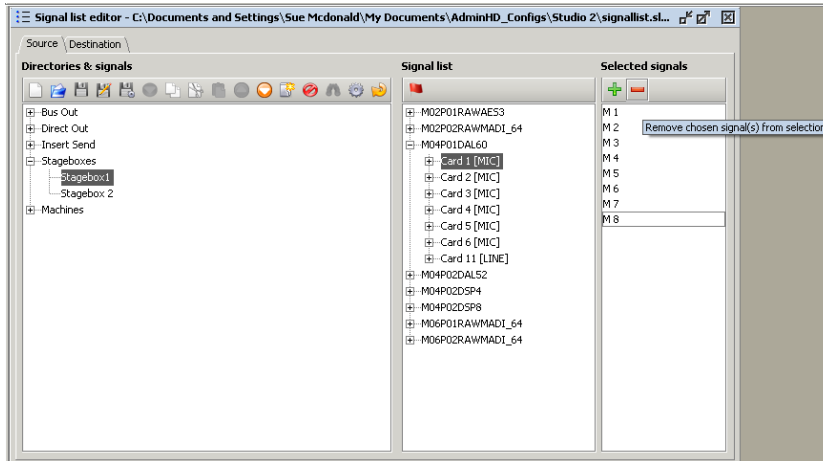
Deleting Signals, Subdirectories & Directories

Once you have added signals into the **Directories & signals** column, you can delete them, or delete a complete directory or subdirectory, as follows:

1. Select the signal or directory or subdirectory from the **Directories & signals** column:
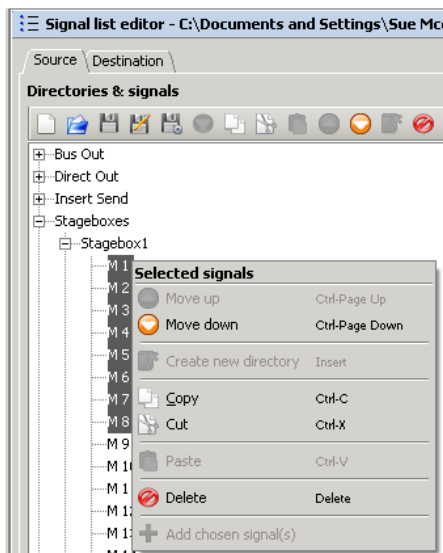
2. Right-click and select Delete.

3. Confirm by clicking Yes.

The selected signals are deleted from the signal list.

Note that deleting a subdirectory deletes all signals within it. And, deleting a directory deletes all subdirectories within it.

Note

Editing the Position of Signals, Subdirectories & Directories

You can alter the position of a signal, subdirectory or directory within the signal list as follows:

1. Select the signal or directory or subdirectory from the **Directories & signals** column – for example, **Stagebox 2**:
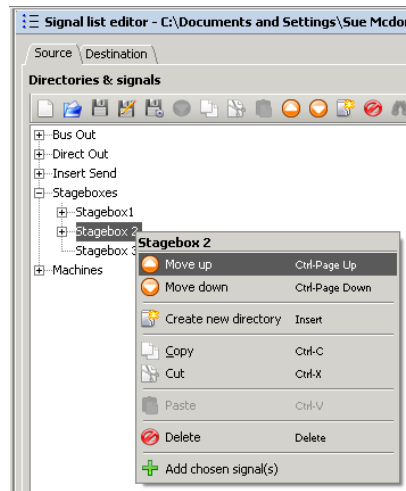
2. Right-click and select Move up or Move down.

The selection moves accordingly.

Copy, Cut and Paste

In addition, you can use the copy, cut and paste functions to quickly edit your signal list. For example, to copy or cut a subdirectory from one directory to another:

1. Select the directory or subdirectory you wish to copy or cut from the **Directories & signals** column – for example, **Stagebox 2**:
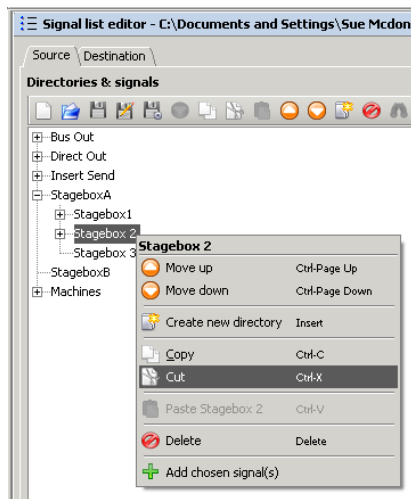
2. Right-click and select Copy or Cut.

The selected subdirectory is copied into the programme's clipboard.

3. Now select the directory where you want to paste the selection – for example, **StageboxB**:
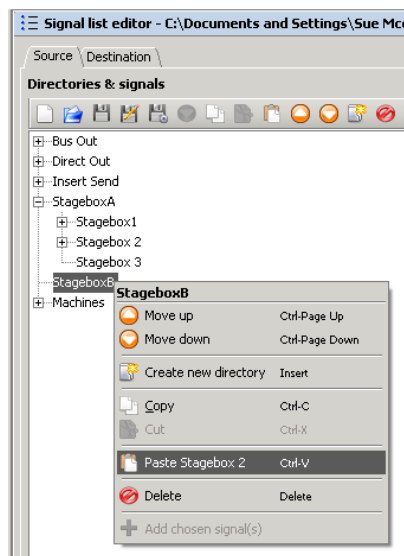
4. Right-click and select Paste.

The selected subdirectory is pasted accordingly.

Saving a Signal List

Having configured your signal list, you should now save it on your AdminHD computer. This will allow you to import it into the 'Connect Manager' or edit the list at a future date.

Signal lists are saved as **.slx** files on your computer. As they relate to the system configuration (**.csv** file), they should be stored in the same directory on your computer.

You have two options when saving the signal list:

Save

If this is a new unsaved signal list, then save it for the first time as follows:

1. Click on the **Save Signal List Config** button within the 'Signal List Editor' Toolbar.

2. Select the directory in which you wish to save the file.

3. Click Save.

*The signal list is stored with the filename **signallist.slx** and the file path is shown in the 'Signal List Editor' title bar:*
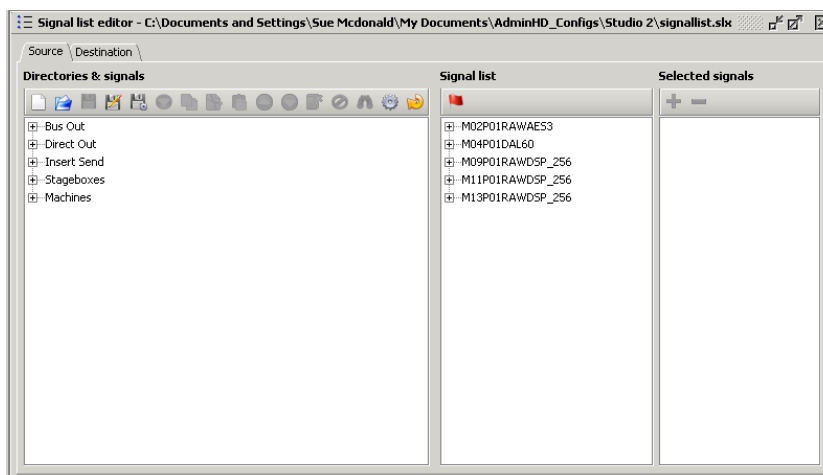
4. From hereon, you can save any subsequent changes instantly by clicking on the **Save** button.

Save As

Alternatively, if you are working on an existing file, you may wish to save the file under a different name.

Repeat as above but click on the **Save As** button within the 'Signal List Editor' Toolbar.

If you are going to store multiple signal lists within the same directory, then rename the file – for example, **AudioControl.slx**.

Generating a Signal List Automatically from the Configuration

In order to generate a signal list quickly, you can use the **Generate automatic tree view from config** function.

This will automatically add all the directories, subdirectories and signals as they are displayed within the **Signals List** column to the **Directories & Signals**:
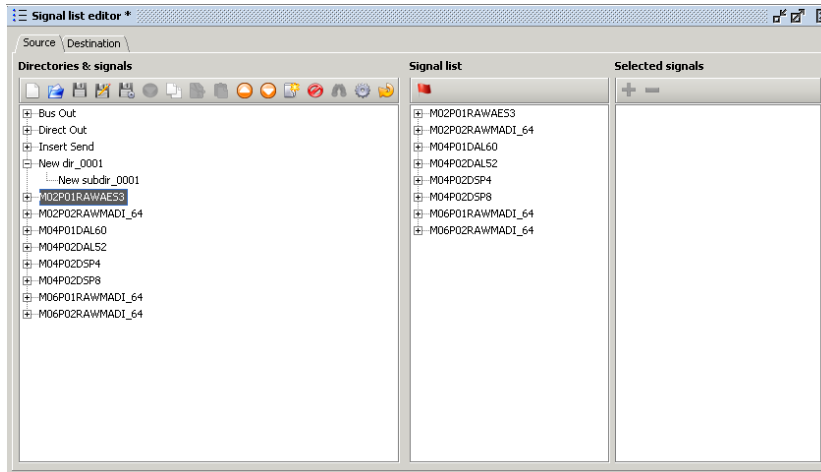
This hardware-based list is especially useful for system technicians. It provides a clearly structured signal list including all available signals within the system.

1. To create the list, click on the **Generate automatic tree view from config** button from the 'Signal List Editor' Toolbar.

The directories are created and get a hardware-based default name.

These names describe the system component as follows – for example, **Mo1Po1DAL52**:

- **Mo1** – indicates the HD Core Module (e. g. Module 1)

- **Po1** – indicates the port on the Module (e. g. Port 1)

- **DAL52**- indicates the device on the port (e. g. DALLIS Device with 52 channels)

Note that you can click on the **Generate automatic tree view from config** button as many times as you wish.

Updating the 'Signal List Editor'

Each time you open the 'Signal List Editor' window, AdminHD analyses your system configuration and reads in the available signals. If you later add a new component or card to your configuration, then you will need to update the 'Signal List Editor' before you can access the new signals from the **Signals List** column:
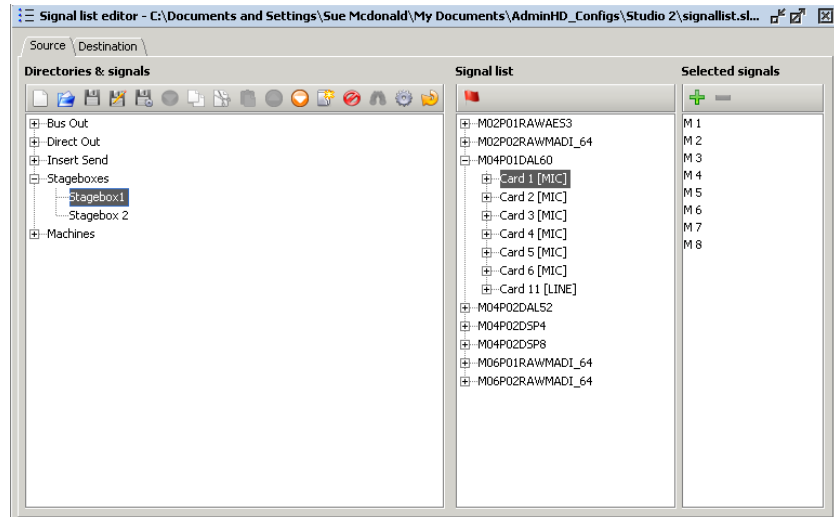
To update 'Signal List Editor':

    1. Click on the Update hardware signal config button.

*The **Signal list** column updates with the new card.*

Online Control – The 'Connect Manager'

The 'Connect Manager' is used to control settings within your system when running online:
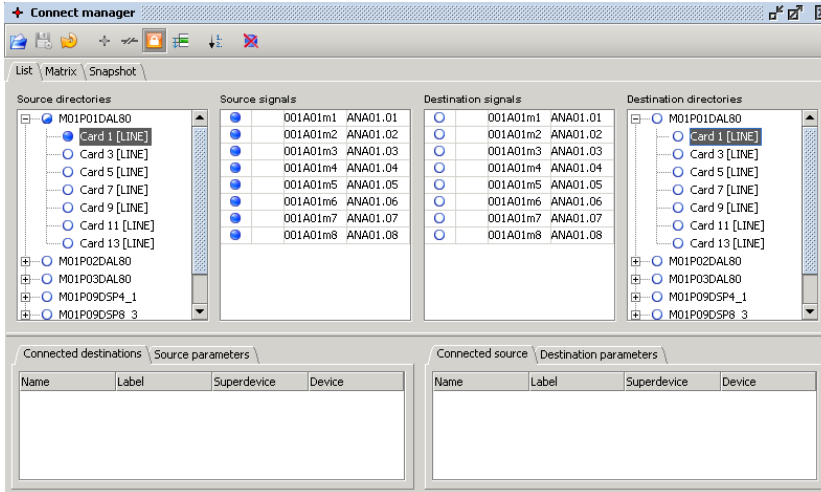
- **Set Matrix crosspoints** – connections from any input to any output.

- **Edit signal labels** – online renaming of signal labels.

- **Control I/O parameters** – for example, to adjust microphone preamp gain, subsonic filter switching, etc.

- **Save and recall snapshots** – to reset any number of signals, with partial or global recalls. A snapshot stores connections to or from a signal, the signal's label and I/O parameter values.

These operations are identical for AdminHD and ControlHD, so please see the "ControlHD Operator's Manual" for full details.

This section deals with 'Connect Manager' functions useful only for AdminHD users.

Note

Updating the 'Connect Manager'

If you add a new component or card to your system configuration, then you will need to update the 'Connect Manager' before you can access the new signals.

Note

Note that you will only need to use this option if you are making programming changes to the configuration and using the 'Connect Manager' at the same time.
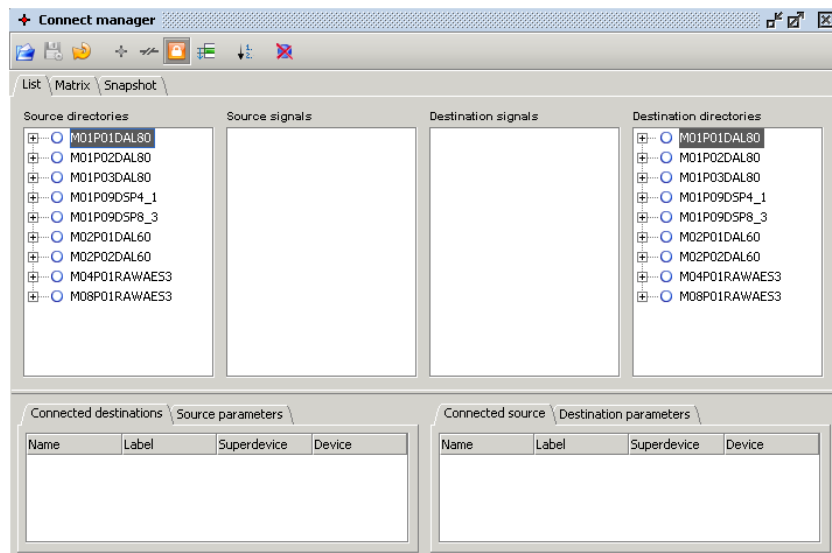
To update 'Connect Manager':

1. Click on the Update hardware config button.

*The **Source** and **Destination signals** columns update with the new signals.*

Exporting a Connection List

You can export a list of all connections within the 'Connect Manager' so that it can be opened in a 3rd party editor, such as MS Excel. For example, in a mc^2 installation you may wish to check which connections are made without disturbing the console operator.

To export the connection list:

1. Click on the **Export** button from the 'Connect Manager' toolbar:

Note that the button only becomes available once there is a connection made.

2. Select a directory and enter a filename, and click **Save**:
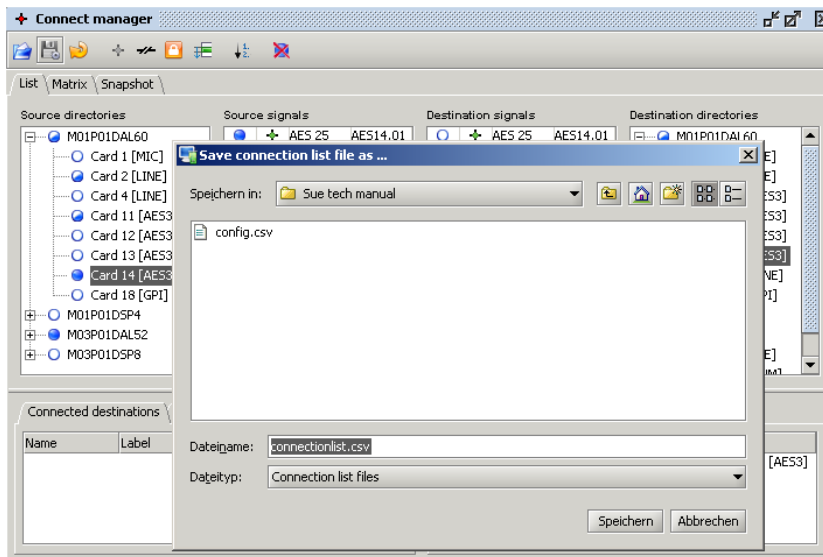
*The connection list is stored as a **.csv** file on your computer.*

3. Now use an editor, such as MS Excel, to open the file:

You can format the data as you wish within the editor.

System Diagnostics

In this section, you learn about the tools for diagnosing the system and the AdminHD software:

- System Diagnosis online

- The 'Remote Log'

- The System Message Log

- System Version Check

Online System Diagnostics

When online, AdminHD can be used to monitor the status of the hardware within the system.

Note that this feature is also available in ControlHD.

If you are not already online, then proceed as follows:
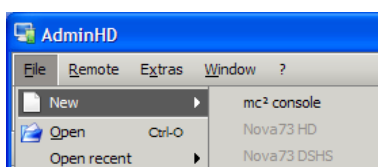
1. First connect and configure your computer so that it is communicating with the system as described on Page 118.

2. Open a New configuration by selecting **File** -> **New** and choose your system from the drop-down menu:

- **Nova73 HD** – to open a Nova73 configuration

- **mc²66 HD** – to open a mc² configuration

- **Nova73 DSHS HD** – to open a "dual self healing star" configuration.

3. Next click on the **Download** button from the Toolbar, or select **Remote** -> **Download all data to remote HD** from the main menus, to download the system configuration:
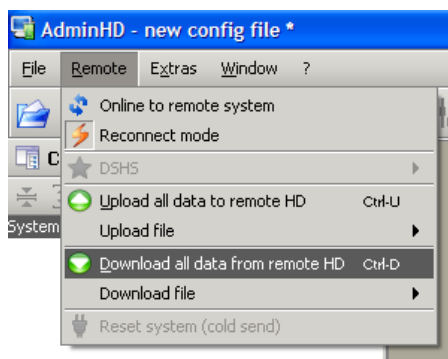
4. Enter the TCP/IP address of the system and click **Connect**:
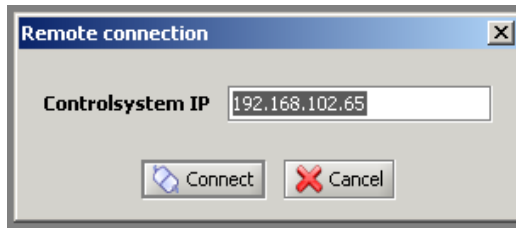
AdminHD downloads the configuration from the system into your AdminHD session.

Note that instead of downloading, you could open a configuration from your AdminHD computer. However, it is always best to download from the system if possible so that your AdminHD configuration matches that within the system.

Also note that you cannot download a configuration if you are already online. So, if this is the case, disable online mode and then download the configuration.

5. Having downloaded the system configuration to AdminHD, go online by selecting **Remote** -> **Online to remote system** from the main menus:
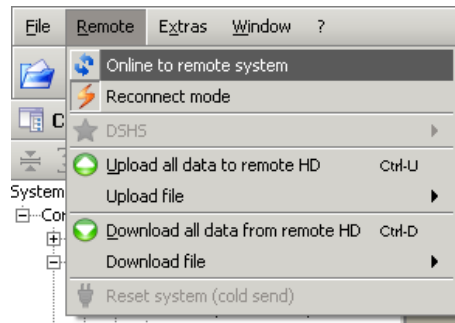
6. And confirm the IP address for the connection by clicking **Connect**:
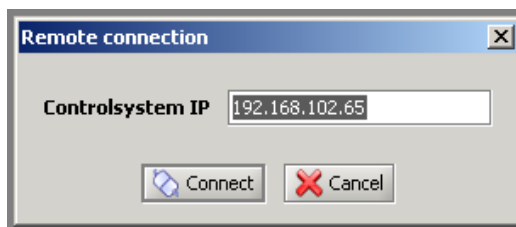
AdminHD connects to the system and the online or offline status is displayed in the Status bar.

If there is a problem communicating with the system, then the connection will time out after about 10 seconds. Check your connections and TCP/IP settings.

7. If you select **Remote** -> **Reconnect mode**, then AdminHD will automatically attempt to reconnect to the system if Network communication is interrupted.

Diagnosing Faulty Components

Once online, you can use the 'Core Browser' and 'Graphic View' windows to monitor the actual status of hardware components within your system:
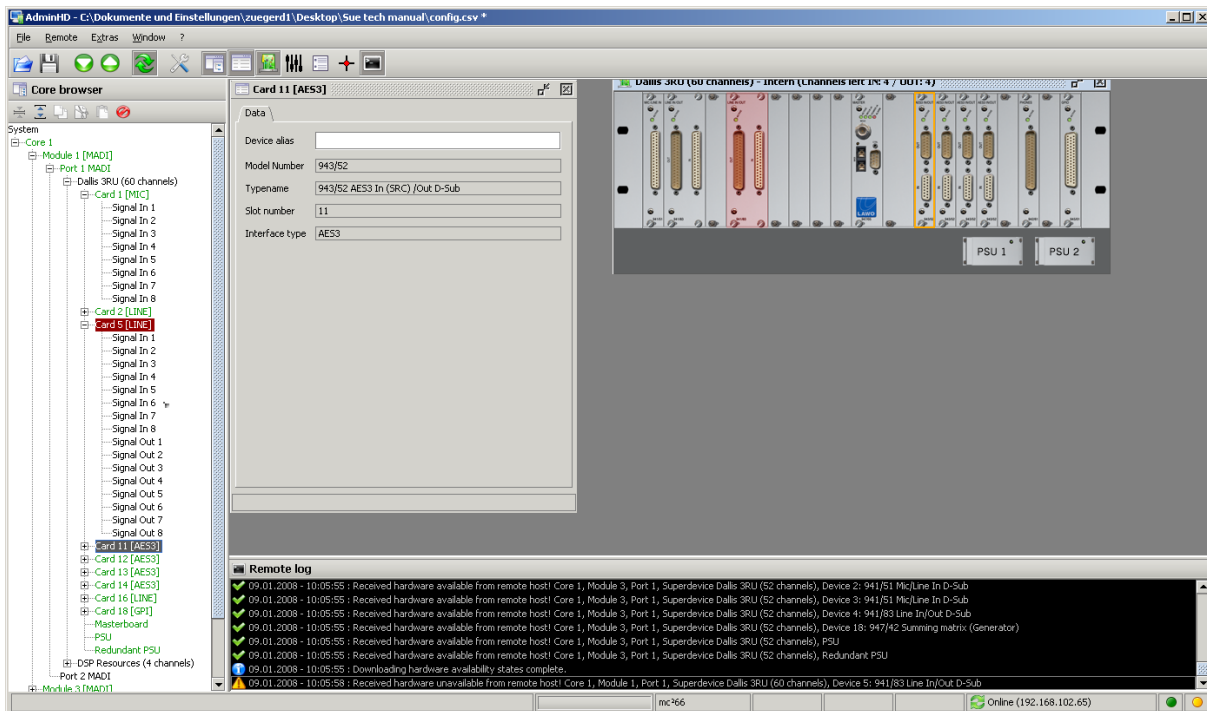
All components are monitored, including the status of the HD Core, DALLIS units and their PSUs.

Components which are operating normally are coloured green within the 'Core Browser'.

Faulty components are highlighted in red within the 'Core Browser'.

1. Click on the faulty component within the 'Core Browser' and the 'Graphic View' window updates to show the position of the component within the frame.

2. Check your connections and if necessary replace the card.

When the card is operating correctly, the component is displayed in green within the 'Core Browser'.

The 'Remote Log'

The 'Remote Log' records all the messages generated by AdminHD, and the system if it is online. You may want to view or save the 'Remote Log' to help diagnose system errors or errors within the operation of AdminHD.

Recording System Errors

Messages from the system are *only* logged when the system is online so if you want to use the 'Remote Log' to help fault find the system, enable **Remote** -> **Online to remote system**.

Saving the Remote Log

The contents of the 'Remote Log' are not saved automatically and will be lost when you exit the programme or clear the log.

To save the contents of the 'Remote Log':

1. Open up the 'Remote Log' window and right-click anywhere within it:
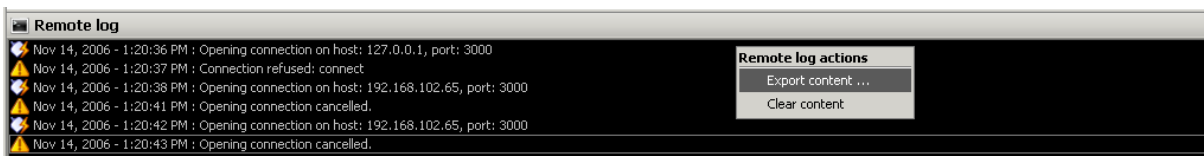
2. From the drop-down menu, select Export content…

Alternatively, you can select **File** -> **Export File** -> **Remote Log** from the main menus:
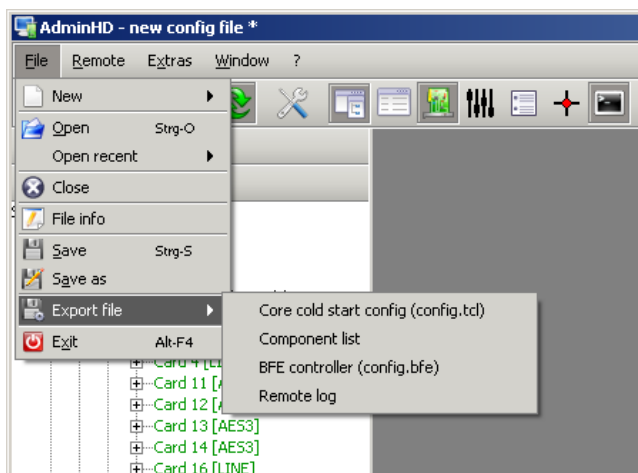
A 'Save As' file selection box appears:
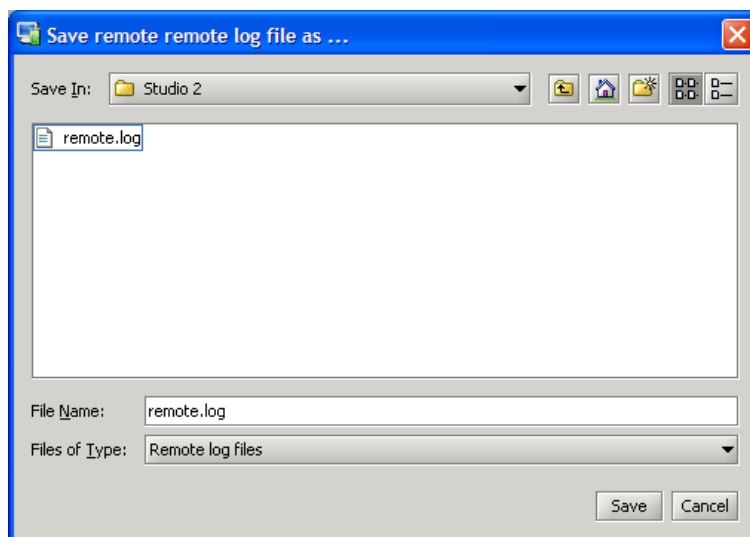
Tip

3. Select the directory in which you wish to save the file and enter a filename:

You can specify a default directory for your log files within the **Extras** -> **Preferences** menu, see Page 227 for details.

4. Click Save.

The log is stored as a plain text file and can be opened by any common text editor.

Clearing the Remote Log

To get a better overview of a problem you may wish to clear the contents of the 'Remote Log':

1. Open up the 'Remote Log' window and right-click anywhere within it:
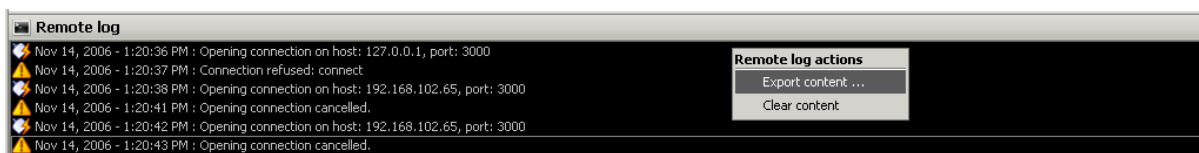
2. From the drop-down menu, select Clear content…

The contents of the 'Remote Log' are deleted.

Tip

If you are not sure whether you will need the 'Remote Log' entries later for reference purposes, you should save the contents of the window before you clear you log.

The System Message Log

In addition to AdminHD's Remote log, the system itself generates and stores error messages. These can be downloaded from the system and saved on your computer as a text file.

