mc²56 MKII

Technical Manual

Version: 5.0/1

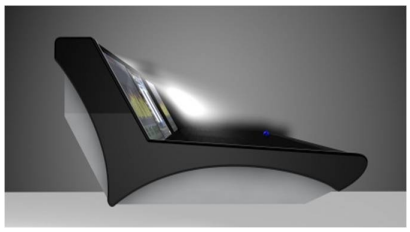
Edition: 03 February 2014

Table of Contents

Welcome

This documentation covers the installation, configuration and service/maintenance of the **mc²56 MKII**.

For more on operation, please see the "mc²56 Operators Manual".



You can access all manuals and other information by registering at www.lawo.com (click on **Login**). By registering you will receive the latest news for your product, and can download software and documentation.

We also recommend that you carefully observe the release notes delivered with your system.

Getting Started

- Read the Technical Overview for an introduction to the system.
- Installation deals with installing the hardware.
- AdminHD covers the Lawo configuration software.
- Service/Maintenance includes hardware servicing and software diagnostics.
- The Trouble-shooting section includes a series of example problems and fault-finding tips.
- Part numbers for system components are included in the Appendices.
- You will find Technical data, and a Glossary of terms at the end of the manual.

The “mc2_Nova73_documentation” guide contains mechanical drawings, data sheets and further information on all control surface, Nova73 and DALLIS components. The guide is included with the "**CD_mc2_56_X-XX-X-x**" software release, available from the **Download-Center** after logging in at www.lawo.com.

Marginal Notes

The following symbols are used to draw your attention to:

Points of clarification.

Useful tips and short cuts.

Warning

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

Changes to This Manual

- **Version 5.0/1** (Edition: February 3rd 2014) - valid from build **V5.0.x.x**:
  - o System Logfiles - logfiles now use standard formatting, making it easier to locate important information within a **messages** file.
  - o The Nova73 Module Options and DALLIS Interface Options have been updated to support some new hardware revisions.

Features from **V5.0.x.x** onwards are supported *only* by Router Module MKII systems

As a result of the DSP required to support the Automix feature, some Recording Channel DSP Configurations are no longer supported (as all channel types must escalate in blocks of 8). Existing productions will load using the closest available match.

- **Version 4.24/3** (Edition: November 8th 2013) - updated Lawo logo & claim.
- **Version 4.24/2** (not published).
- **Version 4.24/1** (Edition: July 19th 2013) - valid from build **V4.24.x.x**. New features added:
  - o Nova73 Compact Core.
  - o New DALLIS Line Level IO Cards.
  - o System logfile time stamping & DSP configuration change information.

Important Safety Instructions

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 Lawo 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:
  - We recommend switching off the loudspeakers before servicing.
  - Before removing parts of the casing, shields, etc. the device *MUST* be switched off and disconnected from all mains.
  - Before opening a device, the power supply capacitor *MUST* be discharged with a suitable resistor.
  - 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

- The system 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 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

- *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.

Chapter 1: Technical Overview

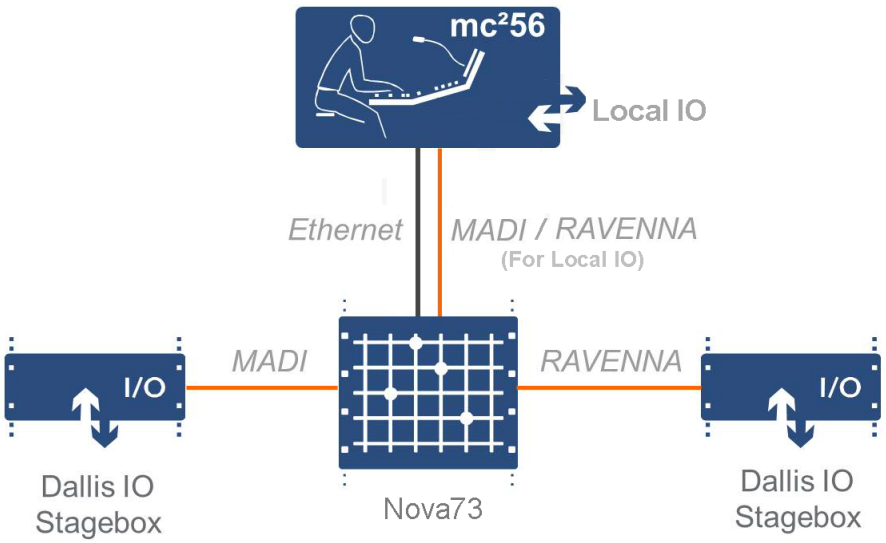
Introduction

This chapter introduces the technical components of the **mc²56 MKII** system:

Hardware Components

The **mc²56 MKII** consists of three principal components:

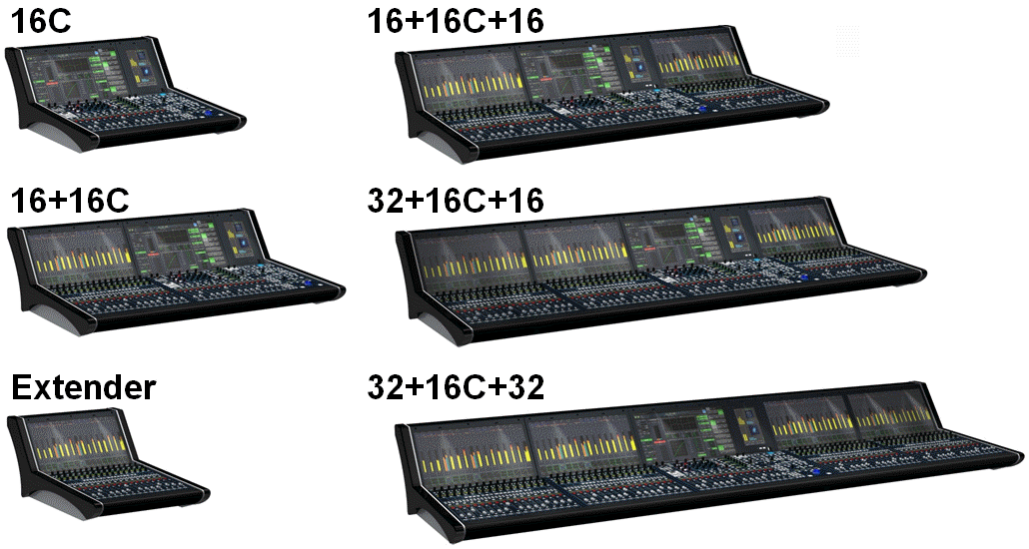
- **Console control surface** - with integrated power supplies and local I/O connections.
- **Nova73** – with Router Modules, DSP boards and AES, MADI, ATM or RAVENNA I/O. Available in two sizes: **Nova73 HD** (10RU) or **Nova73 Compact** (7RU).
- **DALLIS I/O** – offering further I/O breakout options; connected to the Nova73 via MADI, ATM or RAVENNA I/O.



The exact hardware specification defines 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 and auxiliary sends. For a summary of the system capabilities, please see Technical Data.

Console Control Surface

The **mc²56 MKII** control surface is constructed in 16-fader sections, with frame sizes scaling from 16 faders up to 80 faders. You may add 16-fader extenders to expand the number of fader strips.



A range of console options offer wide (studio) or narrow (OB) side panels, table-top or stand mounting, overbridge metering, etc.

Control surface power is provided by internal power supplies, with n+1 redundancy and two mains connections for phase redundancy. PSU status may be monitored from the console GUI.

All application software and user data is handled by the control system, located on the Router Module (MKII) within the Nova73. The surface connects to the Nova73 via TCP/IP Ethernet; if a redundant Router Module is fitted, then main and backup connections can be installed.

The control surface also houses a local I/O board, for monitoring, metering, talkback and headphones. This is available in two versions, connecting to the Nova73 via either MADI or RAVENNA.

As the control system is integrated within the Nova73, the control surface may be powered off without loss of user data or audio!

Nova73

The **Nova73** forms the "heart" of the system, and is available in two sizes - **Nova73 HD** (10RU) or **Nova73 Compact** (7RU):

Nova73 HD (10RU)

Nova73 Compact (7RU)

In each case, the front of the frame houses the:

- **Router Modules MKII** - two central slots are available for a main and redundant Router Module. The Router Module MKII (980/33) contains the summing matrix *AND* control system. The summing matrix offers a $8k^2$ capacity* router at 48kHz (or $4k^2$ capacity at 96kHz). The control system runs on an embedded Linux operating system, and stores both the application software and user data. Connections are made via the two TCP/IP Ethernet ports:
  - ETHERNET A – connects to the control surface.
  - ETHERNET B – connects to the Lawo system network (to other Lawo devices; third-party controllers; computers running configuration, maintenance or remote control software).
- **DSP and I/O Modules** - 16* slots are available for plug-in DSP or I/O modules. Up to 8* DSP boards may be fitted supporting a range of DSP configurations; I/O options include AES/EBU, MADI, ATM and RAVENNA, see Nova73 Module Options. All modules are hot-pluggable enabling them to be be replaced without affecting other aspects of the system. Further breakout formats are realised by connecting to DALLIS I/O.
- **Power Supply Units** - two slots are available for main and redundant power supplies.

The rear of the frame houses the:

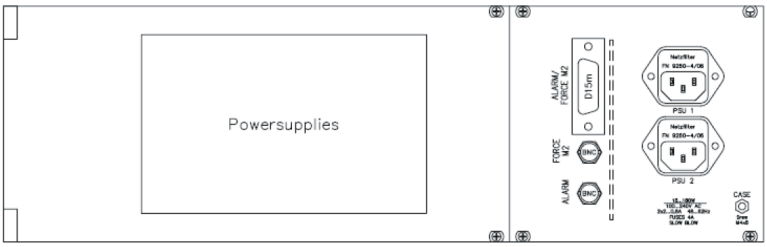
- Sync ports - accepting Wordclock, AES/EBU (AES3-id) or Video Black Burst (PAL or NTSC).
- Alarm and control contacts - including a global alarm; prepare cold start; force redundant Router Module takeover.
- AES connector panels - for front-mounted AES3 I/O modules.
- 5* Cooling Fans - hot-pluggable and easily accessible.

* The figures above are for the **Nova73 HD**. For more details on the Compact core, see the Nova73 Compact Appendix.

DALLIS I/O

Front View

Rear View



The I/O capabilities of the system are expanded by adding **DALLIS** unit(s). Each may be either 3RU (shown above) or 6RU in height, and may be remote from the rest of the system.

The front of the frame houses the:

- **DALLIS Master Boards** - two central slots are provided for a main and redundant master board. A choice of board types provide connection to/from the Nova73 via MADI, ATM or RAVENNA, see DALLIS Interface Options.

> The type of DALLIS master board, and hence the connection, determines the maximum number of audio channels to/from the Nova73: up to 60 (MADI), 80 (ATM) or 128 (RAVENNA).

- **DALLIS I/O cards** - 18 slots are available for a range of I/O breakout options (Mic/Line, Line, AES, SDI, GPIO, etc.), see DALLIS Interface Options.

All cards are hot plug-able, with the exception of Phantom Power.

The rear of the frame provides access to:

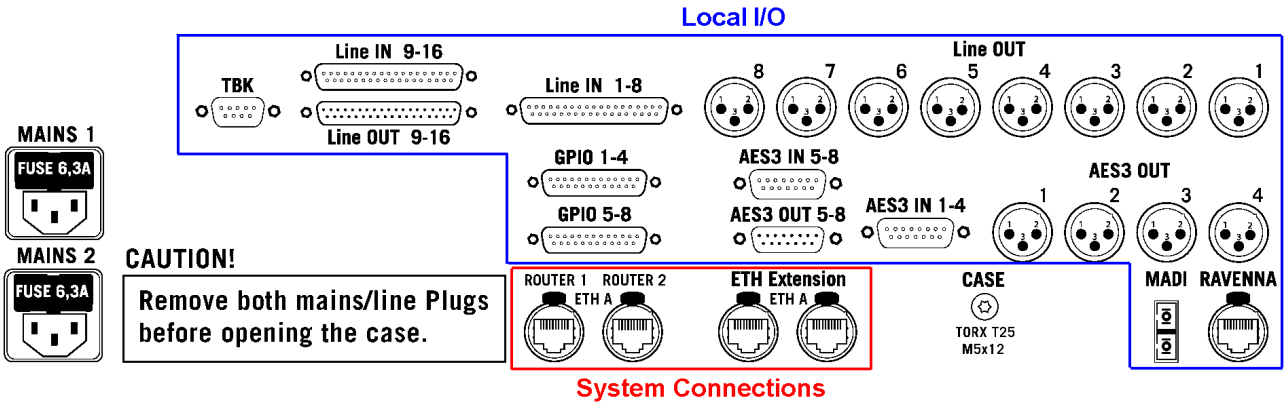
- Main and redundant power supplies
- Alarm and control contacts - including a local DALLIS alarm.

Local I/O

The MKII mc²56 control surface includes an integrated local I/O board. This provides dedicated connections for local devices such as monitoring, metering, talkback and headphones.

(Note that on the classic mc²56, similar functionality may be provided via an external DALLIS.)

All local I/O connections are accessed from the control surface rear panel:



The local I/O provides:

- **16 Line In** - wired to 2 x DSub (female).

  Note that **Line In 16** may be fed from the integrated talkback mic preamp, according to the jumper switch positions set for the Local I/O.

- **16 Line Out**:
  - Line Out 1-8 - wired to 8 x XLR (male). By default, these outputs are routed from the CRM 1 monitor output.
  - Line Out 9-16 - wired to 1 x DSub (male).
- **8 AES3 In** - wired to 2 x DSub (female).
- **8 AES3 Out:**
  - AES3 Out 1-4 - wired to 4 x XLR (male).
  - AES3 Out 5-8 - wired to 1 x DSub (male).

  Note that **AES IN 5-8** and **AES OUT 5-8** connect to the RTW meter, if either of the TM 7 or TM 9 Overbridge options are fitted.

- **8 GPIO** - wired to 2 x DSub.
- **2 Stereo Headphones** - wired to the headphone 1 & 2 connectors on the console's front buffer.
- **1 MADI or 1 RAVENNA** - the local I/O board is available in two versions, connecting to the Nova73 via either MADI or RAVENNA (see Local I/O Connection). You will need to reserve one MADI, or one RAVENNA, port within the Nova73 for this connection.

Please see Local I/O Wiring for more details on wiring, pin-outs and jumper switch options.

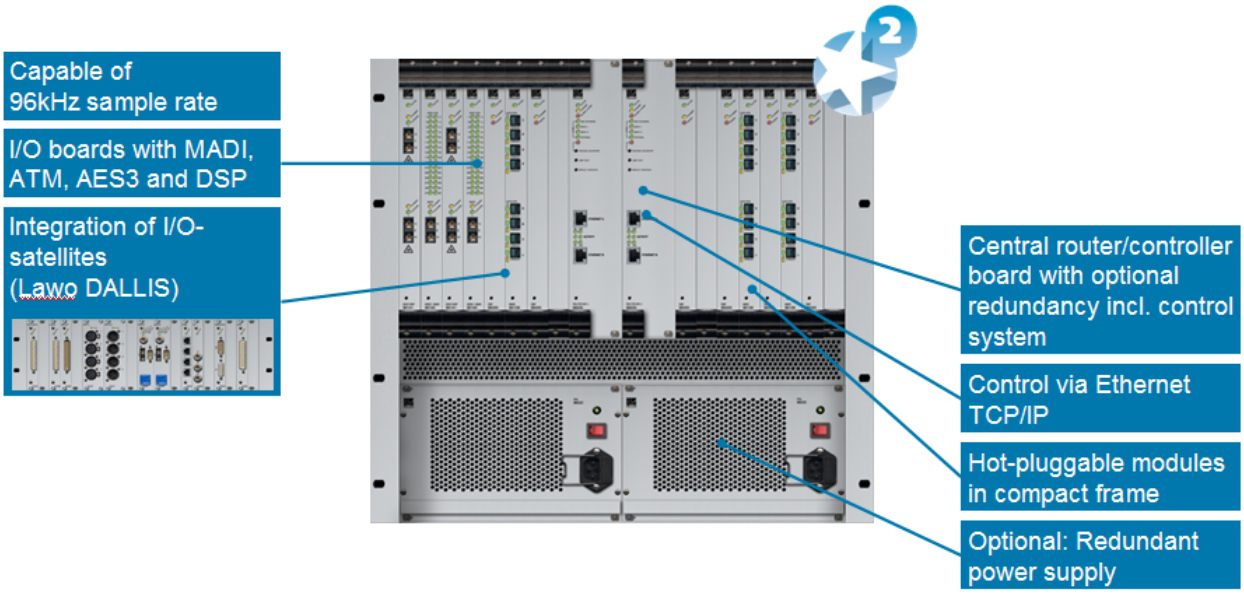
Redundancy

One of the strengths of the **mc²56 MKII** is its ability to withstand component failures, and every component is designed with fault tolerance in mind:

- Star² Technology
- Link & Port Redundancy
- Nova73 & DALLIS Power
- Redundant DSP
- Control System
- Redundant Router Module and Control System
- Control Surface Power
- Control Surface Internal Wiring

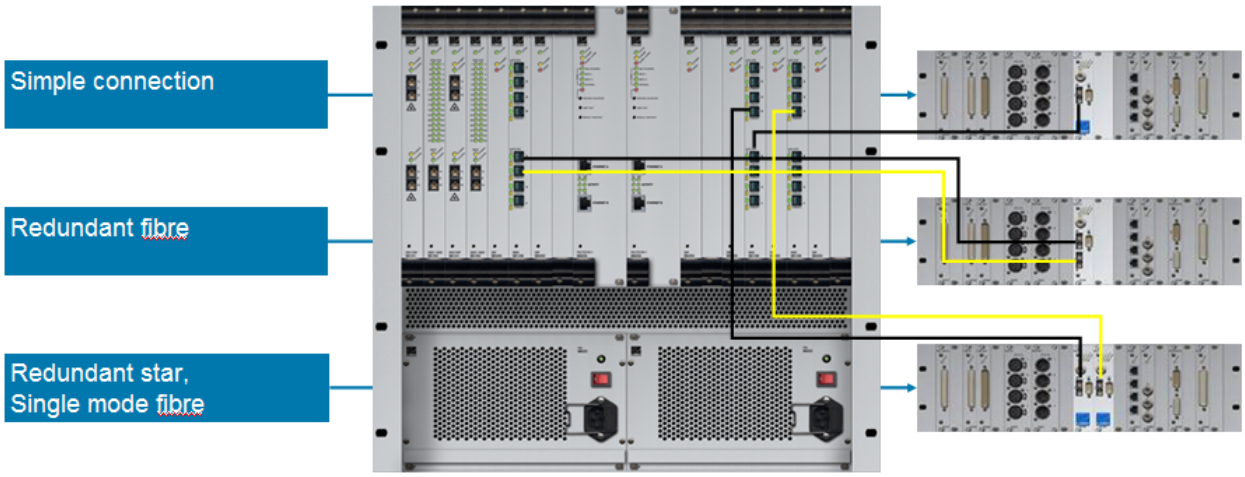
Star2 Technology

All components within the system utilise Lawo's Star² technology:



- **Point-to-point connections** – with point-to-point connections, a fault only affects 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 Nova73, 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. See Link & Port Redundancy.
- **Hot-swappable Modules/Cards** – every plug-in module or card can be hot-swapped without affecting the rest of the system enabling online maintenance of the system.
- **Redundant Power Supply Units** – both Nova73 and DALLIS units can be fitted with dual redundant power supplies, which can be isolated and exchanged from the front or rear. See Nova73 & DALLIS power.
- **Passive backplanes** – the frame backplanes are entirely passive. With no active components, this increases reliability.

Link & Port Redundancy



For crucial interconnections between DALLIS and Nova73 units, you can specify either link, or link and port, redundancy:

- **Link Redundancy** – two physical connections (MADI, ATM or RAVENNA) are made from the DALLIS master board to the Nova73. If the active link fails, then the redundant link ensures an automatic recovery.
- **Link & Port Redundancy** - two master boards are fitted to each DALLIS, and connect to different Nova73 ports (preferably on a different module). Port redundancy provides automatic recovery from a:
  - Failure of the active physical link (MADI, ATM or RAVENNA).
  - Malfunction of the active DALLIS master board.
  - Malfunction of the Nova73 module.

To specify link redundancy:

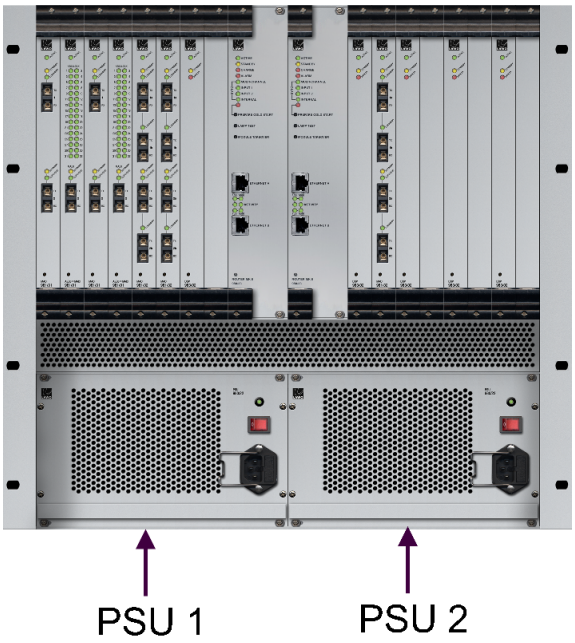
- MADI - order a double-port Nova73 module and DALLIS master board for each connection.
- ATM - order a double-port Nova73 module and two DALLIS master boards for each connection.
- RAVENNA - install both the copper and fibre optic connections from the RAVENNA module / master board.

To specify link & port redundancy:

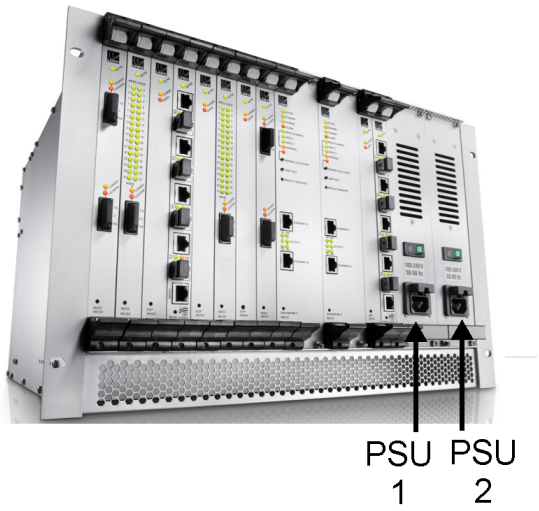
- MADI, ATM or RAVENNA - order two master boards per DALLIS plus enough single-port Nova73 modules to support the connections. AdminHD configures which ports provide redundancy.

Nova73 & DALLIS Power

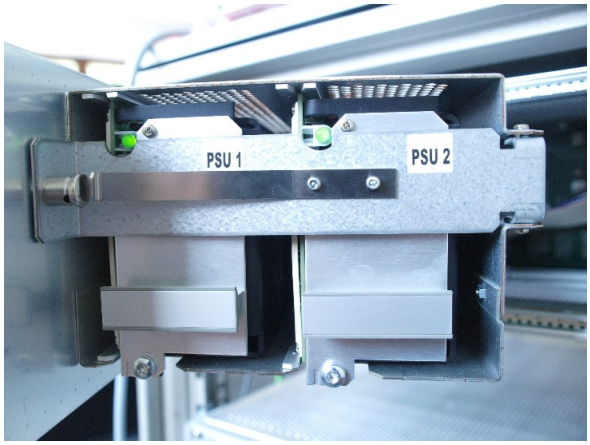
Nova73 HD front view



Nova73 Compact front view



DALLIS internal view of PSUs



The Nova73 HD, Nova73 Compact and DALLIS provide two slots for dual redundant power supplies, see Nova73 power and DALLIS power. Their status may be monitored from the console GUI using the Signal Settings display.

Redundant DSP

Within the Nova73 a DSP board may be reserved to provide redundant processing (indicated by the **STANDBY** LED).

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.

This option is enabled from the console GUI using the DSP Configurations display, and is saved within the production.

Control System

The control system resides on the Router Module MKII (980/33) within the Nova73.

It runs on an embedded Linux operating system for speed and increased reliability, and stores both the application software and user data.

The Router Module MKII (980/33) contains a backup power unit which provides up to 3 seconds of backup power to deal with short interruptions to mains (AC) power.

Warm Start & Cold Start

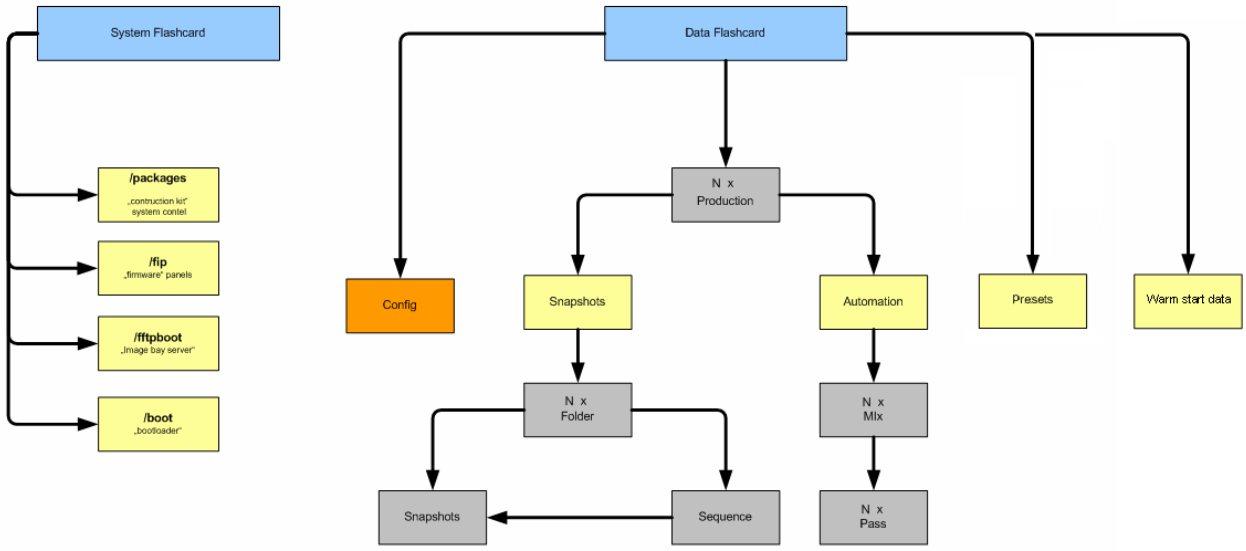
Following switch-off, power is provided to the control system for a further 18 seconds. During this time, all current settings are saved to flash memory; this is known as the system's warm start data.

By default, the warm start data is loaded at the end of boot-up. This means that the console comes back exactly as it was when you last shut down, ensuring fast recovery of all previous settings following a loss of power.

Alternatively, you can perform a cold start if you suspect a problem with the warm start data.

Data Recovery

Two flash cards are used to store the application software (**System Flashcard**) and user data (**Data Flashcard**) separately. You may create a backup copy of the flashcards so that they may be replaced if necessary.

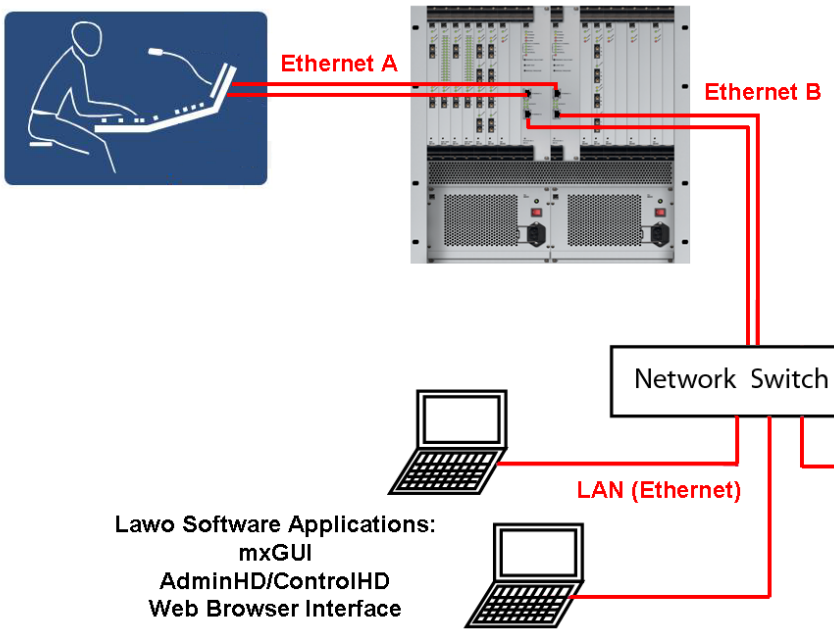


During operation, any errors generated by the control system are stored in the **message** logfile. This can be copied to USB via the File display, or monitored remotely via the Web Browser Interface.

Redundant Router Module and Control System

By fitting a second Router Module to the Nova73, the system can provide redundancy for the routing matrix and control system.

In order to provide redundancy, your Nova73 must be fitted with two Router Modules MKII; Ethernet A and Ethernet B connections from both the main and redundant modules are required:



Automatic Takeover

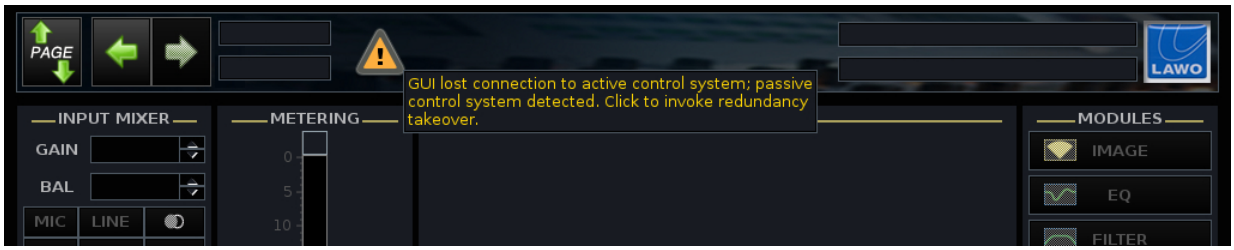
If the main Router Module fails, then the redundant module automatically takes over. This ensures a seamless recovery without any interruption to operation.

> Note that a brief interruption to audio will occur while routes are reconfigured.

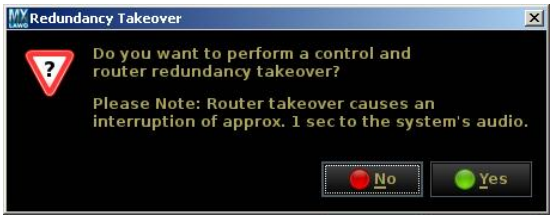
The redundant control system is automatically activated if, internally, a loss of connection is noticed by the redundant system. This could be due to a software failure, hardware error or reboot of the main control system.

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 (for example, if you disconnect the cable).

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.

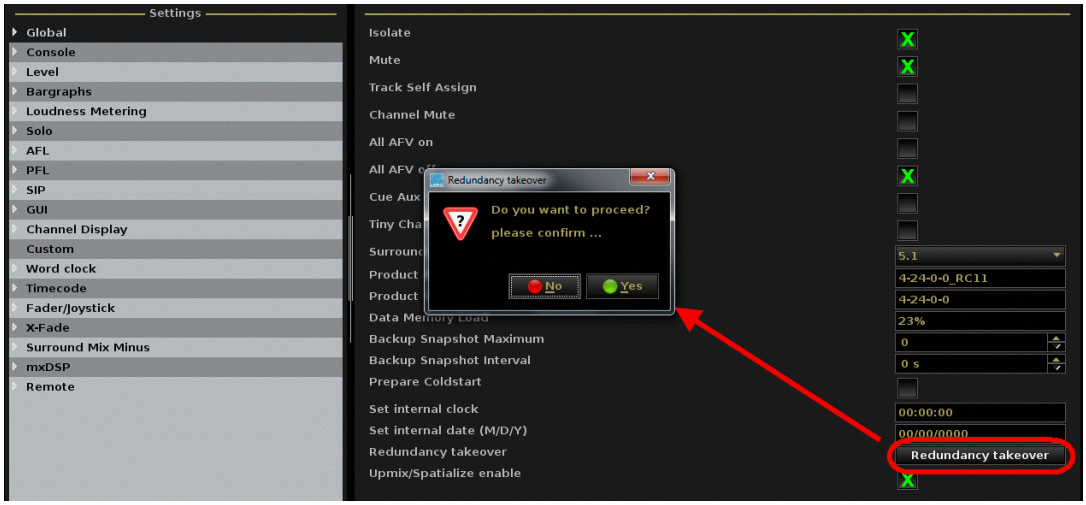
If you select **No**, then you *MUST* fix the problem with the connection before you can regain control of the audio.

Manual Takeover

You can force a manual takeover at any time, using the Redundancy takeover option in the **System Settings** display:

1. Select the **Global** topic followed by 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.

A manual takeover may also be forced using the **ROUTER TAKEOVER** contact, connected to **GPI 1** on the Nova73 rear panel, see Nova73 Alarm & Control Contacts.

Control Surface Power

Control surface power is provided by internal power supplies. Depending on the frame size, either one or two PSU blocks are fitted to each frame. Each block is equipped with two power supplies running in parallel. Both share the current load; if one fails, then the second is powerful enough to handle the required load alone.

Power Supply Desk Alarm

From Version 4.8 software onwards, the Central GUI offers status monitoring for all PSU blocks fitted to the control surface.

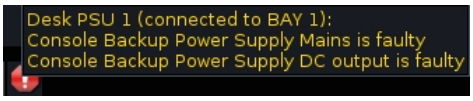
The status of each PSU block is represented by a symbol which appears at the bottom right of every console display:

The number of symbols relates to the number of PSU blocks within the control surface and whether any extender bays with their own PSU are fitted. PSU blocks are represented from left to right, and each block consists of two supplies running in parallel.

The symbols indicate:

- **Green Circle** – the PSU block is working fine.
- **Yellow triangle with an exclamation mark** – the PSU block 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.

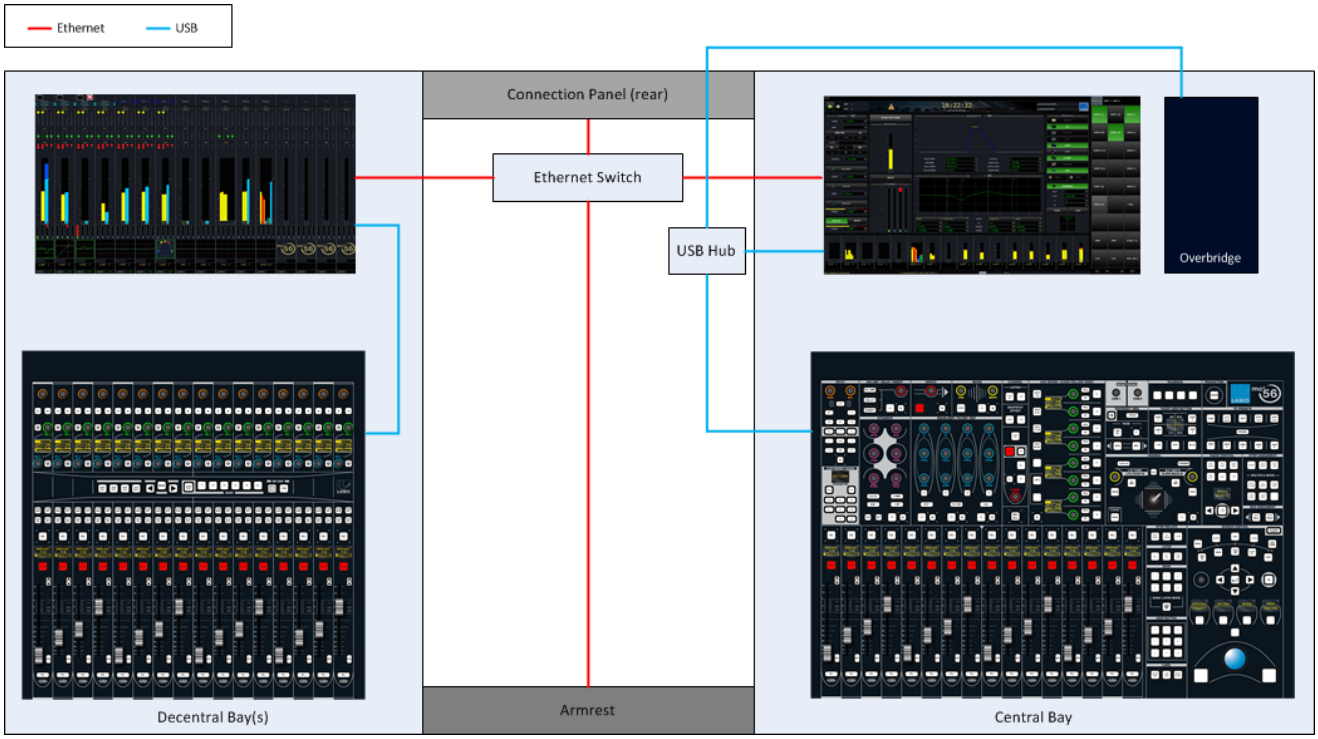
Hover over the symbol to reveal more information:



Our example shows the status for Bay 1 - the first bay on the left of the console.

Note that within the text on the GUI, 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.

Control Surface Internal Wiring



Within each channel and central bay, individual panels and displays connect to an Ethernet Bay Server. (Control surface panels via USB; displays via LVDS for high resolution graphics and USB for touch control).

Each Bay Server then connects to an Ethernet switch, mounted inside the control surface frame. The network connection from the switch appears on the rear panel as ETHERNET A.

By fitting a redundant Router Module to the Nova73, a second Ethernet A connection can be installed for automatic redundancy.

Internally, point-to-point connections provide fault tolerance, and allow any bay or panel to be isolated from the rest of the console.

Control surface panels and displays are hot-pluggable making them easy to service.

Sample Rate & System Clock

Internal Sample Rate

The system may operate at a choice of internal sampling rates including 96kHz, 88.2kHz, 48kHz and 44.1kHz.

The maximum sample rate (96kHz or 48kHz) is set by the AdminHD configuration and cannot be modified from the console GUI. (AdminHD: the maximum sample rate is defined when you select the type of Nova73 Core).

Having configured the maximum rate, you may use the Sample rate option, in the **System Settings** display, to change from 48kHz to 44.1kHz, or from 96kHz to 88.2kHz, 48kHz or 44.1kHz.

System Clock (Sync Reference)

The Nova73 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.

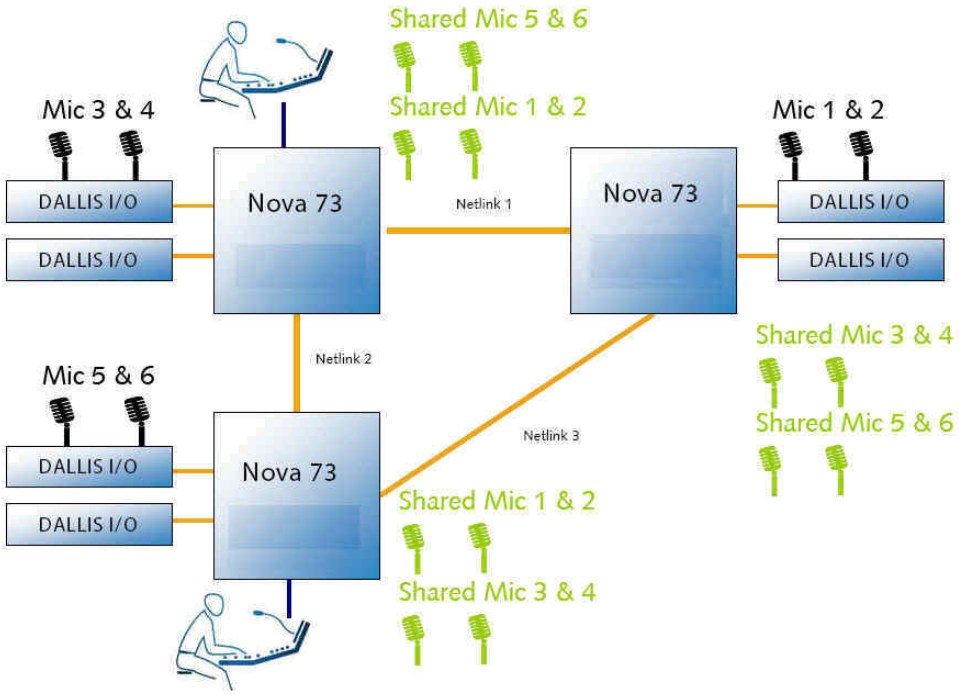
External sync connections are located on the Nova73 rear panel.

The sync signal priorities are defined using the Wordclock options in the **System Settings** display.

Networking I/O Resources

The **mc²56 MKII** is just one member of the mc² family of products, which utilise the same Nova73 and DALLIS architecture, and run on the same operating system and application software.

The Nova73 and DALLIS system is available in its own right as a stand alone routing matrix. Multiple systems may be networked to provide sharing of sources and destinations:



In the example above, mics are physically connected, via a DALLIS, to each system. Signals are transferred between systems via 'Netlinks', providing the ability to share any mic input.

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

Any number of sources may be distributed depending on the physical limitations of your network. Please consult your system specification for details.

On any system within the network, you can view which sources are distributed from the **%** column on the **Signal List** display:

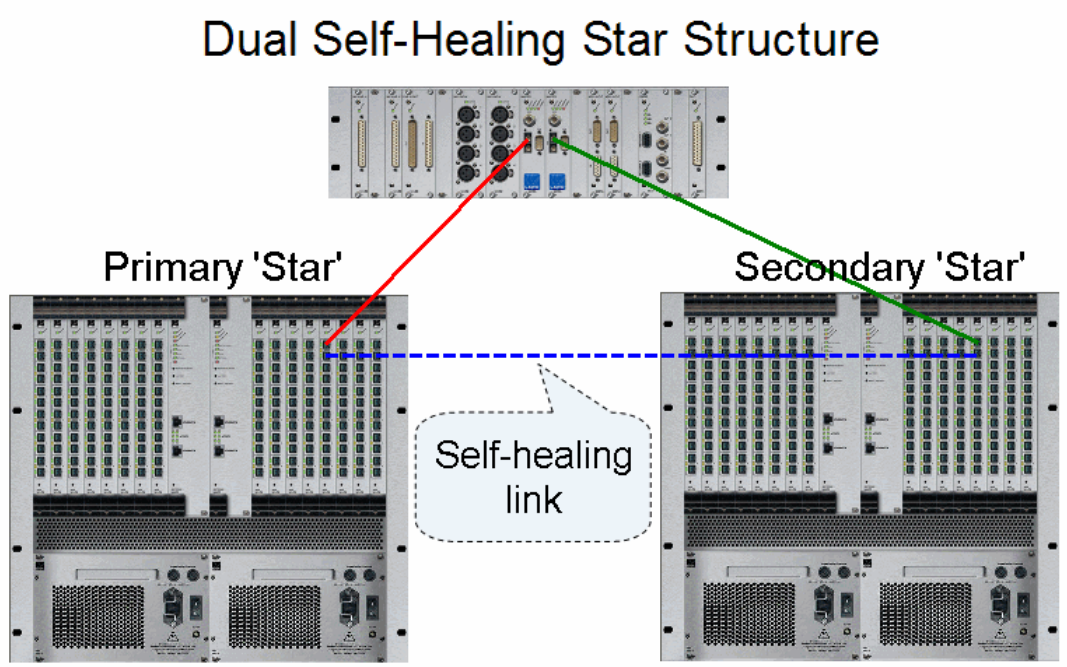
-  indicates that a source is connected locally to this console, and is 'Shared' (made available) to other consoles within the network.
-  indicates that a source is 'Imported'. In other words, it is not connected locally to this console.

From version 4.0.2.2 onwards, all Lawo products have adopted a consistent software release numbering system to indicate compatibility. In each case, the first three digits of the software version *must* match.

So, for example, a mc²66 console running version **4.20.2.0** can be networked to a mc²56, mc²90 or Nova73 running **4.20.2.x**. You can check the software version of your mc² system from the Global Options in the **System Settings** display.

Nova73 HD Dual Self-Healing Star

The Nova73 HD can be implemented in a dual star topology to form a self-healing architecture where one Nova73 is active and the other passive. In the case of a component failure, the system switches to the redundant signal path. This type of system is known as the Dual Self-Healing Star:



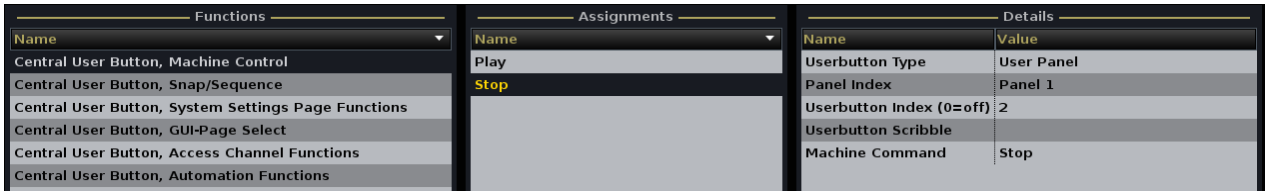
Please see the "Nova73 MKII Technical Manual" for more details.

Configuration

The **mc²56 MKII** can be customised by operators, technicians or Lawo personnel as follows:

Custom Functions

Functions such as user buttons can be re-assigned from the console GUI using the Custom Functions display:



Custom functions are stored at a lower level to productions. This means that any changes will affect all users.

AdminHD

At a lower level (not accessible from the GUI) are a number of files which configure the system's hardware and define settings such as the sampling frequency, and the organisation of signals within the Directories and Subdirectories of the **Signal List** display. The AdminHD configuration is an essential part of the system. If a hardware component is not defined within the configuration, then it will not be visible to you 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.

The configuration is not designed to be changed by an operator, but can be edited by your systems engineer using a software application called AdminHD. For example, if a DALLIS stagebox is hired in for a production, then the unit must be added to the configuration and uploaded to the system before the signals and parameters become available to the operator.

TCL Functions

At a lower level than **AdminHD**, a number of other options may be factory-configured using TCL (Tool Command Language). TCL functions can only be programmed by Lawo personnel, and are designed to provide some flexibility at the specification stage. TCL allows the logical interlinking of GPIs, soft keys and events. For example, tally states, automated input allocation and fader starts can all be programmed using this protocol. Console monitoring is also handled by the TCL protocol.

System Options

The principle system components offer a number of options which define the layout of the control surface, the modules fitted to the Nova73 and the cards fitted to each DALLIS. For details see Control Surface Options, Nova73 Module Options and DALLIS Interface Options.

In addition, the following features may be installed, or configured, to provide further integration with the production environment:

- **mxGUI** - a Lawo software programme which runs on an external computer to provide offline setup or remote operation of any mc² system. mxGUI is covered in the "mc²56 Operators Manual".
- **AdminHD (& ControlHD)** - a Lawo software programme which runs on an external computer to provide system configuration or remote operation of matrix crosspoints, signal labels and IO parameters. See AdminHD.
- **Audio Follow Video (AFV)** - the console supports up to 128 external events to open and close any channel or main fader. AFV events are factory-configured, and received via TCP/IP Ethernet (using Lawo's Remote MNOPL protocol) or GPIO. Please contact your local Lawo representative or email service@lawo.com for more details.
- **General Purpose Channels (GPCs)** - the console supports up to 256 GPCs which may be used to remotely control parameters within an external device via MIDI. The assignment of GPC objects to MIDI program changes and controller values is factory-configured. Please contact your local Lawo representative or email service@lawo.com for more details.
- **Plugin Server** - the optional LAWO Plugin Server allows plugins to be controlled from the mc² console, and all settings to be stored and recalled by a production or snapshot. See the "Lawo Plugin Collection Operators Manual", and the “Plugin Server Technical Documentation” for details.
- **Remote MNOPL** - Lawo’s Remote MNOPL protocol is a freely available Ethernet (TCP/IP) protocol providing control of virtually any system parameter from an external device. A typical application is to provide third-party matrix control from external systems such as VSM, Evertz, Quartz, BFE, Pharos and others. See AdminHD: mapping tables.
- **Remote Desktop** - any of the console’s TFT displays (Channel or Central GUI) may be switched to a remote server in order to view and control other applications. The server running the desktop must be connected to the Lawo system network. The remote desktop function is programmed from the console GUI, using the Custom Functions display, see the "mc²56 Operators Manual".
- **Lawo Remote App** - is a free App which allows you to operate any fader of a mc² console, recall snapshots and control user-defined functions remotely from an iPhone, iPod or iPad. The Lawo Remote App is covered in the "mc²56 Operators Manual". For details on configuring the wireless network access point, see the “TD_AccessPoint.iApp” guide.
- **Machine Control** - the optional Recording Com Kit provides Sony 9pin, LTC and MIDI connections to an external playback device. The operation of machine control is covered in the "mc²56 Operators Manual".
- **Networked Resources** - for more information on configuring 'Netlinks' to share audio resources between systems, please contact your local Lawo representative or email service@lawo.com

- **Web Browser Interface** - the control system includes an integrated web server, allowing status information to be monitored from an external computer, see the Web Browser Interface.
- **Dial-up Router** - this option may be installed to provide remote 'dial-up' maintenance from the Lawo service department. Please contact your local Lawo representative or email service@lawo.com for more details.

Chapter 2: Installation

Introduction

This chapter deals with installing the hardware components, connecting up the system and powering on:

- Installing the Nova73
- Installing the DALLIS Unit(s)
- Installing the Control Surface
- System Connections
- Powering On & Checking the System
- System Settings

The “mc2_Nova73_documentation” guide contains mechanical drawings, data sheets and further information on all control surface, Nova73 and DALLIS components. The guide is included with the "**CD_mc2_56_X-XX-X-x**" software release, available from the **Download-Center** after logging in at www.lawo.com.

Installing the Nova73

Both the Nova73 HD and Nova73 Compact core are 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 Nova73. The 19" frame *MUST NOT* carry the complete weight of the unit.

Dimensions and Weight

Frame:	Nova73 HD	Nova73 Compact
Width	19" 483mm (front plate) 440mm (chassis)	
Height	10RU	7RU
Cable Duct	1RU below the frame is required for cable ducting and ventilation.	
Depth (including rear connectors and system locking devices)	510mm	489mm
Weight	16.25 Kg (one PSU fitted) Each PSU weighs 4.25 Kg	14.5 Kg (two PSUs fitted) Each PSU weighs 2.86 Kg

Ambient Conditions/Air Conditioning

Proper operation of the Nova73 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 Nova73 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).

The Nova73 is cooled actively by built-in fans. The housing of the Nova73 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 m^3/h.

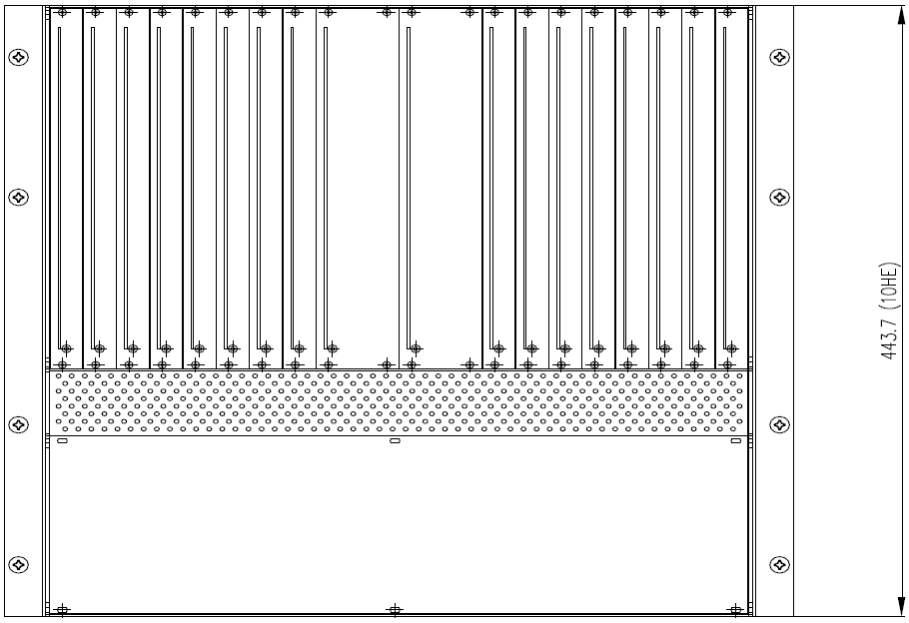
The life cycle of a fan is typically 70.000 operating hours (at a maximum ambient temperature of 40° C). For details on how to change a fan, see Nova73 fan replacement.

Warning

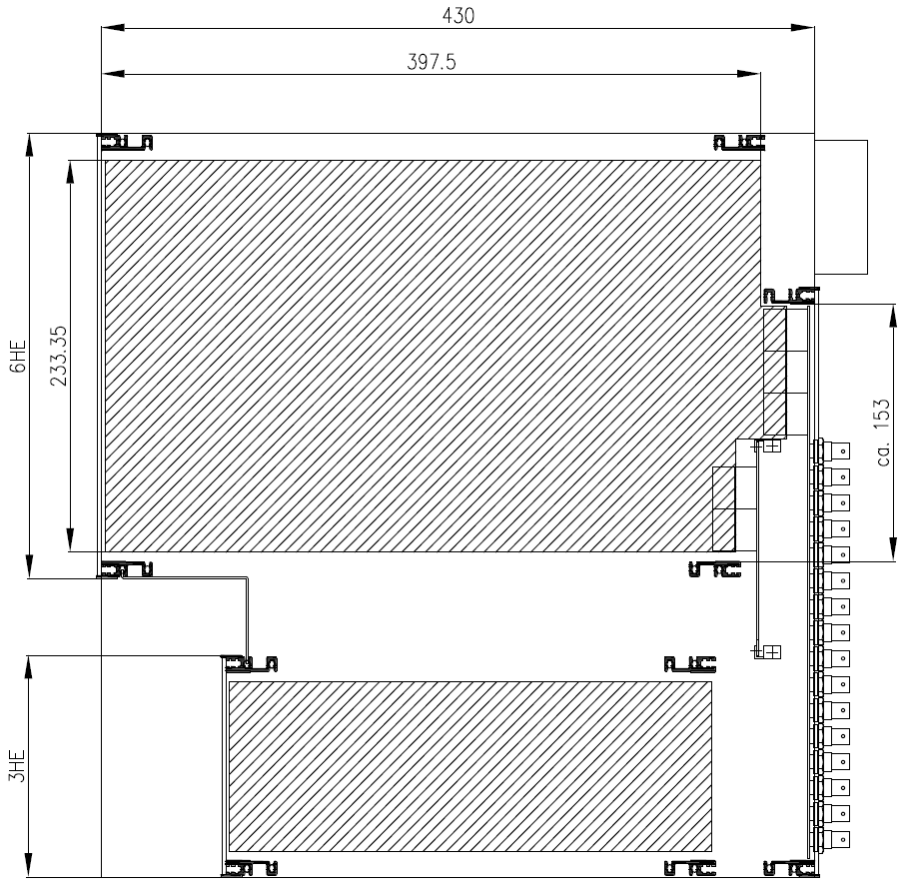
Take care that no devices or cables obstruct the flow of air thereby hindering cooling.

Nova73 HD Frame (980/02)

Frame 980/02, front view

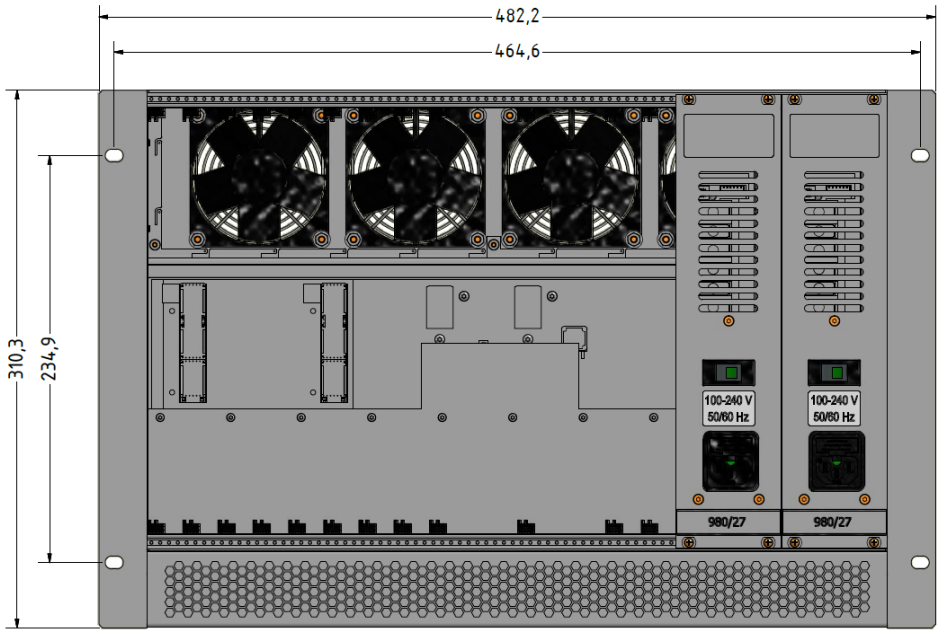


Frame 980/02, side view

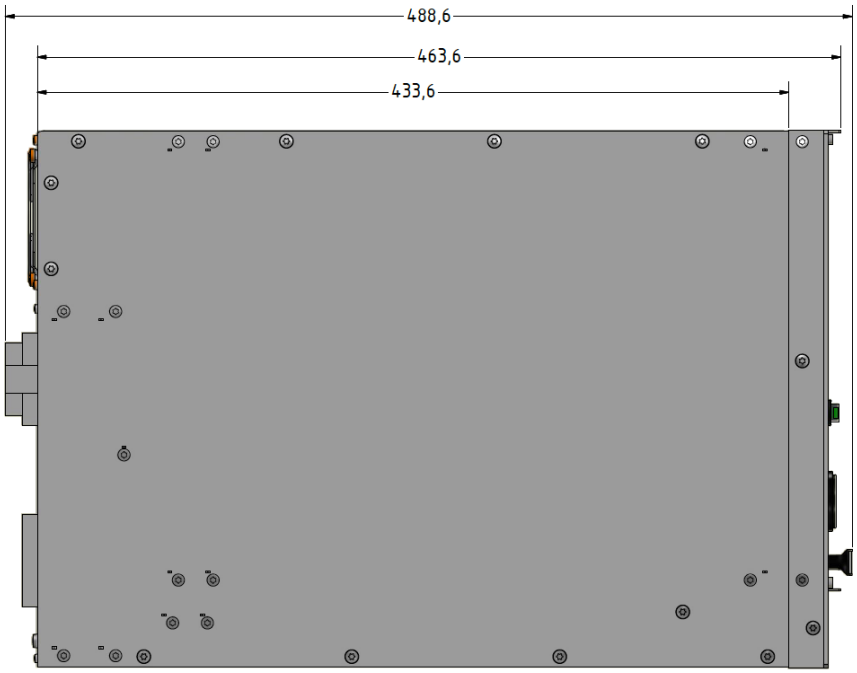


Nova73 Compact Frame (980/06)

Frame 980/06, front view



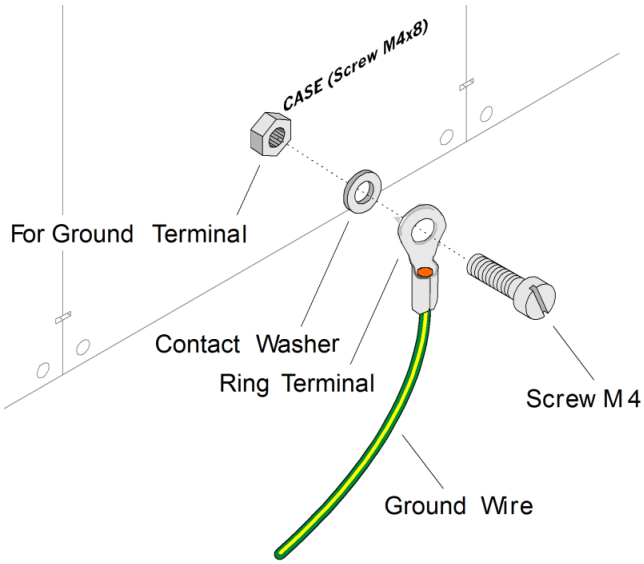
Frame 980/06, side view



Grounding

Although operator protection is guaranteed (the Nova73 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 **CASE** grounding bolt (M4 x 8) on the Nova73 rear panel using a Torx driver:



Warning

The Nova73 must be on the same potential as all other system devices/modules.

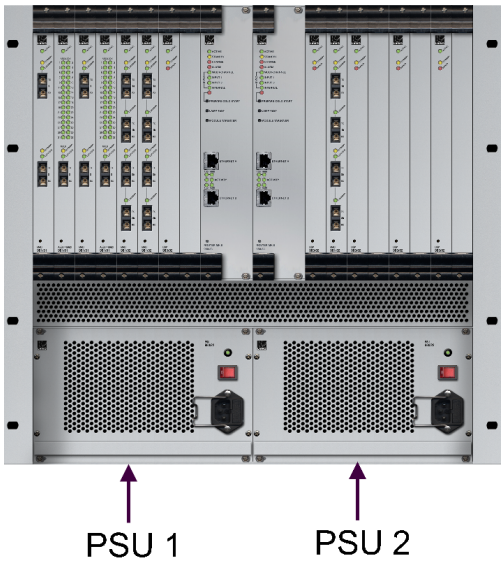
For Scandinavian countries, *ALWAYS* use a grounded mains connection, to prevent the device from being grounded through Ethernet or other signal connections.

Grounding of Audio Interfaces

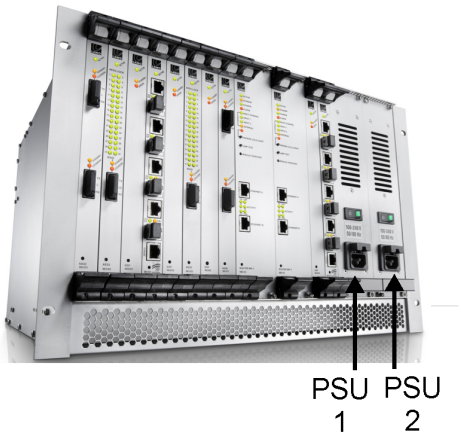
For compliance with AES3, digital interfaces should be connected to a field ground.

Power

Nova73 HD front view



Nova73 Compact front view



The front of the Nova73 frame offers two slots for the installation of power supply units. On the **Nova73 HD**, the second PSU is optional. The Nova73 Compact is always installed with two supplies.

To operate the Nova73, one PSU is sufficient. When a second PSU is fitted for redundancy, the load is shared between the two supplies.

The PSUs are hot pluggable. For details on how to change a PSU, see Nova73 PSU replacement.

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, both PSU slots *MUST* be occupied when the Nova73 is operational:

- **Nova73 HD**: if only one PSU is installed, then please fill the empty slot with a dummy plate (Type 980/21).
- **Nova73 Compact**: leave both PSUs in the frame until a replacement can be fitted.

Power Consumption

The power consumption of the Nova73 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

Nova73 HD Frame	**PSU Specification**
980-25 (1000W Power Supply)	Input: 100-240 VAC (PFC)/ 47–63 Hz/ max. 13,5 A Output: 48 VDC / 23 A
980-22 (600W Power Supply)	Input: 100-240 VAC (PFC)/ 47–63 Hz/ max. 8,2 A Output: 48 VDC / 13 A
980-21 (Dummy Plate)	n/a
Nova73 Compact Frame	
980-27 (500W Power Supply)	Input: 100-240 VAC (PFC)/ 47–63 Hz/ max. 5,5 A Output: 48 VDC / 10,5 A

Plug-in Modules and Connector Panels

Normally the Nova73 is delivered 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, follow these instructions.

AES3 Rear Connector Panels

➢ **Nova73 HD**

Optionally, the **Nova73 HD** may be fitted with D-Sub and/or BNC AES3 rear connector panels. These provide connections for any front-mounted AES3 modules (of type 981/02). The two panel types may be mixed allowing up to 8 rear connector panels:

- **D-Sub, 8HP (980/14)** - AES3, balanced 110 ?
- **BNC, 16HP (980/15)** - AES3-id, unbalanced 75 ?

See Nova73 Rear Connector Panels for pin-out information.

The position of the rear connector panels determines the slot numbers which *MUST* be used for front-mounted AES3 modules. Therefore, it is important to fit the rear panels *BEFORE* mounting any plug-in modules.

1. Establish the first free slot (seen from the right) at the rear of the frame.
2. Remove the existing dummy plate if fitted.

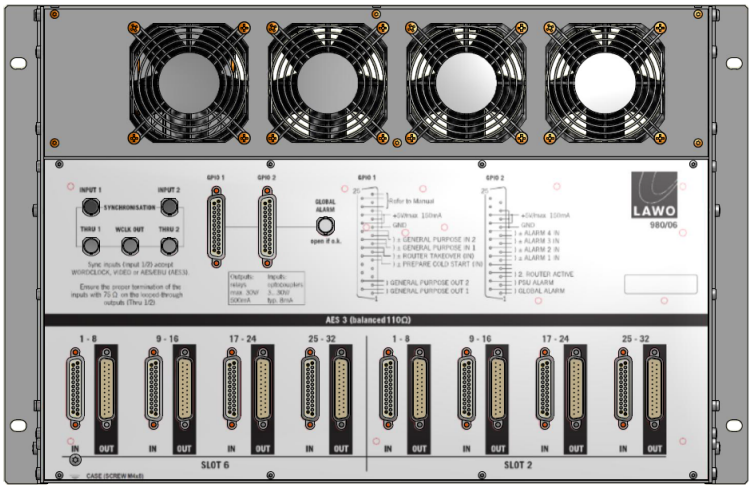
Note that dummy plates are 8HP wide. If you want to mount a connector panel with a width of 16HP you will need to remove two dummy plates.

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.

Warning

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

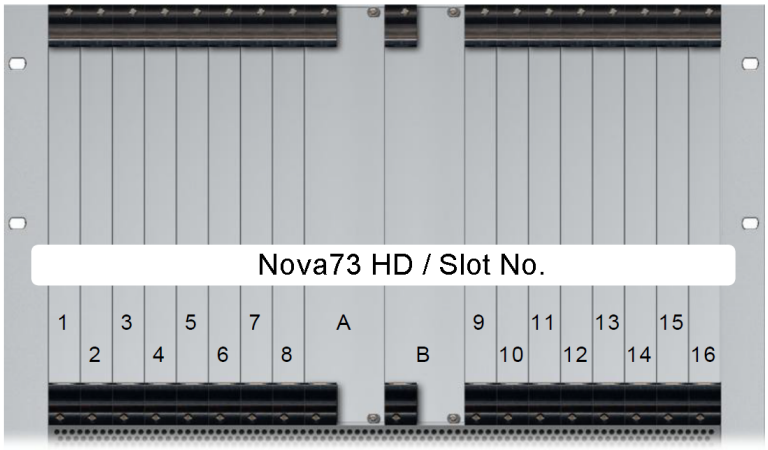
➢ **Nova73 Compact**

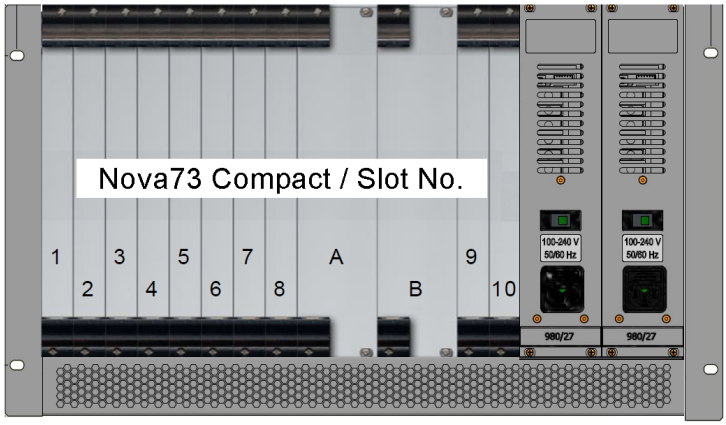


The Nova73 Compact comes with rear-mounted AES3 connectors as standard. These provide balanced 110 ? D-Sub connections for up to two front-mounted AES3 modules (of type 981/02). Note that the AES3 modules *MUST* be fitted to slots 2 and 6 at the front of the core.

See Nova73 Rear Connector Panels for pin-out information.

Front Module Slots





The diagrams above show the front module slots available within the **Nova73**:

- **Slot A** – fit the main Router Module here.
- **Slot B** – reserved for a redundant Router Module.
- **Slots 1-16*** – available for DSP or I/O modules. (*10 slots are available for DSP or I/O modules in the Nova73 Compact core).

See Nova73 Module Options for details on all plug-in modules.

Note that the Nova73 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.

Note that the system logfile counts slots from 0 upwards (e.g. physical slot 1 = slot 0 in the logfile).

To ensure efficient cooling, you should spread the modules evenly within the Nova73.

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

One MADI, or ATM, port is required to provide the Port DSP resources used for the console's monitoring (**Listen surround** and **Listen stereo**). Therefore, you must fit at least one MADI, or one ATM, module to the Nova73.

AES3 Modules

In the **Nova73 HD**, modules of type **981/02** AES3 should be mounted so that they are right-aligned to the rear connector panel position (looking from the front of the frame). For example, if the 1st and 2nd rear connector panels (working from right to left) are D-Sub and the 3rd is BNC, then the AES modules must be front-mounted in slot 2 (D-Sub1), slot 4 (D-Sub2) and slot 8 (BNC).

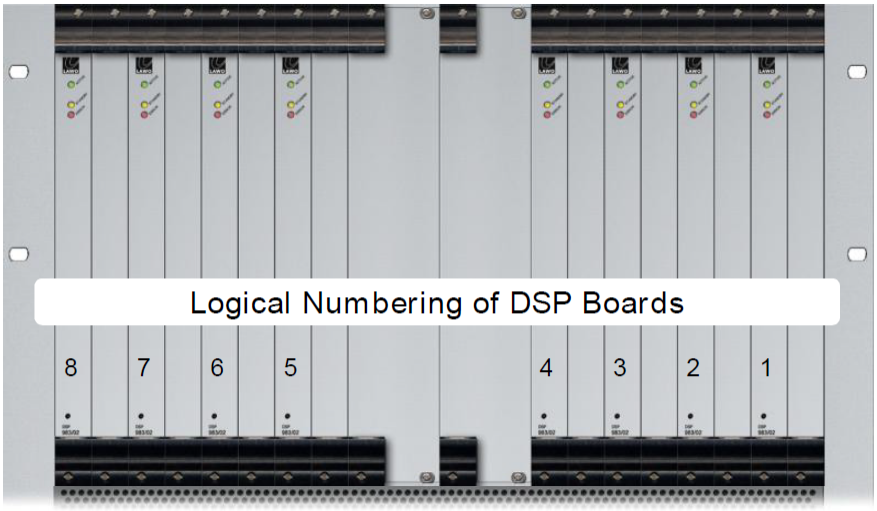
In the Nova73 Compact core, AES3 modules *MUST* be mounted in slots 2 and 6.

If a module has been fitted incorrectly, then you may see its **AES3 LOCK 1** LED blink.

DSP Modules

DSP modules of type **983/02** or **983/03** should be mounted from right to left filling up the odd slots - 15, 13, 11, 9, 7, 5, 3, 1 in the **Nova73 HD** or 9, 7, 5, 3, 1 in the Nova73 Compact core.

The logical numbering of the DSP boards follows the mounting order described above (DSP board 1 in slot 15, DSP board 2 in slot 13, etc.):



>> Mounting the Front Modules

Warning

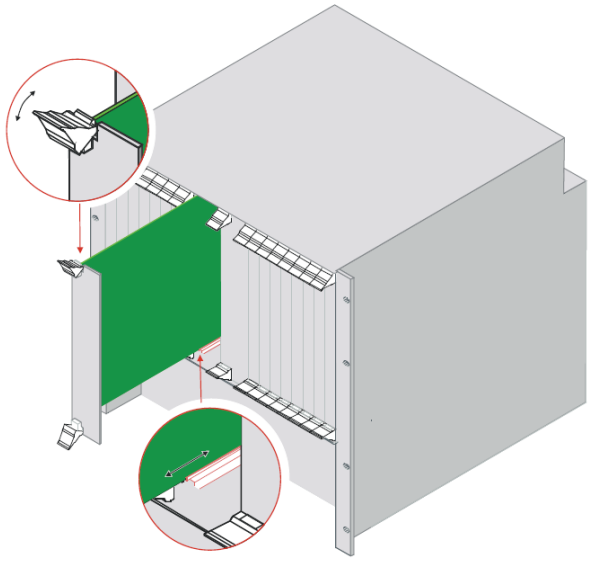
The Nova73 plug-in modules carry highly sensitive electronic components, and therefore should only be handled by authorized personnel, and with the utmost care.

ALWAYS observe the following procedures:

1. Discharge yourself before touching a plug-in module.
2. Wear conductive safety-shoes and grounding wristbands to reduce the risk of electrostatic charging.
3. *DO NOT* bend the modules.
4. Make sure that all rear connector panels are mounted before inserting the respective plug-in module.
5. To remove an existing module, unfasten the front panel screws, release the locking catches (as shown below) and pull out the module.

Some modules include DIP switches to set certain features. Therefore, check the DIP switch settings before inserting a replacement! Further information can be found in the data sheet, available in the "mc2_Nova73_documentation" guide.

6. When fitting a module, make sure that it glides smoothly into the top and bottom guide-rails:



When fitted correctly, it will lock into place.

7. *ALWAYS* fasten the front panel screws in order to fix the module in place. This protects the operator from contact with live parts; protects the module 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.

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

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. 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 DALLIS. The 19” frame *MUST NOT* carry the complete weight of the unit.

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

Ambient Conditions/Air Conditioning

The DALLIS requires 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.

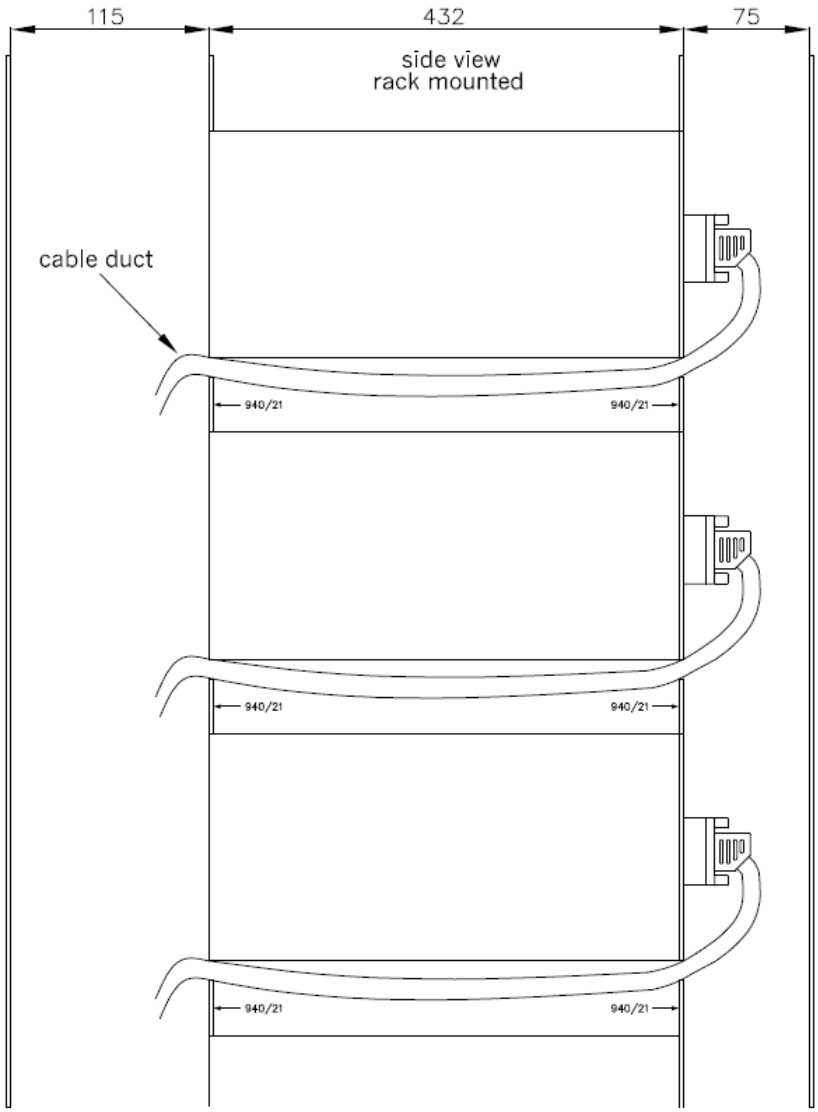
To calculate the air conditioning required, assume a power consumption of 200 Watts.

Warning

ALWAYS leave 1 RU below the DALLIS frame for ventilation and cable ducting. Take care that no devices or cables obstruct the flow of air thereby hindering cooling.

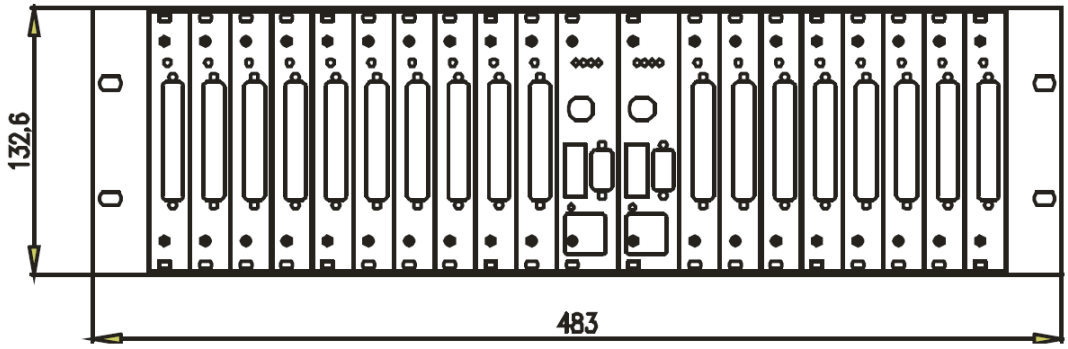
ALWAYS observe the minimum distances at the front and rear of the unit to allow for ventilation and cable ducting.