1. Make sure that you are connected to your system.

2. Select Remote -> Download file -> System log messages from the main menu bar:
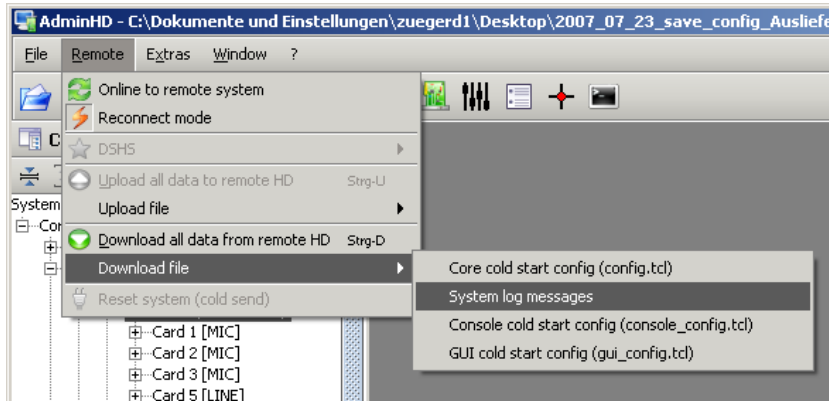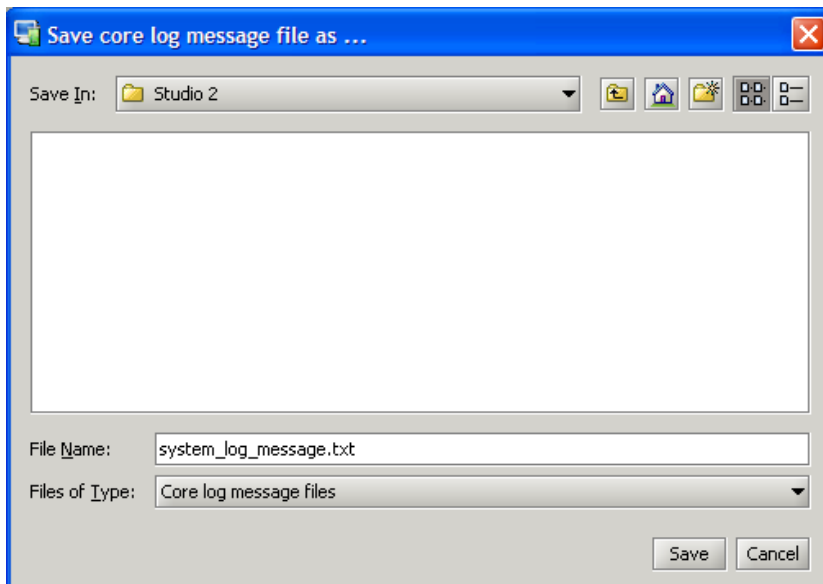
A 'Save As' file selection box appears:

3. Select the directory in which you wish to save the file and enter a filename:

You can specify default directories for your log files within the **Extras** -> **Preferences** menu, see Page 227 for details.

Tip

4. Click Save.

5. AdminHD now opens a connection to your system and downloads the log file.

The log is stored as a plain text file and can be opened by any common text editor.

System Version Check

When new software features are released for your system, then a new version of AdminHD is issued to enable their configuration. If you are not sure whether the version of AdminHD on your computer matches that installed on the system, then you can ask the programme to check the versions each time you make an online connection. This option is particularly useful if you are dealing with multiple systems running different versions of software.

1. Select Extras -> Preferences from the main menus:

2. And select the Remote Communication page:
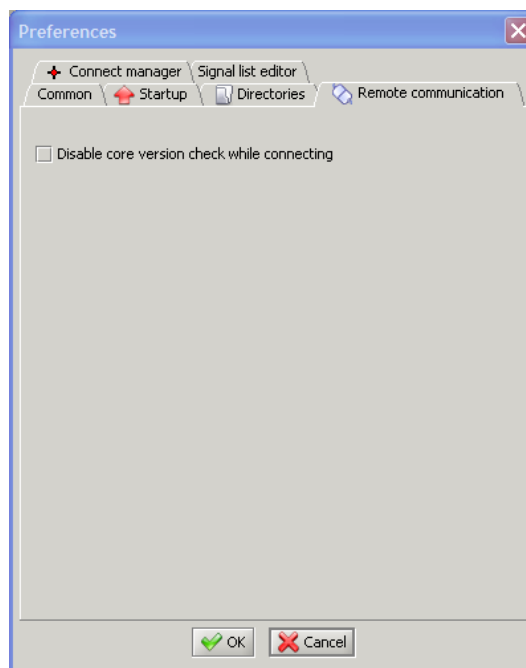
3. If you want AdminHD to check the version while connecting then untick the box and click **OK**.

Documenting Your System

AdminHD provides two tools to help you document your system once you have programmed your configuration:

- Copy Image
- Export a Component List

Copy Image/Write Image to File

You can save the 'Graphic View' of system components such as the HD Core and DALLIS units to help document your system.

In mc^{2}66 mode, you can also save the 'Console Panel' which shows the layout of the control surface.

Saving the 'Graphic View'

1. Open the 'Graphic View' window by clicking on the appropriate button from the Toolbar or pressing **Ctrl** + **SHIFT** + **F** on your computer keyboard.

2. Point your mouse over the frame of the unit.

The unit is outlined in orange.

3. Now right-click.

A pop-up menu opens:

4. If you select **copy image to clipboard**, then the graphic is saved to your computer's clipboard.

5. If you select **write image to file**, then a dialogue window opens. Enter a file name and click on **Save**.

The file is saved to your computer as a .png image file.

Saving the 'Console Panel'

Repeat as for the 'Graphic View' but this time within the 'Console Panel' window:

1. Open the 'Console Panel' window by clicking on the appropriate button from the Toolbar or pressing **Ctrl** + **SHIFT** + **O** on your computer keyboard.

2. Point your mouse over the console frame and right-click to access the pop-up menu:
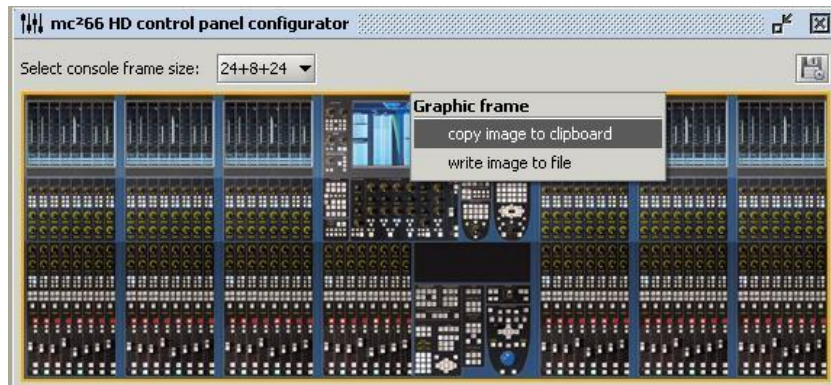
Export a Component List

You can export a component parts list so that it can be opened in a 3rd party editor, such as MS Excel.

1. Open your configuration and select File -> Export file -> Component list:
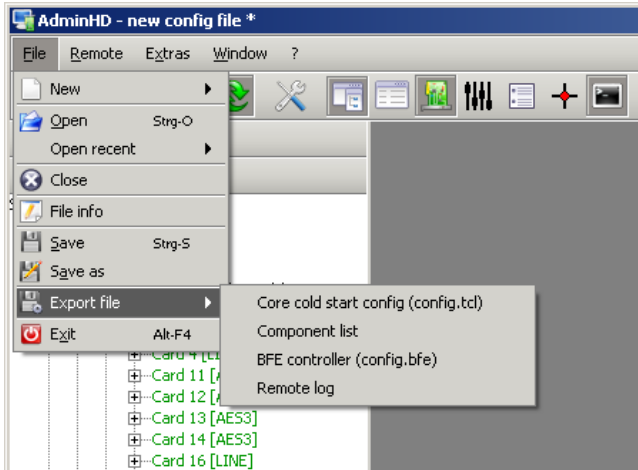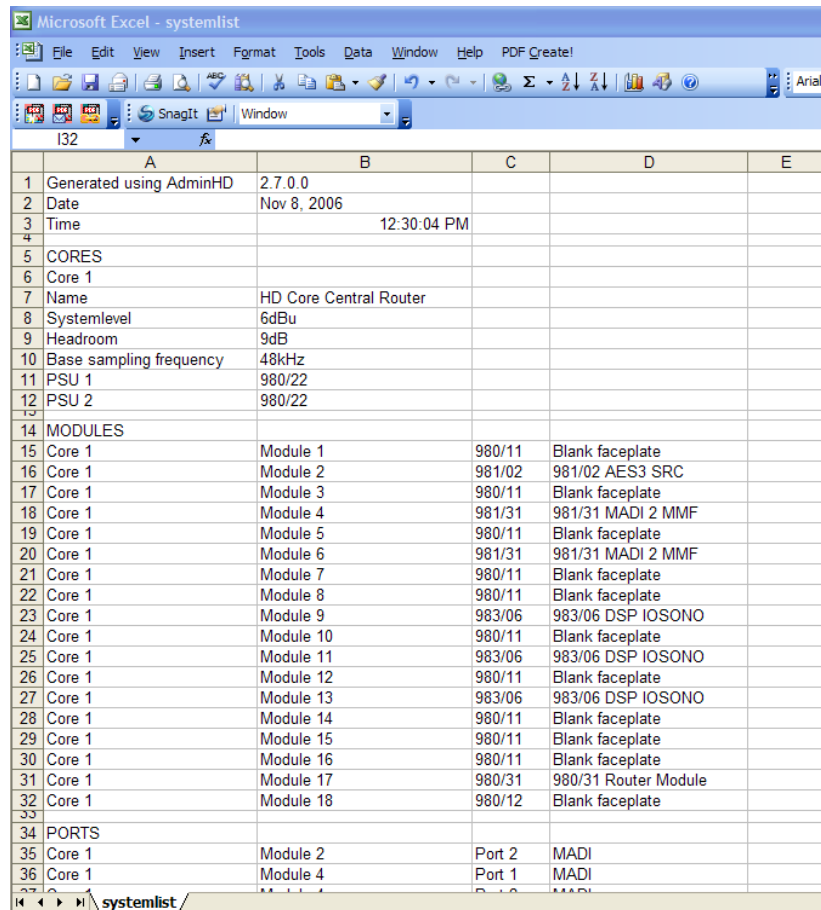
2. Select a directory and enter a filename, and click **Save**:
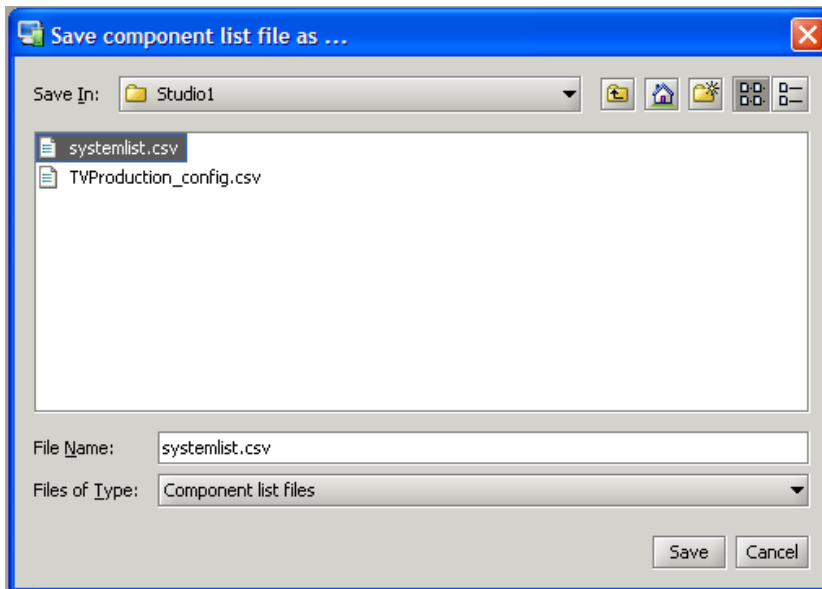
*The system list is stored as a **.csv** file on your computer.*

3. Now use an editor, such as MS Excel, to open the file:

	A	B	C	D	E
1	Generated using AdminHD	2.7.0.0			
2	Date	Nov 8, 2006			
3	Time	12:30:04 PM			
4					
5	CORES				
6	Core 1				
7	Name	HD Core Central Router			
8	Systemlevel	6dBu			
9	Headroom	9dB			
10	Base sampling frequency	48kHz			
11	PSU 1	980/22			
12	PSU 2	980/22			
13					
14	MODULES				
15	Core 1	Module 1	980/11	Blank faceplate	
16	Core 1	Module 2	981/02	981/02 AES3 SRC	
17	Core 1	Module 3	980/11	Blank faceplate	
18	Core 1	Module 4	981/31	981/31 MADI 2 MMF	
19	Core 1	Module 5	980/11	Blank faceplate	
20	Core 1	Module 6	981/31	981/31 MADI 2 MMF	
21	Core 1	Module 7	980/11	Blank faceplate	
22	Core 1	Module 8	980/11	Blank faceplate	
23	Core 1	Module 9	983/06	983/06 DSP IOSONO	
24	Core 1	Module 10	980/11	Blank faceplate	
25	Core 1	Module 11	983/06	983/06 DSP IOSONO	
26	Core 1	Module 12	980/11	Blank faceplate	
27	Core 1	Module 13	983/06	983/06 DSP IOSONO	
28	Core 1	Module 14	980/11	Blank faceplate	
29	Core 1	Module 15	980/11	Blank faceplate	
30	Core 1	Module 16	980/11	Blank faceplate	
31	Core 1	Module 17	980/31	980/31 Router Module	
32	Core 1	Module 18	980/12	Blank faceplate	
33					
34	PORTS				
35	Core 1	Module 2	Port 2	MADI	
36	Core 1	Module 4	Port 1	MADI	

You can now format this data as you wish within the editor.

System Configuration

This section covers all system configuration parameters common to all HD Core systems (Nova73, Nova73DSHS and mc^2). Dual self-healing star and mc^2 users should also refer to Pages 207 and 212 respectively.
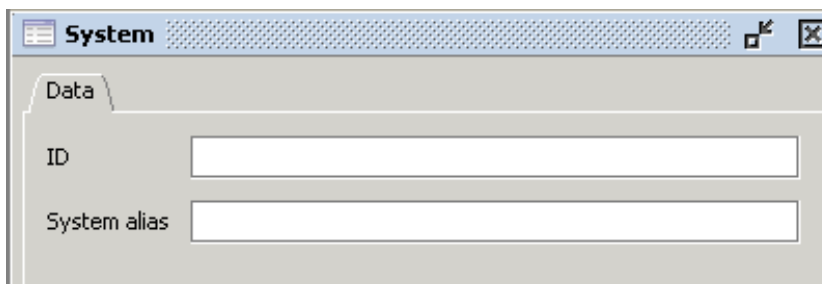
We will assume that you have read the "Getting Started: Configuration" section on Page 121.

The individual components are covered according to their hierarchical order within the 'Core Browser'. For more details on parameter functions, please consult the relevant data sheet for the component.

System

Each configuration consists of a single **system** which contains all the hardware components for your installation.

Open the **System** 'Parameter Box' to edit its parameters:

ID	Usually all Lawo projects receive a project ID, made up of 6 integers. You can log your project ID here; you may be asked for it when servicing your product.
System alias	Here you can enter a reference name for the system. For example, if you work on multiple configuration files, it can be useful to name components within AdminHD.
	Alias names are only used within AdminHD and are not transferred to the system.

Both these fields can be left blank if you wish.

Core

Within each **System**, you may add a type of HD **Core**.
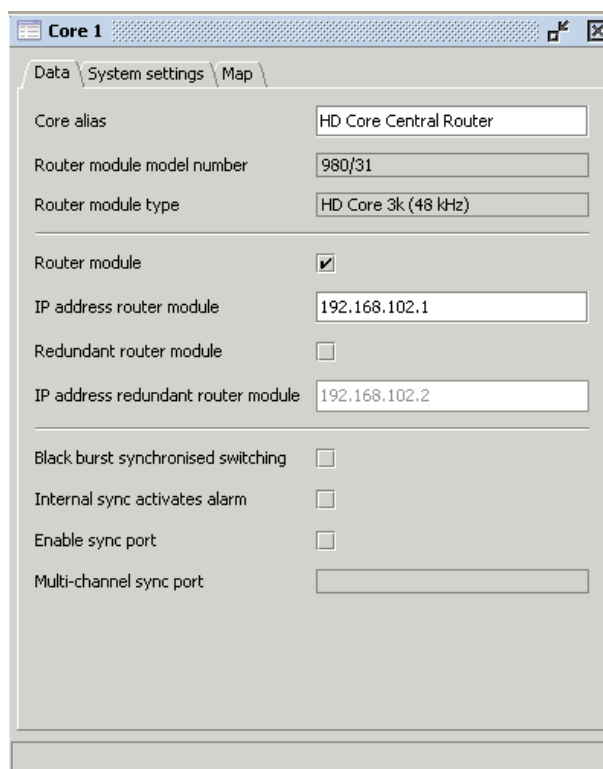
Note that in Nova73 or mc²66 mode, each system consists of a *single* Core. In Nova73 DSHS mode, you can add up to two Cores representing one side of the dual self-healing 'star'.

Open the **Core** 'Parameter Box' to edit its parameters. There are three pages of parameters for the core:

Core Parameters: Data

Core alias	Enter a reference name for the core or leave this field blank.
	Alias names are only used within AdminHD and are not transferred to the system.
Router model number	These fields are for information purposes only and cannot be edited.
Router module type	They show the serial number and type of the core's Router module.
	To change these parameters, you must delete the Core and add a different core type from the 'Core Browser'.
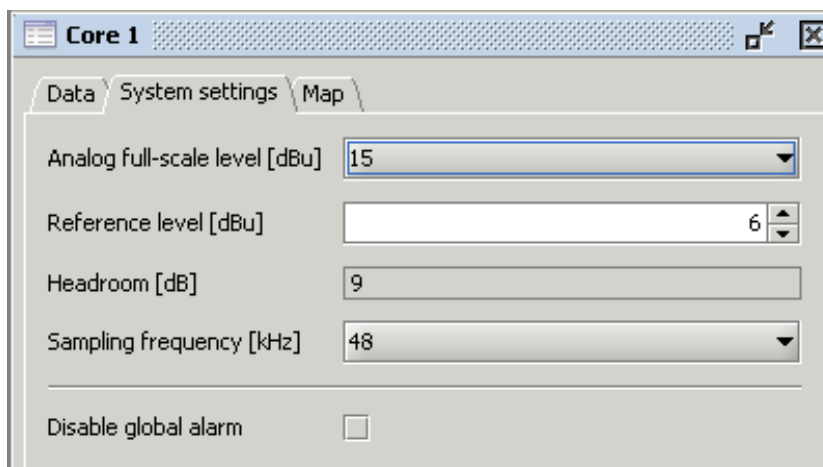
Router module	Tick this box to enable network communication to the HD Core Router module.
IP address router module	This box defines the IP address of the HD Core's router module. Note that the IP addresses required depend on your AdminHD mode. Our example shows a Nova73. For more details see Page 144.
Redundant router module	Tick the redundant router module box to add a redundant router module to the HD Core. See Page 128 for details.
IP address redundant router module	This box defines the IP address for the redundant module.
Black Burst synchronise switching	Tick this box to configure the system to switch matrix cross points synchronous to an external black & burst sync.
Internal sync activates alarm	Tick this box and an alarm will be issued when the system switches to internal sync. For example, if the system is referenced to external sync, then set this box to trigger the global alarm if the external sync source fails and the system switches to internal sync.
Enable sync port	Tick this box to enable the multi-channel sync port. You will be prompted to select the multi-channel sync source, see Page 145 for details.
Multi-channel sync port	This box displays the multi-channel sync port selection as a system address – for example:

System : Core :   Module : Port : n.u. : n.u. : n.u.
   1 : 4 :   4   : 1 : 0 : 0 : 0

Core Parameters: System Settings

Analog full-scale level (dBU)	This option sets the analog level which you wish to correspond to digital full scale level (0dBFS). You can select from 12, 15, 18, 21 or 24 dBU.
Reference Level (dBU)	This option sets the internal system reference level. The maximum reference level is 24dBU.
Headroom (dB)	The resultant headroom is calculated automatically according to the equation: **Analog full-scale level = Reference level + Headroom** For more details on levels, see Page 146.
Sampling Frequency	This option sets the internal sampling frequency of the HD Core. Note that the available options depend on your choice of HD Core. For more details, see Page148.
Disable Global Alarm	Tick this box is you wish to disable the Global Alarm. See Chapter 2: Installation for more details.
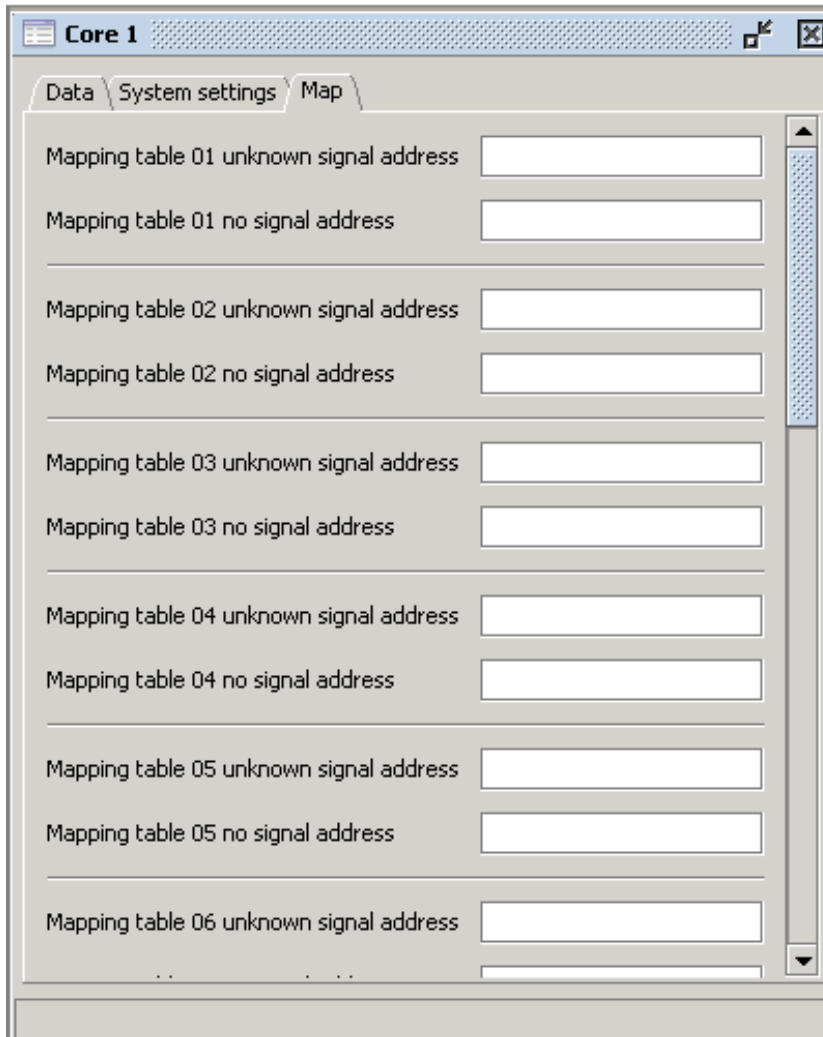
Core Parameters: Map

These parameters are for use with an external controller system.
See Page 149.

For each mapping table (1 to 16) you can enter:
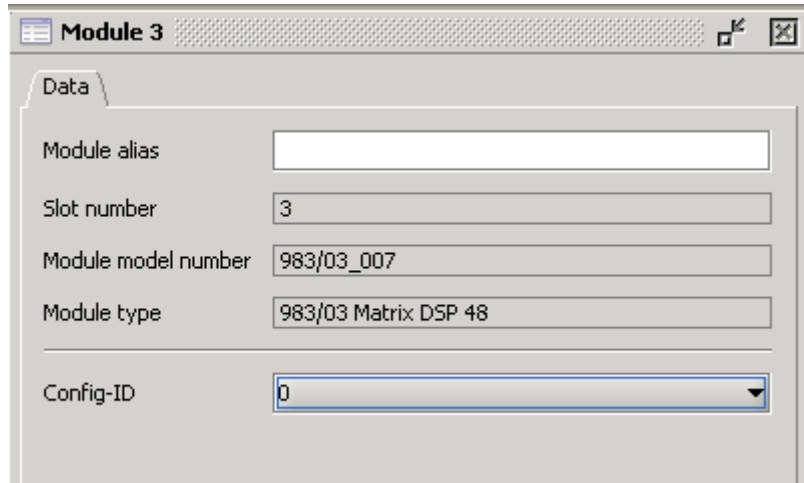
Unknown signal address	This is the address which will be submitted to the external control system when a signal is disconnected.
No signal address	This is the address which will be submitted to the external control system when an undefined source is connected to a defined destination.

Modules

Each **Core** can be fitted with **Modules.** Open the **Module** 'Parameter Box' to edit its parameters:

Module 3		
Data		
Module alias		
Slot number	3	
Module model number	983/03_007	
Module type	983/03 Matrix DSP 48	
Config-ID	0	

Module alias	Enter a reference name for the module. Alias names are only used within AdminHD and are not transferred to the system.
Slot number	This field is for information purposes only and cannot be edited. It shows the slot number within the Core.
Module model number **Module type**	These fields are for information purposes only and cannot be edited. They show the serial number and type of module.
Config-ID	For the 983/03 Matrix DSP 48 Module only. Defines the mode of the Matrix DSP Board. See Page 218.

Ports
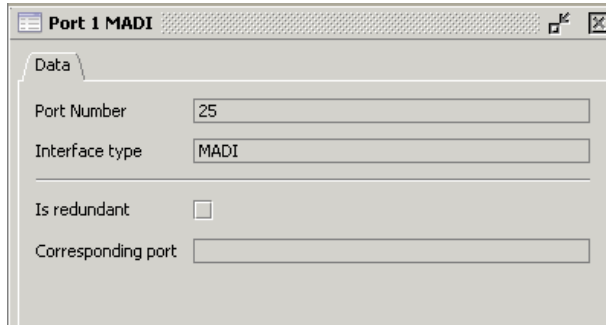
Each I/O **Module** can be opened to view its I/O **Port**s.

Note that DSP modules do not have audio ports, with the exception of the 983/06 card.

Note

Open the **Port** 'Parameter Box' to edit its parameters:

Port 1 MADI	
Data	
Port Number	25
Interface type	MADI
Is redundant	☐
Corresponding port	

Port Number Interface Type	These fields are for information purposes only and cannot be edited. The **Port Number** indicates the logical number of the port. See Appendix C for details. The **Interface Type** is defined by the Module selection: • **MADI** - multi-channel format according to the AES-10 standard. • **ATM** - data rate 155 Mbit/s, multi-channel format with 80 audio channels according to the Lawo standard. • **AES3** – stereo format according to the AES-3 standard. • **DSP** – internal digital signal processing.
Is redundant	Tick this box to enable port redundancy. You will be prompted to select the redundant port, see Page 136 for details.
Corresponding port	This box displays the redundant port as a system address – for example:
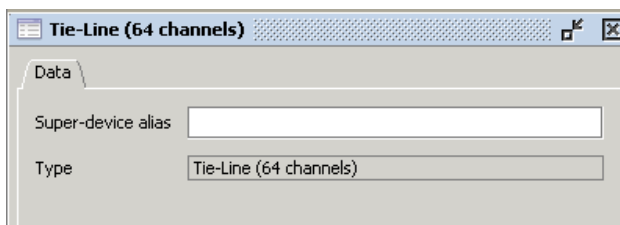
System :	Core :	Module :	Port :	n.u. :	n.u. :	n.u.
1 :	1 :	8 :	1 :	0 :	0 :	0

Super-Device

Below the Port, you will find the type of Super-Device:

Open the 'Parameter Box' to edit its parameters:

	Tie-Line (64 channels)	
Data		
Super-device alias		
Type	Tie-Line (64 channels)	

Super-device alias	Enter a reference name for the tie-line connection. Alias names are only used within AdminHD and are not transferred to the system.
Type	This field is for information purposes only and cannot be edited. It describes the type of connection from:
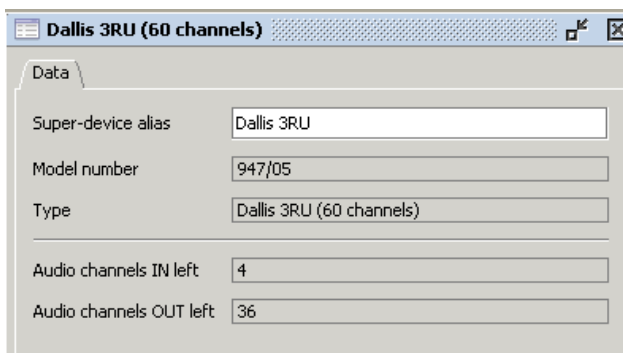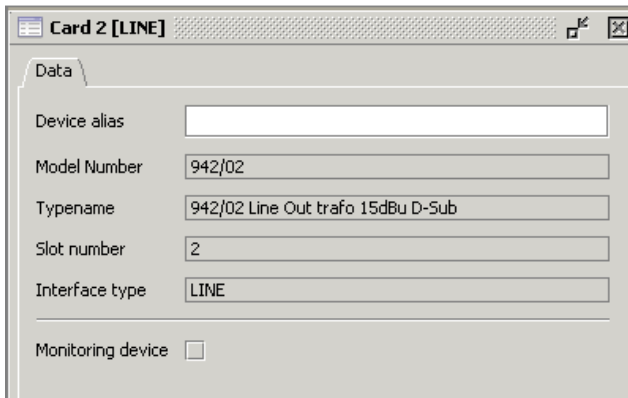
- **I/O** - an I/O connection such as that on the 981/02 AES module.

- **DSP** – internal DSP such as that on the 983/06 DSP IOSONO module.

- **Tie-Line** – multi-channel connection within a MADI or ATM module.

- **DALLIS** - multi-channel connection to an external DALLIS unit.

In addition for a **DALLIS** you can view the **Model number** of the unit and the number of **Audio channels left** (i.e. the number of 'unused' channels which could be used by further plug-in cards.):

	Dallis 3RU (60 channels)	
Data		
Super-device alias	Dallis 3RU	
Model number	947/05	
Type	Dallis 3RU (60 channels)	
Audio channels IN left	4	
Audio channels OUT left	36	

Cards

Within each DALLIS you can fit I/O plug-in cards. Open the **Card** 'Parameter Box' to edit its parameters:

Device alias	Enter a reference name for the card. Alias names are only used within AdminHD and are not transferred to the system.
Model number **Typename** **Slot number** **Interface type**	These fields are for information purposes only and cannot be edited. They show the serial number and type of card, the slot position within the DALLIS frame and the Interface type.
Monitoring device	For the 942/02 or 942/12 cards only. Tick this box if the card is to be used for monitoring. This releases the card from the system level.
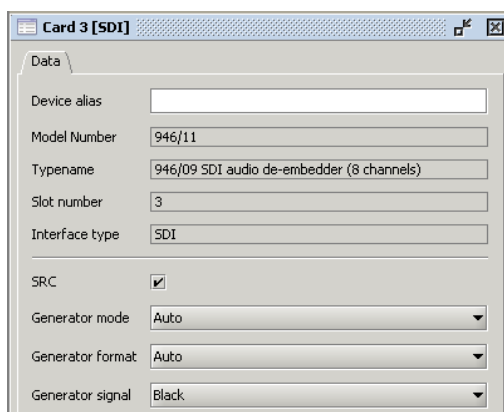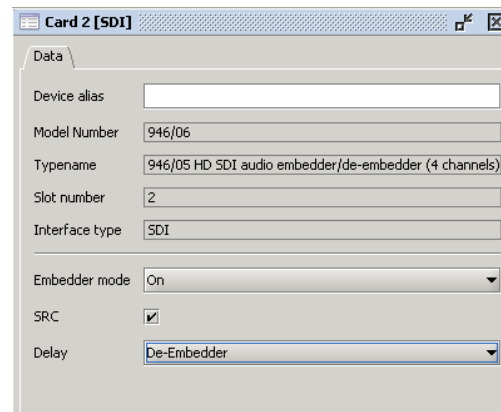
For **SDI** and **HD SDI** cards you will find additional options to configure the cards. Please refer to the relevant data sheets for details:

Signals
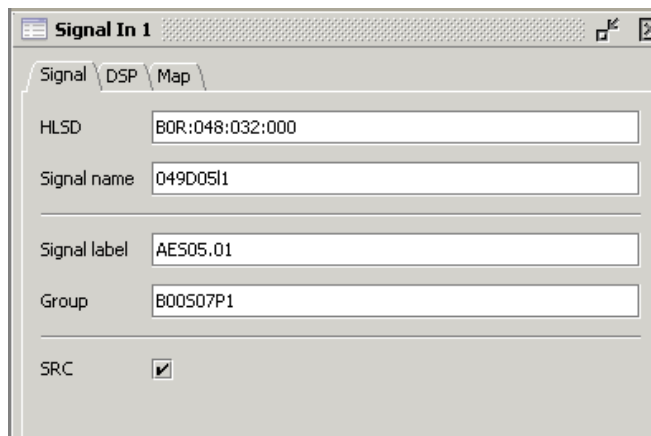
At the lowest level of the system tree are the signals themselves.

Note

Note that depending on the type of signal, there may be up to three pages of parameters. Also that the parameters vary depending on whether you select a **Signal In** or **Signal Out**:

Signal In: Signal

HLSD	**High Level Signal Definition** – this is the system address for the signal which *MUST* be unique in order for the system to operate correctly.
	For normal operation, you should not modify this address from its default. If you do, you may end up with conflicting addresses.

Tip

For applications where you have say two identical but independent studios and you wish to be able to transfer snapshots from one to another in order to reset signal routing and parameters, you can programme signals to have the same HLSD. This will allow snapshots from one studio to be recalled to the other studio and reset the routing in an identical manner. Note that to use this feature, the systems cannot be networked.

Signal name	This is the system name of the signal. It can only be defined by AdminHD and should be used to describe the physical location of the signal.
Signal label	This is the default user label. Note that the signal label can be changed later, either within the **Signal List** display, or within AdminHD's 'Connect Manager' window. However, it is a good idea to programme a default label as this is what the system will reset to after a cold start.
	See Page 141 for details.
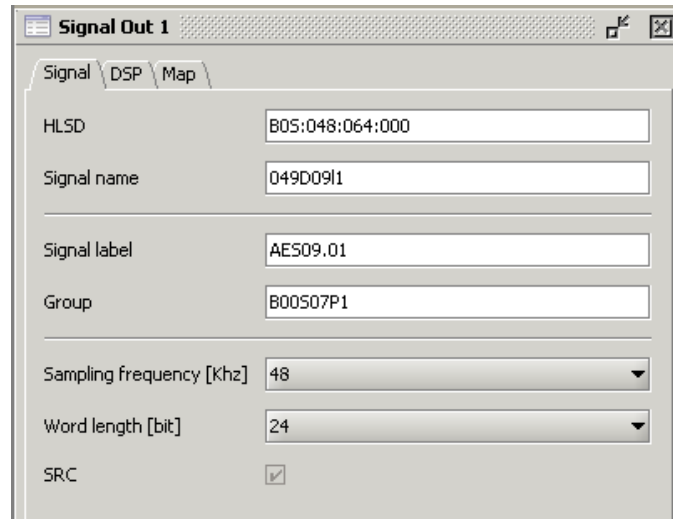
| **Group** | This is the group name for the signal which can be used when interfacing to an external controller system. Please consult your control system documentation for details on how to implement the group name. |
| **SRC** | For AES cards with SRC only. Untick this box to bypass the sample rate converter. |

Signal Out: Signal

For signal outputs, you can define the same parameters as described for the signal inputs.

In addition, for digital I/O cards with SRC (Sample Rate Conversion) you will find the following options:

Sampling frequency	Select the sampling frequency for the output from the available options.
Word length (bit)	Set the word length for the output – e.g. 16-bit, 20-bit or 24-bit.
SRC	This field cannot be modified but shows the status of the output sample rate converter. To bypass the SRC, you must set the Sampling frequency to **System** and the Word length to **24**.
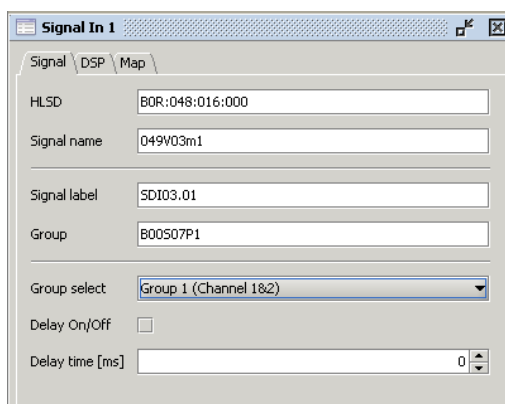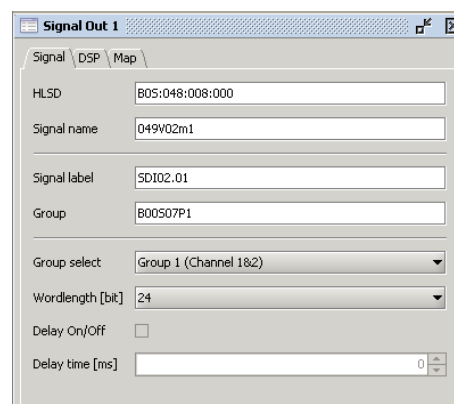
For **SDI** and **HD SDI** cards you will find additional Signal In and Signal Out options. Please refer to the relevant data sheets for details:

DSP

These parameters adjust the DSP on the I/O card and the Silence Detect alarm feature.

Note that not all cards support these features.

Note

⇶ I/O DSP: Inputs
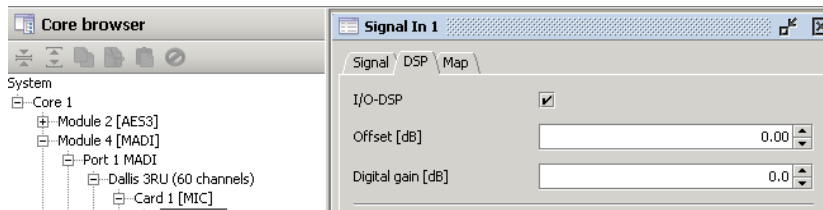
I/O-DSP	Tick this box to enable the I/O DSP. Once enabled, the following parameters become available:
Offset (dB) **Digital gain (dB)**	Enter an offset and/or digital gain value in dB. The resultant gain (Offset + Digital gain) is applied to the signal within the I/O card, and therefore affects all signal destinations. Two separate parameters (Offset and Digital gain) are provided so that you may easily apply a 'permanent' and a 'temporary' gain change. For example, if you need to compensate for a low level line within the installation, then use the Offset parameter to apply this 'permanent' change. In addition, within today's production you may need to compensate for a badly recorded signal; for this 'temporary' adjustment, use the Digital gain. At the end of the production, you can easily reset the Digital gain to 0 dB while keeping the Offset gain intact.

Note that for Dolby E operation the I/O DSP *MUST* be disabled (unticked) for signals to be routed transparently.

Note

➠ **I/O DSP: Outputs**

For an output signal you have access to the following additional options. There are for use with stereo signals:
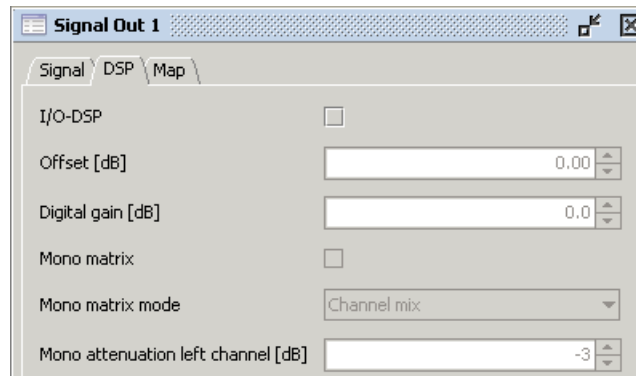
Mono matrix	Tick this box to enable the mono matrix settings and link the output signal to its odd/even partner.
	When the mono matrix is enabled, you can then adjust the following parameters:
Mono matrix mode	The mode can be set to:
	• Channel mix – sums the left and right inputs and routes the mono sum to both left and right outputs.
	• Channel swap – routes the left input to the right output and vice versa.
	• Left to both – routes the left input to both outputs.
	• Right to both – routes the right input to both outputs.
Mono attenuation left channel (dB)	When working in Channel mix mode, you can set attenuation (e.g. -3dB) to compensate for the mono sum. This is applied to the left output signal.

⤷ **Silence Detect:**
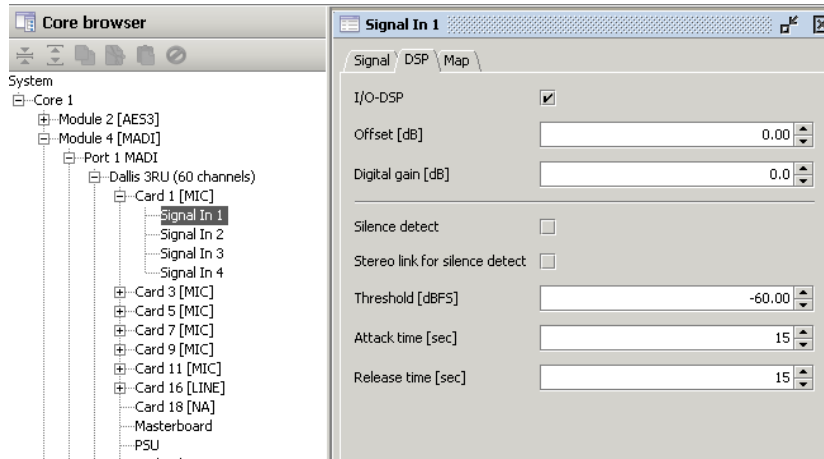
Silence Detect	Tick this box to enable the **Silence Detect** alarm function. Once enabled, if the signal falls below the **Threshold** level then an alarm is issued via Lawo's Remote MNOPL protocol.
Stereo link for Silence Detect	Tick this box to link the left and right sides of a stereo input or output for 'Silence Detection'. When linked, the Silence Detect alarm is only issued if both signals below the **Threshold** level. Only odd and even adjacent signals may be linked.
Threshold (dBFS)	Set the threshold below which the **Silence Detect** alarm will be triggered. The level can be adjusted in 0.25dB and is referenced to digital full scale level.
Attack Time (sec)	This sets the length of time for which the signal must fall below the **Threshold** level before the **Silence Detect** alarm is activated. The time is set in steps of 1 second.
Release Time (sec)	This sets the length of time for which the signal must remain below the **Threshold** level before the **Silence Detect** alarm is cancelled. The time is set in steps of 1 second.
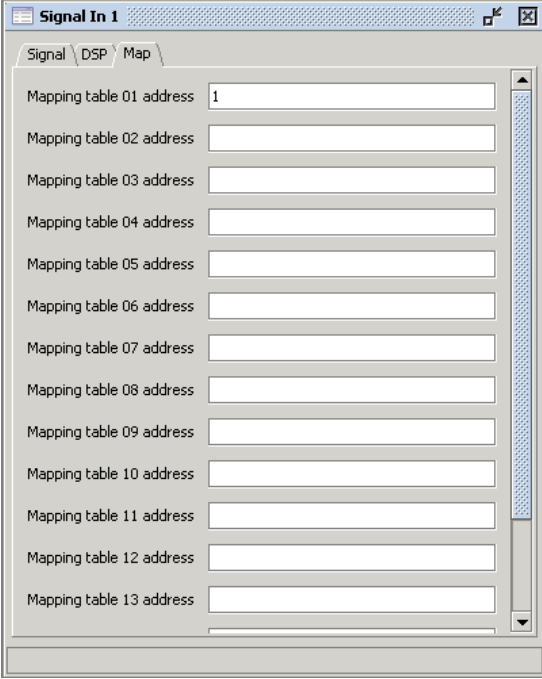
Map

These parameters set the signal's address for mapping tables 1 to 16, so that it can be controlled by a 3rd party system as the Thomson Jupiter, Broadcast Solutions VSM, BBC Colledia, etc. See Page 149 for more details.

Nova73 Dual Self-Healing Star Configuration

This section covers additional notes for Nova73DSHS users.

The configuration of a Nova73 DSHS system should be approached in the same way as for any other HD Core system. Bear in mind the following:

Warning

Within a Dual Self Healing Star system, the two 'stars' MUST be configured identically:

Dual Self-Healing Star Structure
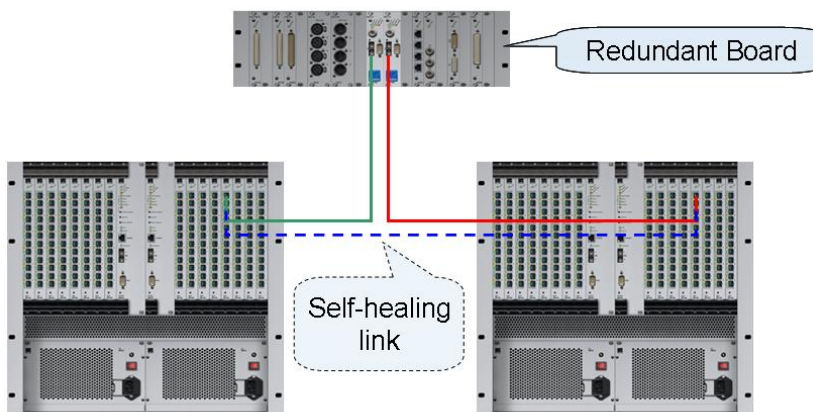
Use AdminHD to programme one 'star' – the active one. The same configuration can then be uploaded to both the active and passive 'stars'.

Creating a New Configuration

Note

When you create a new configuration within AdminHD, make sure that you select the **Nova73 DSHS** mode:
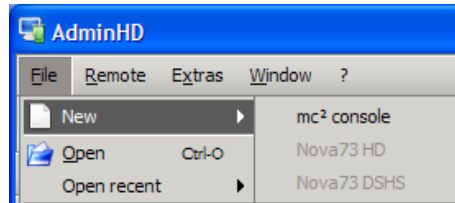
You *CANNOT* change mode later.

The selection of this mode will allow you to configure the correct options for a DSHS system, including the ability to add two HD Cores, and set the default IP address for the DSHS matrix server.
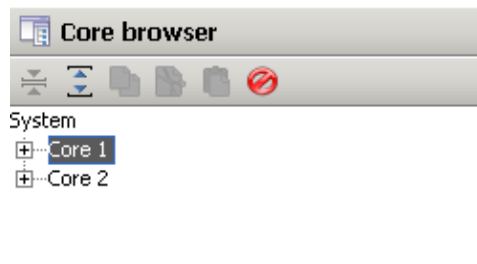
Nova73DSHS TCP/IP Address Configuration

Within a DSHS system, your AdminHD computer must communicate with the matrix control server for the 'star'.
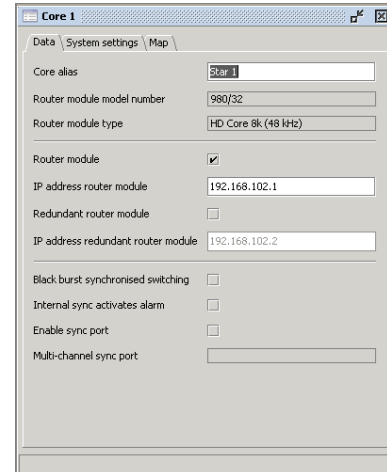
You can only communicate with one 'star' at a time, so to change connection from the active to the passive 'star', you will need to know the IP addresses of each control server:

The IP address for the system can be modified in the **Data** page of the **Core** 'Parameter Box':

1. Tick the **Router module** box to enable communication to the HD Core.

2. Enter the IP address of the HD Core's main router module in the **IP address router module** field.

The default IP addresses are shown opposite.

3. If the HD Core is fitted with a redundant router module, then enter its IP address within the **IP address redundant router module** field.

Updating the Online Configuration

To avoid problems with the operation of the system, it is important that you update the online configuration of the system in the following order:

1. First, connect your AdminHD computer to the active 'star' and download the existing configuration.

2. Edit the system configuration.

3. Upload the new configuration to the active 'star'.

The configuration is uploaded to the active star and then distributed to the passive 'star' automatically by the system.

Warning

This may cause audio drop-outs within the modules or DALLIS units affected by the update. Therefore, any hardware which is to be updated should be isolated before performing the upload.

Updating the Cold Start Configuration

When making changes to the cold star configuration of the system, proceed in the following order:

1. Download the cold start configuration (config.tcl) from the active 'star' into AdminHD.

2. Edit the system configuration.

3. Export a new config.tcl file.

4. Upload the config.tcl file to the active 'star'.

5. Close the AdminHD application and then restart it for connection to the passive 'star'.

6. Upload the config.tcl file to the passive 'star'.

7. Now cold start the complete system.

Note
Note that when you perform a cold start, you will lose any warm start data within the system.

Dual Self-Healing Star Active to Passive Switchover

When AdminHD is connected to either the active or passive 'star' it is possible to manually switch between the two DSHS 'stars':

1. Select Remote -> DSHS -> Show DSHS Frame… from the main menus:

A dialogue window opens:

2. Click on the **Switch** button to change the status of the two 'stars'.

The active 'star' becomes passive and the passive one becomes active.

The **Double star status** LED describes the current status of the DSHS:

- Green = the connected star is the active star.

- Yellow = the connected star is the passive star.

- Red = the connected star has no link with another star.

mc^2 Configuration

This section covers additional configuration notes for mc^{2}56, mc^{2}66 and mc^{2}90 users.

Creating a New Configuration

For any mc^2 console, when you create a new configuration within AdminHD, select the **mc² console** mode:

You *CANNOT* change mode later.

The selection of this mode configures the correct options for a mc^{2}66 system and sets the default IP address for the 66's control system.

When configuring a mc^{2}56 or mc^{2}90 system, remember to edit the default IP address to that of your console's control system (see the next page).

TCP/IP Address Configuration

For a mc^2 console, your AdminHD computer must communicate with the console's Control System.

When you select the **mc² console** mode, the default IP address for a mc^{2}66 Control System is automatically entered, so you will only need to alter this if you are configuring a mc^{2}56, mc^{2}90 or have multiple consoles on the same network.

The IP address can be modified in the **Data** page of the **Core** 'Parameter Box':

1. Enter the IP address of the console control system in the **IP address control system** field.
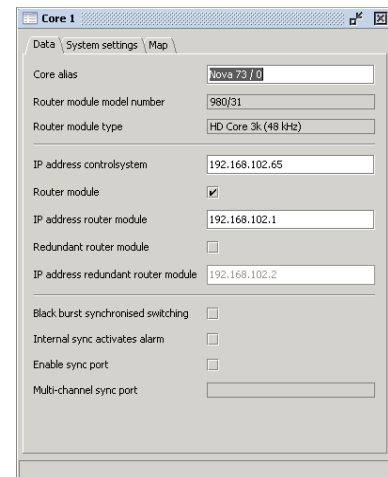
The default IP addresses are as follows:

- 192.169.102.65 – mc^{2}66

- 192.169.102.56 – mc^{2}56

- 192.169.102.90 – mc^{2}90

Note that if a redundant Control System is fitted, then its IP address is automatically set 1 digit higher.

2. Tick the **Router module** box to enable communication to the HD Core.

3. Enter the IP address of the HD Core's main router module in the **IP address router module** field.

4. If the HD Core is fitted with a redundant router module, then enter its IP address within the **IP address redundant router module** field.

The default IP addresses for a mc^{2}66 system are shown opposite.

Configuration of the mc^{2}66 Surface

For the Classic or Top1 mc^{2}66 system, you can use the 'Console Panel' window to configure the surface of the console (see below).

Note

The surface of the MKII mc^{2}66, mc^{2}56 or mc^{2}90 is factory-configured by the console_config.tcl file. If the configuration changes – for example, you add or remove a panel – then please contact the Lawo service department for details on how to edit this file.

Note

Note that from Version 4.10 software onwards, a "restart after crash" strategy is implemented for all GUI and Channel display applications. To support this feature, it is necessary that the console configuration matches the hardware exactly (correct location of GUI_SCREEN and CHANNELDISPLAY_SCREEN). If not, then the logfile will be filled with restart messages and the system may slow down considerably.

The 'Console Panel' Window (Classic or Top1)

Note
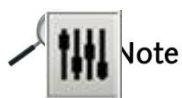
1. To show or hide the 'Console Panel' window, click on the appropriate button from the Toolbar, press **Ctrl + SHIFT + 0** on your computer keyboard, or select the **Window** -> **Console Frame** option from the main menu bar:
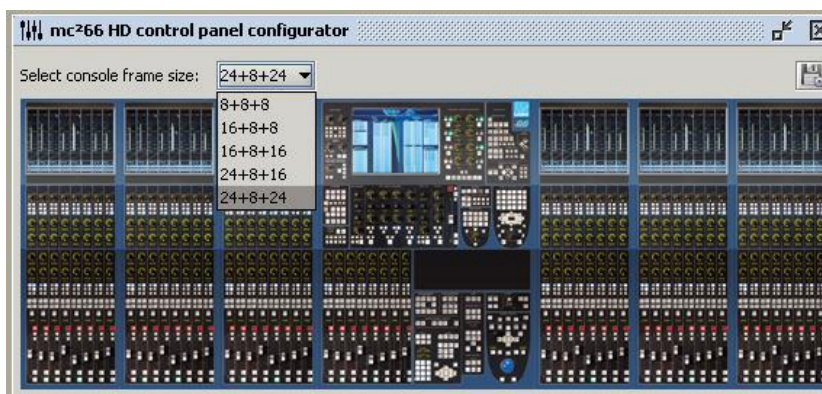
2. Select the console frame size from the drop-down menu (e.g. **24+8+24**).

The window updates accordingly.

3. If your console frame is larger than the fader panels
fitted, then right-click on the fader panel you wish to
remove and deselect the **Assign fader panel to slot**
option:
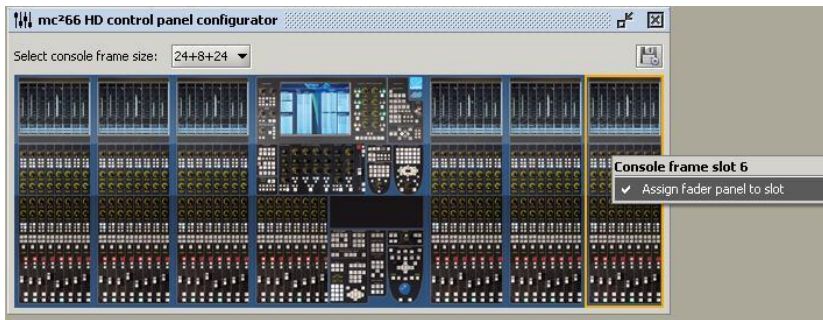
The display updates to show the blank fader panel:
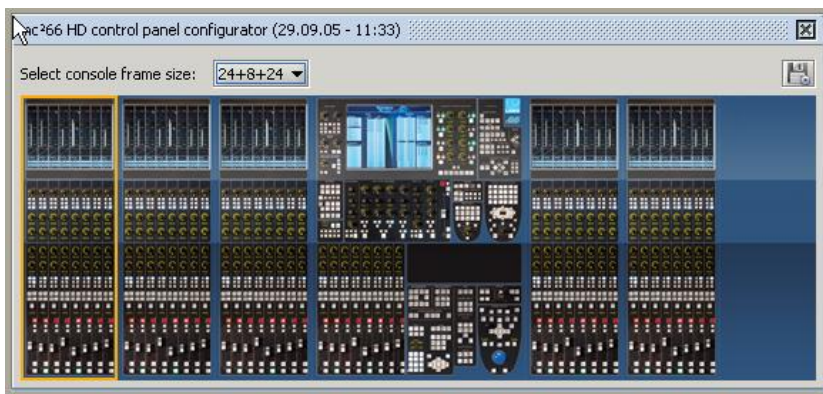
4. You can save changes to the 'Console Panel'
configuration within AdminHD by selecting **File** -> **Save**
or **File** -> **Save As**.

The 'Console Panel' configuration is stored with the rest of the
*system configuration within the **config.csv** file.*

Now upload the changes to the console control system as
follows:

1. To export the configuration, click on the **Export config** button at the top right of the 'Console Panel' window:
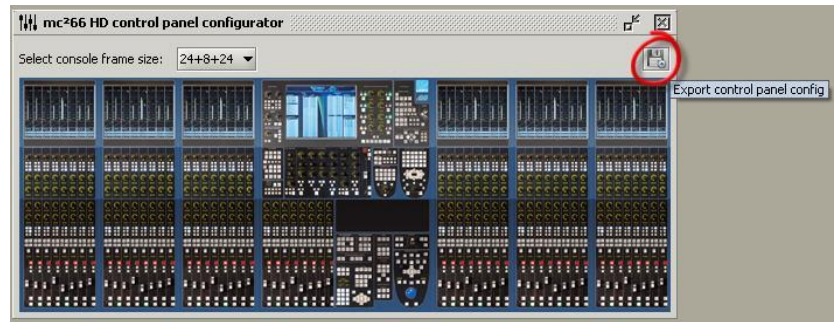
2. Select the directory on your AdminHD PC where you wish to store the file and click **Save**:
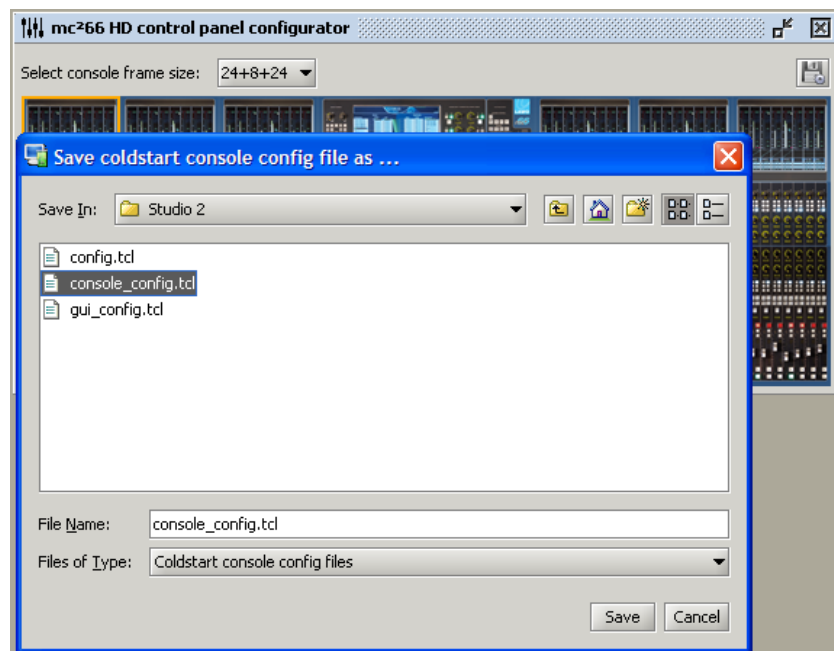
The control surface configuration is stored as a cold start file on your computer.

DO NOT rename the file; it must be named **console_config.tcl** in order to be read by the system.

3. Next, connect and configure your computer so that it is communicating with the mc²66 system as described on Page 118.

It is a good idea to open the 'Remote Log' so that you can monitor the progress of the upload.

4. Now upload the file by selecting Remote -> Upload file -> Console cold start config (console_config.tcl):
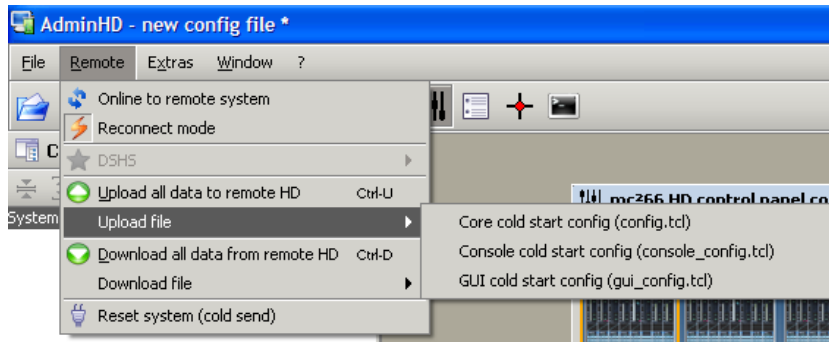
5. And, select the file you wish to upload:
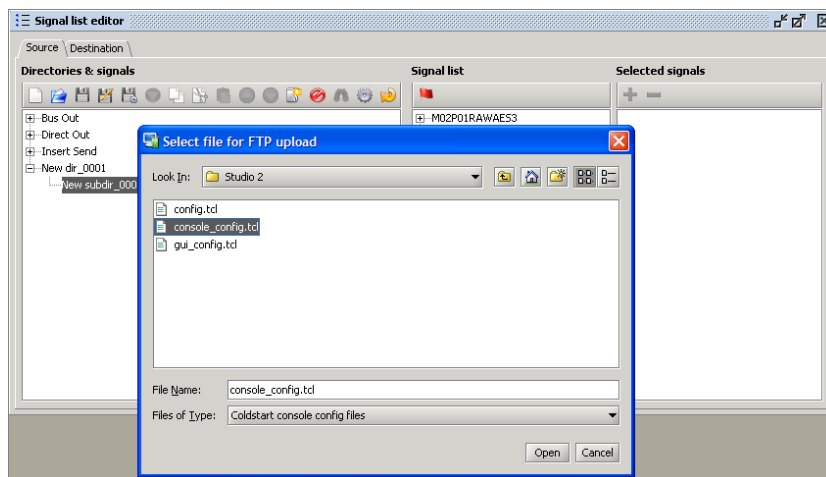
The file is uploaded to the system.

6. You can check whether the file has uploaded successfully within the 'Remote Log':

7. Finally, cold start the mc^{2}66 control system as described in Chapter 4.
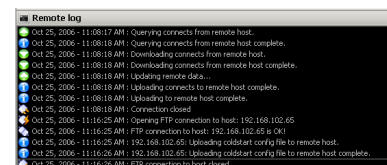
Note that when you perform a cold start, you will lose any warm start data within the system. Therefore, make sure that you have saved the current user data in a production, and any warm start configuration updates within AdminHD *BEFORE* you perform this operation!

Note

mxDSP Configuration

This section covers additional notes for the mxDSP card (983/03-007).