Minimum Distances for DALLIS Installation



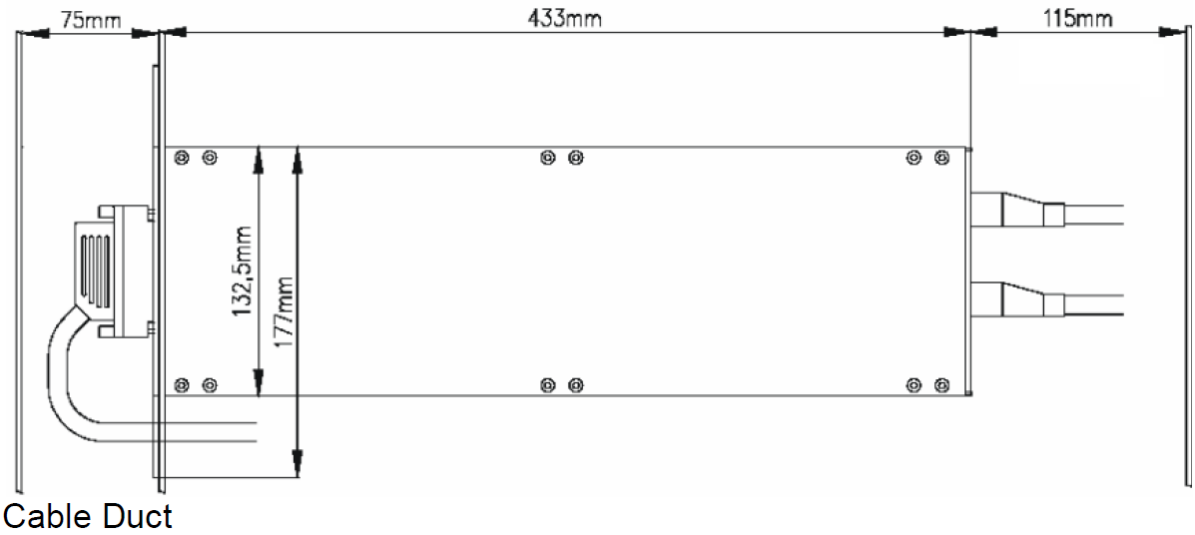
3RU Frame (940/30)

Frame 940/30, front view



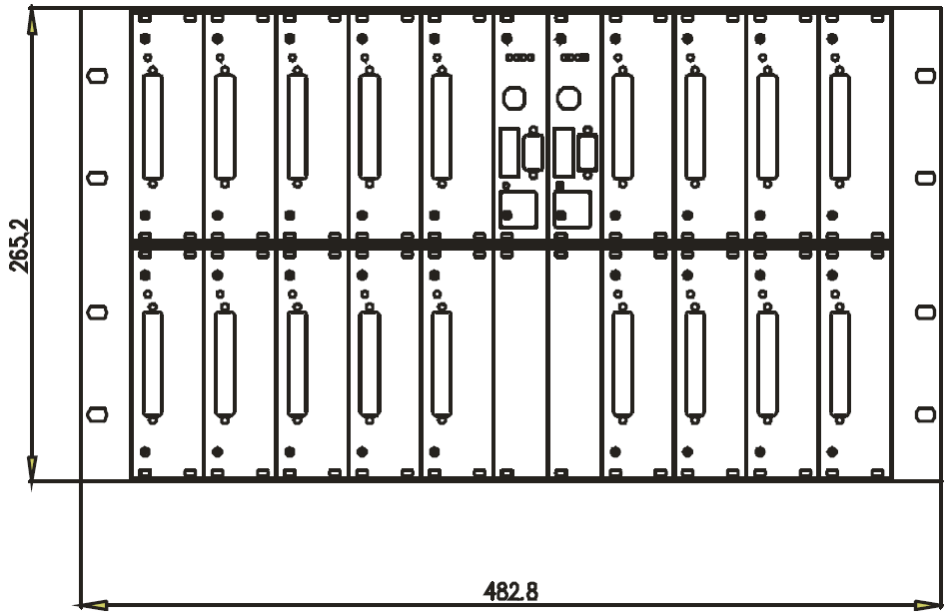
Frame 940/30, rear view

Frame 940/30, side view

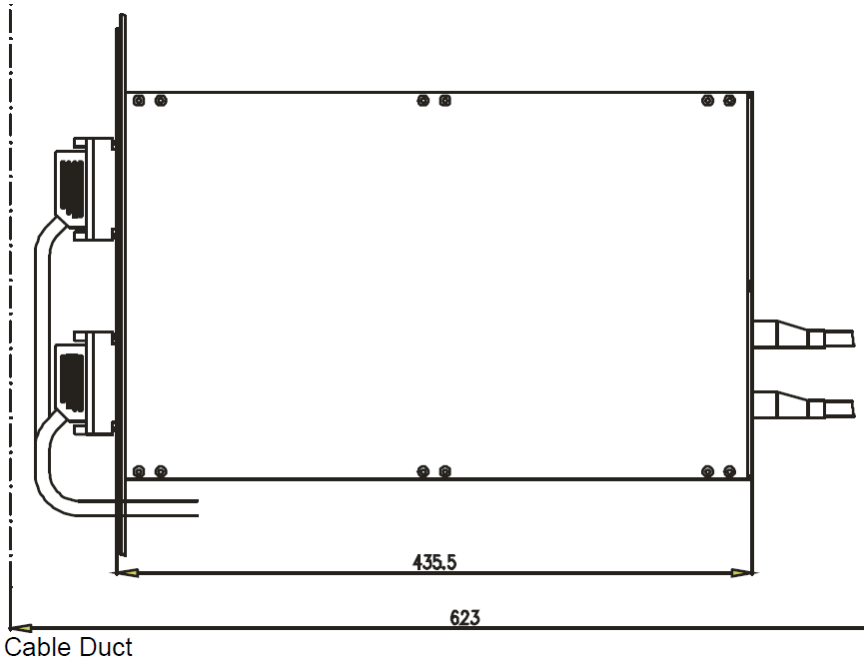


6RU Frame (940/60)

Frame 940/60, front view



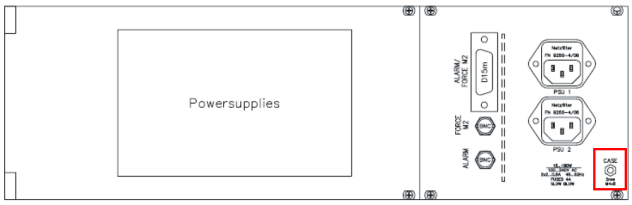
Frame 940/60, side view

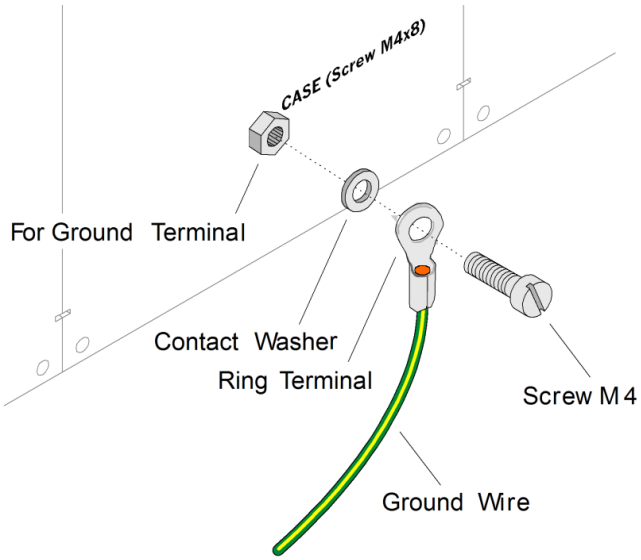


Grounding

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:





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

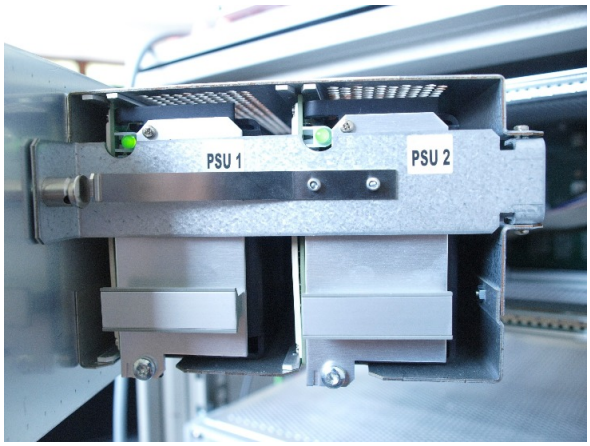
For compliance with AES3, digital interfaces should be connected to a field ground.

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

DALLIS rear view

DALLIS internal view



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. For details on how to change a PSU, see DALLIS PSU replacement.

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!

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

Plug-in Cards

Normally the DALLIS is delivered with the plug-in I/O cards and master boards fitted within the chassis. However, if you need to fit additional plug-in cards or re-arrange the layout, follow these instructions.

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.

- **Slot M1** – fit the main master board here.
- **Slot M2** – reserved for a redundant master board.
- **Slots 1-18** – available for I/O cards.

See DALLIS Interface Options for details.

Note that the DALLIS will only work once slot M1 is fitted with a master board. When fitting a redundant master board, it must be of the same type fitted to slot M1.

Note that the system logfile counts slots from 0 upwards (e.g. physical slot 1 = slot 0 in the logfile).

Not every interface card can be used in every slot. As a general rule, if an interface card is permitted within AdminHD, then it can be fitted to your system.

The type of DALLIS master board, and hence the connection, determines the maximum number of audio channels to/from the Nova73: up to 60 (MADI), 80 (ATM) or 128 (RAVENNA).

Equipping the 6RU Frame

18 double width DALLIS I/O card slots, plus a single width slot reserved for Phantom Power, are available within the 6RU frame. 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.

- **Slot M1** – fit the main master board here.
- **Slot M2** – reserved for a redundant master board.
- **Slots 1-18** – available for I/O cards.
- **Slot 19** – reserved for Phantom Power. If specified, fit the Phantom Power card (947/10) here.

See DALLIS Interface Options for details.

Note that the DALLIS will only work once slot M1 is fitted with a master board. When fitting a redundant master board, it must be of the same type fitted to slot M1.

Note that the system logfile counts slots from 0 upwards (e.g. physical slot 1 = slot 0 in the logfile).

Not every interface card can be used in every slot. As a general rule, if an interface card is permitted within AdminHD, then it can be fitted to your system.

The type of DALLIS master board, and hence the connection, determines the maximum number of audio channels to/from the Nova73: up to 60 (MADI), 80 (ATM) or 128 (RAVENNA).

Mounting the Cards

Warning

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

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 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! Further information can be found in the data sheet, available in the "mc2_Nova73_documentation" guide.

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).

Installing the Control Surface

The console control surface consists of the:

- **Frame** (available in a range of pre-determined sizes).
- **Stand** (optional).
- **Console Keyboard** (English or German) - a floating keyboard which may be connected to any USB port.
- **Removable Script tray** (optional).

The frame is designed for table-top mounting onto a cross bar (not supplied). Note that no separate OB mounting kit is required, as mounting threads are integrated into the frame. Alternatively, the control surface may be delivered with the optional stand.

All plug-in connectors are located on the rear panel. Therefore, when installing, please leave enough room for the cables.

Extenders require their own power and grounding connection, and connect to the main control surface frame via Ethernet.

Please see control surface options for details on customisation options.

The “mc2_Nova73_documentation” guide contains mechanical drawings, data sheets and further information on all control surface, Nova73 and DALLIS components. The guide is included with the "**CD_mc2_56_X-XX-X-x**" software release, available from the **Download-Center** after logging in at www.lawo.com.

Ambient Conditions/Air Conditioning

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).

To keep the control surface cool in extreme environments, the front panel is fitted with low noise fans. A sensor within the console activates the cooling fans if the temperature rises above 30° C.

At temperatures below 30° C the cooling fans are switched off permitting installation within noise critical environments. When relying on convection cooling, ensure that the unit's ventilation holes are not blocked to allow air circulation.

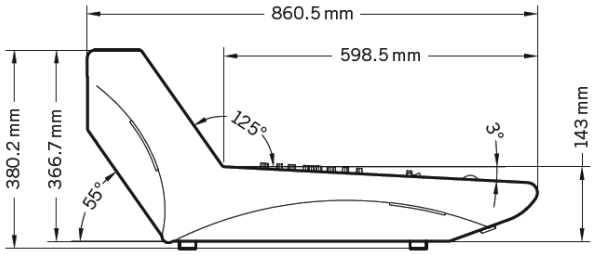
Warning

ALWAYS observe the minimum distances around the console frame to allow for ventilation and cable ducting.

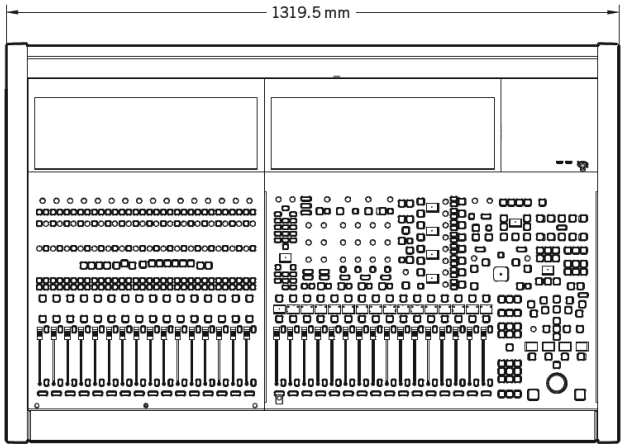
Take care that no devices or cables obstruct the flow of air thereby hindering cooling.

Dimensions and Weight

16+16C Studio Profile



16+16C Studio Overhead

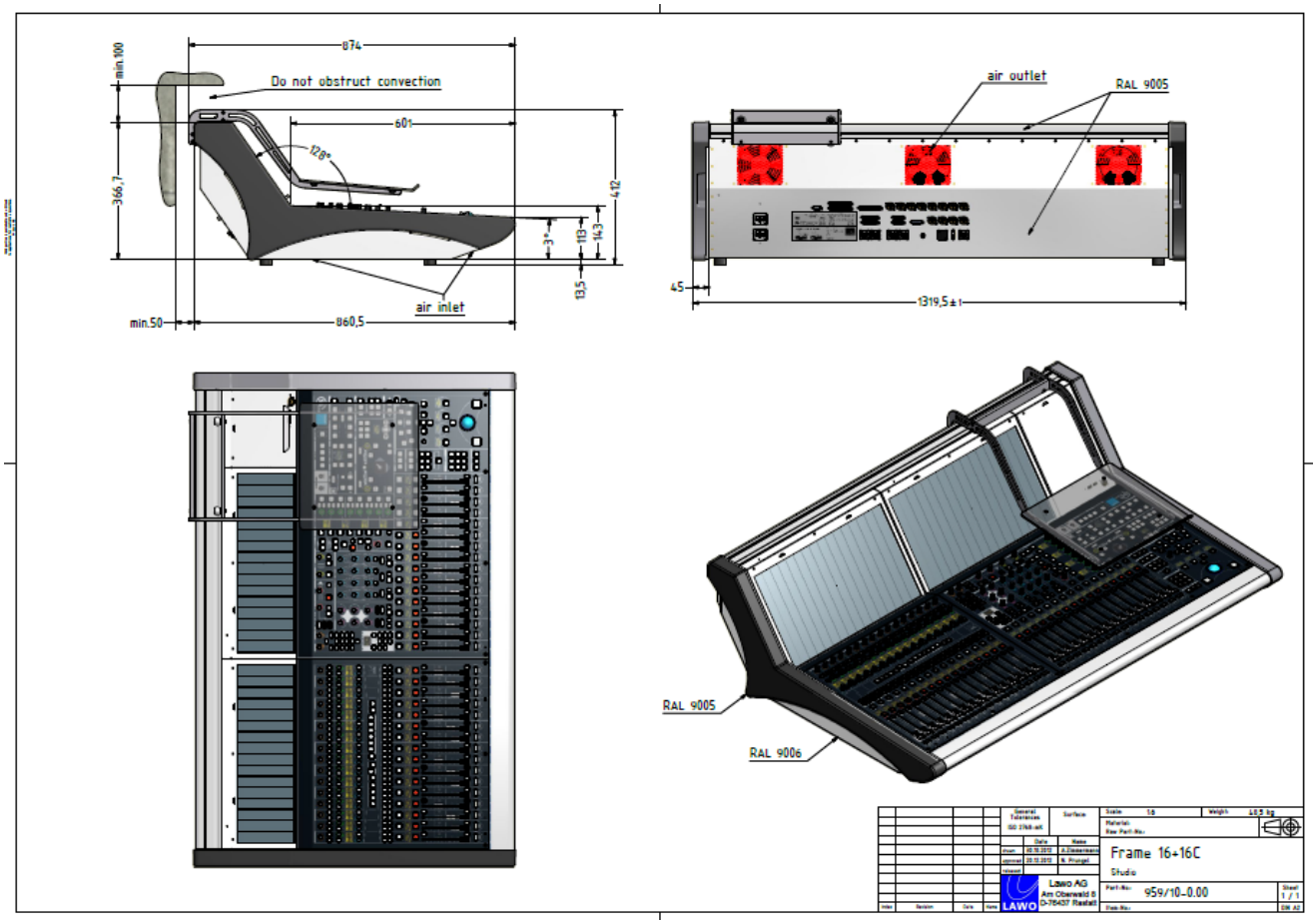


Frame Size	Part Number		Studio Version	OB Version
16C	959-09	Width: Weight:	809mm 32.4kg	731mm 32.4kg
16+16C	959-10	Width: Weight:	1319mm 47.3kg	1241mm 47.3kg
16+16C +16	959-11	Width: Weight:	1829mm 62.6kg	1751mm 62.6kg
32+16C+16	959-12	Width: Weight:	2339mm 80.6kg	2261mm 80.6kg
32+16C+32	959-13	Width: Weight:	2849mm 96.3kg	2771mm 96.3kg
Extender (16-fader)	959-22	Width: Weight:	601mm 23.1kg	523mm 23.1kg

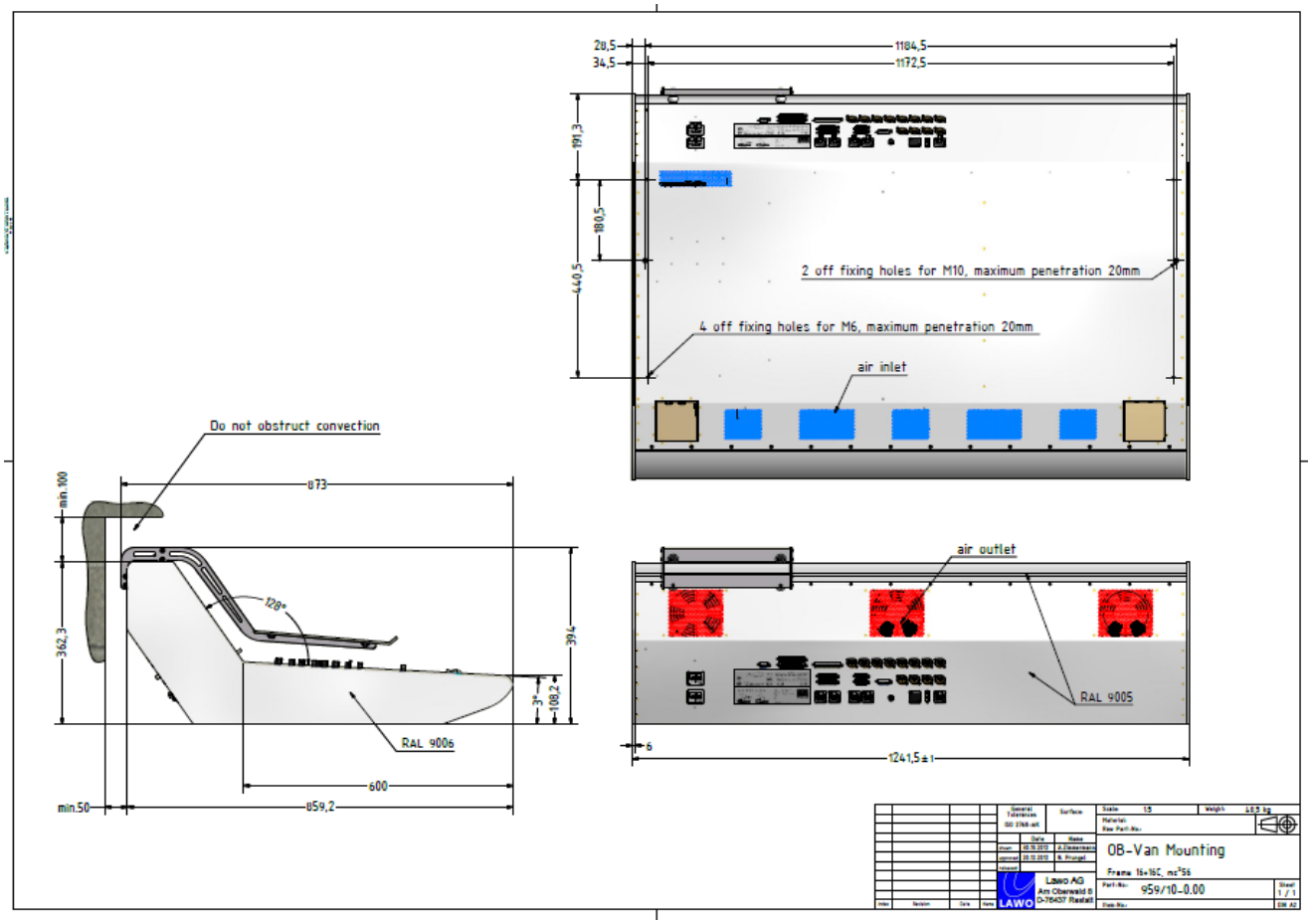
Minimum Distances & OB Van Mounting

Mechanical data for the Studio and OB version of the 16+16C frame are included here. You can find similar data for other frame variations in the "mc2_Nova73_documentation" guide.

16+16C Studio Frame Installation



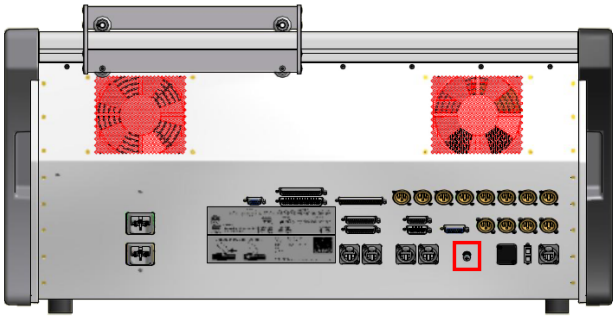
16+16C OB Van Frame Installation

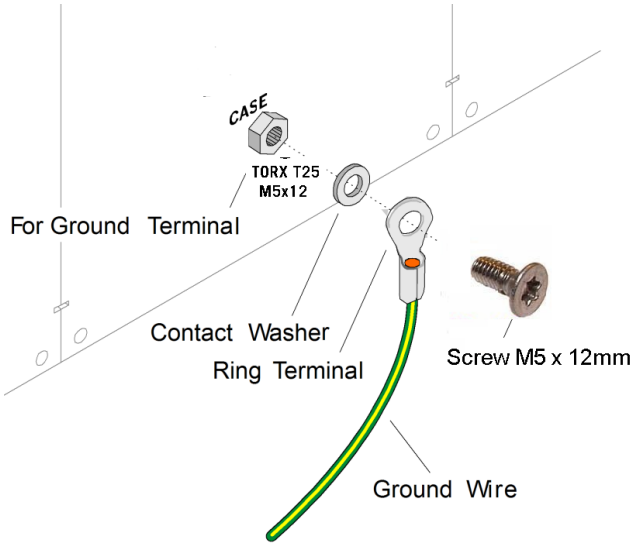


Grounding

Although operator protection is guaranteed (the control surface is connected via the 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 **CASE** grounding bolt (M5 x 12) on the rear panel using a Torx T25 driver:





Warning

The control surface 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 (connected to the Local I/O) should be connected to a field ground.

Power

Control surface power is provided by internal power supplies, and the power consumption is dependent on the number of panels fitted to the surface.

Depending on the frame size, either one or two PSU blocks are fitted to each frame. Each block is equipped with two power supplies running in parallel. Both share the current load; if one fails, then the second is powerful enough to handle the required load alone.

Each of the supplies connects to the mains via its own terminal. Therefore, it is possible to realise phase redundancy if each terminal is connected to a different phase (see below).

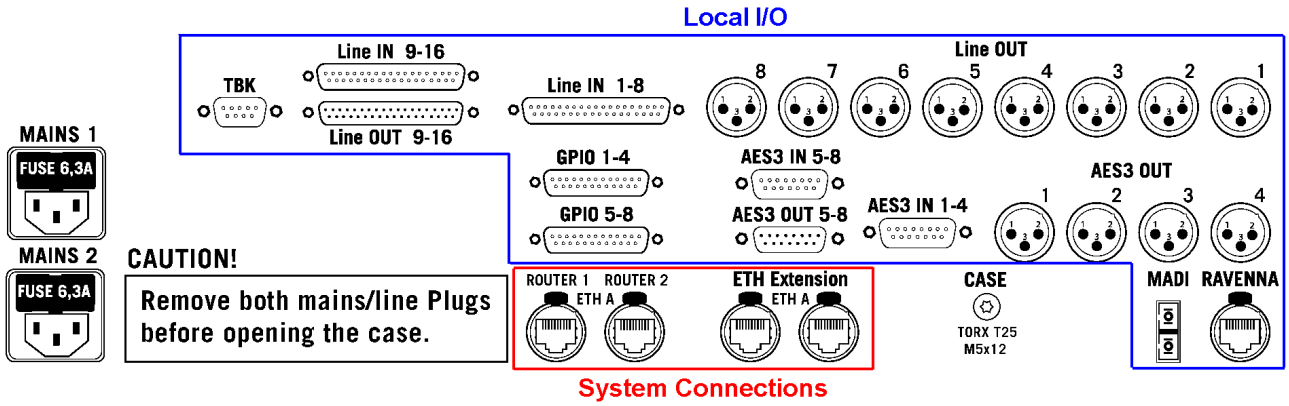
Larger frames require two PSU blocks, and any frame extenders also require their own supply.

The status of all PSU blocks may be monitored from the console GUI.

For details on how to change a PSU, see Control Surface PSU replacement.

Mains Connections

For each PSU block, two mains connectors (**MAINS 1** & **MAINS 2**) are located on the rear of the frame. Only one mains connection is essential for operation; the second provides redundancy.



It is recommended that **MAINS 1** and **MAINS 2** be run from separate phases of the mains supply, and that the same two phases are used for all parts of the desk. It is also recommended that all power connections are controlled from a common mains switch.

Warning

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

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!

To unplug the **MAINS** cables, press the red button to unlock the IEC connector:

Power Consumption

The maximum power consumption, per mains connection, for a fully loaded frame is:

- Current (max): 1.4 A to 3.4 A (depending on the voltage)
- Power (max): 340 Watts

A control surface with fewer panels requires less current and power.

Due to the power supply inrush current, no more than three PSU blocks should be used per 16 A circuit breaker.

Frame Spec & (Part Number)	No. of PSU blocks per phase
16C (959-09)	1
16 + 16C (959-10)	1
16 + 16C + 16 (959-11)	1
32 + 16C + 16 (959-12)	2
32 + 16C + 32 (959-13)	2
16 Fader Extender (959-22)	1

Electrical Voltage

The specification for each PSU block is:

- Input: 100-240 VAC (PFC)/ 47–63 Hz
- Output: 13 VDC / 18 A (max)/ 234 Watts (max)

Console Keyboard Driver

The console keyboard is available in either English or German; if you change the keyboard, then you will need to modify the driver as follows. For the **mc²56 MKII**, the parameter for the keyboard language is saved on the GUI_0 Bay Server (inside the control surface).

1. Using a computer connected to the Lawo system network, open a telnet session to the mc²56 MKII control system, and remotely login to the GUI_0 control system.

   Once logged in, you should see the GUI_0 control system prompt.

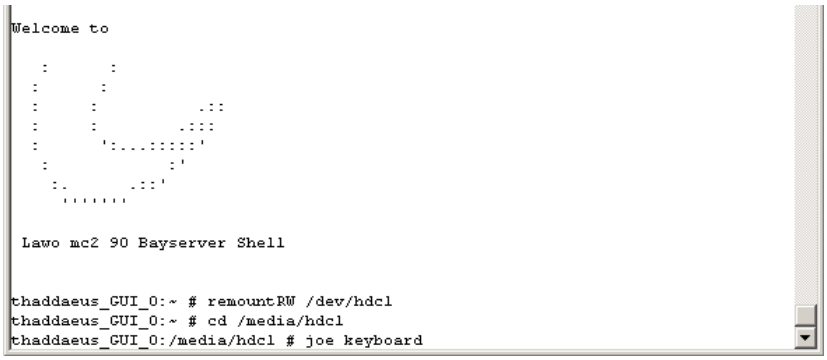
2. Type **remountRW /dev/hdcl** and press Enter.

   This step changes the write protection for the keyboard configuration file directory, so that the file may be altered.

3. Type **cd /media/hdc1** and press Enter**.**

   This navigates to the correct directory.

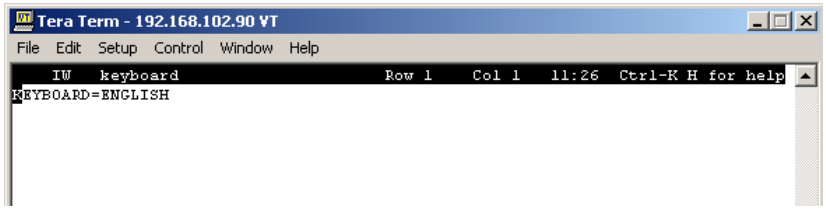
4. Type **joe keyboard** and press Enter:



   This step starts a text editor, called joe, and opens the keyboard configuration file.

5. To change the language version, type:

   - **KEYBOARD=GERMAN** (all capital letters), or
   - **KEYBOARD=ENGLISH** (all capital letters):



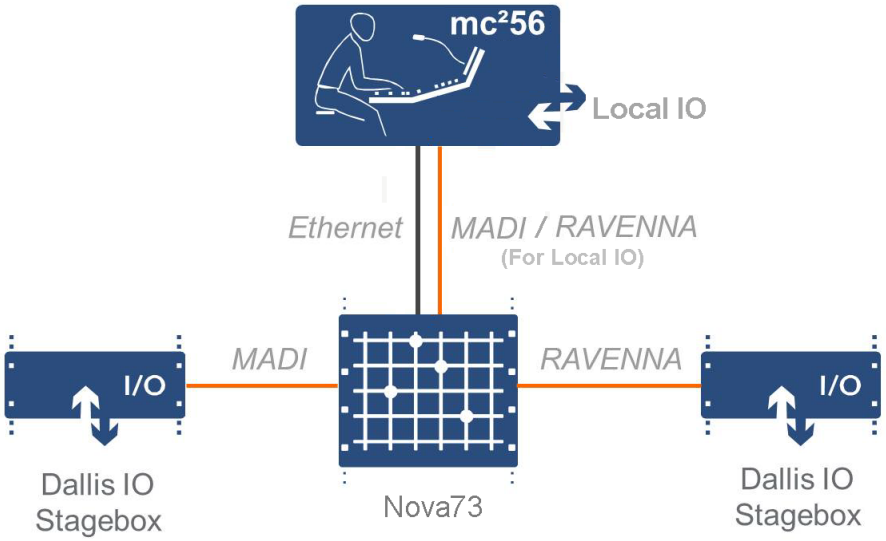
6. Close the editor and save the file by pressing **CTRL** + **K** + **X**.

   The new driver is configured and will become active after the next reboot.

Note that the write protection of the keyboard configuration file is reset after the reboot.

You can reboot the control system from the telnet client by typing **reboot** and Enter.

System Connections



The control system resides on the Router Module MKII (980/33) within the Nova73. Therefore, the following essential connections are required to boot and test the system:

- Ethernet A - connects the control surface to the Nova73 Router Module.
- Control Surface Power - mains connections to the control surface frame.
- Nova73 Power - mains connections to the Nova73.

All other connections, including those to/from DALLIS I/O units, may be made as and when required.

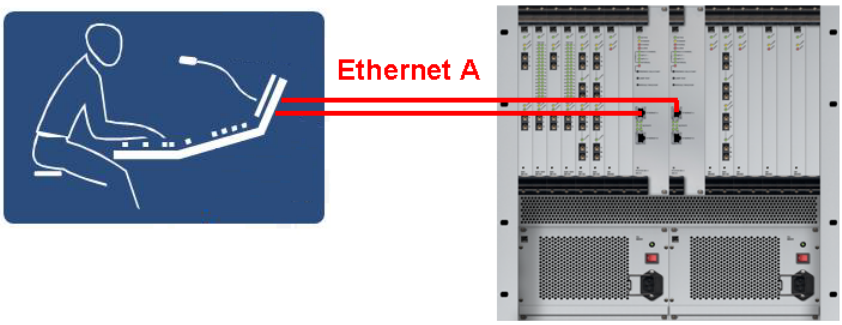
You may connect your external I/O to the:

- **Nova73** - see Nova73 Module Options.
- **DALLIS** - see DALLIS Interface Options.
- **Local I/O (in the control surface)** - see Local I/O.

Ethernet A

This port connects the console control surface to the control system on the Nova73 Router Module MKII (980/33).

Connections are made via TCP/IP Ethernet. Only one connection (to the active Router Module) is essential for operation; the second is required if a redundant Router Module is fitted:

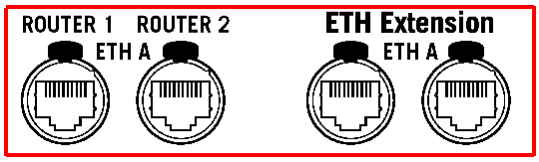


Use a straight (1:1) network cable (STP-CAT 5 with RJ45 connectors):

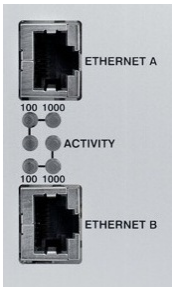
1. Connect either of the control surface **ETH A** ports (on the rear connector panel) to the first Nova73 Router Module.

- On the control surface, you may use either port (**ROUTER 1** or **ROUTER 2**).
- On the Nova73, make sure you connect to **ETHERNET A** (and not ETHERNET B).

Control Surface Rear



Nova73 Router Module MKII Front



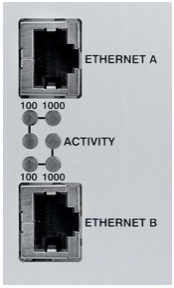
2. If a redundant Router Module is fitted to the Nova73, then run a second network cable from the spare control surface port (**ROUTER 1** or **ROUTER 2**) to the redundant Router Module (**ETHERNET A**).

This second connection is essential to support control system redundancy.

3. You may now power on to boot and check the system, or continue with the rest of the system wiring.

Ethernet B (System Network)

The **ETHERNET B** port, on the Nova73 Router Module MKII (980/33), connects the control system to the rest of the Lawo system network. This connection supports various applications including:



- Remote control from Lawo's mxGUI software.
- Remote configuration from Lawo's AdminHD software.
- Remote control from a third-party device via Lawo's Remote MNOPL.
- Diagnostics and maintenance from the Web Browser Interface, Telnet session, etc.
- Control connections to other Lawo systems to support audio networking.
- Remote maintenance, from Lawo's service department, via the dial-up router.

Connections are made via TCP/IP Ethernet.

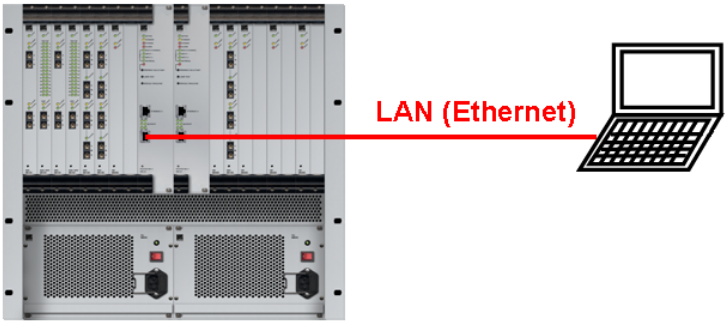
A single device can connect directly. However, more commonly, a network switch is installed to support a wider system network.

Network Connection

For a Direct Connection

Use a *crossed* network cable (STP-CAT 5 with RJ45 connectors):

1. Connect the device to the **ETHERNET B** port on the active Router Module MKII:



If a redundant Router Module is fitted, and a control system takeover is actioned, you will lose your network connection. Therefore, a network switch is recommended.

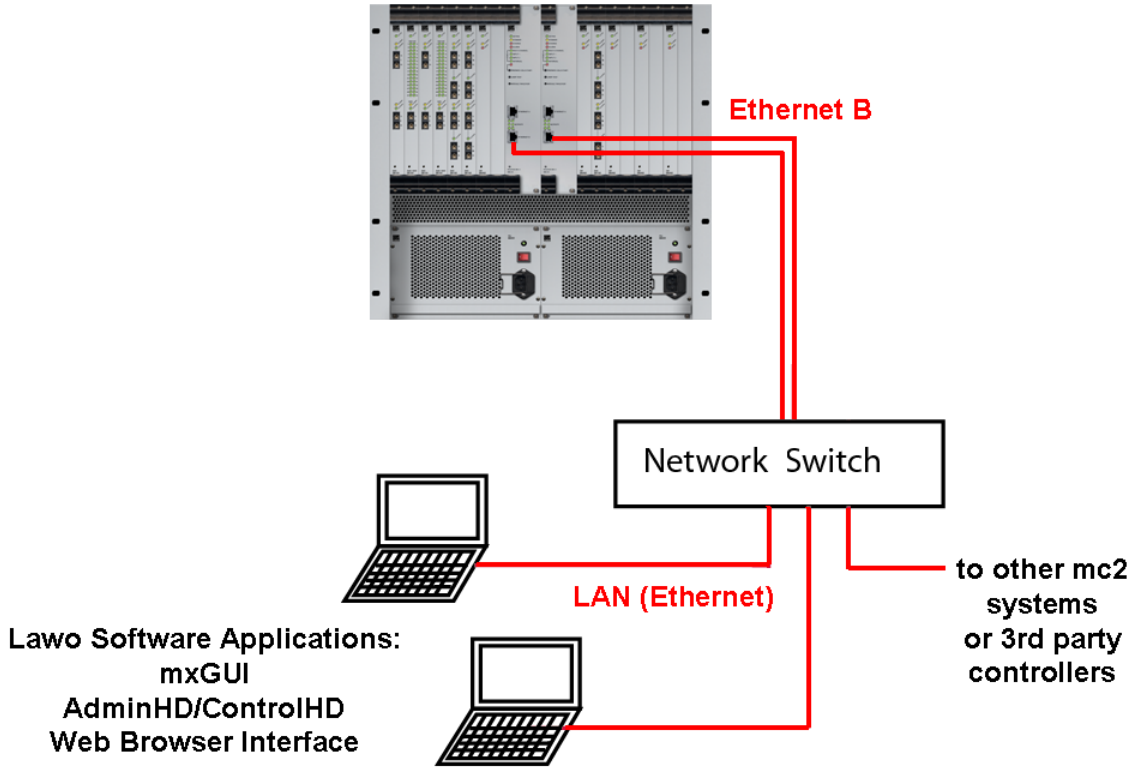
For a Connection via a Network Switch

Use a *straight* (1:1) network cable (STP-CAT 5 with RJ45 connectors):

1. Connect the device to the network switch.

And, if not already installed:

2. Connect the network switch to the **ETHERNET B** port on the Router Module MKII.
3. If a redundant Router Module is fitted, then run a second network connection. This ensures continued operation should a control system takeover occur:



Warning

You must use a network switch and *NOT* a hub.

Keep the Lawo network separate from other network traffic within the installation.

For more information on installing a suitable network switch, please contact your local Lawo representative or email service@lawo.com.

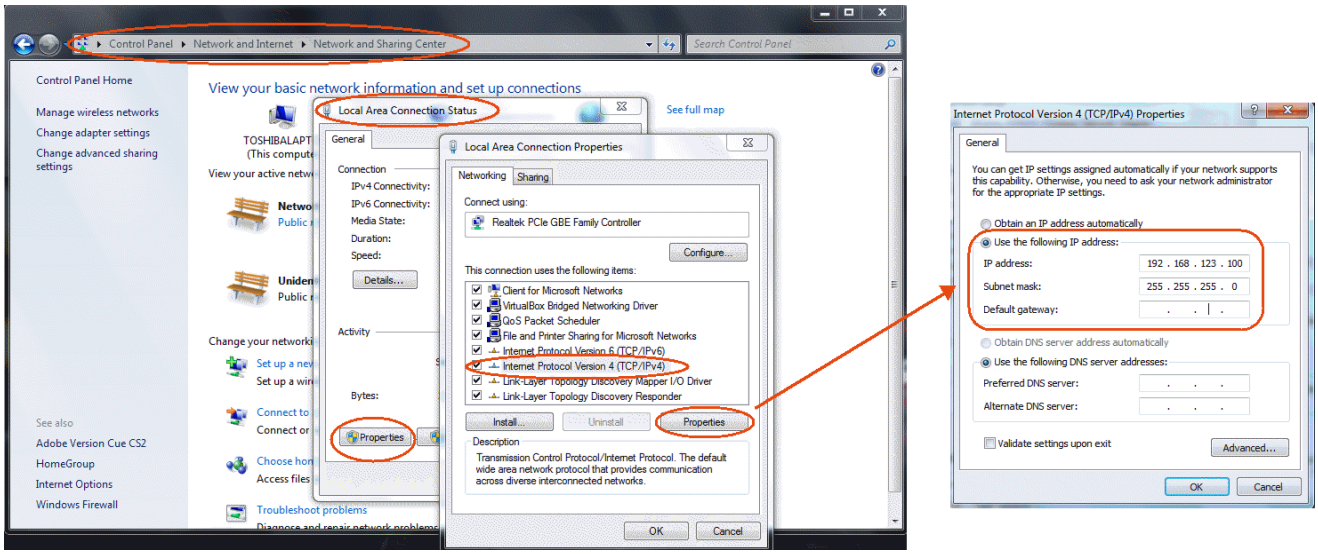
Depending on the number of network connections, one mc²56 MKII system is able to support up to 16 clients simultaneously

TCP/IP Configuration

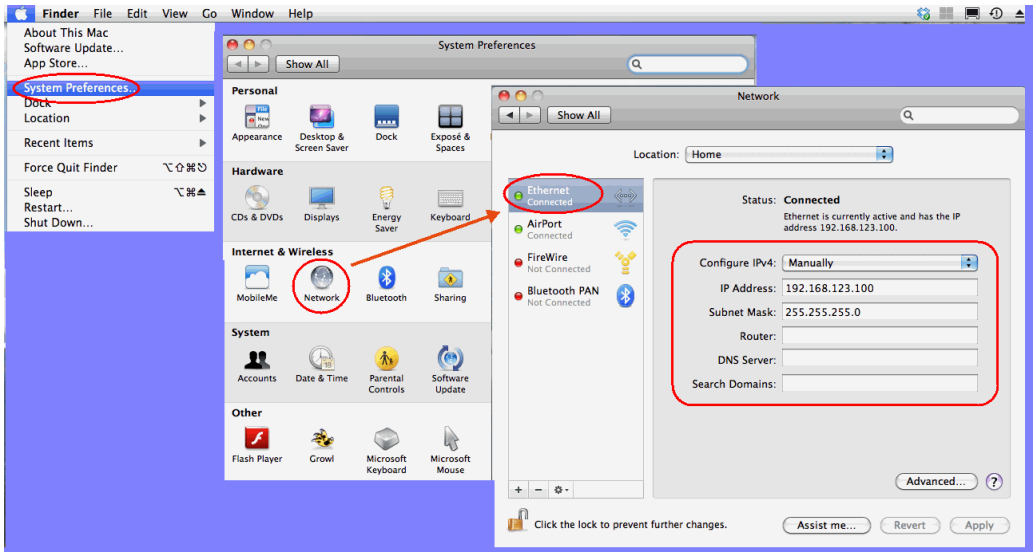
To establish communication with the control system, you will need to configure the TCP/IP settings for your device's network interface card.

The following screenshots demonstrate how to do so on a computer running Windows 7 and Mac OS X:

Windows 7:



Mac OS X:



You can find further information from www.microsoft.com or www.apple.com.

IP Address

The IP address of your device's network interface card must be unique, and set within the same range as that of the mc²56 MKII control system.

You can check the IP address of your control system from the console GUI (using the Signal Settings display). See TCP/IP Addresses for a list of the default IP addresses for different Lawo products.

For example, to connect to a mc²66 with a default IP address = 192.168.102.65, set your device's IP address to **192.168.102.101**.

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.

Take care when setting the IP address of your device. If there is an IP conflict within the network, then the console may not operate correctly.

Subnet Mask

The Subnet Mask of your device's network interface card should be identical to that of the system. For all products, the default Subnet Mask is **255.255.255.0**.

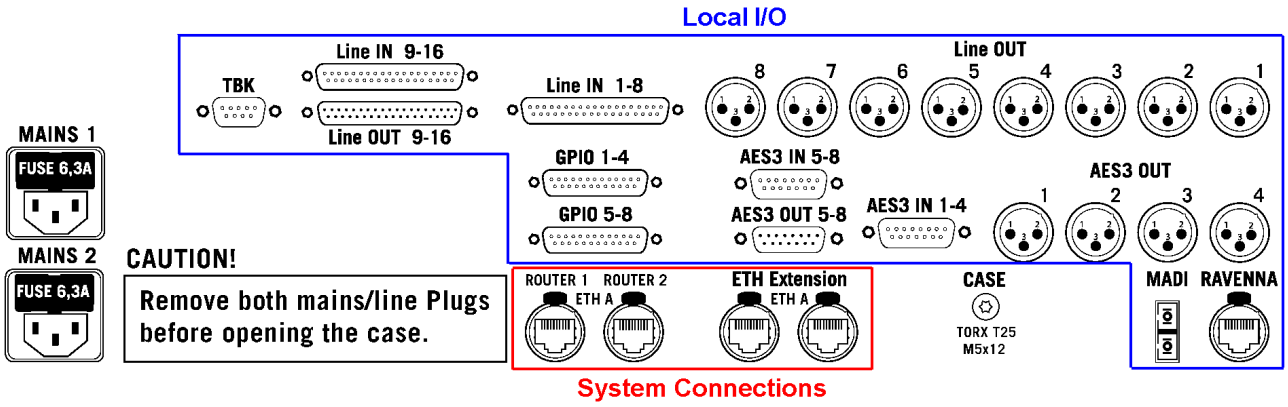
Checking Network Communication

You can use AdminHD, mxGUI or the Web Browser Interface to check the network communication.

Wiring from the Control Surface

Main Frame (Rear Connector Panel)

The principle connections come from the main control surface frame:

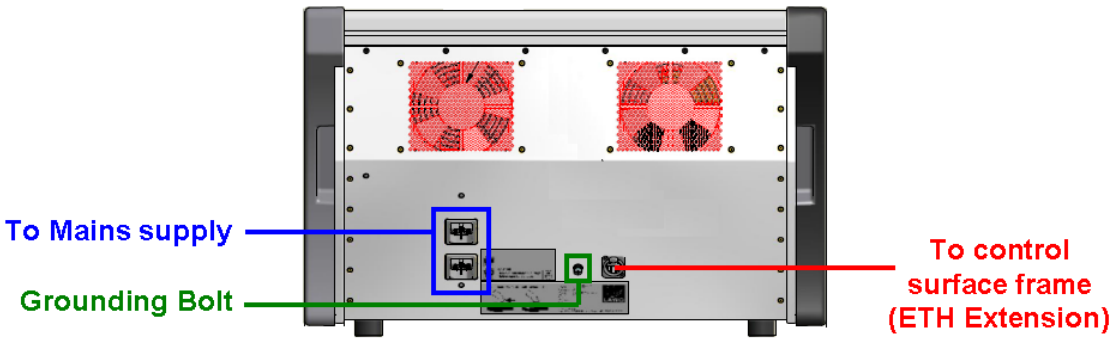


- **MAINS 1 & MAINS 2** - see control surface power. Only one mains connection is essential for operation; the second provides redundancy.
- **CASE** - see control surface grounding.
- **ROUTER 1 & ROUTER 2 (ETH A)** - see Ethernet A. Only one connection (to the active Router Module) is essential for operation; the second connection is required if a redundant Router Module is fitted.
- **ETH Extension x 2 (ETH A)** - connect to extender frames.
- **MADI & RAVENNA** - one of these ports connects the local I/O board to the Nova73. The connection type is pre-determined by the version of the Local I/O board, so check your system specification for details.
- **TBK**, **LINE**, **AES & GPIO** - audio and GPIO breakouts for the local I/O, see Local I/O and Local I/O Wiring.

Extender Frames

Extenders require their own power and grounding connection, and connect to the main control surface frame via Ethernet:

Use a straight (1:1) network cable (STP-CAT 5 with RJ45 connectors) to connect the extender to one of the **ETH Extension** ports on the main frame. If more than two extenders are fitted, then a Fast Ethernet switch is supplied.



If you are adding a new extender, then you may need to adjust the Bay Server address settings.

Main Frame (Front)

Note that a number of "user" connections are also available at the front of the console:

- **USB x 2** - on the Overbridge, to connect the console keyboard or a data memory stick.
- **XLR x 1** - on the Overbridge. This is the talkback mic connector.
- **Stereo Headphones x 2** - in the arm rest. The default monitoring configuration sets HP 1 to follow the CRM 1 monitor source selector, and HP 2 to follow CRM 2. Note that on larger frames, two additional phones connectors (HP 3 & 4) operate in parallel with HP 1 & 2.
- **Ethernet x 1** - in the arm rest. Another network port for connecting an mxGUI or AdminHD/ service computer.

Wiring from the Nova73

The **Nova73 HD** (shown below) and Nova73 Compact core provide identical connections:

Nova73HD Front View

Nova73HD Rear View

Front Connections:

- **PSU 1** & **PSU 2** - see Nova73 power. Only one PSU is essential for operation; the second provides redundancy.
- **Router Module(s) MKII:**
  - ETHERNET A – connect to the control surface.
  - ETHERNET B – connect to the Lawo system network.

If two Router Modules are fitted, then run Ethernet A and Ethernet B connections from both the main and redundant Router Modules.

- **MADI, ATM & RAVENNA** - connect to DALLIS units or external I/O devices. See Nova73 Module Options. One MADI or RAVENNA port must be reserved for the local I/O.

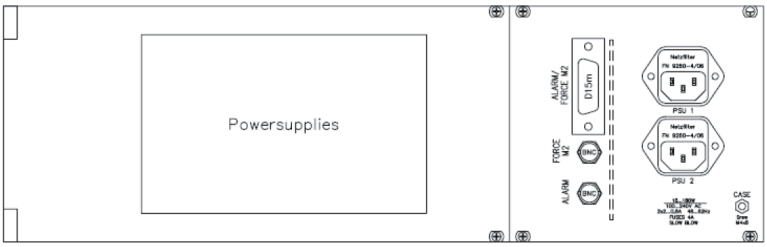
Rear Connections:

- **SYNCHRONISATION Ports** - see External Sync. If a sync reference is not connected, or invalid, then the system automatically switches to internal sync.
- **GPI 1 & 2, Global ALARM** - see Nova73 Alarm & Control Contacts.
- **AES Breakout Connectors** - see Nova73 rear connector panels.

Wiring from DALLIS Unit(s)

Front View (3U frame)

Rear View (3U frame)



Front Connections:

- **DALLIS Master Board(s):**
  - **MADI, ATM or RAVENNA** - connect to the Nova73, see DALLIS Interface Options. If two master boards are fitted, then you may configure Link & Port Redundancy.
  - **CTRL, WCLK, SYNC** - on some master boards, you will find additional connections for a control computer and local sync. Please refer to the relevant data sheet, available in the "mc2_Nova73_documentation" guide. Note that external sync for the mc²56 MKII should be made to/from the Nova73.
- **DALLIS I/O Cards** - audio and GPIO breakouts, see DALLIS Interface Options.

Rear Connections:

- **PSU 1** & **PSU 2** - see DALLIS_power. Only one PSU is essential for operation; the second provides redundancy.
- **ALARM & FORCE M2** - see DALLIS Alarm & Control Contacts.

Nova73/DALLIS Interconnects

The type of master board determines how each DALLIS unit connects to the Nova73. There are three possible options: MADI, ATM or RAVENNA:

MADI

- AES10, multi-channel digital audio interface.
- Connections are either multi-mode or single-mode fibre, depending on the master board type; duplex-SC connectors:
  - Multi-mode fibre: 62.5 / 125 µm, 1300nm
  - Single-mode fibre: 9 / 125 µm, 1300nm
- Up to 64-channels at 48kHz, or 32-channels at 96kHz, per port.

A minimum of 4-channels are used to transport Port DSP resources to/from the DALLIS. This leaves up to 60-channels at 48kHz, or 28-channels at 96kHz, for plug-in I/O.

ATM

- ATM, over STM-1, multi-channel digital audio interface.
- Connections are either multi-mode or single-mode fibre, depending on the master board type; duplex-SC connectors:
  - Multi-mode fibre: 62.5 / 125 µm, 1300nm
  - Single-mode fibre: 9 / 125 µm, 1300nm
- Up to 80-channels at 48kHz, or 40-channels at 96kHz, per port.

RAVENNA

- Ravenna Link 1.0, multi-channel digital audio over IP interface.
- Two physical connections, per port, for standard CAT 5 Ethernet *and* optical fibre:
  - CAT 5/6/7 Gigabit Ethernet, RJ45 connectors, crossed or straight (1:1) cable, up to 100m.
  - Optical transceivers (SFPs) can be installed for multi-mode or single-mode fibre. These *must* be Lawo-certified, see SFP Modules.
- Up to 128-channels at 48kHz, *and* 96kHz*, per port, for DALLIS interconnects. (RAVENNA supports 128/256-channels per port for non-DALLIS applications.)

* 96kHz RAVENNA is a future option.

Connecting the RAVENNA Ports

RAVENNA links should be *directly* wired to the corresponding RAVENNA port. The interface is completely self-configuring. Thus, once you have connected the ports (from your Nova73 to DALLIS), no further network configuration is necessary.

Warning

To guarantee low latency, reliability and easy setup, do *NOT* connect any network equipment between the two RAVENNA ports.

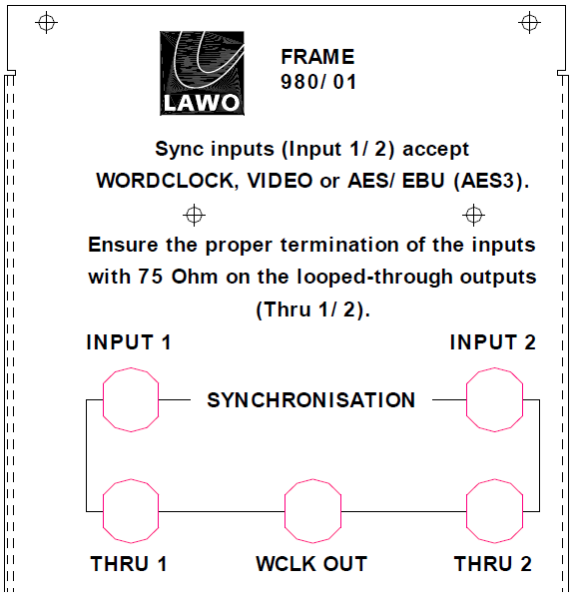
When both copper and fibre are installed at start-up, fibre is the preferred medium. In either case, the second medium can be hot-plugged without disturbing the current operating link. If a link breaks, then the card automatically switches to the second medium (if installed) - note that there will be an audible audio interruption until the automatic link/stream setup re-establishes the connection.

Close any unused optical connectors, with a protection plug, to avoid performance degradation by dust or dirt.

For more details, see Service/Maintenance: RAVENNA Interfaces.

External Sync

All external sync connections should be made to and from the Nova73 rear connector panel:



- **INPUT 1 & INPUT 2** - accept Wordclock, Video Black Burst (PAL or NTSC) or AES 3-id.

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

The Nova73 supports only one video format at a time. Thus, if both inputs are supplied with Video Black Burst, only signals of the same type can be used (either PAL or NTSC).

- **THRU 1 & THRU 2** - provide an output of the sync signals connected to **INPUT 1** & **INPUT 2**. Note that the **THRU** ports provide a "looped-through" signal, and do *NOT* follow the system clock selection.

Warning

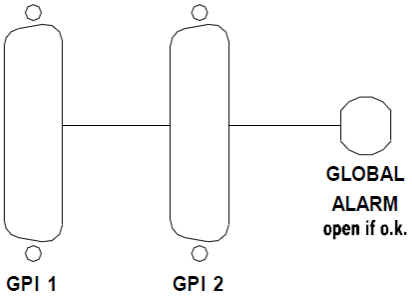
If no further components are connected to the **THRU** ports, then it is essential to terminate each port using a 75 ? resistor. Terminating resistors, designed as BNC connectors are included in the delivery.

- **WCLK OUT** - provides an output of the current system clock. This output follows the system clock selection.

The sync signal priorities are defined using the Wordclock options in the **System Settings** display.

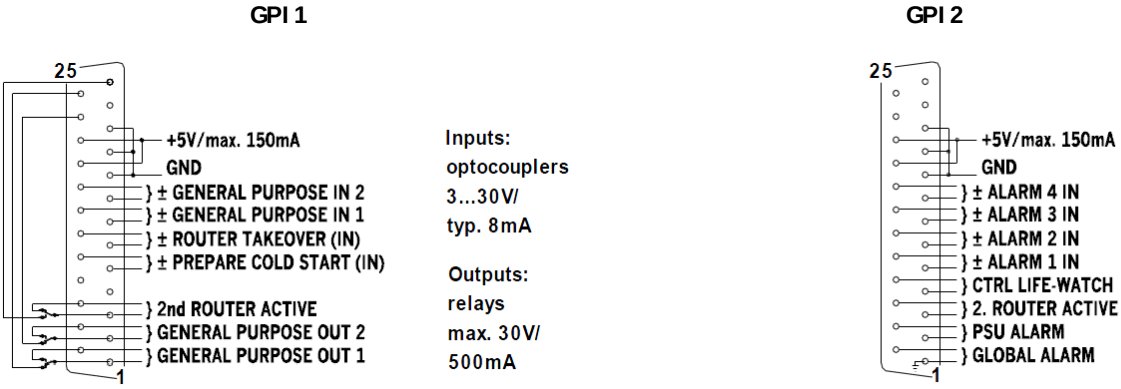
A star-like clock distribution, via a distribution amplifier, offers better signal quality and should be preferred to that of passive daisy chaining.

Nova73 Alarm & Control Contacts



Three alarm connectors appear on the Nova73 rear panel:

- **GPI 1 & GPI 2** - two 25-pin D-Sub connectors carrying various input and output signals.
- **GLOBAL ALARM** - one BNC carrying the global alarm.



On both D-Sub connectors, you can pick up a short-circuit proof voltage feed (+5V, max 150mA).

GPI Inputs

The GPI inputs are opto-couplers; accept voltages of 3V..20V; draw a typical current of 8 mA; and are floating and galvanically isolated.

➢ **GPI 1**

- **GENERAL PURPOSE IN 1 & 2** – used for project-specific applications, please check your system specification for details.
- **ROUTER TAKEOVER (IN)** – use this input to force a takeover to the redundant Router Module. The takeover is triggered by a positive edge at the input.
- **PREPARE COLDSTART (IN)** – when turning on the Nova73, supply a voltage at this input to force a cold start.

➢ **GPI 2**

- **ALARM IN 1 to 4** - may be used to monitor peripheral equipment such as devices from other manufacturers. The inputs *MUST* be factory-configured. Each alarm is triggered by an applied voltage. When the input is open or grounded, the alarm is cancelled. Within the AdminHD configuration, you can assign a text error message for each input, and define whether the input activates the global alarm. Predefined standards are:
  - **ALARM 1 IN** = failure of the external clock supply (activates the global alarm).
  - **ALARM 2 IN** = failure of the external power supply (activates the global alarm).
  - **ALARM 3 IN** = failure of the external I/O system (activates the global alarm).
  - **ALARM 4 IN** = the external device exceeds its operating temperature (activates the global alarm).

GPI Outputs

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

➢ **GPI 1:**

- **2nd ROUTER ACTIVE** – this contact reports the activation of the redundant Router Module (closed status).
- **GENERAL PURPOSE OUT 1 & 2** – used for project-specific applications, please check your system specification for details.

➢ **GPI 2:**

- **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.com for more details.
- **PSU ALARM** – this contact reports the failure of either of the Nova73 PSUs (closed status).
- **GLOBAL ALARM** – this contact signals that the global alarm is active (closed status).

Global Alarm

The global alarm can be output by both the **GLOBAL ALARM** BNC and GPI 2 D-Sub connectors.

The global alarm status can also be monitored from the Web Browser Interface.
Global alarm errors are stored on the control system in the **alarm.log** system logfile.

The global alarm may be disabled by the AdminHD configuration (see Parameters: Core -> System Settings).

When enabled, the global alarm is triggered when any of the following conditions are satisfied:

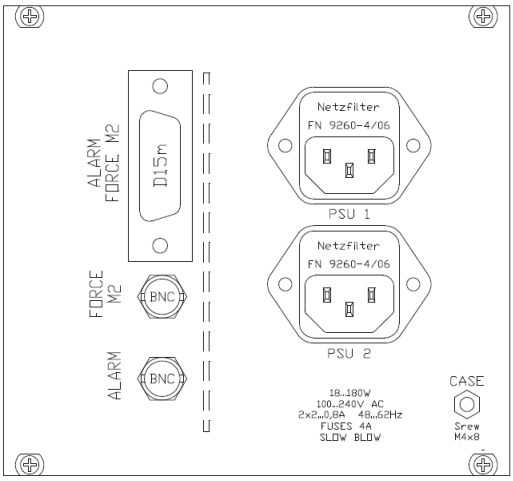
Within the Nova73:

- 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 Nova73.
- Malfunction of a PSU.
- Malfunction of a fan.
- Active external control input – the global alarm can be triggered by a control input from an external device (e.g. via GPI).
- Internal sync (optional) - the the AdminHD configuration can set the global alarm to be triggerd if the system switches to internal sync (see Parameters: Core -> Data).

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

- 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.

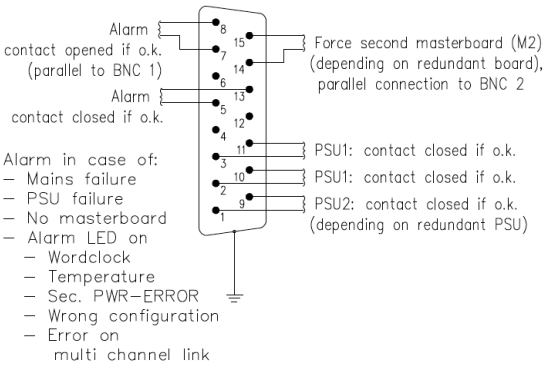
DALLIS Alarm & Control Contacts



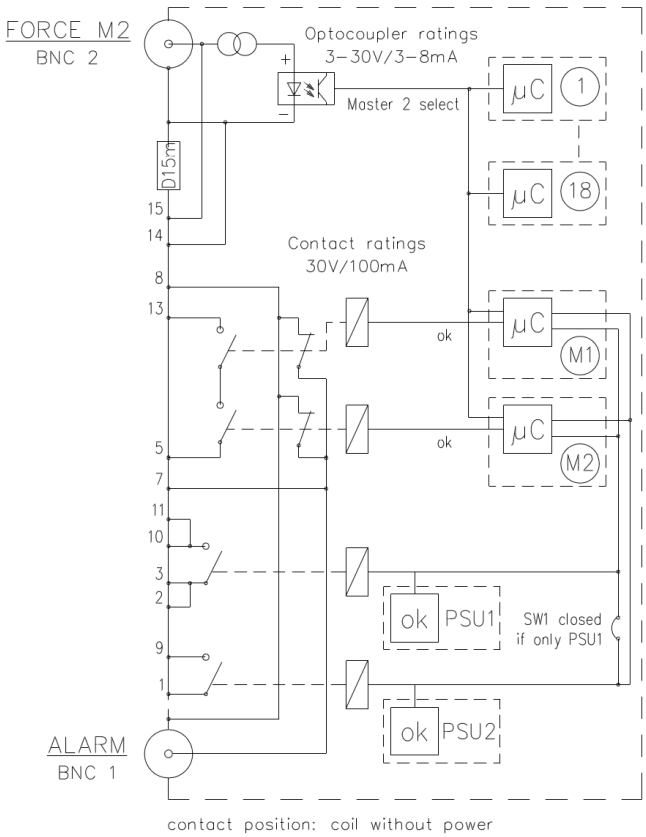
Three alarm connectors appear on the DALLIS rear panel:

- **ALARM FORCE M2** -15-pin D-Sub carrying the DALLIS local alarm and other signals.
- **FORCE M2** - BNC for the FORCE M2 control signal.
- **ALARM** - BNC carrying the DALLIS local alarm.

ALARM FORCE M2 D-Sub



ALARM FORCE M2 Block Diagram



ALARM FORCE M2

The following contacts are accessible via the **ALARM FORCE M2** (15-pin D-Sub) connector:

- **Force second masterboard M2** (Pins 14&15) – use this input to force a redundant Master Board takeover (if two master boards are fitted to the DALLIS). The takeover is triggered by a positive edge at the input.
- **Alarm** (Pins 7&8) – this contact signals that the DALLIS local alarm is active (closed status).
- **Alarm Inverted** (Pins 5&13) – as above, but the status is inverted.
- **PSU 1** (Pins 3&11; Pins 2&10) – these contacts report the failure of PSU 1 (closed status).
- **PSU 2** (Pins 1&9) – this contact reports the failure of PSU 2, if fitted (closed status).

The two BNC connectors provide:

- **FORCE M2** – use this input to force a redundant Master Board takeover (as above).
- **ALARM** – outputs the DALLIS local alarm.

DALLIS Local Alarm

A local alarm for the DALLIS unit can be output by both the **ALARM** BNC and **ALARM FORCE M2** D-Sub connectors.

Note that some of the alarm conditions vary for DALLIS fitted with the RAVENNA master board (947/21); the differences are highlighted in the second table below.

Local Alarm Output States for DALLIS fitted with 947/03, 947/13, 947/05, 947/07 and 947/15

Condition	ALARM (BNC / D-Sub Pin 7&8)	ALARM Inverted (D-Sub Pin 5&13)
No power	closed	open
1 card in left slot, booting	closed	open
1 card in left slot, no error present	open	closed
1 card in left slot, error present	closed	open
2 cards, booting	closed	open
2 cards, left no error, right no error	open	closed
2 cards, left error, right no error	closed	open
2 cards, left no error, right error	closed	open
2 cards, left error, right error	closed	open

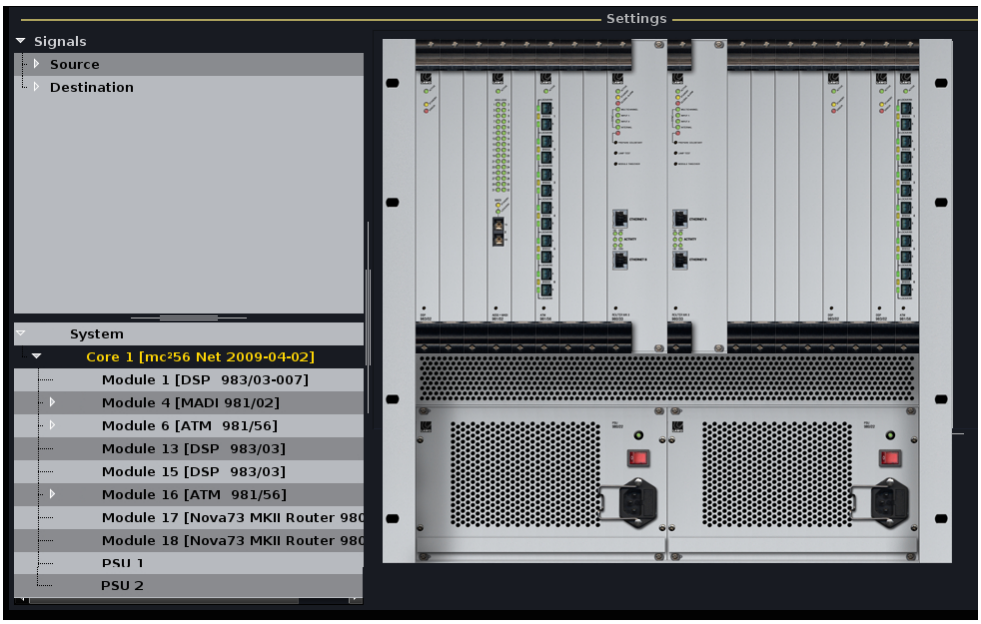
Local Alarm Output States for DALLIS fitted with 947/21

Condition	ALARM (BNC / D-Sub Pin 7&8)	ALARM Inverted (D-Sub Pin 5&13)
No power	closed	open
1 card in left slot, booting	closed	open
1 card in left slot, no error present	closed	open
1 card in left slot, error present	open	closed
2 cards, booting	closed	open
2 cards, left no error, right no error	closed	open
2 cards, left error, right no error	closed	open
2 cards, left no error, right error	closed	open
2 cards, left error, right error	open	closed

Powering On & Checking the System

For details on how to power on, see System Shutdown and Restart.

Once the system has booted, you can check that the status of all Nova73 and DALLIS components by looking at the console's **Signal Settings** display. If all modules and DALLIS units are installed and operating correctly, then they appear in grey:



If any components are not installed or connected, then a red/white cross in the System tree, and a red highlighted card, shows the location of the problem. See Diagnosing System Errors.

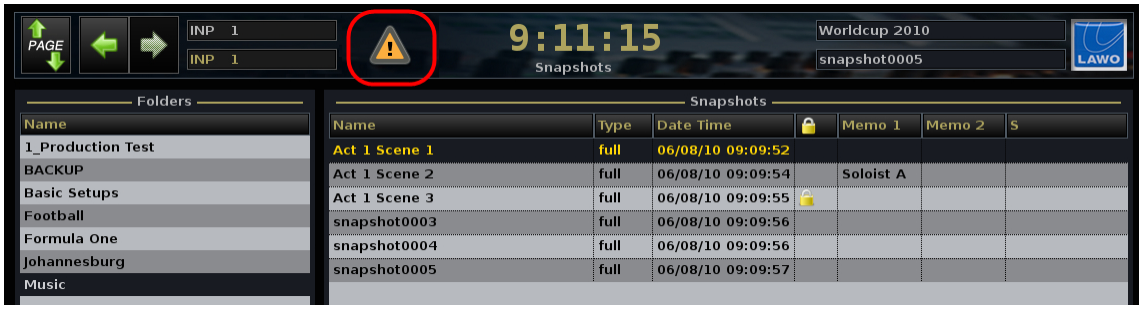
You can also check the status LEDs on each unit's front panel:

The **ACTIVE** LED on each Nova73 module, or DALLIS card, should blink in time with all other **ACTIVE** LEDs (at approximately 100Hz). This shows that the card is synchronous to the rest of the system. If an LED is out of sync, then check that the card is fitted correctly, and if the symptom persists, replace the card.

See also trouble-shooting for a list of example problems and fault-finding tips.

Diagnosing System Errors

In the event of a component failure, a hazard warning flag appears in the title bar of the console GUI. Note that this flag will appear at the top of any display, so you don't need to be viewing the **Signal Settings** display to monitor your system hardware:

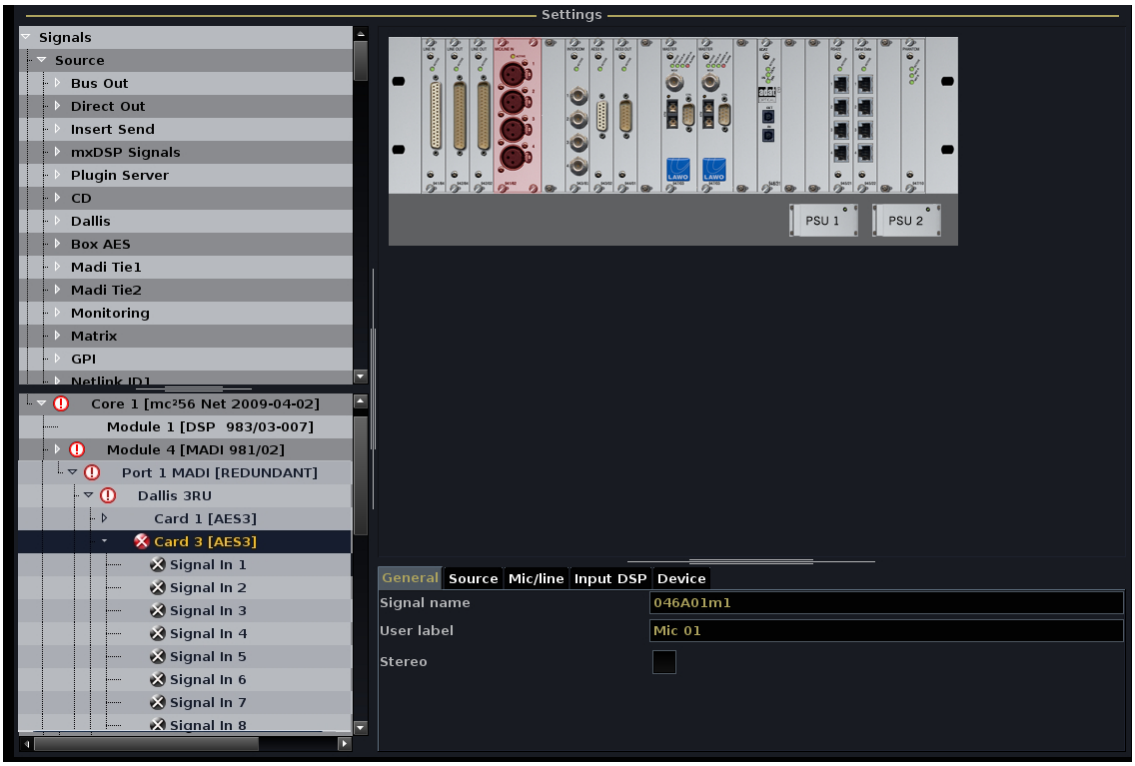


1. Press the **SIGNAL** button, located on the SCREEN CONTROL panel, to view the **Signal Settings** display.

*A red/white cross in the **System** tree, and a red highlighted card, show the location 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.

3. Open the DALLIS card further, and 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 in the title bar is cleared.*

System Settings

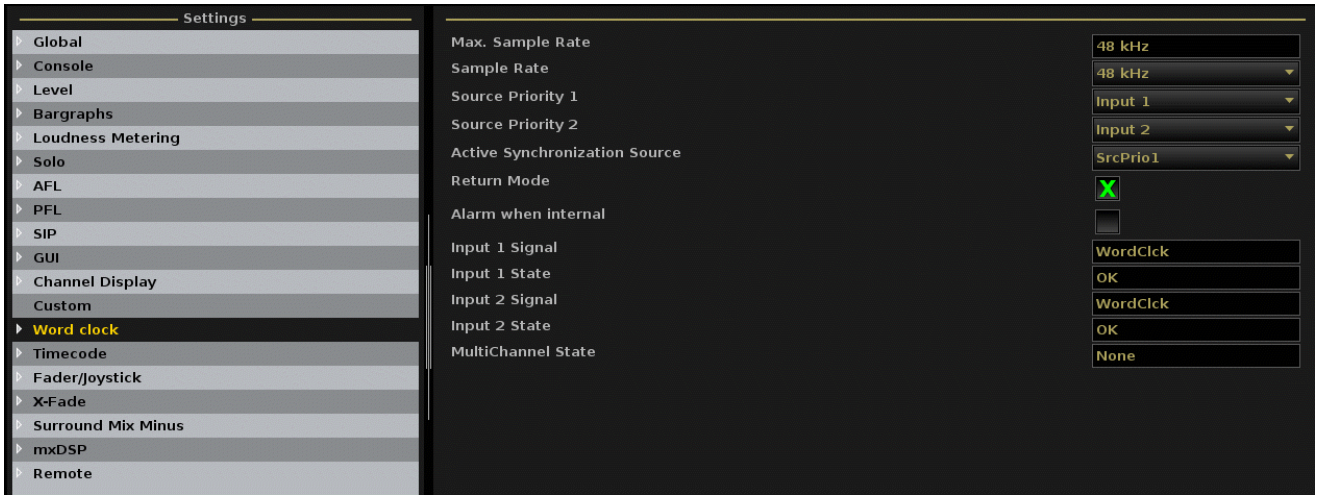
At this stage, you may also want to adjust the following **System Settings** from the console GUI:

- Wordclock Options - sample rate and system clock priorities.
- Level Options - reference level and headroom.

All **System Settings** are stored and recalled with productions. Therefore, any changes should be saved for recall at a later date.

Wordclock Options

The **Wordclock** topic covers a range of options for selecting the internal sample rate of the system, and defining source priorities for system sync.



Max Sample Rate & Sample Rate

The option to run at higher (96kHz or 88.2kHz) or lower (48kHz or 44.1kHz) sample rates is made within the AdminHD configuration and cannot be modified from the console.

Higher sample rates use twice as much DSP resource as lower sample rates; this is reflected in the DSP Configurations display.

Higher sample rates also affect the crosspoint capacity of the routing matrix (8k² at 48kHz, or 4k² at 96kHz).

Max Sample Rate

The maximum rate is displayed in the **Max Sample Rate** field. This field is for display purposes only, and determines the available **Sample Rate** options below.

Sample Rate

This option selects the internal sample rate of the system.

If the system is configured to run at lower sample rates (by AdminHD), then you may select either **48kHz** or **44.1kHz** operation.

If the system is configured to run at higher sample rates, then you may select **96kHz**, **88.2kHz**, **48kHz** or **44.1kHz** operation.

It is recommended that you mute your loudspeakers when changing the system sample rate.

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

System Clock Options

The remaining **Wordclock** options define the system's sync reference.

The Nova73 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.

Source Priority 1 & 2

These two options define the main and redundant clock source.

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 Priority 2**, the system automatically switches to internal sync.

You can set each of the options to:

- **Input 1** – connected to the Nova73 rear panel (Wordclock, Video Black Burst or AES3-id).
- **Input 2** – connected to the Nova73 rear panel (Wordclock, Video Black Burst or AES3-id).
- **MultiCh** - Multichannel Sync (MADI or ATM, as defined by 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**.

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**.

Alarm when Internal

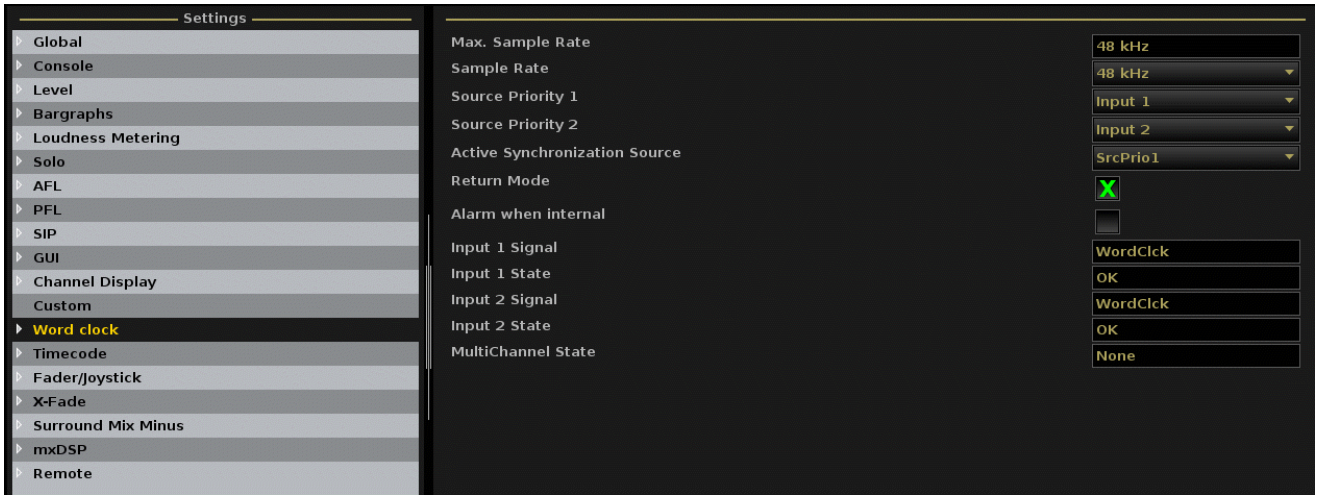
This option activates an alarm when the system is running on internal sync:

- **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 Nova73 Router Card.

External Sync Input Status

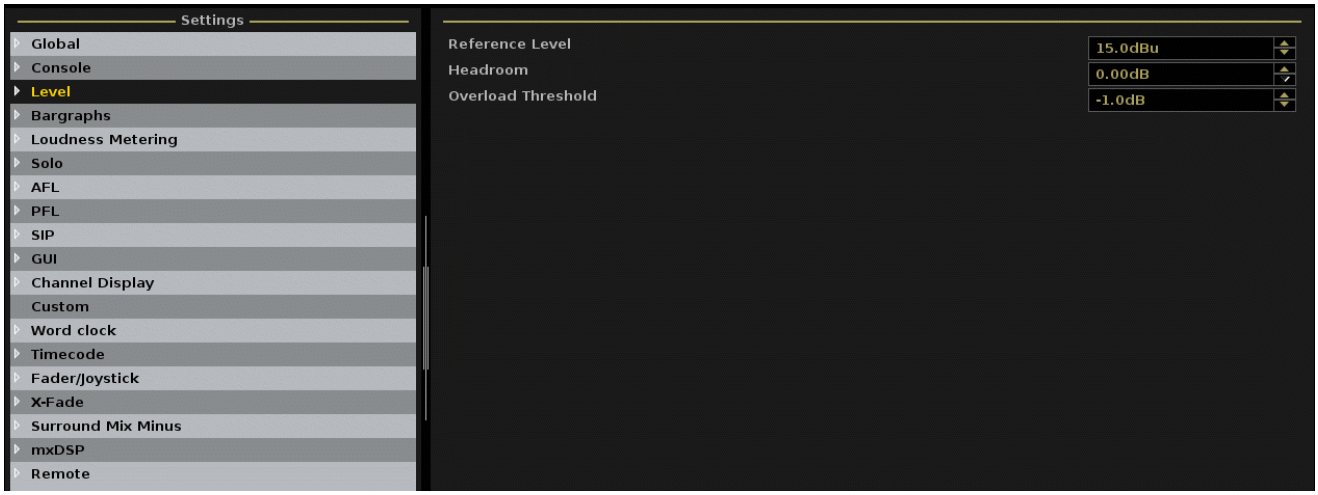
The next five options are for display purposes only and show the status of the external and multi-channel sync signals.



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**.

Level Options

Select the **Level** topic to make changes to the system's reference level, headroom or overload threshold:



These levels affect the maximum analogue level from your system according to the following equation:

- Maximum Analogue Level = **Reference Level** + **Headroom**

The system supports a maximum analogue level = +24dB, and a minimum analogue level = +12dBu.

Warning

Changing the **Reference Level** or **Headroom** options move the internal 0dB operating point for the system and therefore will change the behaviour of any level dependent settings such as dynamics processing and metering. Therefore, it is not advisable to alter these levels once dynamics processing has been set.

For systems fitted with fixed level analogue I/O cards:

- The **Headroom** and **Reference Level** cannot be altered independently. For example, with a +15dBu fixed analogue I/O card and +9dB **Headroom**, the **Reference Level** *must* be +6dBu.
- The Maximum Analogue Level of the whole system is defined by the DALLIS card with the lowest GDA (General Device Address) - this is the card with the lowest address fitted to the DALLIS frame connected to the lowest port number of the first Nova73. (If a different fixed level analogue card is fitted elsewhere within the system, then a warning appears in the log file; however, the card with the lowest GDA still wins.)

Reference Level

Sets the reference level of your analogue interfaces in dBu.

Reference level may be set from 0dBu to +24dBu, depending on the **Headroom**.

Headroom

Sets the operating headroom to the external world; this is the difference between the analogue reference level and digital full scale (0dBFS).

Headroom may be set from 0dB to +20dB depending on the **Reference level**.

Note that the internal Headroom is more then 380dB which means, if you route from input to group to group to sum, you can overdrive the level more then 380dB before clipping!

Chapter 3: AdminHD

Introduction

This chapter covers **AdminHD**, the Lawo software programme which runs on an external computer to provide remote configuration of any mc² system.