Physically, a mxDSP card is identical to a normal channel DSP card (983/03) and occupies one slot within the HD Core. Any number of cards may be configured for mxDSP operation, providing a pool of DSP resource which can be applied to signal paths within the routing matrix. For example, to apply fixed DSP settings to line arrays.

Several configuration options are supported, providing up to 192 DSP chains plus a 64 x 64 mixing matrix per card. The DSP chains are configured from various elements including level, mute, delay, EQ, etc. The number of DSP chains, and their signal flow, is determined by the **Config-ID** for the module:

Miscellaneous
DSP variations

(Operation mode „Standby" provides n+m redundancy)
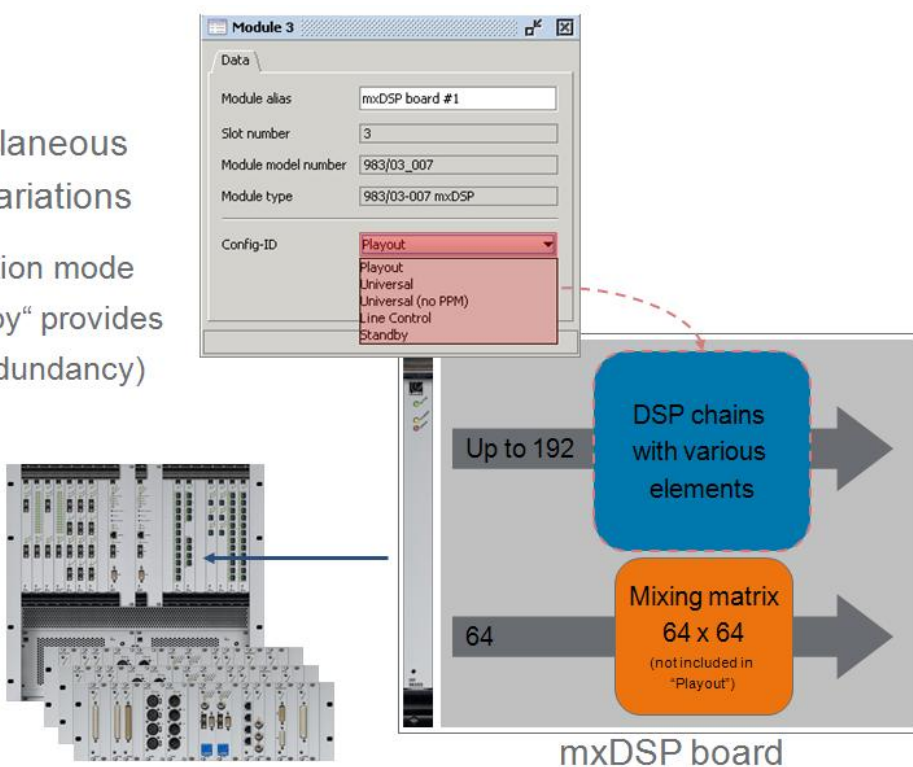
Once configured, operators may adjust DSP parameters from the **mxDSP Settings** display. Note that the 64 x 64 mixing matrix cannot be controlled from the console GUI.

To configure a DSP card for mxDSP operation, the following steps are required:

1. Edit and upload a new system configuration (config.tcl) using AdminHD.

2. Edit and upload a new Signal List (gui_config.tcl) using AdminHD.

3. Cold start the system so that the new system configuration is active.

4. Update the firmware on the mxDSP card via a Telnet session.

Before you begin, download the current system configuration and Signal List from the system you wish to update. This ensures that you are editing the latest configuration.

System Configuration

To add a mxDSP card to the system configuration:

1. Select the slot and change the module type to **983/03-007 mxDSP**:
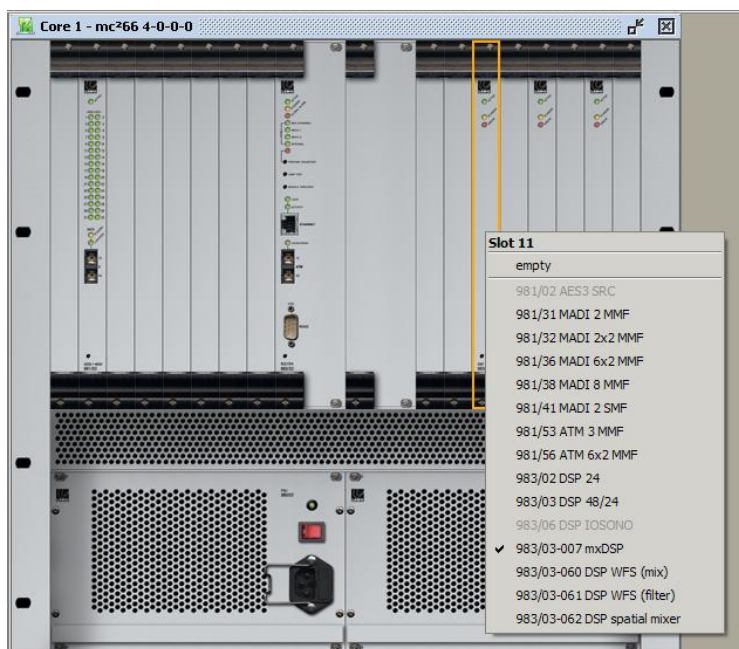
2. Open the module 'Parameters Box' and choose an option from the **Config-ID** menu:
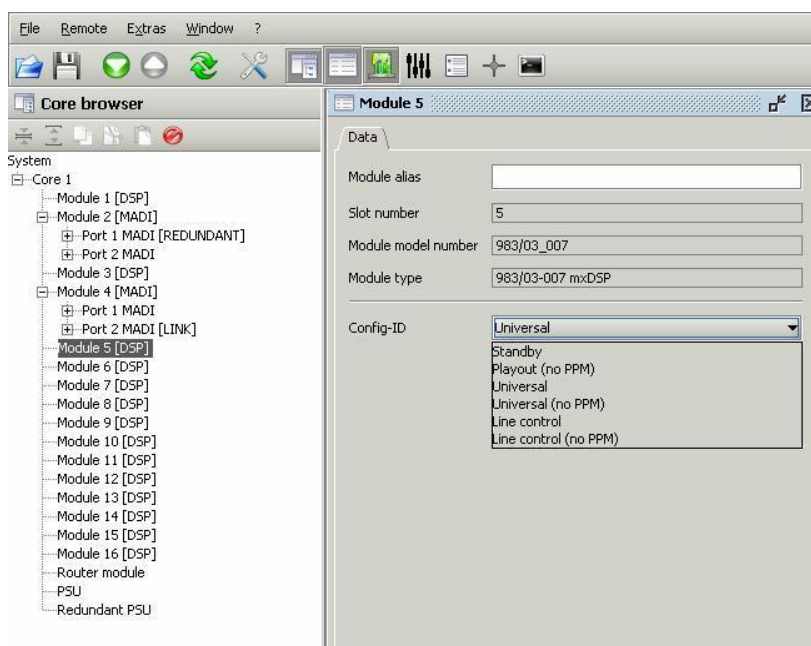
These options determine the number, and signal flow, of the DSP chains (see next page).

3. Save and upload the system configuration (config.tcl) to the system's cold start data.

Config-ID Options

The **Config-ID** defines the signal flow of the DSP chains, and whether the card supports the 64 x 64 mixing matrix shown below:

Provided in variations
- Universal
- Universal (no ppm)
- Line Control (only 48 kHz)

64 channels

Crosspoints with:
• Level
• Mute (on/off)
• Phase Reverse
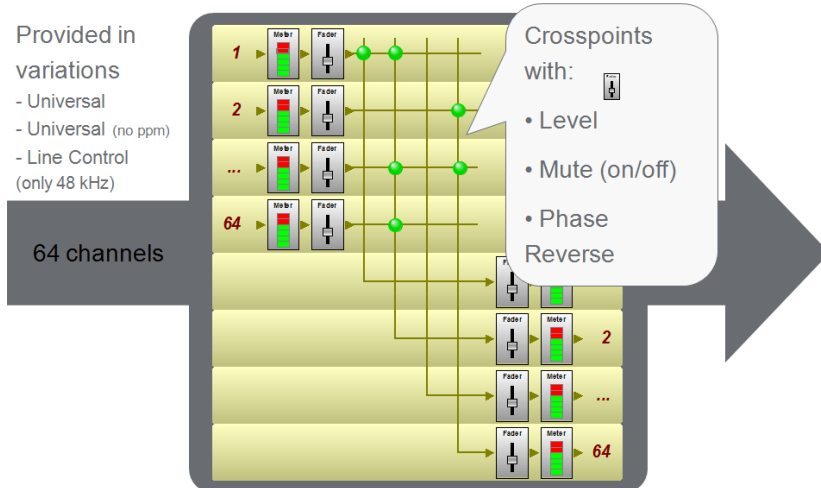
▸ **Standby**

Select this option to run the mxDSP module in standby mode. Use this mode to configure a redundant mxDSP card.

▸ **Playout (no PPM)**

This option provides 184 channels of DSP only (no mixing matrix):

Provided in "Playout"

(only 48 kHz)

184 channels

120 x (mono)   Compr.   Fader   Limiter

64 x (mono)   Short-Delay   Compr.   Fader   Limiter
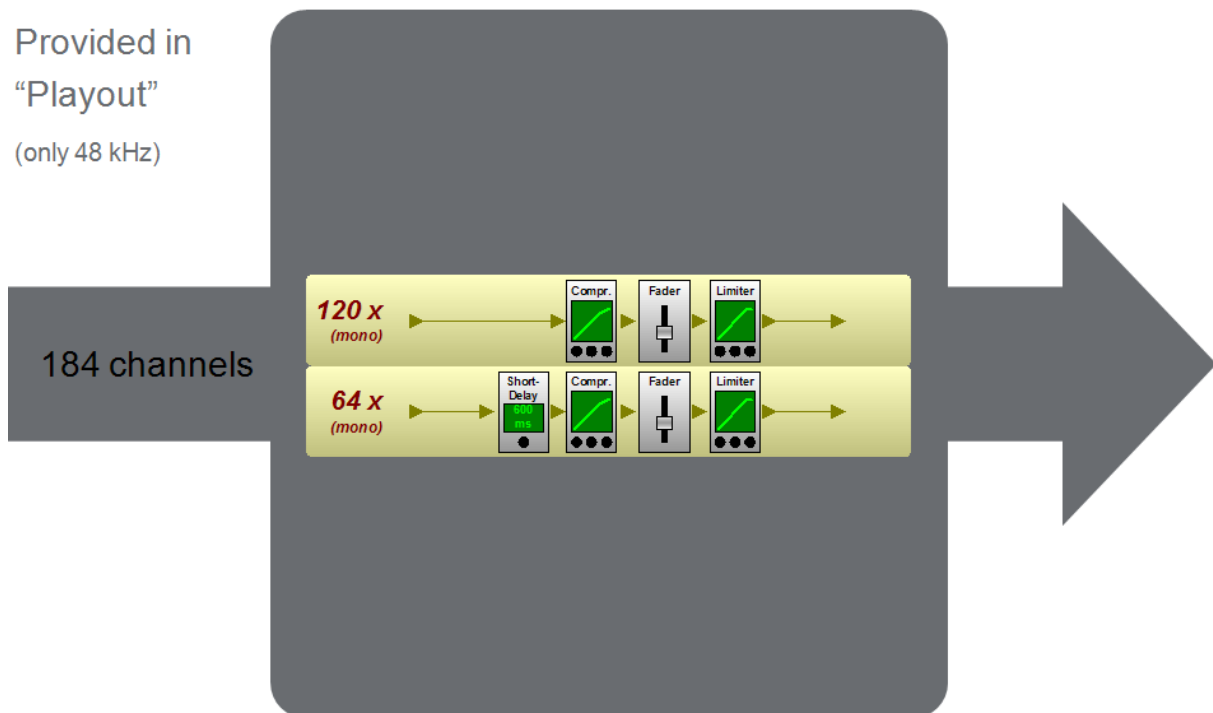
⤻ Universal

This option provides 154 channels of DSP plus the 64 x 64 mixing matrix:

Provided in "Universal"

(only 48 kHz)
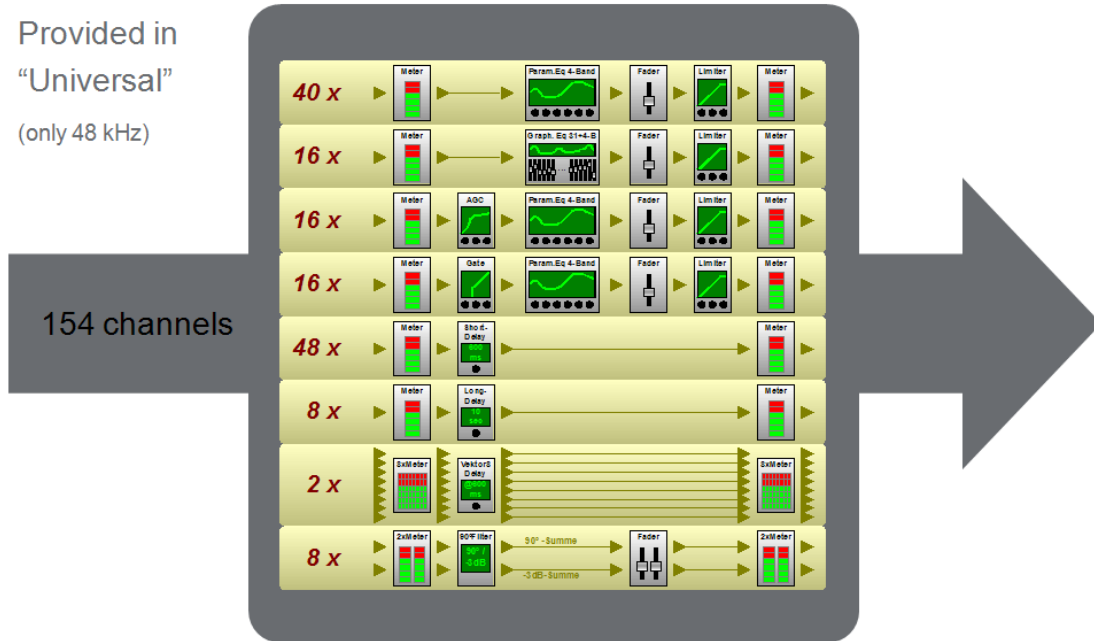
154 channels

⤻ Universal (no PPM)

This option provides 154 channels of DSP plus the 64 x 64 mixing matrix:

Provided in "Universal (no ppm)"

(only 48 kHz)

154 channels

No PPM
= lower system
requirements
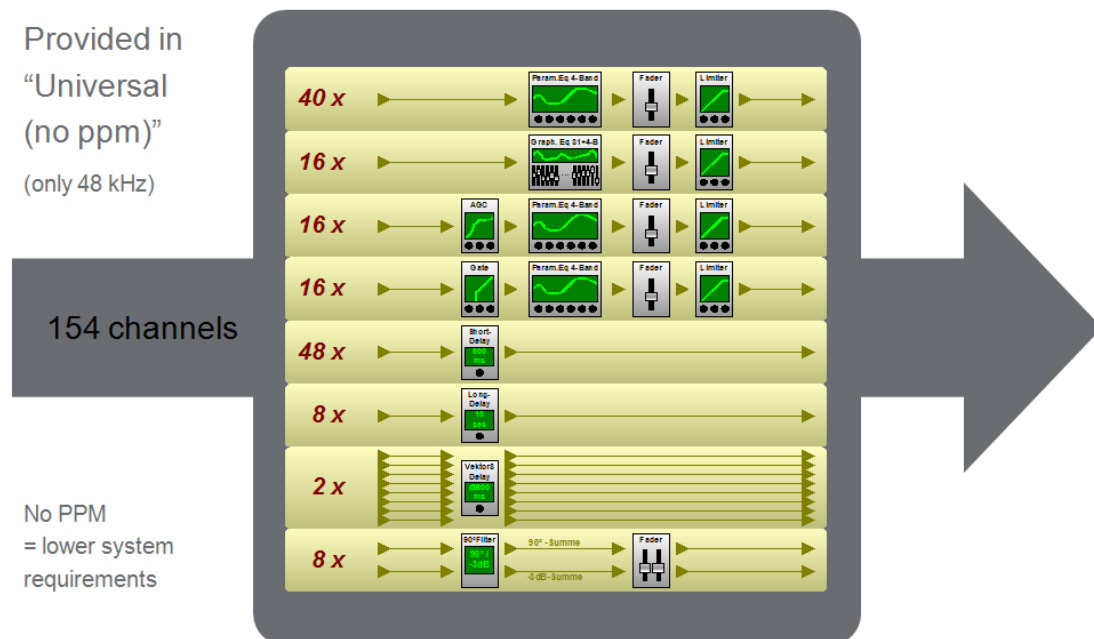
⠆ Line Control

This option provides 184 channels of DSP plus the 64 x 64 mixing matrix:
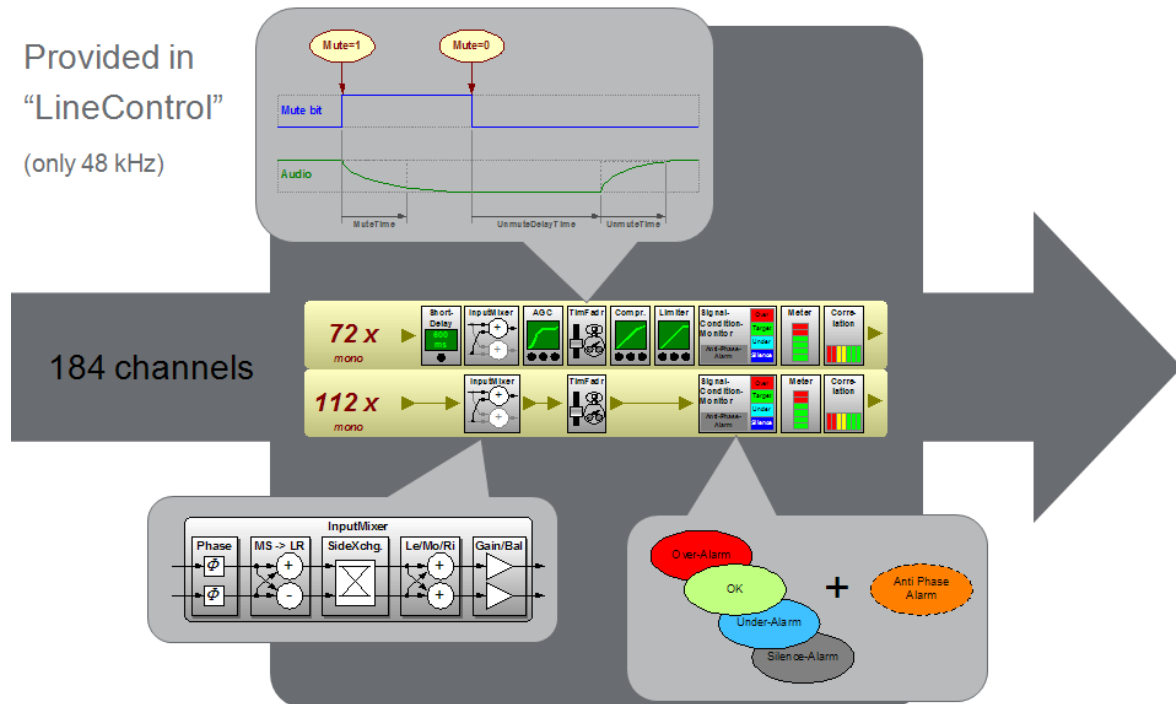
⠆ Line Control (no PPM)

This option provides 184 channels of DSP, as above, but with less system resources, similar to Universal (no PPM).

Signal List Configuration

In order for the DSP chains to appear within from the **Signal List** display, the mxDSP card must be added to the Signal List configuration (gui_config.tcl).

Make sure that you have downloaded the current Signal List from the system to the Signal List Editor. And that you have added the mxDSP card to the AdminHD configuration:

> **1.** Click on the **Update hardware signal config** button.

The mxDSP signals from the newly configured card are added to the existing Signal List:
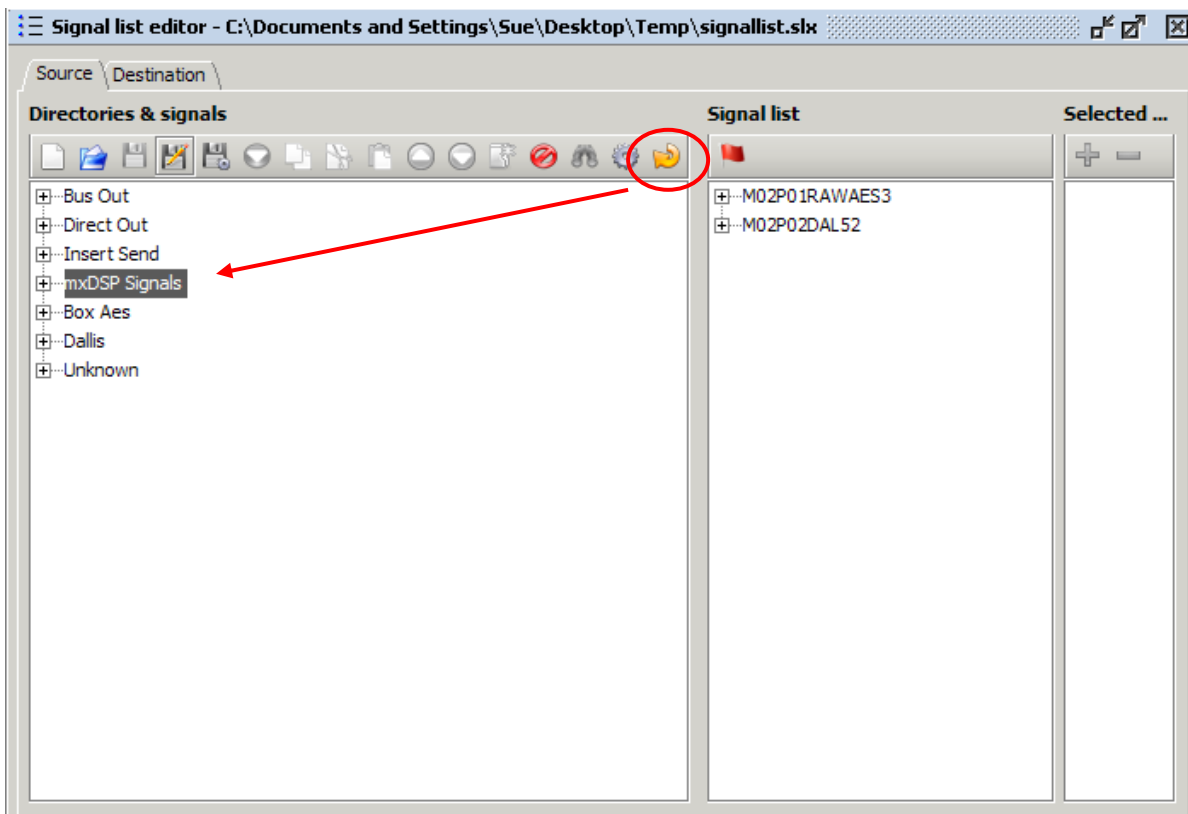
> **2.** You can organise the signals, and name and label them, in the usual manner.
>
> **3.** Save and upload the new signal list configuration (gui_config.tcl) to the system's cold start data.
>
> **4.** Cold start the system.

*The new system configuration and signal list should now be active. You can check this by opening the **mxDSP Settings** and **Signal List** displays.*

Updating the Firmware

Before the mxDSP card will operate correctly, its software must be updated. You can update the software automatically by opening a Telnet session to the control system.

We recommend using Tera Term Pro Web 3.1.3, a free telnet client for windows, which can be downloaded from http://www.ayera.com/teraterm/

1. Open the Tera Term Pro telnet client.

To configure the IP Address of your console open TCP/IP from the Setup menu, and add the TCP/IP address of your control system to the host list:
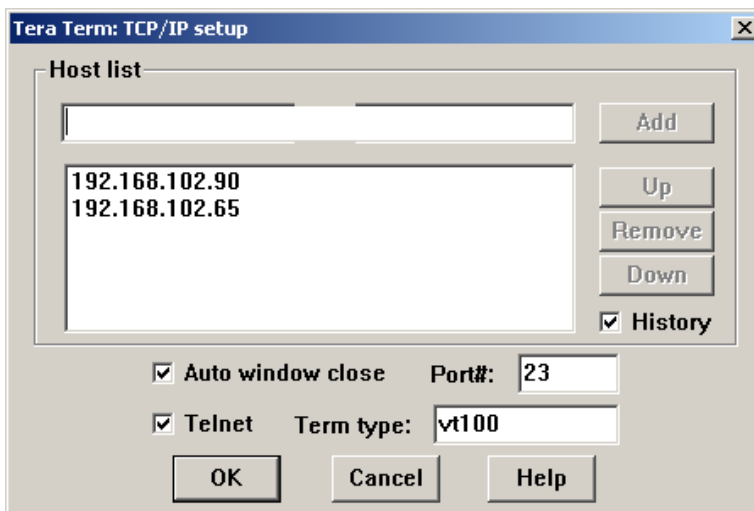
Note

2. Now set up a new telnet connection using **File -> New connection.**

3. Enter the login name: **root** and the password: **hong**

Tera Term PRO opens a telnet session to the control system.

4. Open the mcx shell programme by typing **mcxsh**

5. Then type the command **mcx_software_auto_update**

The software on each card is automatically updated according to the system configuration:

The mxDSP card is now ready for operation.

AdminHD Preferences

This section deals with AdminHD's Preferences.

1. Click on Extras -> Preferences from the main menu bar or press CTRL + P:

The 'Preferences' pop-up appears:
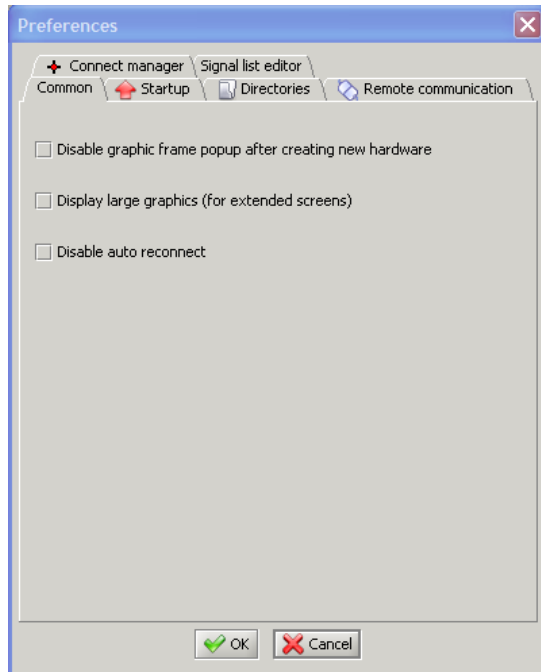
2. Use the tabs at the top of the pop-up to select a page.

3. Select or unselect a preference.

4. After changing a preference, click **OK**.

Note that most preferences do not take affect until you next start the programme or open the relevant window.

Also note that your Preferences are stored with the setup files for the ControlHD software. Therefore, they will remain as you last set them each time you start the programme.

Also, if you are switching between both AdminHD and ControlHD on your computer, note that the preferences will affect both versions of the programme.

There are six pages of options. Let's work through them:
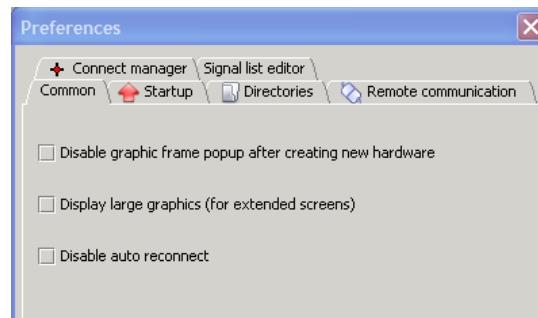
Common

The first page deals with common programme options:

- **Disable graphic frame pop-up after creating new hardware** – tick this box if you wish to stop AdminHD automatically displaying the 'Graphic View' when new hardware is added to the configuration.

- **Display large graphics (for extended screens)** – select this option if you are working with a larger screen (e.g. 21"). The graphics are doubled in size.

- **Disable auto reconnect** – tick this box if you wish to prevent AdminHD automatically reconnecting to the system if Network communication is interrupted.

Start up
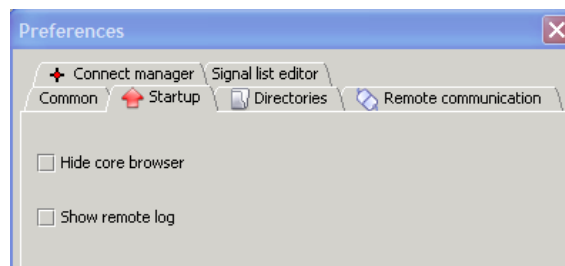
This page deals with start-up options:

- **Hide Core Browser** – tick this box if you do not want the 'Core Browser' window to appear automatically when you open or create a new configuration.

- **Show remote log** – tick this box if you do want the 'Remote log' window to appear automatically when you open or create a new configuration.

Directories
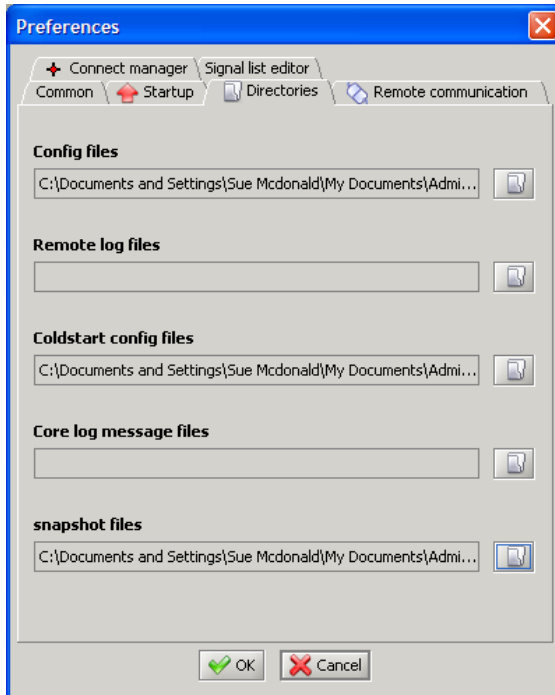
This page allows you to specify a default directory which will open whenever you save or open an AdminHD/ControlHD file type:

1. Click on the folder next to the entry you want to specify – **Config files**, **Remote log files**, etc.:

A file dialogue box for the selection of the path is displayed:
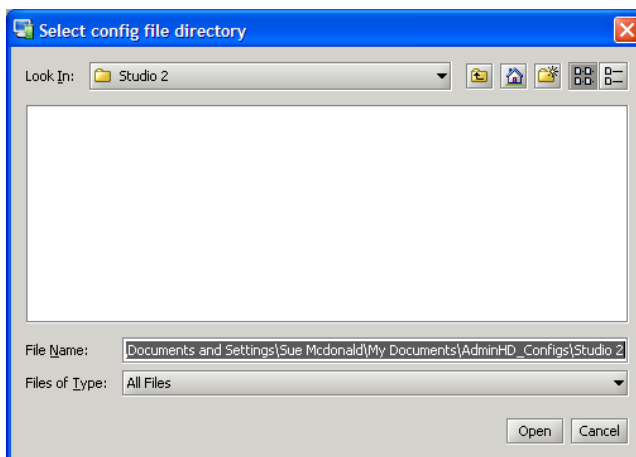
2. Select the folder where you usually want to save your files and click on **Open**.