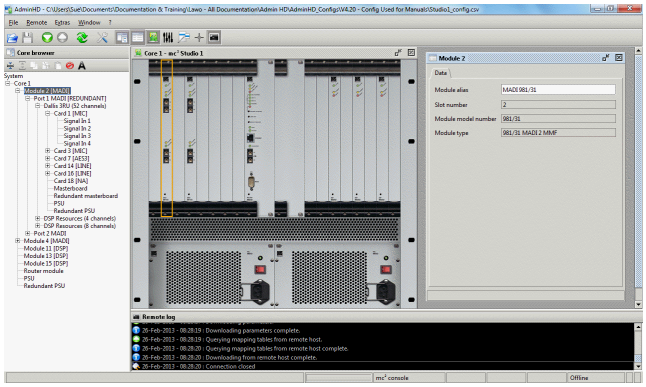
Topics covered are:

Overview

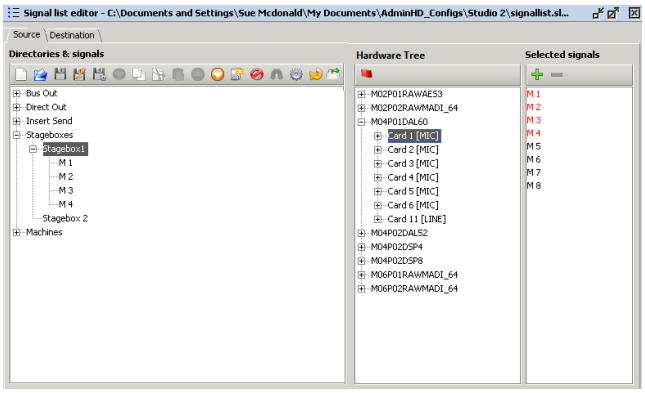
AdminHD is the Lawo software application used to configure all **Nova73** systems.

It is responsible for generating the **config.tcl** and **gui_config.tcl** configuration files, which are read by the control system at boot-up following a cold start. These files define the Nova73 and DALLIS system components, and the console GUI's **Signal List** display:

System Configuration

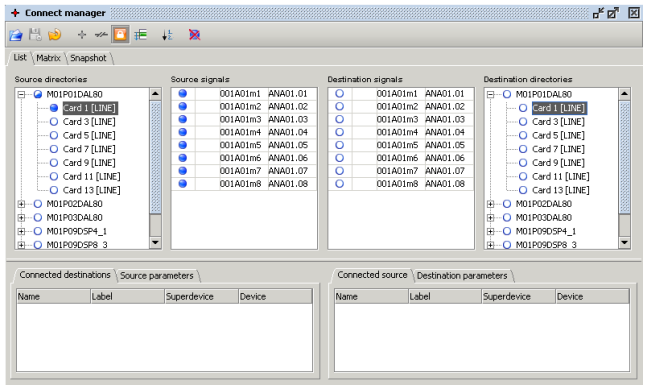


Signal List Editor

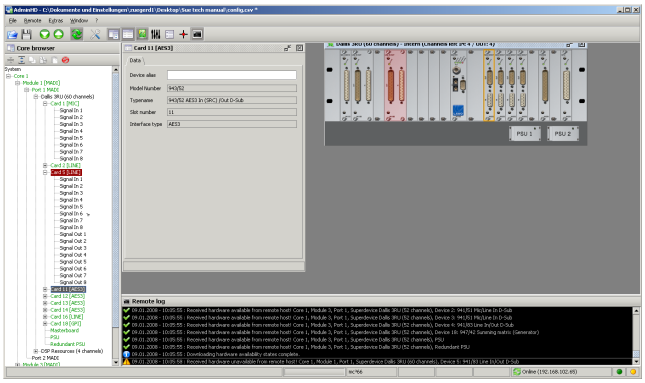


It can also run online to provide control of matrix crosspoints, signal labels and I/O settings, or perform system diagnostics:

Online Connect Manager



System Diagnostics



In addition, a number of useful tools are included for documenting the configuration.

The configuration files created by AdminHD are an essential part of the system. If a hardware component is not defined within these files, then it will not be visible to the user 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:

- 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 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.

AdminHD and mxGUI

From Version 4.8 software onwards, a separate programme – **mxGUI** – is available to complement **AdminHD**.

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 (via the 'Connect Manager'). **mxGUI** emulates the GUI displays of the mc² consoles, providing control of virtually any user parameter.

Both programmes can also run offline on your computer. This allows you to prepare a complete system ahead of an event as follows:

1. Use **AdminHD** to define the Core configuration (config.tcl) and Signal List (gui_config.tcl).
2. Upload the configuration files from **AdminHD** to the **mxGUI** local control system on your computer.
3. Use **mxGUI** to prepare and save user settings (by saving a production).
4. Once connected to the final system, you can use **mxGUI** to transfer both the configuration and production(s) from your computer to the Lawo control system.

For more details on **mxGUI**, please refer to the "mc²56 Operators Manual".

Compatibility

AdminHD may configure, or connect to, any Nova73 system. To ensure that you can only access the options supported by your product, the software can be opened in one of two modes:

- **AdminHD for Mixing Consoles** – supports mc²56, 66 and 90 consoles (MKI and MKII).
- **AdminHD for Nova73 & DSHS** – supports the Nova73 stand-alone routing matrix, or Nova73 HD Dual Self-Healing Star.

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

From version 4.0.2.2 onwards, all Lawo products have adopted a consistent software release numbering system to indicate compatibility. In each case, the first three digits of the software version *must* match.

So, to prepare a configuration or connect to a mc² console running **4.20.2.0**, you need to run AdminHD **4.20.2.x**.

You can check the software version of your mc² system from the Global Options in the **System Settings** display, and the version of AdminHD from the ? main menu.

Note that:

- Configurations saved by an earlier version of AdminHD can be opened in a later release. However, configurations saved by a newer release are not backwards compatible.
- Configurations created for one type of system are *NOT* compatible with another; you cannot open a mixing console configuration from **AdminHD for Nova73 & DSHS**, or vice versa.

Computer System Requirements

To install and run the AdminHD software, your computer *MUST* meet or exceed the following system requirements:

Windows PC:

- **Hardware**: 500MHz.
- **Operating System**: Windows XP, Windows Vista (32-bit), Windows 7 (32-bit and 64-bit)
- **RAM**: 1.5GB RAM (Windows XP), 2GB RAM (Windows Vista/7).
- **Hard Disc**: minimum 200 MB free space.
- **Operation**: Keyboard and mouse.
- **Interface**: Ethernet 10/100Mbit.

MAC:

- **Hardware**: 500MHz.
- **Operating System**: MAC OS X 10.6 (Snow Leopard), 10.7 (Lion), 10.8 (Mountain Lion)
- **RAM**: 2GB RAM
- **Hard Disc**: minimum 200 MB free space.
- **Operation**: Keyboard and mouse.
- **Interface**: Ethernet 10/100Mbit.

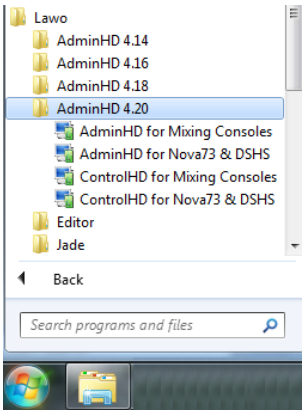
Software Installation

During installation, you may choose to install AdminHD and/or ControlHD:

- **AdminHD** is the administration programme providing configuration, remote control, system diagnostics and documentation.
- **ControlHD** is a subset of the AdminHD software. It looks and operates in an identical manner, but can only be used for remote control and system diagnostics (i.e. not configuration).

By installing only ControlHD on some computers and AdminHD on others, you can set up computers for different users within the facility. Remember that you may also use mxGUI for online operation of the system.

In each case, both modes are installed (**... for Mixing Consoles** and **... for Nova73 & DSHS**), resulting in up to four programme entries on your computer:



You can install multiple AdminHD versions (4.18, 4.20, etc.) as shown above; there is no need to uninstall older versions. This is particularly useful when working with systems running different releases of software..

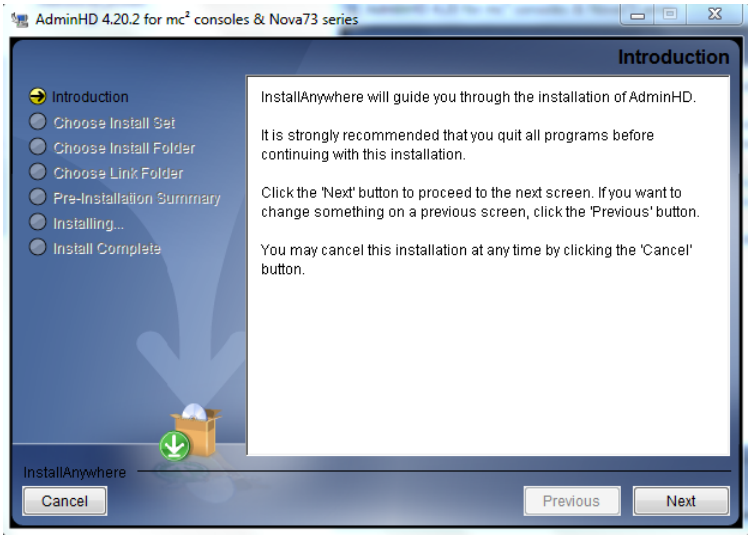
Licensing

Lawo's AdminHD/ControlHD application is free of charge and does not require a software licence.

Installation Procedure

1. Copy the **AdminHD_Release_X-X-X-X.zip** onto your computer and unpack the file.
2. Double-click on the relevant **installer**.

AdminHD is delivered in a compressed format, so it may take a few seconds before you see the 'Setup Wizard':



If you are running Windows 7, then you may be prompted to allow changes to your User Account; select **Yes** to continue.

If you are running MAC OS X 10.8 (Mountain Lion), and have problems opening the installer, see additional notes for MAC OS X.

3. Follow the Wizard's instructions accepting the default options provided.

As part of the installation process, you can choose the **AdminHD**, **ControlHD** or **AdminHD + ControlHD** install set.

4. When you reach the 'Summary' window, check the options and click **Install**.

The software is installed onto your computer; this may take a few minutes.

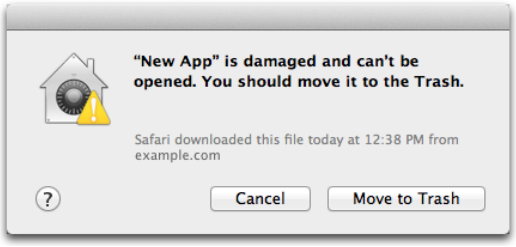
By default, files are installed in the location: 'C:\Program Files\Lawo/AdminHD X.XX'. where X.XX is the release version.

5. When the installation is complete, a confirmation window will appear.
6. Click on **Finish** to exit the 'Setup Wizard'.

If you have any problems with the software installation, please contact your local Lawo representative or email service@lawo.com.

Additional Notes for MAC OS X Installation

If you are running **MAC OS X 10.8.x.x** (Mountain Lion), then you may see the following error message after double-clicking on the "install.exe" file:



This error can appear if your "Gatekeeper.app" does not allow installation from downloads which are not from the MAC App Store. To change this setting:

1. Select "**System Preferences** -> **Security & Privacy**" and set the "**Allow applications downloaded from**:" as follows:

2. Then retry opening the AdminHD "install.exe" file.

Uninstall & Update

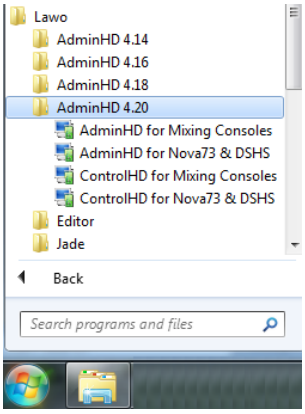
Uninstalling AdminHD

On Windows 7, use the “Uninstall a program” option within the Control Panel to uninstall AdminHD.

On MAC OS X, remove the programme from your "Applications" folder.

Updating AdminHD

To update to a newer version of AdminHD or ControlHD, simply run the installer; there is no need to uninstall older versions. Following installation, each version appears within its own folder:



Connecting to the Lawo Control System

In order to transfer configuration data, or run AdminHD online, you will need a valid network connection between your computer and the mc²56 MKII control system.

On the mc²56 MKII, the **ETHERNET B** port on the Nova73 Router Module MKII (980/33) should be used:

1. Connect your computer to the Lawo system network.
2. Configure the TCP/IP settings on your computer's network interface card.

The control system location may vary for other Lawo products, see Control System Locations.

You may open an existing AdminHD file, or create a new configuration, without this connection. However, it is a good idea to configure the network now, so that you are ready to transfer data later.

Checking the Network Communication

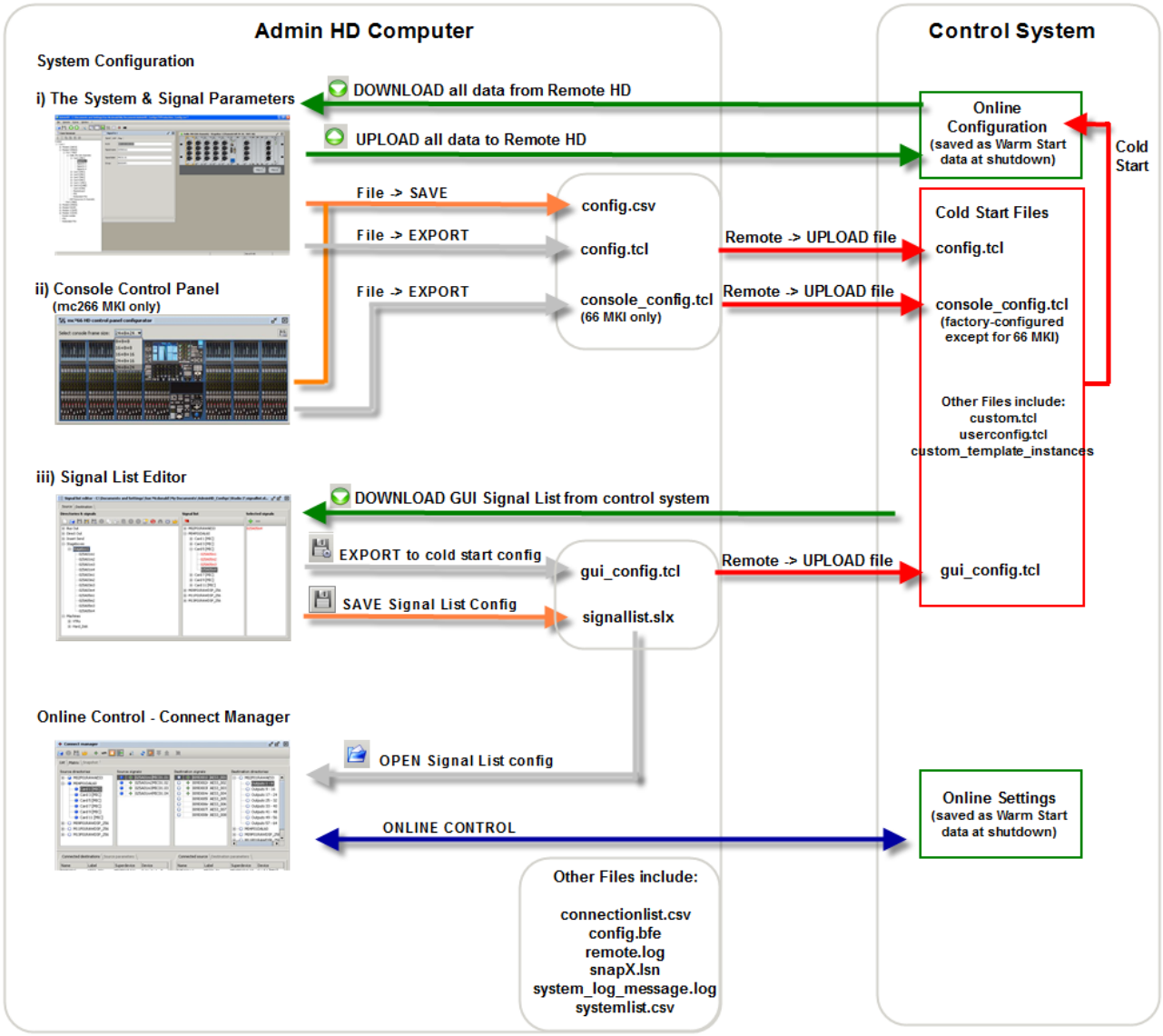
If this is the first time you have connected to the mc²56 MKII control system, then start AdminHD, create a new session and then download the online configuration from the remote system:

- If the connection is successful, then the 'Core Browser' updates to display the hardware components for your system.
- If the connection fails, then nothing appears in the 'Core Browser', and the 'Remote Log' reports that the connection has timed out:
  - Check the network connection and TCP/IP settings of your computer's network interface card.
  - Check that AdminHD is compatible with the mc²56 MKII system (the first three digits of the software versions *must* match.)
  - See also the trouble-shooting tips to resolve the problem.

Alternatively, if you have an existing AdminHD file, with the correct system IP address, then you can switch online to test the network communication.

Configuration Files

Before you start working with AdminHD, it is useful to understand how configuration data is stored on the mc²56 MKII control system, and which files can be edited and saved on your AdminHD computer. The diagram below illustrates the processes involved; keep reading for further explanation.



Control System Cold Start Files

The following configuration files are stored on the mc²56 MKII control system, and are read after a cold start:

- **config.tcl** – this file, known as the Core configuration, defines the:
  - Nova73 and DALLIS components.
  - System-wide parameters such as sample rate, reference levels and sync options.
  - Signal parameters such as the HLSD address, name, default label, I/O settings, silence detects and mapping tables.
- **gui_config.tcl** – this file, known as the Signal List configuration, defines the Directories, Subdirectories and signal organisation within the GUI's Signal List display.
- **console_config.tcl** – this file, known as the Console configuration, defines the control surface layout for mc² consoles.
- **custom.tcl** – this file defines customer-specific functions.
- **userconfig.tcl** – this file defines the user monitoring functions in the mc² console series.
- **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.

The table below summarises which files can be edited by AdminHD and which must be factory-configured. Also, whether files can be accessed by mxGUI and how they are named within mxGUI's File Transfer display:

Control System Filename	Edit in AdminHD	File Transfer to mxGUI	Appears in mxGUI as:
config.tcl	✓	✓	Core Configuration
gui_config.tcl	✓	✓	Signal List Configuration
console_config.tcl	✓*	✓	Console Configuration
custom.tcl	✗	✗	n/a
userconfig.tcl	✗	✗	n/a
Custom_template_instances	✗	✓	Custom_template_instances

* The **console_config.tcl** file can be edited using AdminHD for MKI mc²66 systems only; for all other mc² consoles, this file is factory-configured; the file is unused by a stand-alone Nova73.

Files such as the **custom.tcl** and **userconfig.tcl** must be edited by Lawo personnel. Please contact your local Lawo representative or email service@lawo.com if you require further assistance to modify these aspects of the configuration.

AdminHD Files (on your computer)

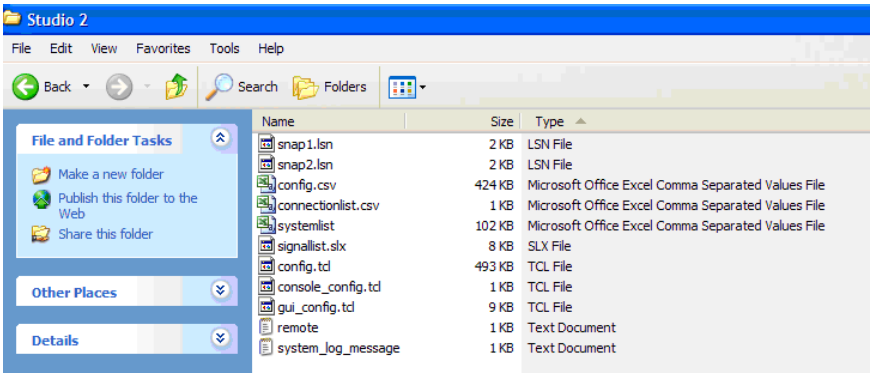
AdminHD cannot edit the **config.tcl** and **gui_config.tcl** files directly. Instead, it downloads the online configuration (running in memory) from the mc²56 MKII, and saves it locally onto your computer as a **.csv** or **.slx** file. These file types can then be opened, edited and saved by any AdminHD computer.

Once editing is complete, you can choose to either update the online configuration (in temporary memory) or export and upload new versions of the cold start **.tcl** files (recommended for permanent changes).

Organising Your Files

These processes mean that AdminHD creates several files all relating to a single system's configuration.

In the example below, we have created a folder named **Studio 2** to store all the AdminHD files for a mc² mixing console:



Create a backup folder to store copies of the current configuration files before you begin editing.

When using both AdminHD and mxGUI, you could create a master folder for the system, with separate sub folders for AdminHD and mxGUI.

The following files are created by AdminHD and stored locally on your computer:

- **config.csv** - created when you save the AdminHD configuration. This 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. It is a good idea to keep "config" in the name to distinguish it from other .csv files.

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

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

- **config.tcl** and **gui_config.tcl** - are the cold start configuration files exported from AdminHD. They are stored locally on your computer, in preparation for an upload to the mc²56 MKII control system.

DO NOT rename these files, or edit them using an application other than AdminHD. Otherwise, they cannot be read by the control system! If you wish to keep copies of 'older' versions, store them in a sub folder or change the filename.

- **systemlist.csv** - can be exported to produce a parts list for the hardware defined within your configuration. It is a .csv file which can be opened by a 3rd party editor, such as MS Excel, in order to print or view the data.
- **connectionlist.csv** - can be exported from the 'Connect Manager'. It is a .csv files which can be opened by a 3rd party editor, such as MS Excel, in order to print or view all matrix crosspoints set within the system.
- **config.bfe** - exported for use with a BFE controller system. Please contact your local Lawo representative or email service@lawo.com for more details.
- **remote.log** - created when you save the contents of the 'Remote Log' window as a text file. You may be asked for this file if you request assistance from the Lawo service department.
- **system_log_message.log** - can be downloaded from the mc²56 MKII control system. You may be asked for this file if you request assistance from the Lawo service department.
- **snapX.lsn** - are snapshot files which you can save or load from the 'Connect Manager'. If you are creating snapshots for multiple systems, then store them in separate folders on your computer.

Operating Principles

This section covers the basic operating principles of AdminHD:

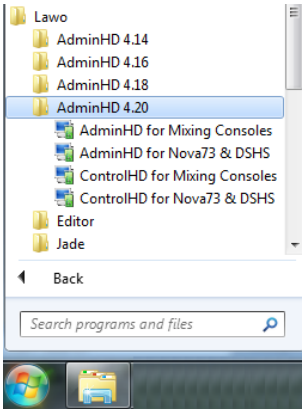
- Starting AdminHD
- The Main Operating Window
- Online/Offline Status
- The Main Toolbar
- The Sub Windows
- 'Core Browser'
- 'Graphic View'
- 'Parameter Box'
- 'Remote Log'
- The Main Menus
- AdminHD Preferences

If you'd like some data to work with, then create a new session and download the online configuration from the mc²56 MKII to your computer (recommended). Or, open an existing **config.csv** file.

If neither of these options are possible, create a new session and build a simple Core configuration from scratch.

Starting AdminHD

1. Start the programme, by selecting **AdminHD for Mixing Consoles** from the START menu (Windows) or Applications folder (MAC):

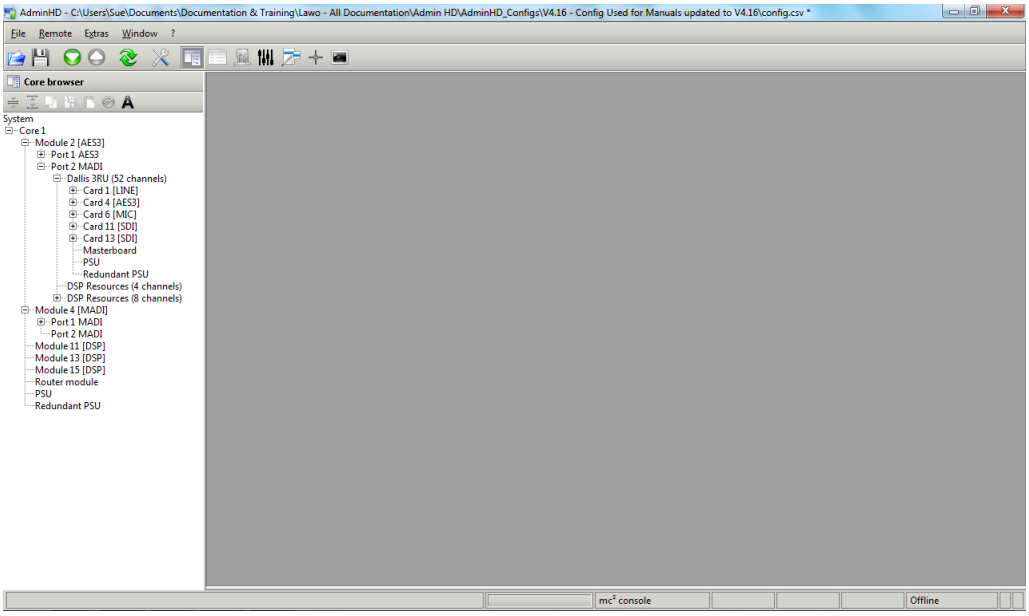


Warning

It is very important that you choose the correct mode (**... for Mixing Consoles** and not **... for Nova73**) , *AND* the correct software version (the first three digits *must* match the software running on your remote system).

If not, AdminHD will not be able to connect to the mc²56 MKII. Or, the system may not read your configuration data. See Compatibility for details.

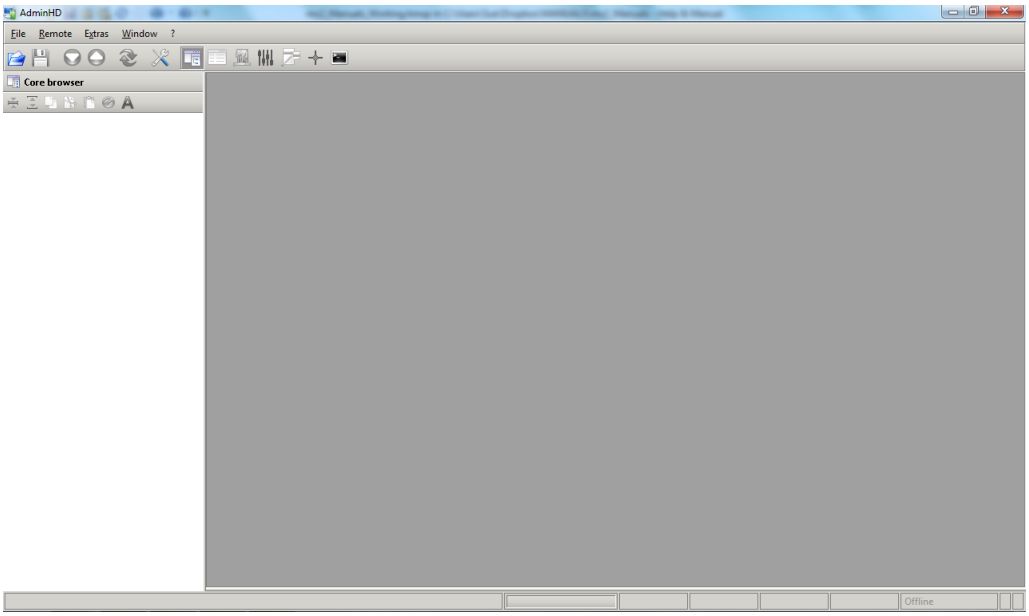
AdminHD starts up and opens the last configuration file (config.csv) you were working on:



If the file was saved in an older version of AdminHD, then you will be asked to convert it.

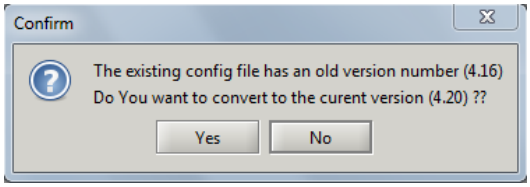
The 'Core Browser' and 'Remote Log' sub windows may open automatically (according to the **Extras** -> **Preferences** -> Startup menu).

If this is the first time you have started AdminHD, or a file could not be loaded, then AdminHD opens with a completely empty operating window:



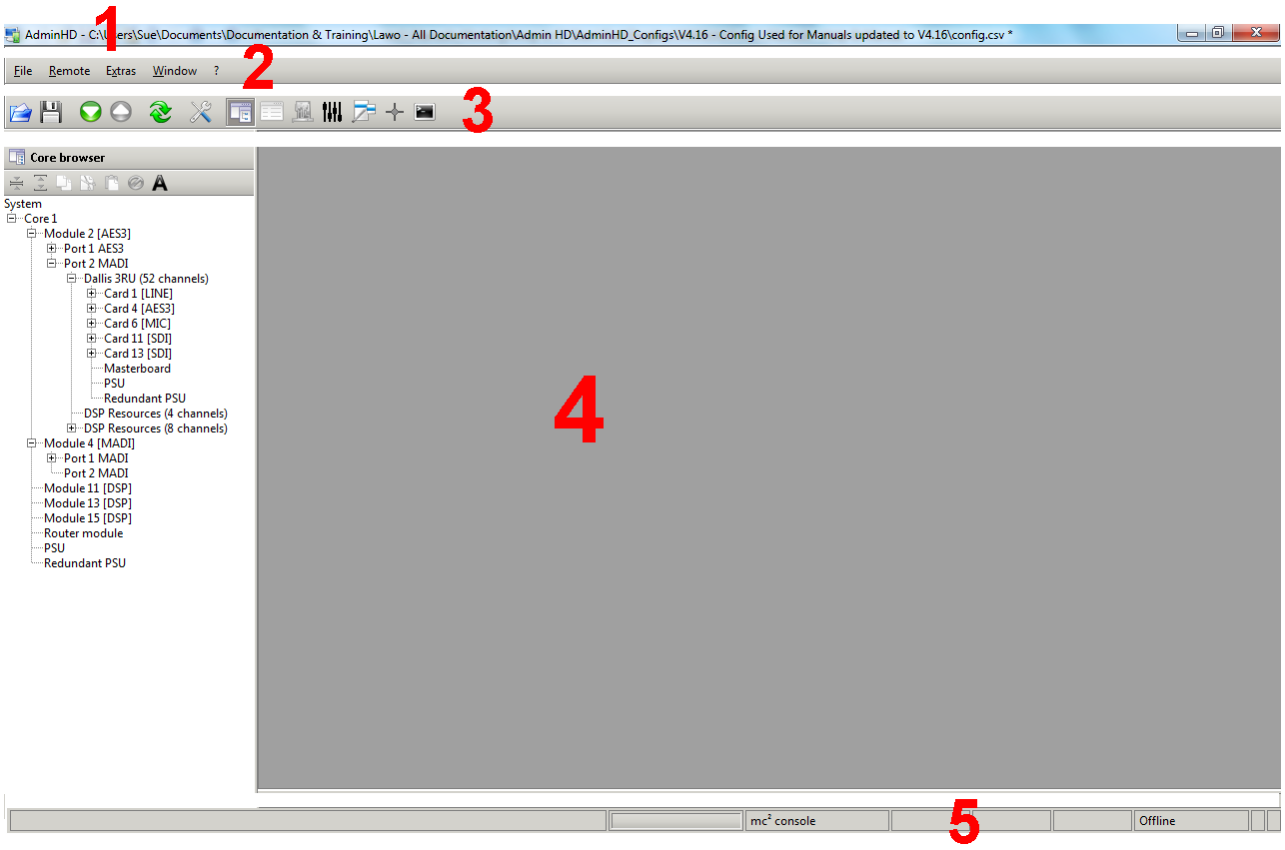
File Conversion

The following dialogue pop-up appears if there is a mismatch between the AdminHD software version and the configuration file you are trying to open:



- Select **Yes** to convert the configuration file to the newer **AdminHD** release.
- Select **No** to leave the file unchanged, and open **AdminHD** without any configuration data.

The Main Operating Window

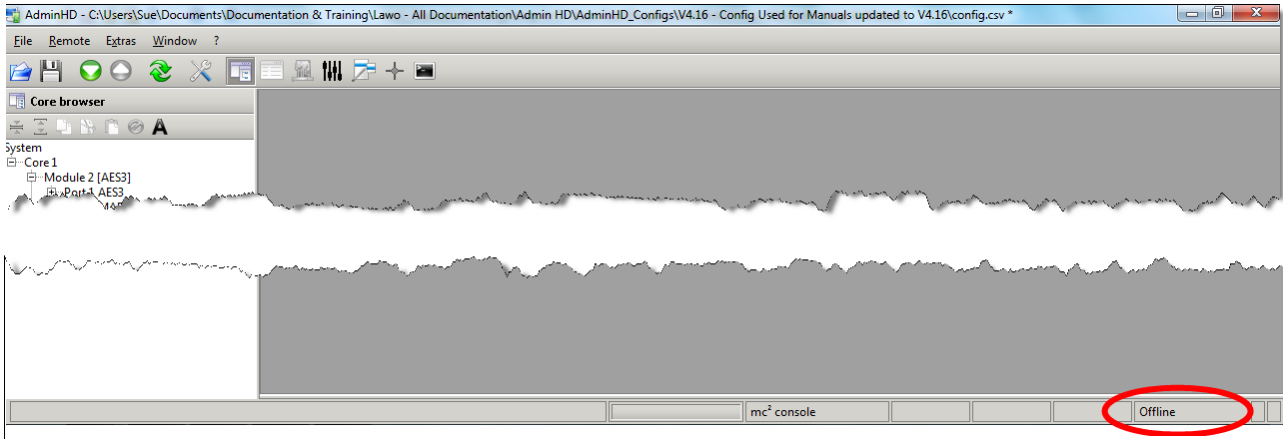


The main operating window is divided as follows:

1	**Headline**	Displays **AdminHD**, or **Control HD**, followed by the file path of the open file (**config.csv**). If no filename appears, then this is a new AdminHD session. If the filename is followed by an asterisk (*), then changes have been made since the last save. On the right you can close the programme or minimise/maximise AdminHD in the usual manner.
2	**Main Menus**	Access to the **File**, **Remote**, **Extras**, **Window** and **?** main menus.
3	**Main Toolbar**	Fast access to common functions.
4	**Sub Windows**	This is the main operating area in which you can open a mixture of sub windows. In our example, only the 'Core Browser' is open.
5	**Status Bar**	Displays the AdminHD mode (**mc² console** or **Nova73 HD**) and online/offline status.

Online/Offline Status

AdminHD starts up in offline mode; the online/offline status is shown in the status bar at the bottom of the display:



Offline

When running offline, you can:

- Download configuration data (from the online system to your computer).
- Edit the configuration data, locally on your computer in AdminHD.
- Export and upload cold start configuration files (from your computer to the mc²56 MKII control system).

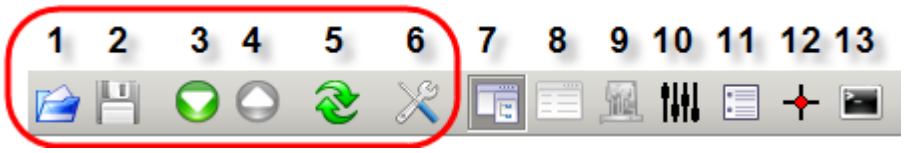
Note that to download and upload data, you will need a valid network connection between your AdminHD computer and the mc²56 MKII control system.

Online

You should switch to online mode if you wish to:

- Monitor the system status.
- Use the 'Connect Manager' to control matrix crosspoints, signal labels and I/O settings.
- Update the online configuration (in memory).

The Main Toolbar



The first six buttons provides fast access to common functions:

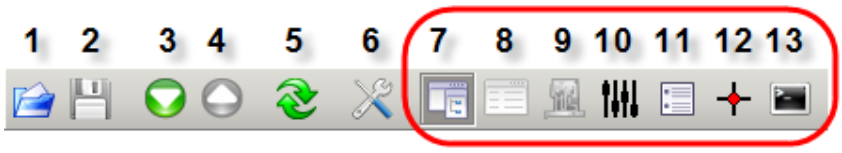
1	Open	Opens an existing AdminHD file (**config.csv**).
2	Save	Saves the current AdminHD configuration as a **config.csv** file.
3	Download	Downloads configuration data from the online control system into AdminHD.
4	Upload	Uploads the AdminHD configuration to the online system (available in online mode only).
5	Online	Enables (or disables) the online connection to the remote control system.
6	Preferences	Opens the AdminHD Preferences window.

The remaining buttons show or hide the sub windows.

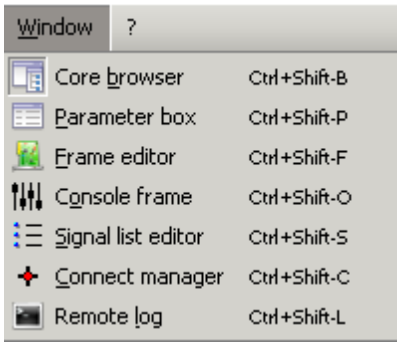
The Sub Windows

AdminHD supports seven sub windows. They can be opened from the main toolbar, the **Window** menu, or by using a keyboard shortcut:

Toolbar



Window menu & Keyboard Shortcuts



7	Core Browser	Displays the Core configuration hardware as a system tree. You can navigate around the system, and add or remove components. When running online, components are colour-coded to provide diagnostics.
8	Parameter Box	Used to adjust parameters for the selected component or signal.
9	Graphic View (Frame editor)	Provides a graphical representation of the system. Works in conjunction with the 'Core Browser' to add or remove system components. When running online, components are colour-coded to provide diagnostics.
10	Console Panel	Defines the Console configuration (MKI mc²66 systems only).
11	Signal List Editor	Creates the Signal List configuration used in the GUI's Signal List display or AdminHD's 'Connect Manager'.
12	Connect Manager	Available in online mode only. Here you can remotely control matrix crosspoints, signal labels and I/O settings.
13	Remote Log	Logs all the messages generated by AdminHD and, when online, the mc²56 MKII control system.

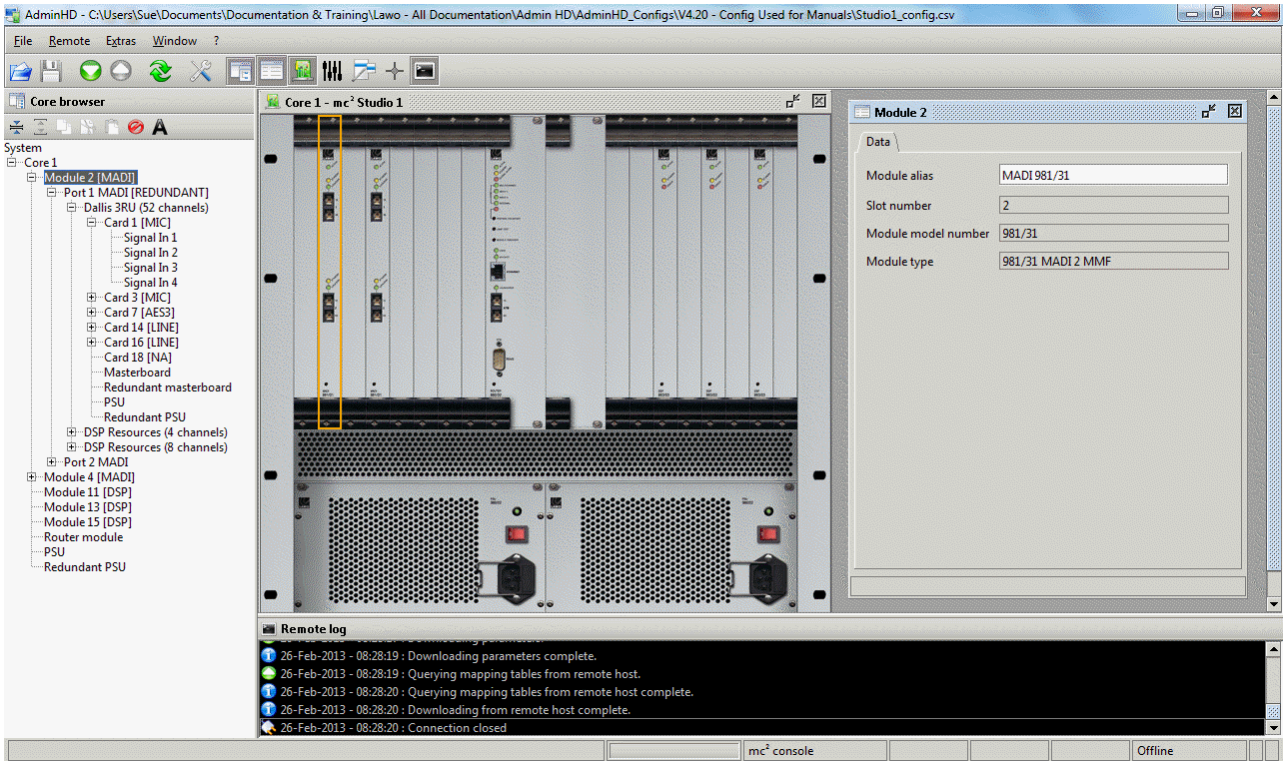
Some selections may be unavailable (greyed out). For example, the 'Connect Manager' can *only* be selected once you are running online.

The 'Core Browser' and 'Remote Log' may open automatically (according to the **Extras** -> **Preferences** -> Startup menu).

Arranging the Sub Windows

The sub windows are rarely used in isolation, and should be combined according to the application.

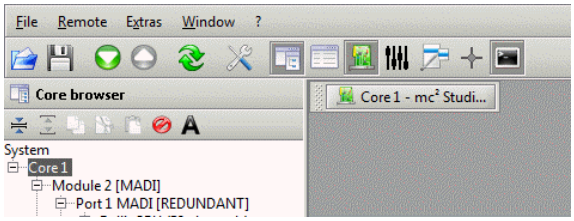
For example, while editing a configuration, you may open the 'Core Browser', 'Graphic View', 'Parameter Box' and 'Remote Log':



Sub windows can be closed, minimised, resized or moved as follows:

1. Click on ☒ to close a window.
2. Click on ⊟ to minimise a window.

Minimised windows are reduced to a button, for example:



Click on the button - e.g. **Core 1** - to restore the window to its original size and position.

3. To change the size of a window, point to the relevant margin or corner, and drag left/right or up/down accordingly.

4. To move a window, place the mouse pointer over the title bar of the window. Then drag and drop the window to its new position.

The 'Core Browser' cannot be minimized or moved.
The 'Graphic View' cannot be resized.

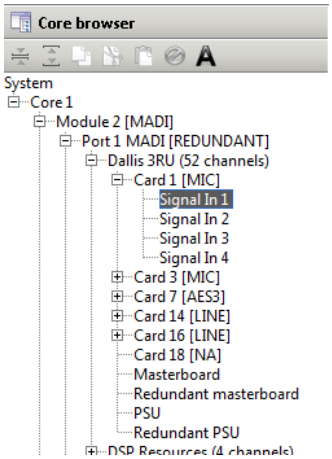
‘Core Browser’

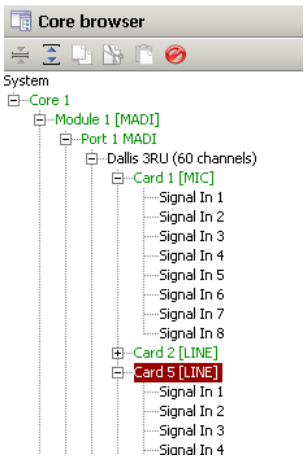
The ‘Core Browser’ displays the Core configuration using a hierarchical system tree. It can be used to navigate around the system, add or remove components, and monitor their status (when online).

1. Click on  from the main toolbar to show the ‘Core Browser’.

   Or select **Window -> Core browser** (from the main menus) or press **CTRL + SHIFT + B** (on your computer keyboard).

   The System tree appears as you last left it. When running online, components are colour-coded to provide diagnostics:





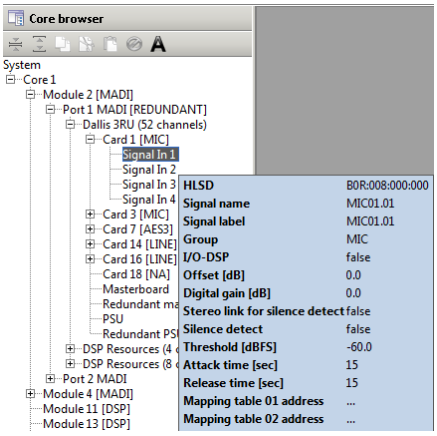
2. Click on the **+** or **–** signs to open or close a branch of the system tree. Or, use the arrow keys on your computer keyboard:

   - Up/Down - navigate up/down.
   - Left/Right - open/close the selected branch.

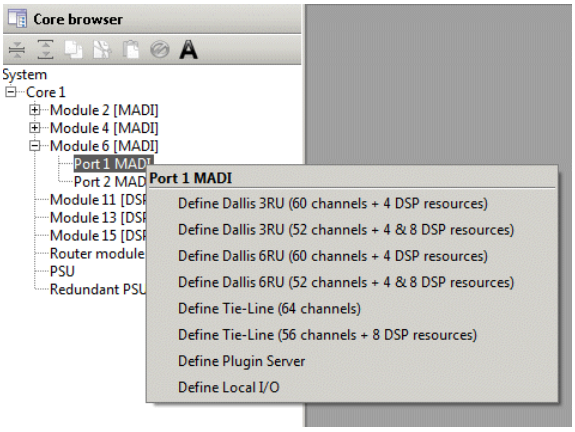
3. Hover over an individual signal (e.g. **Signal In 1**) to display its parameters.

4. Right-click on a component to reveal its configuration options.

Signal Parameters Summary



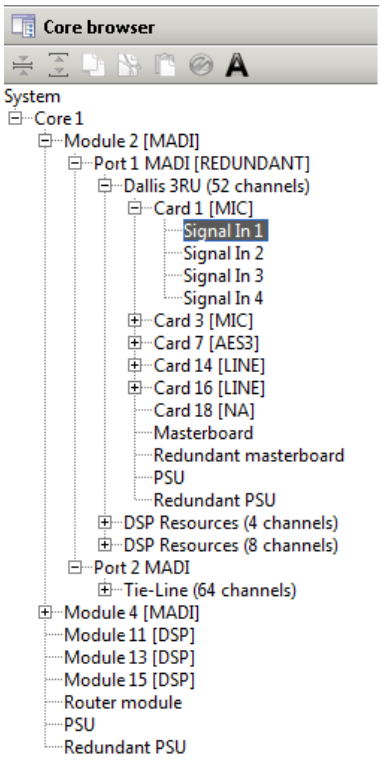
Right-click Options



The System

The **System** structure is hierarchical and arranged as follows:

System	Each configuration consists of a single **System** containing all the hardware components for your installation.
Core	Within the **System**, you define the **Core**. Virtually all Systems consist of a single Core. (In certain specialised Nova73 DSHS systems, two Cores may be configured.)
Modules	Next, you fit the **Core** with **Modules**. In our example, **Core 1** is fitted with two MADI Modules, and three DSP Modules. Standard components, such as the **Router module**, main **PSU** and **Redundant PSU** are added automatically when you define the Core.
Ports	Each **Module** can then be opened to view its I/O **Port**s: In the case of a MADI, RAVENNA or ATM module, the ports offer a range options (for example, to connect to a **DALLIS** or operate as **Tie-Lines**).
Cards	Each DALLIS may then be fitted with **Card**s. In our example, you can see the **MIC**, **AES3** and **LINE** cards fitted to the **DALLIS** connected to **Module 2**, **Port 1**.
Signals	At the lowest level of the system tree are the signals themselves – in our example, **Card 1** has been opened to reveal the four mic/line input signals (**Signal In 1** to **4**).



The Core Browser Toolbar

At the top of the 'Core Browser' are a number of useful functions.

The first two buttons help with system navigation:

1	**Collapse all**	Hides all sub nodes within the selected branch.
2	**Expand all**	Shows all sub nodes within the selected branch.

The next four buttons can be used when editing the Core configuration:

3	**Copy**	Copies the selected component and its sub entries.
4	**Cut**	Cuts the selected component and its sub entries
5	**Paste**	Pastes the copied component, with sub entries, to the selected branch of the system.
6	**Delete**	Deletes the selected component and its sub entries

The last button can help identify system components:

7	**Alias**	Displays your device alias names rather than the Lawo system names.

‘Graphic View’

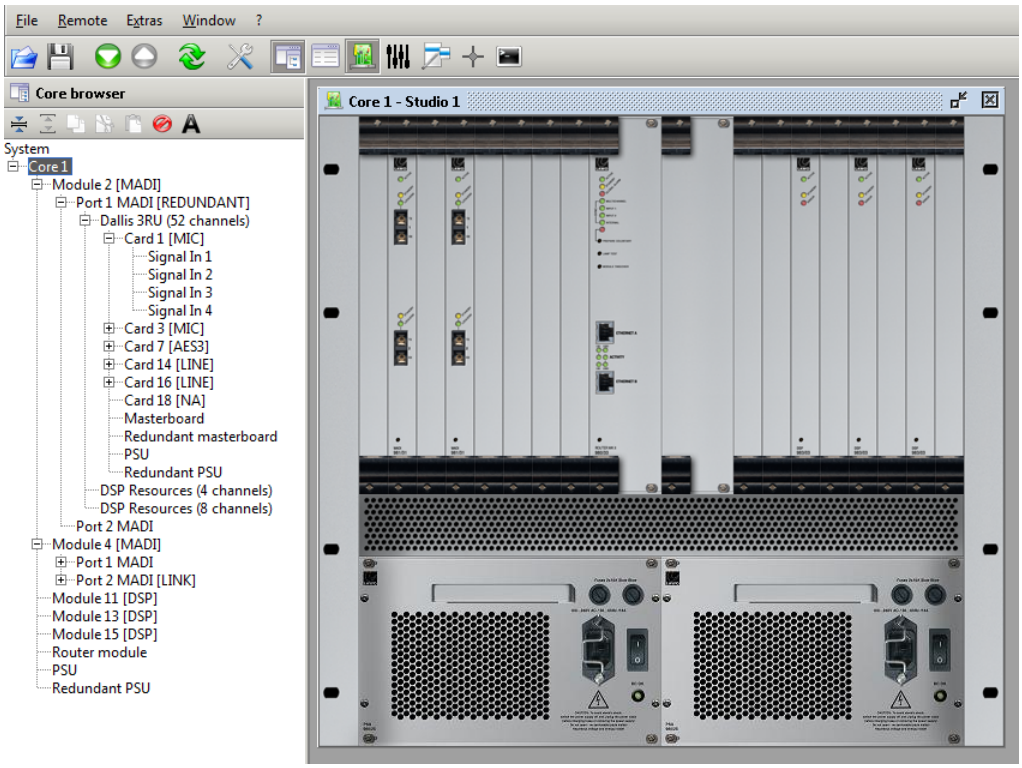
The ‘Graphic View’ provides a graphical representation of the system. It works in conjunction with the 'Core Browser' to define the Core configuration and monitor system status (when online).

1. Open the 'Core Browser' and select a component other than the **System** - e.g. **Core 1**.

2. Click on  from the main toolbar to show the ‘Graphic View’.

Or select **Window -> Frame editor** (from the main menus) or press **CTRL + SHIFT + F** (on your computer keyboard).

A pictorial representation of the selected component appears. (When running online, components are colour-coded to provide diagnostics.)



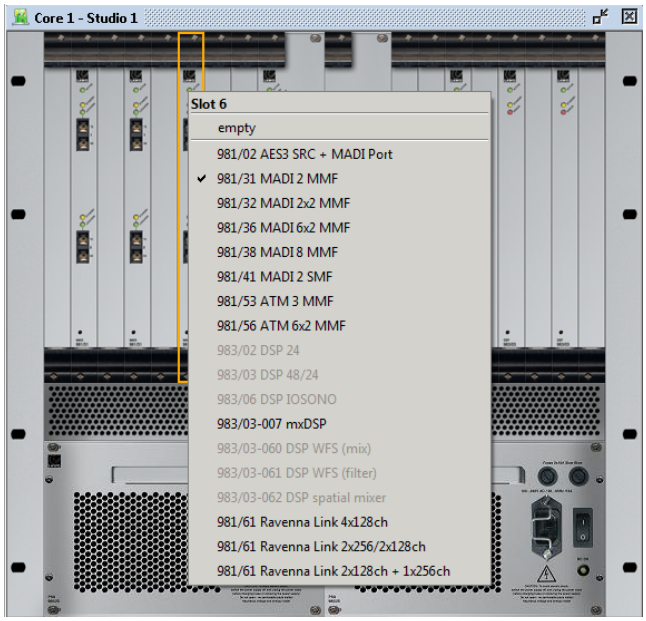
The ‘Graphic View’ cannot be opened if **System** is selected (as there is no valid hardware component to display!) In addition, the ‘Graphic View’ will close automatically if you select **System** in the 'Core Browser'.

3. Click on a module in the 'Graphic View', and the system tree selection (in the ‘Core Browser') follows.

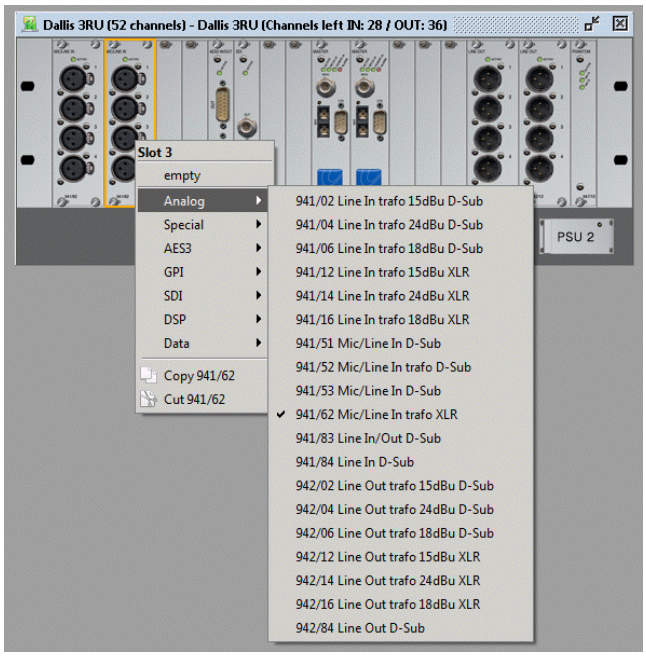
4. Similarly, select a different component in the ‘Core Browser', and the 'Graphic View' updates.

5. Right-click on a Module slot (within the **Core**), or a Card slot (within a **DALLIS**), to reveal its configuration options:

Core Module Options



DALLIS Card Options



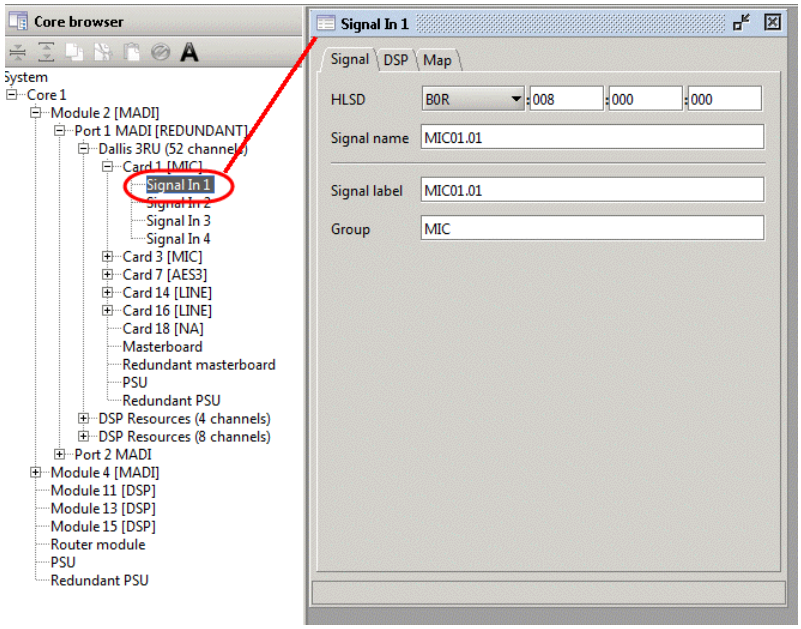
'Parameter Box'

The 'Parameter Box' is used to adjust settings for the selected component or signal. It works in conjunction with the 'Core Browser' and 'Graphic View' to define the Core configuration.

1. Open the 'Core Browser' and double-click on a component or signal - for example, **Signal In 1**.

   Alternatively, select the component or signal, and click on  from the main toolbar to show the 'Parameter Box'.

   Or select **Window -> Parameter box** (from the main menus) or press **CTRL + SHIFT + P** (on your computer keyboard).



Once the 'Parameter Box' is open, if you make a different selection (in the 'Core Browser' or 'Graphic View'), then the 'Parameter Box' follows.

2. Use the tabs to select a page - e.g. **Signal**, **DSP**, **Map**.

   - White parameter fields (e.g. **Signal name**, **Signal label**, **Group**) can be edited.
   - Grey parameter fields are usually for information purposes and cannot be modified.
   - Check boxes may selected or deselected.

'Remote Log'

The 'Remote Log' lists all the messages generated by AdminHD and by the mc²56 MKII control system (when online). It is a good idea to open this window when transferring data to or from a system, or running online.

1. Click on  from the main toolbar to show the 'Remote Log'.

   Or select **Window -> Remote log** (from the main menus) or press **CTRL + SHIFT + L** (on your computer keyboard).

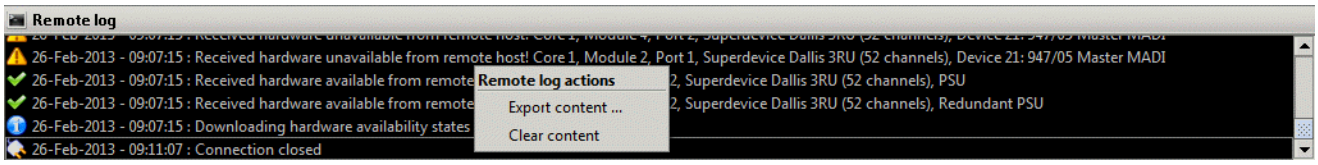
   The log displays all errors and queries since AdminHD was started:

2. Scroll up the list to view the log history.

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

To save the log contents:

3. Right-click anywhere within the window, and select **Export content..** (or select **File** -> **Export File** -> **Remote Log**):



   A File -> Save dialogue box appears.

4. Choose a folder, enter a filename and click **Save**.

   The log is stored as a plain text file and can be opened by any common text editor.

You can specify a default directory for your logfiles from the **Extras** -> **Preferences** -> **Common Directories** menu.

To clear the log contents:

5. Right-click anywhere within the window, and select **Clear content..**

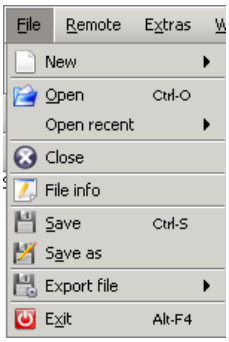
   The existing contents of the 'Remote Log' are cleared.

The Main Menus

AdminHD supports five main menus:

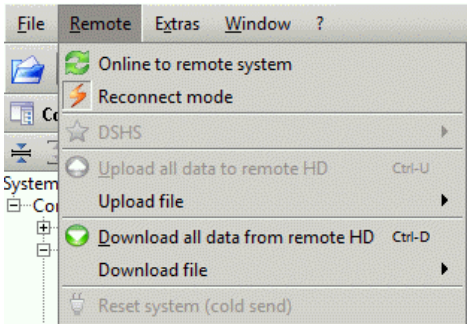
- File
- Remote
- Extras
- Window
- ?

File



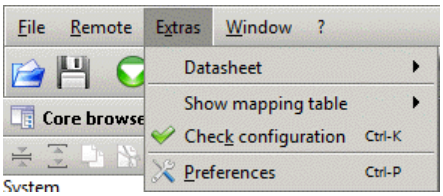
- **New** – creates a new AdminHD session.
- **Open** – opens an existing AdminHD file (**config.csv**).
- **Open recent** – opens a recent **config.csv** file.
- **Close** – closes the current AdminHD session. You will be prompted to save your configuration as a **config.csv** file before closing.
- **Save** – saves the current AdminHD configuration as a **config.csv** file.
- **Save As** – saves the current configuration under a new filename.
- **Export file** - exports the following file types:
  - **Core cold start config (config.tcl)** – the cold start Core configuration.
  - **Component List** – a component parts list.
  - **BFE controller** – a BFE controller file. Please contact your local Lawo representative or email service@lawo.com for more details.
  - **Remote log** - the contents of the 'Remote Log'.
- **Exit** – click to close the AdminHD programme. You will be prompted to save your current configuration before closing.

Remote



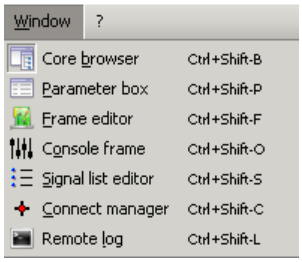
- **Online to remote system** – enables (or disables) the online connection to the remote control system.
- **Reconnect mode** – when enabled, AdminHD attempts to reconnect to the remote control system if network communication is interrupted.
- **DSHS** – access to dual self-healing star options (**Nova73 DSHS** configurations only).
- **Upload all data to remote HD** – uploads the AdminHD configuration to the online system (available in online mode only).
- **Upload file** - uploads the following configuration files from your computer to the remote control system:
  - **Core cold start config (config.tcl)** – the cold start Core configuration.
  - **Console cold start config (console_config.tcl)** – the cold start Console configuration (MKI mc²66 only).
  - **GUI cold start config (gui_config.tcl)** – the cold start Signal List configuration.
- **Download all data from remote HD** – downloads configuration data from the online control system into AdminHD.
- **Download file** – downloads the following file types from the remote control system to your computer:
  - **Core cold start config (config.tcl)** – the cold start Core configuration.
  - **System log messages** - the control system log file.
  - **Console cold start config (console_config.tcl)** – the cold start Console configuration.
  - **GUI cold start config (gui_config.tcl)** – the cold start Signal List configuration.
- **Reset system (cold send)** – cold starts the remote control system (available in online mode only).

Extras



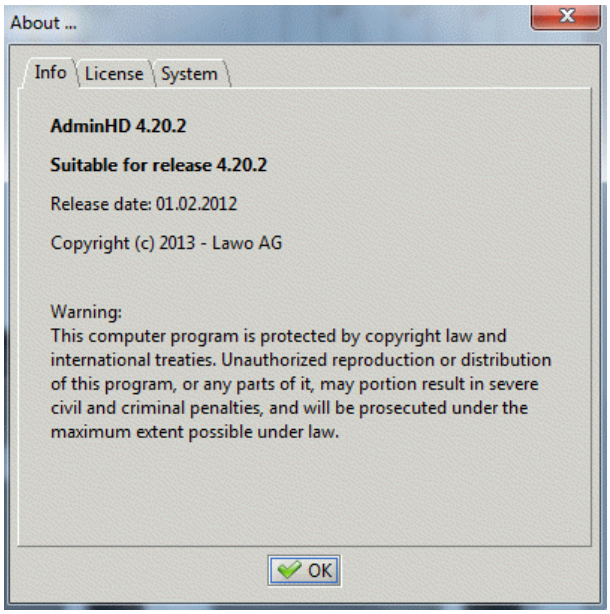
- **Datasheet -> Comfort Text Edit Mode** - enable this mode to use the naming short cut in the Signal 'Parameter Box'.
- **Show mapping table** – opens an overview of the mapping tables 1 to 16.
- **Check configuration** – checks the AdminHD configuration for programming errors.
- **Preferences** – opens the AdminHD Preferences.

Window



Shows or hides the seven sub windows.

? -> About

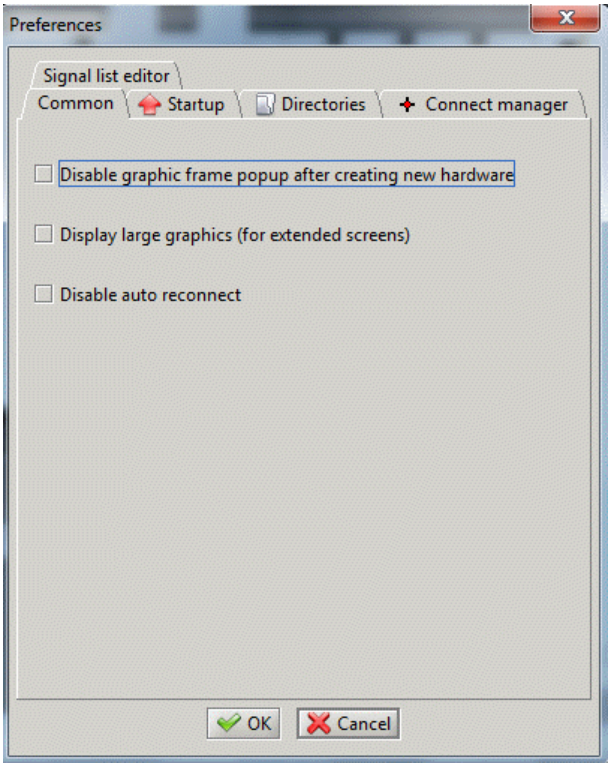


Information about the AdminHD software version, license and operating system.

AdminHD Preferences

When using AdminHD for the first time, it is a good idea to spend a few minutes adjusting the programme's **Preferences**.

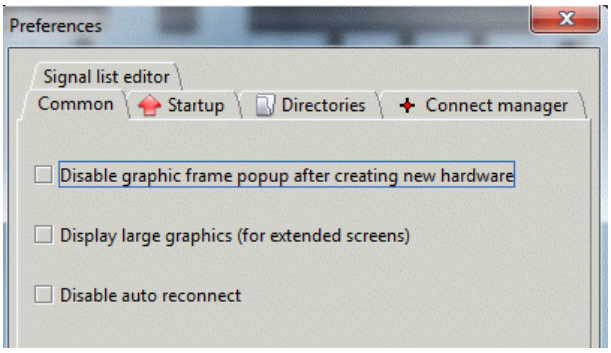
1. Select **Extras -> Preferences** from the main menus, or press **CTRL + P**, to open the 'Preferences' pop-up window:



2. Use the tabs to select a page.
3. Select or unselect a preference.
4. Click **OK** to save your changes.
5. Restart AdminHD or re-open the relevant window for the changes to take affect.

Your preferences are stored in the setup files for the software. Therefore, they will remain as you last left them each time you start the programme.

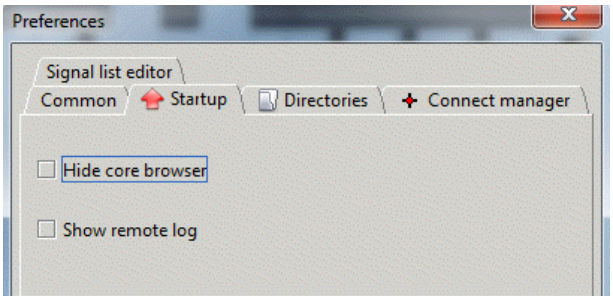
Preferences -> Common



This 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 to prevent AdminHD automatically reconnecting to the online system if network communication is interrupted.

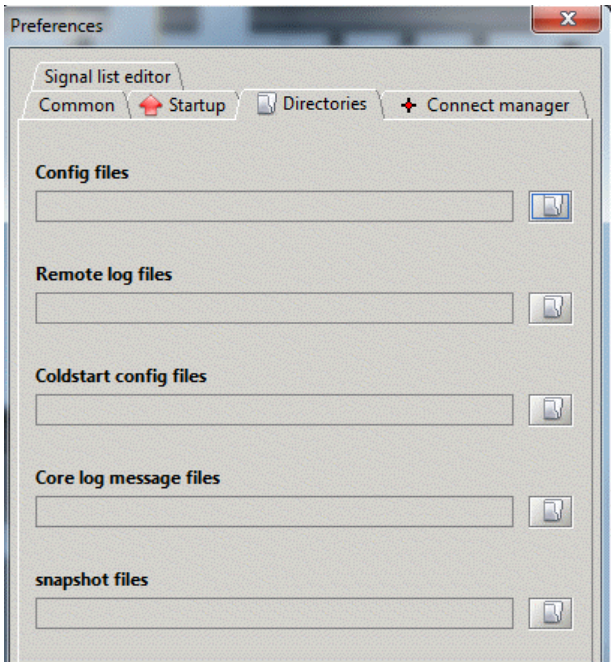
Preferences -> Start up

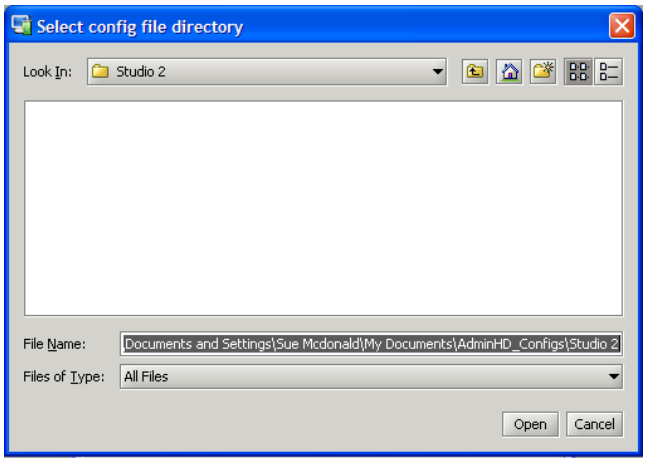


This page deals with start-up options which occur when you open or create a new configuration.

- **Hide Core Browser** – tick this box if you do *NOT* want the 'Core Browser' to appear automatically.
- **Show remote log** – tick this box if you *DO* want the 'Remote log' to appear automatically.

Preferences -> Directories





This page allows you to specify the default directory paths which will be used each time you save, open, export or download a file:

1. Click on the folder button next to the entry you want to specify – e.g. beside **Config files**.

A file dialogue box appears.

2. Select the folder where you usually want to save your files and click on **Open**.

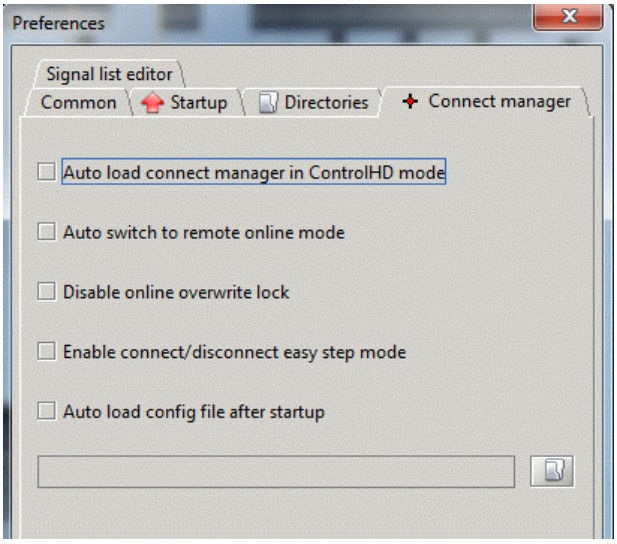
*The file dialogue closes and the path is displayed in the **Preferences** field.*

3. Repeat for all the AdminHD file types:

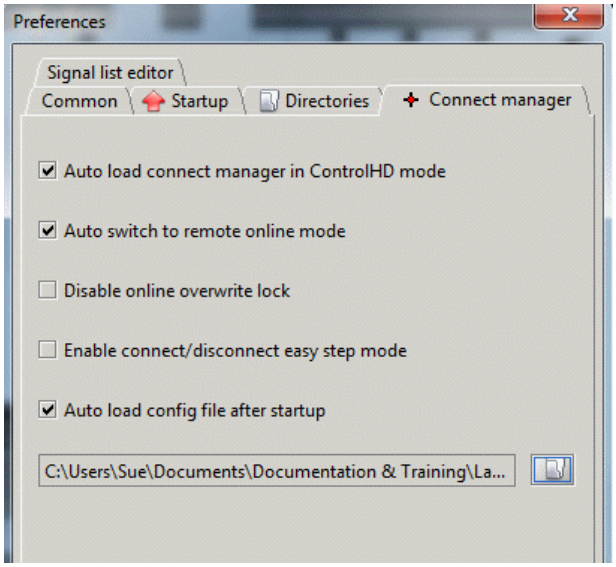
- **Config files** – AdminHD configuration files (**config.csv**).
- **Remote logfiles** – 'Remote log' text files.
- **Coldstart config files** – **config.tcl**, **gui_config.tcl** and **console_config.tcl** files.
- **Core log message files** – System log text files.
- **Snapshot files** – 'Connect Manager' snapshots.

Preferences -> Connect Manager

Default Options



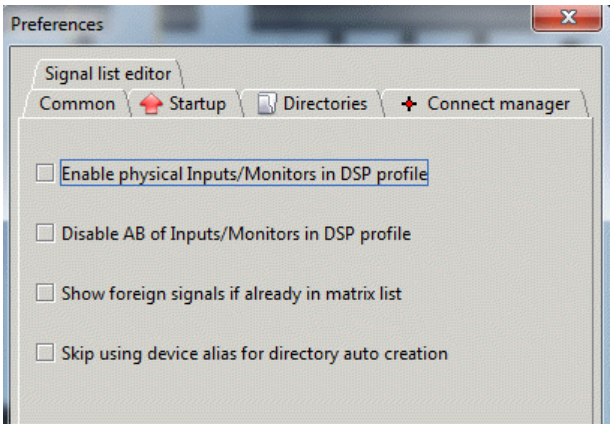
Recommended Options for ControlHD



These preferences affect what happens when the 'Connect Manager' window opens:

- **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.

Preferences -> Signal List Editor

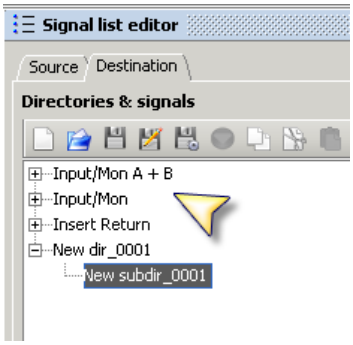


These preferences affect how the 'Signal List Editor' creates new signal lists.

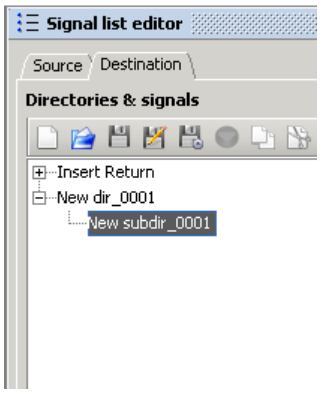
The first two options affect mc² mixing console systems only:

- **Enable physical Inputs/Monitors in DSP profile** – tick this option to add the physical inputs of the mc² input and monitor channel DSP channel to the default directories of the **Destination** page.
- **Disable A/B of Inputs/Monitors in DSP profile** - untick this option if you do *NOT* wish to add the mc² input and monitor channel DSP signals to the default directories of the **Destination** page.

Enable physical Inputs/Monitors in DSP profile (ticked)



Disable A/B of Inputs/Monitor in DSP profile (ticked)



The second two options affect all Nova73 systems:

- **Show foreign signals if already in matrix list** – affects networked systems. Please contact your local Lawo representative or email service@lawo.com for advice.
- **Skip using device alias for directory auto creation** - tick this option if you do *NOT* want to use the Super-device alias names when directories are automatically added to the signal list.

Core Configuration: First Steps

This section deals with how to edit and update the Core configuration. The best approach is as follows:

1. Create a new AdminHD session and, if possible, download the online configuration from the mc²56 MKII control system.

Alternatively, if you can't connect to the mc²56 MKII, open an existing **config.csv** file. This may be a file which you saved earlier or requested from your configuration engineer.

If you have neither a network connection or an existing **config.csv** file, then you will need to create a new session and build a configuration from scratch. Note that this method can be time consuming, and is not recommended for minor changes to an existing system!

2. Save the configuration as a **config.csv** file - this allows you to open it later, or move it to another AdminHD computer.

3. Define the new system components and edit their parameters using the 'Core Browser', 'Graphic View' and 'Parameter Box'.

4. Check the configuration for programming errors.

5. Backup the system's existing cold start files.

6. Export the configuration as a cold start **config.tcl** file - this puts the data into a format which can be read by the control system.

7. Upload the cold start **config.tcl** from your computer to the mc²56 MKII control system.

8. Cold start the mc²56 MKII to see your changes take affect.

As an alternative to exporting and uploading the **config.tcl** file, AdminHD can update the online configuration (in temporary memory). However, this is not recommended for permanent changes to a configuration.

Workflow Suggestions:

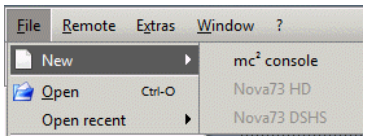
Both the **config.csv** and **config.tcl** files can be transferred between computers. This allows you to download and save the configuration (as a **config.csv**) on a networked AdminHD computer; open it on your personal AdminHD computer (for editing); export the **config.tcl** and transfer this back to the networked computer (for upload to the control system).

If you are also editing the Signal List configuration, then download and save both sets of data (**config.csv** and **signallist.slx**) while you are connected to the control system. Once editing is complete, export both cold start files (**config.tcl** and **gui_config.tcl**), and upload them to the control system. You can then perform a single cold start to action all your changes.

File -> New

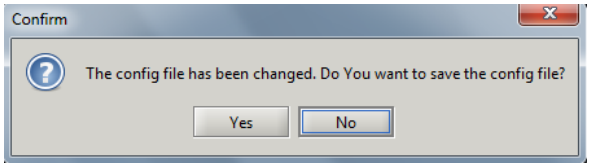
This menu option creates a new empty AdminHD session. It should be used before downloading data into a new session, or to build a new configuration from scratch.

1. Select **File** -> **New** from the main menus, and choose **mc² console**. This mode supports the mc²56, 66 and 90 consoles (MKI and MKII):



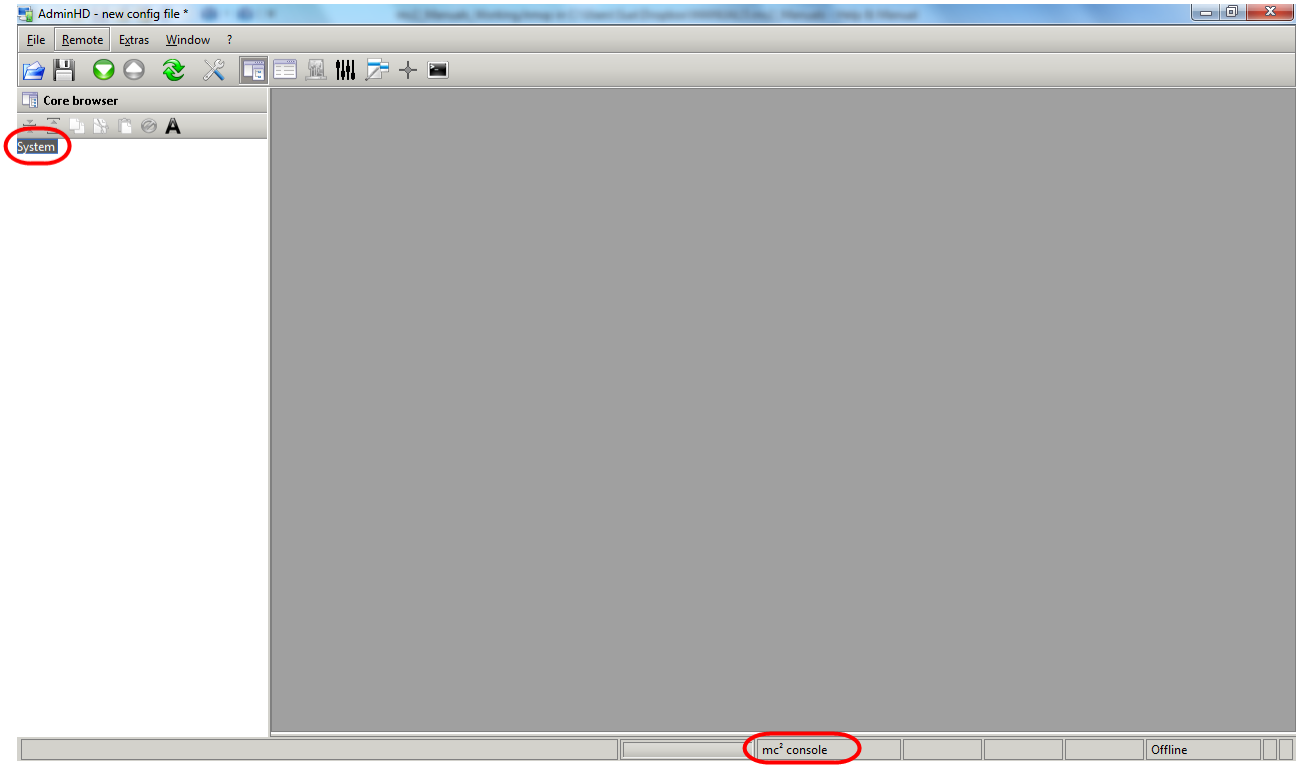
The available options depend on the AdminHD mode and software release.

2. If you have not closed your previous AdminHD session, then the following dialogue box appears:



- Select **Yes** to save the configuration (as a .csv file) before proceeding.
- Select **No** to continue without saving.

*The new session opens - you will see the entry **System** in the 'Core Browser' and confirmation of the system type in the status bar:*



Downloading the Online Configuration

The best way to ensure that you are working with your system's latest configuration data, is to download the online configuration, from the mc²56 MKII control system.

To perform a successful download, you will need a valid network connection between your computer and the control system.

We recommend running AdminHD offline, to avoid accidentally clicking the Upload button. Open the 'Remote Log' to monitor the progress of the download.

1. When you download the online configuration, you will download the current data (stored in memory). Therefore, to make sure this data is identical to the cold start configuration, reset the system by performing a cold start.

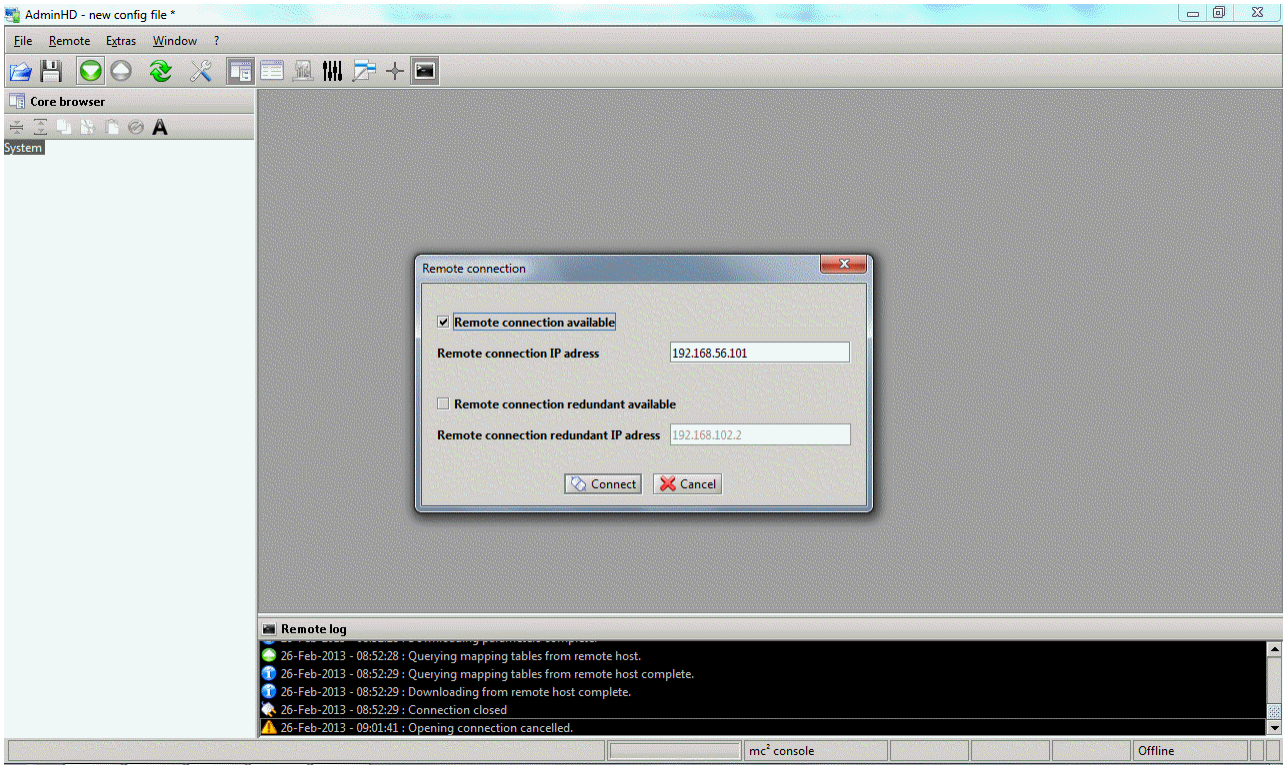
2. Once the system has cold started, open a new AdminHD session (**File -> New**).

This step ensures that you will be asked for the IP address of the **Remote connection** below. If you miss this step, then AdminHD will attempt to connect to the IP address configured in your current session.

3. Then click on  from the main toolbar (**Download all data from remote HD**).

Or select **Remote -> Download all data from remote HD** (from the main menus) or press **CTRL + D** (on your computer keyboard).

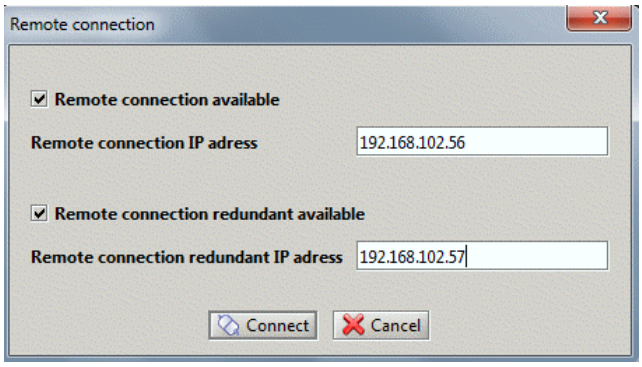
*The following pop-up appears requesting an IP address for the **Remote connection**:*



4. Enter the IP address of your control system.

If a single Router Module is fitted to the Nova73, then enter the main **IP address** only.
If main and redundant Router Modules are fitted, tick both boxes and enter both IPs; the **redundant IP address** is *always* 1 above the main **IP address**.

Router Module Redundancy

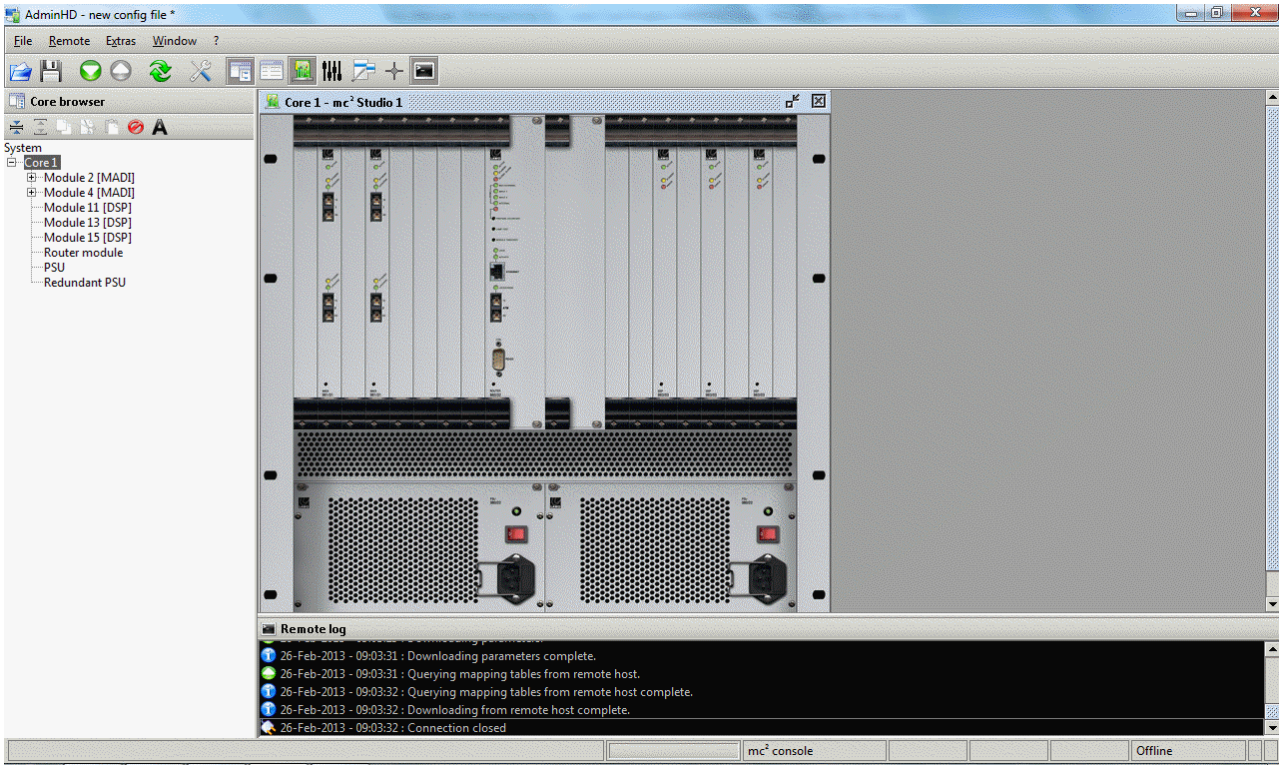


You can connect AdminHD to mxGUI by entering mxGUI's virtual IP address (**192.168.56.101**).

5. Then click **Connect**.

AdminHD downloads the online configuration data from the remote system; the 'Remote Log' reports on the progress.

When the download is complete, any open windows such as the 'Core Browser' update to show the new configuration:



If there is a problem with the download, then:

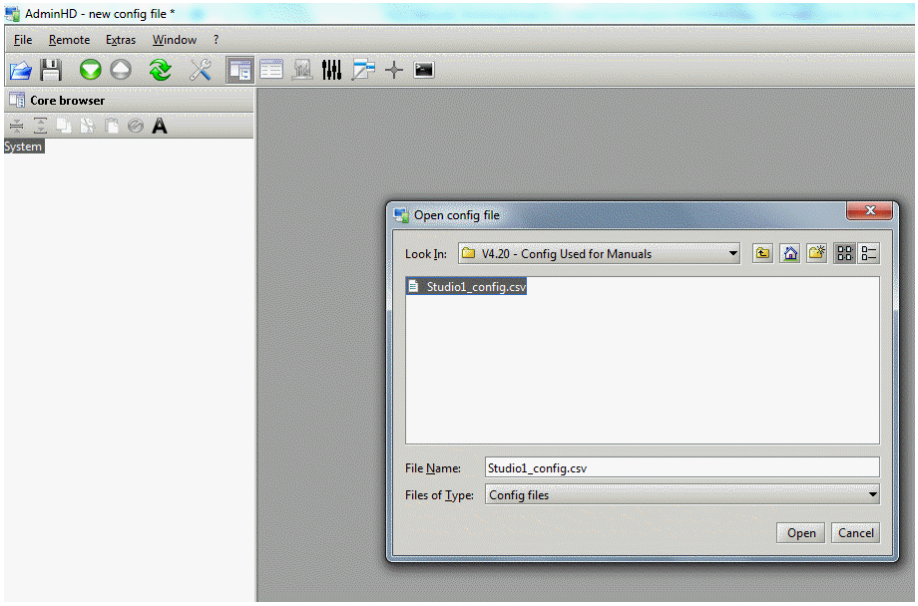
- Check the network connection and TCP/IP settings of your computer's network interface card.
- Check that AdminHD is compatible with the mc²56 MKII system.
- See the trouble-shooting tips.

Opening a Saved Configuration

To open an existing **config.csv** file:

1. Click on  from the main toolbar.

Or select **File -> Open** (from the main menus) or press **CTRL + O** (on your computer keyboard):

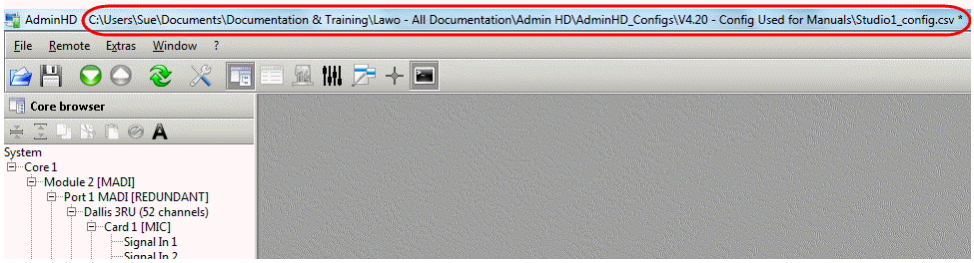


Use **File** -> **Open recent** to select a recent configuration.

2. Select your file and click **Open**.

If the file was saved in an older version of AdminHD, then you will be asked to convert it.

The file opens, and the path and file name appear at the top of the display:



You can decide whether the 'Core Browser' appears automatically from the **Extras -> Preferences ->** Startup menu.

If there is a problem opening the file, then check:

- Is the file an AdminHD **.csv** ?
- Was the file saved by a newer release of AdminHD?

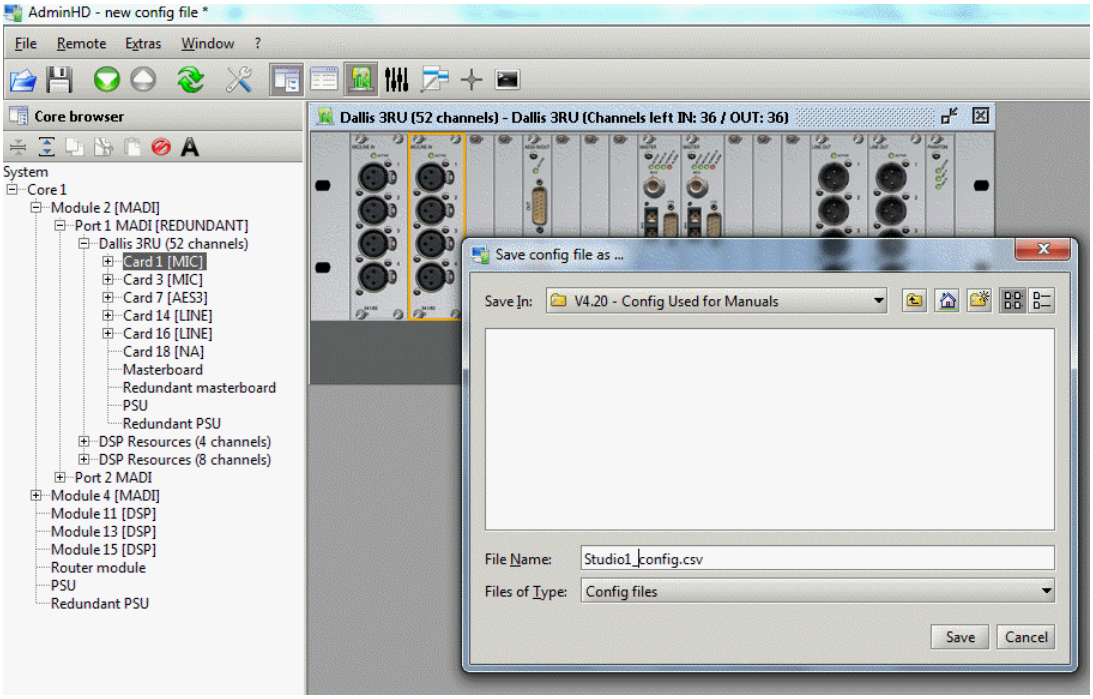
Configurations saved by an earlier version of AdminHD can be opened in a later release. However, configurations saved by a newer release are not backwards compatible.

Saving the Configuration

Having downloaded or opened an existing configuration, it is a good idea to save the data as an AdminHD **config.csv** file. This creates a copy, in AdminHD format, which can be opened later, or moved to another computer.

1. Select either **File** -> **Save**, or **File** -> **Save As** from the main menus:

- **File** -> **Save** overwrites the current file name (if one exists).
- **File** -> **Save As** asks for a new file name:



2. Select a path and enter a suitable file name.

You can use any name as long as it keeps the **.csv** suffix, but it is a good idea to keep the word "config" in the name to distinguish it from other **.csv** files. See Organising Your Files.

You can also specify a default directory for your config files from the **Extras** -> **Preferences** -> **Common Directories** menu.

3. Click **Save** to save the configuration onto your computer's hard disk.

4. From here on, you can quickly update the file by clicking on  (from the main toolbar) or pressing **CTRL + S**.

If you are making a lot of configuration changes, use **File -> Save As** to save different versions during the programming. This will allow you to revert to an earlier version, if there is an error in your programming.

Editing the Configuration

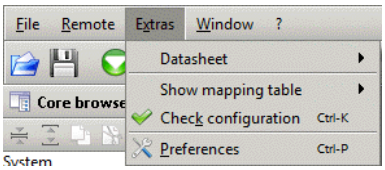
You can edit the Core configuration using the 'Core_Browser', 'Graphic_View' and 'Parameter_Box' windows. The details are covered later in this chapter, please see:

- Defining the System - to add or remove components, or modify the System structure.
- Editing Parameters - to adjust system or signal parameters.

Checking the Configuration

Having completed your AdminHD 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 the configuration to check for the following errors:

- **Signal HLSD Conflicts** – if two signals have the same HLSD (Lawo system address).
- **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:

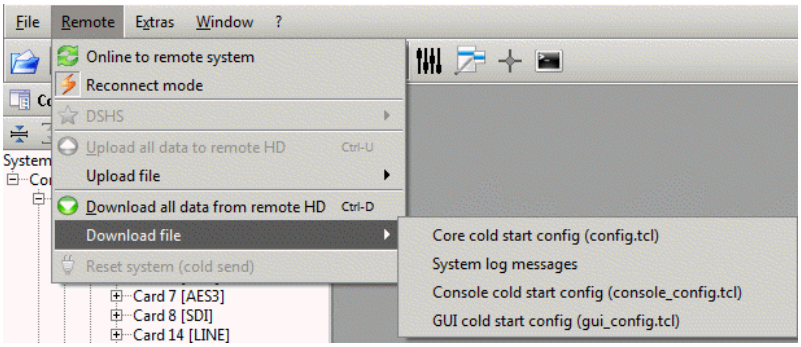
If an error is reported, then try retracing your steps by opening an earlier version of the **config.csv**.

Backing up the Cold Start Files

Before uploading new data, it is a good idea to backup the system's cold start configuration files.

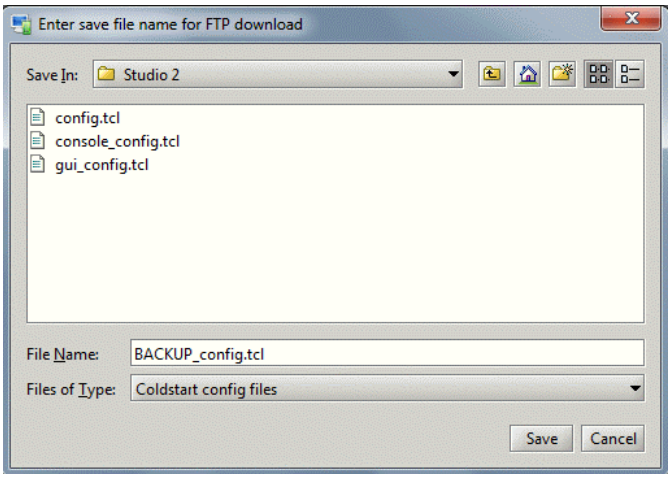
To perform a successful download, you will need a valid network connection between your computer and the control system.

1. Select **Remote -> Download file** from the main menus, and click on a file option:



- **Core cold start config (config.tcl)** – the cold start Core configuration.
- **System log messages** - the control system log file.
- **Console cold start config (console_config.tcl)** – the cold start Console configuration.
- **GUI cold start config (gui_config.tcl)** – the cold start Signal List configuration.

2. You are asked to specify a folder location and name for the file - in our example, we have chosen the **Studio 2** folder created earlier, and have renamed the file as **BACKUP_config.tcl**, see Organising Your Files.



3. Click **Save**.

AdminHD downloads the file from the remote system; the 'Remote Log' reports on the progress.

4. Repeat for each file you wish to backup.

Upload Options

The Core configuration may be uploaded to the mc²56 MKII in one of two ways:

- For permanent changes, you should upload a new version of the cold start **config.tcl** file. This file will be stored on the mc²56 MKII control system, and read following a cold start. Note that this method requires three stages:
  - Export the configuration as a **config.tcl** file.
  - Upload the **config.tcl** file from your computer to the mc²56 MKII control system.
  - Cold start the mc²56 MKII.
- For temporary changes, or for installations where a cold start is not possible, you should upload your data to the online configuration. This updates the online system without requiring a restart; AdminHD must be running online to use this method.

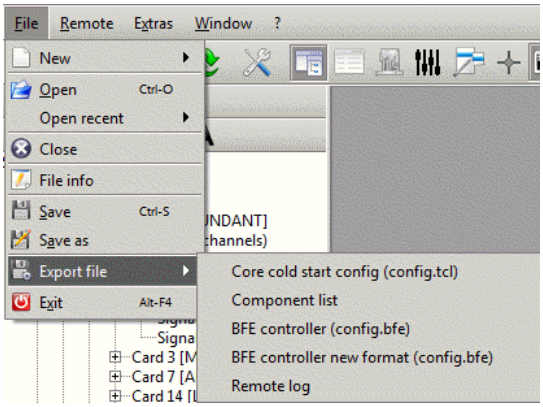
The next few sections work through both options.

Before uploading new data, it is a good idea to backup the system's cold start configuration files.

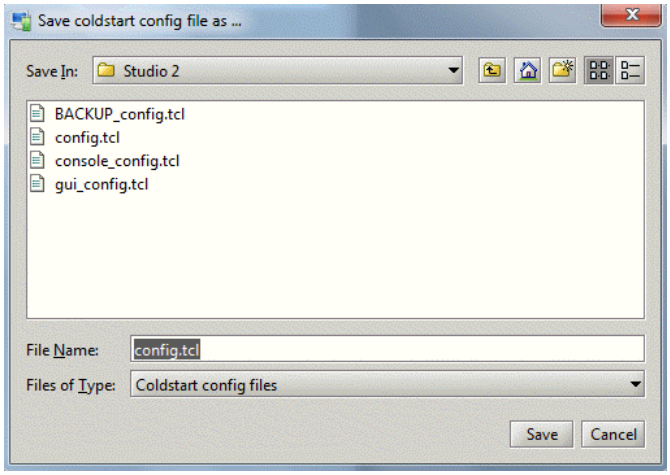
Exporting the Cold Start config.tcl

This operation exports the Core configuration from AdminHD, and puts it into a format which can be read by the mc²56 MKII control system - the **config.tcl**.

1. Select **File -> Export file** -> **Core cold start config (config.tcl)** from the main menus:



2. You are asked to specify a folder location for the file - in our example, we have chosen the **Studio 2** folder created earlier, see Organising Your Files.



Do *NOT* rename the file; it must be named **config.tcl** in order to be read by the control system.

You can specify a default directory for your Coldstart config files from the **Extras** -> **Preferences** -> **Common Directories** menu.

3. Click **Save**.

The configuration is exported from AdminHD and saved on your computer.

Uploading the Cold Start config.tcl

Having exported the **config.tcl** file, it may now be uploaded to the mc²56 MKII control system.

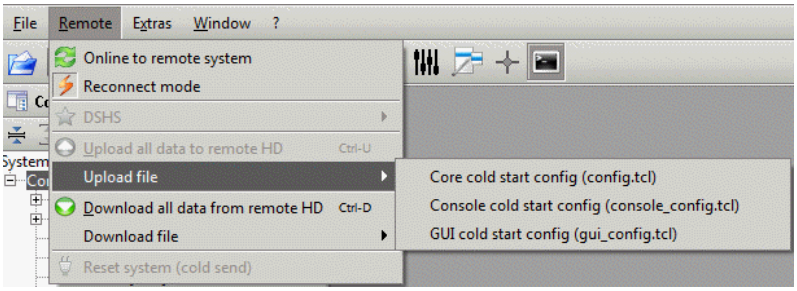
You can use this operation to upload any **config.tcl** file. For example, a backup file, or a file prepared on another AdminHD computer.

To perform a successful upload, you will need a valid network connection between your computer and the control system.

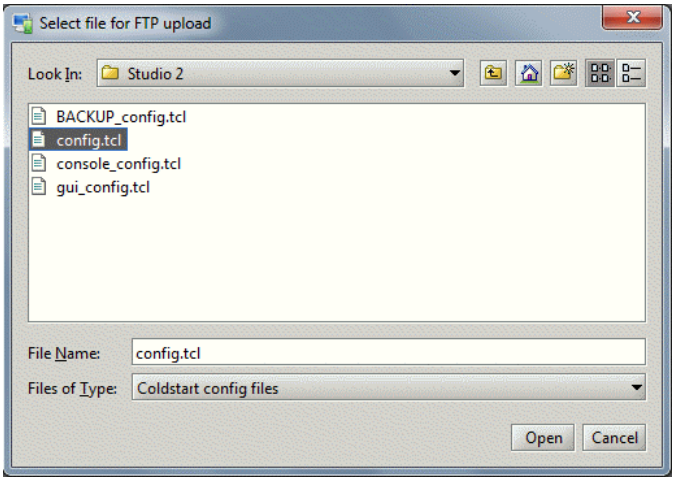
AdminHD can remain offline to upload cold start configuration files.

If you have a redundant Router Module, then you will need to disable the redundant control system *BEFORE* uploading the **config.tcl** file, see Upgrading Configuration and Software in a Redundant System.

1. Select **Remote -> Upload file** -> **Core cold start config (config.tcl)** from the main menus:

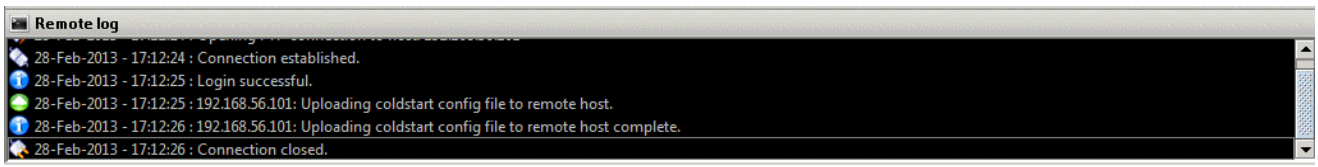


2. Then select the **config.tcl** file you wish to upload:



3. Click **Open**.

The file is uploaded to the remote system's cold start data; the 'Remote Log' reports on the progress:



If there is a problem with the upload, then:

- Check the network connection and TCP/IP settings of your computer's network interface card.
- See the trouble-shooting tips.

4. Cold start the mc²56 MKII to see your changes take affect.

If there is a problem reading the new configuration after the cold start:

- Check that you have uploaded the correct **config.tcl** file - the file *MUST* be named **config.tcl** ***and*** *MUST* have been created using a compatible version of AdminHD.

When uploading a **config.tcl** to mxGUI, you should treat the mxGUI control system like any real mc² or Nova73. In other words, upload the file (as above), and then cold start mxGUI.

Uploading Data to the Online Configuration

For temporary changes to the Core configuration, or for installations where a cold start is not possible, you should upload your data to the online configuration. This updates the online system without requiring a restart and can be useful for testing, or updating systems where a cold start is not possible (for example, if 24 hour continuous operation is required).

The online configuration is stored in the system's warm start data (at shutdown), and recalled following a normal restart (warm start). Providing you do not cold start the system, any changes made will remain intact.

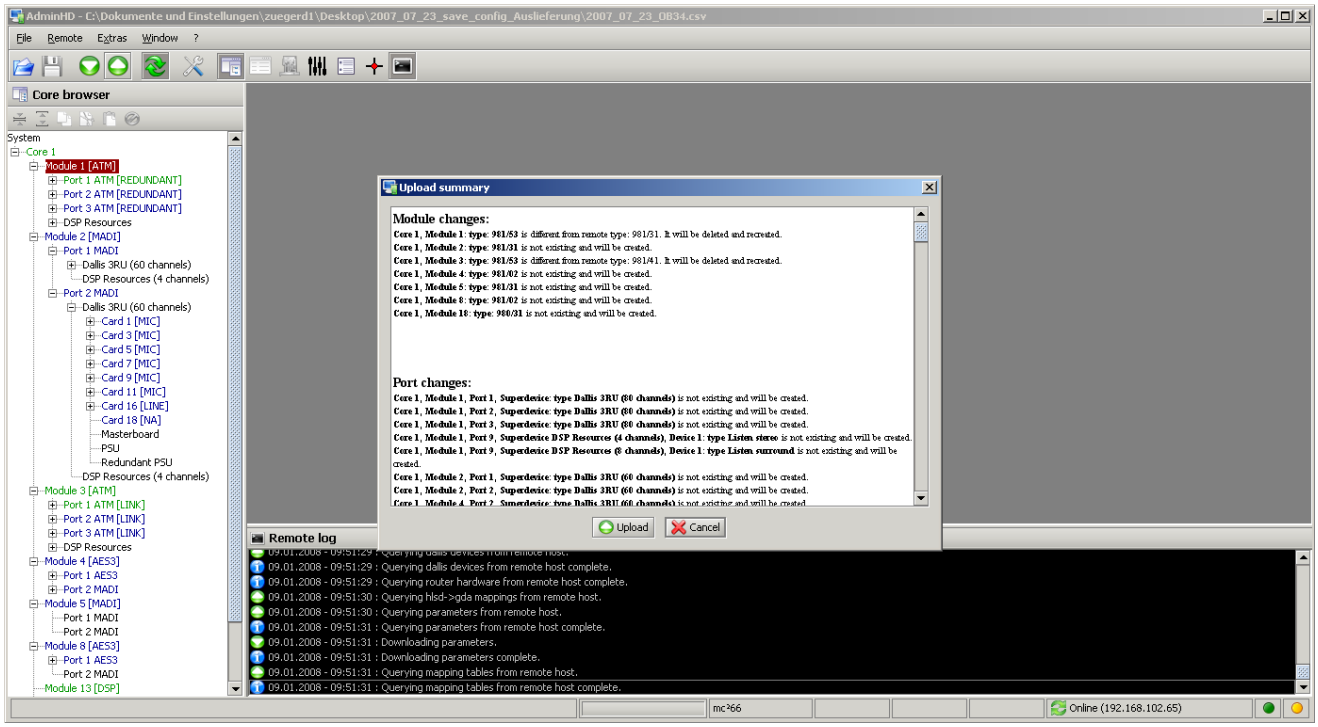
Only the **Core configuration** can be modified in this manner (you cannot update the **Signal List** or **Console Configuration**).

Warm start data is temporary. Therefore, this method is *NOT* recommended for permanent changes to the configuration. If the control system is 'cold started', then it reads the **config.tcl** file, and any changes to the online configuration will be reset.

To upload your current AdminHD session to the online configuration:

1. Enable online mode, by clicking on  from the main toolbar (**Online to remote system**).

AdminHD now connects to the remote system and compares the online configuration to the one open in AdminHD. When the analysis is complete, an 'Upload summary' appears:



This list allows you to review the changes which you are about to make *BEFORE* you continue with the upload.

2. Read through the list and click on **Upload** to continue (or **Cancel** to abort the upload).

The 'Remote Log' reports on the progress of the upload; after a successful upload, the system immediately updates.

Core Configuration: Defining the System

This section looks at adding or removing components to/from the Core configuration - for example to add a new DALLIS or plug-in card.

To change parameters for existing components or signals, skip straight to Editing Parameters.

The same principles apply whether you are updating an existing configuration or building a new system from scratch. The system is hierarchical, and therefore components must be added in the following order:

1. Define the Nova73 (the Core).
2. Fit modules to the Core.
3. Define the I/O ports: for example, to configure a DALLIS or Tie-Lines.
4. Fit cards to a DALLIS.
5. Define other options such as Link and Port redundancy, and Port DSP resources.

You should open both the 'Core Browser' and 'Graphic View' to perform these tasks.

Warning

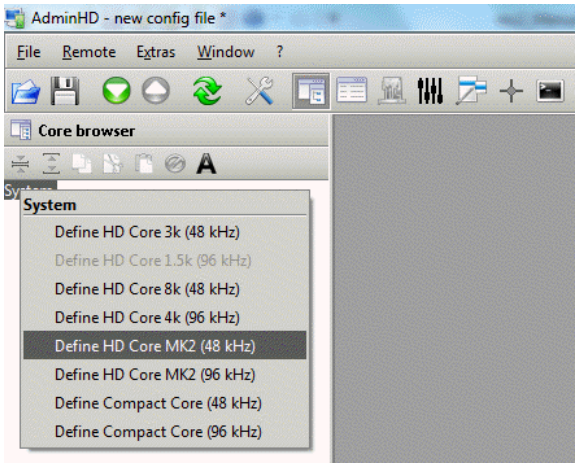
It is vital that the configuration matches your intended physical installation. Otherwise components may not operate correctly. Therefore, it is useful to have the specification details (part numbers and options) to hand.

Defining the Core

The first step when configuring a new System is to add the Core:

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

A list of drop-down options appears - those in black can be selected; those in grey cannot. The available options depend on the AdminHD mode and software release:

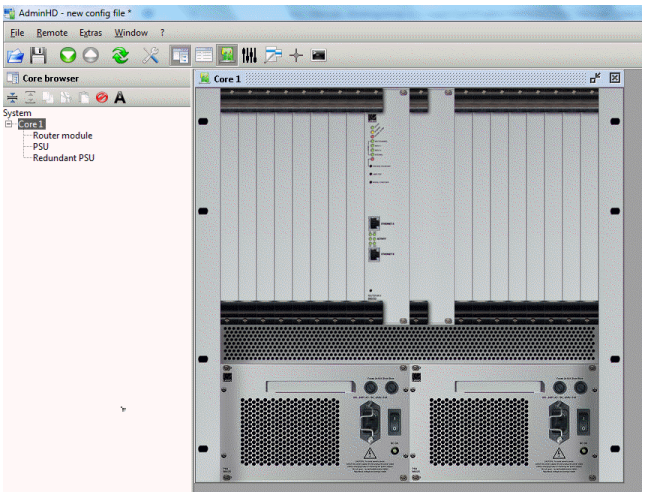


2. Select an option to define the type of Core. The first four options provide support for MKI systems. For MKII systems, select one of the last four options:

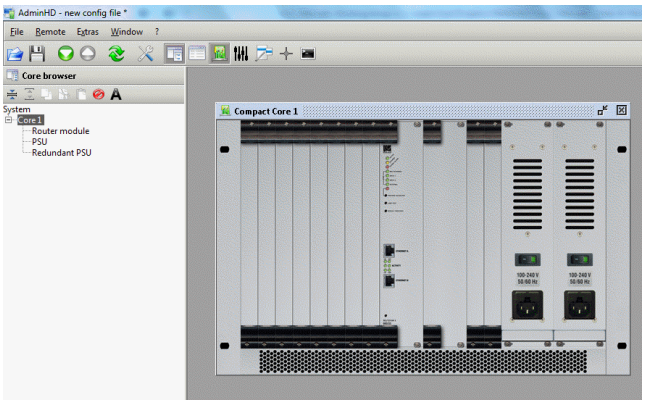
- **HD Core MK2 (48kHz) or (96kHz)** = Nova73 HD; fitted with the Router Module MKII (980/33); with a maximum sampling rate up to 48kHz or 96kHz.
- **Compact Core (48kHz) or (96kHz)** = Nova73 Compact; fitted with the Router Module MKII (980/33); with a maximum sampling rate up to 48kHz or 96kHz.

*The selected **Core** is added to the **System** tree, along with its standard components: **Router module**, **PSU** and **Redundant PSU**:*

Nova73 HD



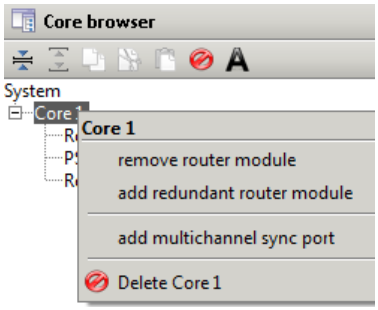
Nova73 Compact



You can decide whether the 'Graphic View' appears automatically from the Extras -> Preferences -> Common menu.

If you want to change the Core, then you will need to delete it and make a new selection:

3. Select **Core 1** in the 'Core Browser', right-click and select **Delete**:



*You are asked to confirm - **Yes** or **No**.*

4. Select **Yes** to remove the Core, and all of its sub components, from the configuration. You can now return to step 1 to make a new selection.

Warning

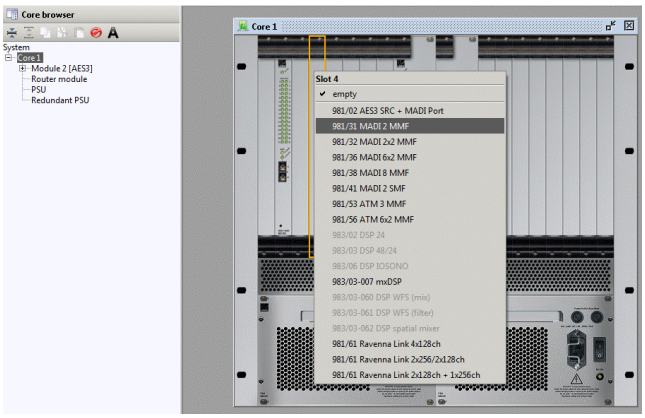
Once you have defined the Nova73 Core, you *CANNOT* change the type later. So take care to select the correct option before continuing!

Fitting Modules to the Core

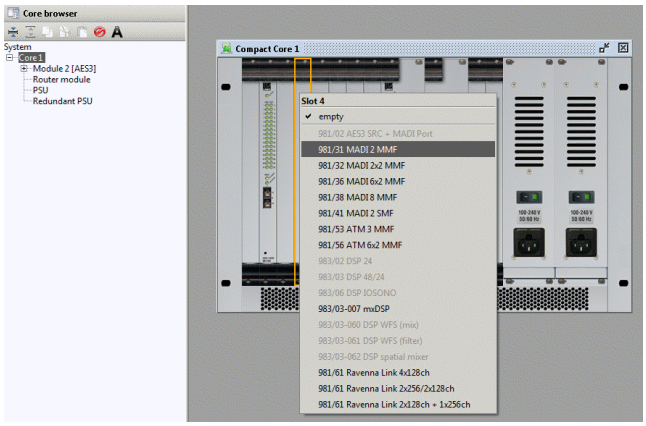
Next, fit your I/O and DSP modules to the Core, using the 'Graphic View' as follows:

1. Right-click on a module slot - e.g. **Slot 4** - and select a drop-down option:

Nova73 HD

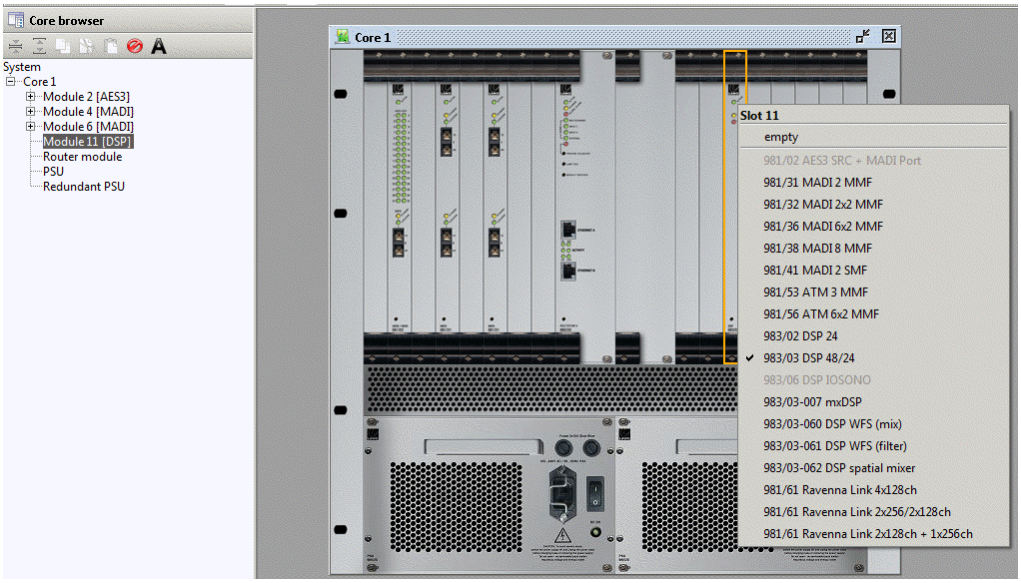


Nova73 Compact

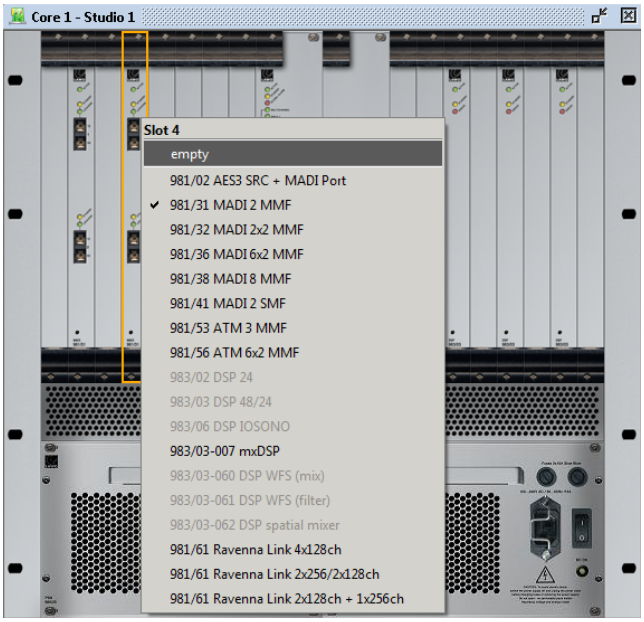


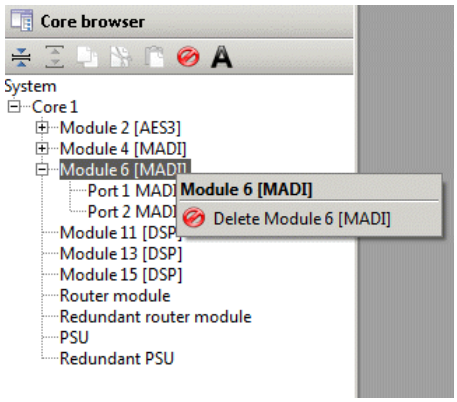
The fitted modules appear within the 'Graphic View' and 'Core Browser'.

The available options depend on the selected slot; you cannot configure an illegal option (they are "greyed out"):



2. To remove a module right-click on the 'Graphic View' slot and select **Empty**. Or, go to the 'Core Browser', right-click on the module and select **Delete**:

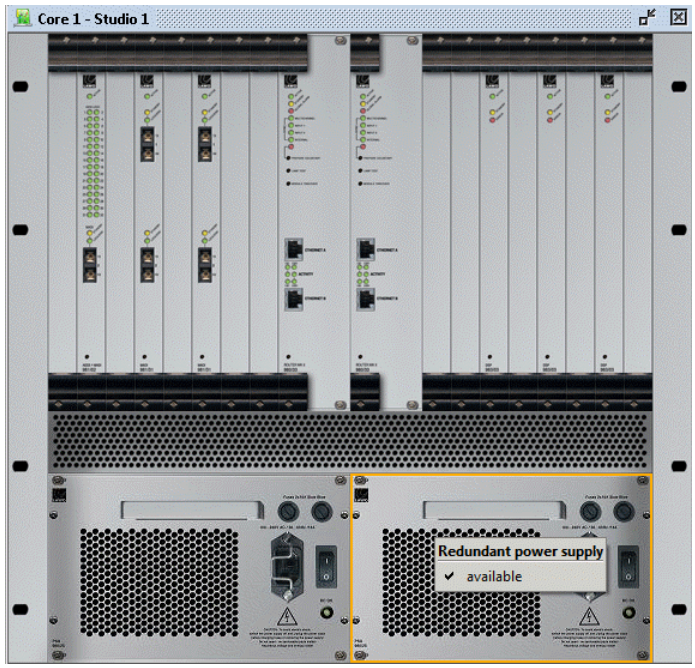




*You are asked to confirm - **Yes** or **No**.*

3. Select **Yes** to remove the **Module**, and all of its sub components, from the configuration.

4. For the Nova73 HD, you can right-click on the second PSU to add or remove the redundant power supply:



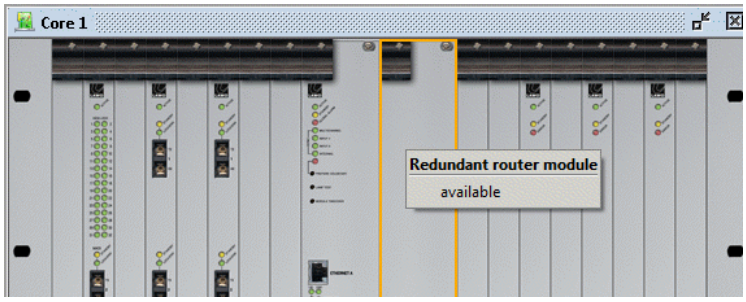
Warning

Take care to fit each module so that it matches the exact slot position, and part number, of your physical installation. Otherwise, the module may not operate correctly.

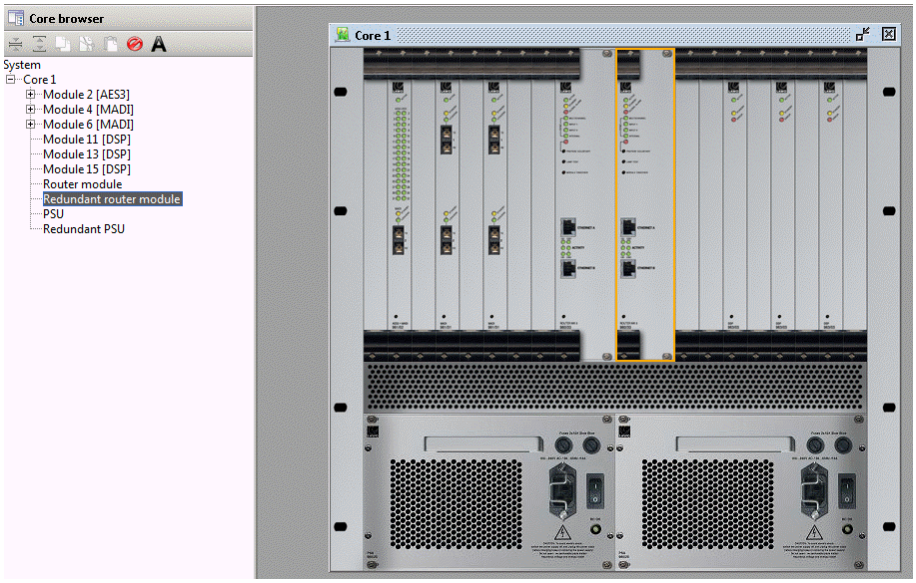
Fitting a Redundant Router Module

To add a redundant Router Module:

1. Right-click on the redundant Router Module slot and select **available:**



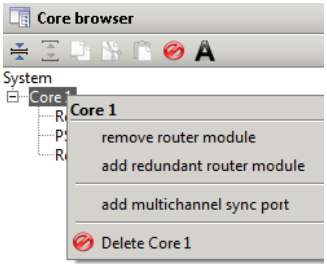
The module is added to the 'Graphic View' and 'Core Browser':



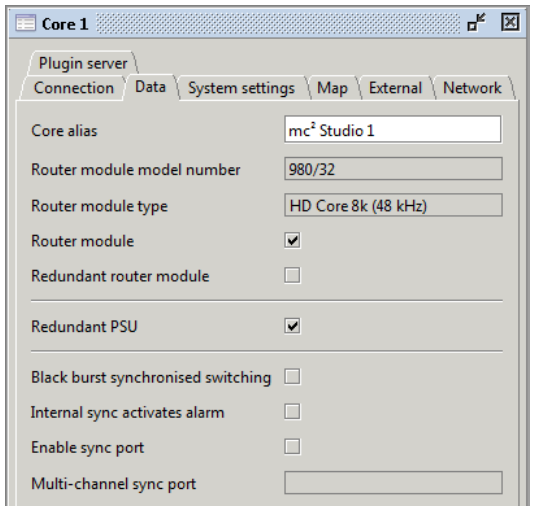
Note that the type of Router Module is automatically configured (to match that of the existing module).

You can also add or remove a redundant Router Module from the 'Core Browser', or 'Parameter Box':

'Core Browser'



'Parameter Box'



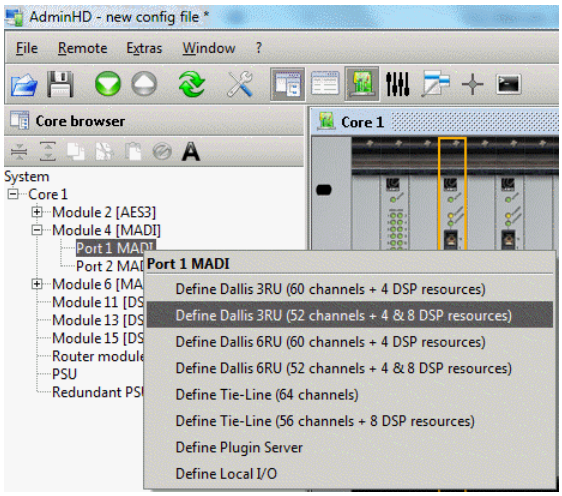
Defining the IO Ports

Each I/O module can now be opened within the 'Core Browser' to view its ports.

In the case of an AES3 module, the port is pre-defined and can be opened to access the AES input and output signals.

In the case of a MADI, RAVENNA or ATM module, the ports require further configuration. For example, the port may connect to a **DALLIS**, operate as **Tie-Line**s to/from an external device, connect to a Lawo **Plugin Server**, etc.

1. Select the **Port** in the 'Core Browser' and right-click:

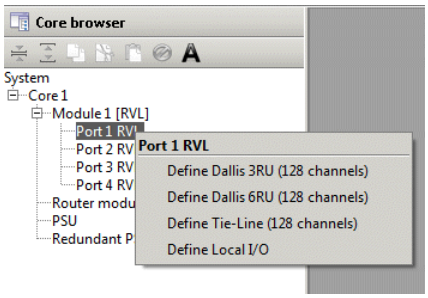


The drop-down options vary, depending on the module (MADI, ATM or RAVENNA), and the AdminHD mode and software release. For a **MADI** port, the options are:

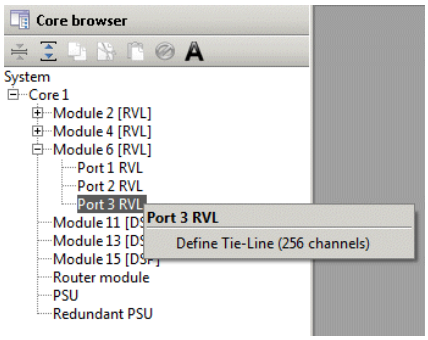
- **DALLIS** - configures a DALLIS unit (**3RU** or **6RU** frame), with either **60** or **52** audio channels + DSP resources.
- **Tie-Line** - the port is configured for a direct connection to an external device, either **64** audio channels only, or **56** audio channels + DSP resources.
- **Plugin Server** - configures a connection to the Lawo Plugin Server.
- **Local I/O** - configures a connection to the Local I/O board in the mc²56 MKII.

RAVENNA and **ATM** ports support similar options:

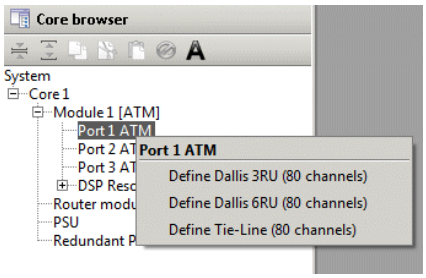
RAVENNA 128 ch link Port Options



RAVENNA 256 ch link Port Options



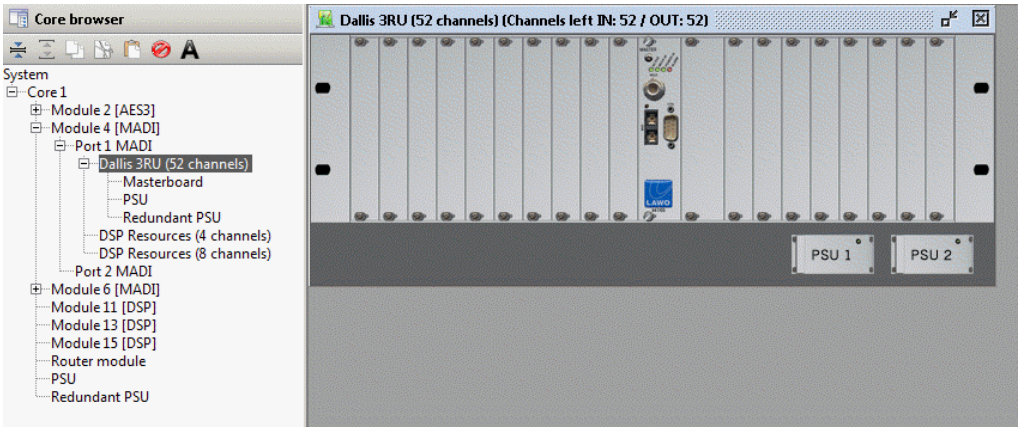
ATM Port Options



2. Select an option to define the port.

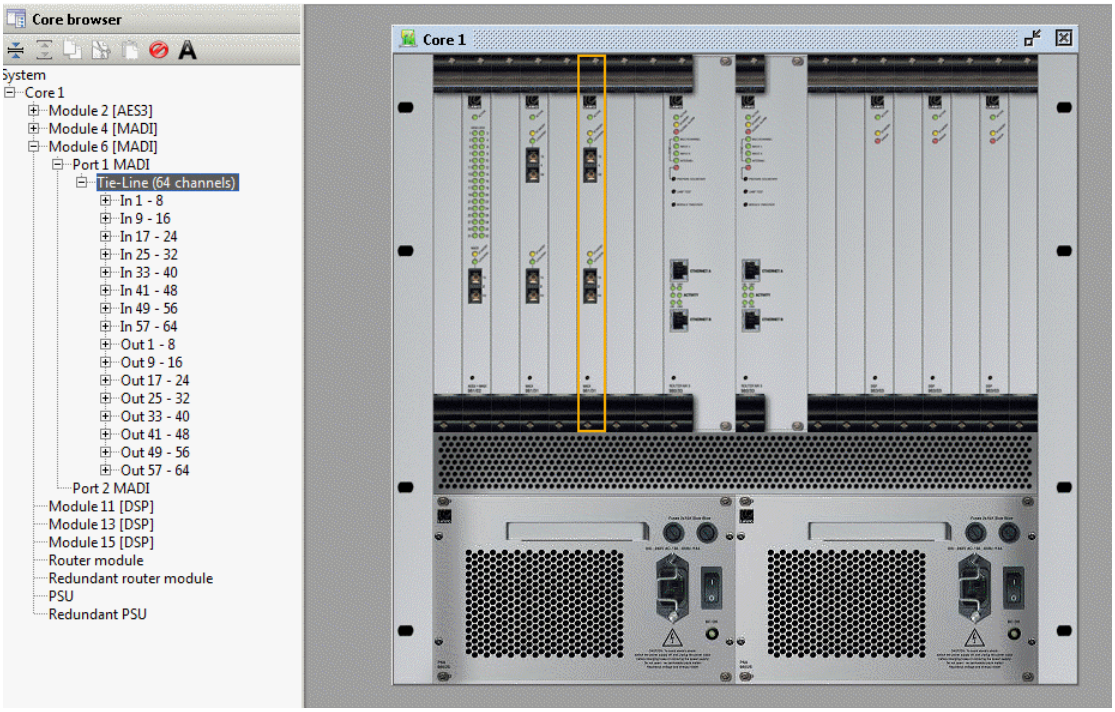
Your selection is added to the 'Core Browser' - for example:

- Select a **DALLIS 3RU (52 channels)** - a **DALLIS** with **DSP Resources** (**4** & **8 channels**) is added to the **Port**. If you open the DALLIS, you will see its standard components (**Masterboard**, **PSU**, and **Redundant PSU**). You can now fit cards to the DALLIS.



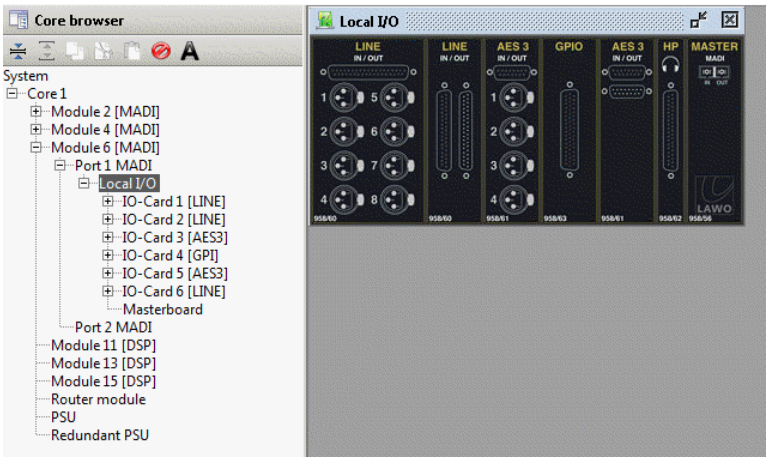
Note that the DALLIS master board is configured automatically according to the connection type from the Nova73 module.

- Select a **Tie-Line** - the MADI signals are added to the **Port**:



- Select **Plugin Server** - a special 64 channel connection to the Lawo Plugin Server is added to the **Port**:

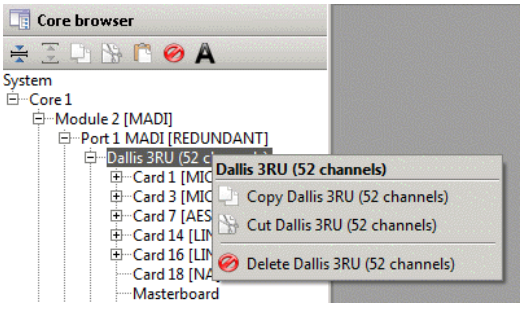
- Select **Local I/O** - Local I/O resources, supported by the mc²56 MKII, are added to the **Port**:



The signals appear in a similar manner to DALLIS plug-in cards. However, you cannot change the Local I/O card arrangement, as this is determined by the physical board fitted to the control surface!

If you want to change the function of a port, then you will need to delete the current assignment:

3. For example, right-click on a **DALLIS** in the 'Core Browser' and select **Delete**:



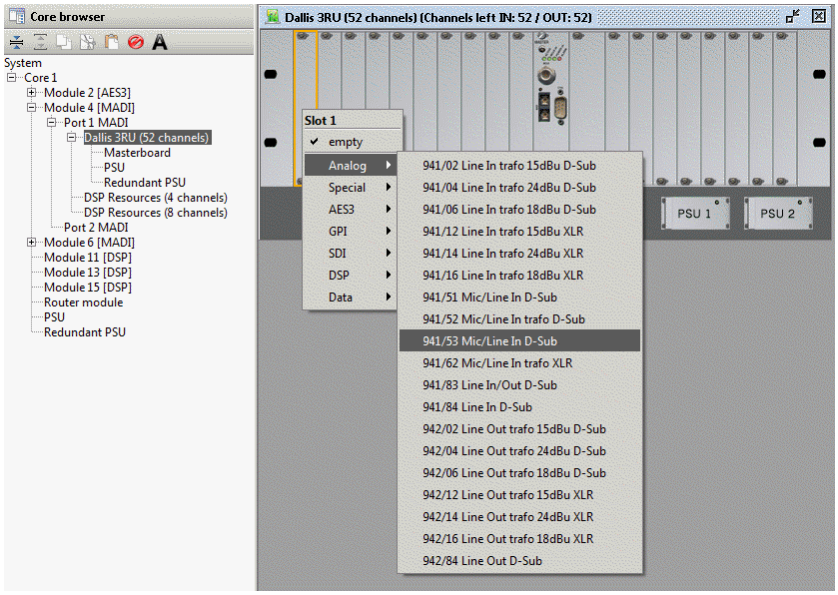
*You are asked to confirm - **Yes** or **No**.*

4. Select **Yes** to remove the DALLIS, and all of its sub components, from the configuration. You can now return to step 1 to make a new selection.

Fitting Cards to a DALLIS

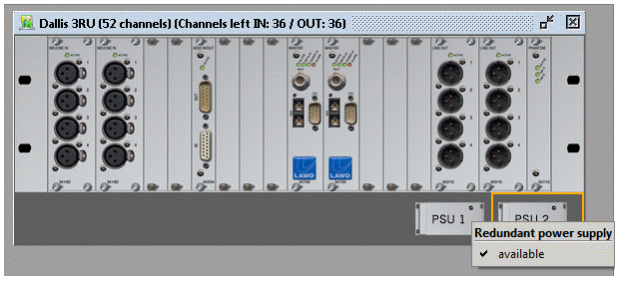
You can now fit cards to DALLIS units in a similar manner to fitting Nova73 modules:

1. Right-click on a card slot and select a drop-down option:



The available options depend on the selected slot and the capacity of the DALLIS; you cannot configure an illegal option.

2. Right-click on **PSU 2** to add or remove a redundant power supply:



You can check how many audio channels are left by looking in the title bar of the DALLIS frame - in our example, **52 In** and **52 Out**.

The DALLIS master board type cannot be altered (as this is configured automatically when you define the Nova73 I/O Port.

Warning

Take care to fit each card so that it matches the exact slot position, and part number, of your physical installation. Otherwise, the card may not operate correctly.

Copy, Cut & Paste

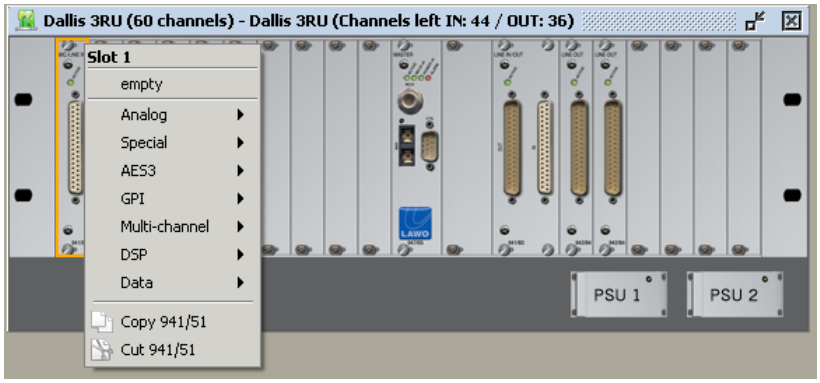
If you are fitting several components of the same type, then you can use copy, cut and paste.

For example, you may be fitting several MIC cards to a DALLIS, or connecting several DALLIS (with the same I/O configuration) to the Nova73. Or, you may need to move a DALLIS card from one slot position to another.

Note that all sub components and parameters are copied. Therefore, you may wish to configure the DALLIS or card completely (including any parameters), before using copy, cut and paste.

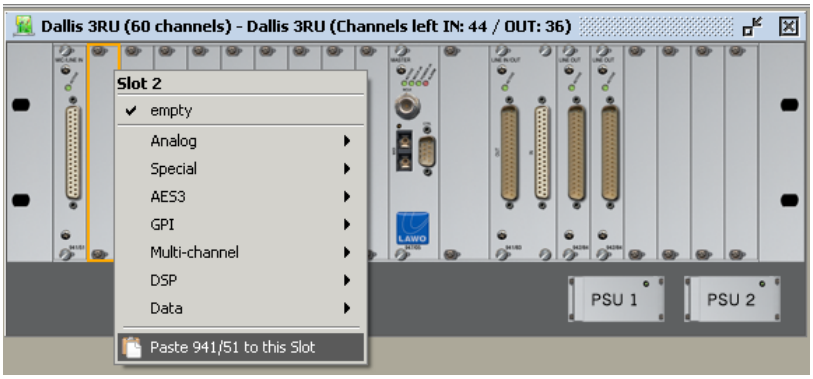
Copy & Paste from the 'Graphic View'

1. Right-click on the source DALLIS card and select **Copy**:



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

2. Then right-click on the destination card slot and select **Paste**:



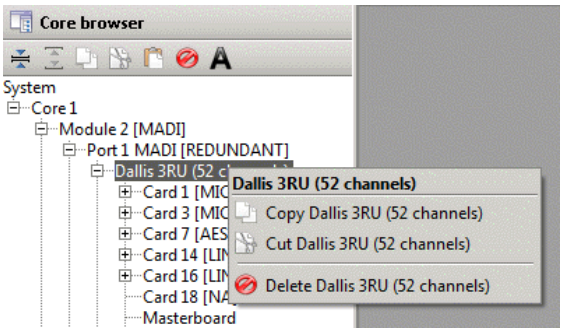
The card, and all of its parameters, are pasted into the configuration.

3. Repeat step 2 to quickly assign the same card to a number of slots.
4. Select **Cut** (in step 1) to move a card to a different slot.

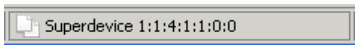
Note that **Paste** is only available if you select a valid destination. For example, if the DALLIS runs out of audio channels, then you will not be able to select **Paste**.

Copy & Paste from the 'Core Browser'

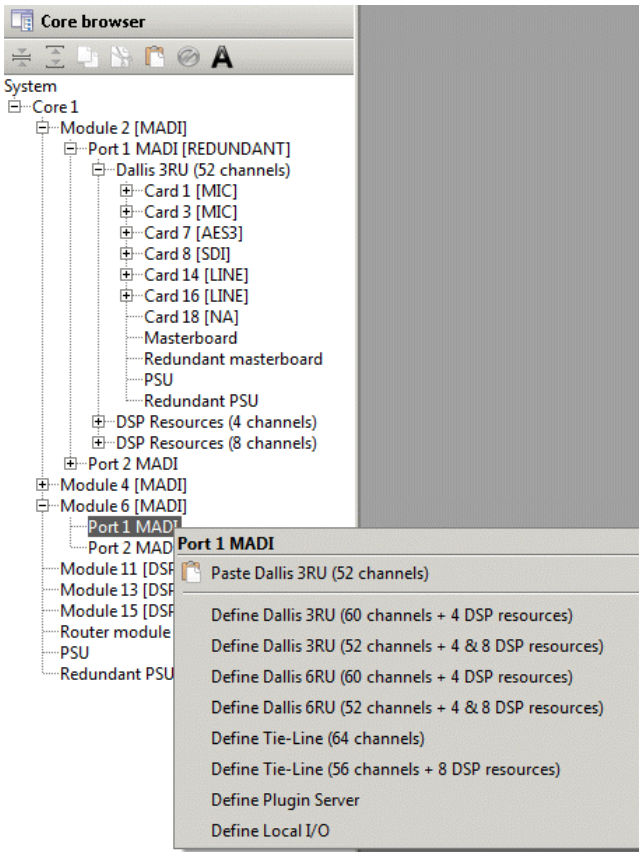
1. Right-click on the source component - for example, a complete **DALLIS** - and select **Copy**:



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



2. Then right-click on the destination **Port** and select **Paste**:



The DALLIS, including all of its cards and parameters, are pasted into the configuration.

3. Repeat step 2 to paste the same DALLIS configuration to multiple ports.

4. Select **Cut** (in step 1) to move a DALLIS to a different port.

Note that **Paste** is only available if you select a valid destination. For example, you can only paste a MADI DALLIS to another MADI port.

Deleting Components

Depending on the component, it can be deleted either from the ‘Core Browser’ or ‘Graphic View’, see Defining the Nova73 and Fitting Modules to the Core.

Warning

Deleting a component, removes it and all of its sub components, from the configuration. Therefore, if you wish to keep parts of an existing configuration, use Copy, Cut & Paste.

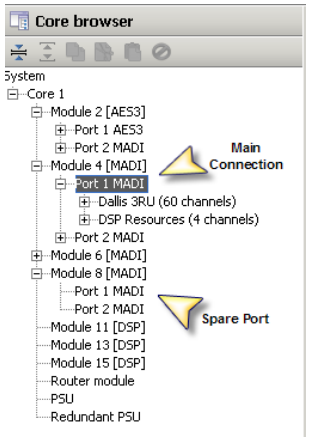
Port Redundancy

For crucial interconnections between DALLIS and Nova73 units, you can specify link & port redundancy.

To configure port redundancy, two master boards are fitted to each DALLIS. Each connects to a different Nova73 port (preferably on a different module). AdminHD can select which I/O port is used for the redundant connection as follows.

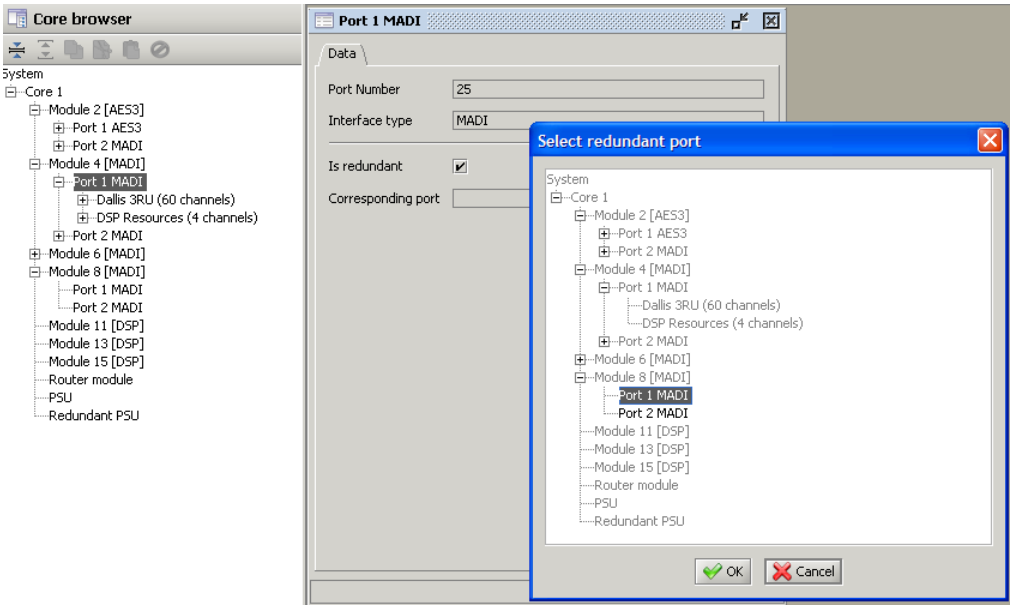
Note that to support this feature, your system *must* be fitted with two master boards per DALLIS, plus enough single-port Nova73 modules to support the connections.

Let's take an example, where the main connection to the DALLIS is from **Module 4 Port 1**. We have a spare port on **Module 8 Port 1** which we want to use for the redundant connection:



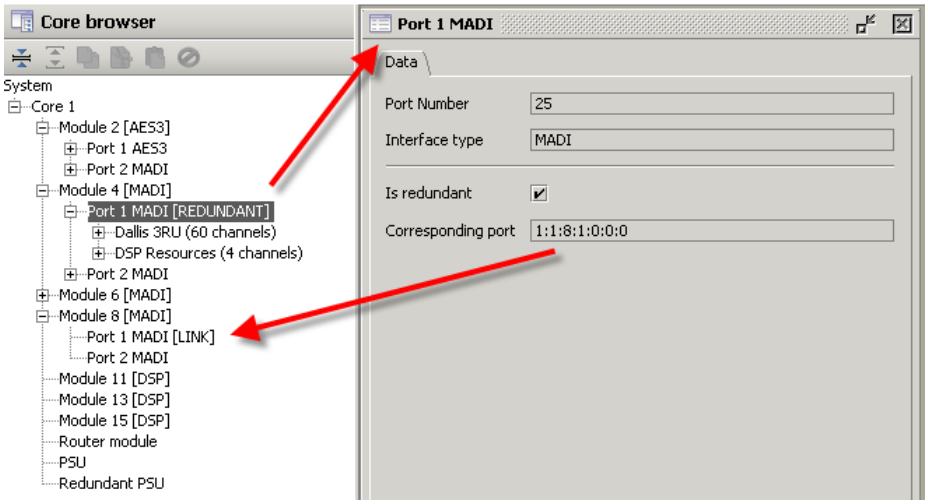
1. Select **Module 4 Port 1** and double-click to open its 'Parameter Box'.
2. Tick the **Is redundant** option.

The following pop-up appears:



3. Select the redundant port – in our example, **Module 8 Port 1** and click **OK**.

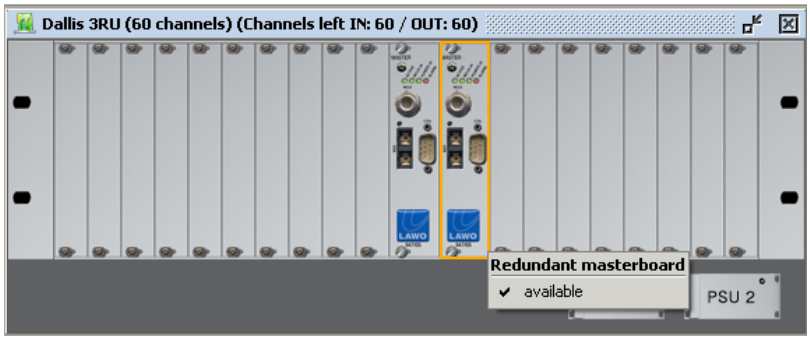
The ports are now linked as indicated in the 'Core Browser':



And 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:

System	:	Core	:	Module	:	Port	:	n.u.	:	n.u.	:	n.u.
1	:	1	:	8	:	1	:	0	:	0	:	0

4. If you now select the DALLIS and look at its 'Graphic View', you will see that a redundant master board has been fitted:



5. Right-click on the redundant master board slot and select (or unselect) **available** to add (or remove) the link to the redundant port.

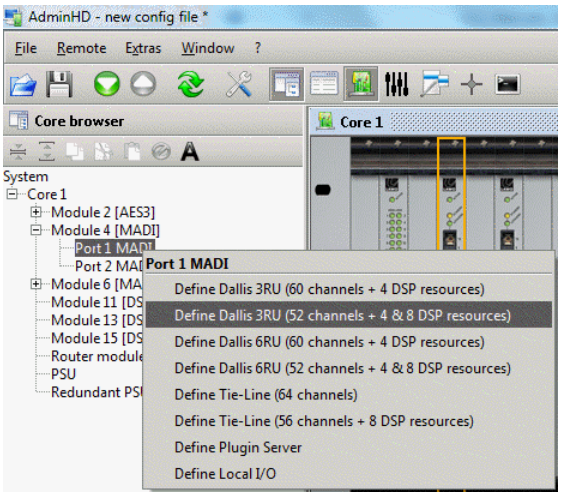
Port DSP Resources

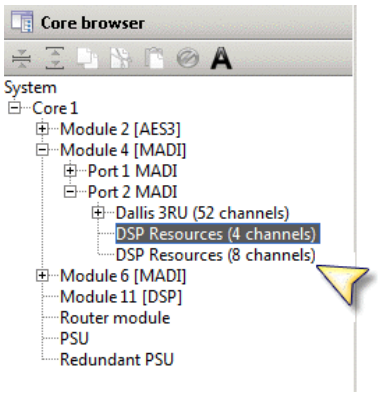
Whenever you define a MADI **Tie-line** or **DALLIS** which is 60-channels or less, you automatically configure an amount of DSP resource.

This is DSP which is physically located on the port (within the Nova73 module), and can be used for additional mix matrices of either **4x4** or **8x8**. The applications for this DSP resource are defined by AdminHD and include:

- **Console Monitoring** - one **4x4** plus one **8x8** resource are required to support the console's standard stereo and surround control room monitoring.
- **Downmix Matrix** - one **8x8** matrix is required to for each surround downmix. Once configured, matrices can be controlled from the GUI's **Downmix** display.

The amount of DSP resource is defined when you configure each MADI Port - for example, defining a 52-channel DALLIS leaves 12 free channels to support one **4x4** plus one **8x8 DSP resource**:

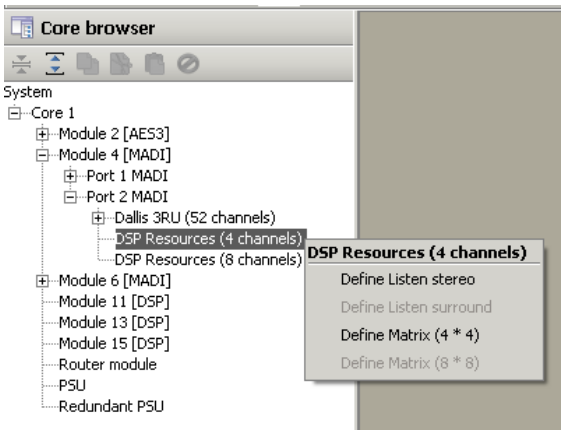


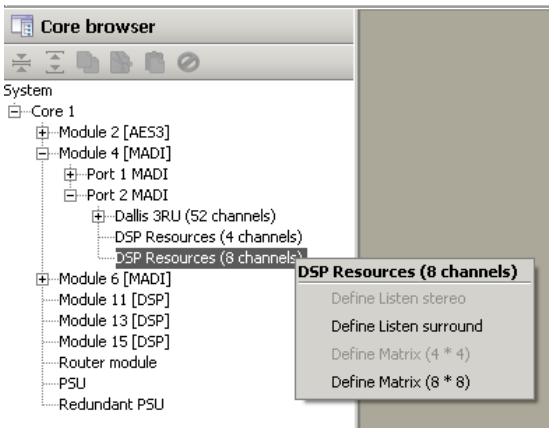


To configure the application of the DSP resources:

1. Right-click on the **DSP Resources** in the 'Core Browser'.

A drop-down menu appears listing the available options. These vary depending on the number of channels:

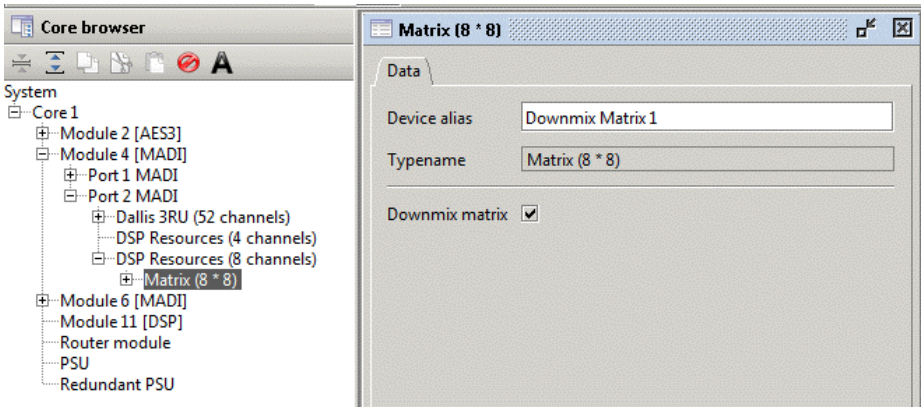




2. Select an option to configure the resources:

- **Listen stereo** or **Listen surround** – configures matrices for the console's stereo and surround monitoring.
- **Matrix (4 * 4)** or **Matrix (8 * 8)** – creates summing matrices. You will need a **Matrix (8 * 8)** to define a downmix matrix.

3. To define a **Matrix (8 * 8)** as a downmix matrix, double-click to open its 'Parameter Box', and tick the **Downmix matrix** option:



*Once the configuration is uploaded to the system, you will be able to control the surround downmix from the GUI's **Downmix** display.*

To access the inputs and outputs of a matrix, the signals must be added to the Signal List configuration (**gui_config.tcl**) using the 'Signal List Editor'.

Core Configuration: Editing Parameters

This section looks at editing the system-wide and signal parameters stored within the Core configuration.

To add or remove a hardware component, see Defining the System.

Whether you want to change a system or signal parameter, the operation is essentially the same, see Operating Principles: 'Parameter Box'.

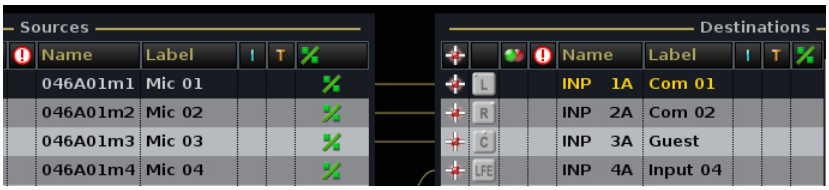
For details on all options, see the Parameters reference section. Here we will cover some of the most common editing tasks:

- Signal names and labels
- Device names (Alias names)
- Control system IP address
- Multi-channel sync
- Operating levels
- Maximum sample rate
- Mapping Tables

Signal Names and Labels

For each individual signal, you can edit the **Name** and default **Label**. These appear in the GUI's **Signal List** display, and are also used by AdminHD's 'Connect Manager':

mc² Signal List display



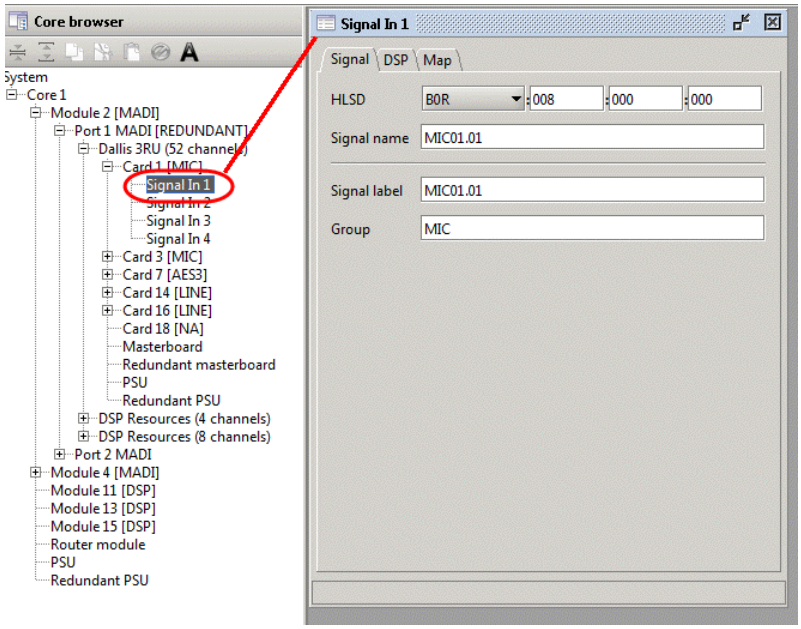
- The signal **Name** is stored *only* by the Core configuration, and cannot be edited from the console GUI. It should be used to provide a "fixed" signal name relevant to the installation.
- The signal **Label** is the label which the system resets to after a cold start. Users can change labels later from the GUI's **Signal List** display, or from AdminHD's 'Connect Manager'.

Both the **Name** and **Label** are limited to a maximum of 8 characters.

➢ **To edit an individual name (or label):**

1. Open the branches of the 'Core Browser' to reveal the signal you wish to edit.
2. Double-click on the signal – for example, **Signal In 1**.