The file dialogue is closed and the path displayed in the ***Preferences*** *pop-up.*

3. Repeat for all the file types:

- **Config files** – AdminHD configuration files (.csv).

- **Remote log files** – 'Remote log' text files.

- **Coldstart config files** – config.tcl files.

- **Core log message files** – System log text files.

- **Snapshot files** – 'Connect Manager' snapshots.

The default directory paths are set and will be used each time you save, open, export or download that type of file.

Remote Communication
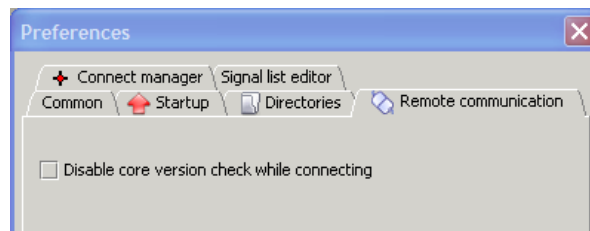
This preference selects whether AdminHD checks the system version when connecting to it. This option is particularly useful if you are dealing with multiple systems running different versions of software. See Page 186 for details.

Connect Manager
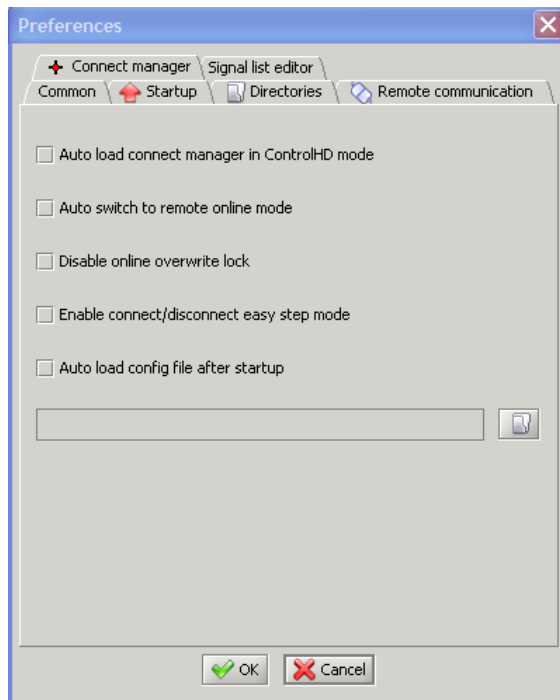
These preferences affect what happens when the 'Connect Manager' window is opened:

- **Auto load connect manager in ControlHD mode** – when ticked, the 'Connect Manager' will automatically open when you open or download a configuration in ControlHD. This option does not affect AdminHD.

- **Auto switch to remote online mode** – when ticked, AdminHD will automatically select online mode when you open the 'Connect Manager'.

- **Disable online overwrite lock** – tick this box if you want overwrite lock to be disabled each time you open the 'Connect Manager'.

- **Enable connect/disconnect easy step mode** – tick this box if you want easy step mode to be enabled each time you open the 'Connect Manager'.

- **Auto load config file after startup** – when ticked, AdminHD will load a signal list when you open the 'Connect Manager'. The signal list is selected by clicking on the file open icon and making a selection from the pop-up.

The default options are shown above. For more details on the best way to configure these preferences for online control, please see the ControlHD Operator's Manual.

Signal List Editor
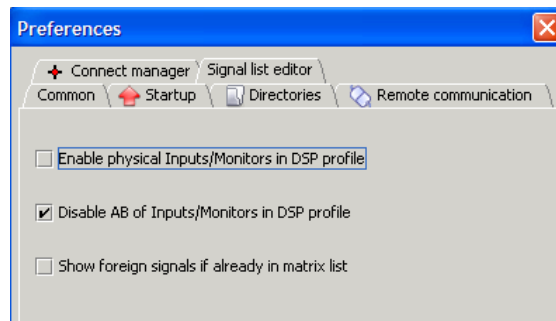
These preferences affect how the 'Signal List Editor' creates new signal lists. The default preference options are shown above.

The first two options affect mc^2 systems only.

With the default preferences, a new signal list for a mc^2 system looks as follows:
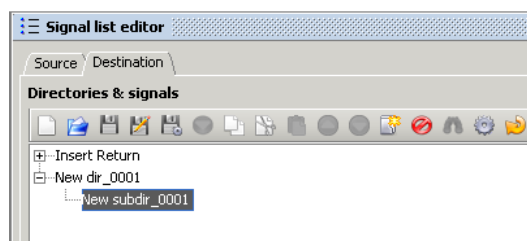
1. Tick the **Enable physical Inputs/Monitors in DSP profile** if you wish AdminHD to add the console's input channel and monitor channel signals to the **Destination** directories within the signal list.

2. Remove the tick against the **Disable A/B of Inputs/Monitors in DSP profile** if you wish AdminHD to add the A and B input channel and monitor channel signals to the **Destination** directories within the signal list.

For example:
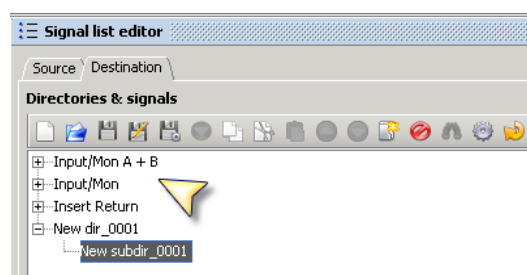
The third option - **Show foreign signals if already in matrix list** – may affect mc^2, Nova73 or DSHS, and applies if the system is networked.

AdminHD Quick Reference Guide

The Operating Console:
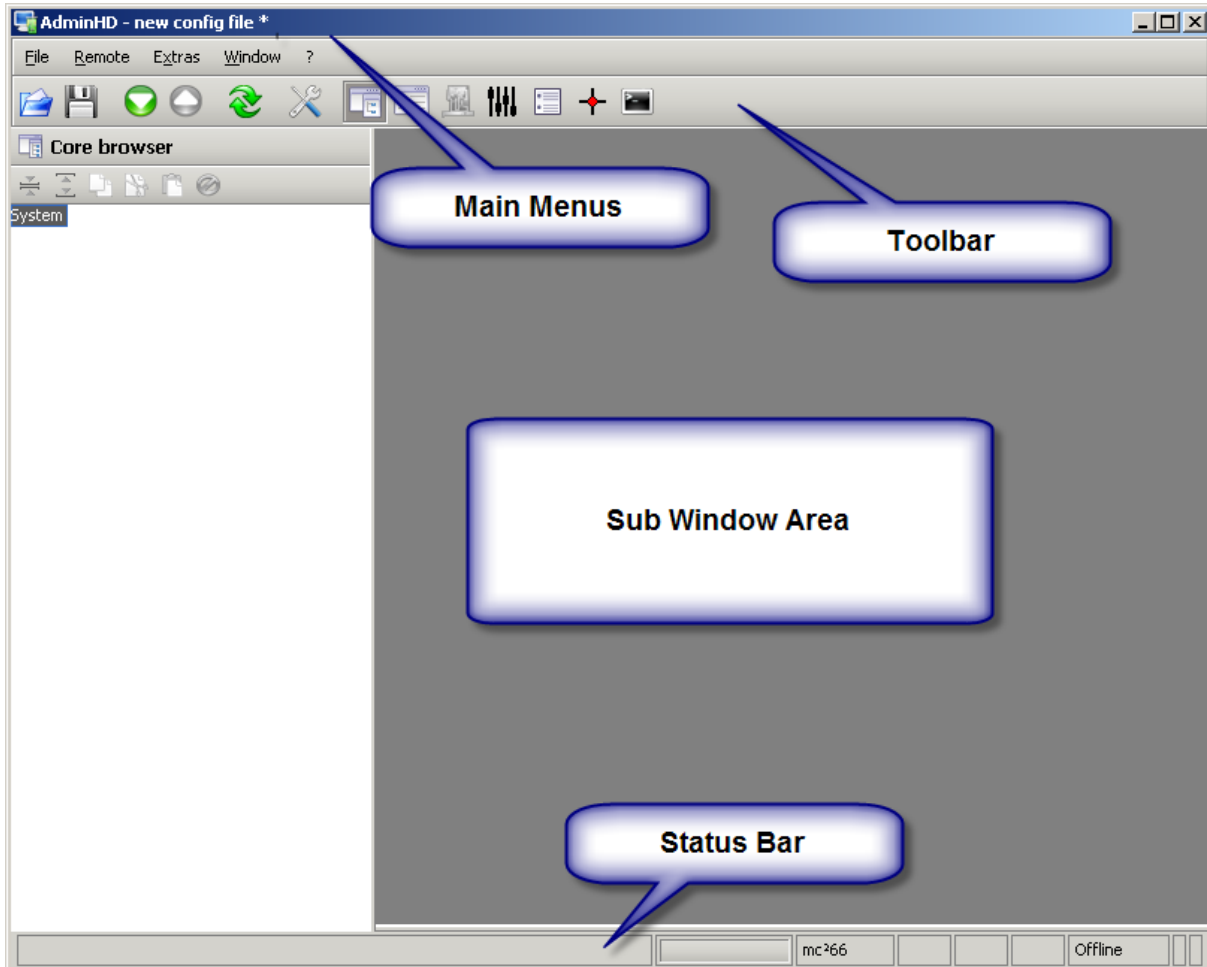
1	Main Menus	AdminHD provides 5 main menu options: **File**, **Remote**, **Extras**, **Window** and **?**.
2	Toolbar	Many functions may be quickly accessed by clicking on buttons from the Toolbar.
3	Sub Window Area	Beneath the Toolbar is the main area of the Operating Console in which you can open a variety of sub windows such as the 'Core Browser'.
4	Status Bar	At the very bottom of the display you will see the Status Bar. This shows status information relating to the programme and operation such as the AdminHD mode and online/offline status.

The 5 Main Menus

File
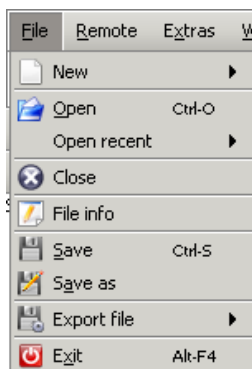
Click on **File** to access the following menu options:

- **New** – create a new configuration file.

- **Open** – open an existing configuration file from your computer.

- **Open recent** – lists the most recent files opened by the AdminHD programme.

- **Close** – closes the current configuration session.

- **Save** – saves the current configuration file.

- **Save As** – saves the current configuration to a new filename.

- **Export file** – options for exporting files:
  - Core cold start config (config.tcl) – see Page 153.
  - Component List – see Page 189.
  - BFE controller – this is a project-specific feature.
  - Remote Log – see Page 183.

- **Exit** – click on **Exit** to close the AdminHD programme.

Remote
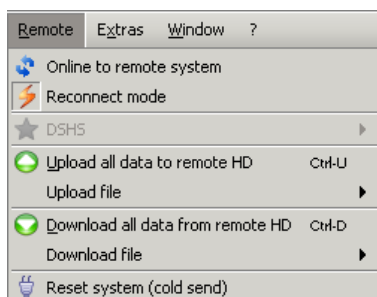
Click on **Remote** to access the following menu options:

- **Online/offline to remote system** – enables or disables the online connection to the system, see Page 180.

- **Reconnect mode** – when enabled, as shown opposite, AdminHD automatically attempts to reconnect to the system if Network communication is interrupted.

- **DSHS** – accesses the dual self-healing star switchover option, see Page 207.

- **Upload all data to remote HD** – uploads the AdminHD configuration to the system's warm start data.

- **Upload file** – access to the cold start configuration upload options.

- **Download all data from remote HD** – downloads the system configuration into your current AdminHD session.

- **Download file** – downloads the system's **.tcl** files onto your AdminHD computer for backup purposes.

- **Reset system (cold send)** – when working online, you can cold start the system from your AdminHD computer using this option.

Extras

Click on **Extras** to access the following menu options:

- **Show mapping table** – opens an overview of the mapping tables 1 to 16, see Page 149.

- **Check configuration** – checks the AdminHD configuration for programming errors, see Page 151.

- **Preferences** – selects the Preferences pop-up as described on Page 227.
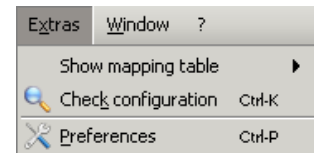
Window

Click on **Window** to access any of the seven sub windows:

▸ **?**
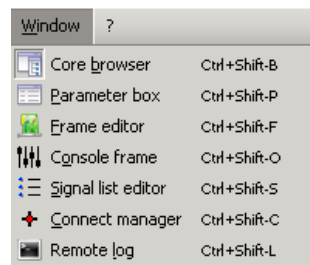
Select **About** from the Help menu for information about the version of your AdminHD software:
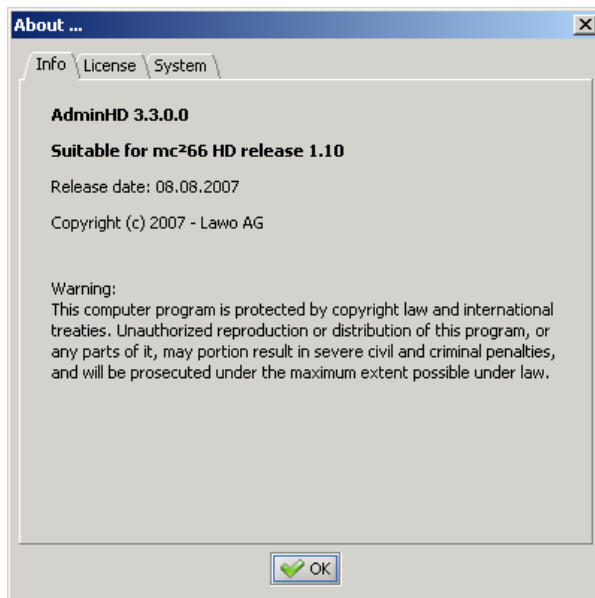
The Main Toolbar:
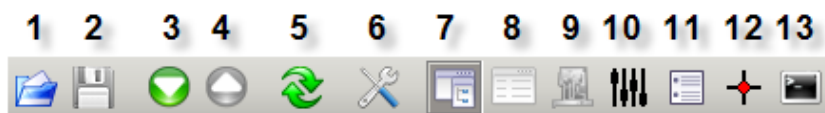
1		**Open -** open an existing configuration file (.csv) from your computer.
2		**Save** – save the current AdminHD session (as a .csv file) on your computer.
3		**Download** – download the system configuration into your current AdminHD session.
4		**Upload** – upload the AdminHD configuration to the system's warm start data.
5		**Online to remote system** – turn online mode on or off.
6		**Preferences** – access the Preferences pop-up, see Page 227.

The remaining Toolbar buttons open or close the sub windows:

| 7		**Core Browser -** here you can navigate around the system and add system components.
8		**Parameter Box -** this window is used to display or enter settings for the component or signal selected within the 'Core Browser'.
9		**Graphic View -** this window shows a graphical representation of the hardware component selected within the 'Core Browser'.
10		**Console Panel** – only available in mc^{2}66 mode, this window is used to configure the console control surface.
11		**Signal List** – here you can create signal lists for use with the 'Connect Manager' or mc^2.
12		**Connect Manager –** online control to set matrix cross points, edit signal labels, control I/O parameters or save/recall snapshots.
13		**Remote Log -** this window logs all the messages generated by AdminHD or the HD Core.

The Core Browser Toolbar

At the top of the 'Core Browser' is its Toolbar:

1		**Collapse all subnodes** - click to hide all sub entries within the selected branch.
2		**Expand all subnodes** - click to show all sub entries within the selected branch.
3		**Copy** - click to copy the selected component and its sub entries.
4		**Cut** - click to cut the selected component and its sub entries.
5		**Paste** - click to paste the copied component, with sub entries, to the selected branch of the system.
6		**Delete** - click to delete the selected component and its sub entries.

The Signal List Editor Toolbar
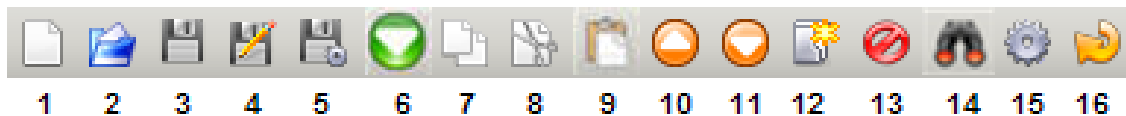
At the top of the 'Signal List Editor' is its Toolbar:

1		**New** - creates a new signal list.
2		**Open** - opens an existing signal list from your AdminHD computer.
3		**Save** – saves the current signal list configuration on your computer.
4		**Save As** – saves the current signal list under a new name on your computer.
5		**Export** – exports the current signal list configuration as a gui_config.tcl file and stores it on your computer.

6		**Download** – downloads the signal list from a mc^2 system to your computer. Only available in $mc^2$66 mode and if the system is online.
7		**Copy** – copies the current selection from the **Directories & signals** column.
8		**Cut** – cuts the current selection from the **Directories & signals** column.
9		**Paste** - click to paste selections to a directory in the **Directories & signals** column.
10		**Move node(s) up** – click to move the position of a signal or directory in the **Directories & signals** column.
11		**Move node(s) down** – click to move the position of a signal or directory in the **Directories & signals** column.
12		**Add new directory/subdirectory** – click to add a new entry to the **Directories & signals** column.
13		**Delete** - click to delete the selections within the **Directories & signals** column.
14		**Locate signal** – select a signal within the **Directories & signals** column and then click to locate its position within the **Signal list**.
15		**Generate automatic tree view** – click to automatically add directories, subdirectories and their signals from the **Signal list** into the **Directories & signals** column.
16		**Update hardware signal config** – click to update the Signal list if you make changes to the system configuration while working with the 'Signal List Editor'.

The Connect Manager Toolbar

At the top of the 'Connect Manager' is its Toolbar:

1		**Open** - opens a signal list from your AdminHD computer.
2		**Export** – exports a list of all connections as a .csv file and stores it on your computer.
3		**Update hardware config** – click to update the Source and Destination signals if you make changes to the system configuration.
4		**Connect** – click to connect the selected source to the selected destination.
5		**Disconnect** – click to disconnect the selected source from the selected destination.
6		**Overwrite Lock** – when enabled, a confirmation pop-up will appear each time you attempt to connect or disconnect signals.
7		**Easy Step Mode** – when enabled, the Connect Manager automatically steps down to the next source/destination after a connect is made.
8		**Special User Label Edit Mode** – when enabled, you can edit signal labels incrementally (e.g. PRES_01, PRES_02, PRES_03, etc.) by typing in the first label and then pressing return.
9		**Clear all snapshot flags** – click to clear all snapshot selection flags (blue flags).

Chapter 4: Service and Maintenance

Introduction

This chapter covers system servicing and maintenance, including details on software diagnostics tools and hardware servicing. At the end of the chapter you will also find a Trouble Shooting section to help fault find any problems.

Software Versions

Numbering

From version 4.0.2.2 onwards, all Lawo products have adopted a consistent software release numbering system to indicate networking compatibility:

The first three digits of the software revision number must be identical to ensure networking compatibility.

For example, a Nova73 running Version 4.0.2.2 can be networked to a mc^{2}66 running Version 4.0.2.4. However, if the software revisions were 4.0.2.2 and 4.0.4.0, then they are not network compatible.

Upgrading or Downgrading Software

Please note the following:

- If you are upgrading to software > V4.8.0.0 from a lower revision, then you will need to adjust the bay server rotary switch settings. See Page 278. This is also true if you wish to downgrade to software < V4.8.0.0 from a higher revision.

- If you downgrade to software < V4.10.0.0 from a console with new fader software, then turn off the control surface before performing the upgrade.

Software Diagnostics and Maintenance Tools

AdminHD/ControlHD System Diagnosis

You can use the following windows within AdminHD or ControlHD to diagnose errors within your system remotely from a PC:

- **Graphic View** – when running online, the Graphic View window updates to reflect hardware errors within the system:
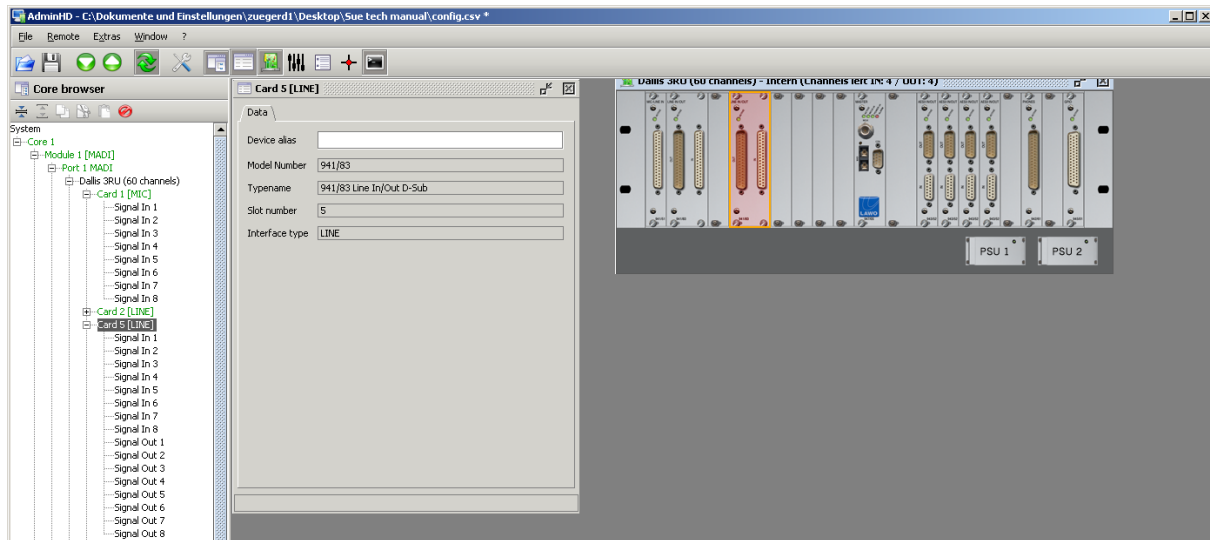
- **Remote Log** – this window will log all the messages generated by the programme or HD Core during online communication:
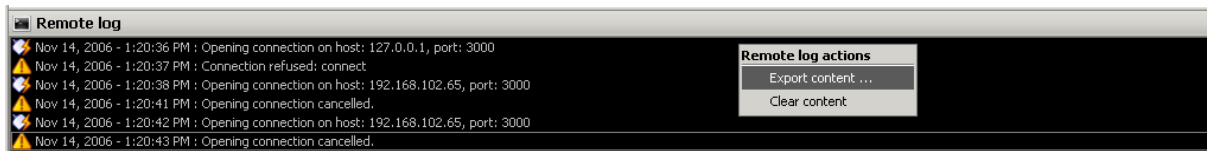
For more details, please refer to Chapter 3: AdminHD.

mc^{2}66 Console Diagnostics

Ethernet Monitoring

If the Ethernet connection between the control surface and Router Module fails, then the operator is presented with an error message:

If the system is fitted with a redundant Router Module, then you can switch to the redundant Control System as follows:

1. Click on the message and a confirmation pop-up appears:
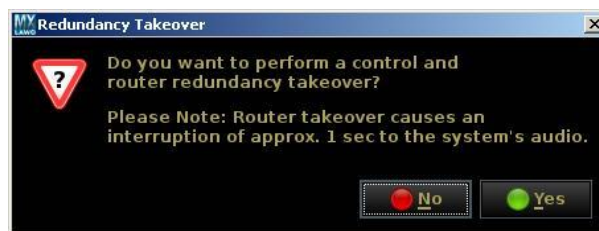
2. Select **Yes** to switch to the redundant control system or **No** to cancel.

*Selecting **Yes** causes an interruption to the audio.*

If you select **No**, then you MUST fix the problem with the connection before you can regain control of the audio.

For more details on Control System redundancy, see Page 262.

The Signal Settings Display

The **Signal Settings** display provides a graphical overview of the hardware contained within your system, and serves to provide a diagnostics tool in the unlikely event of a component failure.

1. Press the **SIGNAL** button, located on the SCREEN CONTROL panel, to view the **Signal Settings** display:

The two "trees" on the left of the display show the location of a signal within the **Signal List** (top) and its physical location in the **System** (bottom). Whenever a signal is selected from the **Signal List**, the **System** tree follows, and vice versa.

You can open or close branches of the **Signal List** or **System** tree by clicking on the arrows or double-clicking on a directory/component name.

As you select signals, a graphical representation appears in the middle of the display – in our example, we can see the DALLIS where our mic signal is connected.

If all is well with the system hardware, then the components are coloured grey. However, if there is a problem, the component will be highlighted in red, and you will see a red/white cross next to the component name in the system tree.

When you select an individual signal a number of parameter tabs appear at the bottom of the display – in our example, **General**, **Source**, **Mic/Line**, **Input DSP** and **General**:
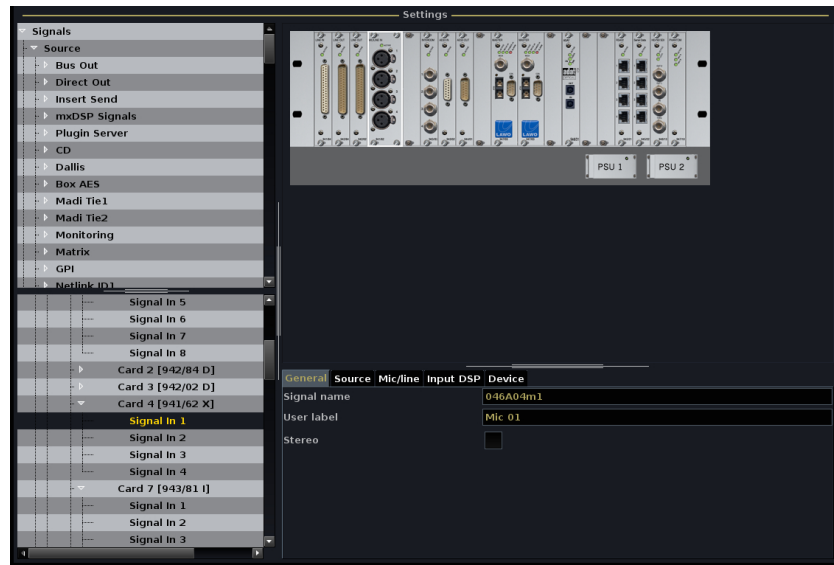
Note that the parameter tabs depend on the type of signal selected.

2. Select a tab to access I/O parameters for the selected signal.

When working with the **System Settings** display you can resize the different areas by clicking and dragging the grey separator bars - for example, during normal operation you might hide the **System** tree until it is needed. If information within an area is hidden, then left/right or up/down scroll bars will automatically appear.

Diagnosing System Errors

In the unlikely event of a component failure, a hazard warning flag appears in the title bar of the centre control screen. Note that this flag will appear at the top of any SCREEN CONTROL display, so you don't need to be viewing the **Signal Settings** to monitor your system hardware:

1. Press the **SIGNAL** button, located on the SCREEN CONTROL panel, to view the **Signal Settings** display:

A red/white cross and highlighted card reveal the problem.

2. If the fault is hidden within the **System** tree, follow the red warning flags and open each branch of the tree to find the problem – in our example, a DALLIS card:
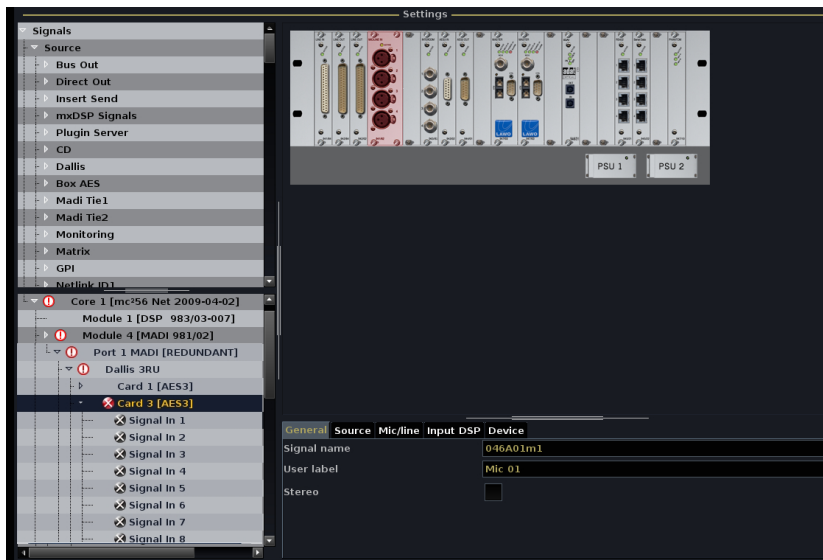
If you open the DALLIS card further, you will see grey/white crosses beside **Signal In 1**, **Signal In 2**, etc. These show that the AES signals are no longer available:

3. Check and replace the card if necessary.

Once all components are connected and working correctly, the red/white crosses disappear from the **System Settings** display and the hazard warning flag is cleared.