The 'Parameter Box' opens:



3. Click in the **Signal name** (or **Signal label**) field, and type in the new name - you may enter up to 8 characters.
4. Press Enter to confirm the name.

➢ **To edit a range of names (or labels):**

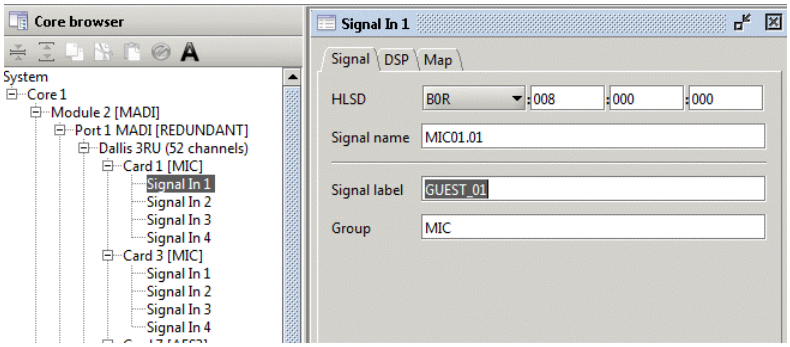
Once you have selected the text in the **Signal name** (or **Signal label**) field, you can use the **PAGE UP** or **PAGE DOWN** keys (on your computer keyboard) to navigate up or down the system tree while retaining the selected field.

This short cut can be applied to any "name" field - for example, the **Group** name, **Super-device alias** name, etc.

You can also press **CTRL + C** to copy, and **CTRL + V** to paste text between fields.

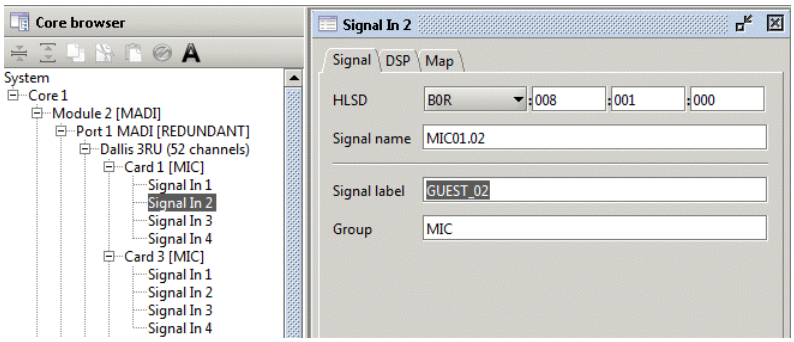
Alternatively, if you want to name a range of signals with the same suffix – for example, **GUEST_01**, **GUEST_02**, **GUEST_03**, then you can use the **Comfort Text Edit Mode**:

1. Enable this mode from the **Extras -> Datasheet -> Comfort Text Edit Mode** main menu.
2. Name the first signal and leave your cursor in the "name" field:



3. Now press **CTRL + SHIFT + PAGE DOWN**.

AdminHD steps down to the next signal in the system tree and automatically increments the suffix:



4. Repeat for all the signals in the range.

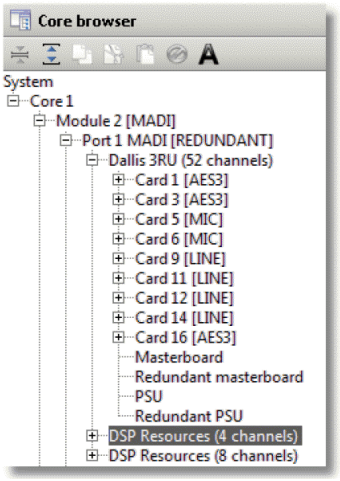
Device Names (Alias Names)

For each component you may enter an alias name to help identify components in AdminHD.

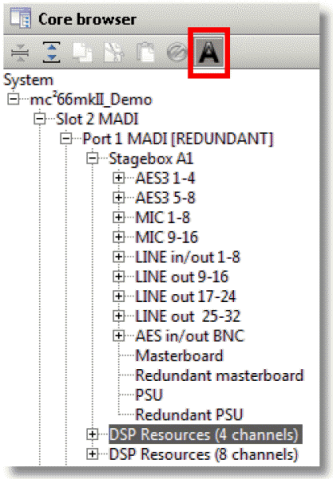
The names are used only within AdminHD, and are not transferred to the remote control system.

You can display the alias names in the 'Core Browser' by enabling the Alias button on the toolbar:

Alias off



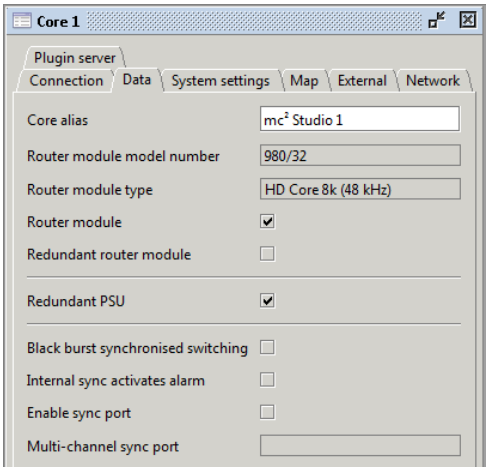
Alias on



The alias names are also used by the 'Signal List Editor' (within the **Hardware Tree**), and if you use the Generate Automatic Signal List button.

To enter an alias name:

1. Double-click on the component - e.g. the **Core** - within the 'Core Browser', and select the **Data** tab in the 'Parameter Box':



2. Enter a name into the **Core alias** field.

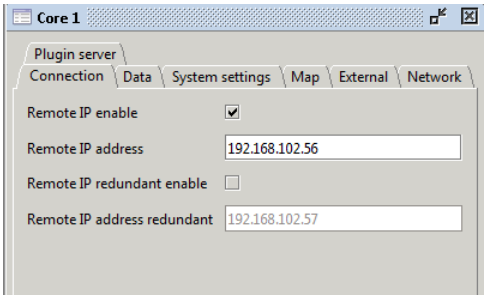
If the field is left empty, then a default system name is used to describe each component.

Control System IP Address

These parameters set the TCP/IP address of the control system (for the Lawo system network port - Ethernet B).

➢ **To edit the system's IP Address:**

1. Double-click on the **Core** within the 'Core Browser', and select the **Connection** tab in the 'Parameter Box':



2. If a single Router Module is fitted to the Nova73, then enter the main **Remote IP address** only.

3. If main and redundant Router Modules are fitted, then also tick **Remote IP redundant enable.** This enables the redundant Router Module and automatically sets the **Remote IP address redundant** - *always* 1 above the **Remote IP address**.

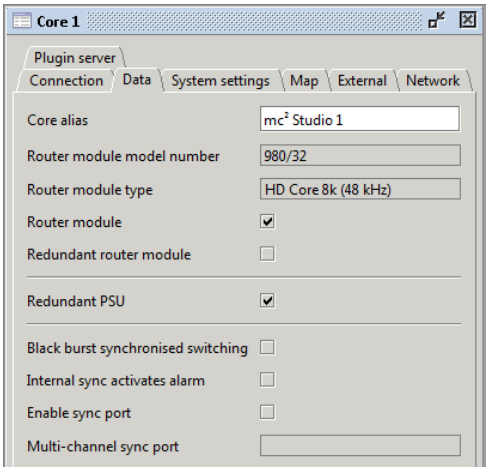
We recommend keeping the default IP address, where possible, as this will simplify remote maintenance. However, if your mc²56 MKII is part of a larger network, then it will need a unique IP.

Multi-channel Sync

The Nova73 offers a fully redundant clock source structure, including the ability to lock to sync from an incoming multi-channel signal.

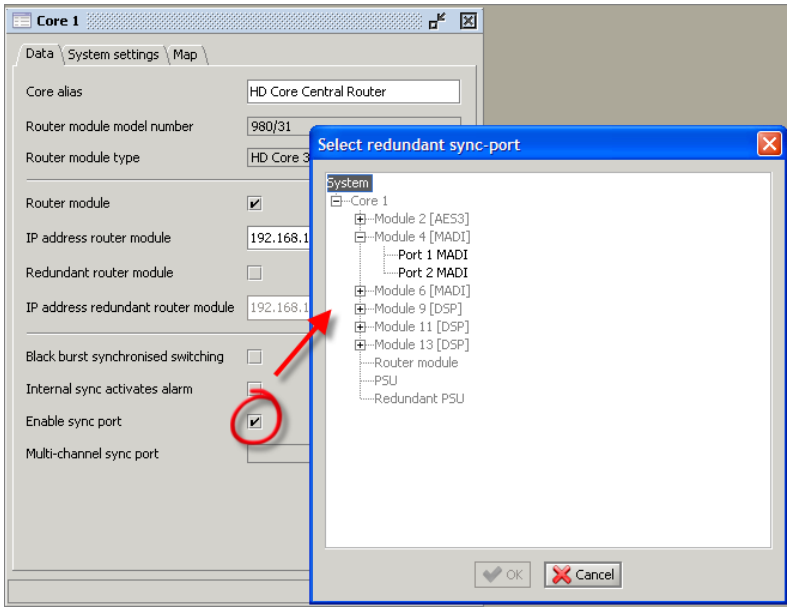
➢ **To define the multi-channel sync source:**

1. Double-click on the **Core** within the 'Core Browser', and select the **Data** tab in the 'Parameter Box':



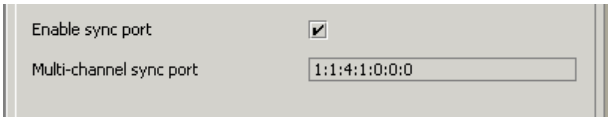
2. Click on the **Enable sync port** box.

A pop-up appears where you can select the multi-channel sync source:



3. Select the source – for example, **Module 4 Port 1 MADI** - and click on **OK**.

The multi-channel sync source is displayed as a system address – for example:



Operating Levels

These parameters specify the operating levels which the system resets to after a cold start. Users can change the levels later from the console GUI's **System Settings** display.

There are three level settings which interact to define the internal and analogue-to-digital operating levels of the system:

- Maximum Analogue Level = **Reference Level** + **Headroom**

The system supports a maximum analogue level = +24dB, and a minimum analogue level = +12dBu.

Warning

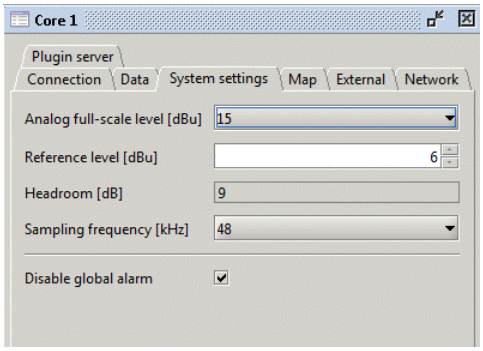
Changing the **Reference Level** or **Headroom** options move the internal 0dB operating point for the system and therefore will change the behaviour of any level dependent settings such as dynamics processing and metering. Therefore, it is not advisable to alter these levels once dynamics processing has been set.

For systems fitted with fixed level analogue I/O cards:

- The **Headroom** and **Reference Level** cannot be altered independently. For example, with a +15dBu fixed analogue I/O card and +9dB **Headroom**, the **Reference Level** *must* be +6dBu.
- The Maximum Analogue Level of the whole system is defined by the DALLIS card with the lowest GDA (General Device Address) - this is the card with the lowest address fitted to the DALLIS frame connected to the lowest port number of the first Nova73. (If a different fixed level analogue card is fitted elsewhere within the system, then a warning appears in the log file; however, the card with the lowest GDA still wins.)

➢ **To set the levels:**

1. Double-click on the **Core** within the 'Core Browser', and select the **System settings** tab in the 'Parameter Box':



2. Select the **Analog full-scale level** from the drop-down menu options.

3. Then set the **Reference level** by clicking on the up and down arrows.

*The resultant **Headroom** is calculated automatically.*

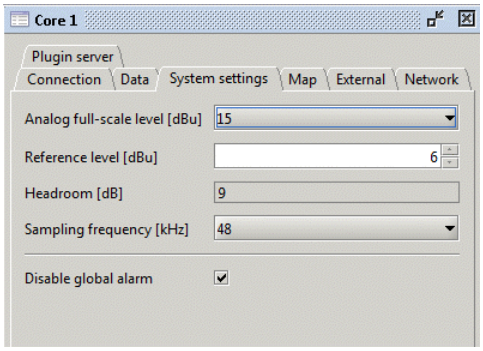
Internal Sampling Rate

This parameter specifies the internal sampling frequency which the system resets to after a cold start. Users can change the sample rate later from the console GUI's **System Settings** display.

Note that the maximum sample rate (96kHz or 48kHz) is defined when you select the type of Nova73.

➢ **To set the internal sampling rate:**

1. Double-click on the **Core** within the 'Core Browser', and select the **System settings** tab in the 'Parameter Box':



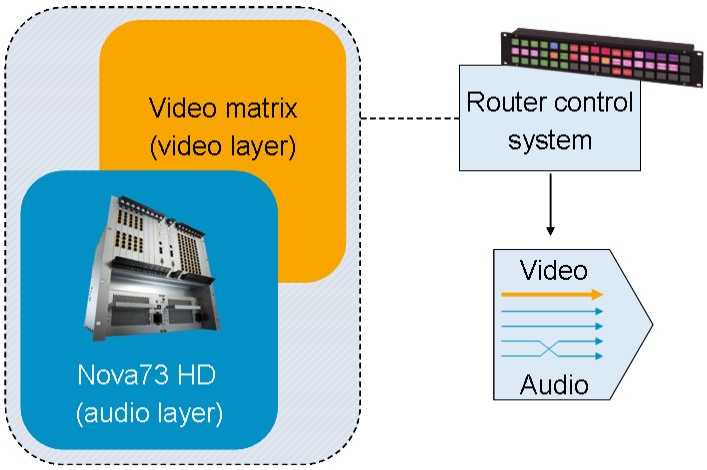
2. Select the **Sampling frequency** from the drop-down menu option.

The available options are defined by your choice of Core.

Mapping Tables

Lawo's Remote MNOPL protocol is a freely available Ethernet (TCP/IP) protocol providing control of virtually any system parameter from an external device.

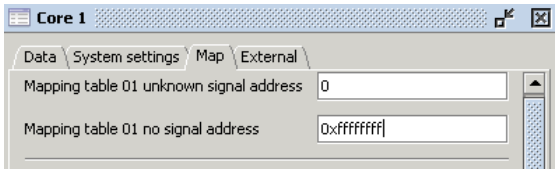
A typical application is to provide third-party matrix control so that crosspoints within the **mc²56 MKII**'s routing matrix can be controlled by external control systems such as VSM, Evertz, Quartz, BFE, Pharos and others. (If your preferred supplier does not support the protocol, then please ask them 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.

➢ **To configure the mapping tables:**

1. Double-click on the **Core** within the 'Core Browser', and select the **Map** tab in the 'Parameter Box':



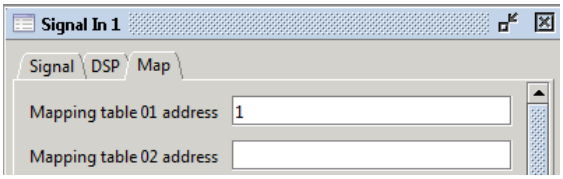
2. For your chosen mapping table (**01** to **16**), enter the signal addresses which will be submitted to the external control system:

- **unknown signal** - submitted when an undefined source is connected to a defined destination.
- **no signal address** - submitted when a signal is disconnected.

Please refer to your external control system's documentation for details on which addresses to enter. Our example shows the addresses for a Lawo zirkon control system.

3. Now select the first signal you wish to map to the controller, and select the **Map** tab.

4. For your chosen mapping table (**01** to **16**), assign the **Mapping table address**:

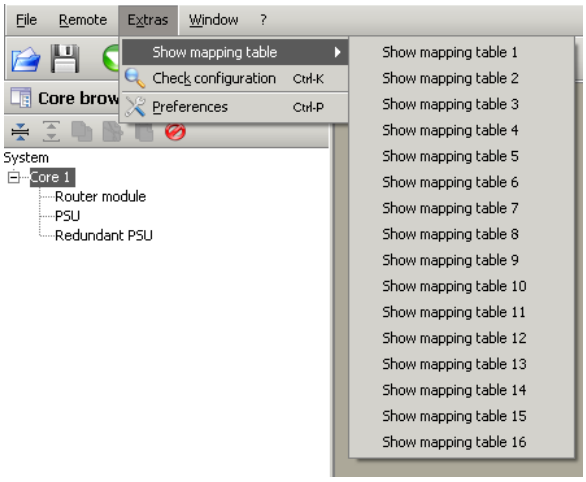


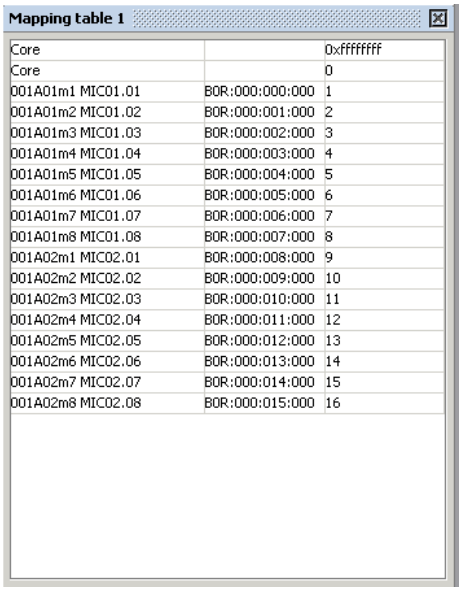
The format of the address will be specified by your external control system.

5. Repeat for all the signals you wish to control from your external device.

6. You can get an overview of the assignments by selecting **Extras** -> **Show Mapping Table** from the main menus.

*In our example, **Mapping table 1** assigns signals to a Lawo zirkon system:*





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

Signal List Configuration

This section deals with how to edit and update a Signal List.

Signal Lists are created by the 'Signal List Editor' and stored as separate **.slx** files to the Core configuration (**.csv** file).

The 'Signal List Editor' can produce a cold start file (**gui_config.tcl**) to modify the console GUI's Signal List display, or a **signallist.slx** file to customise the signals visible in the 'Connect Manager'.

The **gui_config.tcl** can *ONLY* be uploaded to the remote system's cold start data. This means that you *MUST* be prepared to restart the mc²56 MKII in order to change its Signal List configuration.

The principles are similar to editing the Core configuration (**config.tcl**); the best approach is as follows:

1. AdminHD must have a Core configuration with some relevant signals. Therefore, first download or open a Core configuration as described earlier.
2. Open the 'Signal List Editor' sub window.
3. If possible, download the existing Signal List configuration from the mc²56 MKII control system.

   Alternatively, if you can't connect to the mc²56 MKII, open an existing **signallist.slx** file. This may be a file which you saved earlier or requested from your configuration engineer.

   If you have neither a network connection or an existing **signallist.slx** file, then you will need to create a new Signal List and build a configuration.
4. Save the configuration as a **signallist.slx** file - this allows you to open it later, or move it to another AdminHD computer.
5. Edit the Signal List.
6. Backup the system's existing cold start files.
7. Export the Signal List configuration as a **gui_config.tcl** file - this puts the data into a format which can be read by the control system.
8. Upload the **gui_config.tcl** file from your computer to the mc²56 MKII control system.
6. Cold start the mc²56 MKII to see your changes take affect.

Workflow Suggestion:

If you are making changes to both the Core and Signal List configurations, then download and save both sets of data (**config.csv** and **signallist.slx**) while you are connected to the control system. Once editing is complete, export both cold start files (**config.tcl** and **gui_config.tcl**), and upload them to the control system. You can then perform a single cold start to action all your changes.

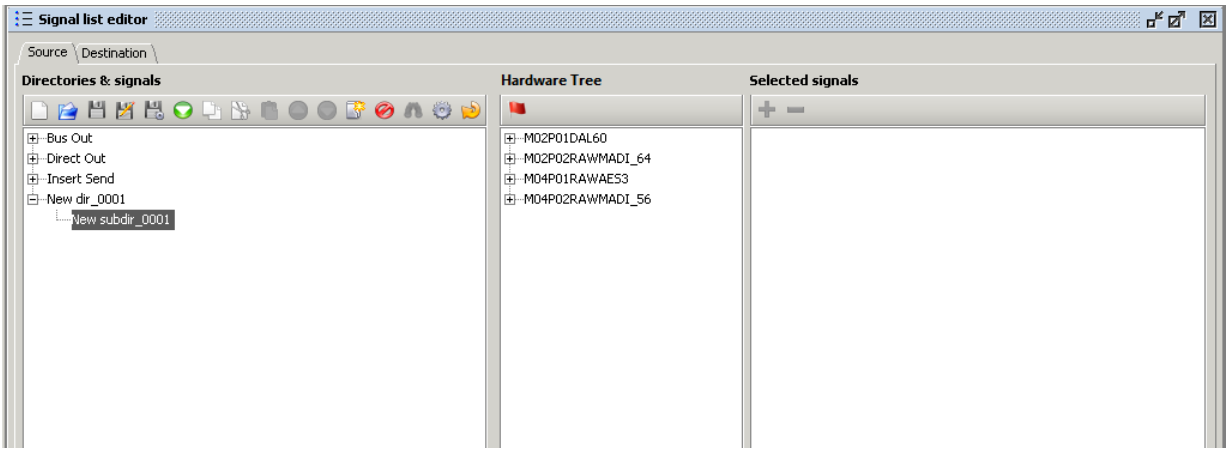
The 'Signal List Editor'

The 'Signal List Editor' is used to download, create, edit and upload the Signal List configuration used in the console GUI's Signal List display or AdminHD's 'Connect Manager'.

1. Click on  from the main toolbar to show the 'Signal List Editor'.

   Or select **Window -> Signal list editor** (from the main menus) or press **CTRL + SHIFT + S** (on your computer keyboard).

   AdminHD analyses its Core configuration and opens the 'Signal List Editor' window:

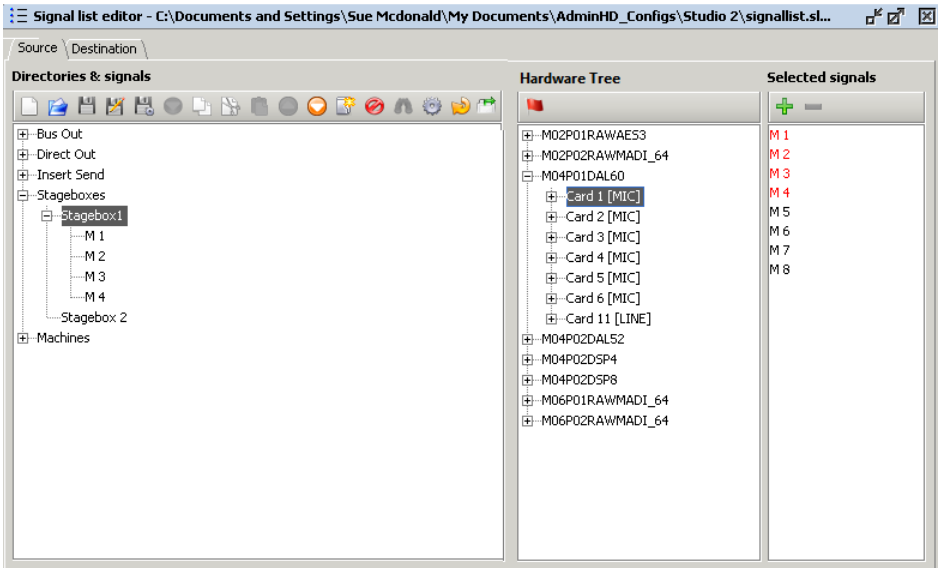


AdminHD creates a new 'empty' Signal List each time you open the 'Signal List Editor'. If you wish to edit an existing Signal List, then either download the Signal List configuration from the mc²56 MKII control system, or open an existing **signallist.slx** file.

The 'Signal List Editor' is divided into two pages – **Source** and **Destination**.

2. Click on the **Source** and **Destination** page tabs to change between pages.

Each page has three columns:



1	**Directories & signals**	This column displays the configured Signal List. Signals are organised into directories and subdirectories which may be added and renamed as you wish. Use the **+** and **–** signs to open and close branches of the **Directories & signals** column to interrogate the configured signal list.
2	**Hardware Tree**	This column lists all the signals within the Core configuration. The list uses the alias names (if entered). Otherwise, default system names are used to describe each component – for example, **MO4PO1DAL60**: • **MO4** – indicates the Nova73 Module (e.g. Module 4). • **PO1** – indicates the port on the Module (e.g. Port 1). • **DAL60** - indicates the device on the port (e.g. a DALLIS Device with 60 audio channels). Use the **+** and **–** signs to open and close branches of the **Hardware Tree**. Click on an individual signal, or a card, and the signal(s) appears in the third column - **Selected signals**.
3	**Selected signals**	This column is used to build a list of signals, which you can add to the selected subdirectory using the + button. Signals in red are already used somewhere within the configuration; those in black are not.

For more details, see Editing a Signal List.

The Signal List Editor Toolbar

The toolbar, at the top of the 'Signal List Editor', is used to action most of the editor's functions.

Note that buttons are "greyed out" if they are unavailble - for example, you cannot **Add a new directory** (12) if you have a signal selected in the **Directories & signals** column.

1	**New**	Creates a new signal list.
2	**Open**	Opens an existing Signal List file (**signallist.slx**).
3	**Save**	Saves the current Signal List configuration as a **signallist.slx** file.
4	**Save as**	Saves the current configuration under a new filename.
5	**Export**	Exports the current Signal List configuration as a cold start **gui_config.tcl** file.
6	**Download**	Downloads the Signal List configuration from the mc²56 MKII control system into AdminHD.
7	**Copy**	Copies the selected signal or directory, from the **Directories & signals** column, to the clipboard.
8	**Cut**	Cuts the selected signal or directory from the **Directories & signals** column.
9	**Paste**	Pastes the clipboard data to the selected directory in the **Directories & signals** column.
10 **11**	**Move up** **Move down**	Moves the position of a signal or directory in the **Directories & signals** column.
12	**Add directory/ subdirectory**	Adds a new directory to the **Directories & signals** column.
13	**Delete**	Deletes the selected signal or directory from the **Directories & signals** column.
14	**Locate signal**	Select a signal within the **Directories & signals** column, and then click this button to locate its position within the **Hardware Tree**.
15	**Generate automatic tree view**	Adds the directories and signals from the **Hardware Tree** into the **Directories & signals** column. Use this button to quickly generate a Signal List from your hardware components.
16	**Update hardware signal config**	Updates the **Hardware Tree** column if you make changes to the Core configuration while the 'Signal List Editor' is open.
17	**Duplicate directory structure**	Copies the directory structure, within the **Directories & signals** column, from the **Source** to the **Destination** page (or vice versa).

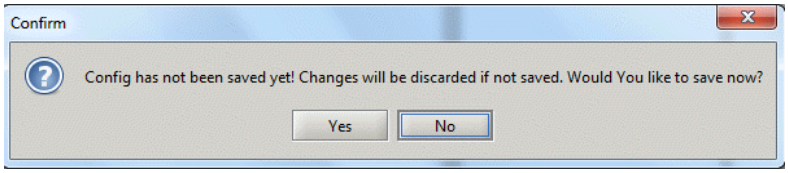
Downloading the Signal List

The best way to ensure that you are working with your system's latest data, is to download the Signal List configuration, from the mc²56 MKII.

To perform a successful download, you will need a valid network connection between your computer and the control system.

Open the 'Remote Log' to monitor the progress of the download.

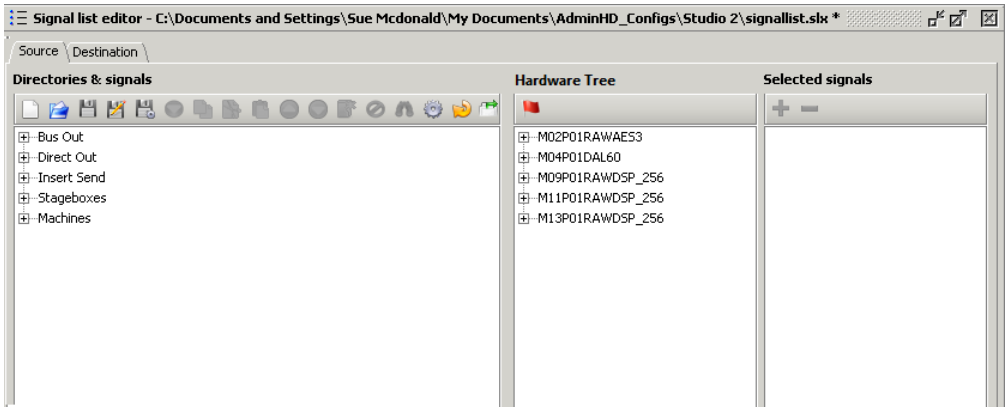
1. Click on (**Download GUI signal list config**) from the 'Signal List Editor' toolbar.
2. If you have made changes to the current Signal List, then the following dialogue box appears:



- Select **Yes** to save the configuration (as a .slx file) before proceeding.
- Select **No** to continue without saving.

AdminHD downloads the configuration data from the remote system; the 'Remote Log' reports on the progress.

When the download is complete, the 'Signal List Editor' updates:



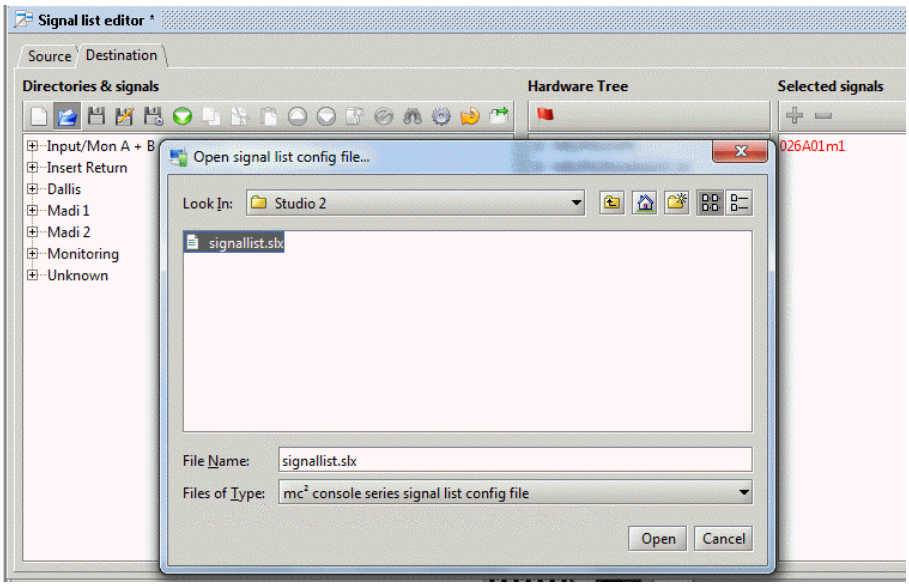
If there is a problem with the download, then:

- Check the network connection and TCP/IP settings of your computer's network interface card.
- Check that AdminHD is compatible with the mc²56 MKII system.
- See the trouble-shooting tips.

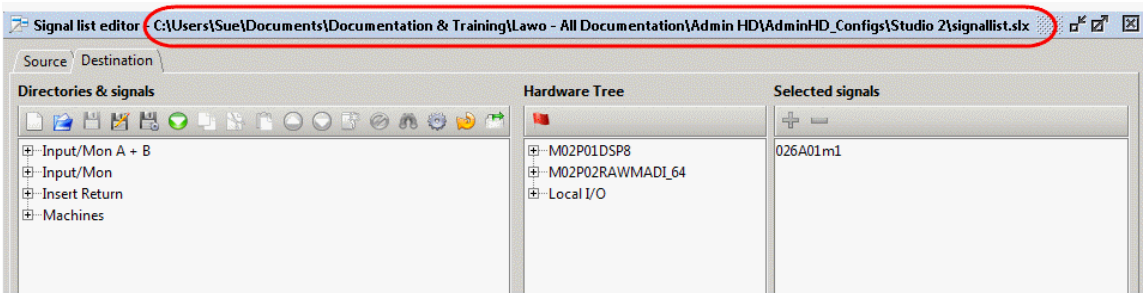
Opening a Saved Signal List

To open an existing **signallist.slx** file:

1. Click on (**Open signal list config**) from the 'Signal List Editor' toolbar. (If you have made changes to the current Signal List, then you will be asked if you wish to Save the changes first).
2. Select your file and click **Open**:



The file opens, and the path and file name appear at the top of the 'Signal List Editor' window:



If there is a problem opening the file, then check:

- Is the file an AdminHD **.slx** ?
- Was the file saved by a newer release of AdminHD?

> Configurations saved by an earlier version of AdminHD can be opened in a later release. However, configurations saved by a newer release are not backwards compatible.

- Does the file contain signals which are not supported by the current Core configuration? If so, then some parts of the Signal List may not load.

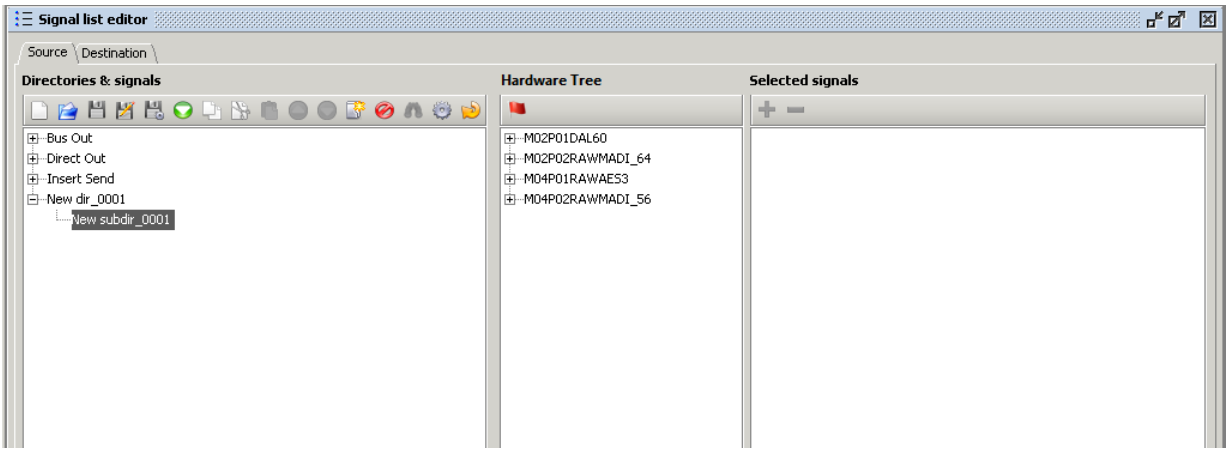
Creating a New Signal List

A new 'empty' Signal List is created each time you open the 'Signal List Editor'. However, if you already have a Signal List open, and wish to clear its data, create a new file as follows:

1. Click on  (**New Signal List Config**) from the 'Signal List Editor' toolbar.

*A new list is created, in the **Directories & signals** column, which includes the system's default directories and an unnamed entry (**New_dir_001** and **New subdir_001**).*

*In the **Hardware Tree** column, you will see all the signals available within your Core configuration:*



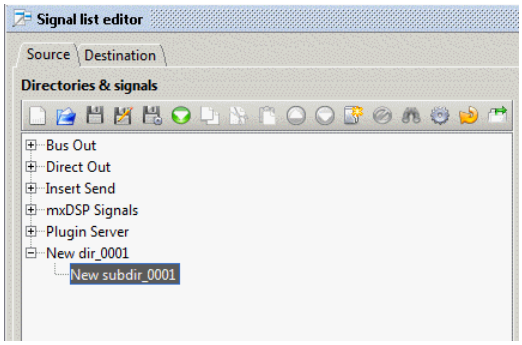
Use the Generate automatic tree view from config button to quickly generate a Signal List from your Core configuration.

Default Directories

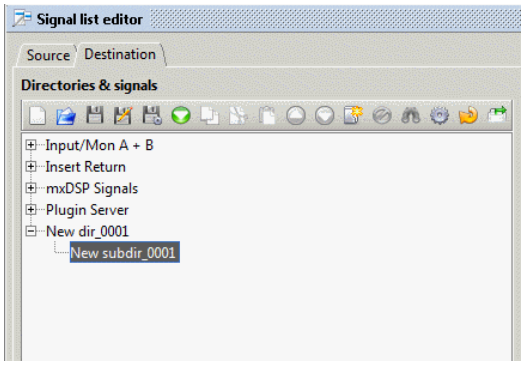
For the mc² mixing consoles, you will see some default **Source** and **Destination** directories which cannot be edited or deleted.

These provide access to the console's channel DSP resources (**Input/Mon A+ B**, **Bus Out**, **Direct Out**, **Insert Send/Return**), and other options dependent on your Core configuration (**mxDSP Signals** and **Plugin Server**):

Source Page



Destination Page



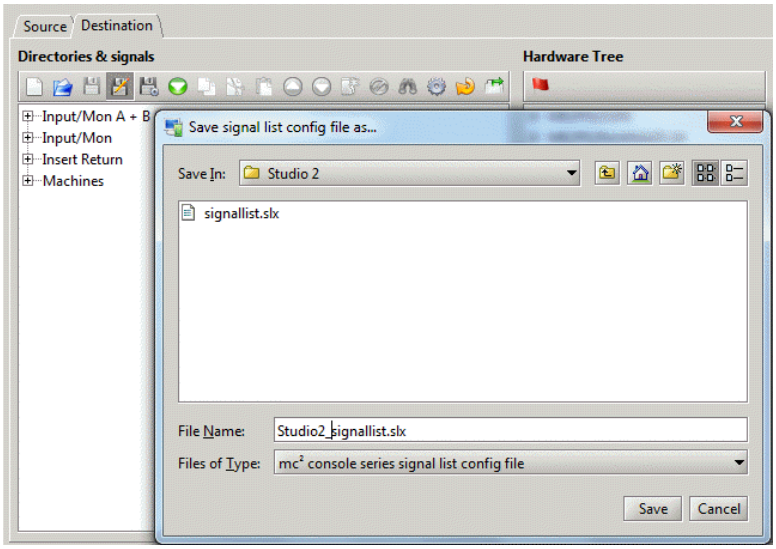
You can select whether the **Input/Mon A + B** directory appears from the **Extras** -> **Preferences** -> Signal List Editor menu.

You will only see the **mxDSP Signals** directory if an mxDSP module has been added to the Core configuration. Similarly, you will only see the **Plugin Server** directory if a MADI I/O Port has been defined for the plugin server.

Saving the Signal List

Having downloaded, opened or created a new Signal List, it is a good idea to save the data as an AdminHD **signallist.slx** file. This will allow you to open the file later, move it to another AdminHD computer, or import it into the 'Connect Manager'.

1. Click on either (**Save**) or (**Save as**) from the 'Signal List Editor' toolbar:
   - **Save** overwrites the current file name (if one exists).
   - **Save as** asks for a new file name:



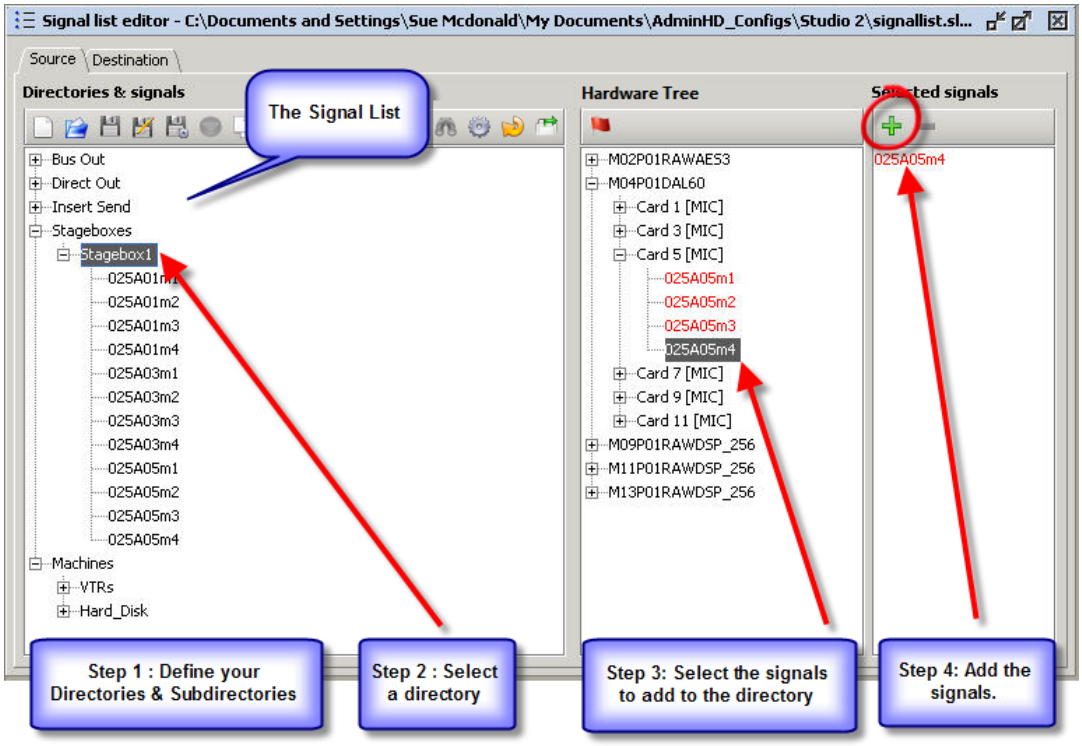
2. Select a path and enter a suitable file name.

You can use any name as long as it keeps the **.slx** suffix. As the Signal List relates to the Core configuration (**.csv** file), it is a good idea to store the two files in the same location. See Organising Your Files.

3. Click **Save** to save the Signal List configuration onto your computer's hard disk.
4. From here on, you can quickly update the file by clicking on (**Save**).

Editing a Signal List

The current Signal list configuration is shown in the **Directories & signals** column. Directories and subdirectories can be added and named as you wish. Signals can then be added to subdirectories as follows:



Note that:

- The Signal List structure supports three levels: directories, subdirectories and signals; you cannot configure additional levels or add signals directly to directory. These restrictions are required in order to support the GUI's **Signal List** display.
- The 'Signal List Editor' can add, remove and rename directories and subdirectories, and organise signals into subdirectories. To rename the signals themselves, use the 'Parameter Box' to edit the Signal name field.
- You can add a signal to more than one subdirectory.

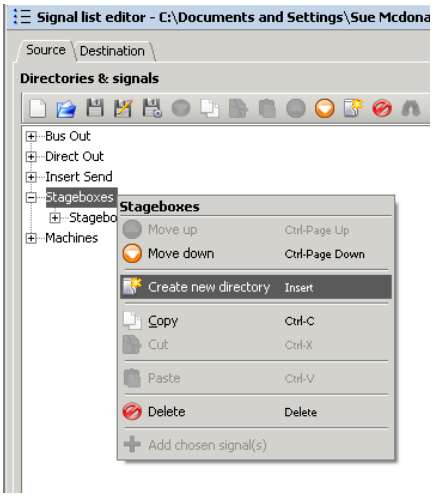
Some tips:

- Keep the 'Signal List Editor' open, while adding components to the Core configuration. Then use the Update hardware signal config button to refresh the **Hardware Tree**.
- You can generate a signal list automatically from the Core configuration. This is a quick way of getting a useful starting configuration.
- Use Copy, Cut and Paste to duplicate or move subdirectories.
- Use the duplicate directory structure function to copy the structure of your **Source** directories to the **Destination** page, or vice versa.
- The context menu (available from a right-click in the **Directories & signals** column) offers a number of keyboard shortcuts.

Adding & Naming Directories & Subdirectories

➢ **To add a new directory, or subdirectory:**

1. Select a position in the **Directories & signals** column.
2. Right-click and select **Create new directory**:



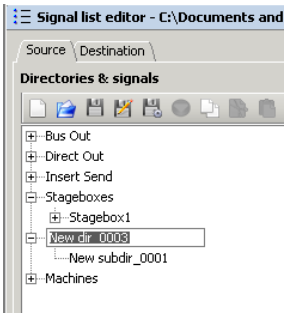
The new directory, or subdirectory, is added below your selection and given a default name.

Note that the Signal List structure supports three levels: directories, subdirectories and signals; you cannot configure additional levels.

➢ **To rename a directory, or subdirectory:**

1. Double-click on the existing name.

The text is highlighted:



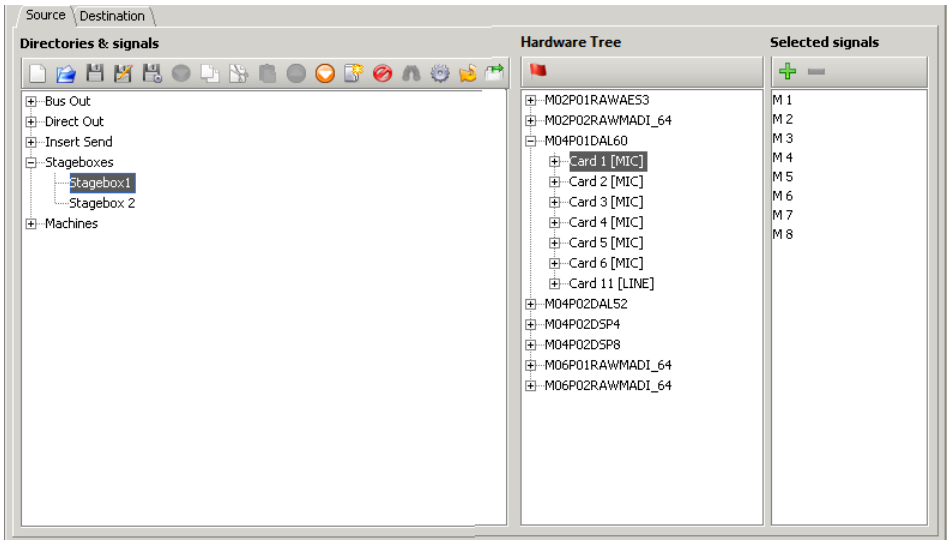
2. Type in the new name on your computer keyboard and press Enter - you may enter up to 16 characters.

For easy operation from the GUI's **Signal List** display, try and keep the names as short as possible.

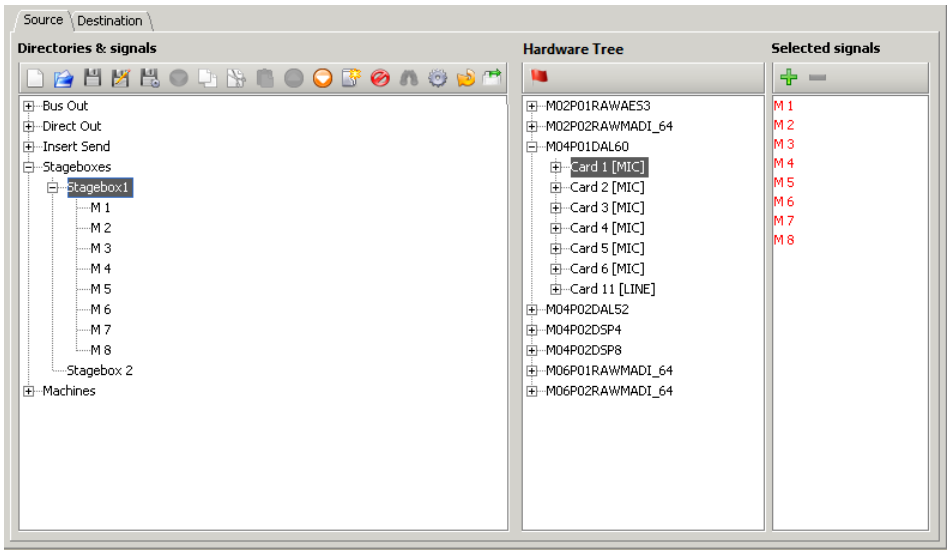
Adding Signals to a Subdirectory

To add signals to a subdirectory:

1. First, use the **Hardware Tree** to build up a list of signals in the **Selected signals** column - you can select single or multiple signals, and use the button to edit the **Selected signals** list. See Selection tips.



2. Once you are happy with the **Selected signals** content, click on the button to add all the **Selected signals** to your subdirectory:



Note that you can click the button multiple times if you wish.

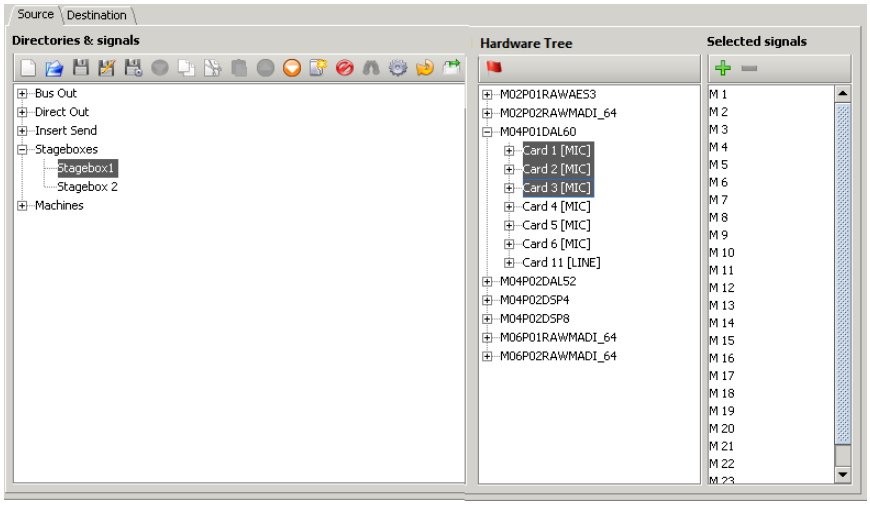
Note that in the **Selected signals** column, signals in red are already used somewhere within the configuration; those in black are not.

Selection Tips and Tricks

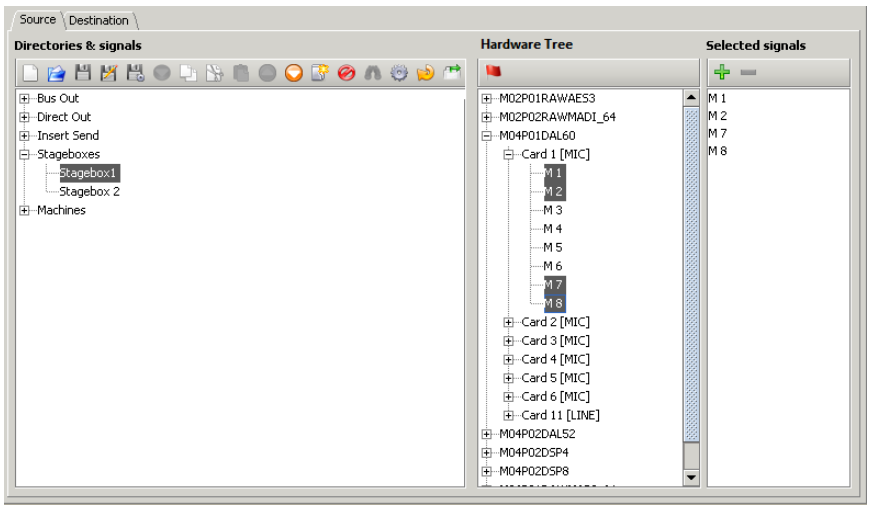
When adding signals, you can use the following tips and tricks to edit the contents of the **Selected signals** column.

(The same tips can be used when deleting signals, but you would make selections in the **Directories & signals** column.)

- To select all the signals from a card, click on the card within the **Hardware Tree** - all signals within the card are added to the **Selected signals** list.
- To select a range of consecutive signals or cards, select the first signal or card; press and hold **SHIFT** (on your computer keyboard), and then select the last signal or card - all signals within the range are added to the **Selected signals** list:



- To select non-consecutive signals or cards, press and hold **CTRL** (on your computer keyboard) and then click on the signals or cards. As long as you continue to hold the **CTRL** button, your selections accumulate within the **Selected signals** list:

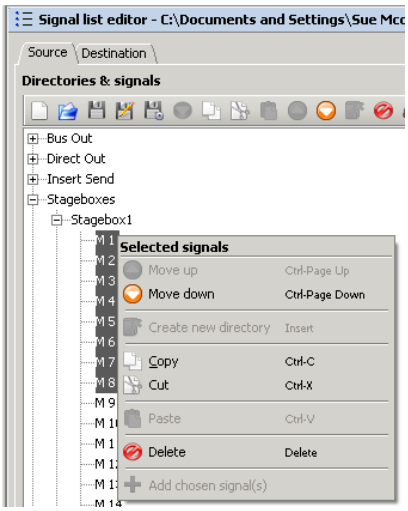


- To remove a signal, from the **Selected signals** column, select the signal and click on the button. Note that this function only edits what is in the **Selected signals** column. If you wish to remove a signal from a subdirectory, then see deleting signals.

Deleting Signals, Subdirectories & Directories

➢ **To delete signals from a subdirectory:**

1. Select the signals, from the **Directories & signals** column, see Selection tips and tricks.
2. Right-click and select **Delete**:

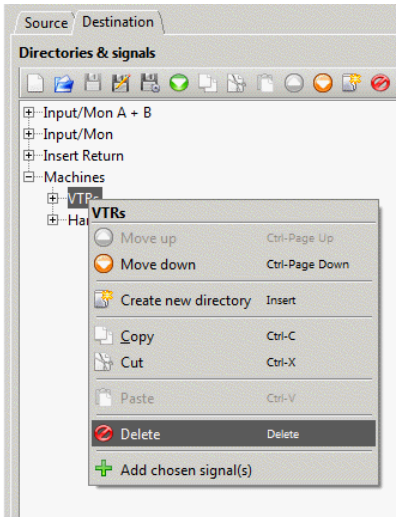


3. Confirm by clicking **Yes**.

The selected signals are deleted from the Signal List.

➢ **To delete directories or subdirectories:**

1. Select the directory or subdirectory, from the **Directories & signals** column. You can make multiple selections if you wish, see Selection tips and tricks.
2. Right-click and select **Delete**:



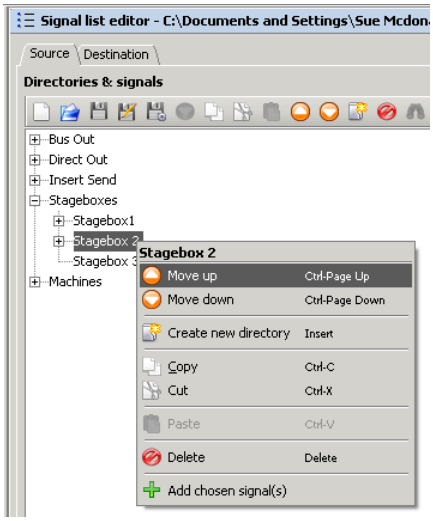
3. Confirm by clicking **Yes**.

Note that deleting a directory deletes all subdirectories and signals within it.

Editing the Position of Signals, Subdirectories & Directories

➢ **To move the position of a signal, subdirectory or directory:**

1. Select the signal, directory or subdirectory, from the **Directories & signals** column.
2. Right-click and select **Move up** or **Move down**:



Or, click on the  or  (**Move node**) buttons from the 'Signal List Editor' toolbar.

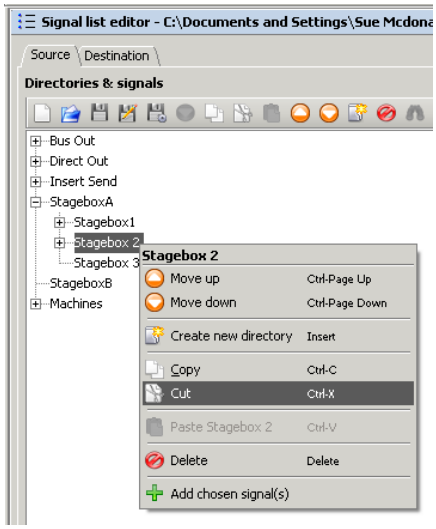
The selection moves accordingly.

Copy, Cut and Paste

The Copy, Cut and Paste functions provide a quick way to edit your signal list. For example:

➢ **To cut a subdirectory from one directory to another:**

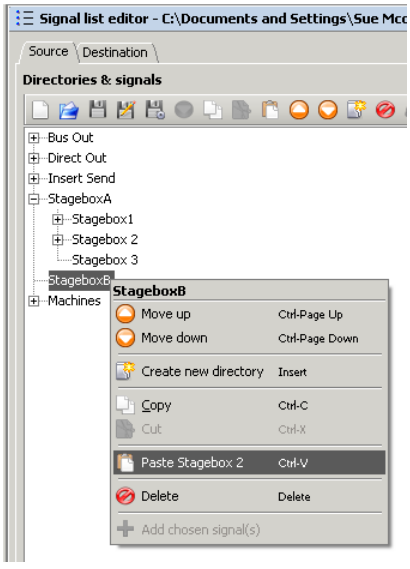
1. Select the subdirectory you wish to copy from the **Directories & signals** column.
2. Right-click and select **Cut**:



Or, click on the  (**Cut**) button from the 'Signal List Editor' toolbar.

The selected subdirectory is copied to the 'Signal List Editor' clipboard.

3. Now select the directory where you want to paste the selection.
4. Right-click and select **Paste**:



Or, click on the  (**Paste**) button from the 'Signal List Editor' toolbar.

The selected subdirectory is pasted accordingly, along with all of its contents.

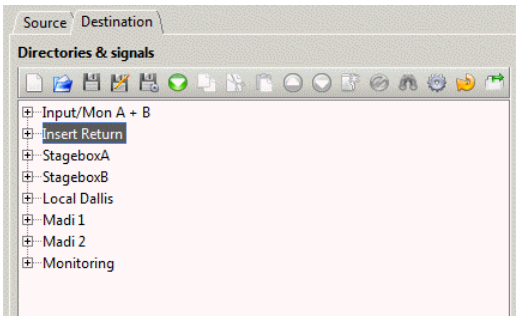
Directories and subdirectories may be copied and pasted in a similar manner.

Duplicating the Source/Destination Directory Structure

This function copies the structure of your **Source** directories to the **Destination** page, or vice versa. It can be very useful if you wish to use similarly named directories and subdirectories in your **Source** and **Destination** lists.

1. First, edit either your **Source** (or **Destination** page):

2. Then click on the  (**Duplicate directory structure**) button, from the 'Signal List Editor' toolbar, to copy the directory structure to the alternate page:



Note that you can click the  button multiple times if you wish - the structure is duplicated multiple times.

Updating the Hardware Tree

This function forces the 'Signal List Editor' to re-analyse the Core configuration and update the signals in the **Hardware Tree**.

You should use it if you have added components to the Core configuration, while the 'Signal List Editor' has been open.

1. To perform the update, click on the  (**Update hardware signal config**) button from the 'Signal List Editor' toolbar.

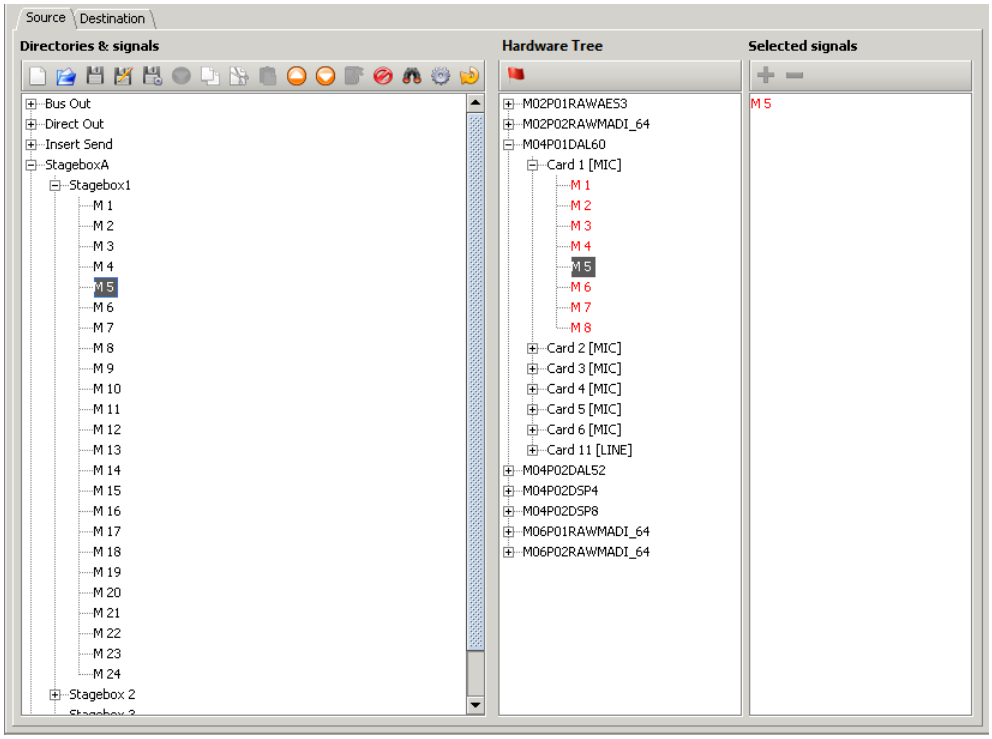
   *The system analyses the Core configuration, and the **Hardware Tree** updates.*

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 signal**) button from the 'Signal List Editor' toolbar.

*The **Hardware Tree** opens to show the location of the signal:*



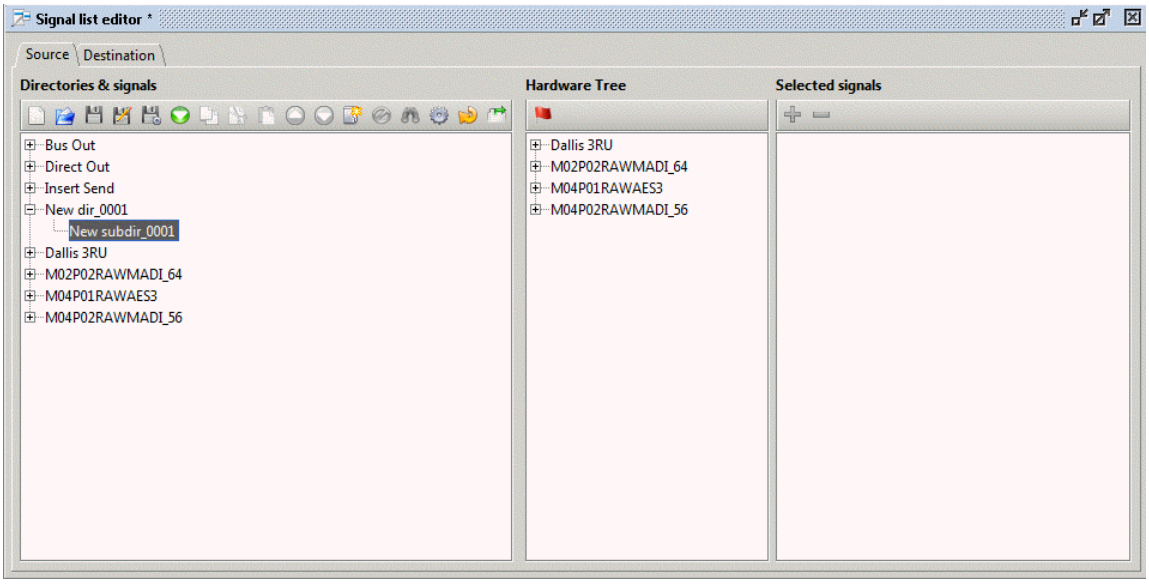
Generating a Signal List from the Core Configuration

This operation adds all the directories and signals from the **Hardware Tree** into the **Directories & signals** column, and can be used to quickly generate a Signal List from your hardware components.

It is a good idea to add this structure below your "user" directories, so that service technicians can easily locate signals using the **Hardware Tree** naming structure.

1. Click on  (**Generate automatic tree view from config**) from the 'Signal List Editor' toolbar.

*All the directories and signals from the **Hardware Tree** are added to the bottom of the **Directories & signals** column:*



The structure uses the alias names (if entered). Otherwise, default system names are used to describe each component – for example, **MO4PO1DAL60**:

- **MO4** – indicates the Nova73 Module (e.g. Module 4).
- **PO1** – indicates the port on the Module (e.g. Port 1).
- **DAL60** - indicates the device on the port (e.g. a DALLIS Device with 60 audio

2. The button may be selected multiple times to repeat the structure.

For example, you might add the structure twice; leave the lower structure unchanged (for your "service view"), and then edit the upper structure to provide more "user friendly" directory and subdirectory names.

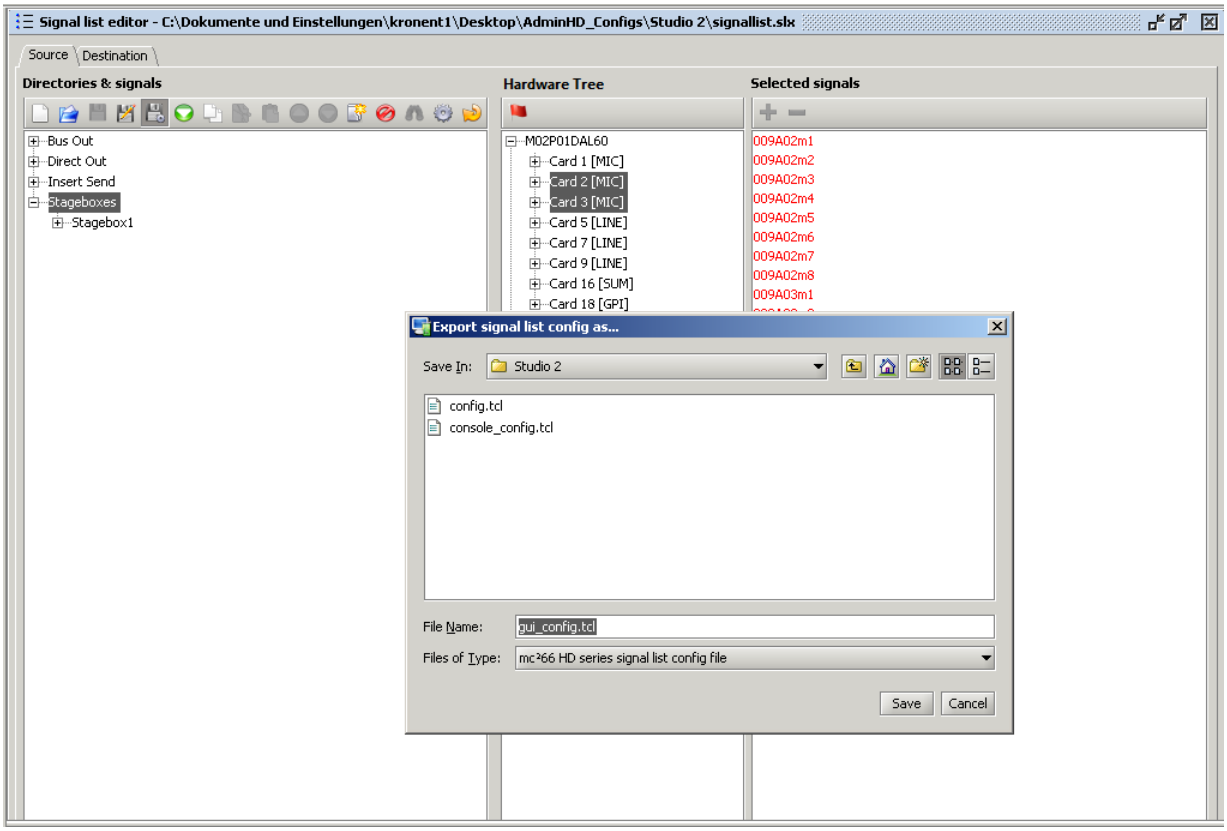
Exporting the Cold Start gui_config.tcl

To update the Signal List configuration on a mc² mixing console, you must export the 'Signal List Editor' contents, as a **gui_config.tcl** file, in preparation for a cold start upload.

If you have also edited the Core configuration, then export and upload both cold start files (**config.tcl** and **gui_config.tcl**).

1. Click on the  (**Export to cold start config**) button from the 'Signal List Editor' toolbar.

2. You are asked to specify a folder location for the file - in our example, we have chosen the **Studio 2** folder created earlier, see Organising Your Files.



Do *NOT* rename the file; it must be named **gui_config.tcl** in order to be read by the control system.

You can specify a default directory for your Coldstart config files from the **Extras** -> **Preferences** -> **Common Directories** menu.

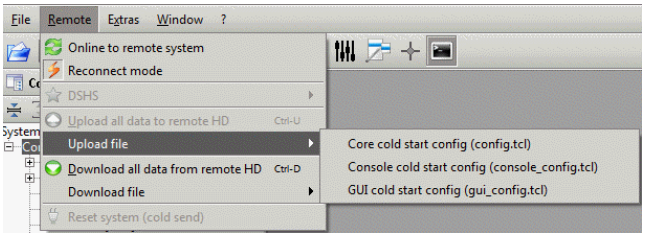
3. Click **Save**.

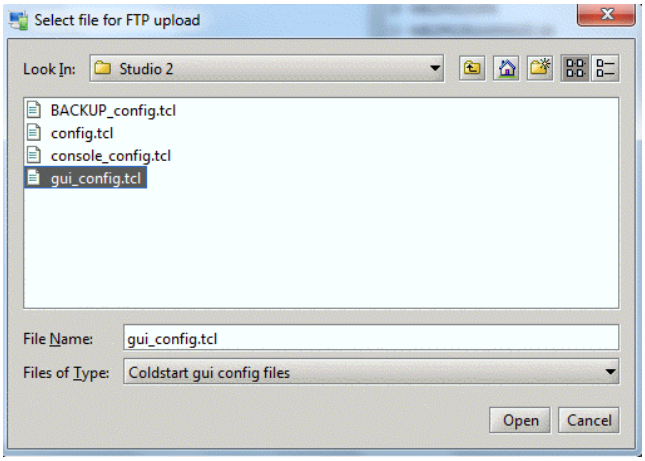
The configuration is exported from the 'Signal List Editor' and saved on your computer.

Uploading the Cold Start gui_config.tcl

Having exported the **gui_config.tcl** file, it may now be uploaded to the mc²56 MKII control system.

This operation is similar to uploading the cold start **config.tcl** file, except this time upload the **GUI cold start config (gui_config.tcl)**:





If you have edited both the Core and Signal list configurations, then you should export and upload both cold start files (**config.tcl** and **gui_config.tcl**).

You will need to cold start the mc²56 MKII to see your changes take affect.

Online Operation

You should switch AdminHD online, in order to:

- Monitor the status of your remote system.
- Control matrix crosspoints, signal labels and I/O settings via the 'Connect Manager'.
- Update the online configuration (in memory) - available for the Core configuration only.

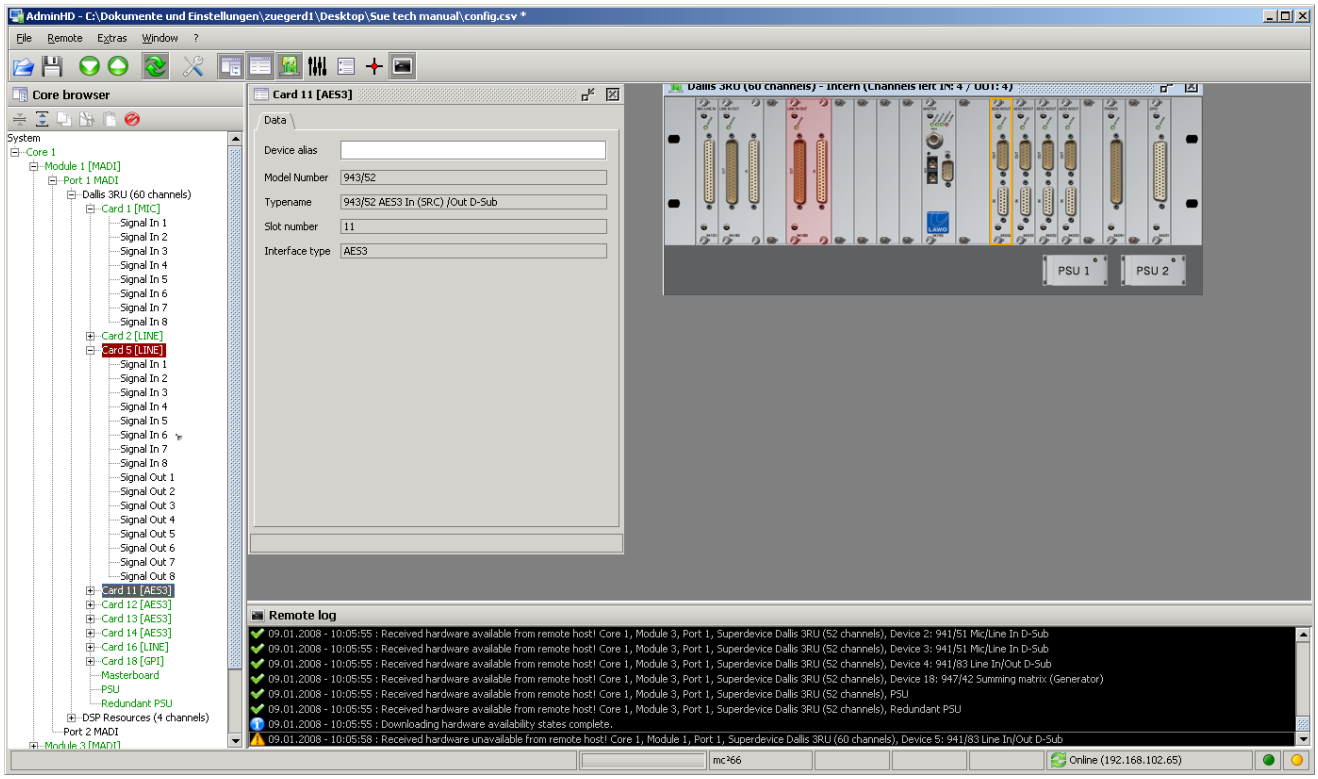
Note that you will need a valid network connection between your computer and the mc²56 MKII control system.

➢ **To switch between modes:**

1. Click on  from the main toolbar (**Online/Offline to remote system**).

   Or select **Remote** -> **Online/Offline to remote system** (from the main menus).

   When switching online, AdminHD connects to and synchronises with the system. The IP address of the connected host is displayed in the Status bar and the 'Core Browser' and 'Graphic View' update:

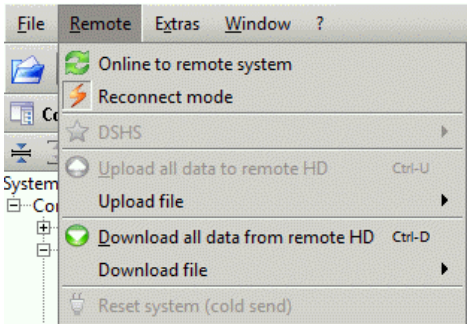


If the connection fails, then the 'Remote Log' will report that the connection has timed out:

- Check the network connection and TCP/IP settings of your computer's network interface card.
- Check that AdminHD is compatible with the mc²56 MKII system (the first three digits of the software versions must match.)
- See also the trouble-shooting tips to resolve the problem.

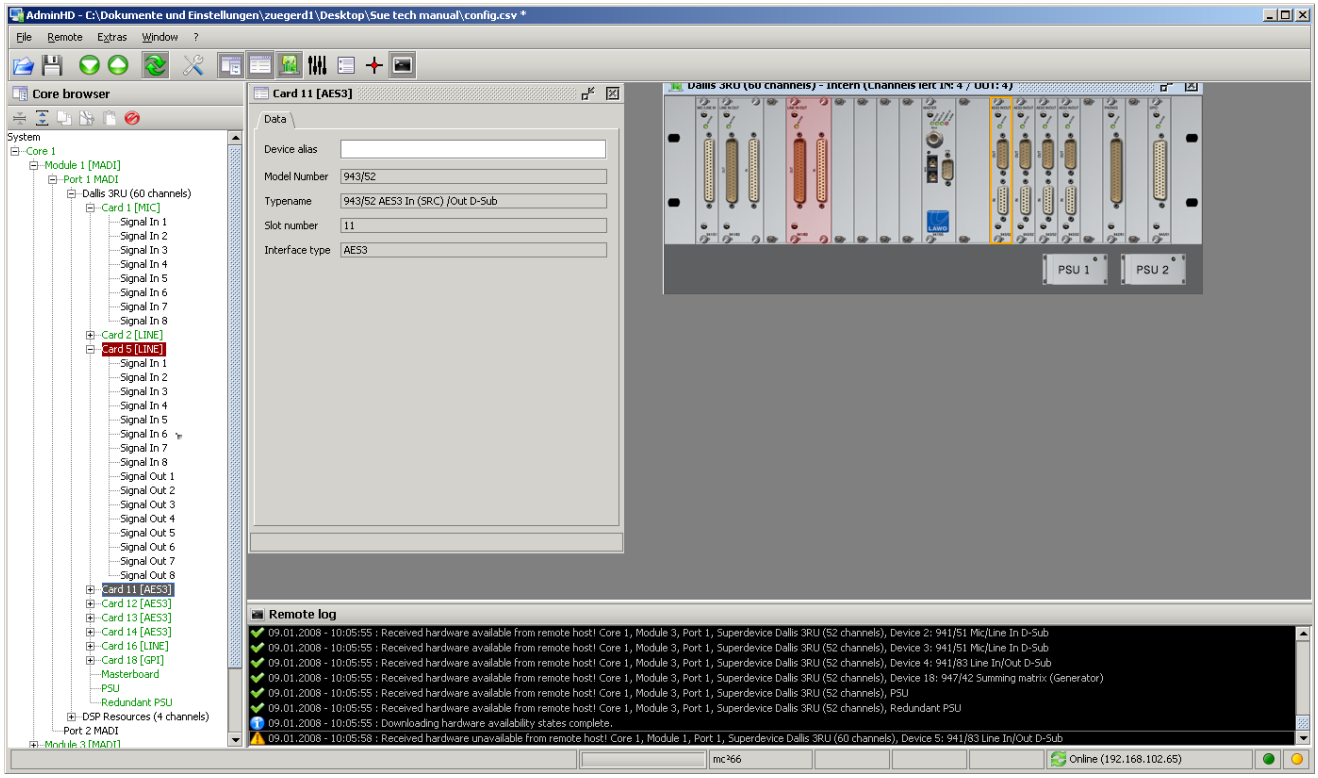
2. Click on the same button  , to switch offline.

3. Select **Remote -> Reconnect mode** (from the main menus), if you wish AdminHD to reconnect to the remote control system if network communication is interrupted.



System Diagnostics

Once AdminHD is running online, you can use the 'Core Browser' and 'Graphic View' to monitor the real-time status of hardware components:



All components are monitored, including the status of the Nova73, DALLIS units and their PSUs.

Components which are operating normally are coloured green; faulty components are highlighted in red. In our example above, one of the DALLIS plug-in cards is missing or faulty. Check the card's connections, and if necessary replace the card.

In addition, the 'Remote Log' records all messages generated by AdminHD and the online system. You can save the contents of the 'Remote Log' to help diagnose any errors.

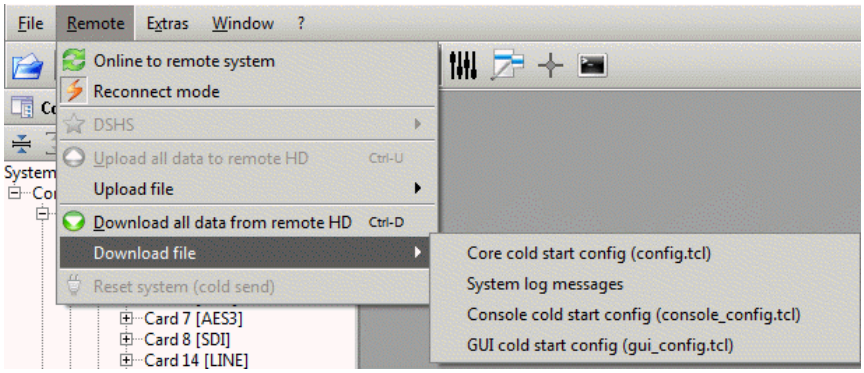
The System Message Log

The **mesages** logfile is generated and stored by the control system during operation. It can be downloaded from remote system and saved on your computer using AdminHD.

Note that this is the one of the system logfiles which can also be copied to USB, from the console GUI, using the **File** display, or monitored using the Web Browser Interface.

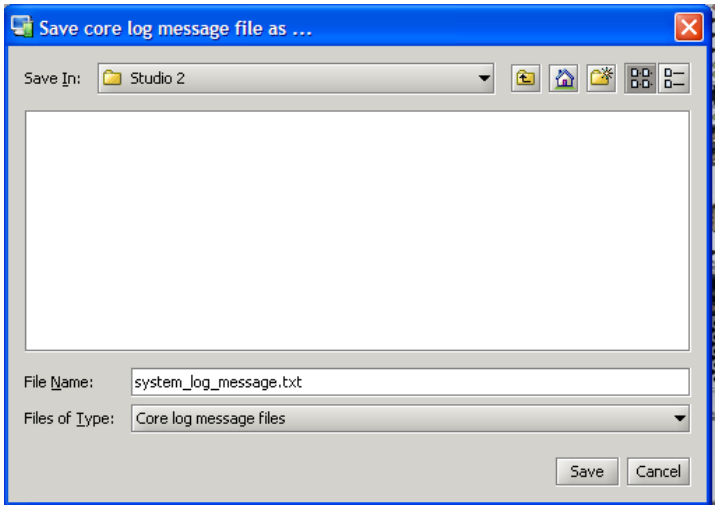
To download the logfile:

1. Select **Remote -> Download file -> System log messages** from the main menus:



A 'Save As' file selection box appears.

2. Select a folder location and enter a filename:



You can specify a default directory for your Core logfiles from the **Extras** -> **Preferences** -> **Common Directories** menu.