The System Tree

The **System** tree can be opened as follows:

1. Close and then reopen the **System** to see all the **Cores** contained within your system network – e.g. **Core 1**:
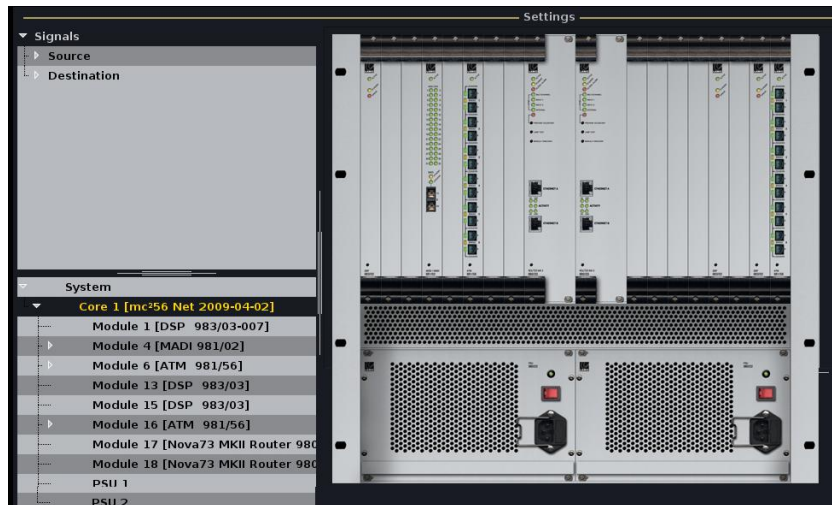
2. Open **Core 1** to see all the **Modules** fitted to the core, and its power supplies – **PSU 1** and **PSU 2**:
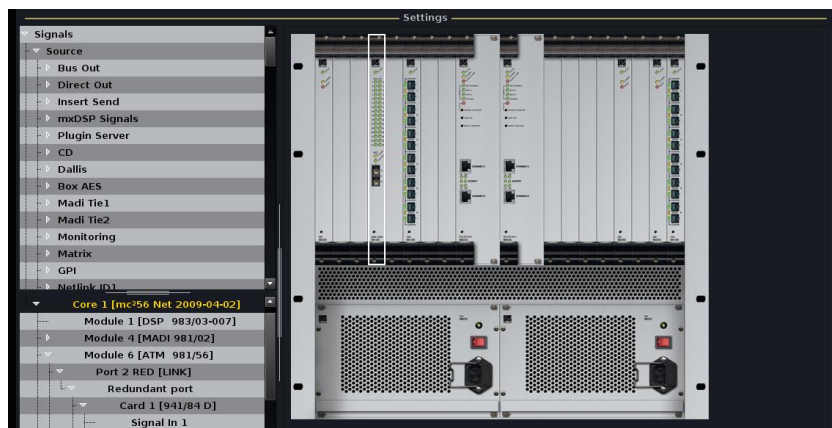
3. And open a **Module** to view its ports and then any DALLIS units connected to those ports:
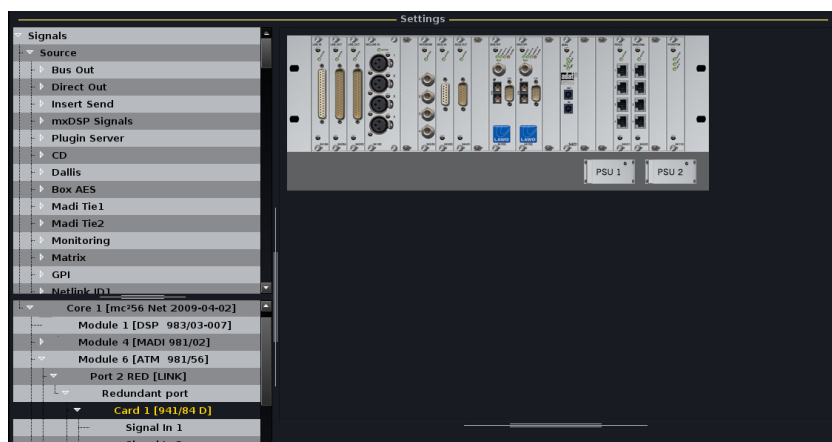
PSU Alarm (Desk PSUs)

From Version 4.8 software onwards, the console GUI offers status monitoring for the console's external PSU(s).

Note that if you have upgraded from an earlier software release to V4.8, then you will need to modify your hardware in order to support this feature, see Page 278.

The status of each external PSU is represented by a symbol which appears at the bottom right of every console display:
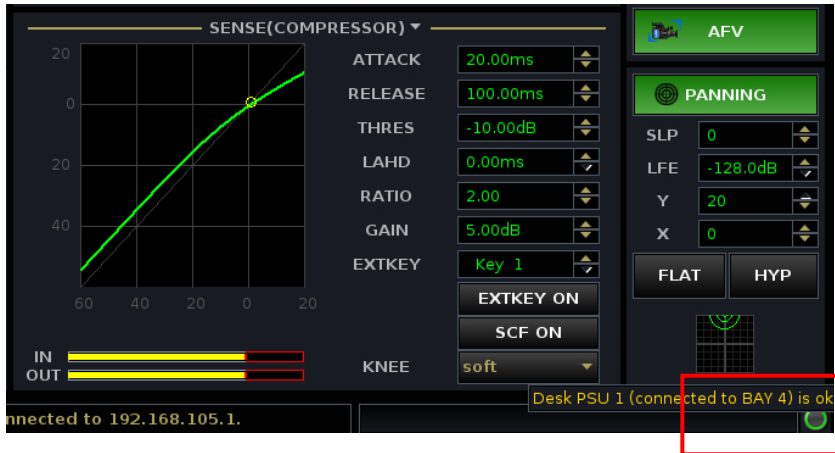
The symbols indicate:

- **Green Circle** – the PSU is working fine.

- **Yellow triangle with an exclamation mark** – the PSU is working fine, but there was a fault in the past which has now been cleared. Click on the icon to reset it.

- **Red circle with an exclamation mark** – there is a fault.

Hover over a symbol to reveal more information:
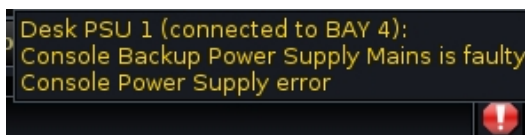
In the mc^{2}66, the bay server to the right of the GUI display usually contains the direct connection to the console's external PSU. In our example, this is bay 4 (shown above).

Depending on the frame size, more than one external PSU may be required, and additional symbols will monitor their status.

Note that within the text on the GUI display, bays are counted from BAY 1 upwards. However, internally bays are addressed from 0. This means that BAY 1 on the GUI relates to an internal Bay Server address of 0, BAY 2 to an internal address of 1, and so on.

See Page 278 for more details on Bay Server addressing.

System Information via Web Browser
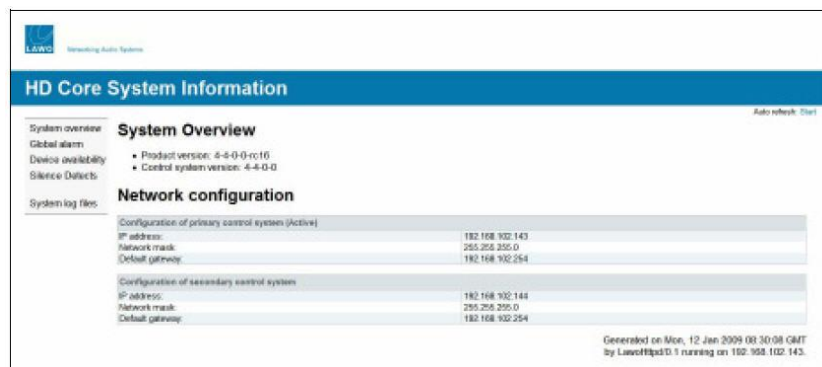
The Control System includes an integrated web server allowing status information to be monitored via a web page running on a service computer.

Accessing the System Information Pages

1. Connect your service computer either directly to the Control System, or via a Network Switch, using the instructions provided on Page 73.

2. Configure the TCP/IP settings on your service computer.

3. Once a connection is established, type the following into any normal web browser:

http://192.168.102.65 where 192.168.102.65 is the IP address of the mc^2 Control System.

This opens the **System Overview** page within the browser:

4. To automatically refresh any page turn on the **Auto Refresh** option at the top right of the screen.

5. Use the navigation buttons on the left to access the following pages:

▸▸ **Global Alarm**

This page lists all errors which have triggered the Global Alarm. Every error has an explicit ID, description and time stamp. These errors are stored within the file: /var/log/alarm.log.

⤷ **Device Availability**

⤷ **Silence Detects Page**

System Shutdown and Restart

Shutting down the System

The system should be shut down by powering down the external PSU unit(s) for the control surface and the power to the HD Core.

Warning

Warning

NEVER disconnect Harting power connectors from the control surface before switching off the external PSU.

Note that the console control system is located within the Router Module of the HD Core. Therefore, it is here where your data is stored.

Following switch-off, power is provided to the control system for a further 18 seconds in order to save all current settings to flash memory. This is called the console's warm start data. You will hear eight tones signaling that the shutdown operation has been successfully completed. The system is shutdown when the blue LED of the trackball is off.

You may switch off the power to other system components – the DALLIS units - at any time.

Starting the system

To start the system, turn on the external PSU unit(s) and HD Core. Note that you may power the console and HD Core before other interfaces if desired. This enables you to begin setting up the console before your remote Stageboxes are connected.

During the restart, the Central Control Screen displays the status during boot-up. If the system is set to warm start, then all of your previous settings (the warm start data) are recalled from the system's flash memory ensuring that the console comes back as it was last used. This procedure is called a warm start and ensures fast recovery from a loss of power.

Note that you can set the system to cold start on start up by selecting the **Force Cold Start** option from the **System Settings** display. See Page 253 for details.

Data Storage

The Control System reads and stores data to/from Flashcard. Two separate flashcards are used to keep the console's application software (**System Flashcard**) separate from any user data (**Data Flashcard**):
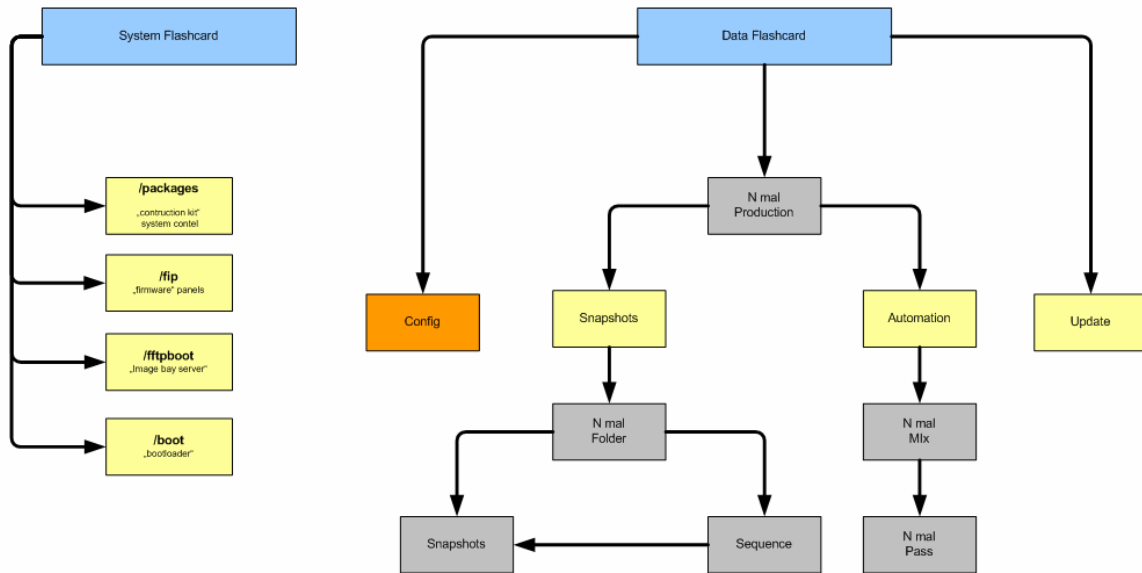
This allows you to boot the system either with or without loading your user data, known as a warm start or a cold start respectively:

Warm Start Data

Following a warm start, the following settings are restored:

- Matrix crosspoints.
- The console's DSP configuration.
- All configuration settings changed online by AdminHD/ControlHD.
- The console's complete settings.
- All DSP settings (EQs, dynamics, etc.).
- All I/O parameters (e.g. gains of microphone preamps, SRC on/off, etc.)

Cold Start Data

Following a cold start:

- All matrix connections are cleared.

- A default DSP-configuration is loaded.

- All configuration files return to the defaults (i.e. do not include online updates).

- The control surface will appear blank (no channel assignments).

- All DSP settings are set to default values.

- All I/O-parameters are set to default values

Performing a Restart

The Control System can be restarted by powering off, and then on, the main PSUs on the rear of the HD Core.

1. Power down the HD Core and wait until you hear the eight tones signalling that the shutdown operation has been successfully completed.

The system is shutdown when the blue LED of the trackball is off.

2. Then power on the core and the console control system will restart.

Note that the system can be set to either warm or cold start from the **Global** options in the **System Settings** display:
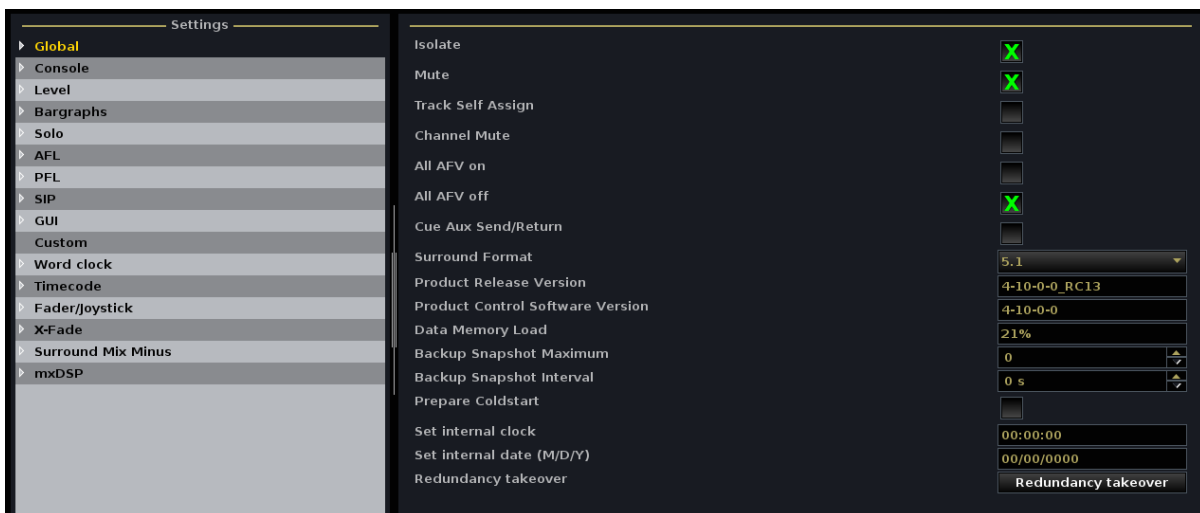
- If the **Prepare Coldstart** option is unchecked (recommended), then at the end of the next restart the console will load the last valid warm start data ensuring that the console comes back as it was last used.

- Check the **Prepare Coldstart** option and the next time the system restarts it will do so without loading any user data. Use this option if there is a problem with your user data, or if you wish to clear all user data from the system.

Note that you can also activate this option by pressing the **Prepare Coldstart** button on the HD Core Router Module.

Restarting the TFT display Bay Server

Each TFT display on the mc^{2}66 has its own Ethernet Bay Server which can be restarted from the front panel.

1. Using a pointed object, press the recessed button at the bottom of the display:

The bay server restarts as indicated:

Once the restart is complete, the selected display is reinstated:
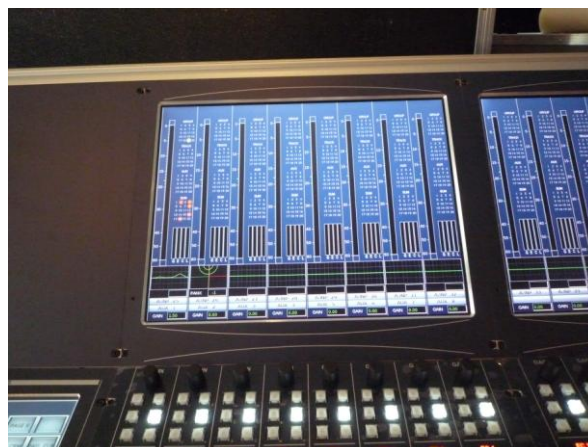
Service Commands

In addition to 'user' level diagnostics, there a number of 'service' level commands which may be used to perform lower level operations to the **mc²66** control system. These include:

- **Logfiles** – can be used to view the logfiles of the control system.

Starting a Telnet Session/Control System Log-in

You can run any of these commands remotely from your service PC via the system network. First open a Telnet session to the control system shell programme as follows:

1. On your computer, select **START -> Run…**

2. Type **cmd** in the Run window followed by **OK**:
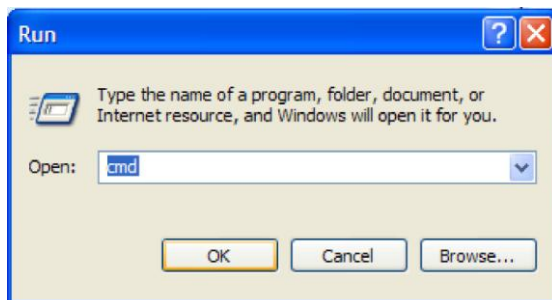
This opens a DOS command prompt window:

3. Type **telnet 192.168.102.65** and press enter.
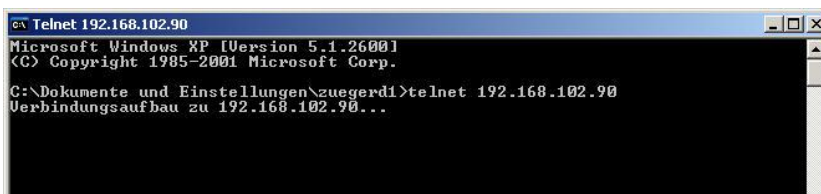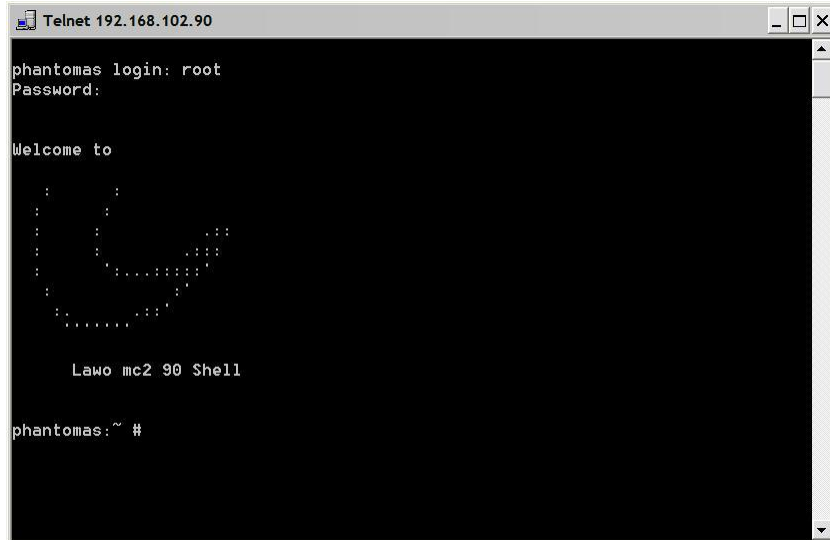
(mc²90 IP address shown)

4. Next log-in to the mc²66 control system by typing:

Login: **root**

Password: **hong**

A log-in prompt appears showing the version of the shell programme:

```
Telnet 192.168.102.90                                    _ □ ×

phantomas login: root
Password:


Welcome to

          :         :
       :       :
       :      :            .::
       :      :            .:::
       :       ':....:::::'
        :              ;:'
         :........:::'


           Lawo mc2 90 Shell

phantomas:~ #
```

(mc²90 shown)

Viewing Logfiles

The logfiles of the control system are stored in ,,/var/log and called "messages" and "messages.old".

1. To open the log, type:

tail –n100 –f /var/log/messages

where **n** is the number of old message lines which will be printed, and **f** sets the tail command to show all following log entries while the log is opened:

tail	-n	100	-f	/var/log/messages
Command	option	parameter	option	directory

2. To close the active log, press **CTRL** + **C**.

HD Core

Replacing the Fans

Each of the 5 fans located at the rear of the HD Core frame can be replaced individually during operation:
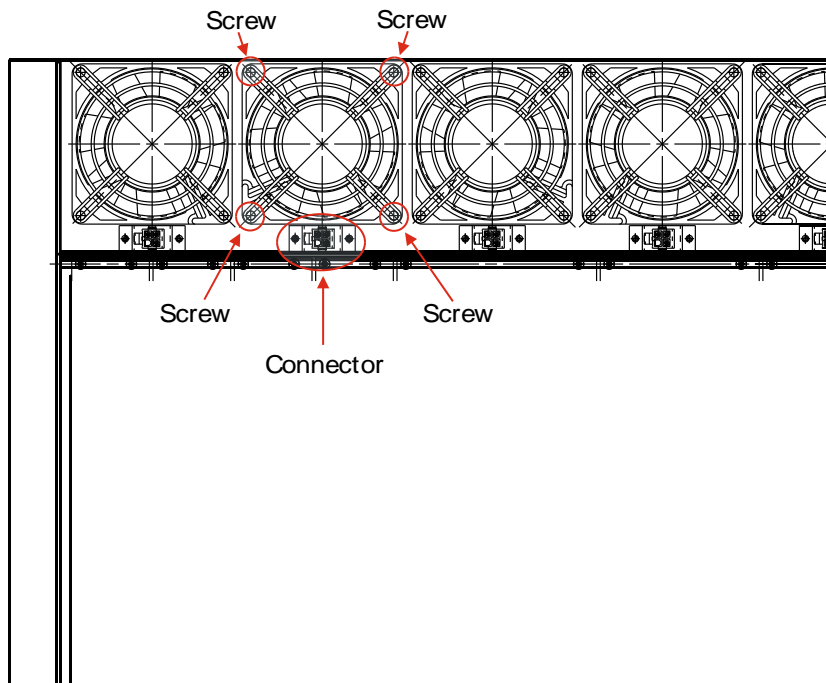
1. Unplug the 4-pin connector from the frame as shown above.
2. Loosen the screws and remove the fan from the frame.
3. Insert the replacement and fasten the screws to secure.
4. Plug the 4-pin connector into the coupler of the frame.

Replacing a Power Supply Unit

Depending on your system specification, the HD Core may be delivered with single or dual redundant power supply units (PSUs). The PSUs are hot pluggable and can be replaced from the front of the frame as follows:

1. Switch off the PSU you wish to replace:

When two supplies are fitted, this will not affect the operation of the system.

2. Disconnect the mains from either the **PSU 1** or **PSU 2** IEC mains connector as appropriate.

3. Unfasten the four screws and, using the handle provided, pull out the PSU.
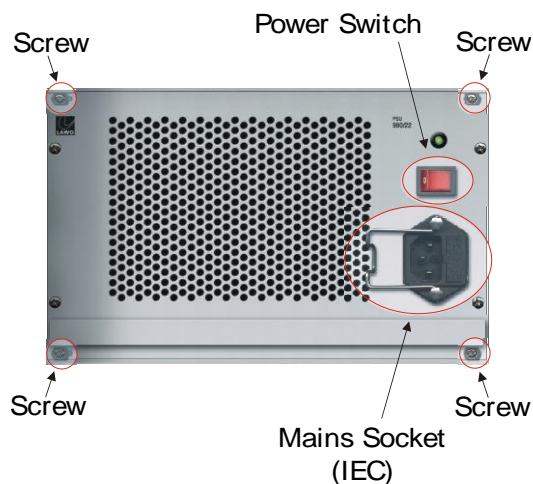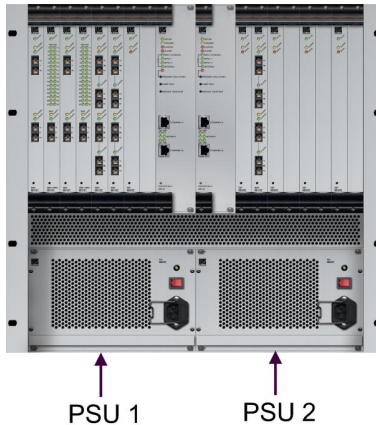
4. Before fitting the replacement PSU make sure that it is switched off.

5. Insert the new PSU and slide it into position until it locks into place.

6. Secure the unit by fastening the four screws.

7. Re-apply the mains to the PSU IEC mains connector and switch on!

Warning

For air conditioning reasons, a HD Core in operation requires both PSU slots to be occupied. If you do not wish to have a redundant PSU, then please insert a dummy housing (Type 980/21).

HD Core Router Module (MKII)

The **mc²66** requires the MKII Router Module (980/33) to be fitted to the HD Core. The module provides the following front panel connections and functions:

ACTIVE LED	Flashes green when the control system is running. The **ACTIVE** LEDs across all modules should flash in sync with each other. If an LED is out of sync, then the module is not synchronised to the rest of the system.
STANDBY LED	Illuminates in yellow when the module is running in redundant mode.
CHARGE LED	Illuminates when the backup power unit is charging. Off = unit is fully charged.
ALARM LED	Illuminates in red when the global alarm is triggered. See Chapter 4 for more details.
SYNC LEDs	These four LEDs indicate the current sync source (flashing green) and available redundant sync sources (solid green).
PREPARE COLDSTART	Press this button (the LED illuminates) to prepare a cold start. Having activated the button, the system will cold start on the next power cycle or restart.
LAMP TEST	Press this button to test all the LED lamps within the HD Core modules.
MODULE TAKEOVER	Press this button to force a takeover from the Active Router Module. (Functions only when two Router Modules are fitted.)
ETHERNET A	Connects to the mc²66 control surface.
ETHERNET B	Connects to a system network or external PC for configuration, maintenance or control.
	Both connections are RJ45.
	The **ACTIVITY** LEDs flash green when data is being transferred.
POWER Button	This recessed button will power on or off the module (and Control System).
	Note that this button should only be used as a last resort if all other restart methods fail. Please see Page 250 for recommended shutdown and restart procedures.

Replacing the Router Module

Follow the same procedure used to mount plug-in I/O cards as described in Chapter 2.

Warning

Warning

If only one Router Module is fitted to the HD Core, then to replace the board you will need to shutdown the system.

Replacing the System or User Data Flashcard

If you have a backup image copy of the System Flashcard or Data Flashcard then they can be replaced as follows:

Note

Note that you must power off the HD Core in order to replace a Flashcard.

The Flashcards are located on the MKII Router Module within the HD Core.

1. First power off the HD Core and remove the Router Module as described in Chapter 2 (Mount plug-in I/O cards).

You will see the System and Data Flashcards slotted into the Control System:

2. Remove the appropriate card and slide in your replacement.

3. Replace the Router Module and power on.

I/O and DSP Modules

| AES3/
MADI | MADI | MADI
SMF | ATM | DSP |
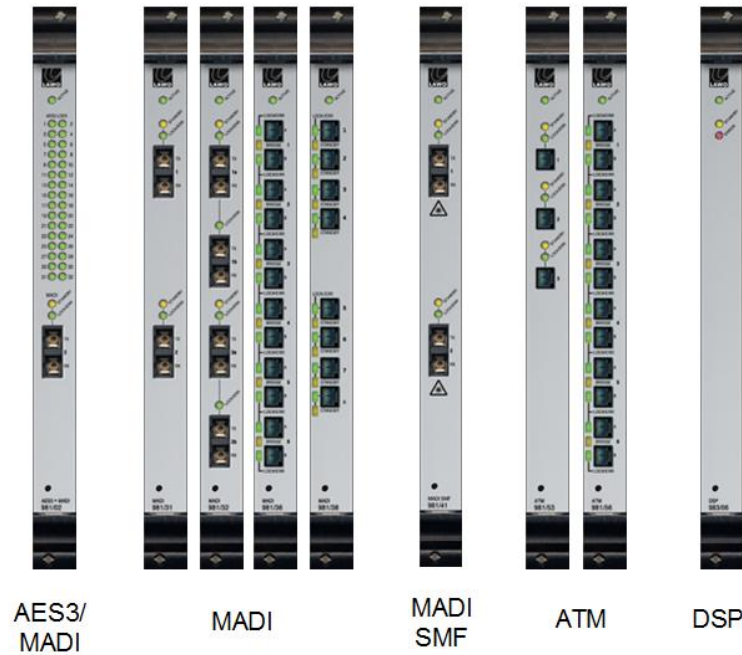
At the front of the HD Core, you will find the plug-in modules description and part numbers silk screened onto the top and bottom of every I/O board.

Use the part numbers to locate the relevant data sheets for card specifications and further information.

Module Status LEDs

The front of each module contains a number of useful status LEDs:

- **ACTIVE** – This LED shows that the module's internal control system is running. The **ACTIVE** LEDs across all modules should flash in sync with each other when the system is running correctly. If an LED is out of sync, then the module is not synchronised to the rest of the system. Check that the module is fitted correctly and if the symptom persists replace the module.

- **Module Specific LEDs** – Some modules include additional status LEDs. For details on these functions please consult the relevant data sheet.

Replacing a Module

Follow the same procedure used to mount plug-in I/O modules as described in Chapter 2.

Redundant Control System

By fitting a redundant Router Module to the HD Core, a redundant Control System is added. If the main Control System fails, then the redundant Control System will automatically take over in the event of a software or hardware error.

Connections

Ethernet connections from both the main and redundant Router Modules are required (ETHERNET A to the console surface; ETHERNET B to the control network):

- **Ethernet A** – connects to the mc^2 control surface:
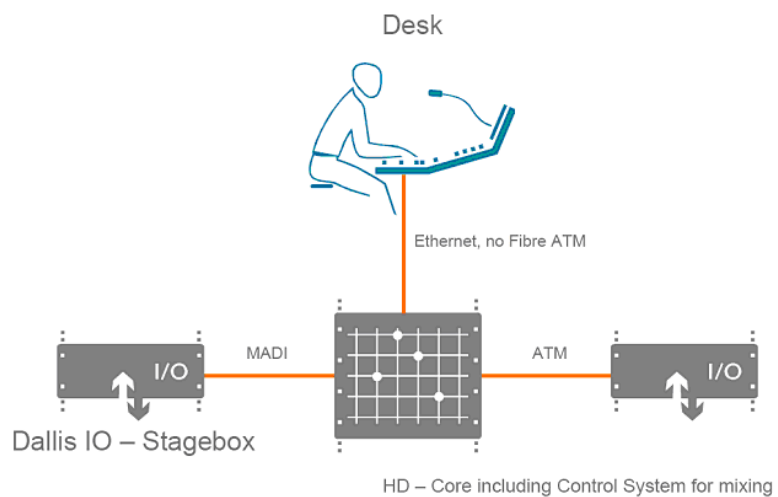
- **Ethernet B** – connects to the system network or external PC for configuration, maintenance or remote control.
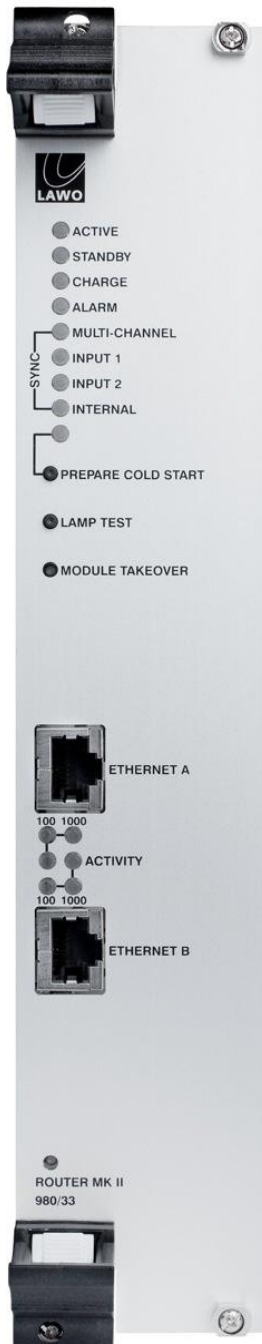
Automatic Takeover

If the main Control System fails, then the redundant Control System will automatically take over.