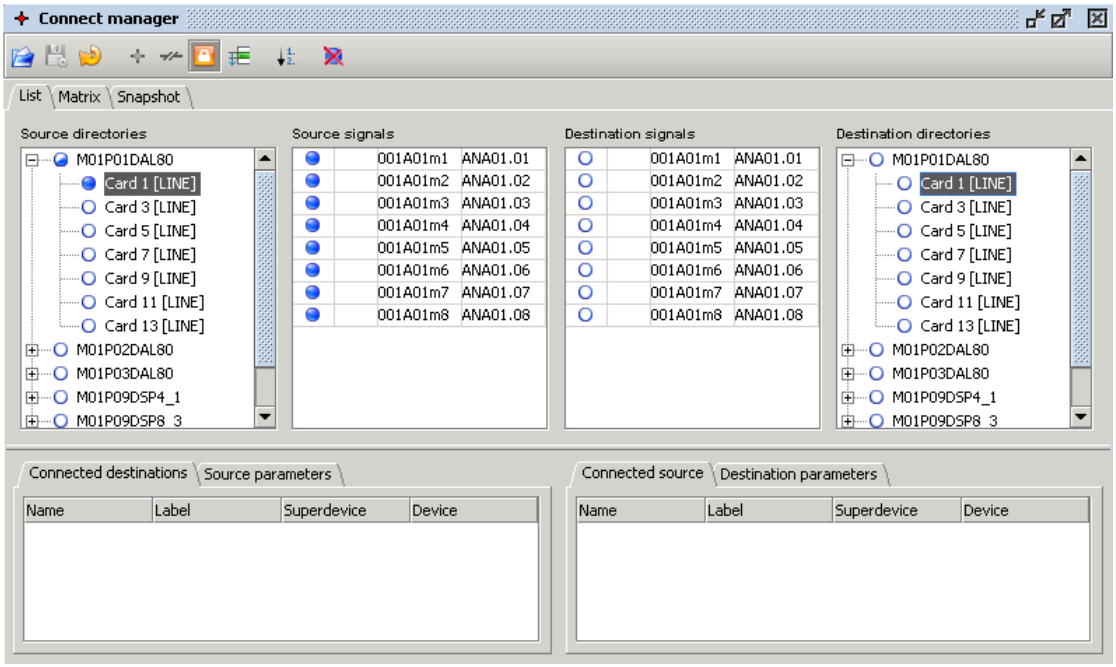
3. Click **Save**.

AdminHD downloads the file.

The log is stored as a plain text file, and can be opened by any common text editor.

The ‘Connect Manager’

The ‘Connect Manager’ can be used to control matrix crosspoints, signal labels and I/O settings within your remote system. And save and recall snapshots - a snapshot stores connections to or from a signal, the signal’s label and I/O parameter values.



Note that online mode must be enabled, in order to open the 'Connect Manager'.

The end-user operation is identical for both AdminHD and ControlHD. Therefore, please see the separate “ControlHD User Manual” for full details on operation.

To determine which signals are "seen" by the 'Connect Manager', ControlHD opens a Signal List (**signallist.slx** file). By creating different Signal Lists for different ControlHD clients, you can provide users with access to different parts of the matrix.

The Connect Manager Toolbar

1	**Open**	Opens a Signal List file (**signallist.slx**) from your computer.
2	**Export**	Exports a list of all matrix connections as a **.csv** file.
3	**Update hardware config**	Updates the **Source** and **Destination** signals if you have made changes to the Core configuration while the 'Connect Manager' is open.
4	**Connect**	Click to connect the selected source to the selected destination.
5	**Disconnect**	Click to disconnect the selected destination.
6	**Overwrite Lock**	When enabled, you are asked to confirm each Connect and Disconnect operation.
7	**Easy Step Mode**	When enabled, the 'Connect Manager' automatically steps down to the next source/destination after a Connect occurs. This is similar to **Step mode** on the console GUI's **Signal List** display.
8	**Special User Label Edit Mode**	When enabled, you can edit signal labels incrementally (e.g. Guest_01, Guest_02, Guest_03, etc.) This is similar to **Easy Edit mode** on the GUI's **Signal List** display.
9	**Clear all snapshot flags**	Click to clear all the snapshot selection flags (blue flags).

Please see the separate "ControlHD User Manual" for full details on operation.

Exporting a Connection List

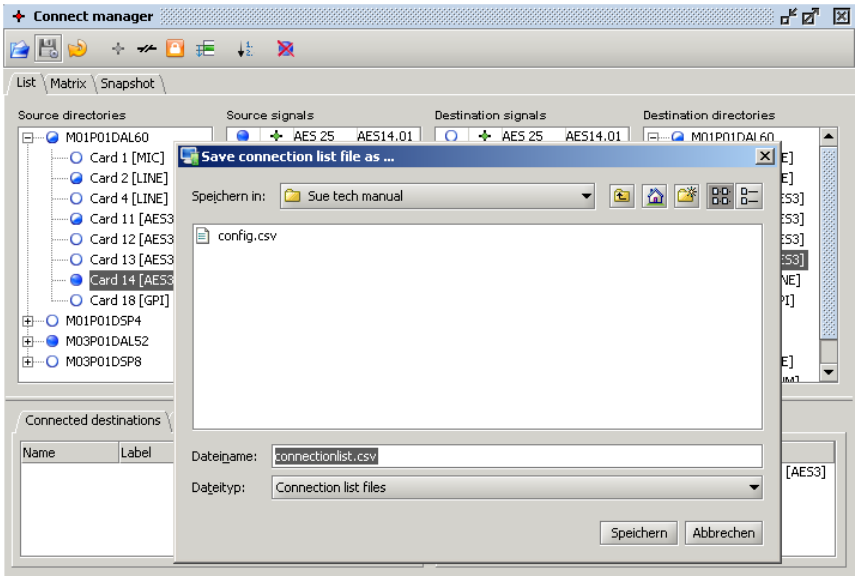
You can export a list of all matrix connections from the 'Connect Manager' as a **.csv** file. This can be opened by a 3rd party editor, such as MS Excel, to check which connections are made or document the system.

To export the connection list:

1. Click on  (**Export connection list**) from the 'Connect Manager' toolbar.

Note that the button only becomes available once a connection made.

2. Select a folder location and enter a filename:



3. Click **Save**.

The connection list is stored as a .csv file on your computer.

Documenting the Configuration

AdminHD provides two tools to help document the system once you have programmed your configuration:

- Copy Image / Write Image to File
- Export a Component List

Copy Image / Write Image to File

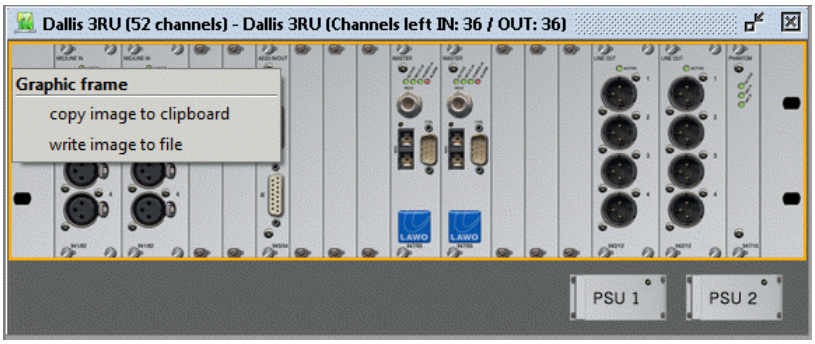
You can save the graphical images used within AdminHD to help document your system - for example, to save the front panel configuration of your Nova73 and DALLIS.

Saving the 'Graphic View'

1. Open the 'Graphic View' and hover your mouse over the frame of the Core or DALLIS.

The frame is outlined in orange.

2. Right-click and select one of the drop-down options:



- **copy image to clipboard** - saves the graphic to your computer's clipboard.
- **write image to file** - saves to graphic as a **.png** image file. You are asked for a folder location and filename.

Saving the 'Console Panel'

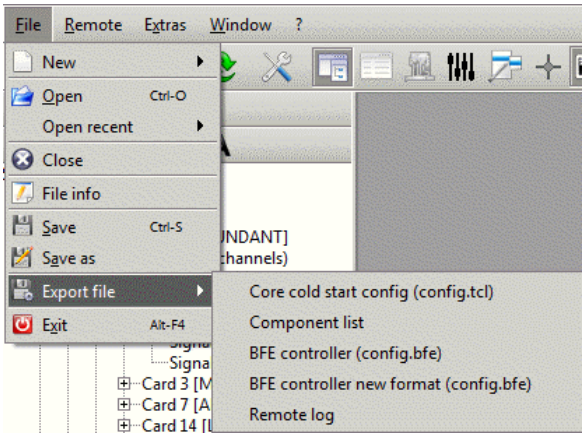
This is similar to above, but saves the image of the console front panel. Note that the 'Console Panel' can only be used to configure MKI mc²66 systems, and does not represent your control surface configuration for the mc²56 MKII.

Export a Component List

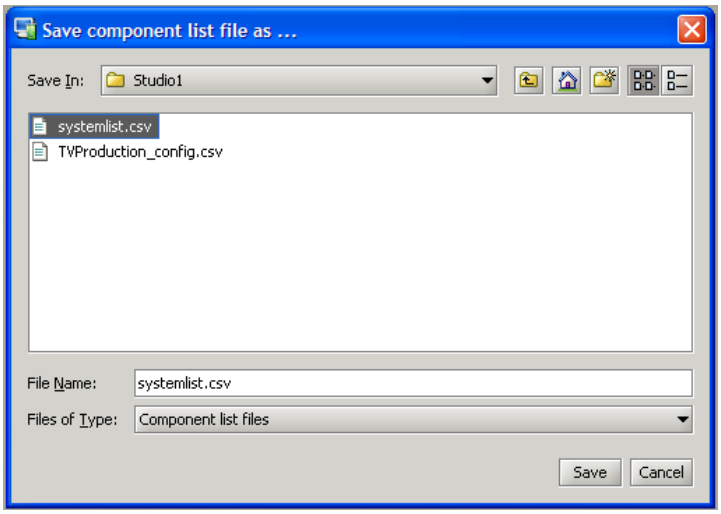
You can export a component parts list as a **.csv** file. This can be opened in a 3rd party editor, such as MS Excel.

To export the list:

1. Select **File -> Export file -> Component list** from the main menus:



2. Select a folder location and enter a filename:



3. Click **Save**.

The component list is stored as a .csv file on your computer.

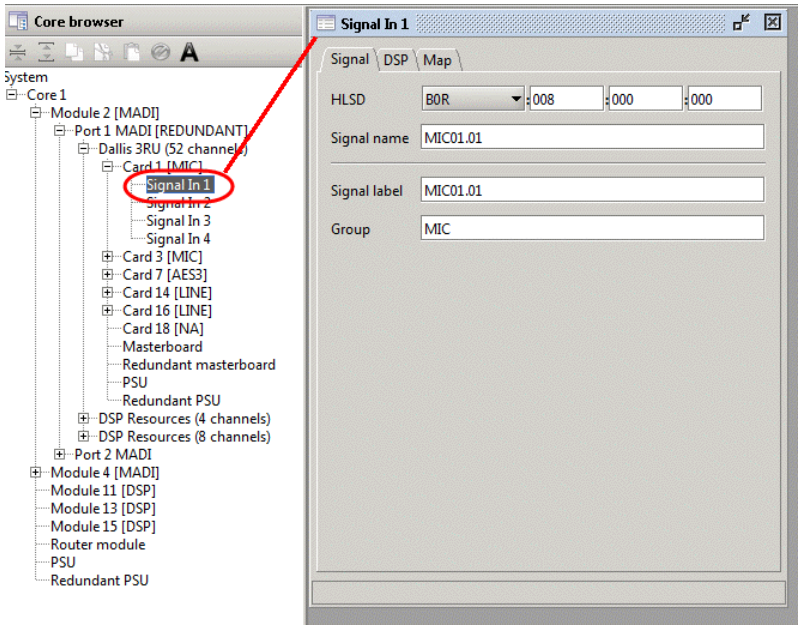
Core Configuration: Parameters

This section covers all the Core configuration parameters for the mc²56 MKII system.

Please see First Steps, Defining the System and Editing Parameters for the operating principles.

Component and signal parameters are covered according to their hierarchical order within the 'Core Browser' System. For more details on functionality, please consult the relevant data sheet, available in the "mc2_Nova73_documentation" guide.

In each case, you should open the 'Parameter Box', for the component or signal, to access its parameters:



System

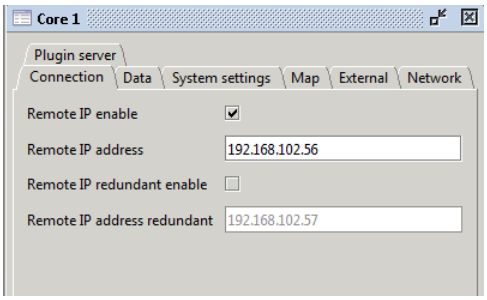
ID	Usually all Lawo projects receive a project ID, made up of 6 integers. You can log your project ID here; you may be asked for it when servicing your product. The field can be left blank.
System alias	Enter an alias name for the **System**.

Core

Parameters for the **Core** are divided into pages:

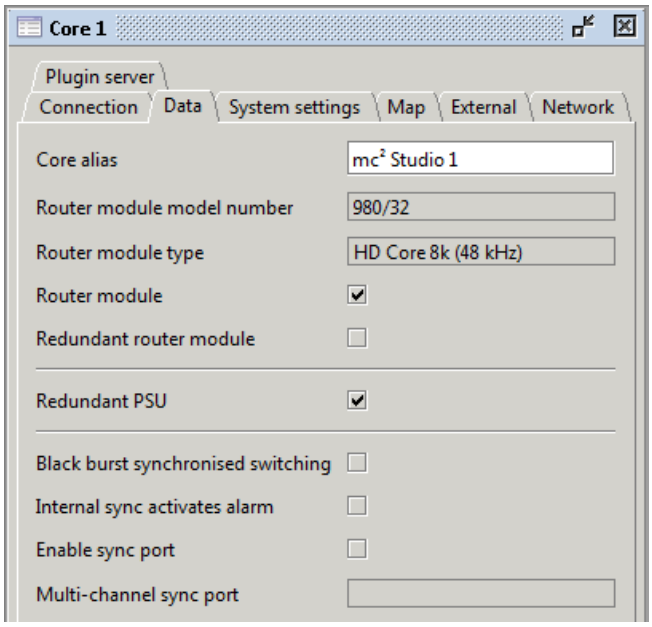
- Core -> Connection
- Core -> Data
- Core -> System Settings
- Core -> Map
- Core -> Network
- Core -> Plugin Server

Core -> Connection



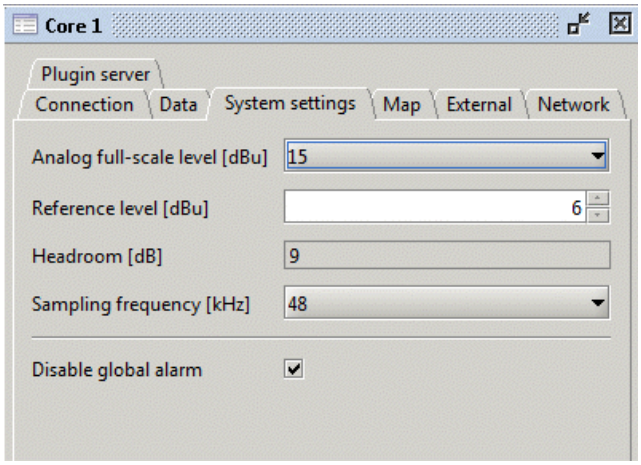
These parameters define the TCP/IP address of the mc²56 MKII control system. See Editing the IP Address for details.

Core -> Data



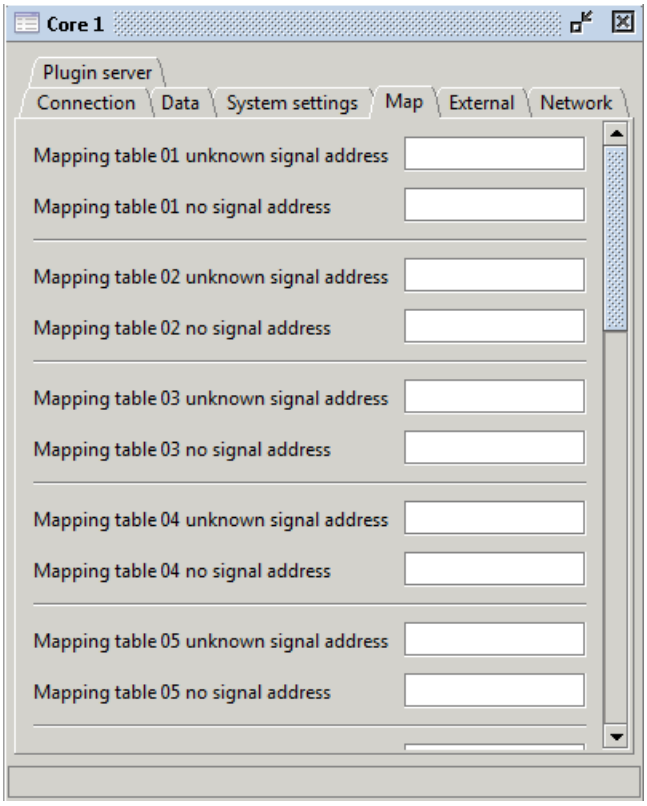
Core alias	Enter an alias name for the **Core**.
Router module model number **Router module type**	These fields are for information purposes only and cannot be edited. They show the serial number and type of Router Module. The type of Router Module is defined when you add a **Core** to the **System** (in the 'Core Browser').
Router module	This box should *always* remain ticked, as every **Core** requires at least one Router Module.
Redundant router module	Tick this box to add a redundant Router Module to the Nova73.
Redundant PSU	Tick this box to add a redundant PSU to the Nova73.
Black burst synchronised switching	Tick this box to make matrix cross point switching synchronous to an external Black Burst sync source.
Internal sync activates alarm	Tick this box to activate the Global Alarm if the system switches to internal sync.
Enable sync port	Tick this box to enable the multi-channel sync port. A pop-up appears asking you to select the sync source, see Multi-channel Sync.
Multi-channel sync port	This box displays the multi-channel sync port source as a system address (if **Enable sync port** is active).

Core -> System Settings



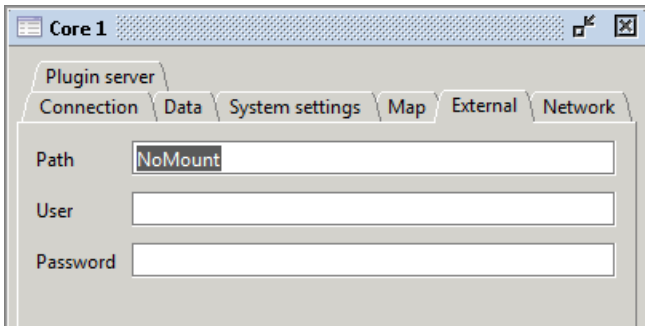
Analog full-scale level (dBU)	This option sets the analogue level which corresponds to digital full scale level (0dBFS). You can select 12, 15, 18, 21 or 24 dBu.
Reference Level (dBU)	This field sets the internal reference level of the system. The maximum reference level is 24dBu.
Headroom (dB)	The resultant headroom is calculated from the first two options. See Operating Levels for details.
Sampling Frequency	This parameter sets the internal sampling frequency which the system resets to after a cold start. See Internal Sampling Rate for details.
Disable Global Alarm	Tick this box is you wish to disable the Global Alarm.

Core -> Map



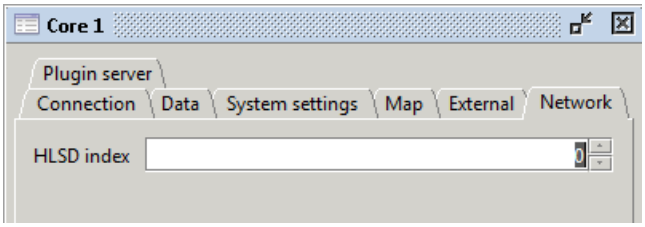
These parameters are used if you wish to control matrix crosspoints from an external device. See Mapping Tables for details.

Core -> External



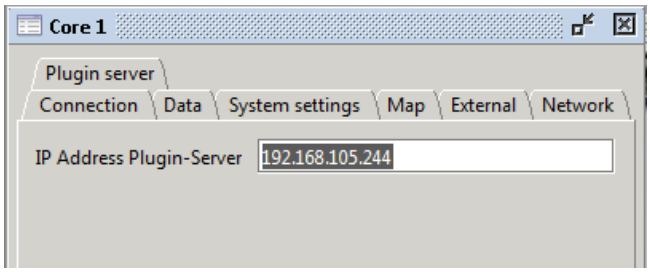
These parameters are used to connect an external file server to the system. Once configured, the server is available to users via the console GUI's File Import/Export page.

Core -> Network



HLSD index	This parameter is used if your **Core** is part of a larger network, see Networking I/O Resources.

Core -> Plugin Server

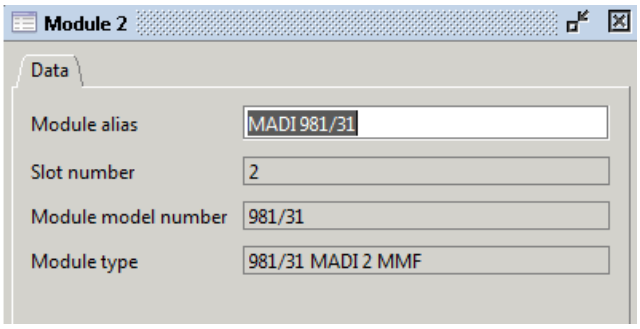


IP Address Plug-in Server	Enter the IP Address of the optional Plugin Server. The default address is shown above.

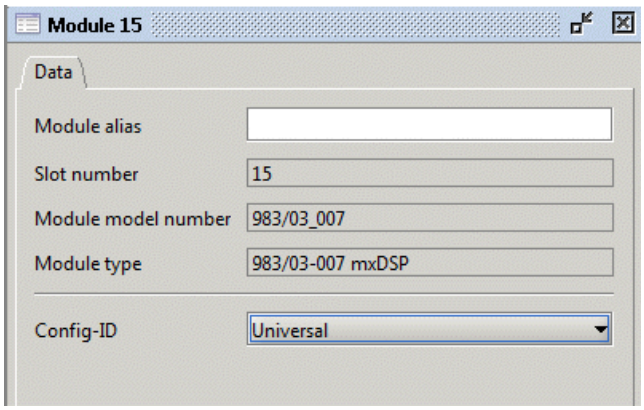
Modules

Parameters for a **Module** depend on the module type:

I/O, & Channel DSP Module Parameters



Matrix DSP Module Parameters

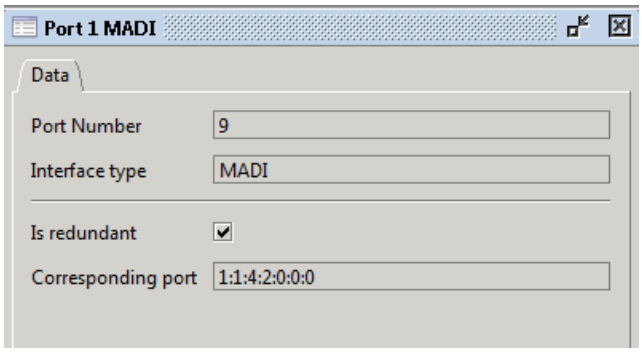


Module alias	Enter an alias name for the **Module**.
Slot number **Module model number** **Module type**	These fields are for information purposes only and cannot be edited. They show the **Slot number** used in the Core, and the serial number and type of module, see Nova73 Module Options.
Config-ID	On the 983/03_007 mxDSP module, this parameter defines how the matrix DSP is configured. See mxDSP configuration for details.
Backplane Hardware	On the 981/02 AES3 module, this parameter defines the rear connector panel (either D-Sub or BNC).

Ports

Parameters for a **Port** depend on the port type:

MADI, ATM & RAVENNA Port Parameters



AES Port Parameters

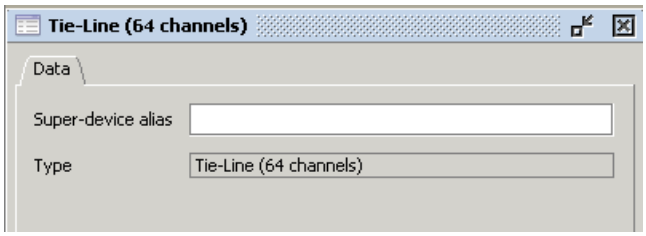
Port Number **Interface type**	These fields are for information purposes only and cannot be edited. They show the logical port number, which is dependent on the module's slot position in the Core, and the interface type (MADI, RAVENNA, etc.)
Is redundant	Tick this box to enable port redundancy. You will be prompted to select the redundant port.
Corresponding port	Shows the system address of the linked port, if **Is redundant** is enabled.

Super-Device

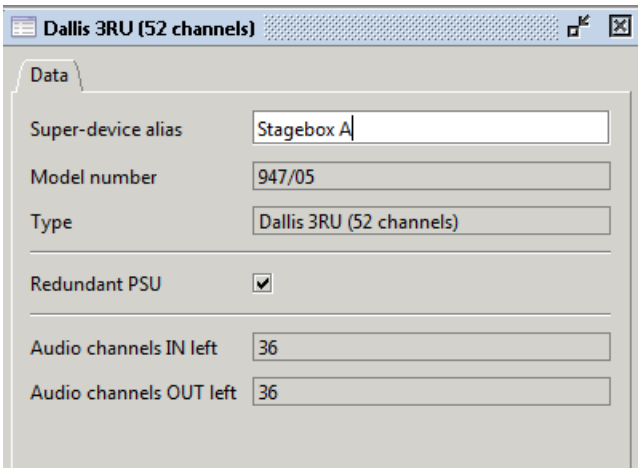
Super-Device is the generic term used to describe the I/O port's definition: **DALLIS**, **Tie-Line**, etc.

Tie-Line, **Plugin Server** and **Local I/O** all display similar parameters; **DALLIS** frames display some additional options.

Tie-Line, Plugin Server & Local I/O Parameters



DALLIS Parameters

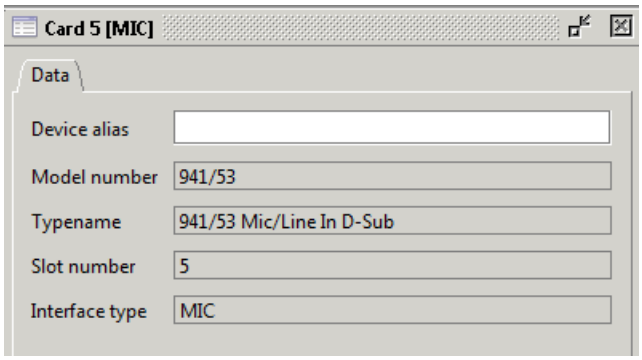


Super-device alias	Enter an alias name for the **DALLIS**,**Tie-Line**, **Plugin Server**, etc.
Model number & Type	These fields are for information purposes only and cannot be edited. They describe the serial number (of a DALLIS frame) and the type of Super-device.
Redundant PSU	Tick this box to add a redundant PSU to the DALLIS frame.
Audio channels IN left **Audio channels OUT left**	These two boxes cannot be edited and show the number of 'free' audio channels left in the DALLIS frame. These are channels which could be used by fitting additional plug-in cards.)

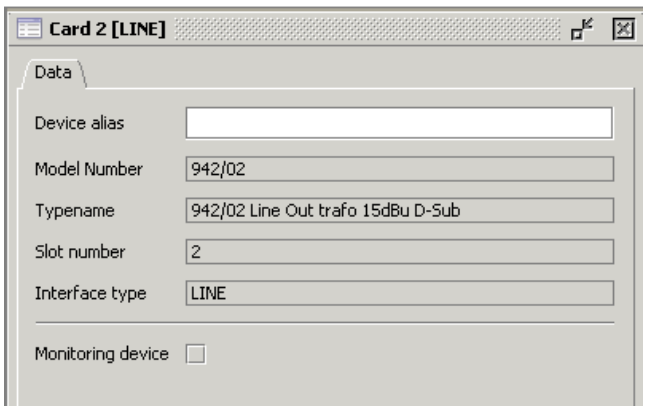
Cards

Parameters for the DALLIS **Card**s depend on the card type. Below are two examples. See also SDI Parameters.

941/53 Mic Card Parameters



924/02 Line Card Parameters



Device alias	Enter an alias name for the card.
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 942/02 and 942/12 cards only. Tick this box to release the card from the system reference level, if the card is to be used for monitoring.

For details on an individual card's parameters, please refer to the relevant data sheet available in the "mc2_Nova73_documentation" guide.

Signals

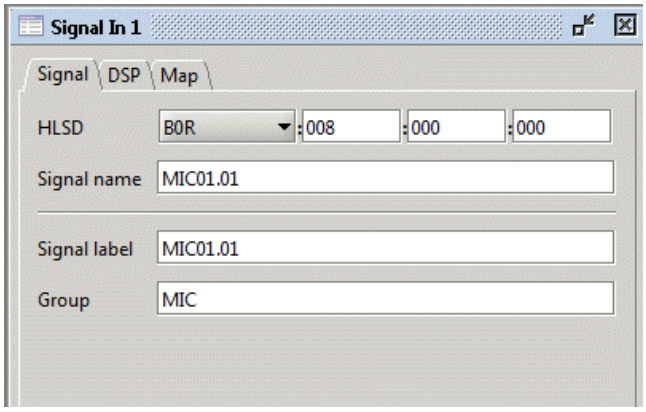
Parameters for **Signals** are divided into pages:

- Signal In -> Signal
- Signal Out -> Signal
- Signal In/Out -> DSP
- Signal In/Out -> Map

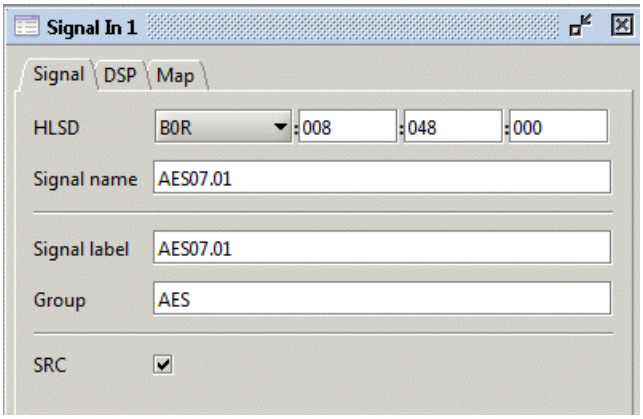
Signal In -> Signal

Signal In parameters depend on the type of signal (Mic, Line, AES, SDI, etc.). Below are two examples. See also SDI Parameters.

Mic Signal In Parameters



AES Signal In Parameters (with SRC)



HLSD	**High Level Signal Definition** - this is the Lawo system address for the signal. It *MUST* be unique, and normally you should not modify this address from its default setting.
Signal name	This is the system name of the signal. It can *only* be defined by AdminHD, and should be used to provide a "fixed" signal name relevant to the installation.
Signal label	This is the user label which the system resets to after a cold start. Users can change labels later, from the console GUI's **Signal List** display, or from AdminHD's 'Connect Manager'.
Group	This is the group name for the signal. It can be used when interfacing to an external controller. Please refer to your external system's documentation for details on how to implement the group name.
SRC	For AES cards with SRC only. Tick this box to enable the sample rate converter. Users can change this parameter later, from the console GUI's **Signal Settings** display.

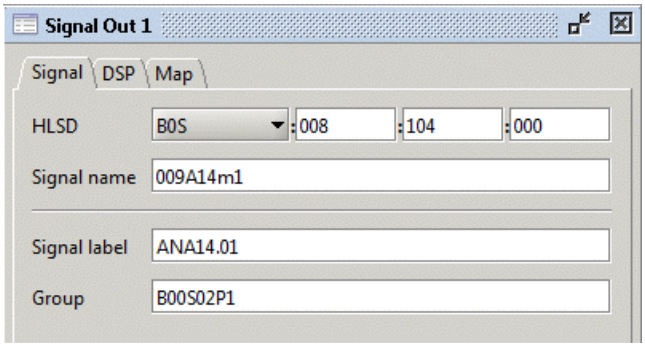
For details on an individual card's parameters, please refer to the relevant data sheet available in the "mc2_Nova73_documentation" guide.

To make a digital path suitable for Dolby E operation, you should turn off the I/O DSP for both the input and output, and disable any sample rate conversion.

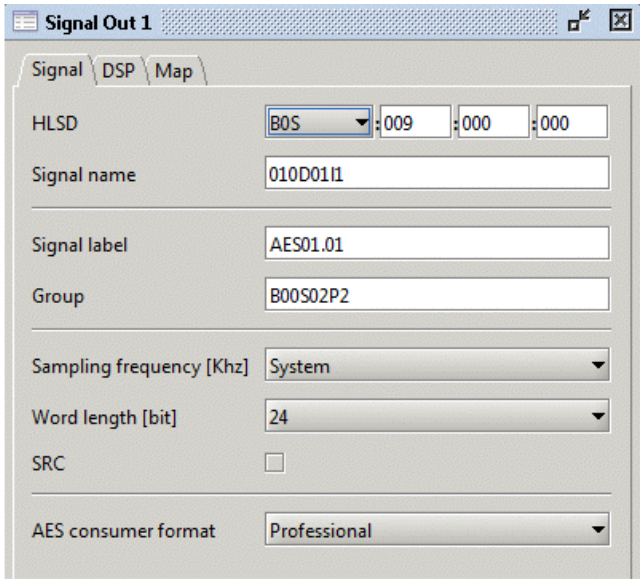
Signal Out -> Signal

Signal Out parameters depend on the type of signal (Line, AES, SDI, etc.). Below are two examples. See also SDI Parameters.

Line Signal Out Parameters



AES Signal Out Parameters (with SRC)



HLSD	See Signal In: HLSD.
Signal name	See Signal In: Name.
Signal label	See Signal In: Label.
Group	See Signal In: Group.
Sampling frequency **Word length** **SRC**	For AES cards with SRC only. Sets the sample rate and word length for the output. Note that the **SRC** field cannot be edited and shows the status of the sample rate converter. To disable the SRC, you *must* set the **Sampling frequency** to **System** and **Word length** to **24**-bit. For all other combinations, SRC is always enabled. Users can change these parameters later, from the console GUI's **Signal Settings** display.
AES consumer format	For AES cards released after 2006. Sets the channel status of the AES output to either **Consumer** or **Professional**. Please refer to the AES3 standard definition for details.

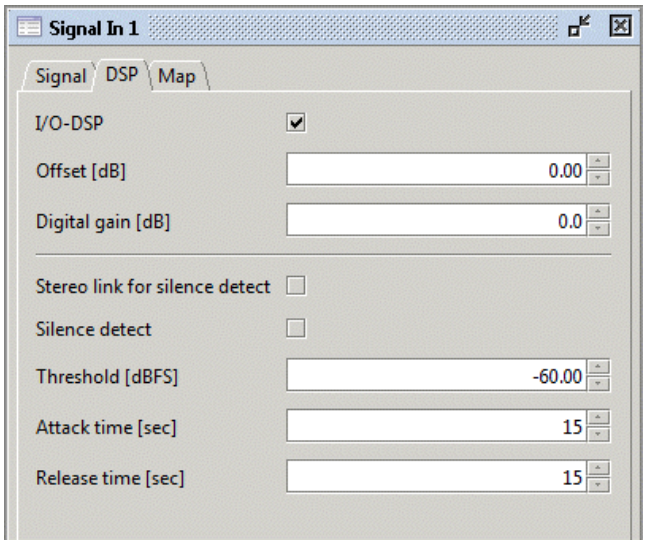
For details on an individual card's parameters, please refer to the relevant data sheet available in the "mc2_Nova73_documentation" guide.

To make a digital path suitable for Dolby E operation, you should turn off the I/O DSP for both the input and output, and disable any sample rate conversion.

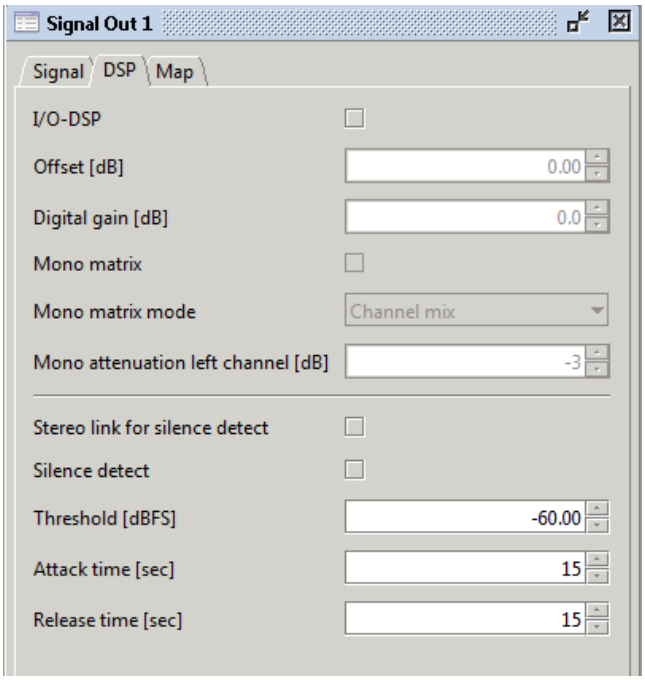
Signal In/Out -> DSP

These parameters adjust the I/O DSP and Silence Detect alarms. Note that not all cards support these parameters.

Signal In -> DSP Parameters



Signal Out -> DSP Parameters



Signal In: I/O DSP

I/O-DSP	Tick this box to enable the **I/O DSP**. Once enabled, the following parameters become active:
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 destinations. The two separate parameters (**Offset** and **Digital gain**) allow you to apply a 'permanent' and a 'temporary' gain change. For example, to compensate for a low level line input, use the **Offset** parameter to apply a 'permanent' gain change. In addition, for today's production you may also 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.

Signal Out: I/O DSP

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.

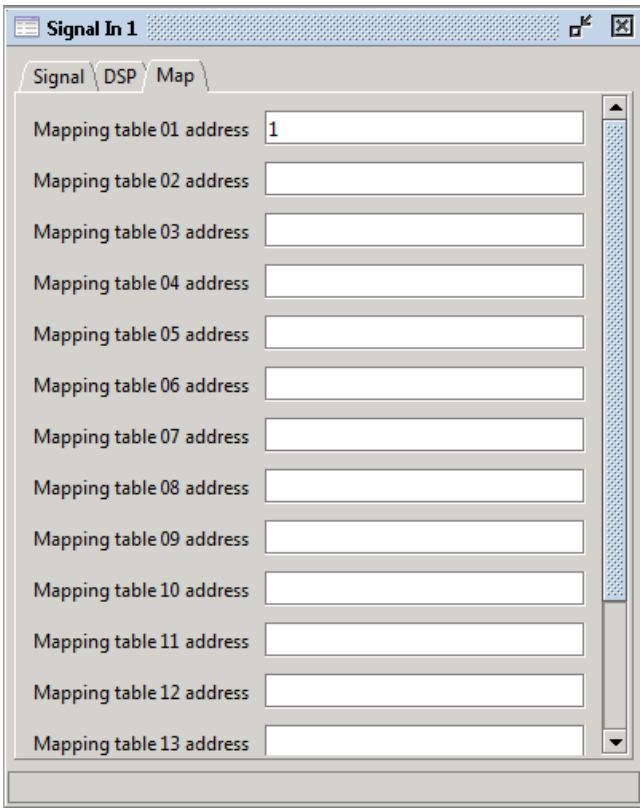
To make a digital path suitable for Dolby E operation, you should turn off the I/O DSP for both the input and output, and disable any sample rate conversion.

Silence Detect Alarm

These parameters can be applied to inputs and/or outputs, to trigger an alarm state if signals fall below a certain threshold level. The silence detect alarms can be output to an external control system, via Lawo's Remote MNOPL protocol, or monitoring using the Web Browser Interface.

Silence detect	Tick this box to enable the Silence Detect alarm for the signal.
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 alarm is only issued if both signals fall 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 steps and is referenced to digital full scale level (dBFS).
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.

Signal In/Out -> Map



These parameters set the signal's address for each of the mapping tables 1 to 16. You should use these parameters to map a signal to an external controller, see Mapping Tables.

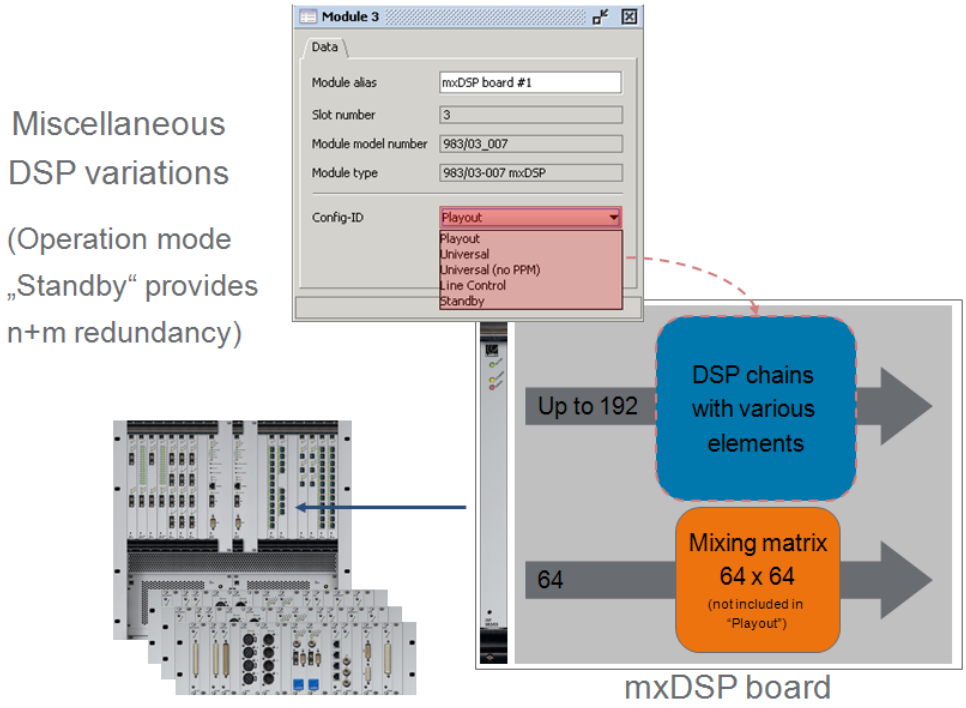
mxDSP Configuration

This section covers additional notes for the mxDSP module (983/03-007).

An mxDSP module provides a pool of DSP resource which may be applied to signal paths within the routing matrix. For example, to apply fixed DSP settings to line arrays.

Physically, each mxDSP module is identical to a normal channel DSP board and occupies one slot within the Nova73. However, rather than DSP channels, which can be assigned to the console surface, the mxDSP provides DSP “chains” which can be viewed and controlled from the **mxDSP Settings** display.

Several configuration options are supported, providing up to 192 DSP chains plus a 64 x 64 mixing matrix per module. 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 AdminHD configuration:



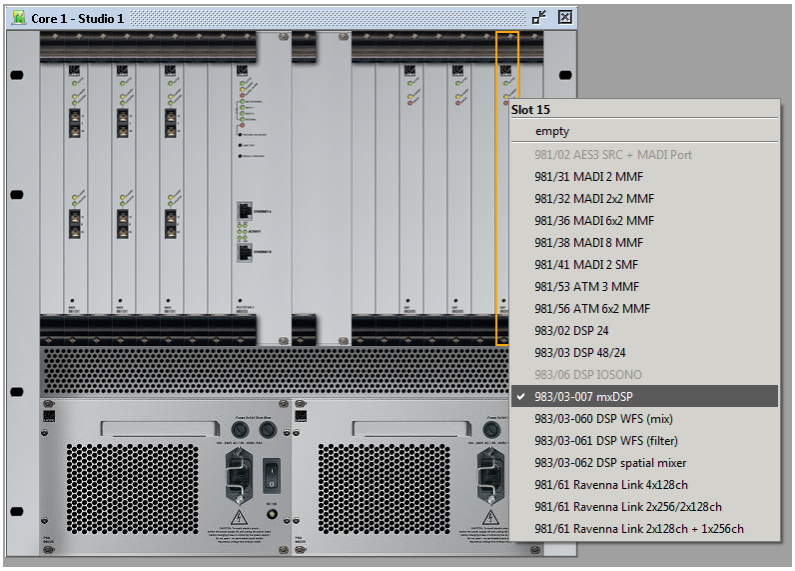
To configure a 983/03 DSP board for mxDSP operation, the following steps are required:

1. Edit the Core configuration using AdminHD.
2. Edit the Signal List configuration using AdminHD.
3. Update the cold start configuration (**config.tcl** and **gui_config.tcl**) using AdminHD.
4. Update the firmware on the mxDSP module via a Telnet session.

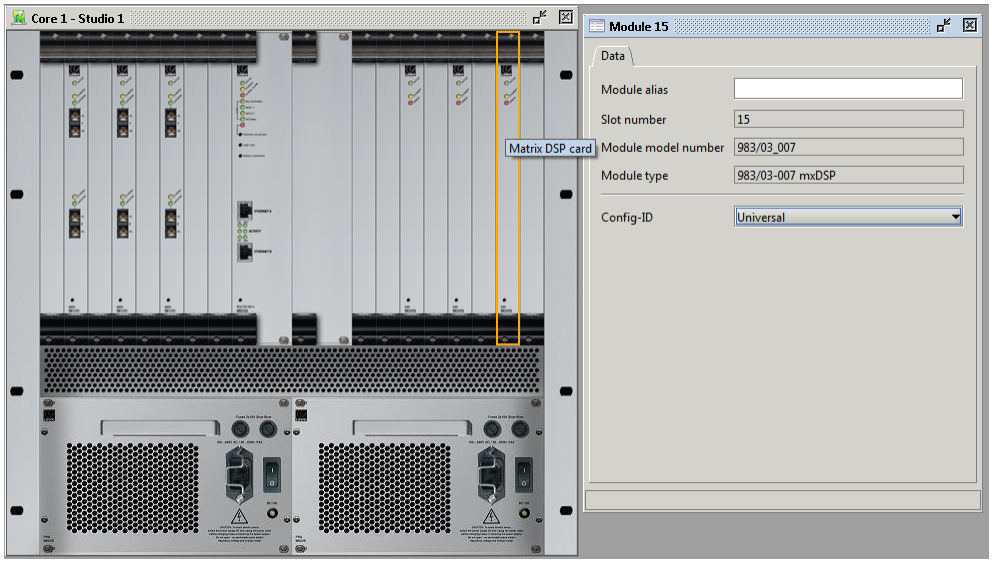
Editing the Core Configuration

1. Download the online Core configuration to make sure that you are editing the latest configuration data.

2. Select the slot and change the module type to **983/03-007 mxDSP**:



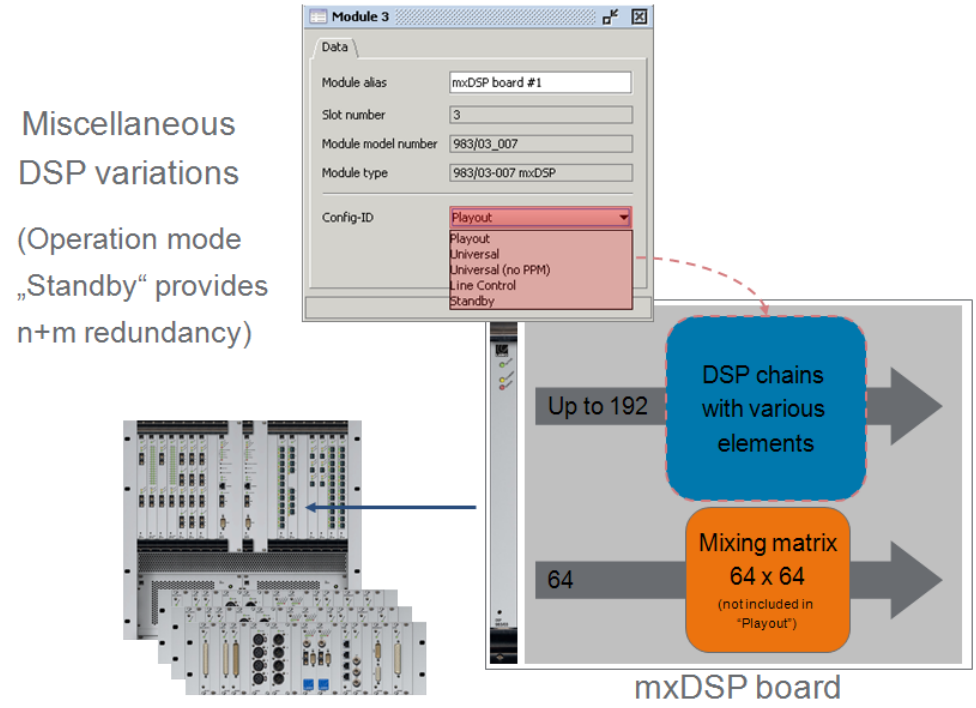
3. Open the module's 'Parameters Box' and select an option from the **Config-ID** menu:



These options determine the number, and signal flow, of the DSP chains, see Config-ID Options.

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:

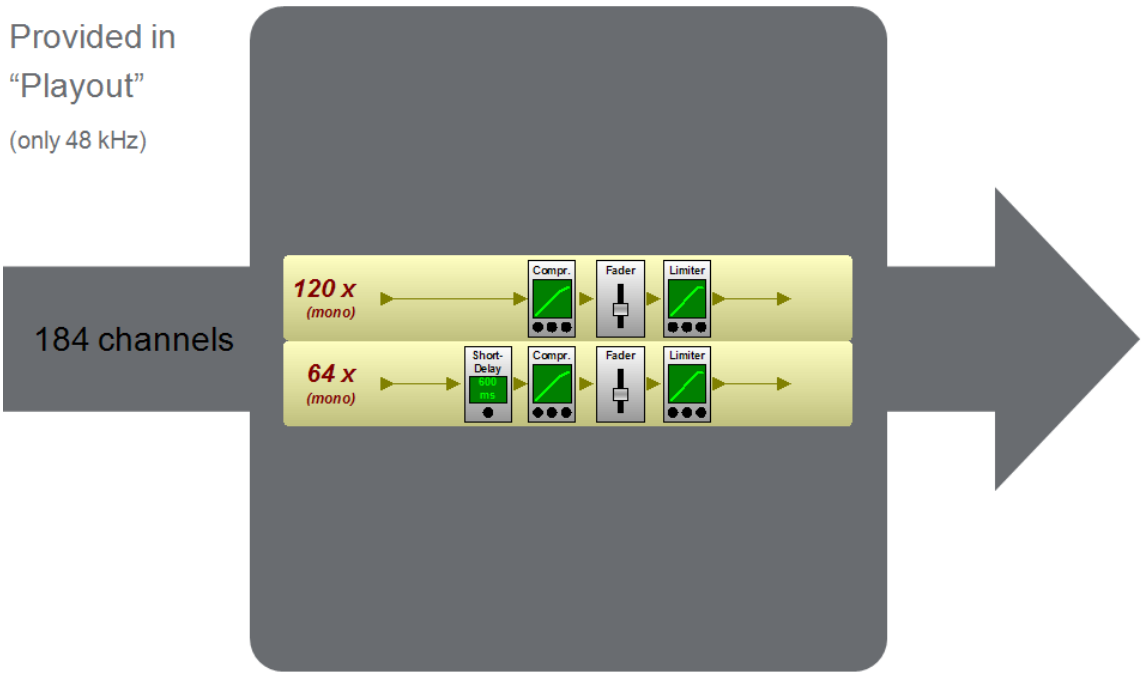


➢ **Standby**

Select this option to run the mxDSP module in standby mode. Use this mode to configure a redundant mxDSP module.

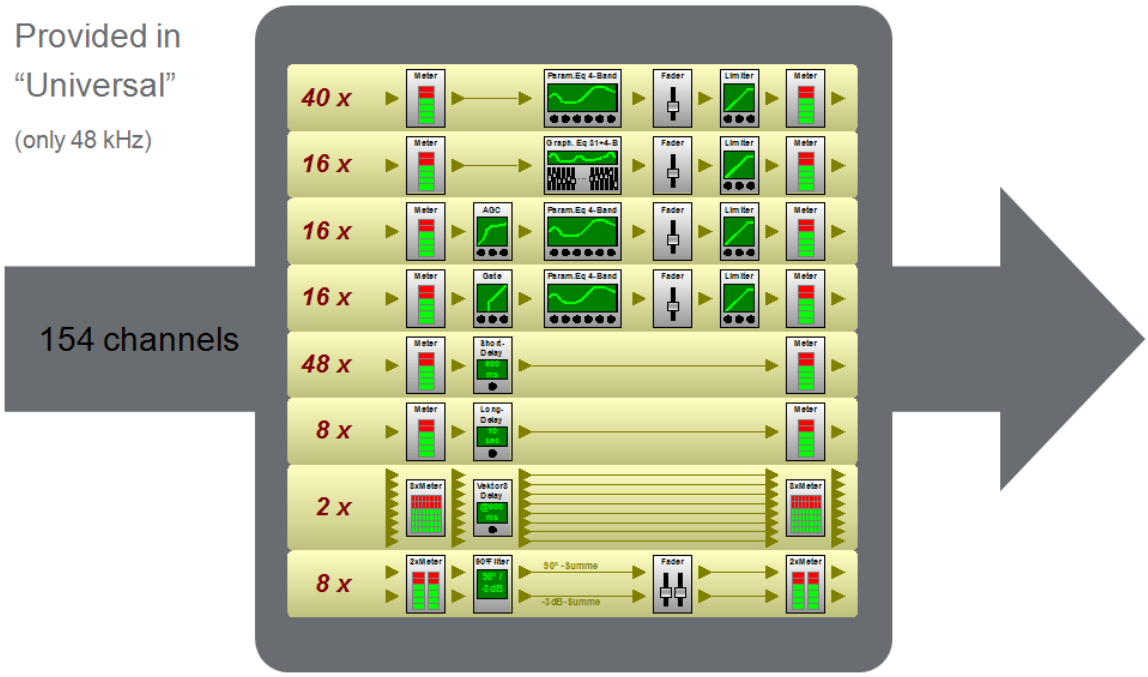
➢ **Playout (no PPM)**

This option provides 184 channels of DSP only (no mixing matrix):



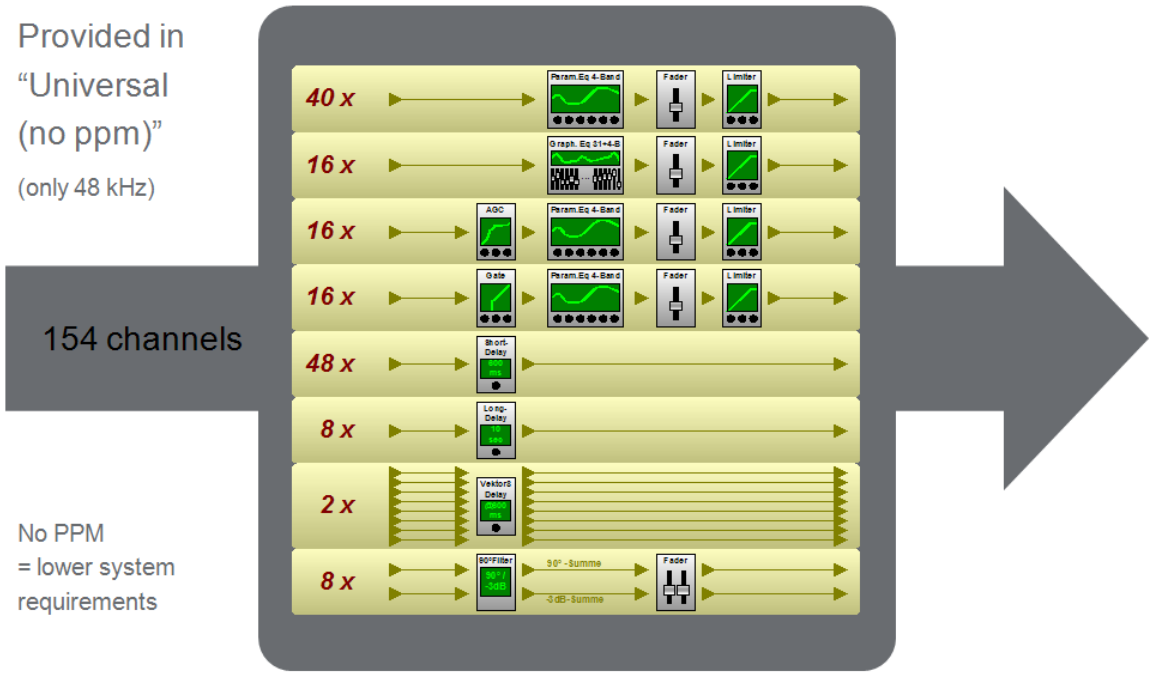
➢ Universal

This option provides 154 channels of DSP plus the 64 x 64 mixing matrix:



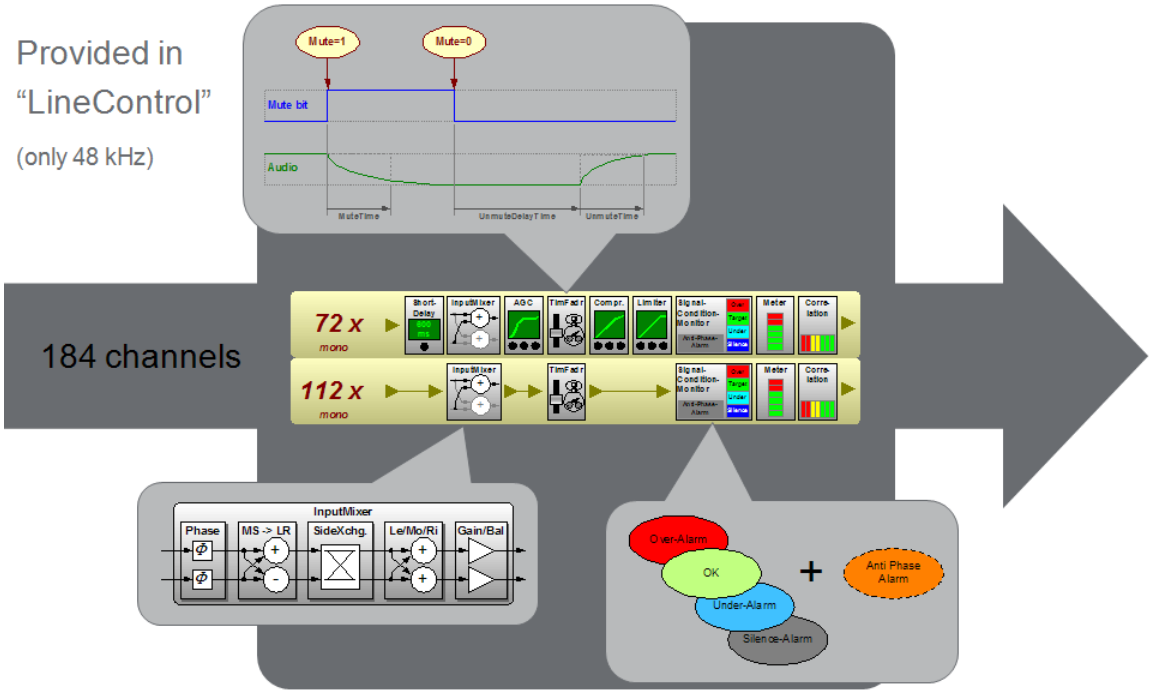
➢ Universal (no PPM)

This option provides 154 channels of DSP plus the 64 x 64 mixing matrix:



➢ 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)**.

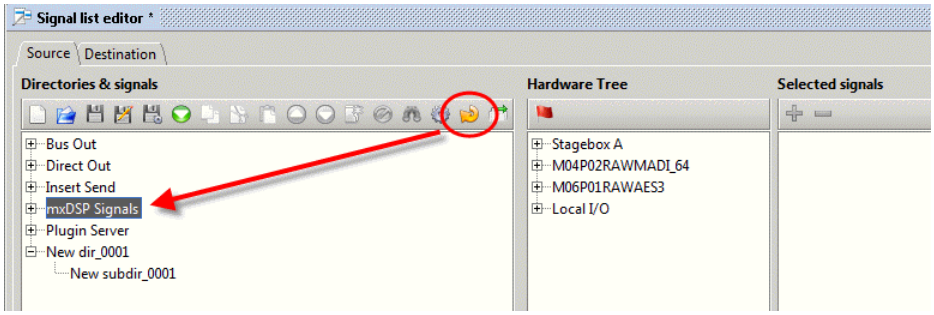
Editing the Signal List

In order for the DSP chains to appear within the console GUI's **Signal List** display, the mxDSP module must be added to the Signal List configuration (**gui_config.tcl**).

Having added the mxDSP module to the AdminHD configuration:

1. Download the existing Signal List to make sure that you are editing the latest configuration data.
2. Click on the Update hardware signal config button.

The mxDSP signals from the newly configured card are added to the existing Signal List:



3. You can organise the signals, and name and label them, in the usual manner See Editing a Signal List.

Updating the Cold Start Configuration

1. Export and upload both of the cold start configuration files (**config.tcl** and **gui_config.tcl**), in the usual manner.
2. Cold start the mc²56 MKII control system so that the new configuration data is active.

You can check the configuration by opening the console GUI's **mxDSP Settings** and **Signal List** displays.

Updating the Firmware

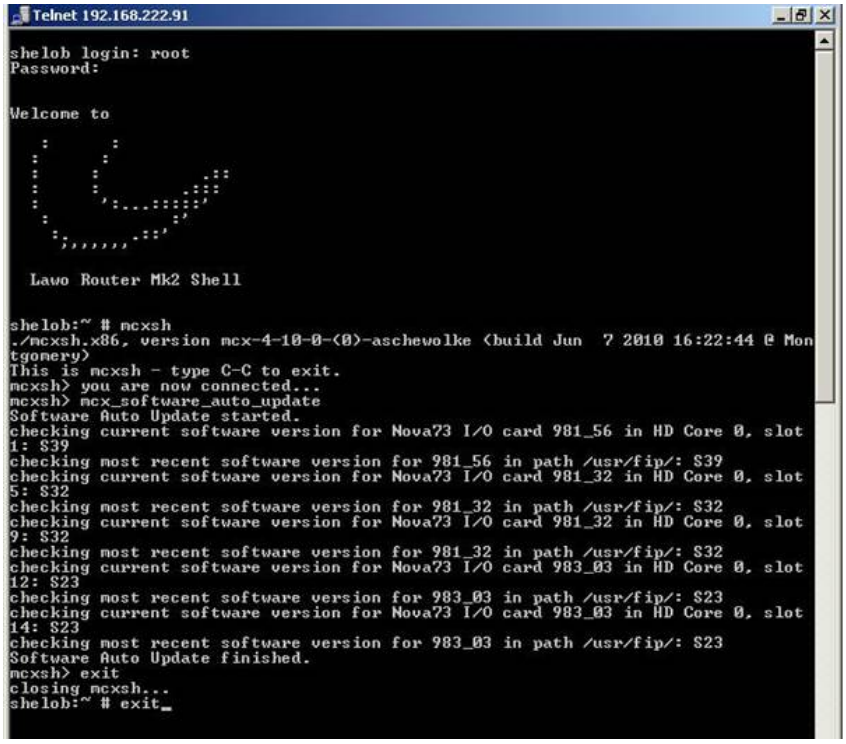
Before the mxDSP module will operate correctly, its software must be updated:

1. Using a computer connected to the Lawo system network, open a telnet session to the mc²56 MKII control system.
2. At the main control system prompt, type **mcxsh** and press Enter.

This opens the mcx shell programme.

3. Then type the command **mcx_software_auto_update** and press Enter.

The software on each card is automatically updated according to the Core configuration:



The mxDSP module is now ready for operation.

The 'Console Panel'

The 'Console Panel' can be used to edit the control surface layout for a MKI mc²66 system (classic or top1), and export a cold start Console Configuration (**console_config.tcl**) file.

For all other mc² systems, the **console_config.tcl** *must* be factory-configured. Please contact your local Lawo representative or email service@lawo.com if you require further assistance to modify its configuration. In these systems, do *NOT* attempt to use the 'Console Panel' to generate a new.tcl file, as the control system cannot read the data.

The **console_config.tcl** file is not required for a stand-alone **Nova73**.

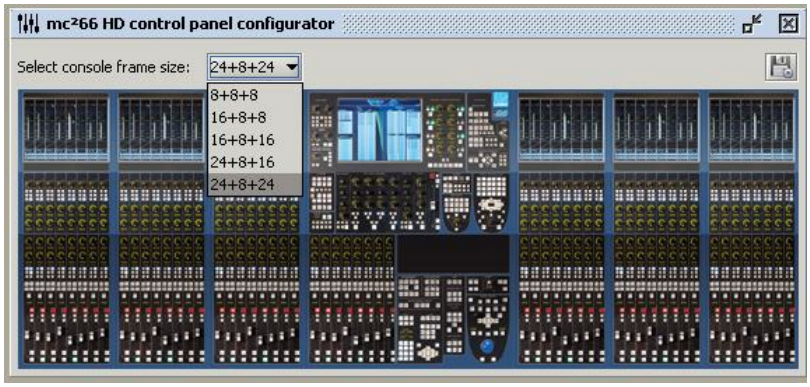
You can use AdminHD to upload a **console_config.tcl** file on any mc² system. This could be a file emailed to you from Lawo service.

Editing the Control Surface Configuration (MKI mc266)

1. Click on  from the main toolbar to show the 'Console Panel'.

Or select **Window -> Console frame** (from the main menus) or press **CTRL + SHIFT + O** (on your computer keyboard).

An image of the MKI mc²66 control surface configuration appears:



2. Select the console frame size from the drop-down menu (e.g. **24+8+24**).

The window updates accordingly.

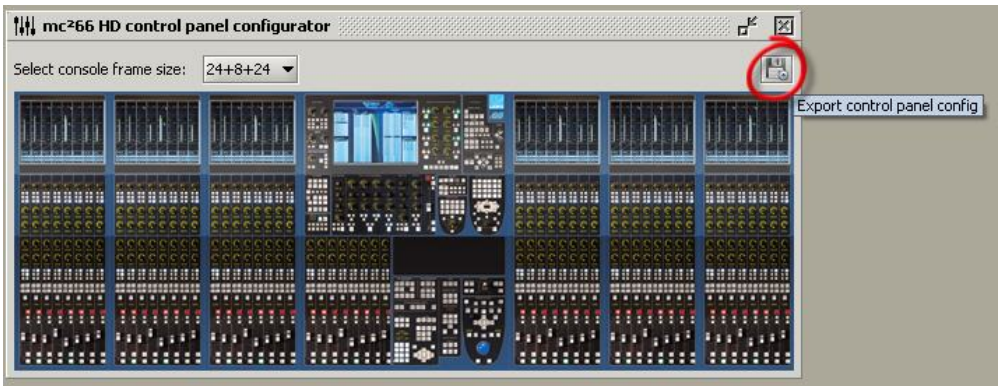
3. If your console frame is larger than the fader panels fitted, then right-click on the fader panel you wish to remove and deselect the **Assign fader panel to slot** option.

The display updates to show the blank fader panel.

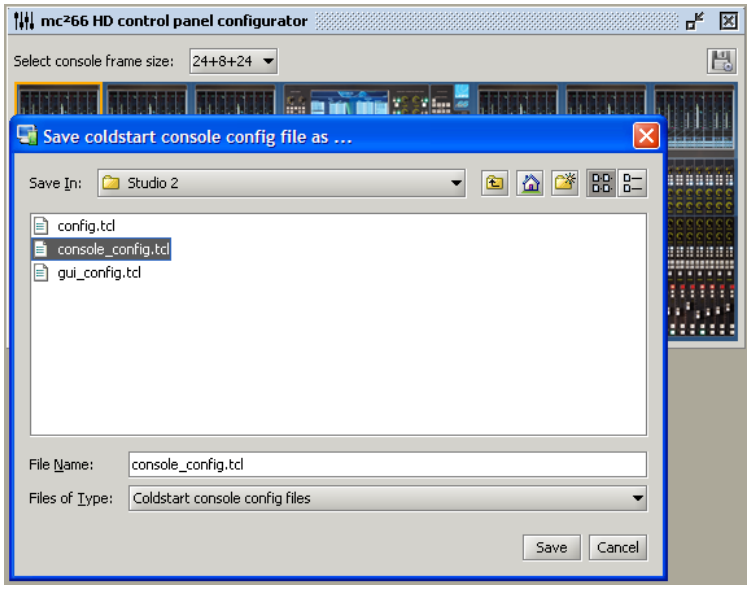
4. You can save changes to the 'Console Panel' configuration by selecting **File** -> **Save** or **File** -> **Save As** from the main menus.

*The 'Console Panel' configuration is stored with the rest of the Core configuration within the **config.csv** file.*

5. Now export the configuration, by clicking on the **Export config** button at the top right of the 'Console Panel' window:



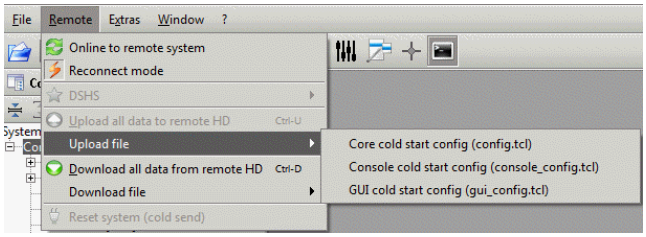
6. Select a folder location and click **Save**:

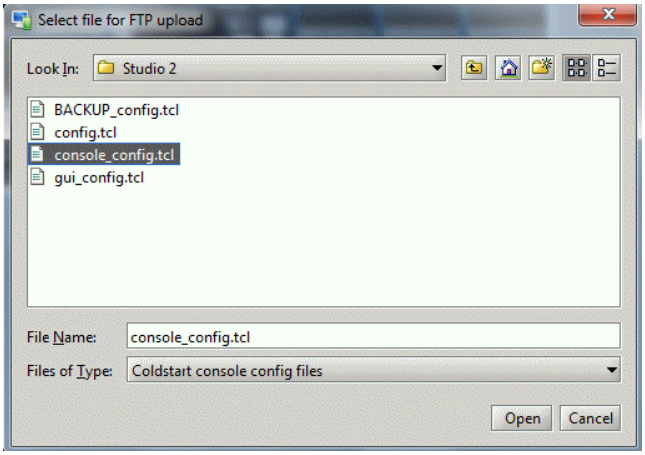


Do *NOT* rename the file; it must be named **console_onfig.tcl** in order to be read by the control system.

Uploading the Cold Start console_config.tcl

This operation is similar to uploading the cold start **config.tcl** file, except this time upload the **Console cold start config (console_config.tcl)**:





You will need to cold start the mc²56 MKII to see your changes take affect.

Chapter 4: Service/Maintenance

Introduction

This chapter covers service and maintenance, including software diagnostics and hardware procedures.

See also trouble-shooting for a list of example problems and fault-finding tips.
For further assistance, contact your local Lawo representative or the service department at service@lawo.com.

Topics covered in this chapter are:

Software Versions

Compatibility

From version 4.0.2.2 onwards, all Lawo products have adopted a consistent software release numbering system to indicate compatibility. This affects system networking, mxGUI and AdminHD. In each case, the first three digits of the software version must match.

Checking the Software Version

You can check the software version of your mc² system from the Global Options in the **System Settings** display.

Upgrading Software

Please register at www.lawo.com (click on **Login**) and go to the **Download-Center** to download software and documentation for your product.

Information about each software release can be found in the "Release_Notes_X.xx".

Instructions on how to perform each upgrade are included with the first software release candidate ("Product_systemupdate_VX-xx-x-x"). To perform a system update, you will need a computer connected to the Lawo system network, and installed with suitable FTP and Telnet clients.

System Shutdown and Restart

Shutdown

The console should be shut down by powering off the control surface (mains connections at rear) and Nova73 (mains connections at front).

Note that the control system is located on the Router Module (MKII) within the Nova73. Therefore, it is here where your user data is stored.

Following switch-off, power is provided to the control system for a further 18 seconds. During this time, all current settings are saved to flash memory; this is known as the warm start data. You will hear several tones signalling that the shut down operation has been successfully completed. The system is shut down when the blue LED of the trackball is off.

You may switch off the power to other system components (e.g. DALLIS units) at any time.

Starting the System (Warm Start)

To start the system, turn on the power to the control surface (mains connections at rear) and Nova73 (mains connections at front). The components may be powered in any order, but note that the control system resides within the Nova73. Therefore, the system boots when you turn on power to the Nova73.

You may switch on the power to other system components (e.g. DALLIS units) at any time.

The control system boots in a few seconds; during this time the Central GUI reports back on the boot-up progress.

By default, the warm start data is loaded at the end of boot-up. This means that the system comes back exactly as it was when you last shut down, ensuring fast recovery of all previous settings following a loss of power.

Depending on who was last using the console, you may be sat in front of a fully configured control surface with DSP settings or a series of blank fader strips! In either case, the fastest way to reset the console is to load a production.

The control surface and Nova73 may be booted before DALLIS units. This enables you to prepare settings, including signal routing, before remote DALLIS stageboxes are connected or have received power.

Starting the System (Cold Start)

Alternatively, the system may be set to cold start, following the next reboot, using the Prepare Coldstart option in the **System Settings** display. Or, the **Prepare Coldstart** button on the front of the Router Module (MKII).

Select the **Prepare Coldstart** option, and then force a restart by powering off, and then on, the Nova73.

A cold start boots without loading any warm start data. You should perform a cold start *only* if there is a problem with the warm start data, or if you wish to clear all warm start data from the system.

The best way to reset the console for a new job or show is to load a production. (A cold start resets the system back to its cold start data and factory default settings.)

Warm Start & Cold Start Data

Warm Start Data

The following settings are stored in the warm start data, and are recalled following a warm start:

- Matrix crosspoints.
- The DSP configuration.
- The console's complete settings (control surface layout, etc.)
- All DSP parameters (EQ, Dynamics, etc.).
- All I/O parameters (Mic preamp gain, SRC on/off, etc.)
- Any Core configuration settings changed by an online AdminHD computer.

Cold Start Data

Following a cold start:

- All matrix connections are cleared, unless protected by a factory configuration (.tcl) file.
- The default DSP configuration is loaded. This can be defined from the Custom Functions display.
- The control surface will appear blank (no fader strip assignments).
- All DSP parameters are set to factory default values.
- All I/O parameters are set to factory default values
- All configuration files return to their cold start defaults (config.tcl, gui_config.tcl, etc.)

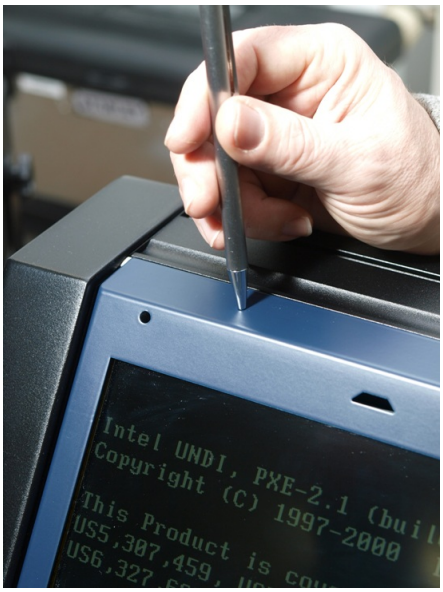
Restarting a Bay Server

Each TFT display on the mc²56 MKII has its own Ethernet Bay Server which can be restarted from the front panel. You should perform this procedure, rather than a system restart, if:

- the graphics on an individual display freeze or look odd.
- the controls on a panel are not responding; indicators not updating.

These symptoms can sometimes occur if a Bay Server looses its Ethernet connection to the control system.

1. Using a pointed object, press the recessed button on the top of the display:



The Bay Server restarts.

Once the restart is complete, communication with the control system is re-established, and the selected display reinstated.

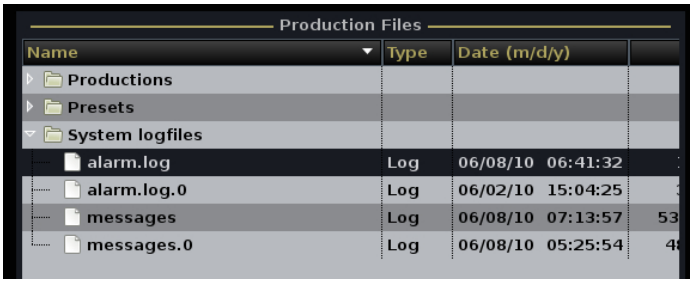
System Logfiles

During operation, the system generates and stores logfiles on the control system. This allows you to export the files to assist Lawo service with fault-finding.

There are 4 principle logfiles:

- **alarm.log** - global alarm errors (the last 5000).
- **alarm.log.old** - archived global alarm errors (the previous **alarm.log** file).
- **messages** - messaging errors generated by the control system (the last 5000).
- **messages.old** - archived messaging errors (the previous **messages** file).

Logfiles can be copied to USB, from the console GUI, using the **File** display, see the "mc²56 Operators Manual":



Alternatively, you may monitor the contents of a log file, remotely from your computer, using the Web Browser Interface.

➢ Timestamping a logfile

From V4.24 software onwards, two enhancements have been made:

- **Timestamping** - click on the LAWO logo, from the Central GUI's title bar, to create a time stamp in the **messages** file. This marks the logfile at a moment in time, and can assist Lawo's service department when diagnosing system behaviour.
- **DSP change** - whenever the DSP configuration changes (by loading a production, changing the DSP configuration or switching to a redundant DSP card), information about every DSP card is printed in the **alarm.log**. The information is formatted as follows:

```
New DSP card role for {HDCore 0, Slot 14}: active (role index 1)

New DSP card role for {HDCore 0, Slot 12}: active (role index 2)

New DSP card role for {HDCore 0, Slot 10}: active (role index 3)
```

➢ Reading a logfile

From V5.0 software onwards, each line within the **messages** file is formatted in three sections:

```
<Software Module> <Error Type> <Details>
```

The `<Error Type>` indicates the severity of the error as follows:

- **DEBUG** - information for developers, not usually seen once a release is issued.
- **INFO** - general information, not a real error.
- **WARNING** - an error with low impact.
- **ERROR** - an error with moderate impact.
- **FATAL** - a serious error which may lead to system crashes.

By searching the **messages** file for the appropriate text - e.g. **FATAL** - you can quickly identify the relevant information.

GUI Diagnostics

The console's Central GUI, or an mxGUI computer running online, provides the following system diagnostics:

Nova73/DALLIS Status

If a Nova73 or DALLIS component fails, or a connection is lost, then a hazard warning flag appears in the title bar of the console GUI. Use the Signal Settings display to interrogate the source of the problem. This display monitors all the Nova73 and DALLIS components which are defined in the Core configuration.

Control Surface Connection

If a redundant Router Module and Ethernet connection to the control surface are installed, then the operator is presented with an error message should the active connection fail. They may then decide to force a takeover or investigate the cause of the problem.

Control Surface Power

On the right of status bar, the console GUI offers status monitoring for all power supplies. You will see a red circle with an exclamation mark if a supply has failed.

Redundant Control System Takeover

If a redundant Router Module (MkII) is fitted to the Nova73, then you may force a manual takeover to the redundant control system, either from the **System Settings** display or by pressing the recessed button on the front of the Router Module.

Prepare Cold Start

The system may be set to cold start, following the next reboot, using the **Prepare Coldstart** option in the **System Settings** display.

Bulb Test, Fader Calibrate, OLED Saver Enable

These options, in the **System Settings** display, can be used to test the control surface illumination, calibrate the faders or enable the OLED display saver (recommended to prolong their lifespan). See the "mc²56 Operators Manual" for details.

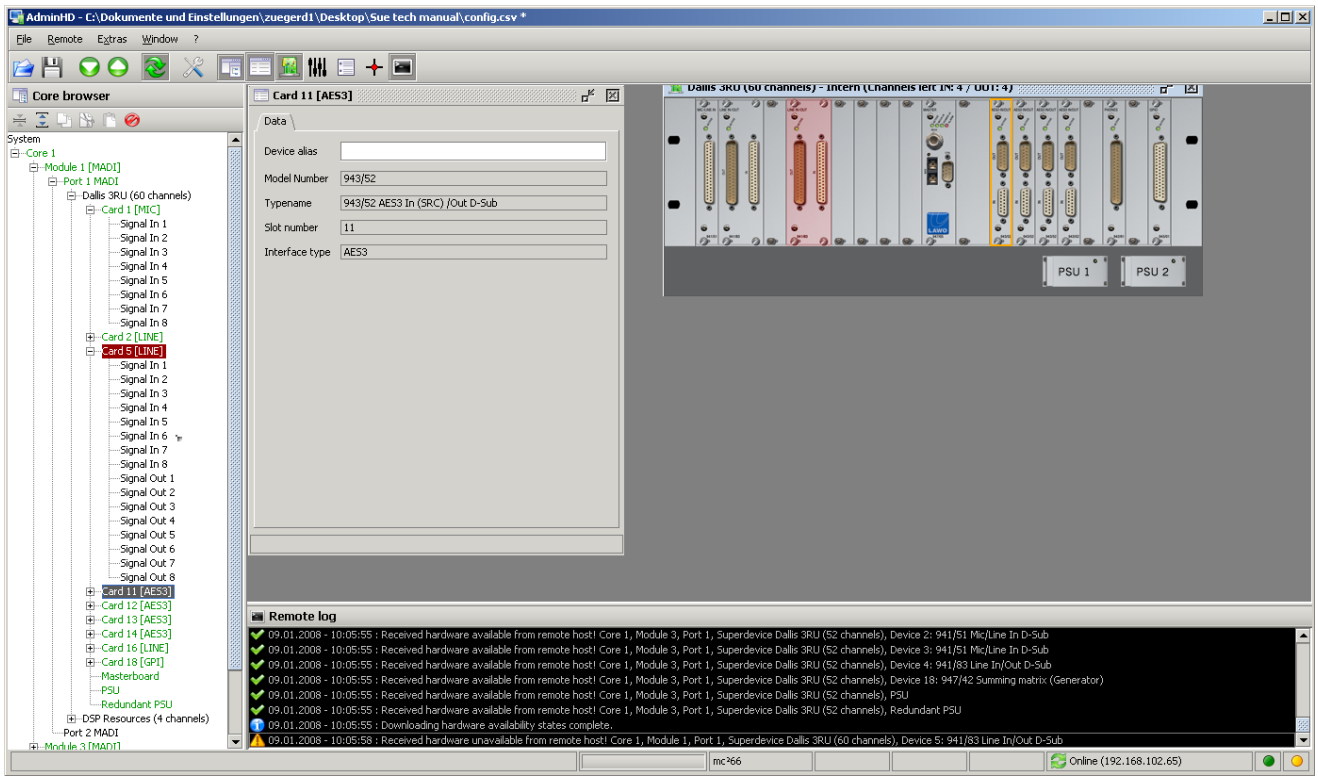
AdminHD/ControlHD Diagnostics

An AdminHD, or ControlHD computer, running online provides the following system diagnostics:

Nova73/DALLIS Status Monitoring

Once AdminHD is running online, you can use the 'Core Browser' and 'Graphic View' to monitor the real-time status of hardware components.