The redundant Control System is automatically activated if, internally, a loss of connection is noticed by the redundant system. This could be due to a software failure, hardware error or reboot of the main Control System.

Note that if the Ethernet connection between the control surface and Router Module fails, then an automatic takeover does not occur, as the failure may be deliberate (e.g. you disconnect the Ethernet cable).

Note

Instead the operator is presented with an error message:

1. Click on the message and a confirmation pop-up appears:
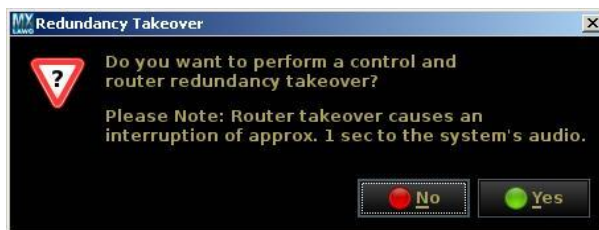
2. Select **Yes** to switch to the redundant control system or **No** to cancel.

*Selecting **Yes** causes an interruption to the audio.*

If you select **No**, then you MUST fix the problem with the connection before you can regain control of the audio.

Manual Takeover

You can force a manual takeover at any time from the **System Settings** display:

1. Select the **Global** Topic and then select the **Redundancy takeover** option.

A confirmation dialogue box appears:
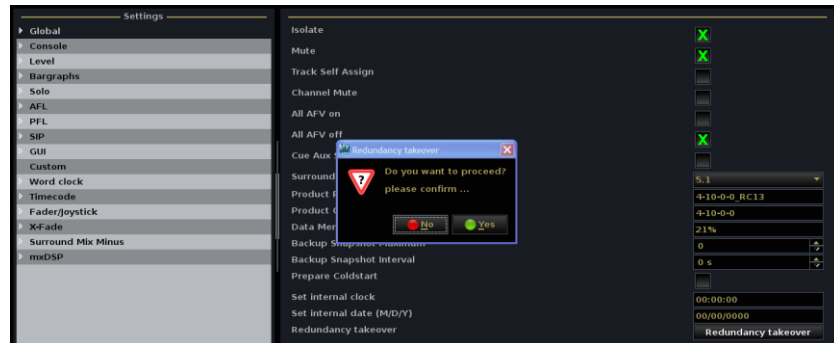
2. Select **Yes** to confirm or **No** to cancel the operation.

*Selecting **Yes** switches to the redundant Control System.*

Alternatively, press the **Module Takeover** button on the front of the redundant Router Module to force a takeover.

Updating the Configuration or Software

For redundancy to work, both main and redundant Control Systems must hold identical information and mirror each other.

User data (productions and warm start data) are mirrored at all times. However, the cold start configuration and system software are only synchronised when the Control System boots up. This has implications if you wish to upload a new AdminHD configuration or update system software:

Let's take an example where your main Control System is called A and redundant Control System is called B. If you upload your new configuration or software to Control System A and then cold start it, the following will occur:

- The system responds to the cold start of the main Control System by automatically switching to the redundant Control System (B).

- At the end of the cold start, data from the active Control System (B) is copied back to the redundant Control System (A). In other words, your new data is overwritten!

To avoid this, and upload a new configuration or update software successfully:

1. Disable the redundant Control System.

This can be achieved by releasing the locking catches which are fitted to the top and bottom of the redundant Router Module (see opposite). This unlocks the module from the HD Core and automatically disables it. Note that it is not necessary to pull out or remove the module.

2. Now upload your new AdminHD configuration or software to the active Control System and cold start.

The system restarts using the new configuration data.

3. Once the main Control System is running the updated configuration/software, lock the redundant Router Module back into place to reactivate it.

The redundant Router Module boots up, and all data from the main Control System is copied to it, ensuring that both modules are running the new data.

4. Cold start the system once more, and check the new configuration/software.

During steps 2 and 4 the system can be cold started by selecting the **Prepare Coldstart** option from the **System Settings** display, and then powering off and on the main PSUs of the HD Core.
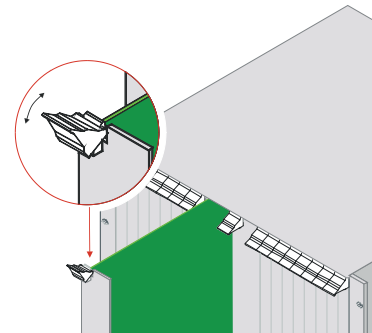
DALLIS

Replacing a Power Supply Unit

Depending on your system specification, each DALLIS may be delivered with single or dual redundant power supply units (PSUs). The PSUs are hot pluggable and can be replaced as follows:

1. On the rear of the DALLIS, disconnect the mains from either the **PSU 1** or **PSU 2** IEC mains connector as appropriate.

2. Unfasten the two screws on the right hand side of the hinged PSU cage door (marked by the arrows below):

Pull the door open to access the PSU docking bays:
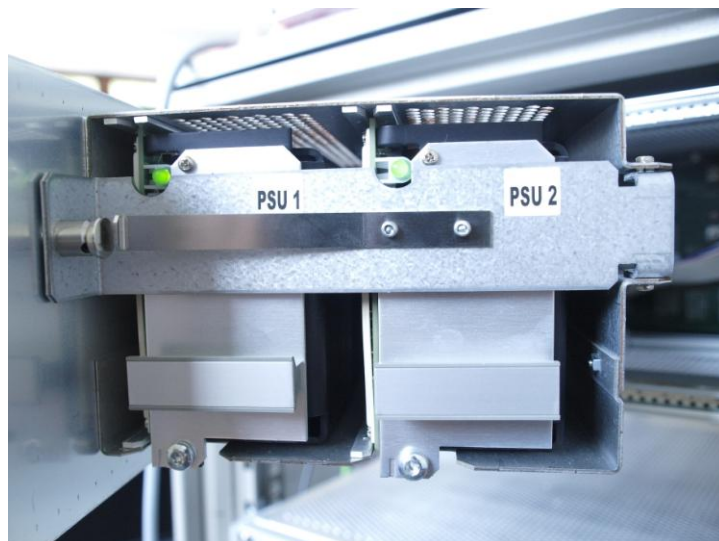
3. Unfasten the metal catch which holds the PSUs in place by pushing on the catch as shown below:

4. Remove the relevant power supply unit and replace with the spare.

5. Fasten the catch back into place.

6. Replace the cage door and fasten the two screws.

7. Re-apply the mains to the PSU IEC mains connector.

DALLIS Master Board

A choice of DALLIS Master boards are available determining the type of connection to the HD Core (MADI or ATM, multimode or single mode fibre) and whether the connection has redundancy. All versions of the board provide similar functions:
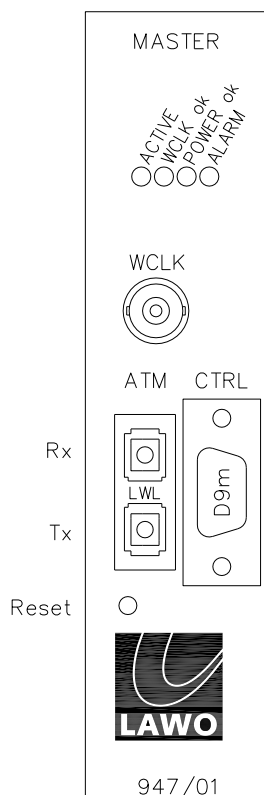
ACTIVE LED	Flashes green when the card's internal control system is running. The **ACTIVE** LEDs across all cards should flash in sync with each other. If an LED is out of sync, then the card is not synchronised to the rest of the system.
WCLK OK	Illuminates in green when the system is receiving a valid Wordclock sync signal.
POWER OK	Illuminates in solid green when the DALLIS PSU is running normally. If the LED flashes, then there is a PSU error.
ALARM	Illuminates in red when any of the following error conditions are triggered: PSU error; internal health state error; sync error; MADI (or ATM) link error; rack configuration error.
WCLK	The DALLIS may be synchronised to an external wordclock reference connected to the **WCLK** BNC.
MADI or ATM Ports	A range of the DALLIS master board options are available: • 947/05 (shown opposite) – Provides a single MADI port connection using multimode fibre. • 947/07 – Provides one main (MADI A) plus one redundant (MADI B) port using multimode fibre. • 947/15 – Provides a single MADI port connection using single mode fibre. • 947/03 – Provides a single ATM port connection using multimode fibre. On some cards, LEDs show the status of the signals arriving at the connection.
CTRL (RS422)	Serial connection to PC for updating system firmware.

Replacing the Master Board

Follow the same procedure used to mount plug-in I/O cards as described in Chapter 2.

Replacing the Lithium Battery

The master board in the DALLIS is fitted with a lithium battery. This battery guarantees that your data remain saved also when the system is switched off. As a precaution we recommend that the battery is replaced after about eight years of operation. Please send the master board to your local service representative to perform this procedure.

Only service staff may replace batteries.

Warning

If only one Master Board is fitted to the DALLIS, then replacing the board will stop and reboot the DALLIS causing an interruption in audio from that unit.

I/O Cards

At the front of the DALLIS, you will find the plug-in card description and part numbers silk screened onto the top and bottom of every I/O card.

Use the part numbers to locate the relevant data sheets for card specifications and further information.

I/O Card Status LEDs

The front of each I/O card contains a number of useful status LEDs:

- **ACTIVE** – This LED shows that the card's internal control system is running. The ACTIVE LEDs across all cards should flash in sync with each other when the system is running correctly. If an LED is out of sync, then the card is not synchronised to the rest of the system. Check that the card is fitted correctly and if the symptom persists replace the card.

- **Card Specific LEDs** – Some cards, for example, the Phantom Power card, include additional status LEDs. For details on these functions please consult the relevant data sheet.

Replacing an I/O Card

Follow the same procedure used to mount plug-in I/O cards as described in Chapter 2.

Console Power Supply Unit

PSU Status LEDs

Internally, the console's external PSU is equipped with three power supplies running in parallel. For correct operation, only two supplies are required; the third is for redundancy. If more than one of the internal supplies fails, then the complete PSU rack must be replaced. Please send the defective rack to Lawo for repair.

LEDs on the front panel show the status of each internal supply and the two mains connections:

- **MAINS PRIMARY and BACKUP** – illuminate in green when the mains power connected to each supply is ok. If a connection fails, then the LED goes out.

- **PSU 1 to 3** – illuminate in green when each internal power supply is ok. If a supply fails then the LED goes out.

- **ERROR** – this LED will flash (red) if:

  o one or more of the mains inputs fail. Only one mains input is required to operate the system.

  o one or more of the internal PSUs fail. For correct operation, only two supplies are required; the third is for redundancy.

- **HIGH TEMPERATURE –** illuminates if the internal temperature exceeds 56° C. The fan is active until the temperature falls below 42° C.

Control Surface

Within each channel or centre section (GUI) bay, individual panels connect via USB to an Ethernet Bay Server. Each Bay Server then connects back to the Control System within the HD Core via Ethernet in a 'star'-like architecture. Point-to-point connections provide fault tolerance, and allow any bay or panel to be isolated from the rest of the console:
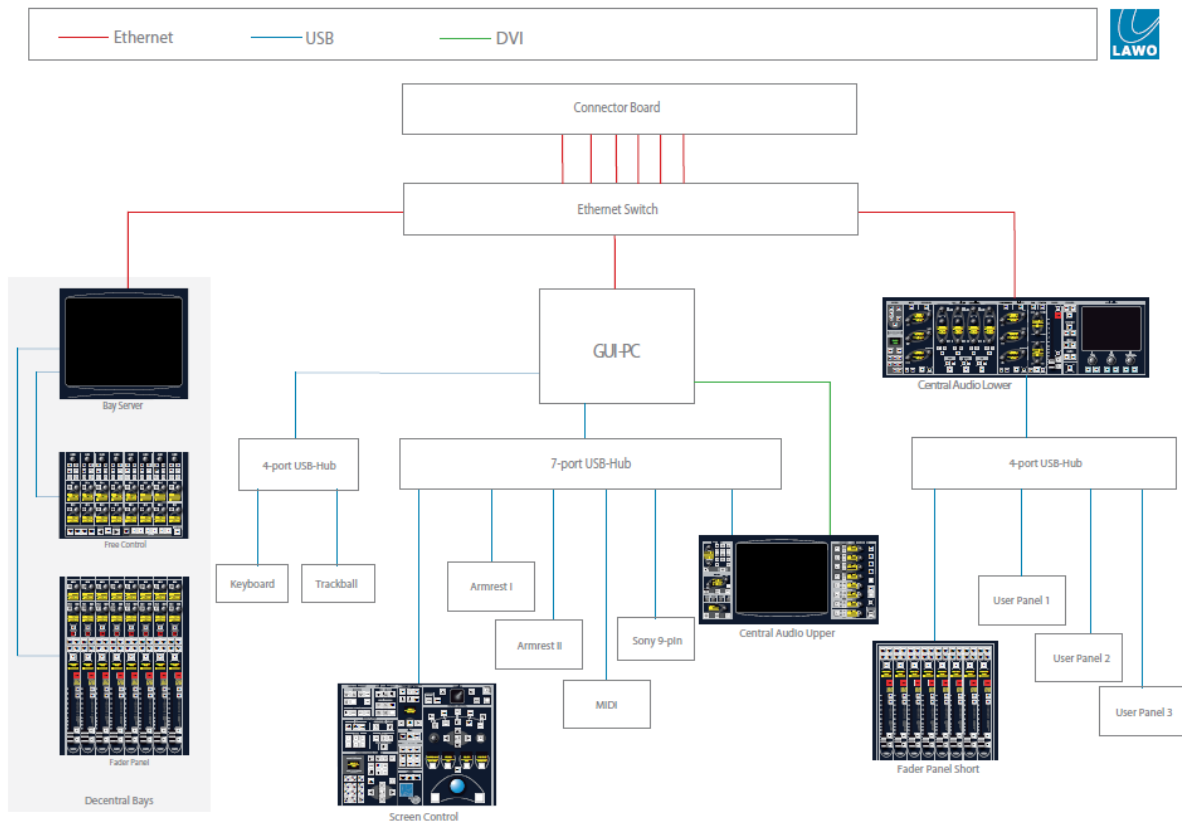
Please see Page 254 for details on how to restart a Bay Server. This may be necessary if the Ethernet connection to the Control System is interrupted.

Calibrating the Touch-screen

You can calibrate the touch-screen for the mc^{2}66. You will need to open a Telnet session and connect to the central GUI control system to do this. We recommend using Tera Term Pro Web 3.1.3, a free telnet client for windows, which can be downloaded from http://www.ayera.com/teraterm/

   1. Open the Tera Term Pro telnet client.

To configure the IP Address of your console open TCP/IP from the Setup menu, and add the TCP/IP address of your console control system to the host list:

Note
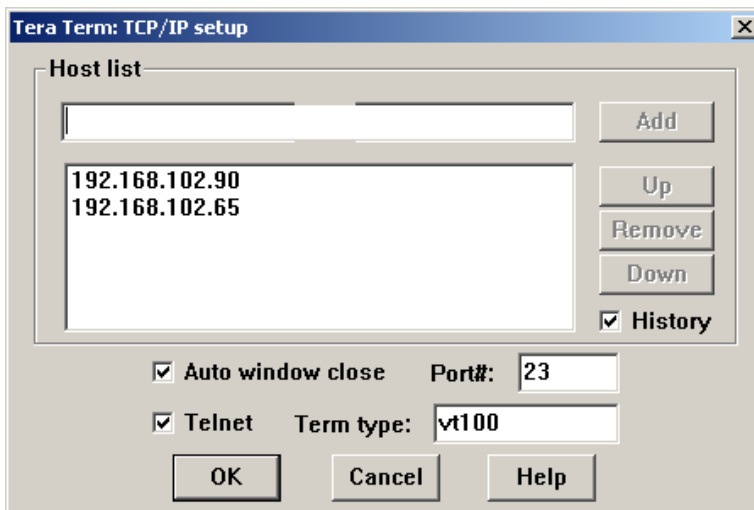
The default TCP/IP address of a mc^{2}56 control system is 192.168.102.56.

   2. Now set up a new telnet connection using **File -> New connection.**

3. Enter the login name: **root** and the password: **hong**

Tera Term PRO opens a telnet session to the console's control system:

To calibrate the touch-screen, you need to connect to the central GUI control system (GUI_0).

4. To find out its IP address, type **ipinfo** and press Enter.

The IP addresses of all GUI and decentral bays are displayed:

Find the IP address for the *GUI_0* control system – in our example, it is 192.168.105.100.

Now connect to the thaddaeus_GUI_0 control system:

5. Type **telnet 192.168.105.100** (the IP address of the GUI_0 control system) and press Enter.

6. Login by typing login: **root** and password: **hong**:

```
shelob:~ # telnet 192.168.105.100

Entering character mode
Escape character is '^]'.

thaddaeus_GUI_0 login: root
Password:

Welcome to

    :       :
    :       :
    :       :        .::
    :       :      .:::
    :       ':...:::::'
    :        :'
    :,,,,,,..::'
    ';;;;;;..::'

 Lawo mc2 56 Bayserver Shell
```

7. Next type **calibrateTouchscreen** and press Enter.

```
thaddaeus_GUI_0:~ # calibrateTouchscreen
Welcome to Lawo Touchscreen Calibration

Please select the type of calibration :
 1) 4  point calibration
 2) 25 point calibration
 3) test calibration
_
```

The calibration options appear as shown above.

8. Select either a simple or more complex calibration and follow the instructions.

9. Option 3 will test the calibration.

MKI mc²66 shown

Replacing a Control Surface Panel

Each panel is hot-pluggable making it easy to service. To replace a panel:

1. Unfasten the panel screws and gently lift the panel using the pullers provided:

2. Remove the USB and power connectors taking notes on where each one should be fitted.

3. Carefully remove the panel.

Check that the rotary switch settings on your replacement panel are correct (see below).

4. Insert your replacement.

5. Reconnect the panel.

If the console is turned on, the panel will boot within a couple of seconds.

Control Surface Panel Rotary Switch Settings

Each control surface panel has a rotary switch with two settings:
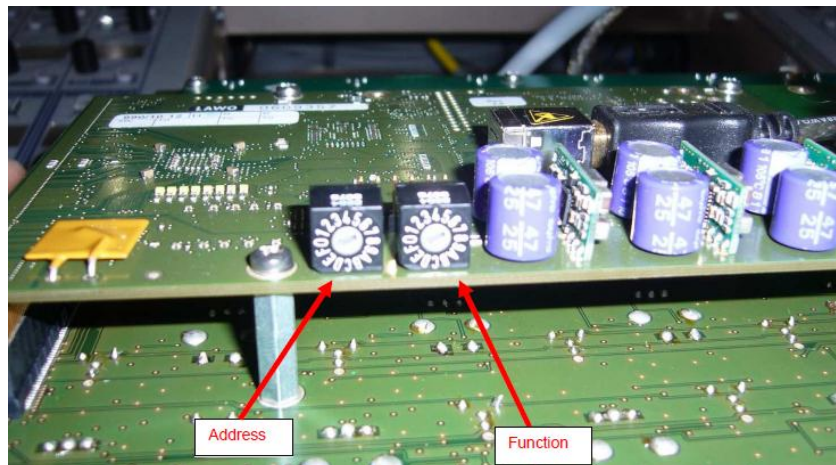
- **Function** - this setting determines the function of the panel. For example whether it is a fader panel, free control (FC) panel, etc.

- **Address** – this setting determines the panel index and is set according to the frame layout of your console.

When replacing a control surface panel, check that both the function and address setting are correct for the panel type (see next page).

⤷ **Central USB Control Panel Rotary Switch Settings**

	mc²66MKII
Address	*0*
function	*0*

⤷ **Main Fader USB Control Panel Rotary Switch Settings**

n = number of decentral bays

	mc²66MKII
Address	*n*
function	*8*

⤷ **Decentral USB Control Panel Rotary Switch Settings**

	mc²66MKII
Address	*0*
function	*0*

Bay Server Rotary Switch Settings

Every Bay Server has a rotary switch with two settings:
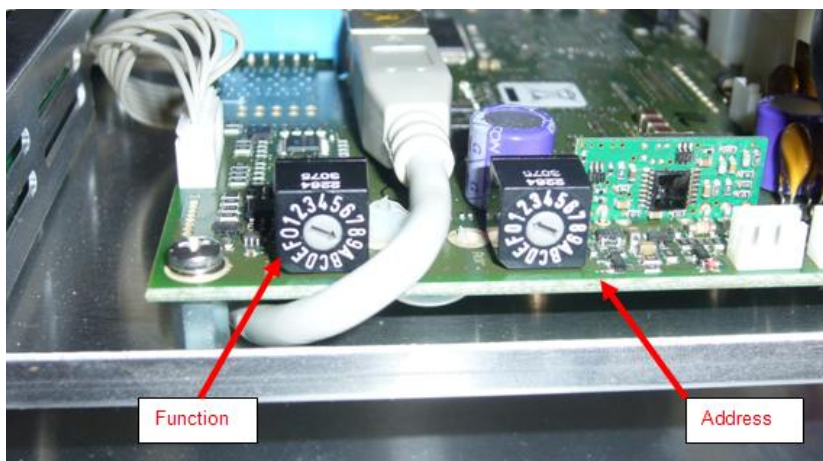
- **Function** - this setting determines whether the Bay Server is a channel or centre section (GUI) bay.

- **Address** – this setting determines the Bay Servers' index, and is set according to the frame layout of your console.

The "address" setting is counted from left to right across the console starting at 0.

You may need to adjust the bay server rotary switch settings if you are upgrading or downgrading to or from Version 4.8 software or adding an extender bay.

⏭ Upgrading to V4.8 Software

From Version 4.8 software onwards, the function settings for bays with a direct PSU connection differ to those with no connection. This change was made to support the PSU monitoring feature described on Page 245. Therefore, if you upgrade or downgrade software, or change the power connections within your console, you will need to modify the Bay Server switch settings.

Please note the following:

- You only need to change the Bay Server switch settings if you have upgraded from an earlier release. All consoles shipped with Version 4.8 or later have their rotary switches set correctly when they leave the factory.

- Only perform this procedure *after* installing the Version 4.8 release of software.

- If you wish to revert back to an earlier software release, then all changes made to the hardware must be reversed to avoid conflicts.

In the mc^{2}66, the Bay Server to the right of the GUI display usually contains the direct connection to the external PSU. If more than one external PSU is supplied, then check the Harting connectors on the frame.

Follow the instructions on Page 266 to remove the TFT screen in order to access the Bay Server Rotary Switch:
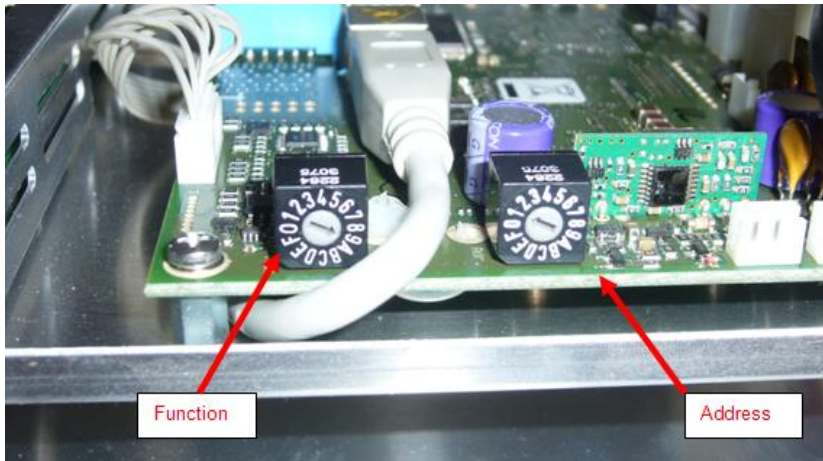
The following table shows the settings required for channel and GUI bays with or without a direct PSU connection, when running software versions before or after 4.8:

		Release < 4.8			Release > 4.8		
		mc²66MKII & mc²90MKI	mc²90star²	mc²56	mc²66MKII & mc²90MKI	mc²90star²	mc²56
Channel Bay							
address		0, 1, .., n	0, 1, .., n	0, 2, 4.., n	0, 1, .., n	0, 1, .., n	0, 2, 4.., n
function		0	1	0	0	1	0
GUI							
address		0, 1, .., n	0, 1, .., n	0, 1, .., n	0, 1, .., n	0, 1, .., n	0, 1, .., n
function		8	9	8	8	9	8
Channel Bay (PSU cable connected)							
address		0, 1, .., n	0, 1, .., n	0, 2, 4.., n	0, 1, .., n	0, 1, .., n	0, 2, 4.., n
function		0	1	0	2	3	2
GUI (PSU cable connected)							
address		0, 1, .., n	0, 1, .., n	0, 1, .., n	0, 1, .., n	0, 1, .., n	0, 1, .., n
function		8	9	8	A	B	A

⊳ Adding an Extender Bay

The "address" setting is counted from left to right across the console starting at 0.

Extender bays are considered as further bays. If an extender is added to left, then the "address" settings of the main frame must be shifted upwards. If the extender is added to the right, then its address can be counted upwards from the main frame.

For more details on Bay Server or Control Panel rotary switch settings, please refer to the separate documentation:

"TD_address_configuration_bay_server_control_panels".

Trouble-shooting

This section includes a series of typical problems and tips to help you fault find the mc^{2}66 system.

⊯ **The console will not boot or does not boot correctly**

1. Power off the HD Core and wait for the system to shutdown.

The system has completed its shutdown when the blue LED of the trackball is off.

2. Power on to try a warm start.

3. If this is unsuccessful prepare a coldstart, either from the **System Settings** display (**Global** options) if accessible, or by pressing the **Prepare Coldstart** button on the HD Core Router Module. Power off and on again (waiting for the system to shutdown in between) to perform a cold start.

If the console now boots correctly, then your warm start user data is corrupt. Check your production data by loading a Production. If there is a problem with the production data, then you may need to replace the Data Flashcard (see Page 260.)

4. If this is still unsuccessful, then you should try replacing the System Flashcard with a backup copy as described on Page 260.

⊯ **The console boots up but I have no audio.**

1. Check the console's **System Settings** display to see if there any reported errors.

If the system looks ok then:

2. Check the fibre connections between the HD Core I/O module and any DALLIS units.

3. Check that all the **ACTIVE** LEDs on modules within the HD Core, and cards within the DALLIS, are green and flashing synchronously at around 100Hz.

If not, try re-plugging the card or module to reboot it.

4. If everything still looks ok, then try reloading the DSP configuration from the console's **DSP Config** display. (Please see the Operator's Manual for details.)

⟫ One of the control surface panels is not working.

1. Carefully lift out the panel, and check the connections.

2. Try disconnecting the USB and power connectors to the panel, and then reconnecting the USB and power.

Try this a few times to see if the panel will boot. If not, then the panel may be faulty so please contact your local service representative.

⟫ The graphics on the TFT displays freezes temporarily

This may occur if the load on the CPU exceeds 95% - for example, during a production load. Audio processing is unaffected, and therefore the behaviour should be ignored. Once the production has loaded, and the CPU returns to normal levels of operation, all graphics should update correctly.

⟫ The graphics on a TFT display freezes or looks odd

If a Bay Server looses its Ethernet connection to the Control System, then it may need to be reset.

1. Follow the procedure described on Page 254 to reset the Bay Server.

⟫ The Network connection between my AdminHD or mxGUI PC and the control system is not working.

Try a PING command from your PC as follows:
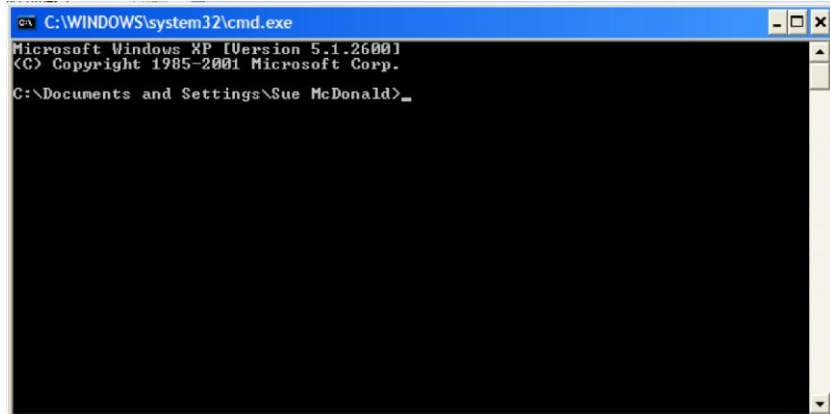
The PING command is a built-in Windows function and allows you to test whether you have a valid network connection to and from the system (or any other networked device).