In addition, the 'Remote Log' records all messages generated by AdminHD and the online system. You can save the contents of the 'Remote Log' to help diagnose any errors.



Web Browser Interface

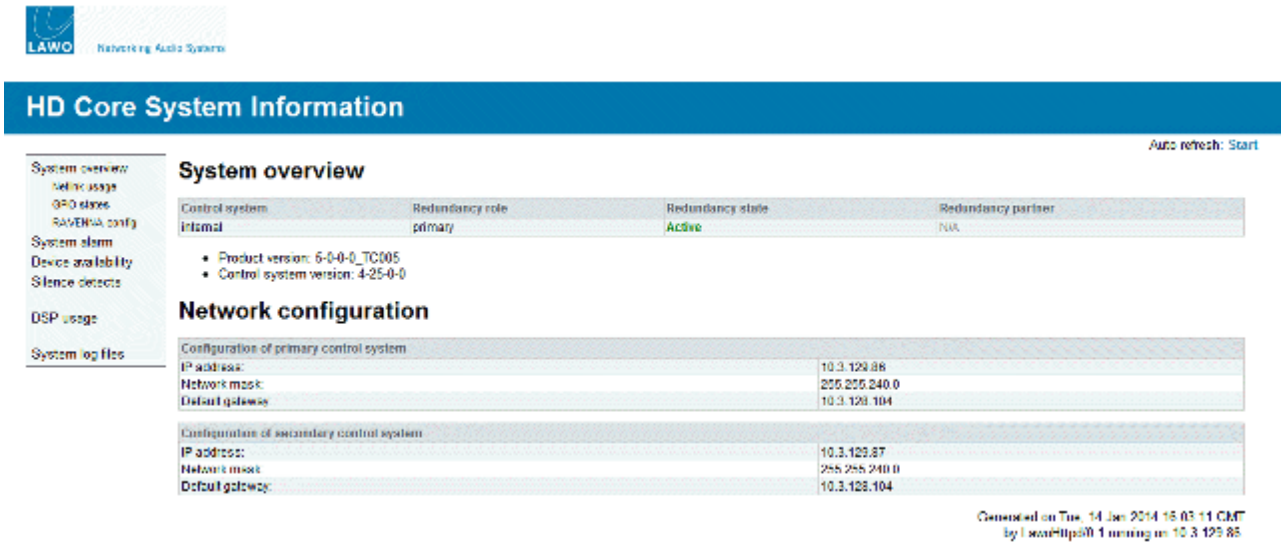
The control system includes an integrated web server. This allows status information to be monitored from a remote computer, via any normal web browser:

1. Connect your computer to the Lawo system network.
2. Configure the TCP/IP settings on your computer's network interface card.
3. Open your browser software, and enter the IP address of the mc²56 MKII control system into the URL field.

   You can check the IP address of your control system from the console GUI (using the Signal Settings display). See also TCP/IP Addresses for a list of the default IP addresses for different Lawo products.

   For example, to connect to a mc²56 with a default IP address, you would type "http://192.168.102.56" and press Enter.

   The System Overview page opens within the browser:

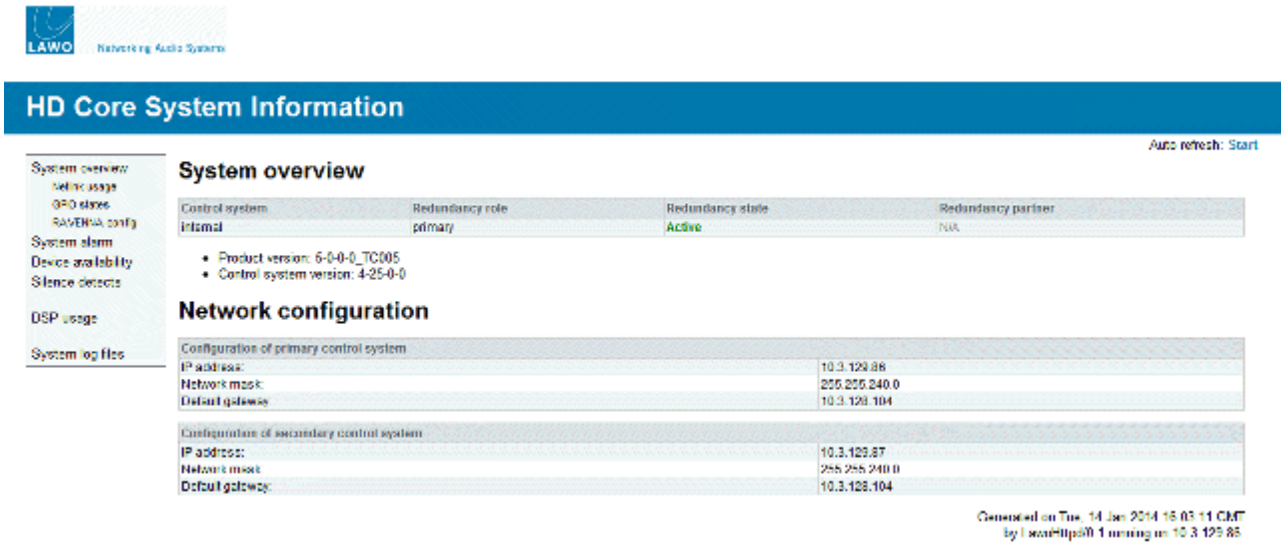


   If the page does not open, then see the trouble-shooting tips.

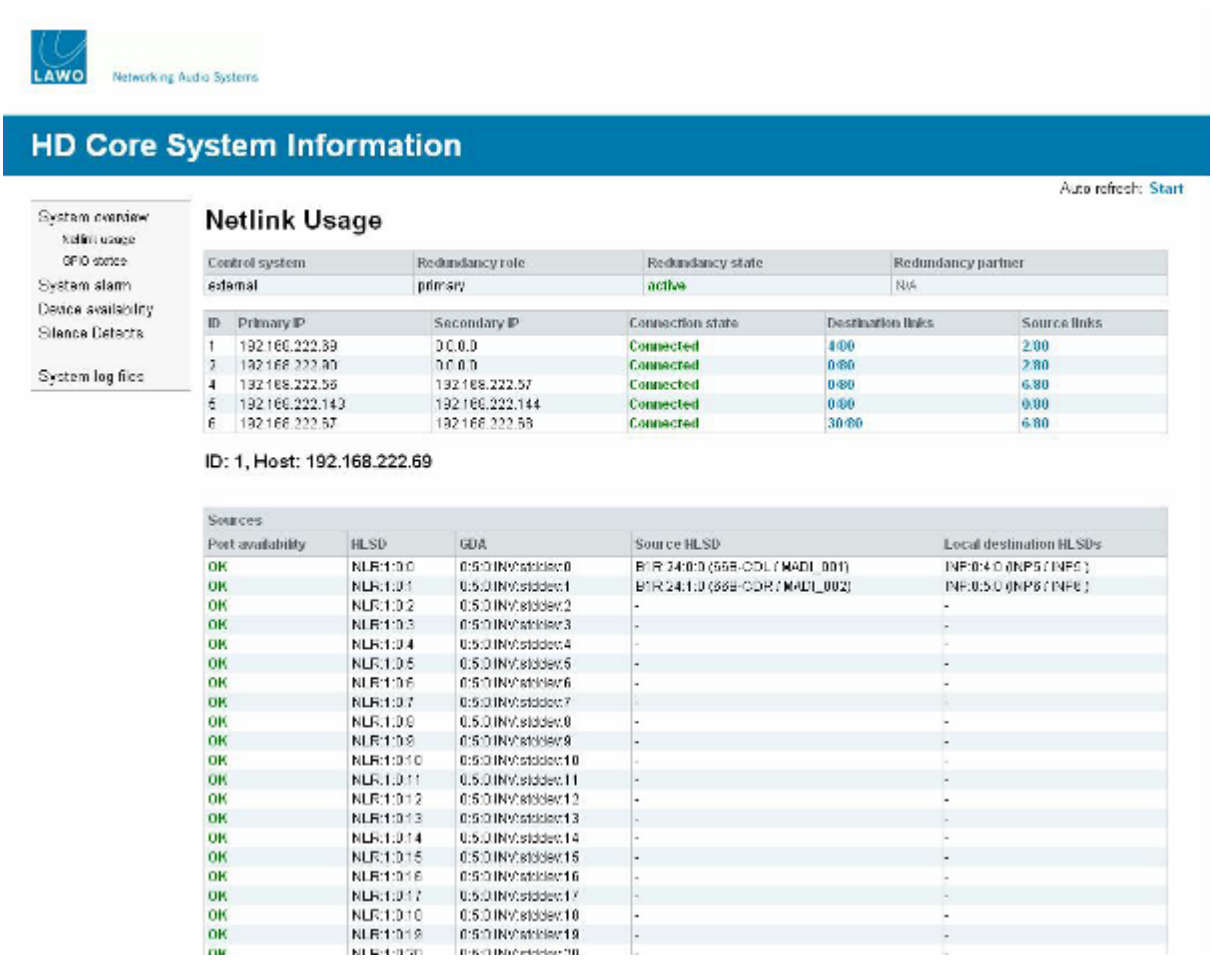
4. To automatically refresh any page turn on the **Auto Refresh** option at the top right of the screen.
5. Use the navigation buttons on the left to access the other page options.

System Overview

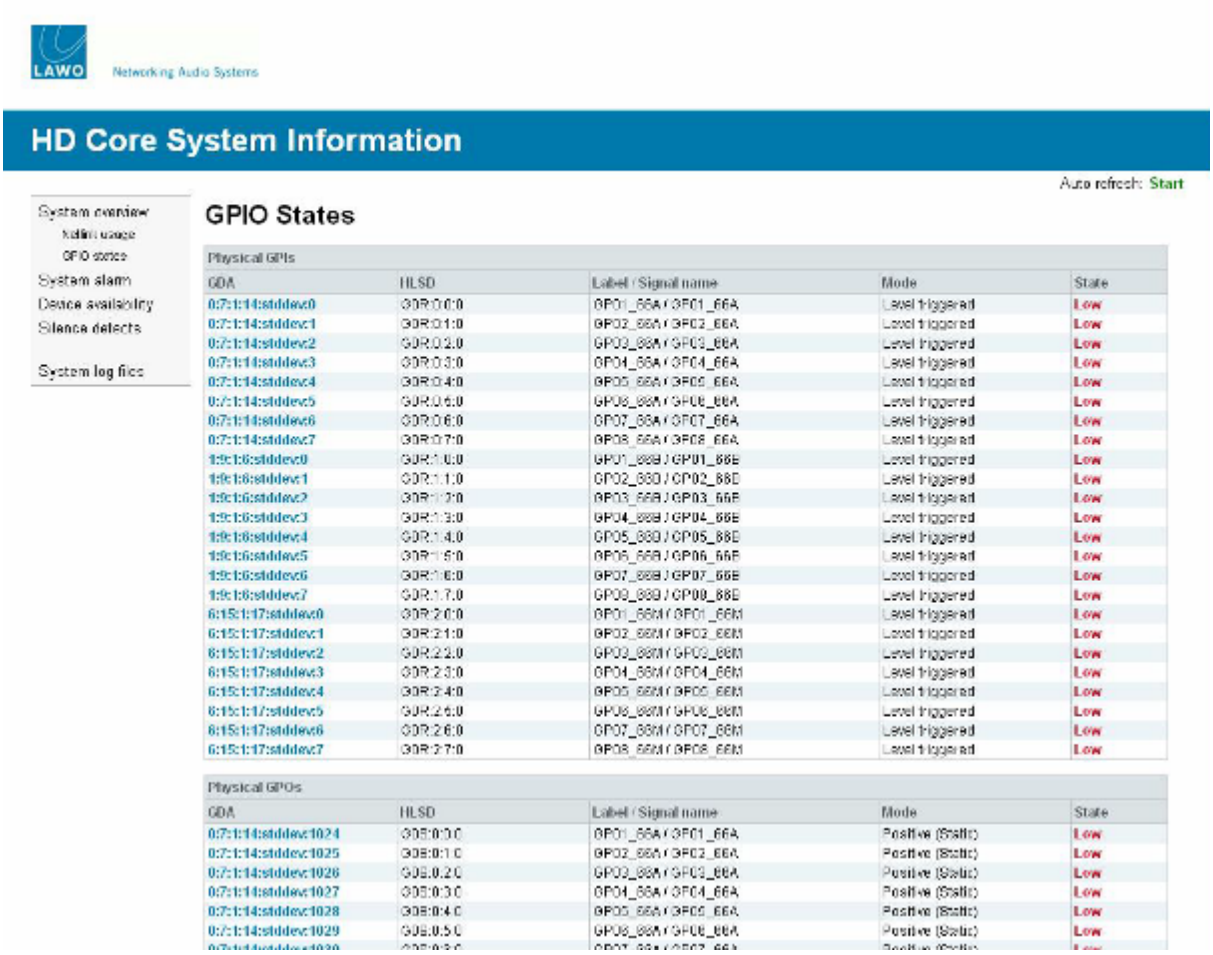
The main **System Overview** provides information on system software versions and the network configuration:



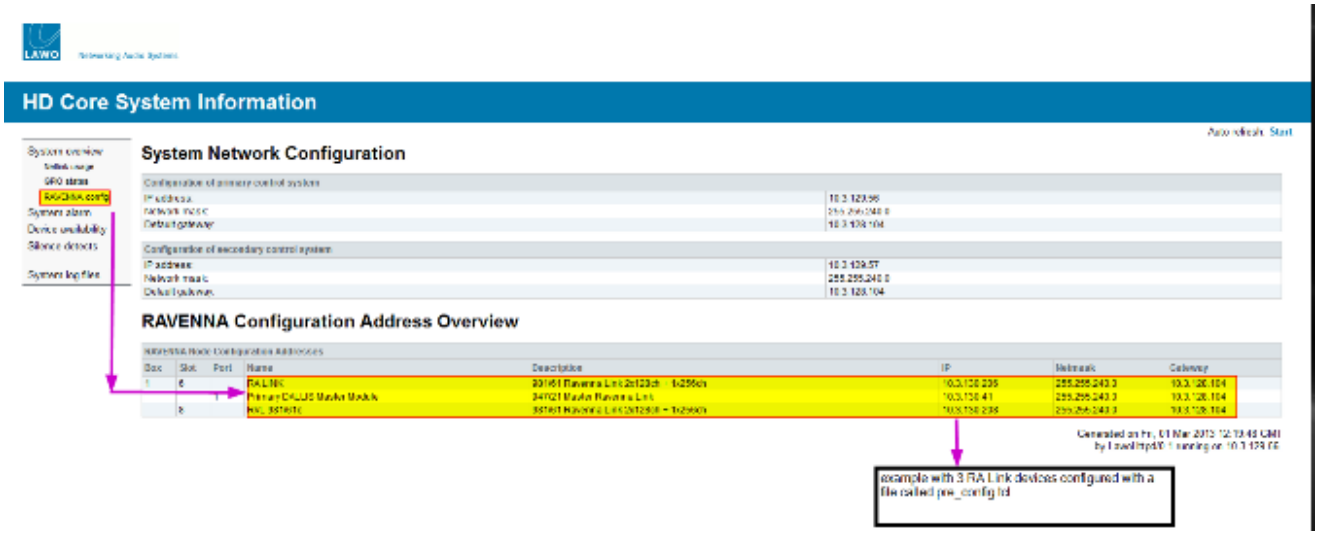
Select **Netlink usage** to view the usage of tie lines within a networked system:



Select **GPIO states** for an overview of the High/Low status of GPIOs:

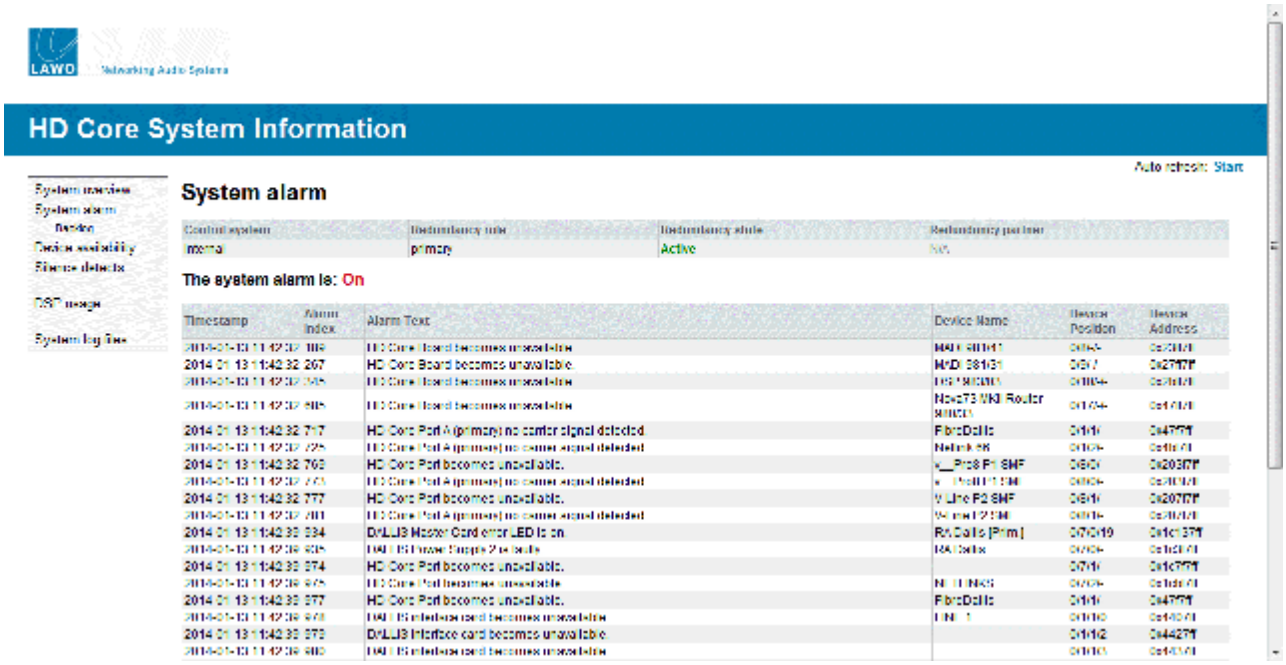


Select **RAVENNA config** to view the configuration of RAVENNA devices fitted to your system. The information includes the IP address of each device:



System Alarm

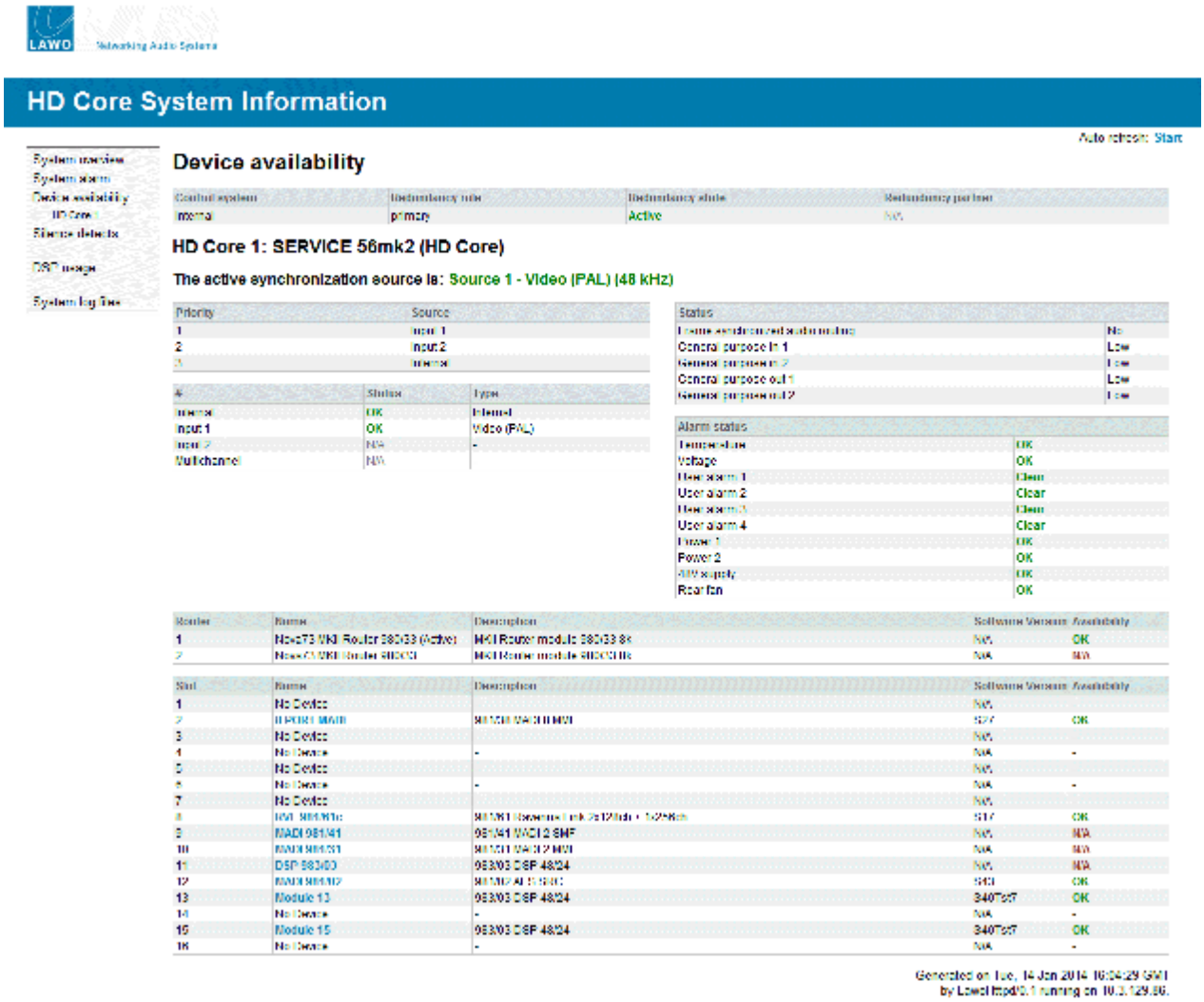
This page lists the last 5000 errors which have triggered the Global Alarm. Every error has an explicit ID, description and time stamp for an easy overview of the alarm events. The errors are stored within the system logfile: **alarm.log**.



Select the **Backlog** sub page to view archived errors (the previous **alarm.log** file). These errors are stored within the system logfile: **alarm.log.old**.

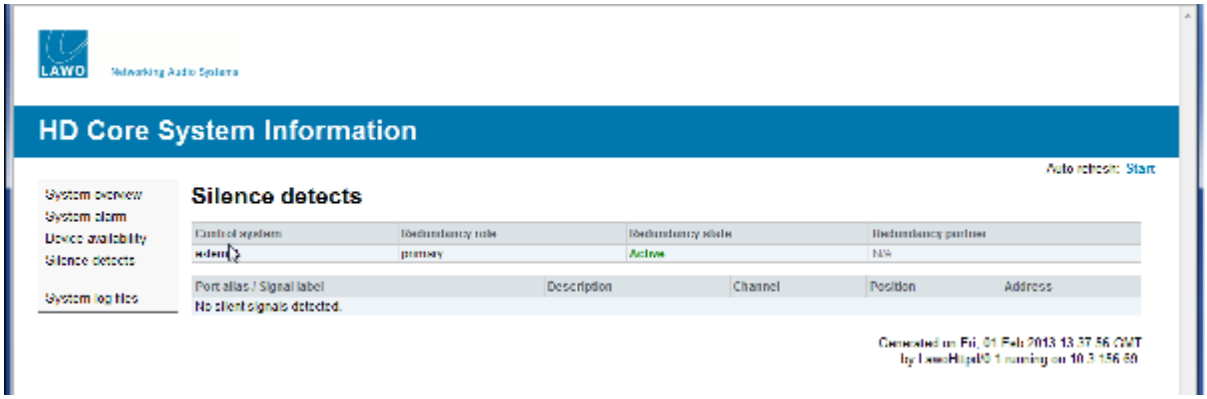
Device Availability

This page contains sub pages for each system component - in our example, one sub page for **HD Core 1** can be selected. Here you can find detailed information, including feedback on sync, alarm status, slot status, etc.



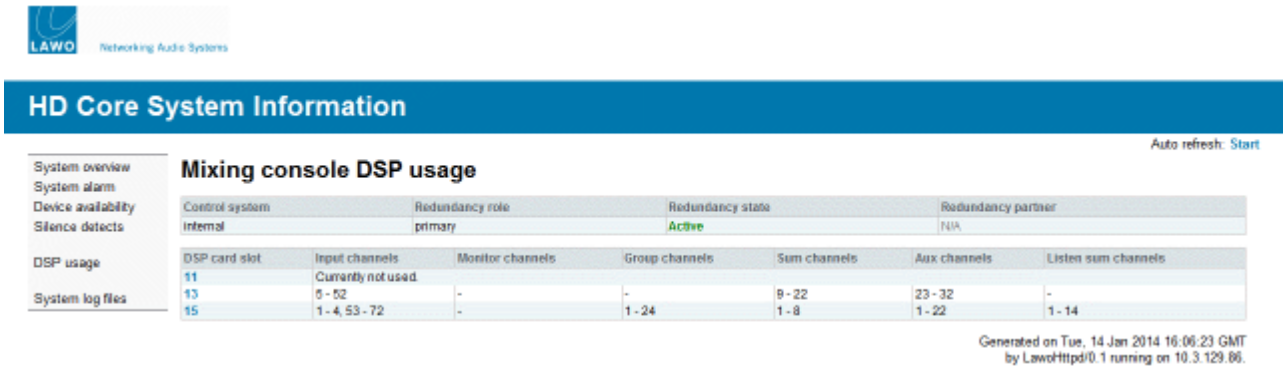
Silence Detects Page

This page lists any silence detect errors generated during operation.



DSP Usage

This page shows the DSP usage of the system:



System Log Files

This page provides access to all logfiles stored on the control system, allowing you to view **system log files** (messages) or **alarm log** errors. Select an option to view the contents of the file.

Telnet Sessions

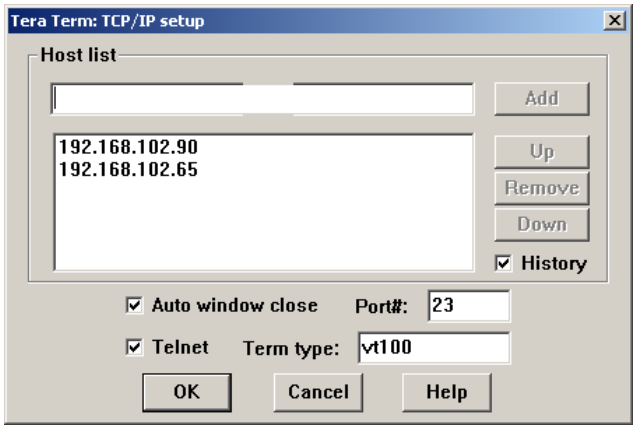
Many parameters on the mc²56 MKII can be adjusted by opening a telnet session to the control system.

Warning

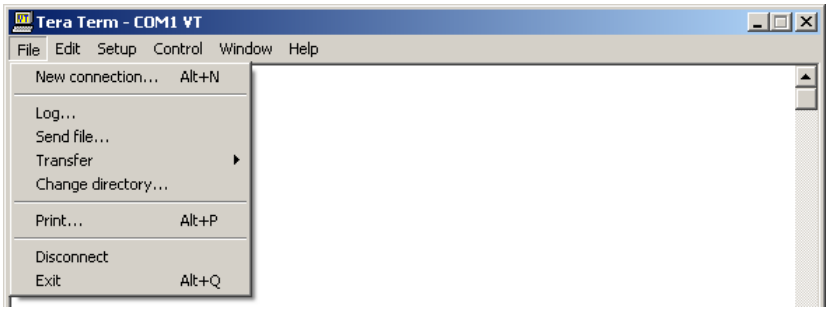
Adjusting parameters via telnet will make low level changes to your system. Therefore, these procedures should *only* be performed by a fully trained member of staff.

To open a telnet session:

1. Install a telnet client on your computer. We recommend using **Tera Term Pro Web 3.1.3**, a free telnet client for Windows, which can be downloaded from www.ayera.com/teraterm/
2. Connect your computer to the Lawo system network.
3. Configure the TCP/IP settings on your computer's network interface card.
4. Open the **Tera Term Pro** Telnet client.
5. Select **TCP/IP** from the **Setup** menu, and add the TCP/IP address of your control system to the host list:

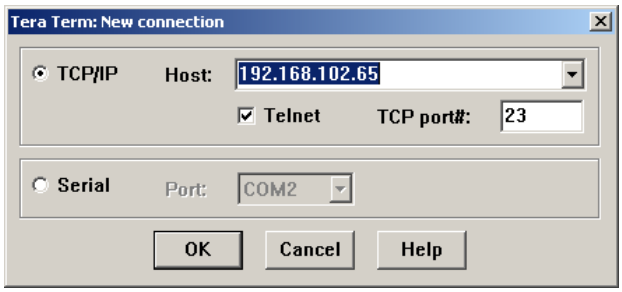


6. Now open a new Telnet connection using **File -> New connection**:

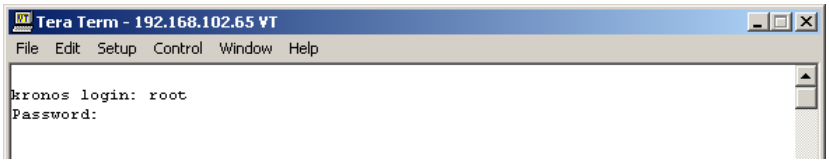


7. Choose the TCP/IP Host address of your control system:

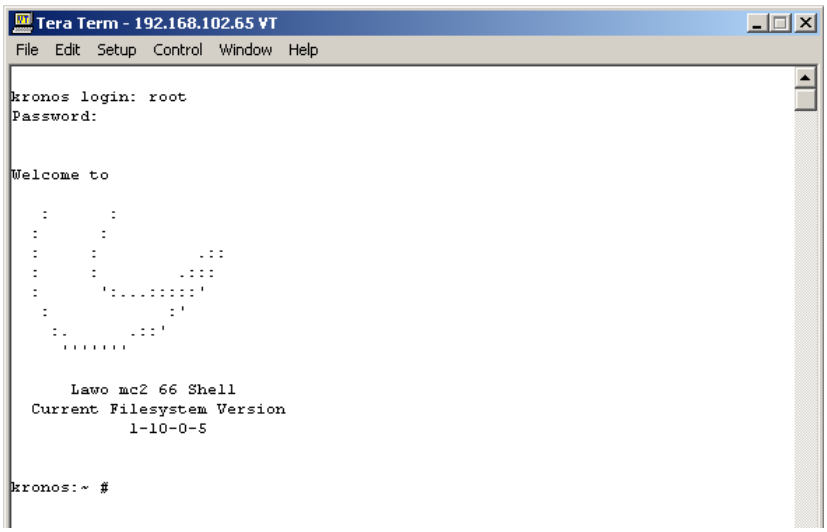
Default IP Address of mc²66 shown:



8. When prompted, enter the login name: **root** and the password: **hong**



The session opens, and you will see the command prompt for the control system:



9. Now follow the specific instructions for the task you wish to perform.

Some parameters are not saved on the main control system, and therefore you may need to remotely login to another part of the system.

You can reboot the control system from the telnet client by typing **reboot** and Enter.

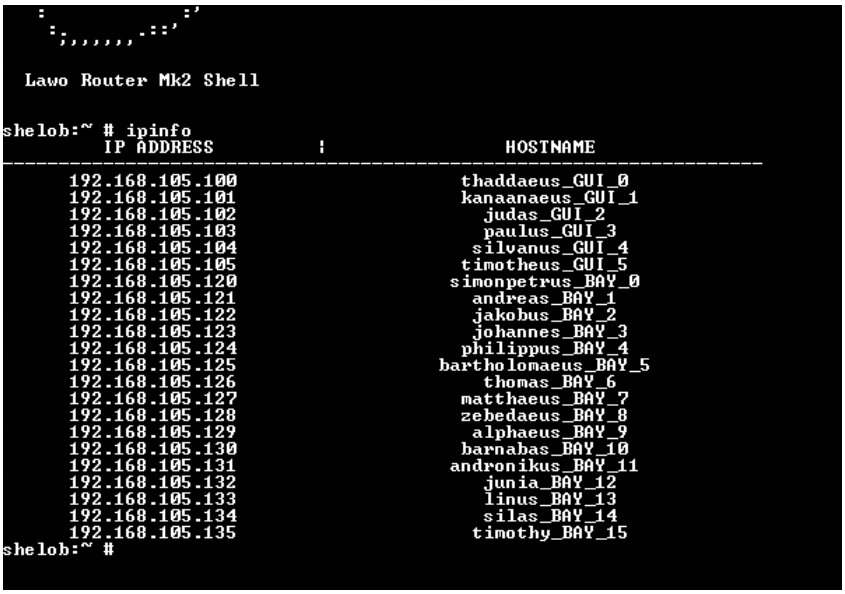
Logging in to a Remote Control System

To remotely login to another control system (for example, the GUI_0 Bay Server):

1. At the main control system prompt, type **ipinfo** and press Enter.

A list of all system IP addresses is displayed:

Telnet Session to mc²56 shown:



For our example, the IP address we require is **192.168.105.100** (thaddeus_GUI_0).

2. Type **telnet xxx.xxx.xxx.xx** (where **xx..** is the IP address of the remote control system) and press Enter.

3. When prompted, enter the login name: **root** and the password: **hong**

The session opens, and you will see the command prompt for the remote control system:

4. Now follow the specific instructions for the task you wish to perform.

5. Once you have finished, you can return to the main control system by typing **quit**.

File Transfer via FTP

All files stored on the control system can be accessed by a suitable FTP client.

You will need this tool to transfer files, such as system software or factory configuration (.tcl) files, which are "hidden" from normal console GUI, mxGUI and AdminHD operation.

Warning

File transfer via FTP may make low level changes to your system. Therefore, these procedures should *only* be performed by a fully trained member of staff.

To perform a file transfer:

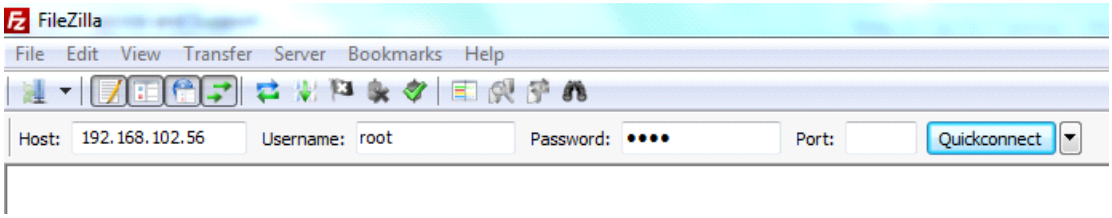
1. Install a suitable FTP client on your computer. We recommend using **Filezilla**, a free FTP client for all platforms, which can be downloaded from www.filezilla-project.org
2. Connect your computer to the Lawo system network.
3. Configure the TCP/IP settings on your computer's network interface card.
4. Open the **Filezilla** FTP client, and enter the following information:

   Host = the IP address of your control system

   Username = **root**

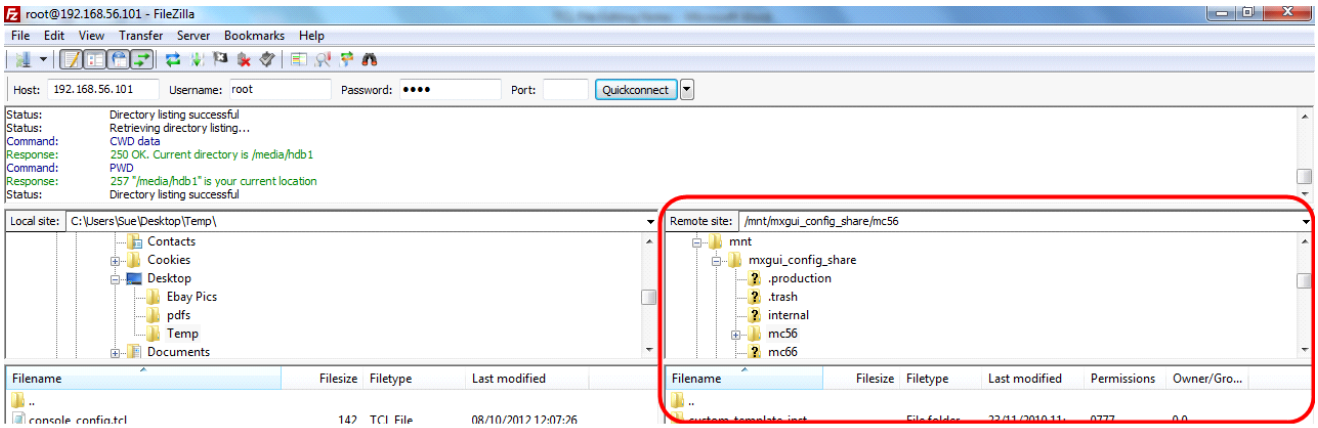
   Password = **hong**

Default IP address of mc²56 shown:

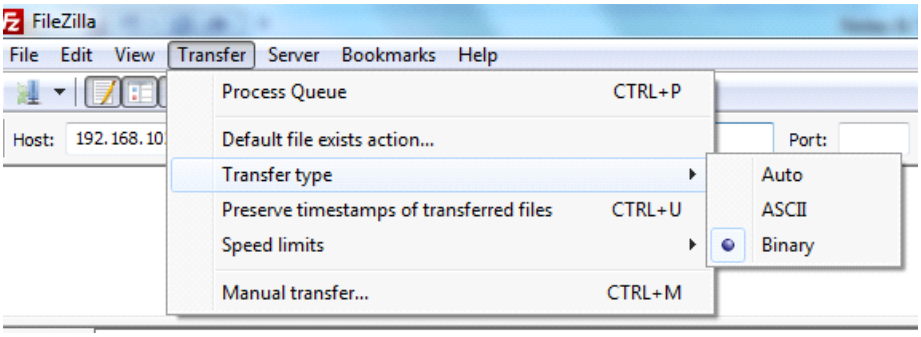


5. Click on **Quickconnect** to make the connection.

   *The session opens, and you will see the filing system of the control system on the right (under **Remote Site**):*



6. *BEFORE* transferring files, check that the **Transfer Type** is set to **Binary**:

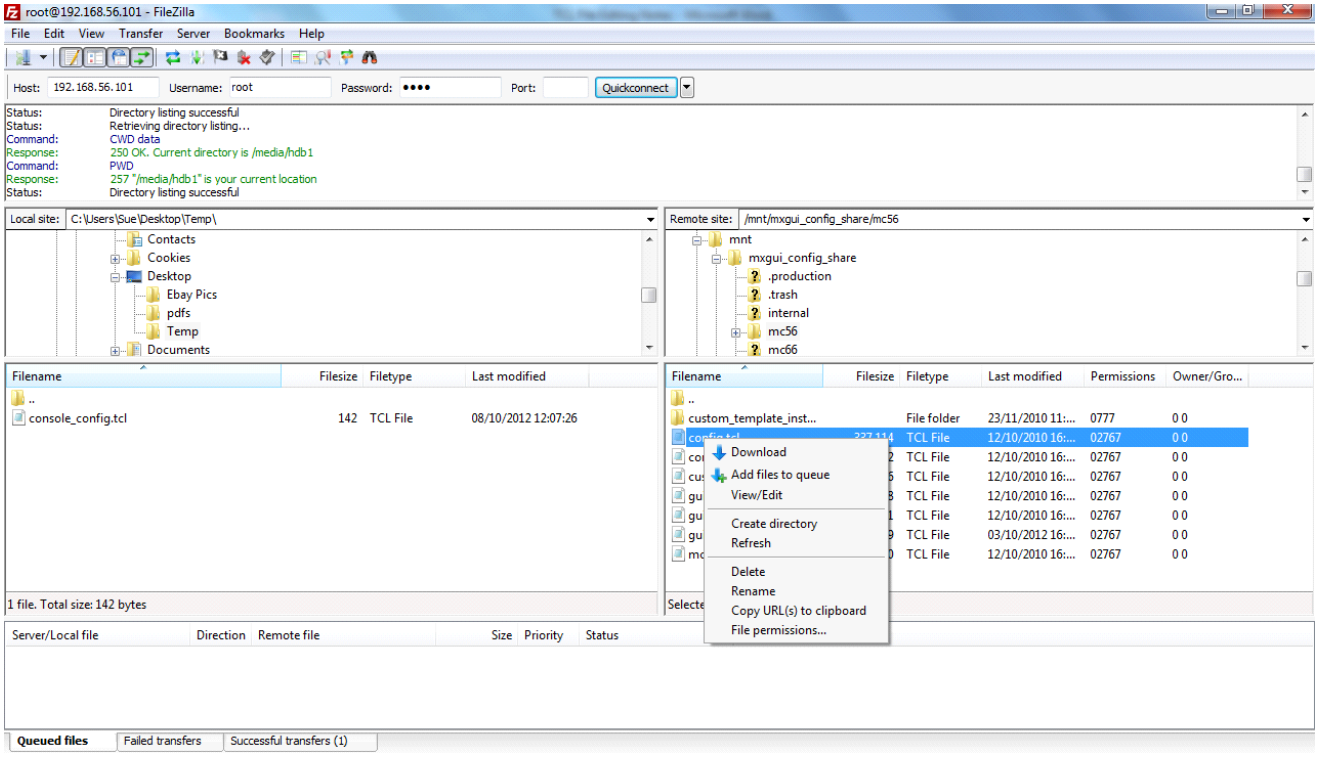


Warning

It is *VERY* important that file transfers use "Binary" mode, and not "ASCII".

7. You can now transfer files from the control system (**Remote site**) to your computer (**Local site**), or vice versa:

- Use the upper areas to navigate through the filing structure - the contents of the selected folder are displayed beneath (under **Filename**).
- Right-click on a filename and select **Upload** or **Download** - the file is transferred to/from the selected folder.



Further information on system files can be found in the relevant technical documentation.

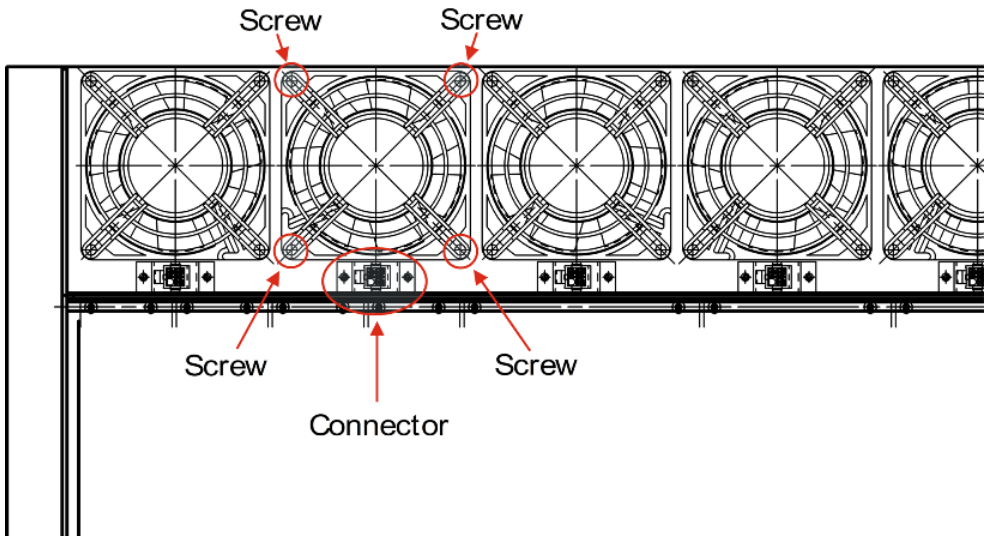
Nova73

This section covers hardware servicing for both the **Nova73 HD** and **Nova73 Compact** core:

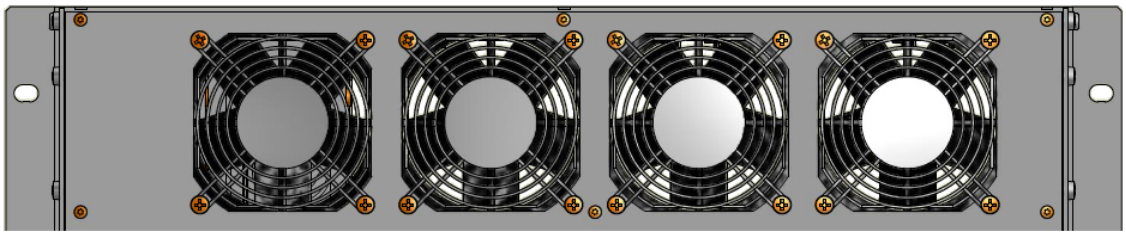
Replacing the Fans

Each of the cooling fans can be replaced individually while the Nova73 is running:

Nova73 HD rear view



Nova73 Compact rear view



1. Unplug the 4-pin connector from the rear of 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

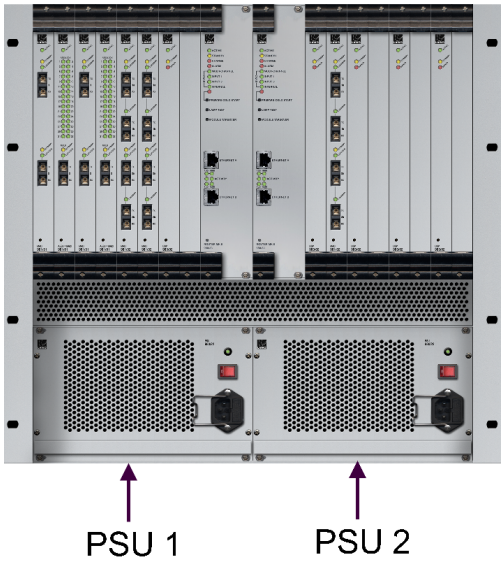
Each of the PSUs are individually hot pluggable.

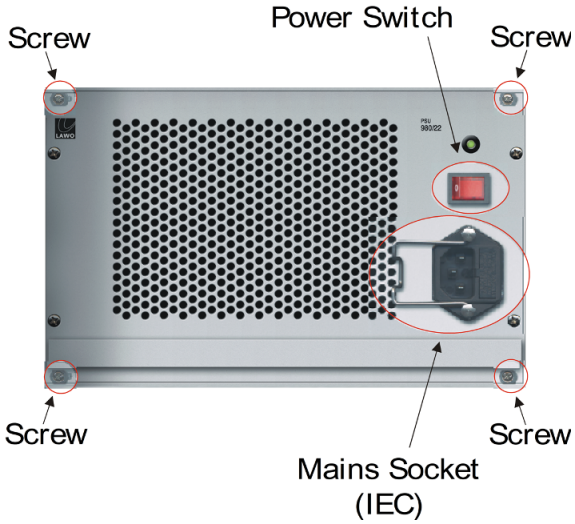
To operate the Nova73, one PSU is sufficient. Therefore, when two supplies are fitted, you can replace a PSU without affecting the operation of the system.

Warning

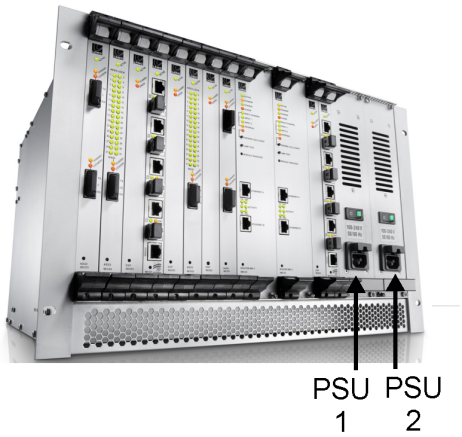
If only one PSU is operational, then powering off will shutdown the system.
The replacement PSU must be of the same type; you cannot mix PSU types.

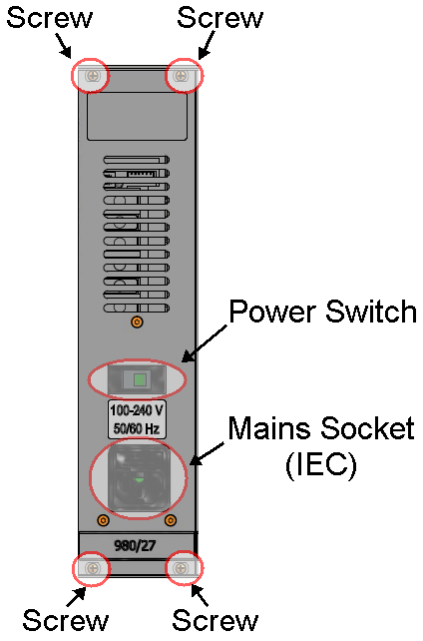
Nova73 HD front view





Nova73 Compact front view





1. Switch off the PSU you wish to replace from the front of the frame as shown above.
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

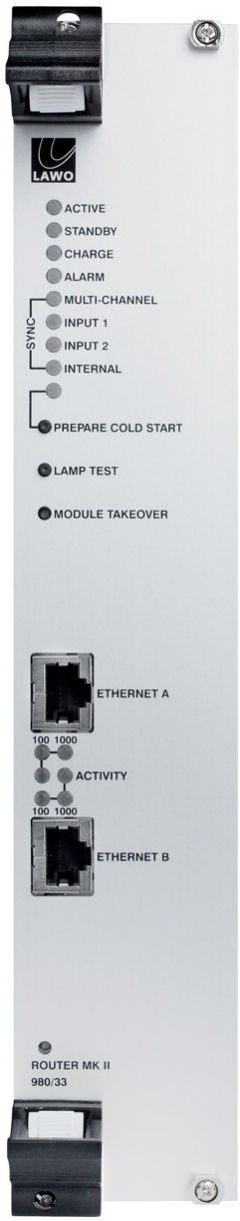
For air conditioning reasons, both PSU slots *MUST* be occupied when the Nova73 is operational:

- **Nova73 HD**: if only one PSU is installed, then please fill the empty slot with a dummy plate (Type 980/21).
- **Nova73 Compact**: leave both PSUs in the frame until a replacement can be fitted.

Router Module MKII: LEDs & Switches

The Router Module MKII (980/33) provides the following front panel connections, LEDs and switches:

ACTIVE LED	Flashes green when the control system is booted and running. The **ACTIVE** LED on each Nova73 module, or DALLIS card, should blink in time with all other **ACTIVE** LEDs (at approximately 100Hz). This shows that the card is synchronous to the rest of the system. If an LED is out of sync, then check that the card is fitted correctly, and if the symptom persists, replace the card.
STANDBY LED	Illuminates in yellow if the module is in standby. If you have a main and redundant Router Module fitted to the Nova73, then one module will be **ACTIVE** while the other is in **STANDBY**.
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 active.
SYNC LEDs	These four LEDs indicate the system's sync source: Flashing green = current sync reference. Solid green = available redundant sync reference.
PREPARE COLDSTART	Press this button (the LED illuminates) to prepare a cold start. The system will then cold start on the next power cycle (or reboot).
LAMP TEST	Press this button to test all the LED lamps within the Nova73 plug-in modules.
MODULE TAKEOVER	If you have a main and redundant Router Module fitted to the Nova73, then press this button to force a takeover to the redundant control system. After a few seconds, the **ACTIVE** and **STANDBY** LEDs on the two modules update accordingly.
ETHERNET A **ETHERNET B**	Connects to the control surface. Connects to the Lawo system network. Both connections are RJ45. The **ACTIVITY** LEDs flash in green when data is being transferred.
POWER Button	This recessed button will power cycle the Router Module. It should *only* be used as a last resort if all other restart methods fail.
Silk Screen	Shows the part number of the module.



Further information can be found in the data sheet, available in the "mc2_Nova73_documentation" guide.

Replacing a Router Module

Router modules are individually hot-pluggable.

If main and redundant Router Modules are fitted to the Nova73, then you may replace the redundant module (in **STANDBY**) without affecting the operation of the system.

Warning

If only one Router Module is fitted, then replacing the module will shut down the system!

See Installation: Mounting the Nova73 Modules for instructions.

Replacing a System or User Data Flashcard

A backup image copy of the **System Flashcard** and/or **Data Flashcard** can be created and stored, so that it can be replaced if necessary.

Full instructions on how to create the image copies are provided in the separate technical documentation "Creating CF Cards using the Virtual Machine".

Once you have the new flashcard, it can be replaced as follows.

> You must power off the Nova73, thereby shutting down the system, in order to replace a flashcard.
>
> If main and redundant Router Modules are fitted to the Nova73, then please see the additional instructions on updating data in a redundant system.

Both flashcards are located on the Router Module MKII (980/33) within the Nova73:

1. Power off the Nova73 (both PSUs if fitted) and remove the Router Module.

   You will see the System and Data Flashcards slotted into the Control System; each should be clearly labelled.

2. Remove the appropriate card and slide in your replacement.

3. Replace the Router Module and power on.

   The control system boots and reads the new data.

Updating Configuration and Software in a Redundant System

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) is 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.

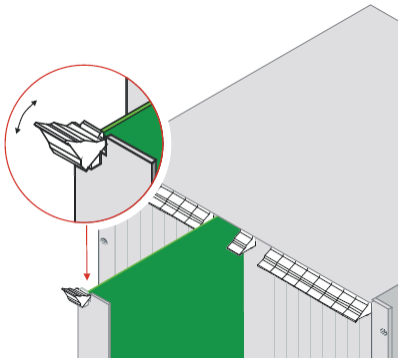
Let's take an example where your main control system is called A and the redundant control system is called B. If you upload your new configuration or software to control system A and then perform a cold start, the following will occur:

- The system responds to the cold start of the main control system (A) 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, fitted to the top and bottom of the redundant Router Module (in **STANDBY**):



This unlocks the module from the Nova73 and automatically disables it; the module's LEDs should be off. Note that it is not necessary to pull out or remove the module.

2. Now upload your new AdminHD configuration, or upload the new software, and cold start.

   The system restarts using the new configuration files or software.

3. Once the control system is running (**ACTIVE** LED flashing), 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 across.

4. Cold start the system once more to confirm that step 3 was successful.

I/O & DSP Modules: LEDs & Switches

The front of each I/O and DSP module provides some useful LEDs:

- **ACTIVE LED** – shows that the module's internal control system is booted and running.

The **ACTIVE** LED on each Nova73 module, or DALLIS card, should blink in time with all other **ACTIVE** LEDs (at approximately 100Hz). This shows that the card is synchronous to the rest of the system. If an LED is out of sync, then check that the card is fitted correctly, and if the symptom persists, replace the card.

- **Other LEDs & Switches** – some modules include additional status LEDs and switches. For details, please consult the relevant data sheet, available in the "mc2_Nova73_documentation" guide. See also RAVENNA Port Status LEDs.
- **Silk Screen** – shows the part number of the module.

Replacing an I/O or DSP Module

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

See Installation: Mounting the Nova73 Modules for instructions.

DALLIS Unit(s)

This section covers servicing the DALLIS hardware:

Replacing a Power Supply Unit

Each of the PSUs are individually hot pluggable.

To operate the DALLIS, one PSU is sufficient. Therefore, when two supplies are fitted, you can replace a PSU without affecting the operation.

Warning

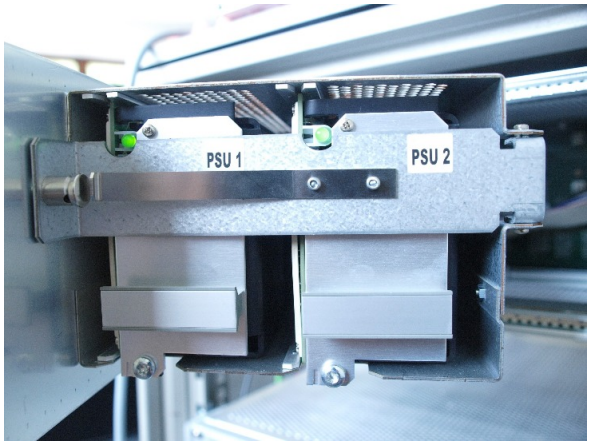
If only one PSU is fitted, then powering off will cause an interruption in audio from the DALLIS unit!

The replacement PSU must be of the same type; you cannot mix PSU types.

1. On the rear of the DALLIS frame, 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).
3. And pull the door open to access the PSU docking bays:

Unfasten these screws:

Pull door open to reveal PSUs:



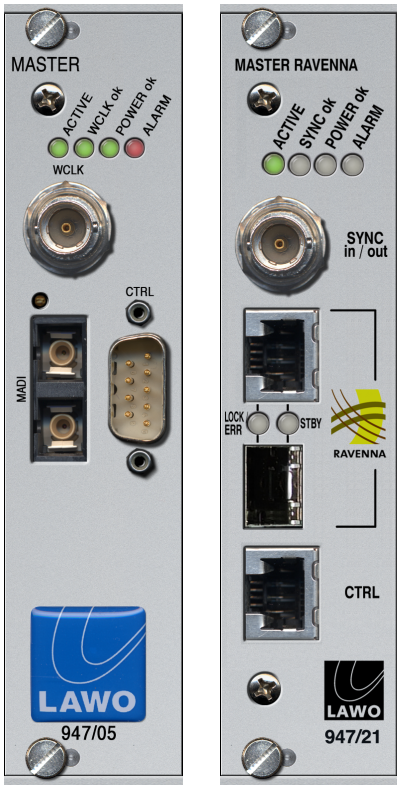
4. Unfasten the metal catch which holds the PSUs in place by pushing on the catch as shown:

5. Remove the relevant power supply unit and replace with the spare.
6. Fasten the catch back into place.
7. Replace the cage door and fasten the two screws.
8. Re-apply the mains to the PSU IEC mains connector and switch on!

Master Board: LEDs & Switches

A choice of DALLIS master boards support different connections to/from the Nova73. All versions provide similar front panel functions:

ACTIVE LED	Flashes green when the card's internal control system is booted and running. The **ACTIVE** LED on each Nova73 module, or DALLIS card, should blink in time with all other **ACTIVE** LEDs (at approximately 100Hz). This shows that the card is synchronous to the rest of the system. If an LED is out of sync, then check that the card is fitted correctly, and if the symptom persists, replace the card.
WCLK OK LED	Illuminates in green when the DALLIS is receiving a valid sync signal.
POWER OK LED	Illuminates in solid green when the DALLIS PSUs are running normally. If the LED flashes, then there is a PSU error.
ALARM LED	Illuminates in red when the local DALLIS alarm is active.
WCLK Port	The DALLIS may be synchronised to an external sync reference connected to this BNC.
I/O Ports	See DALLIS master boards for details on the different I/O connections. On some boards, LEDs show the status of the signals arriving at the connection.
CTRL Port	This port may be used to connect a local computer to update firmware or provide diagnostics.
Silk Screen	Shows the part number of the master board.



Further information can be found in the data sheet, available in the "mc2_Nova73_documentation" guide.

Replacing a Master Board

Master boards are individually hot-pluggable.

If main and redundant master boards are fitted to the DALLIS, then you may replace the redundant board without affecting the operation.

Warning

If only one master board is fitted, then its replacement will cause an interruption in audio from the DALLIS unit!

See Installation: Mounting the DALLIS Cards for instructions.

Replacing the Lithium Battery

The DALLIS master board is fitted with a lithium battery. This battery guarantees that user data remains saved when the system is powered 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 Lawo service representative to perform this procedure.

Only Lawo service staff may replace batteries.

I/O Cards: LEDs & Switches

The front of each I/O card provides some useful LEDs:

- **ACTIVE LED** – shows that the module's internal control system is booted and running.

The **ACTIVE** LED on each Nova73 module, or DALLIS card, should blink in time with all other **ACTIVE** LEDs (at approximately 100Hz). This shows that the card is synchronous to the rest of the system. If an LED is out of sync, then check that the card is fitted correctly, and if the symptom persists, replace the card.

- **Other LEDs & Switches** – some cards include additional status LEDs and switches. For details, please consult the relevant data sheet, available in the "mc2_Nova73_documentation" guide. See also RAVENNA Port Status LEDs.
- **Silk Screen** – shows the part number of the card.

Replacing an I/O Card

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

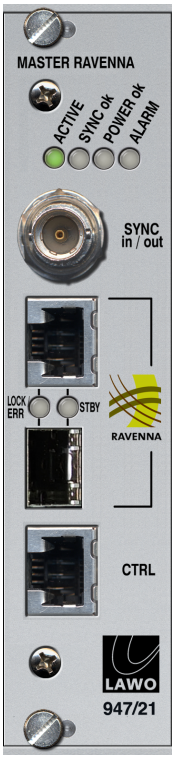
See Installation: Mounting the DALLIS Cards for instructions.

RAVENNA Interfaces

This section covers information relevant to RAVENNA interfaces: the 981/61 Nova73 module and 947/21 DALLIS master board:

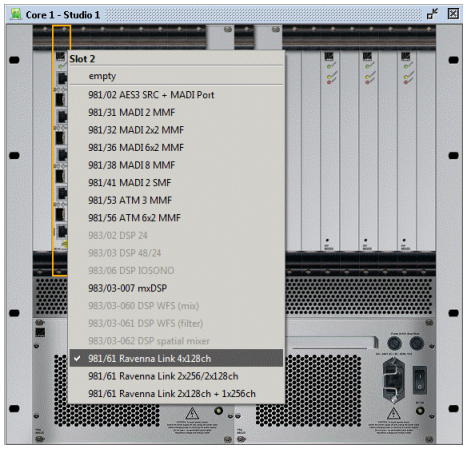
- AdminHD: Configuration Options
- RAVENNA Port Connections
- Optical Fibre SFP Modules
- RAVENNA Port Status LEDs
- The Control Port
- Control Port IP Addresses
- Updating and Servicing RAVENNA Interfaces

For more details, please refer to the relevant data sheet, available in the "mc2_Nova73_documentation" guide.



AdminHD: Configuration Options

The 981/61 Nova73 module provides 4 RAVENNA ports which are defined by the AdminHD configuration. The channel count per port is defined by the module type, see Fitting Modules to the Core.



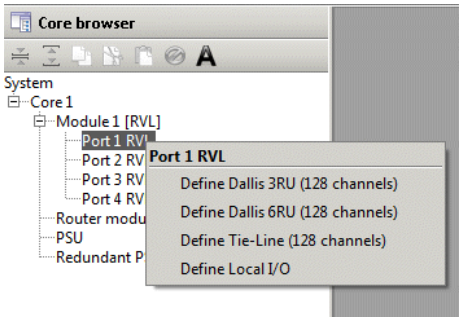
Three different options are available:

- 981/61 Ravenna Link 4 x 128 channel
- 981/61 Ravenna Link 2 x 256 channel/2 x 128 channel
- 981/61 Ravenna Link 2 x 128 channel; 1 x 256 channel

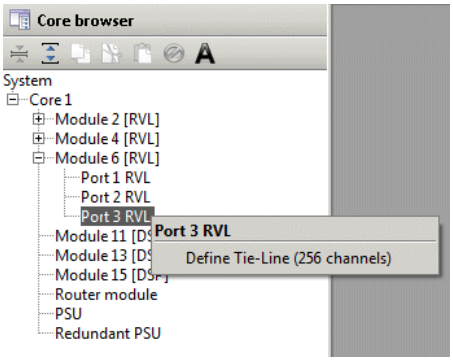
Each RAVENNA port is then configured for its application. See Defining the I/O Ports.

- 128 channel ports - can connect to a **DALLIS**, the mc²56 MKII **Local I/O** board or be configured as **Tie-Line**s.
- 256 channel ports - must be configured as **Tie-Line**s.

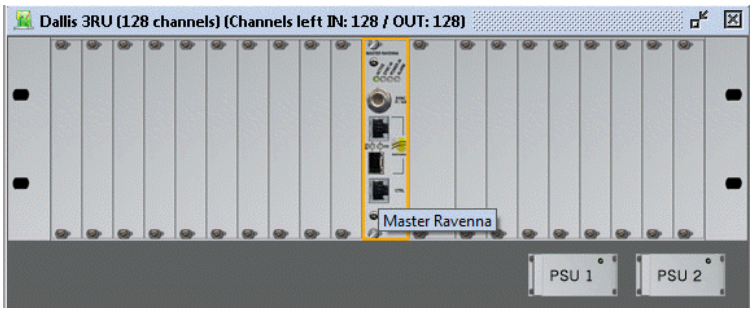
RAVENNA 128 channel Port Options



RAVENNA 256 channel Port Options



If you select a DALLIS, then the DALLIS frame is automatically fitted with the 947/21 RAVENNA master board:



You may configure a redundant 947/21 master board in the usual manner, see Port Redundancy.

RAVENNA can provide link redundancy, without a second master board, by installing both the copper and fibre optic connections between the Nova73 module and DALLIS master board.

RAVENNA Port Connections

Each RAVENNA port provides:

- Ravenna Link 1.0, multi-channel digital audio over IP interface.
- Two physical connections, per port, for standard CAT 5 Ethernet *and* optical fibre:
  - o CAT 5/6/7 Gigabit Ethernet, RJ45 connectors, crossed or straight (1:1) cable, up to 100m.
  - o Optical transceivers (SFPs) can be installed for multi-mode or single-mode fibre. These *must* be Lawo-certified, see SFP Modules.
- Up to 128-channels at 48kHz, *and* 96kHz*, per port, for DALLIS interconnects. (RAVENNA supports 128/256-channels per port for non-DALLIS applications.)

* 96kHz RAVENNA is a future option.

RAVENNA links should be *directly* wired to the corresponding RAVENNA port. The interface is completely self-configuring. Thus, once you have connected the ports (from your Nova73 to DALLIS), no further network configuration is necessary.

Warning

To guarantee low latency, reliability and easy setup, do *NOT* connect any network equipment between the two RAVENNA ports.

When both copper and fibre are installed at start-up, fibre is the preferred medium. In either case, the second medium can be hot-plugged without disturbing the current operating link. If a link breaks, then the card automatically switches to the second medium (if installed) - note that there will be an audible audio interruption until the automatic link/stream setup re-establishes the connection.

Close any unused optical connectors, with a protection plug, to avoid performance degradation by dust or dirt.

Optical Fibre SFP Modules

Each RAVENNA port provides an optical fibre connection which can be used by installing a Lawo-certified SFP module:

SFP Module Description	Part Number
1000 BASE SX: 850nm, -7dBm, multi-mode fibre, 550m	981/60-10
1000 BASE LX: 1310nm, -3dBm, single-mode fibre, 10km	981/60-20
1000 BASE ZX: 1550nm, 0dBm, single-mode fibre, 80km	981/60-30
CWDM: 1270-1610nm, single-mode fibre; up to 40km	981/60-40 to 981/60-57

Warning

The SFP modules *must* be Lawo certified (from the table above).

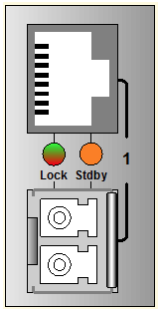
The SFP transceivers are hot-pluggable. To install:

1. Push the SFP module into the rectangular slot:

2. Press gently and firmly until the module locks into position.

RAVENNA Port Status LEDs

Each RAVENNA port provides the following status LEDs:



Lock LED	**Off** = no signal. **Green, steady state** = the link is active, and the signal and streaming are ok. **Red, steady state or flashing** = the link is active but has one of the following errors: • Streaming format error • Streaming lock error • Stream is asynchronous
Stdby LED (Standby)	**Off** = port is active. **Yellow** = port is configured as a redundant port and is in standby (inactive).

The Control Port

All RAVENNA interfaces include an Ethernet control port (labelled **SERVICE** on the 981/61 and **CTRL** on the 947/21).

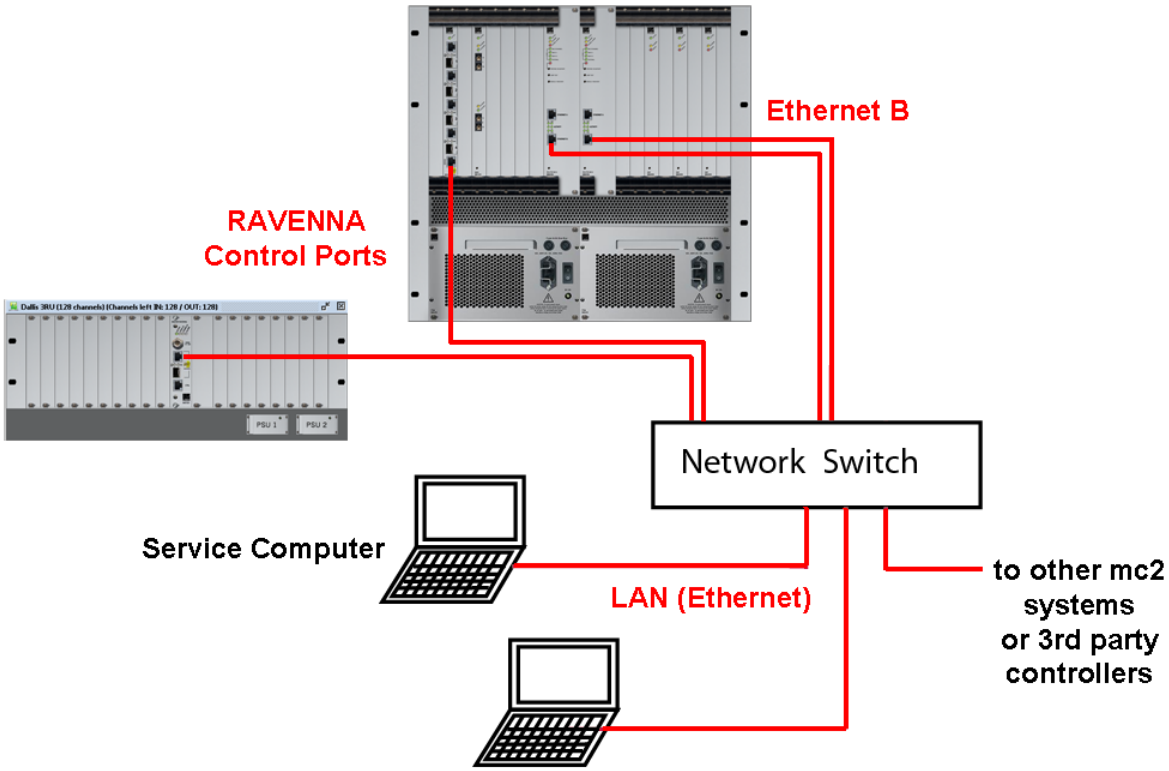
You should connect the RAVENNA control ports to the Lawo system network, so that you may access each interface from a service computer (via FTP or Telnet).

You will need this connection in order to update or service the interface.

Network Connection

Using either a crossed or straight (1:1) network cable (STP-CAT 5 with RJ45 connectors):

1. Connect each RAVENNA control port, and your service computer, to the Lawo System Network. For example:



Control Port IP Addresses

To establish communication, you will need to know the IP address of the RAVENNA control port.

The IP addresses are pre-configured, as shown in the table below, and are dependent on the Nova73 slot position.

Note that the Network segment and Gateway can be configured from a file called the "pre_config.tcl", and so may vary from those shown below.

Note also that the 947/21 DALLIS master board has a standard IP address if it is *NOT* connected to the Lawo control system = **192.168.110.253**.

The table lists all the pre-configured RAVENNA control port IP addresses:

- Orange = 981/61 Nova73 modules, according to slot position.
- Yellow = 947/21 DALLIS master boards, according to their Nova73 connection (via the RAVENNA link port).
- Grey = reserved for future implementation.

Nova73 Slot	1	2	3	4	5	6	7	8
	192,168,110,201	192,168,110,202	192,168,110,203	192,168,110,204	192,168,110,205	192,168,110,206	192,168,110,207	192,168,110,208
RA LINK Ports	110.1	110.9	110.17	110.25	110.33	110.41	110.49	110.57
active	110.2	110.10	110.18	110.26	110.34	110.42	110.50	110.58
	110.3	110.11	110.19	110.27	110.35	110.43	110.51	110.59
	110.4	110.12	110.20	110.28	110.36	110.44	110.52	110.60
RA LINK Ports	110.5	110.13	110.21	110.29	110.37	110.45	110.53	110.61
future option	110.6	110.14	110.22	110.30	110.38	110.46	110.54	110.62
	110.7	110.15	110.23	110.31	110.39	110.47	110.55	110.63
	110.8	110.16	110.24	110.32	110.40	110.48	110.56	110.64

Nova73 Slot	9	10	11	12	13	14	15	16
	192,168,110,209	192,168,110,210	192,168,110,211	192,168,110,212	192,168,110,213	192,168,110,214	192,168,110,215	192,168,110,216
RA LINK Ports	110.65	110.73	110.81	110.89	110.97	110,105	110,113	110,121
active	110.66	110.74	110.82	110.90	110.98	110,106	110,114	110,122
	110.67	110.75	110.83	110.91	110.99	110,107	110,115	110,123
	110.68	110.76	110.84	110.92	110.100	110,108	110,116	110,124
RA LINK Ports	110.69	110.77	110.85	110.93	110.101	110,109	110,117	110,125
future option	110.70	110.78	110.86	110.94	110.102	110,110	110,118	110,126
	110.71	110.79	110.87	110.95	110.103	110,111	110,119	110,127
	110.72	110.80	110.88	110.96	110.104	110,112	110,120	110,128

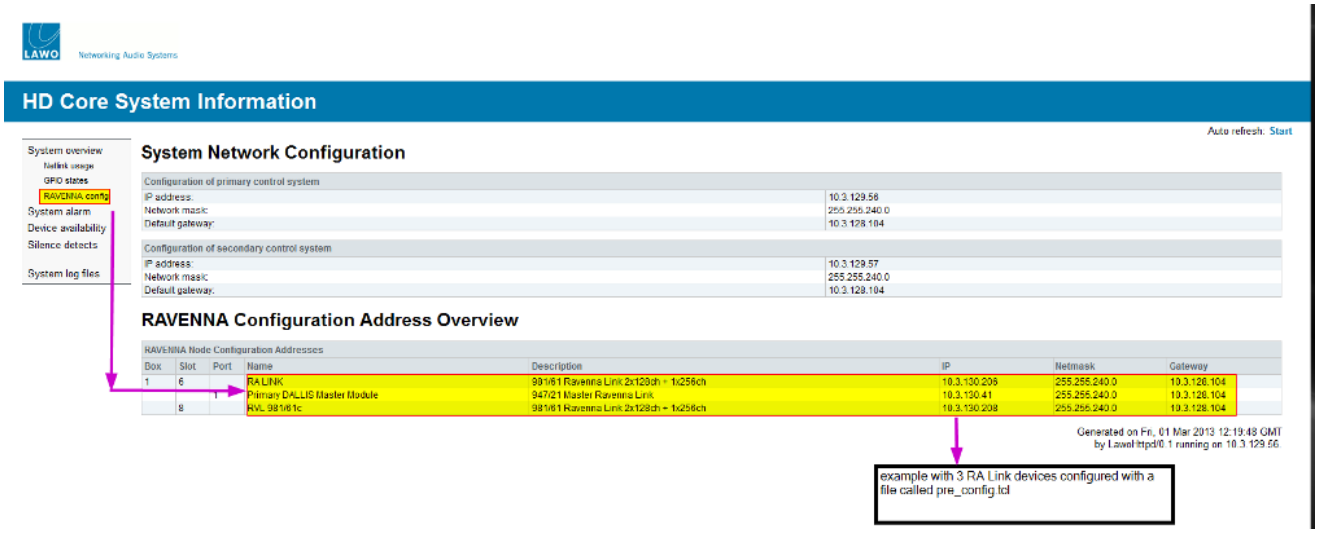
For example:

- The IP address of a 981/61 module fitted to Nova73 slot 5 is **192.168.110.205**.
- The IP address of a 947/21 master board connected to this module's first RAVENNA port is **192.168.110.33**.

Interrogating RAVENNA devices via the Web Browser Interface

You can open the Web Browser Interface (from a service computer connected to the mc²56 MKII control system), to view all configured RAVENNA devices on the network.

This is especially useful if the IP address Network segment or Gateway have been modified. Our example shows three RAVENNA link devices, with IP addresses configured using the "pre_config.tcl" file:



Updating and Servicing RAVENNA Interfaces

To update or service a RAVENNA interface, you will need to open a FTP and Telnet session from your service computer to the device.

To achieve this, the RAVENNA interface must be connected to the Lawo system network via its control port.

➢ **To update the software on a RAVENNA interface:**

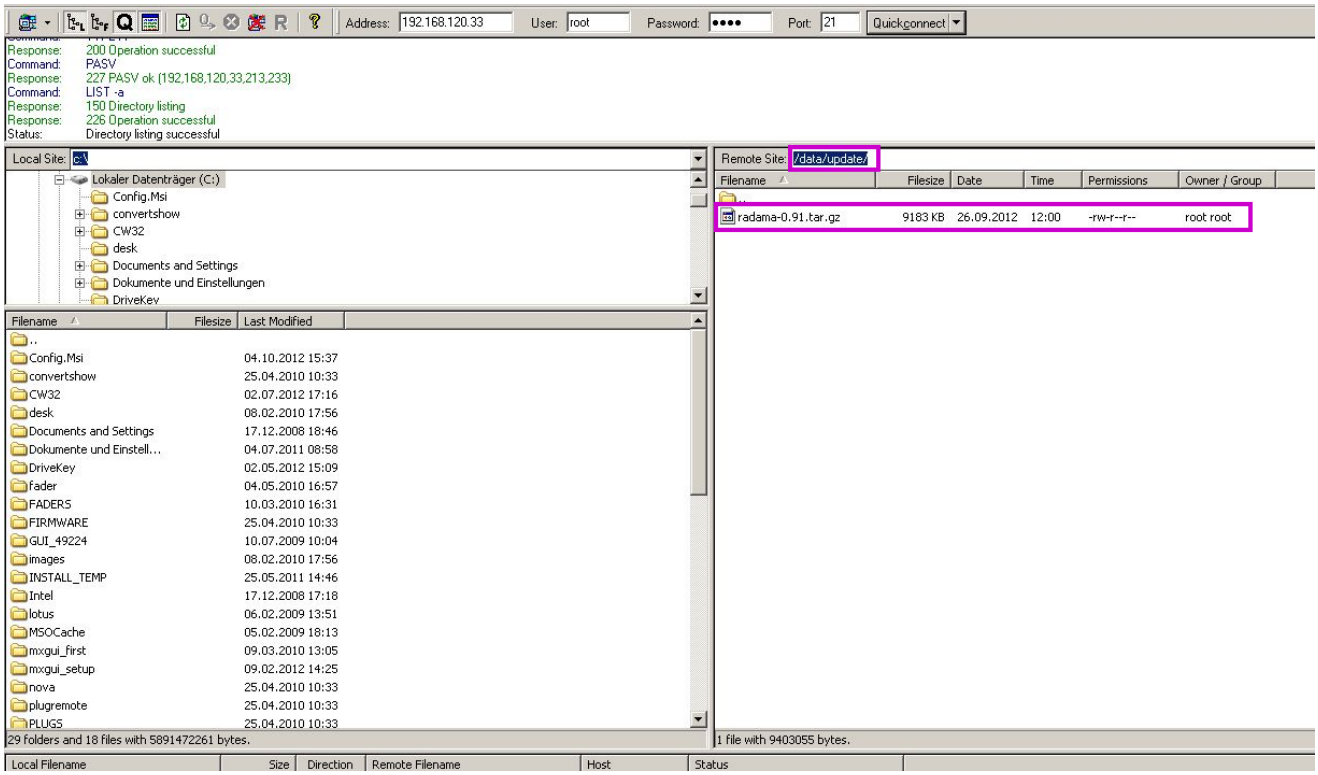
1. Using a computer connected to the Lawo system network, open a FTP connection to the RAVENNA interface.

You will need to know the IP address of the interface you wish to update, see Control Port IP Addresses.

In our example, we are connected to a 947/21 master board with an IP address = **192.168.120.33**

The username (**root**) and password (**hong**) are the same as for the main mc²56 MKII control system. See File Transfer via FTP for more details.