With your PC connected to the system network, proceed as follows:

1. On your computer, select **START -> Run…**

2. Type **cmd** in the Run window followed by **OK**:
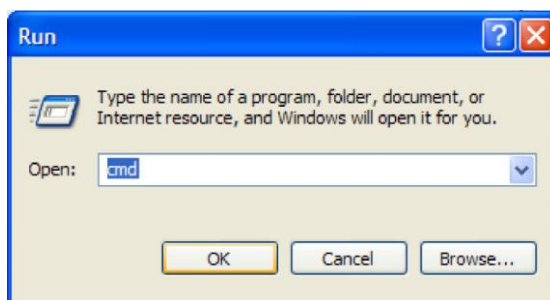
This opens the DOS command prompt window similar to that shown below:
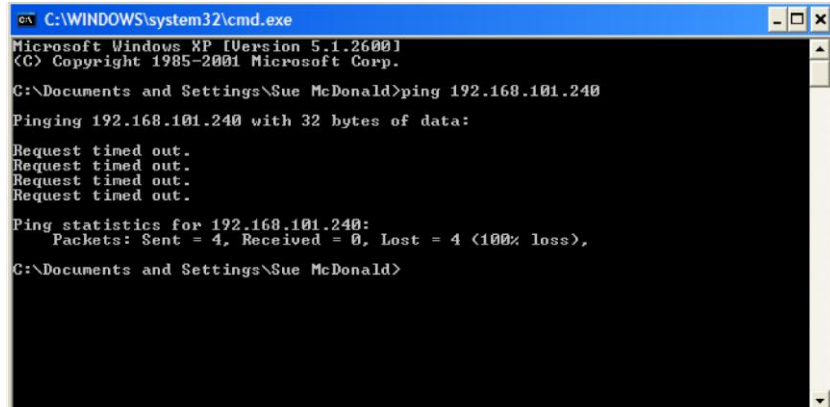
3. Now type the following (assuming that the IP Address of the control system is still set to its factory default):

ping 192.168.102.67

4. Press **ENTER** on your computer keyboard:
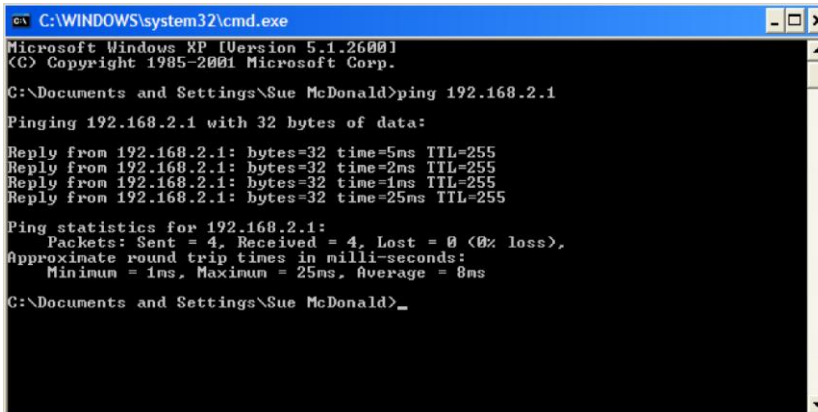
Windows will now try to establish communication:

- If the ping command fails, then you will receive something similar to that below:

This tells you that your PC is not communicating with the master board via the network connection. Check your physical connections, and also the IP settings on your computer.

- If the ping command is successful, then the result will be as follows:

This tells you that a valid network connection is established between your computer and IP device.

If you do not receive an answer from the system then check your connections and TCP/IP settings.

You can find information of changing IP settings within Windows from www.practicallynetworked.com/sharing/troubleshoot.

Technical Data

For technical details on system components, please refer to the relevant data sheets. The following part numbers will help you locate data sheets for the principle components:

System Component		Part Number
Control Panels: Centre Section	Screen Control	962/10
	Central Audio Lower	962/11
	Central Audio Upper	962/12
	FC Preset	962/13
	Main Fader Panel	962/32
User Panels: Centre Section	40 Keys	962/14
	8 Rotary Controls	962/15
	Talkback	962/16
	Machine Remote	962/17
	Automation	962/18
	80 Keys	962/19
Control Panels: Channel Bay	FC Panel	962-20
	Fader Panel	962-21
	Channel Display	962-22
mc^{2}66 PSU	External PSU unit	962/04
DALLIS Unit Frames:	3RU DALLIS Frame	940/03
	6RU DALLIS Frame	940/06
HD Core Frame	10RY HD Core Frame	980/02

Part numbers for the HD Core Module options and DALLIS I/O interfaces can be found in Appendices A and B.

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The following modules are used in the HD Core:

	Box	Nova 73
Linux Kernel 2.6	x	
µCLinux 2.4	x	x
netsnmp	x	x
busy box	x	x
TCL	x	x
xFree86	x	

The GPL source code contained in this product is available at Lawo service department. If you would like a copy of the GPL source code in this product on a CD, please send €9,90 to Lawo for the cost of preparing and mailing the CD to you.

Appendix A: HD Core Module Options

The following HD Core plug-in modules are supported in this release of software:

Central Router Modules	
980/33 ROUTER MKII	Routing Matrix 8k², 8192 crosspoint, integrated control system
I/O Modules	
981/02 AES3	32 in- and outputs AES/EBU (via a rear connector panel); 1 Port MADI (optical)
981/31 MADI	2 ports MADI (optical)
981/32 MADI	2 double ports MADI (optical, connection of redundant fibre)
981/36	6 double ports MADI (optical, connection of redundant fibre)
981/38	8 ports MADI (optical)
981/41 MADI	2 ports MADI (optical, single mode fibre)
981/53 ATM	3 ports ATM (optical)
981/56 ATM	6 double ports ATM (optical, connection of redundant fibre)
DSP Modules	
983/02	24 channels for mixing consoles mc² series
983/03	24/48 channels for the mixing console mc²series or matrix DSP board (depending on the configuration)

For module specifications, please refer to the relevant data sheet. Details on the I/O Module connections follow in Appendix B.

Appendix B: HD Core Module Connector Panels

When mounting AES modules and connector panels, note that the BNC or D-Sub Connector panel always corresponds to the AES module which is right-aligned with the Connector panel slot (looking from the front of the HD Core).

For example, if you want to use the top left back panel for a D-Sub Connector Panel, then you must use the 2nd module slot for the AES board.

If you want to use the top left back panel for a BNC Connector Panel, then you must use the 4th module slot for the AES board.

If you use a mixture of connector panels, then follow the right-align rule – for example. if the 1st and 2nd connector panels are D-Sub and the 3rd is BNC, the AES modules must be mounted in slot 2 (D-Sub1), slot 4 (D-Sub2) and slot 8 (BNC).

980/14 Connector Panel D-Sub

- Connector panel to be mounted at the rear of the frame type 980/02

- Signal supply by plug-in card at the front (seen from the front: on the slot right-aligned to the connector panel):

  o Plug-in card 981/02 for realising the AES3 interfaces (transformer coupled)

- Outputs: 4 plugs D-Sub 25-pin, each with 8 balanced contacts 110 Ω

- Inputs: 4 plug sockets D-Sub 25-pin, each with 8 balanced contacts 110 Ω
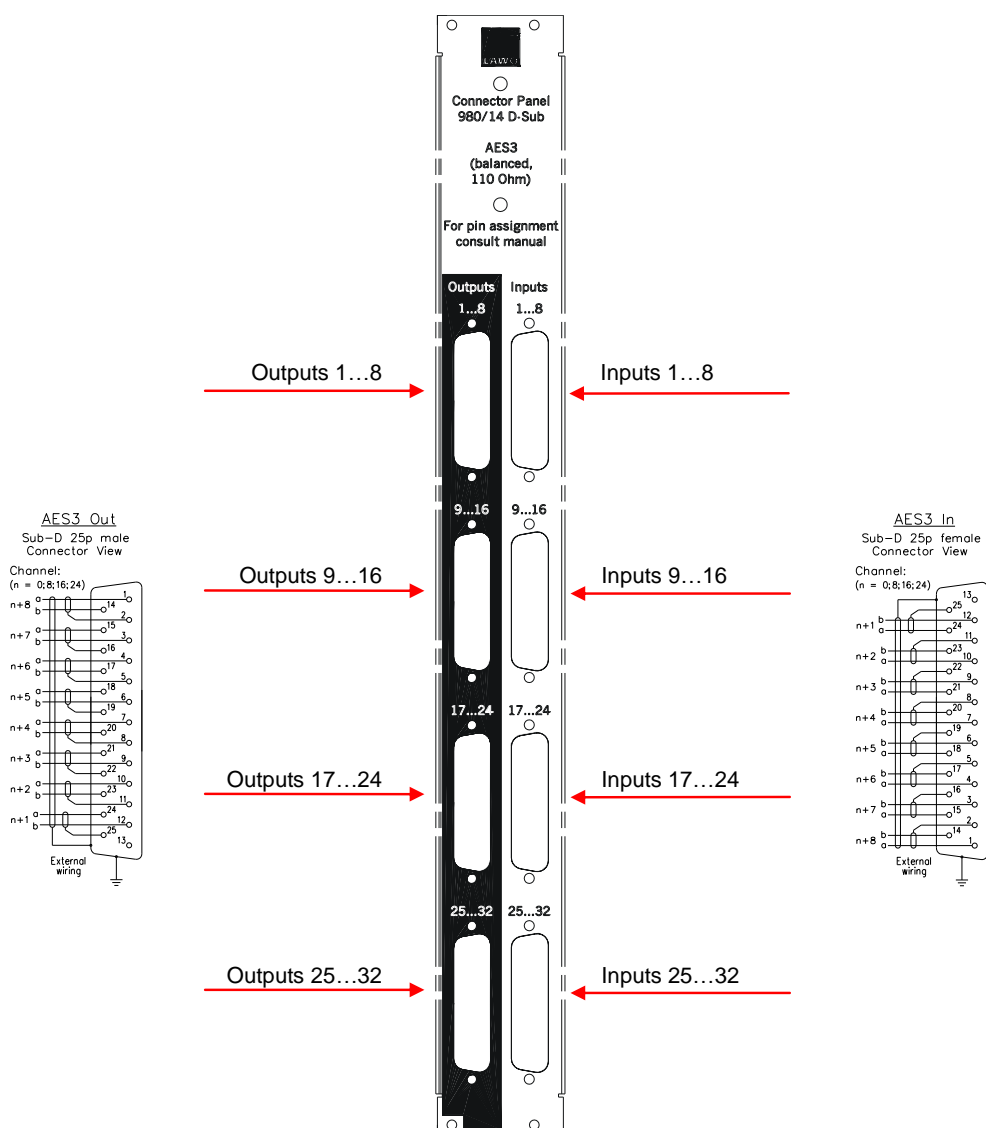
980/15 Connector Panel BNC

- Connector panel to be mounted at the rear of the frame type 980/02

- Signal supply by plug-in card at the front (seen from the front: on the slot right-aligned to the connector panel):

  o Plug-in card 981/02 for realising the AES3 interfaces (transformer coupled)

- Outputs: 32 BNC connector, un-balanced contacts 75 Ω

- Inputs: 32 BNC connector, un-balanced contacts 75 Ω
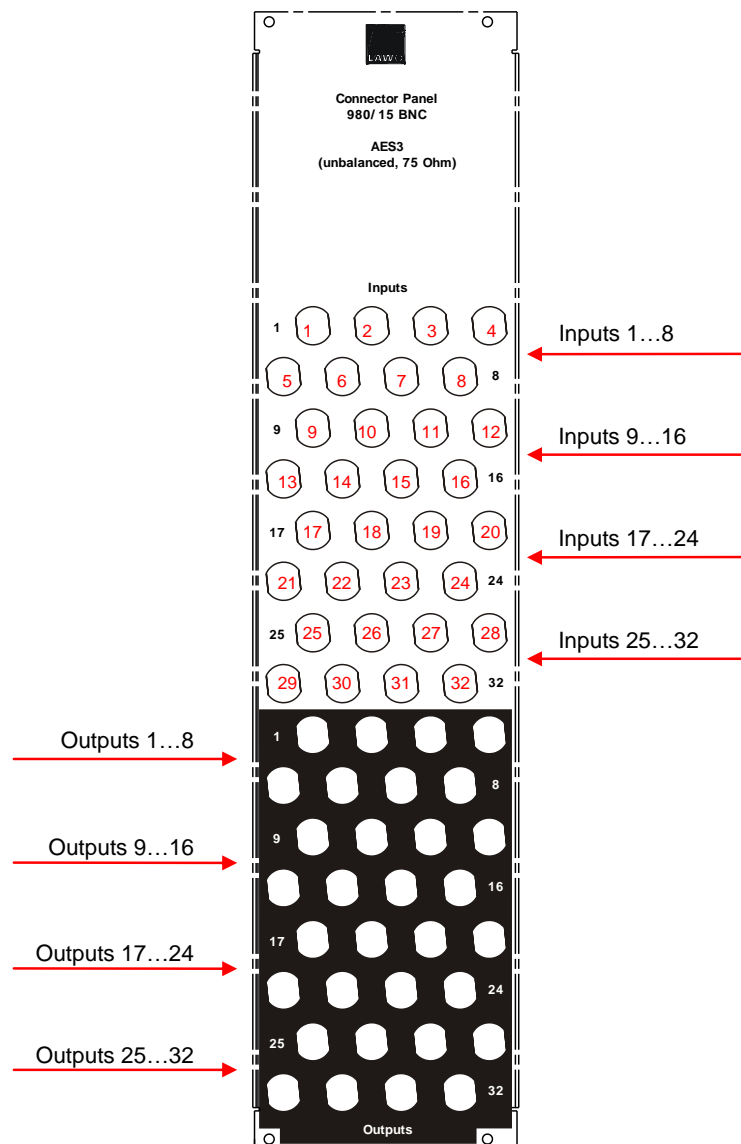
Appendix C: DALLIS Interface Options

Card Description	Fibre			Ports	Part No.
Master Board	MADI Multimode Fibre (MMF)			1 port	947/05
Master Board	MADI Multimode Fibre (MMF)			2 ports	947/07
Master Board	MADI Single mode Fibre (SMF)			1 ports	947/15
Master Board	ATM Multimode Fibre (MMF)			1 ports	947/03
Card Description	**Part Number & Connector Type**			**Inputs**	**Outputs**
	D-Sub	**XLR**	**BNC**		
Mic / Line (transformer)	941/52	941/62	-	4 mono	-
Line in (transformer)	941/02, 04, 06	941/12, 14, 16	-	4 mono	-
Line out (transformer)	942/02, 04, 06	942/12, 14, 16	-	-	4 mono
Mic / Line (electric.-balanced)	941/51	-	-	8 mono	-
Line in (electric.-balanced)	941/84	-	-	8 mono	-
Line in/out (electric.-balanced)	941/83	-	-	8 mono	8 mono
Line out (electric.-balanced)	942/84	-	-	-	8 mono
Headphones	942/61	-	-	-	4 stereo
AES3 in (with SRC)	943/02, 84	943/12	-	4 stereo	-
AES3 in/out (with SRC in)	943/52	-	943/72	4 stereo	4 stereo
AES3 in/out (with SRC in/out)	943/54	-	943/74	4 stereo	4 stereo
AES3 out	944/01	944/11	-	-	4 stereo
SDI (embedded audio)	946/09 - BNC			1 SD SDI (video)	1 SD SDI (video)
HD/SD SDI (embedded audio)	946/13 – BNC			1 HD/SD SDI	1 HD/SD SDI

For card specifications, please refer to the relevant data sheet.

Appendix D: DSP Configurations

Up to 8 DSP modules may be fitted to the HD Core to provide DSP resources for the mc^{2}66 console. These DSP resources are allocated using DSP configurations, selected from the console's **DSP Configuration** display:

Please note that the variation with **1 DSP** board includes: 1 x stereo PFL; 1 x stereo AFL.

All other variations include: 2 x stereo PFL; 1 x stereo AFL; 1 x surround AFL (7.1).

Configuration Presets

Number Of DSP Boards **1** 2 3 4 5 6 7 8

Inputs	TinyInputs	Sums	TinySums	Monitors	Groups	Auxes	TinyAuxes	Index
40	8	4	4	0	0	4	16	1.8
32	12	4	4	0	4	8	16	1.9
28	12	4	4	0	8	8	16	1.10
24	16	8	4	0	8	8	16	1.11
20	20	8	4	8	0	12	16	1.12
16	16	8	4	0	16	8	16	1.13
16	16	6	8	16	0	10	12	1.14
16	16	6	4	8	8	10	16	1.15

Configuration Presets

Number Of DSP Boards 1 **2** 3 4 5 6 7 8

Inputs	TinyInputs	Sums	TinySums	Monitors	Groups	Auxes	TinyAuxes	Index
80	16	8	10	0	0	8	24	2.8
72	16	8	10	0	8	8	24	2.9
64	20	8	12	0	12	12	20	2.10
60	20	8	12	0	16	12	20	2.11
56	16	8	10	8	16	8	24	2.12
52	20	8	14	0	24	12	20	2.13
52	24	8	14	12	8	16	16	2.14
52	16	8	10	24	4	8	24	2.15
48	24	8	12	24	0	16	16	2.16
40	24	8	12	32	0	16	16	2.17
64	8	4	10	0	24	4	24	2.18
64	20	12	10	0	12	8	24	2.19
48	24	16	10	0	24	8	24	2.20
54	30	14	18	0	12	16	16	2.21
60	22	14	10	0	14	8	24	2.22

Configuration Presets

Number Of DSP Boards 1 2 **3** 4 5 6 7 8

Inputs	TinyInputs	Sums	TinySums	Monitors	Groups	Auxes	TinyAuxes	Index
124	16	8	34	0	4	8	24	3.8
116	20	4	34	0	8	16	16	3.9
108	20	8	34	0	16	12	20	3.10
96	24	8	34	0	24	16	16	3.11
96	24	8	34	24	0	16	16	3.12
88	24	8	34	0	32	16	16	3.13
88	24	8	34	16	16	16	16	3.14
80	24	8	34	32	8	16	16	3.15
80	16	8	34	0	48	8	24	3.16
72	24	8	34	24	24	16	16	3.17
72	24	8	34	48	0	16	16	3.18
80	32	16	32	0	32	16	16	3.19
96	24	12	36	0	24	12	20	3.20
72	32	16	32	0	40	16	16	3.21
88	40	8	40	0	16	32	0	3.22

Configuration Presets

Number Of DSP Boards 1 2 3 **4** 5 6 7 8

Inputs	TinyInputs	Sums	TinySums	Monitors	Groups	Auxes	TinyAuxes	Index
164	20	12	36	0	8	8	24	4.10
152	24	8	40	0	16	16	16	4.11
148	28	12	36	0	16	16	16	4.12
144	24	8	40	0	24	16	16	4.13
136	32	16	32	0	24	16	16	4.14
120	40	16	32	0	32	24	8	4.15
120	24	8	40	0	48	16	16	4.16
120	32	16	32	24	16	16	16	4.17
120	32	8	40	32	8	24	8	4.18
112	16	8	24	48	16	8	24	4.19
104	40	16	32	24	24	24	8	4.20
104	16	8	16	64	8	8	24	4.21
96	32	8	24	64	0	24	8	4.22
96	32	16	16	64	0	16	16	4.23
88	24	8	8	48	32	16	16	4.24

Configuration Presets

Number Of DSP Boards 1 2 3 4 **5** 6 7 8

Inputs	TinyInputs	Sums	TinySums	Monitors	Groups	Auxes	TinyAuxes	Index
216	16	8	36	0	8	8	24	5.14
200	32	24	24	0	8	8	24	5.15
184	40	24	24	0	16	16	16	5.16
168	40	24	24	0	32	16	16	5.17
152	40	24	24	0	48	16	16	5.18
168	32	16	32	24	16	16	16	5.19
160	32	16	32	32	16	16	16	5.20
144	32	16	16	48	16	16	16	5.21
128	32	16	0	64	16	16	16	5.22
128	16	0	0	96	0	16	16	5.23
196	28	12	36	0	16	16	16	5.24
172	28	12	36	24	16	16	16	5.25
144	48	16	32	16	32	32	0	5.26
120	48	16	8	64	8	32	0	5.27
112	48	16	0	64	16	32	0	5.28

Configuration Presets

Number Of DSP Boards 1 2 3 4 5 **6** 7 8

Inputs	TinyInputs	Sums	TinySums	Monitors	Groups	Auxes	TinyAuxes	Index
264	16	8	36	0	8	8	24	6.14
248	32	24	24	0	8	8	24	6.15
232	40	24	24	0	16	16	16	6.16
216	40	24	24	0	32	16	16	6.17
200	40	24	24	0	48	16	16	6.18
216	32	16	32	24	16	16	16	6.19
208	32	16	32	32	16	16	16	6.20
192	32	16	16	48	16	16	16	6.21
176	32	16	0	64	16	16	16	6.22
176	16	0	0	96	0	16	16	6.23
244	28	12	36	0	16	16	16	6.24
212	28	12	36	32	16	16	16	6.25
216	48	24	24	0	24	24	8	6.26
176	40	16	8	64	8	24	8	6.27
160	48	16	0	64	16	32	0	6.28

Configuration Presets

Number Of DSP Boards 1 2 3 4 5 6 **7** 8

Inputs	TinyInputs	Sums	TinySums	Monitors	Groups	Auxes	TinyAuxes	Index
312	16	8	36	0	8	8	24	7.17
296	32	24	24	0	8	8	24	7.18
280	40	24	24	0	16	16	16	7.19
264	40	24	24	0	32	16	16	7.20
248	40	24	24	0	48	16	16	7.21
264	32	16	32	24	16	16	16	7.22
256	32	16	32	32	16	16	16	7.23
240	32	16	16	48	16	16	16	7.24
224	32	16	0	64	16	16	16	7.25
224	16	0	0	96	0	16	16	7.26
232	16	8	0	72	16	8	24	7.27
232	16	8	0	80	0	8	24	7.28
264	48	24	24	0	24	24	8	7.29

Configuration Presets

Number Of DSP Boards 1 2 3 4 5 6 7 8

Inputs	TinyInputs	Sums	TinySums	Monitors	Groups	Auxes	TinyAuxes	Index
360	16	8	36	0	8	8	24	8.16
344	32	24	24	0	8	8	24	8.17
328	40	24	24	0	16	16	16	8.18
312	40	24	24	0	32	16	16	8.19
296	40	24	24	0	48	16	16	8.20
312	32	16	32	24	16	16	16	8.21
304	32	16	32	32	16	16	16	8.22
288	32	16	16	48	16	16	16	8.23
272	32	16	0	64	16	16	16	8.24
272	16	0	0	96	0	16	16	8.25
280	16	8	0	72	16	8	24	8.26
280	16	8	0	80	0	8	24	8.27

Glossary

48kHz or 44.1kHz   See Sample Rate.

Access   On the mc²66 console, much of the channel parameter operation is performed by assigning a fader strip to the Central Control Section. This is otherwise known as putting a source 'in access'.

AdminHD   Lawo's configuration and control software for HD Core systems.

ATM   Asynchronous Transfer Mode (Packing of signals in small portions; commonly used and highly standardised network protocol).

Attack Time   In the context of dynamics processing (compressor, limiter, gate or expander), the attack time defines the duration over which an input signal is measured. The longer the attack time, the slower the processor will react. For example, when using a gate, a fast attack time causes the gate to open quickly when signal exceeds the gate threshold.

Aux   Auxiliary

An Aux is a general purpose mono, stereo or multi-channel summing bus which can be used for a variety of applications such as sending to outboard effects devices.

Aux Send   Auxiliary Send

Source channels feed onto each aux via their Aux Send. The aux send from each channel can be either pre or post fader and has variable level control.

Aux Master   Auxiliary Master

The Aux Master is a master source channel used to control the level and processing of the Aux output. The direct output of the Aux Master is the signal routed to the outboard effects send.

Aux Return   Auxiliary Return

The Aux Return is the name given to the return channel from the outboard effects device. This channel controls the level and processing of the effect as it is summed into the rest of the mix.

Band Pass Filter   See Filters.

Balance   Balance is applied to the input of a stereo channel and is the ratio between the left and right input levels. When Balance is set to its default value, the level of left and right inputs are equally weighted.

Bargraph   An optical display instrument in the shape of a LED bar for displaying signal level.

Clean Feed   See Mix Minus.

Compressor   A dynamics processor used to smooth out uneven signal levels. For example, when a presenter shouts and then whispers, they are producing sound which has a wide dynamic range; one moment it is very loud and the next very quiet. This can mean that if we listened to this signal on our radio without compression, we would forever be turning the level up and down! A compressor smoothes the signal such very loud audio is reduced in level and very quiet audio is increased in level. This results in smaller dynamic range ideal for radio transmission.

Configuration   The system configuration is a file created by the AdminHD software. The file may be exported and uploaded to the system's cold start data where it will load following a cold start. Or, the file may be uploaded to the system's warm start data where it is then loaded every time the system reboots or powers on. The configuration defines key elements of the system such as the hardware components, and default signal parameters.

ControlHD   Lawo's control software for HD Core systems.

DALLIS   Lawo's modular I/O interfacing system based on 19" frames using plug-in cards for different interfaces.

dB   deciBel

                        A unit of transmission giving the ratio of two powers.

                        The number of bels is the logarithm to the base 10 of the ratio of the two powers. One decibel equals one tenth of a bel.

dBU   dBU is used to describe levels within the analogue domain, and is a measure of absolute voltage level based on 0dBU = 0.775 Volts (RMS). dBU is often used to indicate nominal broadcast operating levels. For example, in the EBU normal broadcasting level = +6dBU.

dBFs   dB Full Scale

                        dBFs is used to describe levels within the digital domain. 0dBFs describes the system's internal clipping point; this is the maximum level which may be handled by the system without signal distortion. For example, your system may be set for +18dBU = 0dBFs. If your normal broadcast level is +6dBU then this leaves an operating headroom of 12dB.

Delay   The signal output from a delay module is x ms behind the signal input to the module. Delay is often applied to audio sources whose video has undergone digital video processing; delay is required such the audio remains in sync with the video.

Direct Out	Direct Output
	The direct output of a channel is the output of the individual source. Direct Outputs are often used to provide a record or 'snoop' feed of a single source, and may be taken from various points within signal flow: pre fader, post fader, etc.
Drop-out	Interruption of the audio signal caused by an error in the signal transfer or recording.
DSP	Digital Signal Processing
	Digital signal processing (DSP) is the study of signals in a digital representation and the processing methods of these signals.
Dynamics	Dynamics is the collective terms given to audio processing which responds to changes in signal level. For example, a Compressor, Limiter, Gate or Expander.
EQ	Equaliser.
	An equaliser is a processor which changes the frequency characteristics of a signal, for example to increase the amount of treble or bass components in the signal.
Expander	A dynamics processor used to magnify changes in the dynamic range of the input signal. For example, to reduce noise in speech pauses. See also Compressor.
Fader	A potentiometer used to adjust the gain of a signal.
Filters	Filters are equaliser sections which are used to cut out or reduce specific frequency bands within the signal. For example, a Low Pass Filter cuts out high frequencies so will result in less treble to the sound. A High Pass Filter cuts out low frequencies, for example you may use this to remove unwanted low frequencies like hum or rumble. A Band Pass Filter cuts out both high and low frequencies allowing frequency components within the band to pass through the signal; for example, you may use this type of filter to create a telephone effect on a normal voice.
Gain	Adjusting the gain of a signal results in a change in the perceived level or amplitude. An increase in gain (positive values) results in amplification and a reduction in gain (negative values) in attenuation.
Gate	A dynamics processor used to remove unwanted signals below a certain threshold level. For example, if a gate is applied to a presenter's microphone source, then when they speak signal level exceeds the gate threshold and the gate opens, while if they make a low level sound, like shuffling in their seat, the gate remains closed. The result is that only the signal we want to hear is output from the source channel!
GPI	General Purpose Interface – inputs (e.g. optocoupler) and outputs (e.g. relay) for logical signals with two states.

HD Core

Core of the system (Lawo core includes the routing matrix, I/O modules and DSP).

Headroom

The amount of operating level which is in reserve between normal operating level and 0dBFs.

High Pass Filter

See Filters.

Insert Point

A connection point within the source channel which interrupts the signal flow and routes out to a piece of external equipment and returns back to the source channel.

Insert send = route out from the source channel to the external device.

Insert return = input to the source channel from the external device.

Limiter

A dynamics processor used to stop signals exceeding a certain threshold level. For example, you may place a limiter across the main output of the programme to prevent a sudden increase in level exceeding the clipping point of your transmission feed and causing signal distortion.

Low Pass Filter

See Filters.

MADI

Multi-channel Audio Interface; digital interface for combining audio signals of 56 or 64 channels.

Mix Minus

Mix Minus, Clean Feed and N-1 are all terms used to describe a feed which is created from a number of channels minus a particular channel or channels. For example, to provide telephone hybrids with a feed of the programme minus the incoming phone call.

Monitor

Term used to describe the outputs and functionality of feeds to loudspeakers or headphones for the purpose of listening to a mix.

ms

milliseconds

Unit of time measurement.

M-S

Middle and Side Stereo

Used to describe an arrangement of two coincident microphones, one pointing to the front (Middle) and the other (bidirectional) at right angles providing a Side signal. The mc^{2}66 provides M-S to X-Y decoding to turn the Middle and Side signal into normal Left and Right stereo.

mxGUI

Lawo's control software for mc^2 and Nova73 systems. The software runs GUI displays from an external PC and can be used either online or offline.

Nova73

A stand alone routing matrix with networking capabilities; the name given to the HD Core unit without a console control surface.

N-1	See Mix Minus.
On-Air	Term used to indicate that a radio or TV programme is being broadcast.
Overload	Occurs when the signal level is too large for the system, resulting in signal distortion.
Panning	Used to control the left/right position of a mono source when routed to a stereo or multi-channel output. For example, if a source is panned left, then you will all signal from the source is routed to the left side of the summing bus. If a source is panned centre, equal levels are applied to the left and right sides of the summing bus, etc.
PFL	Pre Fade Listen
	Used to listen to signals before the application of fader level. Provides a way of listening to a source when the fader is closed to check its signal before the fader is opened to route it onto the programme output.
Phantom Power	This is the power supply required when working with condenser microphones. The console supplies 48V to the microphone via the audio connector.
Programme	The main output of a live broadcast console. This is the mix which feeds the transmission chain.
Ratio	In the context of a compressor or expander, the ratio defines how much compression or expansion is applied. For example, the higher the compressor ratio, the more signal levels above the compressor threshold will be compressed.
Release Time	In the context of dynamics processing (compressor, limiter, gate or expander), the release time defines the time taken for the action of the processor to subside. For example, when using a gate, a short release time will cause the gate to close quickly after signal falls below the gate threshold.
Roll-off Frequency	See Shelving EQ.
Routing	Signal Routing
	Term used to describe the connection made between an input and output.
RS422	Type of serial interface used to communicate with external devices.
RU	Rack Units ⇒ 44,45 mm respectively 1,75 inch

Sample Rate	The speed at which the internal processing of the system takes samples respective to values from a continuous, analogue audio signal to make a discrete, digital one. For example, when running at 48kHz, incoming analogue audio is sampled at a rate of 48000 values per second.
Shelving EQ	A shelving equaliser band is used to increase or decrease high or low frequency components of a signal. The slope of the shelf defines how steeply the gain increase/decrease is applied. The roll-off frequency defines the frequency at which signal level is reduced by 3dB.
Slope	See Shelving EQ.
SMPTE	Abbreviation for Society of Motion Picture and Television Engineers Standardised protocol for the synchronisation of audio and video technology ⇒ timecode.
SRC	Sample Rate Converter.
Sum	Summing Bus The result of several audio signals mixed together within the console. Within the mc^{2}66, the name given to the main output busses (programme busses).
Telephone Hybrid	Device which deals with bi-directional signals to/from a 2-wire phone line. One line provides an incoming feed from the phone line (e.g. the guests voice), and the other sends signal back to the receiver (e.g. the mix minus feed).
Threshold	In the context of dynamics processing (compressor, limiter, gate or expander), the threshold defines the signal level at which the processor starts to act. For example, the gate threshold sets the level at which the gate will open and then close.

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