2. Upload the software update file from your computer to the **/data/update** folder on the remote device:

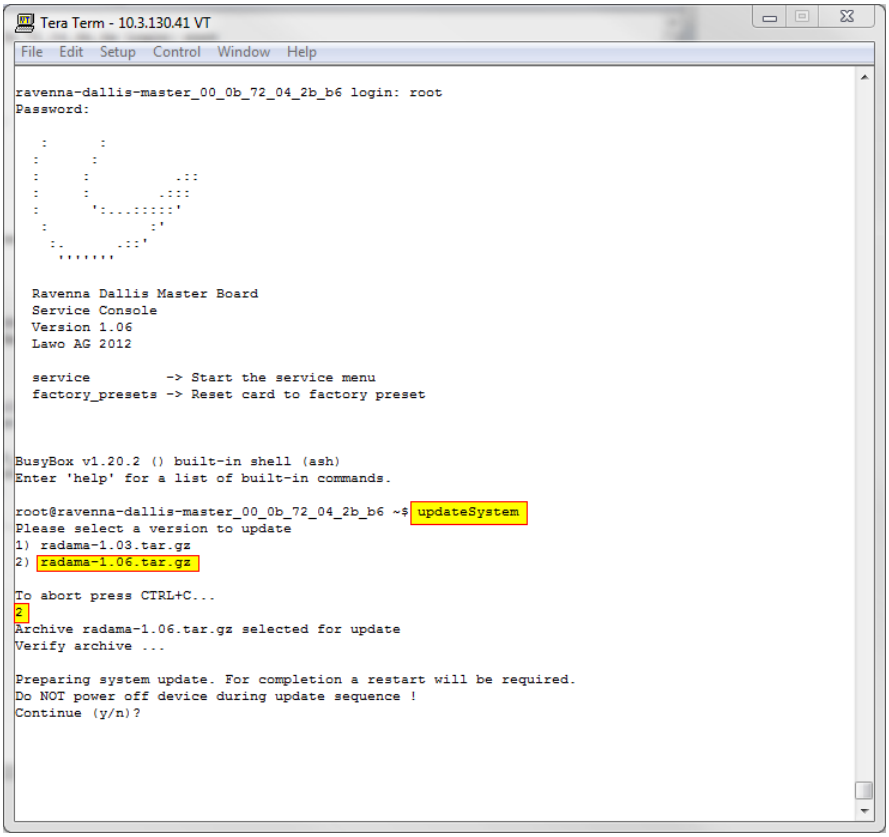


3. Then open a telnet session to the RAVENNA interface - use the same IP address as before (e.g. = **192.168.120.33**) and username (**root**) and password (**hong**).

4. At the RAVENNA control system prompt, type **updateSystem** and press Enter.

A list of software update files appear - this should include the file you uploaded earlier.

5. Select the correct file number, press Enter and follow the instructions to perform the update:



➢ **To download the Log file from a RAVENNA interface:**

1. Using a computer connected to the Lawo system network, open a FTP connection to the RAVENNA interface.

You will need to know the IP address of the interface you wish to update, see Control Port IP Addresses.

In our example, we are connected to a 981/61 Nova73 module with an IP address = **192.168.120.205**

The username (**root**) and password (**hong**) are the same as for the main mc²56 MKII control system. See File Transfer via FTP for more details.

2. Download the **messages** file, from the **/var/log** folder, to copy the log file to your computer.

Control Surface

This section covers servicing the control surface hardware:

- Replacing a Panel
- Using the Hood Fastener
- Calibrating a Touch-screen
- Replacing a TFT Display
- Bay Server Rotary Switch Settings
- Replacing a Power Supply Unit
- Replacing the Local I/O Board
- Adjusting the Local I/O Jumper Switch Positions

If the graphics on an individual display freeze, or the controls on a panel are not responding, then try restarting the Bay Server.

Replacing a Panel

Each control surface panel is individually hot-pluggable enabling panels to be replaced without affecting the rest of the system.

Channel bays are fitted with one 16-fader panel per bay. The centre section is fitted with one central panel connecting to two circuit boards.

➢ **To replace a panel:**

1. Remove the panel screws (along the front buffer) using a T20 Torx driver:

You should remove the screws completely and place them carefully to one side, so that they do not fall into the frame when the panel is lifted. The springs beneath the panel will raise it slightly from the frame.

2. Gently lift the panel using your fingers:

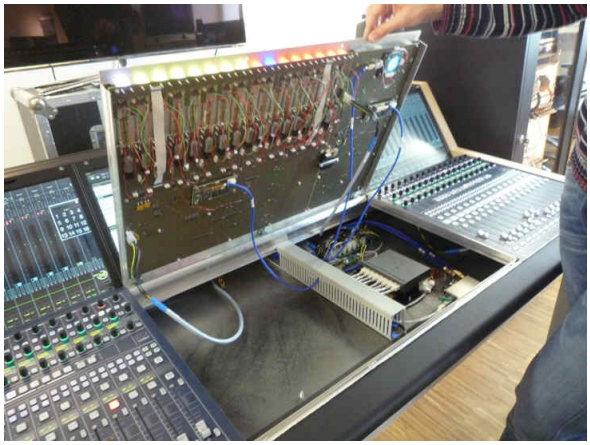
If you are lifting the central panel to gain access to the components beneath, then use the Hood Fastener to keep the panel in place while you work.

3. Remove the USB and power connectors taking notes on where each one should be fitted:

Fader panels have one USB and one power connector. From the central panel, there are two USB and two power connectors.

Channel Bay:

Centre Section:



4. Carefully remove the panel by lifting it out of the frame.

5. Check that the rotary switch settings on your replacement panel are correct - they should both be set to 0, irrespective of the frame position. For details, please check the panel's data sheet, available in the "mc2_Nova73_documentation" guide.

6. Insert and reconnect the replacement panel, and fasten the screws back into place.

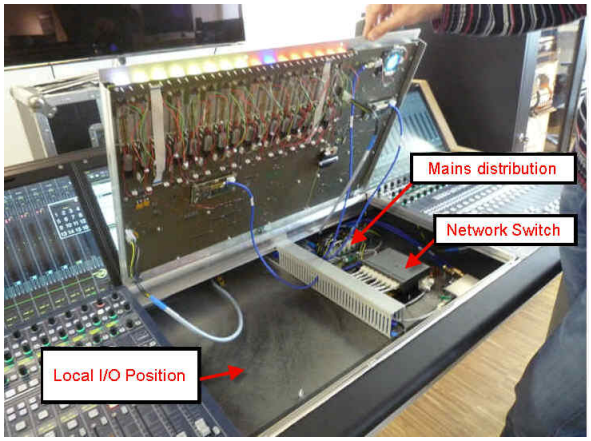
If the control surface is powered, the panel will boot within a couple of seconds.

Hood Fastener

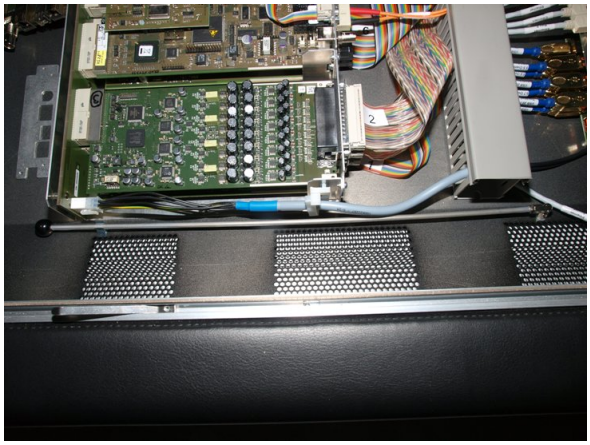
The Hood Fastener can be used to keep the central panel in place while you work inside the console. This avoids having to disconnect cables, and remove the panel, when you need access to other components.

1. Follow the previous section's steps to lift the panel - you will see the Hood Fastener, stowed safely along the front buffer:

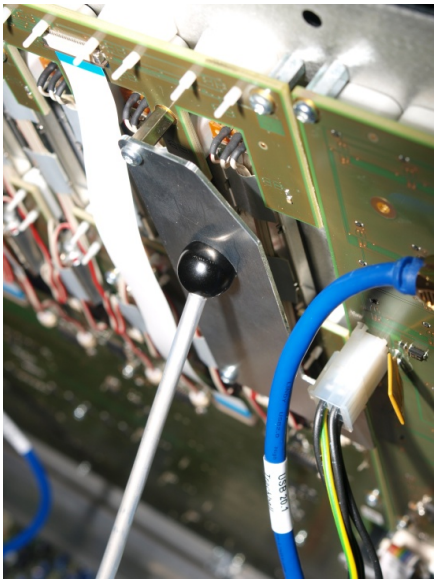
Central Panel lifted:

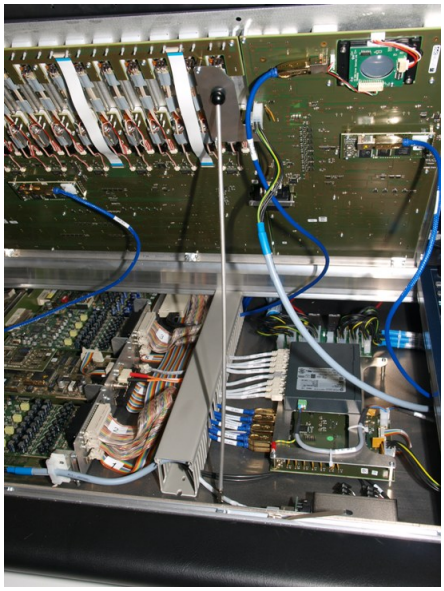


Hood Fastener Stowed:



2. Release the fastener from its catch, and position it against the metal plate (to the left of the trackball) as shown:



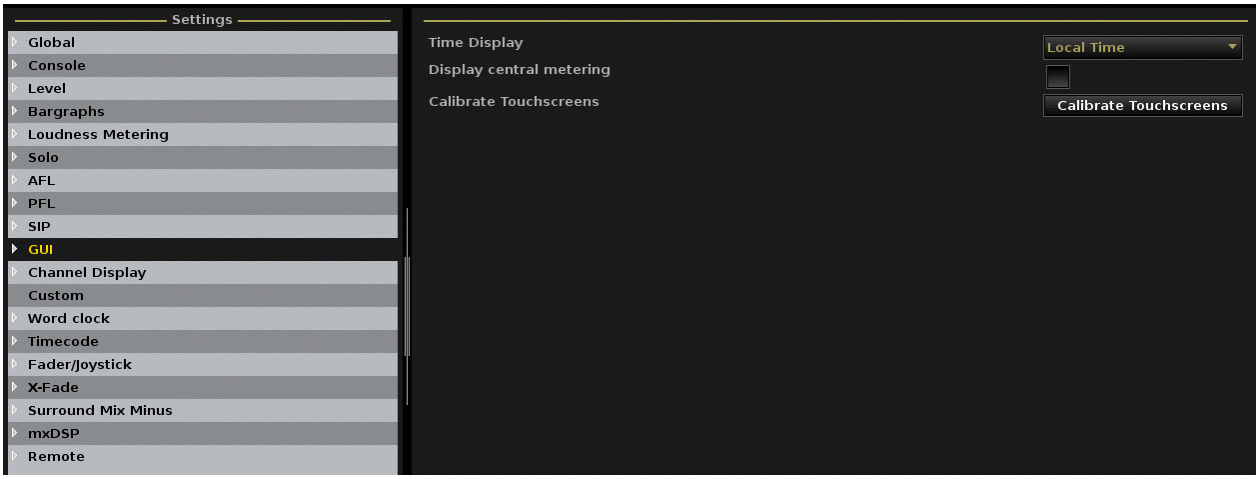


3. When you have completed your service procedure, replace the fastener safely back into its catch, before lowering the central panel.

Calibrating a Touch-screen

The Channel and Central touch-screen displays can be calibrated as follows:

1. Select the GUI's **System Settings** menu, **GUI** topic and **Calibrate Touchscreens**:



Touch-screen calibration is activated across all displays.

2. Follow the on-screen instructions to calibrate the first display. You will be prompted to touch various points on the screen.

When the last point is touched, calibration is complete, and all displays revert to their normal operation.

3. Repeat steps 1 and 2 to calibrate a different touch-screen.

Replacing a TFT Display

Each of the touch-screen displays is individually hot-pluggable, enabling you to replace a display without affecting any other bay within the console. (Note that you will lose control from panels within the bay, as the Ethernet Bay Server is mounted behind the TFT display.)

If you need to replace the centre section display, then connect an mxGUI computer so that it may run online and provide continued access to central GUI operations.

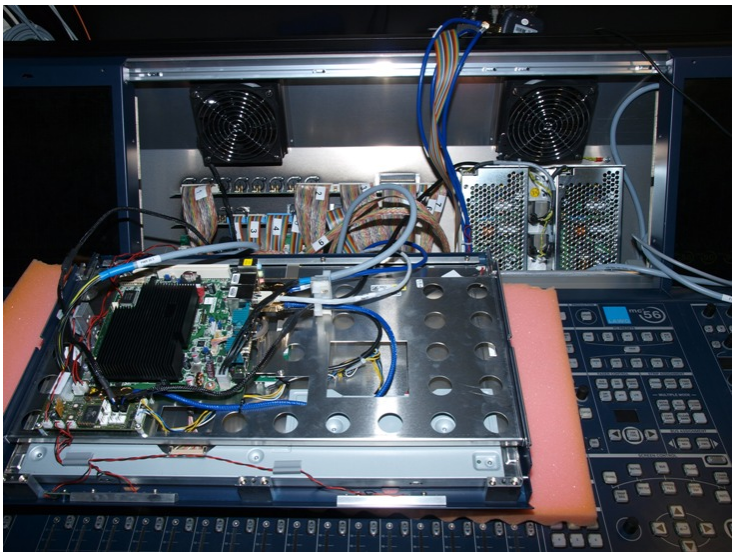
➢ **To replace a display:**

1. Unfasten the three screws at the top of the display using a long T20 Torx driver, and gently tilt the unit forwards:

Warning

The Torx driver shaft *MUST* be long enough to turn the countersunk screws without scratching the front panel. If you attempt to use a short driver, or driver attachment, damage may occur.

2. Lift the display unit out of the frame and lay it carefully face-down on a piece of foam, or similar protective material, on top of the control surface:



3. Remove the LVDS, USB and power connectors taking notes on where each one should be fitted.

4. Check that the Bay Server's rotary switch settings on your replacement panel are correct.

5. Fit the replacement in the reverse manner.

If the control surface is powered, the display will refresh within a couple of seconds.

Bay Server Rotary Switch Settings

Each channel and central bay is supported by an Ethernet Bay Server, mounted behind its TFT display. The Bay Server has a rotary switch with two settings:

- **Function** - determines whether the Bay Server supports a channel or centre section bay.
- **Address** – determines the Bay Server index, counted from left to right across the frame starting at 0.

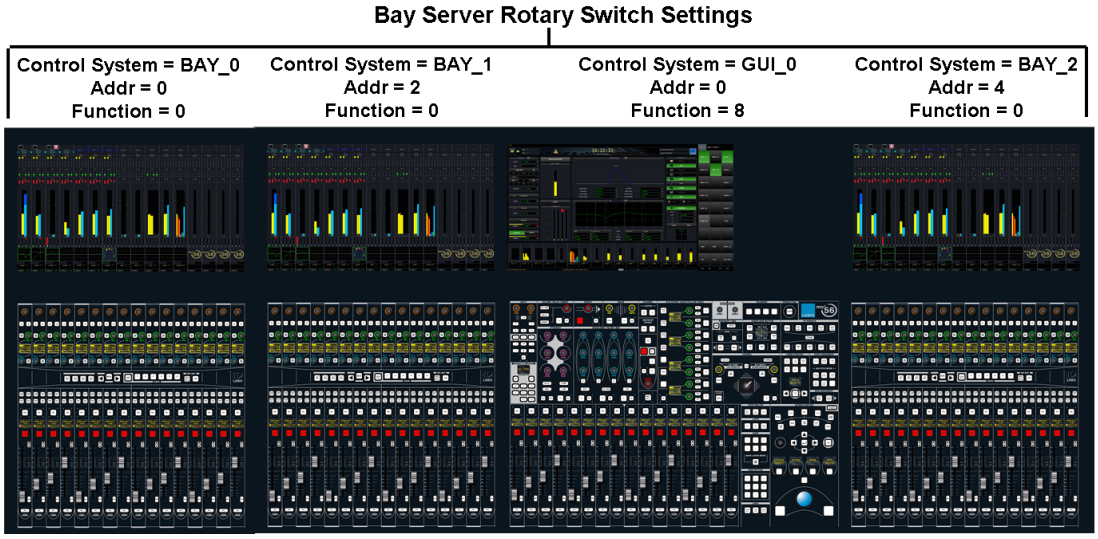
You may need to adjust these settings if you are replacing a TFT display or adding an extender.

The settings also determine how the Bay Server control system is named; this will help locate its IP address should you need to perform a remote login.

Bay Server Location	Function	Address	Control System Naming
Centre Section	8	0	"nickname"_GUI_0
Channel Bay	0	0, 2, 4, etc.	"nickname"_BAY_0, BAY_1, etc.

Note that for channel bays, address 0 is the left-most bay.

The example below shows the settings for a 32+16C+16 frame:



Adding an Extender Bay

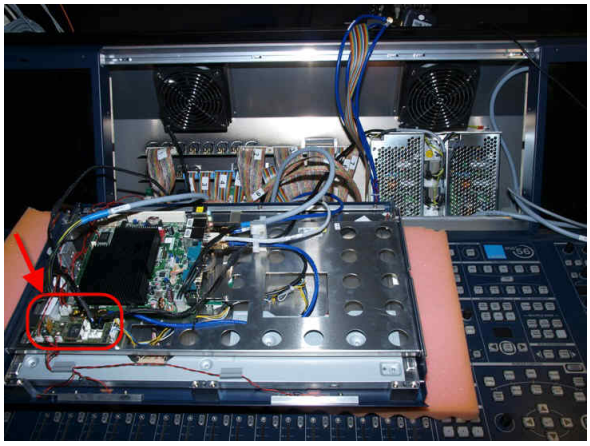
If an extender is added to the left of the main frame, then the addresses of each main frame bay must be shifted upwards.

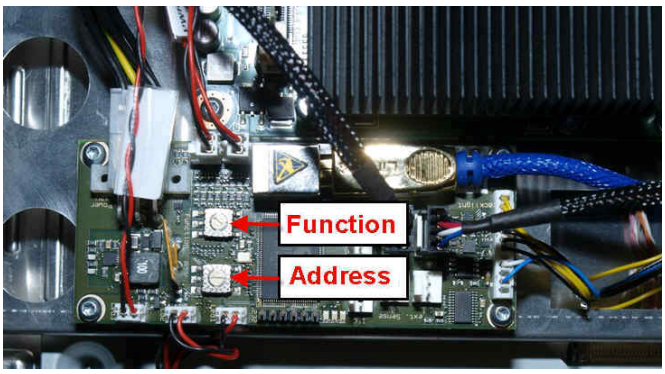
If the extender is added to the right, then its address can be counted upwards from the main frame.

To Adjust a Bay Server's Rotary Switch Settings

1. Remove the TFT display from the bay you wish to adjust. If you lay the display on top of the control surface panel, you do not need to disconnect any cables.

2. Locate the two rotary switches on the Bay Server control board. This is the board mounted at the top of the display unit (closest to you in the pictures below):





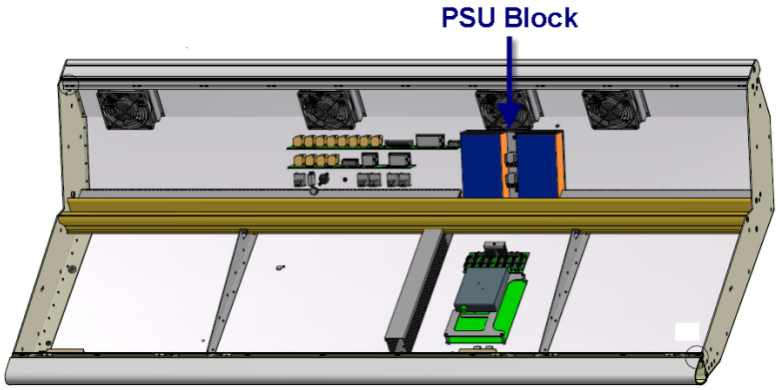
3. Adjust the **Function** and/or **Address** settings.

4. Replace the TFT display.

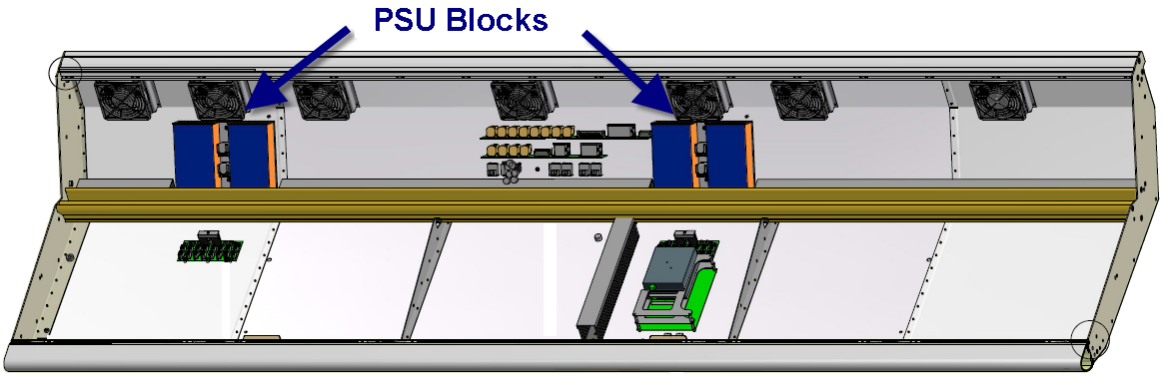
Replacing a Power Supply Unit

Depending on the frame size, either one or two PSU blocks are fitted to each control surface frame. To replace one you will need to disconnect the PSU block from its distribution board (located beneath the control surface panel), and remove the TFT display (to access the PSU block).

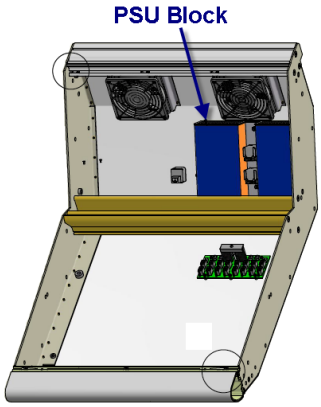
There is always one PSU block fitted to the central bay:



For larger frames, the second PSU block is fitted to the left-most channel bay:



Extenders are also fitted with their own PSU block:



➢ **To replace a PSU block:**

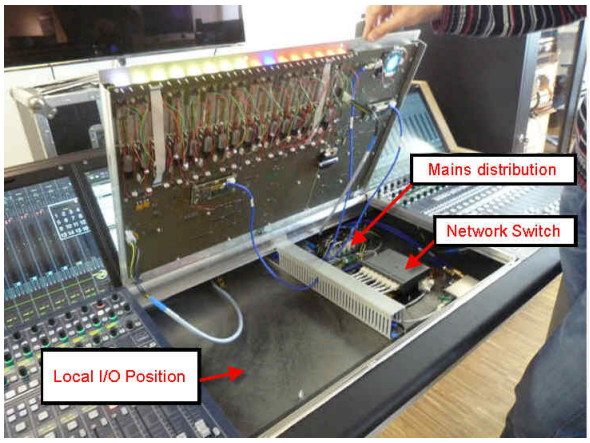
1. Turn off the power to the control surface by disconnecting *ALL* **MAINS** connectors - press the red button on the IEC connector to release the plug.

Warning

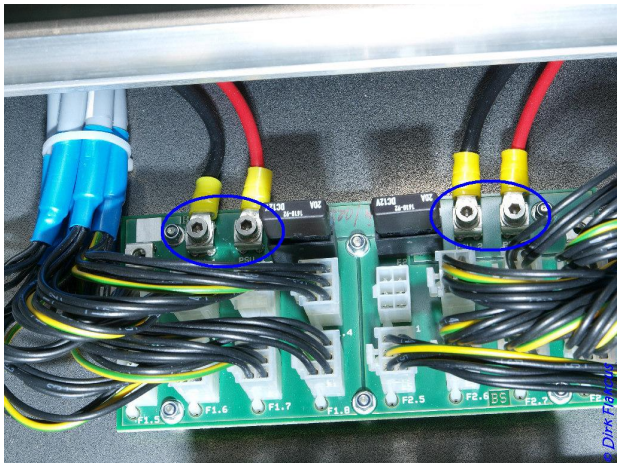
DO NOT attempt to access the power supply unit without disconnecting the mains.

You must remove the **MAINS** connectors from the frame, rather than from the wall, as the IEC sockets form part of the PSU module. If you do not, then the PSU module will get stuck during step 7.

2. Lift the control surface panel in the PSU bay, to gain access to the distribution board. In the central bay, the distribution board is located on the right below the Overbridge:



3. Using a T20 Torx driver, disconnect the PSU block from the distribution board by removing the 4 wires shown below:



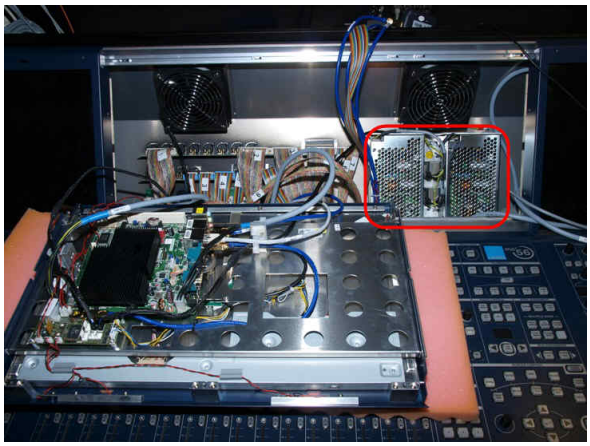
Warning

Do *NOT* disconnect any wires other than those shown.

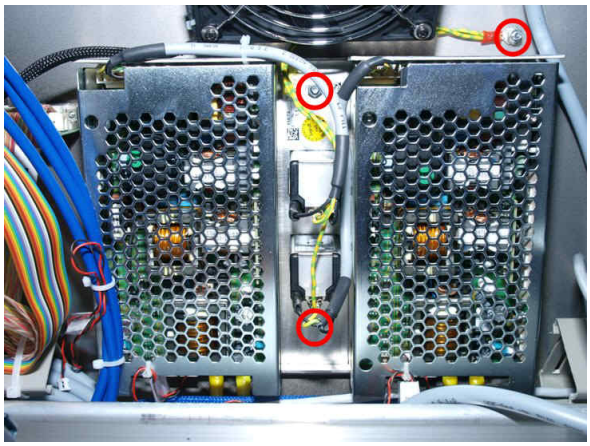
4. Lower the control surface panel back into place, but do not fasten the panel screws as access will be required again in step 11.

5. Now remove the TFT display within the PSU bay. If you lay the display on top of the control surface panel, you will not need to disconnect any cables.

You will see the power supply block mounted at the rear of the frame:



6. Using a 7mm hex socket, remove the two screws holding the power supply block in place, followed by the single screw attaching the protective earth:



Warning

Take care *NOT* to drop any nuts or washers into the desk.

7. Remove the PSU block from the frame, taking care to extract the distribution and protective earth cables along with the unit.

8. Now fit the replacement block (which comes with its own 4-wire distribution and protective earth cabling). The 4-wire distribution cables should be fed down the distribution board area.

9. Screw the protective earth to the frame, and replace the two securing screws (see step 6).

10. Then replace the TFT display (see step 5).

11. Lift the control surface panel once more, and connect the PSU block to the distribution board (see step 3).

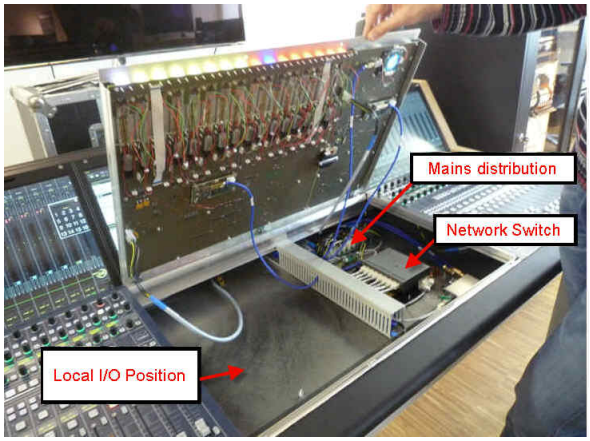
12. Replace the control surface panel, and fasten into place.

13. When everything is back in place, re-connect the rear mains IEC power connectors, and power on.

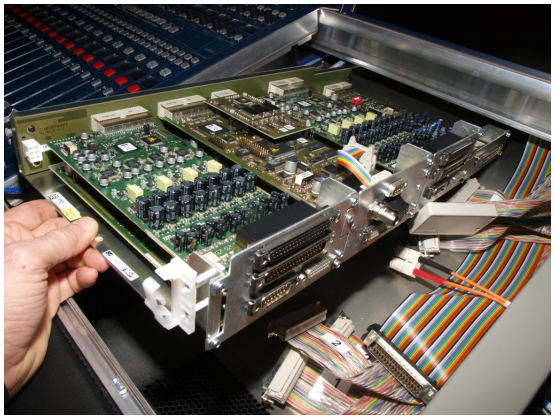
Replacing the Local I/O Board

The local I/O board is mounted inside the control surface beneath the central panel. It may be replaced as follows. The instructions apply to both local I/O board types - 958/55 (MADI) and 958/50 (RAVENNA).

Central Panel Lifted (no local I/O fitted)



Local I/O Carrier Unit (disconnected)



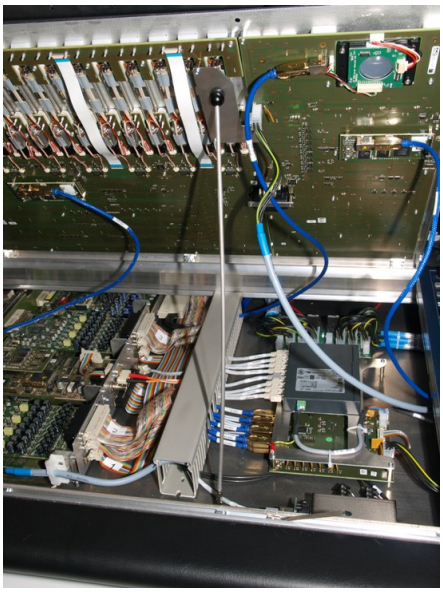
➢ **To replace the Local I/O:**

1. Turn off the power to the control surface by disconnecting *ALL* **MAINS** connectors - press the red button on the IEC connector to release the plug.

Warning

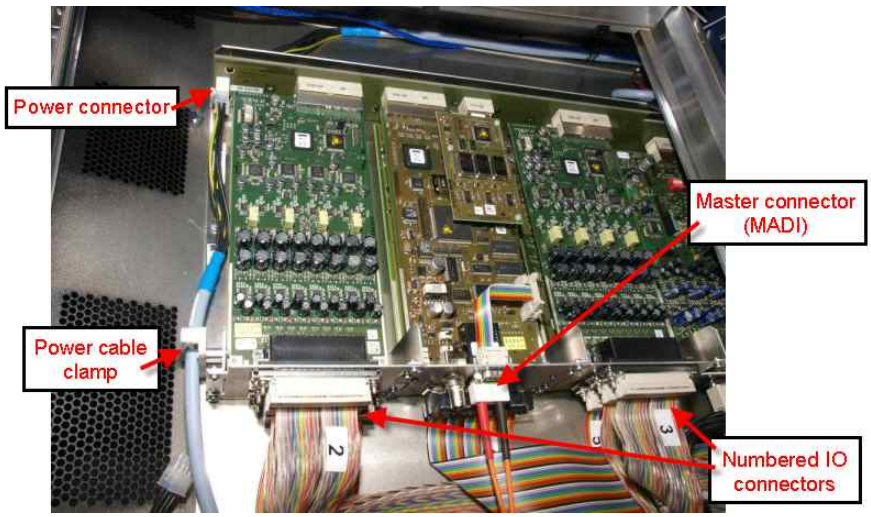
DO NOT attempt to access the local I/O board without disconnecting the mains.

2. Lift the central panel to gain access to the local I/O (on the left hand side), and use the Hood Fastener to keep the panel in place while you work:



3. Remove all of the connectors from the local I/O carrier, in the order described below, taking notes on where each one should be fitted:

Local I/O (side view)



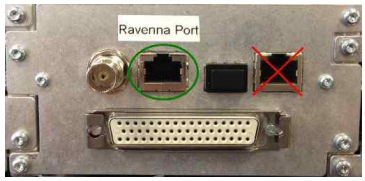
a. Disconnect the power connector from the backplane, and open the clamp to release the cable.

b. Disconnect the master connector - either MADI (optical SC) or RAVENNA (CAT5 RJ45). The connector type depends on the version of your local I/O board.

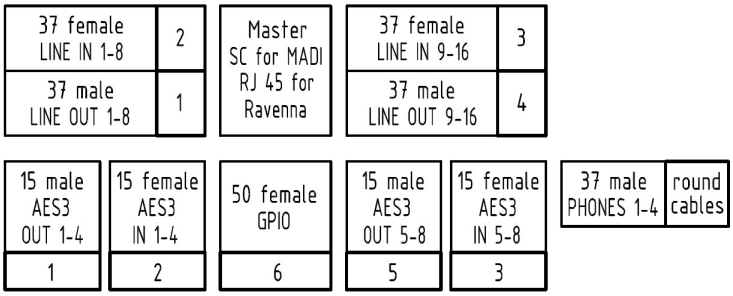
Note that on the 958/55 MADI board, the 9-pin D-Sub and BNC are unused. On the 958/50 RAVENNA board, the master cable connects to the left-hand RJ45 socket, while the right hand RJ45, BNC and SFP cage are unused.

958/55 MADI

958/50 RAVENNA



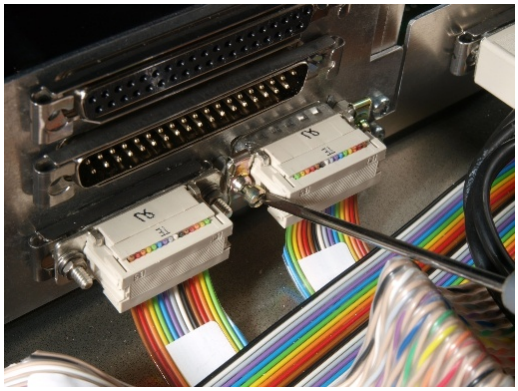
c. Disconnect all of the I/O cables by unlocking and removing each D-Sub connector. The numbers beside the connectors correspond to the ribbon cable labelling. The following reference diagram can be found on the cable duct to the right of the local I/O:



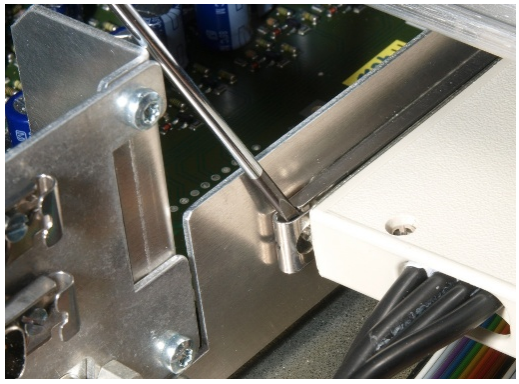
Start with the two upper 37-pin D-Subs (2 & 3); then the two lower 37-pin D-Subs (1 & 4); then the 50-pin GPIO D-Sub (6); the four 15-pin D-Subs (1, 2, 5 & 3); and finally the 37-pin PHONES D-Sub (no number, it is the only rounded connector).

Some D-Subs are unlocked by loosening the two connector screws. Others unlock by moving the sliding lock mechanism (use a small flat-bladed screwdriver to slide the mechanism carefully to the left or right).

D-Sub Unlocked/Locked by Screws

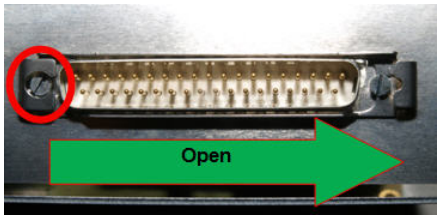


D-Sub Sliding Lock Mechanism

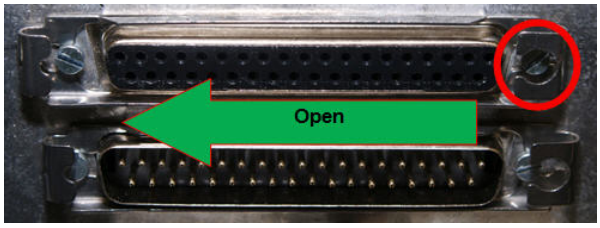


There are two versions of the I/O carrier in the field, using different directions for the sliding lock mechanism. You can verify the direction by looking at the position of the screws; when open, the screws are not covered by the sliding part:

Version 1: To open, slide to the right



Version 2: To open, slide to the left

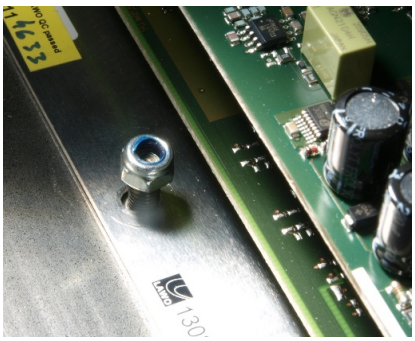


4. Once all the cables have been disconnected and carefully stowed, loosen the local I/O carrier from the console frame. There are two nuts, one at the front (near the console arm rest), and one at the rear (below the Overbridge).

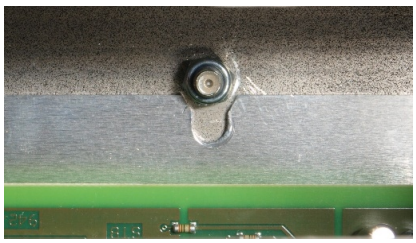
The front nut should be removed completely and placed to one side. The front of the carrier unit may now be lifted over the bolt, and if the rear nut is loose, the unit will slide forwards.

If the rear nut has been tightened, then you may need to loosen it by opening the Overbridge (see Replacing a TFT display for how to gain access).

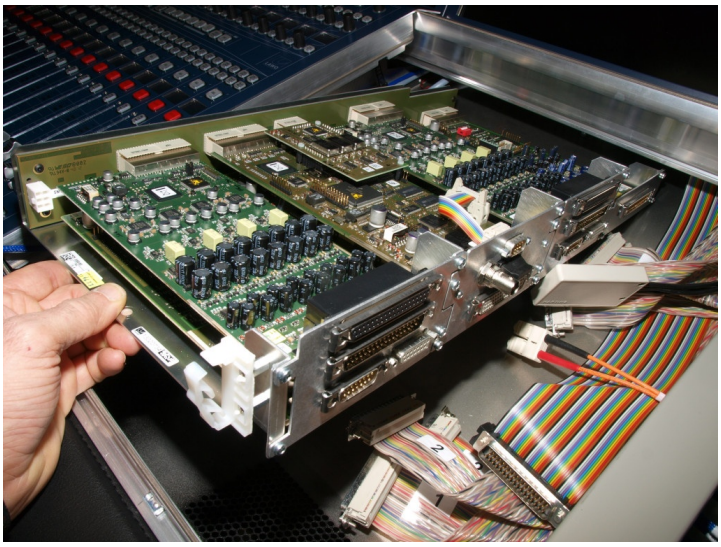
Front Nut



Rear Nut

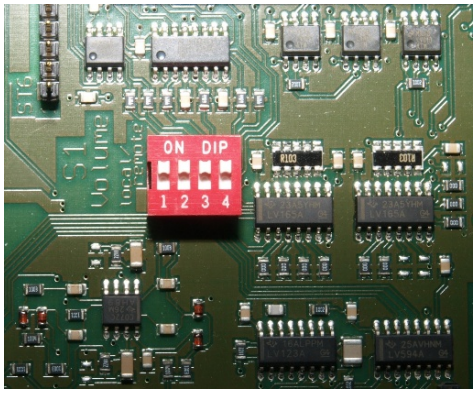


5. Carefully remove the carrier by sliding it forwards and out of the console frame. Take care that the frame does not scrape the unit, and that the cables do not get caught:



You are now ready to fit the replacement.

6. Check the replacement unit - all D-Sub connectors should be in their open position, and the DIP switches set to ON (to enable remote control of headphone volume):



7. Slide the unit into the console frame (see step 5), taking care not to scratch the unit or get any cables caught underneath. The unit should slide underneath the rear nut; fit and tighten the front nut to secure (see step 4).

In mobile installations, such as an OB van or fly-away kit, the rear nut should also be tightened. To access to the nut, you will need to open the Overbridge (see Replacing a TFT display).

8. Replace the I/O, master and power connectors (see step 3), making sure that you lock each of the D-Sub connectors.

9. Replace the central panel, and fasten into place (see step 2).

10. If not already connected, replace the Nova73 connection (MADI or RAVENNA) and audio connections on the rear panel of the console.

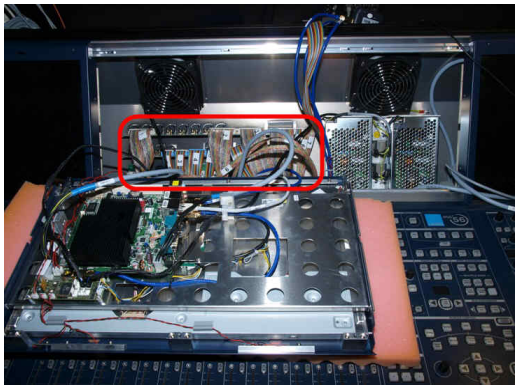
11. When everything is back in place, re-connect the rear mains IEC power connectors, and power on. Then check the functionality of the local I/O.

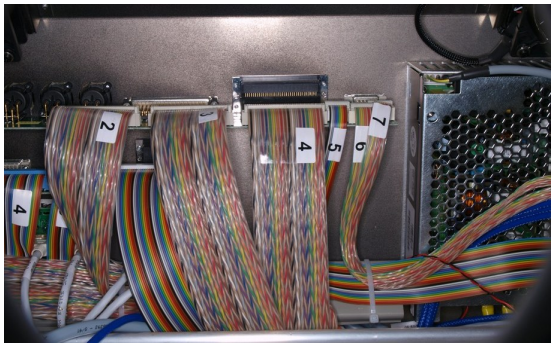
Adjusting the Local I/O Jumper Switch Positions

The local I/O connector board includes four adjustable jumper switches (**JP 1,2** and **JP 3,4**) which determine two settings: the choice of "internal talkback mic source" and the connection to **Line input 16**. See Jumper Switch Positions for an overview.

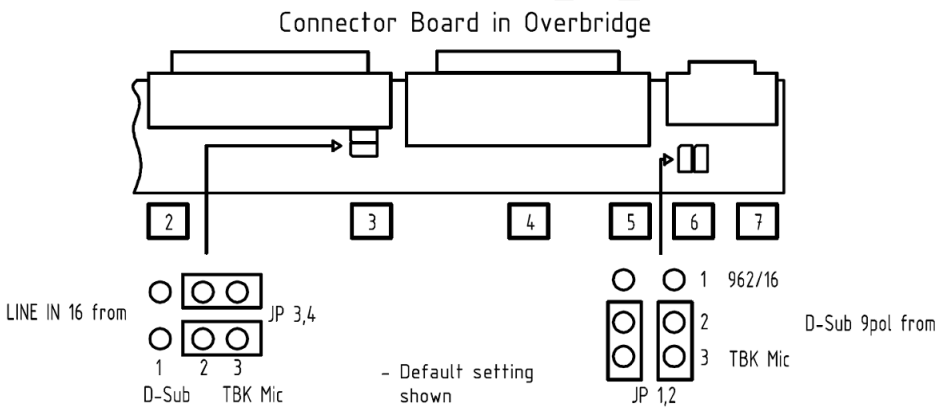
To adjust the switch positions:

1. Remove the Central GUI's TFT display to gain access to the local I/O connector board:



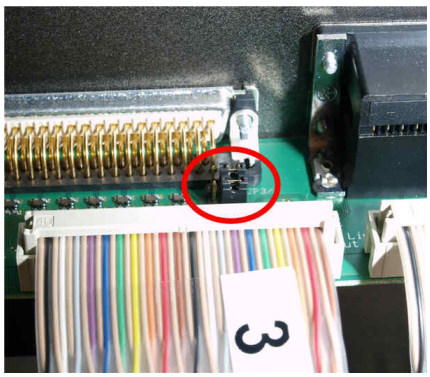


The following reference diagram can be found on the cable duct to the right of the local I/O board (beneath the central panel):

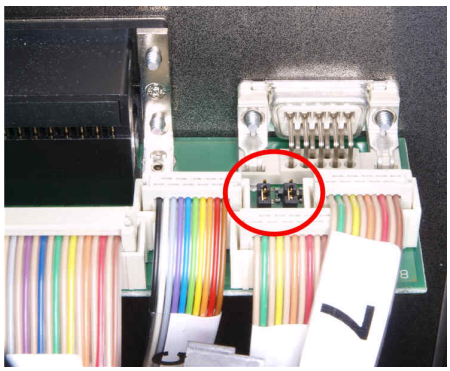


2. Locate the correct pair of jumper switches: either 3 & 4 (**JP 3,4**) or 1 & 2 (**JP 1,2**) - the locations and default positions are shown above and below:

Jumpers 3 & 4 (adjust Line In 16)



Jumpers 1 & 2 (adjust the TBK source)



3. In each case, take care to move *BOTH* jumpers to change a setting:

- **Jumpers 3 & 4 = position 1, 2**: Line input 16 comes from the talkback source (the default setting).
- **Jumpers 3 & 4 = position 2, 3**: Line input 16 comes the **LINE IN 9-16** connector.
- **Jumpers 1 & 2 = position 1, 2**: Internal talkback comes from the standard talkback mic preamp.
- **Jumpers 1 & 2 = position 2, 3**: Internal talkback comes from the optional 962/16 talkback mic preamp.

For more details on the options and signal flow, see Local I/O Wiring.

Trouble-shooting

Introduction

This section includes a series of example problems and tips to help you fault find the mc²56 MKII system.

For further assistance, please contact your local Lawo representative or the service department at service@lawo.com.

The system will not boot or does not boot correctly

1. Power off the Nova73 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 perform a cold start.

If the system now boots correctly, then your warm start user data is corrupt. Check your production data by loading a production. If this is the cause of the problem, perform another cold start and try a different production. If there is a problem with all production data, then you may need to replace the Data Flashcard.

4. If this is still unsuccessful, then you should try replacing the System Flashcard with a backup copy.

The system boots up but I have no audio

1. Check the System Settings display to see if there any reported errors.

If a Nova73 module or DALLIS I/O card is shown in red, then there is a problem with the connection or module/card.

2. Check the connections between the Nova73 I/O module and any DALLIS units.

Are the fibres reversed?

3. Check that all the **ACTIVE** LEDs on modules within the Nova73, and cards within the DALLIS, are green and flashing synchronously.

The **ACTIVE** LED on each Nova73 module, or DALLIS card, should blink in time with all other **ACTIVE** LEDs (at approximately 100Hz). This shows that the card is synchronous to the rest of the system. If an LED is out of sync, then check that the card is fitted correctly, and if the symptom persists, replace the card.

4. If everything still looks ok, then try reloading the DSP configuration from the DSP Configurations display.

The complete control surface is not responding

1. Check the Ethernet A connections between the control surface and Nova73 Router Module.

2. If main and redundant Router Modules are fitted to the Nova73, try forcing a manual takeover to the redundant control system.

3. If not, power off the Nova73 and wait for the system to shutdown. And power on to try a warm start.

One of the control surface panels is not working

1. Try restarting the Ethernet Bay Server.
2. Carefully remove the panel, and check the connections.
3. Try disconnecting and reconnecting the USB and power connectors to the panel.

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 freeze 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 one of the displays freezes or looks odd

This may occur if a Bay Server looses its Ethernet connection to the Control System.

1. Try restarting the Ethernet Bay Server.

If the problem persists, then the display or Bay Server may be faulty so please contact your local service representative.

The network connection to the control system is not working

If you cannot establish network communication between your computer and the control system:

1. Check the network connection and TCP/IP settings of your computer's network interface card.

2. If applicable, check that the software you are running is compatible with the mc² system. When connecting from mxGUI or AdminHD, the first three digits of the software versions *must* match.

3. Try a PING command to test whether you have a valid network connection:

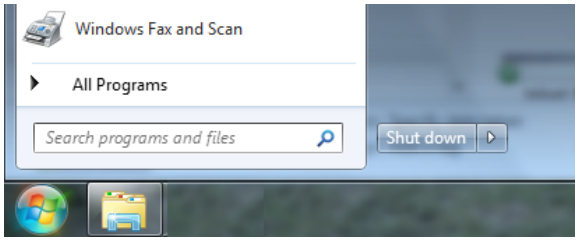
- If the ping test fails, then there is something wrong with your network configuration.
- If the ping test is successful, then this confirms that the network communication is working. If you still cannot connect to the mc²56 MKII control system, then something on your computer is blocking the network connection. Try disabling any firewall and/or antivirus software.

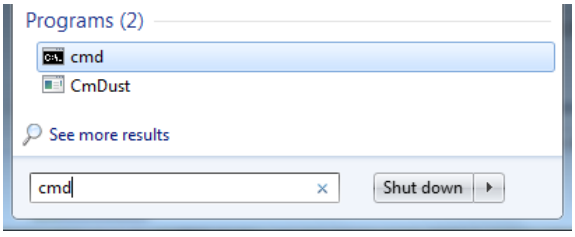
Running a PING test

The PING command is a built-in Windows and Mac function, that allows you to test whether you have a valid network connection to and from any networked device.

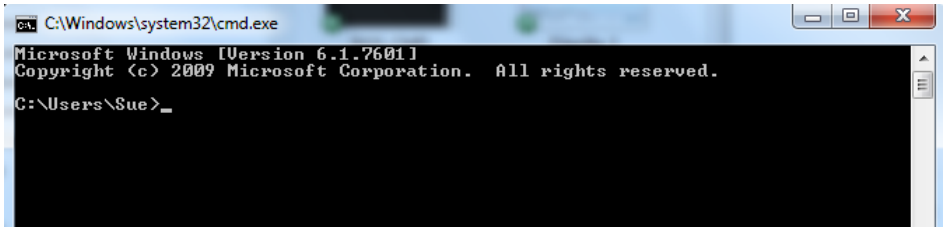
1. Make sure that your computer is connected to the Lawo system network, and that you have configured the TCP/IP settings of your computer's network interface card.

2. On a Windows 7 PC, type **cmd** into the "*Search programs and files*" field under the **Start** menu and press Enter.





This opens the DOS command prompt window:



Alternatively, on a Mac, open the **Terminal** program (found in the **Applications** -> **Utilities** folder).

3. On both platforms, perform the ping test as follows:

Type **ping xxx.xxx.xxx.xx** (where **xx..** is the IP address of the device you are trying to connect to) and press Enter.

You can check the IP address of your control system from the console GUI (using the Signal Settings display). See also TCP/IP Addresses for a list of the default IP addresses for different Lawo products.

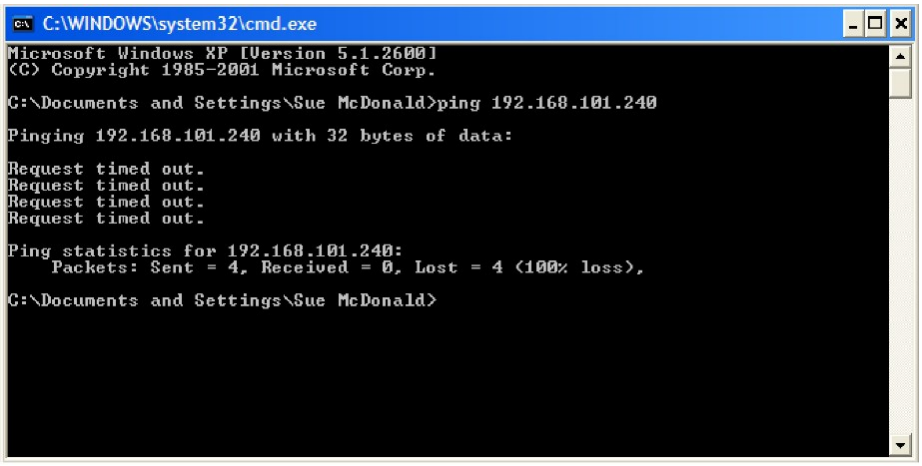
For example, to test the connection to a mc²56 with a default IP address, you would type:

ping 192.168.102.56

Your computer will now try to establish communication...

➢ Ping Test Fail

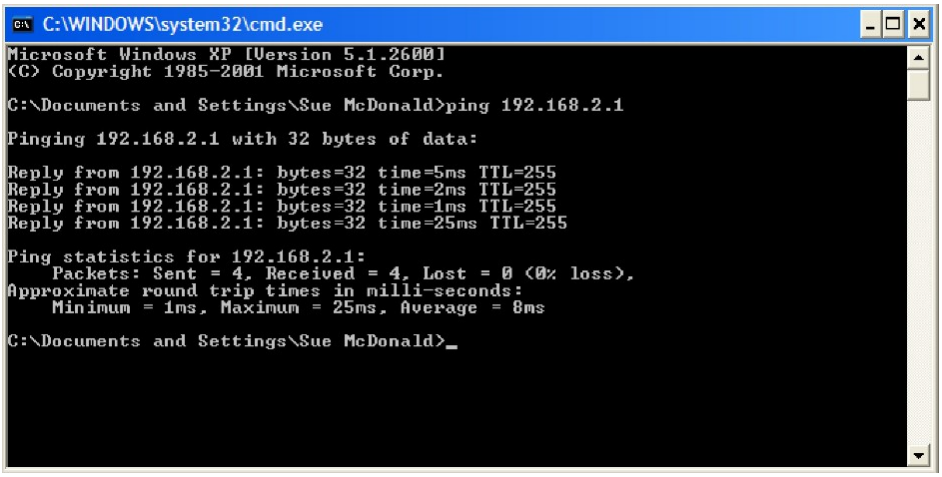
If the ping test fails, then the request will time out, and you will not receive any successful packets:



There is something wrong with your network configuration, so check the network connections, and TCP/IP settings again. Or contact your network administrator.

➢ Ping Test Success

If the ping test is successful, then the result will show that the Sent packets have been successfully Received:



This confirms that the network communication is working. If you still cannot connect to the mc²56 MKII control system, then something on your computer is blocking the network connection. Try disabling any firewall and/or antivirus software.

Technical Data

Control Surface

- Frame widths from 16 to 80 faders.
- Remote stand-alone extender frames from 16 faders.
- 6 banks each with 2 layers.
- 100mm fader + two freely adjustable rotary controls (Free Controls) + Input-Gain rotary control + Channel GUI display for each fader.
- TFT display: mono, stereo or up to 7.1 metering + bus assignment + gain reduction for dynamics + AfV status + VCA assignment + Mix Minus bus assign.
- External display of GUI pages (via mxGUI), e.g. metering.
- Fader colour coding, reset via snapshots.
- Fader notch and PFL overpress (Backstop PFL).
- 12 channel user buttons.
- 9 central user buttons.
- Optional: one integrated user panel (automation, 40 user buttons, reveal fader surround or intercom), RTW goniometer integration, script tray.

Signal Processing

- 888 channels + 144 summing busses, 40bit floating point.*
- Up to 760 inputs with A/B input, up to 64 sub-groups, 32 aux sends, up to 96 track busses, up to 48 main sums.*
- Rapid switching of channel and bus to mono/stereo/surround.
- Up to 96 surround masters + 128 VCA groups with metering + 256 GPCs (General Purpose Channels).
- Surround formats: DTS/Dolby ® Digital 5.1, Dolby ® Prologic 4.0, DTS ES/Dolby ® EX 6.1, SDDS 7.1 or DTS-HD 7.1. Diverse panning characteristics + surround aux bus.
- 2 AFL: 1 surround 8-channel + 1 stereo.
- 2 PFL, both stereo.
- Audio-follow-Video with 128 events, controlled via RemoteMNOPL, GPI or matrix connection. Envelope adjustable up to 10s fade time.
- Solo in place (enabled/disabled from System Settings display).
- Permanent input meter beside fader + adjustable INPUT, PF, AF, DIROUT meter point in Channel display.
- Loudness Metering according to EBU R128 and ATSC A/85, momentary or short term in every channel, integrated measurement on sum channels with display of integrated LUFS value in the Central GUI headline.

- Processing Modules**: INMIX with MS decoder, digital amp (DAMP), 2-band fully parametric FILTER, 4-band fully parametric EQ, 2-band fully parametric side chain filter (SCF), INSERT, DELAY up to 1800ms (switchable to metres, milliseconds or frames), 4 independent dynamic modules: EXPANDER, GATE, COMPRESSOR, LIMITER, stereo IMAGE, METER point, and DIRECT OUT.
- AMBIT Upmix, available on every 5.1 channel, fully Downmix compatible.
- Inline configuration, with per channel or global send/return switching.
- Fully-equipped surround channel with coupling of all channel parameters and hyperpanning.

* Figures are for a Nova73 HD fitted with 8 DSP boards running at 48kHz. At higher sample rates, the number of channels and summing busses is halved.

** The processing modules listed are for a Recording channel. Broadcast channels offer less processing modules in return for twice as many channels.

See Channel Types for more on the differences between Recording and Broadcast channels.

Routing Matrix

- Up to 8192 cross points, non-blocking.
- Up to 96kHz, 24-bit. (Higher sample rate operation is defined by AdminHD).
- Fully redundant signal path.
- Level adjustment for all inputs and outputs.
- Downmix from surround (up to 7.1) to stereo.
- Integrated monitoring devices for remote locations, e.g. director’s room.
- Full networking of up to 16 systems, share and import sources and destinations, studio intervention.
- Full snapshot and production portability independent of matrix and DSP size.
- Level control for every input and output.

Plug-in Server

- Full VST plug-in integration with storage of plug-in parameters in snapshots and production data.

Static and Dynamic Automation

- Snapshot automation.
- Sequence automation with trim and cross fade.
- Dynamic timecode-based automation for all parameters including bus assign. Modes include touch, glide, join, punch in/out and absolute/trim (including trim "on the fly").
- Offline timecode automation editing (copy, paste, delete, cut, insert, etc.)

Interfaces

- Mic/Line, Line Out, AES, 3G SDI, MADI, ATM, GPIO, Serial, MIDI. (For details, see DALLIS product information.)
- Stereo and surround monitoring systems.
- Local I/O within console frame: 16 Line I/O, 8 AES I/O, 8 GPIO, 2 Headphones.

Synchronisation

- 2 redundant sync inputs with automatic Blackburst, Wordclock, AES 3, MADI detection.

Redundancy

- Redundant PSUs (standard).
- Redundant DSP board (defined in the **DSP Configurations** display).
- Optional Redundant Router card provides redundant routing matrix and control system, exchangeable during run time, with full data redundancy.
- Optional Redundant DALLIS cards offer fully redundant signal paths.

Control Features

- Bay Isolate (ISO BAY) with separate bank and layer switching + second PFL/AFL bus.
- Global A/B input switching.
- Enhanced mix-minus control with independent off-air conference.
- Direct out mute by fader.
- Fader control of all level parameters.
- Diverse tally and fader start modes.
- Program switch.
- Machine control.
- Audio-follow-Video, up to 128 camera tallies, Ethernet or GPI controlled.
- Extensive talkback system integration.
- Camera mic remote via GPI or voltage control.
- Remote desktop access from TFT to external computer.
- mxGUI: remote control of GUI pages via external computer.
- iPhone App: remote control of fader level, monitoring and snapshots.

Remote Maintenance

- Connection via Internet remote software.
- Software updates, error diagnostics, remote assistance.

External Control Systems

- Remote control of all routing parameters via network.
- Remote control of monitoring units in remote locations.
- Remote control of integrated matrix monitoring units.
- Remote control of signal parameters such as SDI, silence detects, mic gain, etc. (for details, see the Remote MNOPL documentation).
- Online configuration with AdminHD, graphical configuration of Nova73 and DALLIS components.
- External matrix controllers: VSM, Evertz, Quartz, BFE, Pharos, and others.
- EmBER+ control protocol (available 2013).

Appendices

This section includes the following appendices:

System Part Numbers

The following part numbers will help you locate data sheets for the principle system components:

System Component		Part Number
mc²56 MKII Frame:	16C	959-09
	16 + 16C	959-10
	16 + 16C + 16	959-11
	32 + 16C + 16	959-12
	32 + 16C + 32	959-13
	Extender (16-fader)	959-22
Control Surface Modules:	Fader Panel	958-10
	Central Panel	958-20
	Channel Display	958-13
DALLIS Unit Frames:	3RU DALLIS Frame	940-30
	6RU DALLIS Frame	940-60
Nova73 HD Frame	10RU Nova73 HD Frame	980-02
Nova73 Compact Frame	7RU Nova73 Compact Frame	980-06

See also Control Surface Options, Nova73 Module Options and DALLIS Interface Options.

Control Surface Options

This section summarises the main control surface options. For more details, please refer to the relevant data sheet, available in the "mc2_Nova73_documentation" guide.

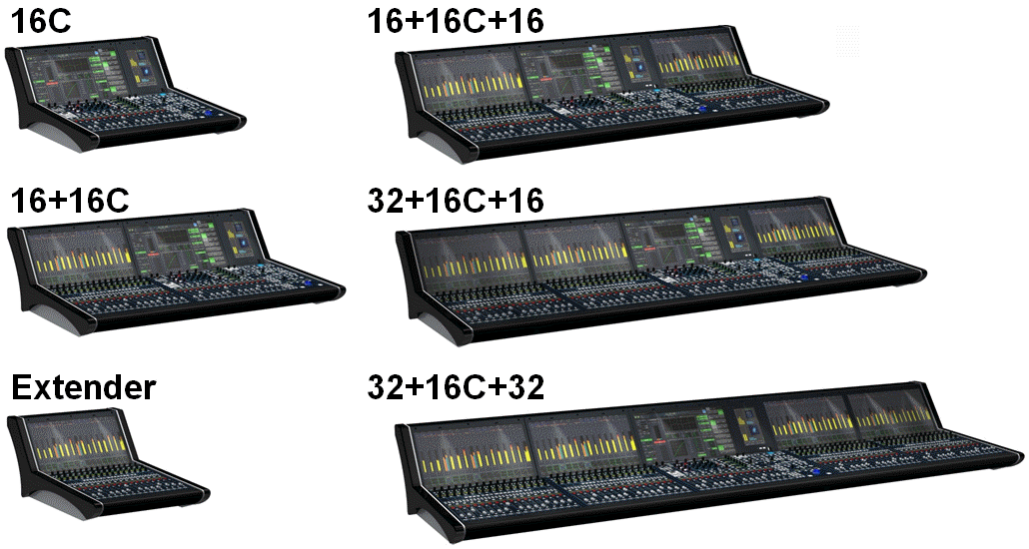
See also Installing the Control Surface and Service/Maintenance: Control Surface.

Note:

- **Monitoring, Headphones, External Metering & Talkback** - the local I/O, integrated within the control surface, provides audio connections for monitoring, headphones, external metering and talkback. Therefore, there is no need to specify these as additional options. See Local I/O Wiring for details.
- **19" Integration/User Panels** - there are no 19" or USER panels (other than those permitted in the Overbridge).
- **Power Cables** - country-specific power cables are supplied for all system components.

Frame Layouts

The **mc²56** control surface comes in a range of predetermined frame sizes. Any frame may be expanded by fitting stand-alone extenders:



Frame Layout	Part Number
16C	959-09
16+16C	959-10
16+16C+16	959-11
32+16C+16	959-12
32+16C+32	959-13
16 Fader Extender	959-22

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

By default, frames come fully-fitted with the appropriate control surface panels:

Control Surface Panel	Part Number
Fader Panel (1 per 16-fader decentral bay)	958-10
Central Panel (1 per console)	958-20
Channel display (1 per bay)	958-13

You may fit dummy panels within a frame, to reduce the initial cost of the system, and allow for future expansion.

Frame Version

Two different frame versions are available, designed for either studio or OB van installation.

The version affects the side panels fitted to the console. You should specify the OB version for narrow side panels and a reduced console width:

Option	Part Number
Studio Side Panels	959-30
OB Van Side Panels	959-31

Please see Dimensions and Weight for details.

Stand

Optionally, the console may be delivered with a stand:

Option	Part Number
Console Stand	959-32

Overbridge Options

Space is available in the Overbridge to fit either RTW metering (shown above) and/or a Lawo User Panel.

The permitted variations are:

Part Number	RTW	User Panel	Fitted
958/90	No	No	Blank Panel
958/91	Yes	No	TM 9 (shown above)
958/92	Yes	Yes	TM 7 + User Panel
958/93	No	Yes	Blank Panel + User Panel

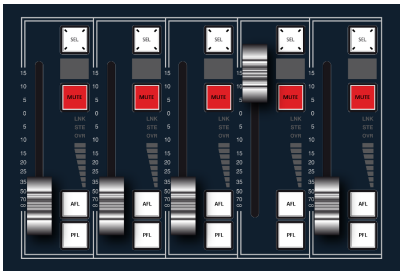
When the RTW TM 7 or TM 9 are fitted, they connect to the AES3 in/out 5-8 of the local I/O.

The default configuration usually sets the RTW to automatically follow the CRM 1 monitor source selector.

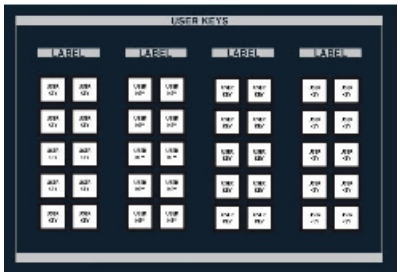
The Overbridge User Panel options are:

Part Number	User Panel	Description
962/29	REVEAL FADER	5 dedicated faders for revealing surround slaves.
962/14	USER KEYS	40 user buttons configured from the Custom Functions display.
962/16	INTERCOM	integrated loudspeaker and internal talkback microphone, see Local I/O Wiring.
962/18	AUTOMATION	timecode automation controls.
962/15	USER CONTROLS	8 rotary controls defined by the factory configuration.

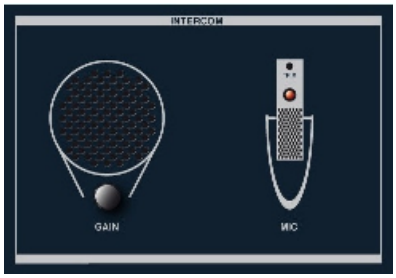
REVEAL FADER



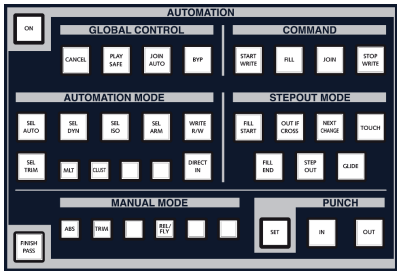
USER KEYS



INTERCOM



AUTOMATION



USER CONTROLS

Local I/O Connection

The local I/O board, integrated within the control surface, is available in two versions; the version determines the connection to/from the Nova73:

Option	Part Number
Local I/O (MADI)	958-55
Local I/O (RAVENNA)	958-50

You will need to reserve one MADI, or one RAVENNA, port within the Nova73 for this connection, see Nova73 Module Options.

Console Keyboard

The console keyboard is available in English or German:

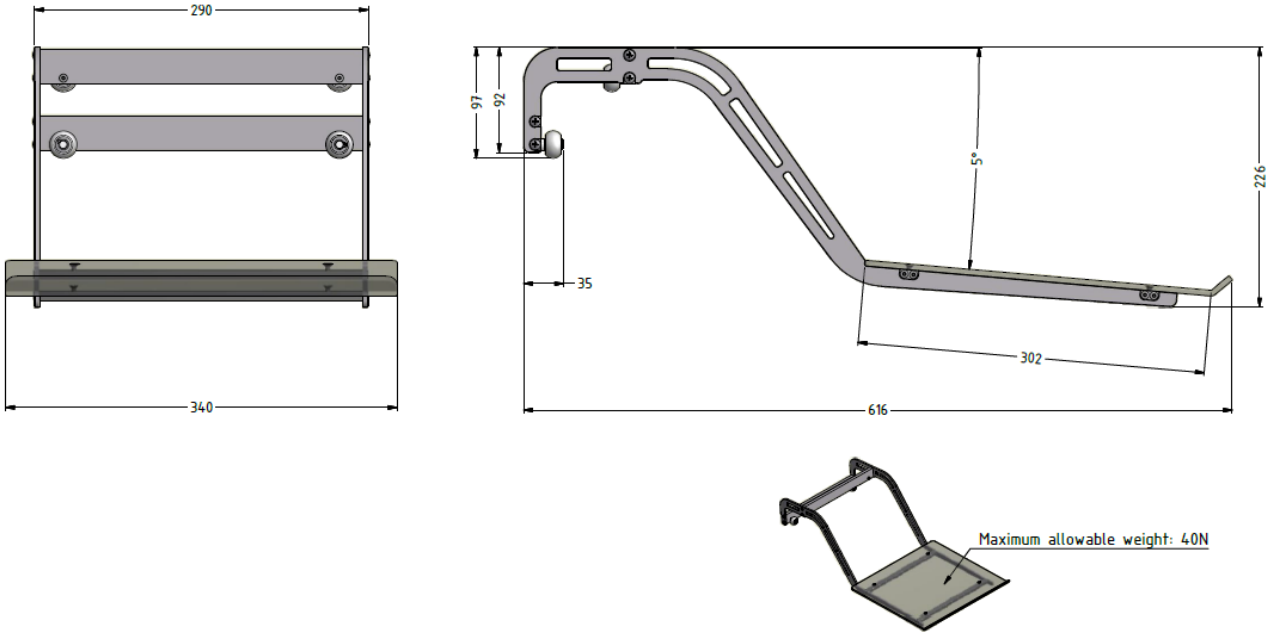
Option	Part Number
English Keyboard	956-23
German Keyboard	956-24

Please see Console Keyboard Driver Installation for details on how to change the language version.

Script Tray

Optionally, one or more removable script trays may be fitted:

Option	Part Number
Removable Script Tray	959-41



Recording Com Kit

The optional Recording Com Kit provides Sony 9pin (P2), LTC and MIDI connections to an external playback device.

Option	Part Number
Recording Com Kit (P2, LTC, MIDI)	958-80

Machine control functions may be mapped onto user buttons from the console's Custom Functions display, or handled from the optional machine control panel, mounted externally from the console.

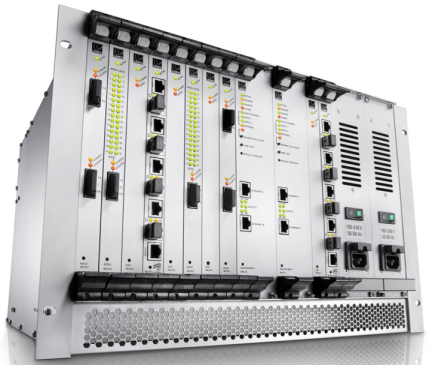
For more details, please see the "Technical Documentation: Recording Com Kit", available from the **Download-Center** after logging in at www.lawo.com.

Nova73 Compact Core

The **Nova73 Compact** offers an alternative to the Nova73 HD for space-restricted installations:

Nova73 HD (10RU)

Nova73 Compact (7RU)



Operationally, the two cores are identical, and share the same Router, DSP and I/O Modules. A second Router Module may be fitted for redundancy. And either core may operate stand-alone or within a larger networked system.

The key features and differences are:

	Nova73 HD	Nova73 Compact
Width	19” 483mm (front plate) 440mm (chassis)	
Height	10RU	7RU
Weight	16.25 Kg (one PSU fitted)	14.5 Kg (two PSUs fitted)
Depth	510mm	489mm
Max. number of DSP + I/O Modules	16 (8k² capacity router at 48kHz)	10 (5k² capacity router at 48kHz)
Max. number of DSP Modules	8	5
Max. number of AES Modules	8	2 (fitted in slots 2 and 6)
Redundant Power Supplies	optional	standard
Redundant Router Module MKII	optional	optional
Configured using AdminHD	Yes	Yes
Support for Dual Self-Healing Star	Yes	No

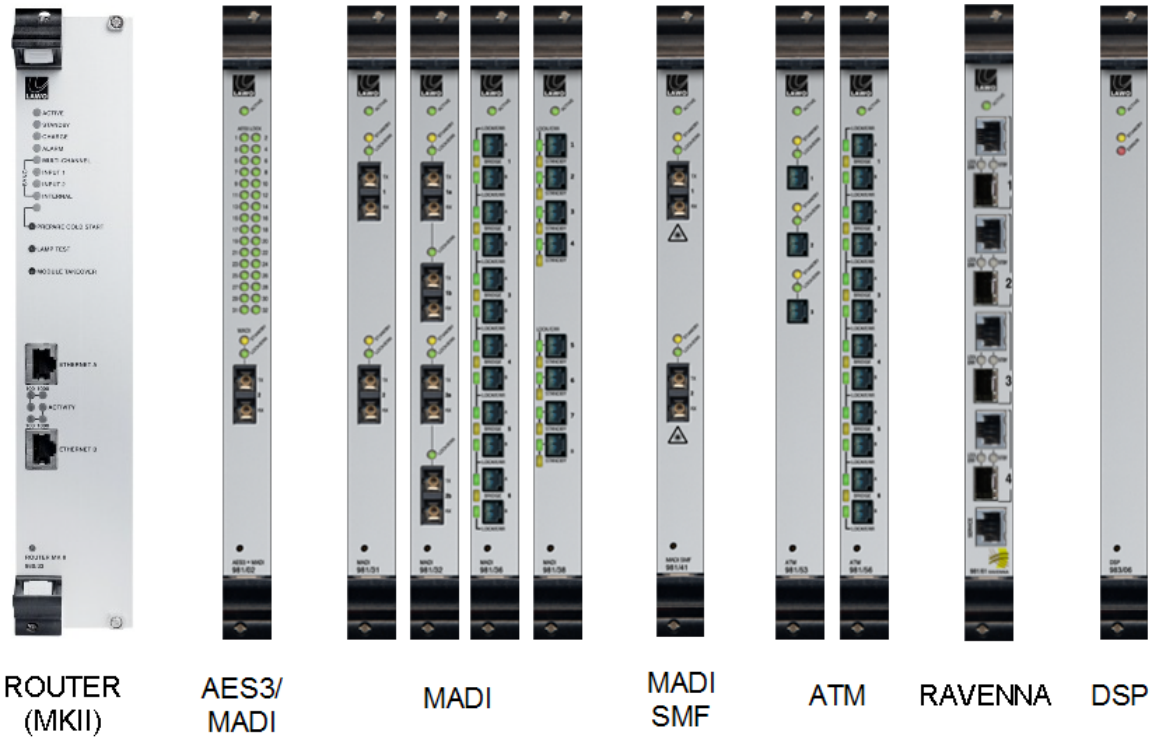
To achieve its smaller footprint, the **Nova73 Compact** utilises a different frame (980/06), with front-mounted plug-in power supply modules (980/27) and rear-mounted fan units (980/28). The frame comes fitted with rear connector panels for any front-mounted AES modules (in slots 2 and 6).

Nova73 Module Options

The following tables summarise the Nova73 modules supported in this release of software. For more details, please refer to the relevant data sheet, available in the "mc2_Nova73_documentation" guide.

See also Installing the Nova73 Plug-in Modules and Service/Maintenance: Nova73.

Nova73 Plug-in Module Options



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

One MADI, or ATM, port is required to provide the Port DSP resources used for the console's monitoring (**Listen surround** and **Listen stereo**). Therefore, you must fit at least one MADI, or one ATM, module to the Nova73.

Central Router Modules	
980/33 ROUTER MKII	Routing matrix (8k² at 48kHz, or 4k² at 96kHz) and integrated control system.
I/O Modules	
981/02 AES3 + MADI	32 inputs and 32 outputs AES/EBU (via D-Sub or BNC rear connector panel); 1 port MADI (optical, multi-mode fibre)
981/31 MADI	2 ports MADI (optical, multi-mode fibre)
981/38 MADI	8 ports MADI (optical, multi-mode fibre)
981/32 MADI	2 double ports MADI, redundant fibre (optical, multi-mode fibre)
981/36 MADI	6 double ports MADI, redundant fibre (optical, multi-mode fibre)
981/41 MADI	2 ports MADI (optical, single-mode fibre)
981/53 ATM	3 ports ATM (optical, multi-mode fibre)
981/56 ATM	6 double ports ATM, redundant fibre (optical, multi-mode fibre)
981/61 RAVENNA	4 ports RAVENNA (CAT 5 Ethernet *and* SFP option for single or multi-mode optical fibre); the port configuration and redundancy are configured by AdminHD. See RAVENNA Interfaces.
DSP Modules	
983/02 DSP 24	24 channels for the mc² series mixing consoles.
983/03 DSP 48/24 *	48/24 DSP channels for the mc² series mixing consoles: 48 channels at 48kHz; 24 channels at 96kHz. (The 983/04 is a later revision of the 983/03 supporting identical features.)
983/06 DSP IOSONO	For project-specific applications, please check your system specification.

* The **983/03** (or **04**) DSP module may be configured for different applications by changing the AdminHD configuration and updating the module's firmware:

- 983/03 DSP 48/24 - DSP channels for the mc² series mixing consoles, see DSP Configurations.
- 983/03-077 mxDSP - DSP paths for the routing matrix, see mxDSP Configuration.
- 983/03-060 DSP WFS (mix), 983/03-061 DSP WFS (filter) and 983/03-062 DSP spatial mixer - for project-specific applications, please check your system specification.

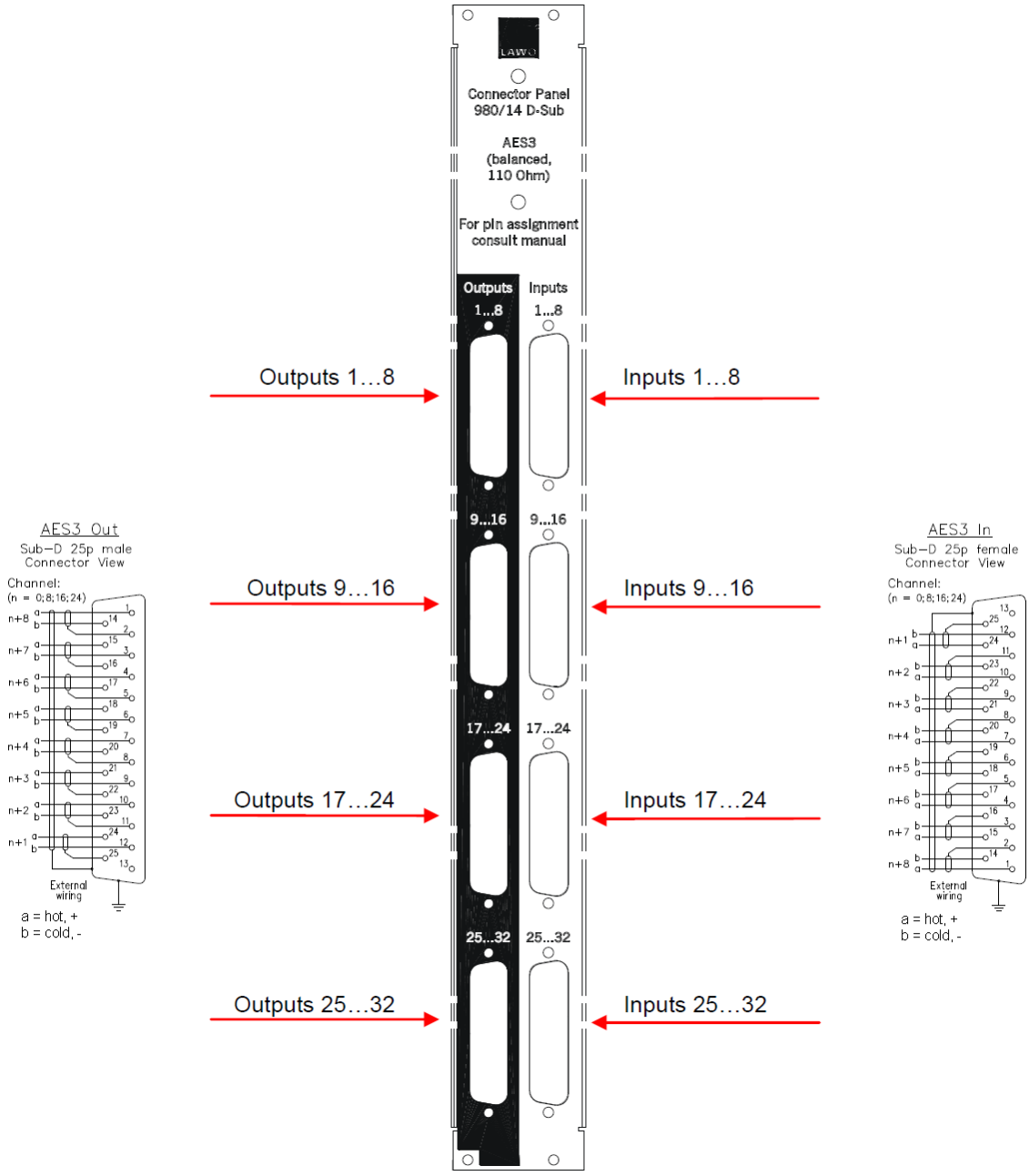
Nova73 Rear Connector Panels

The **Nova73 HD** supports two types of AES3 rear connector panel: the 980/14 (D-Sub) and 980/15 (BNC).

Pin-outs for the **Nova73 Compact** AES3 rear connectors are identical to the 980/14.

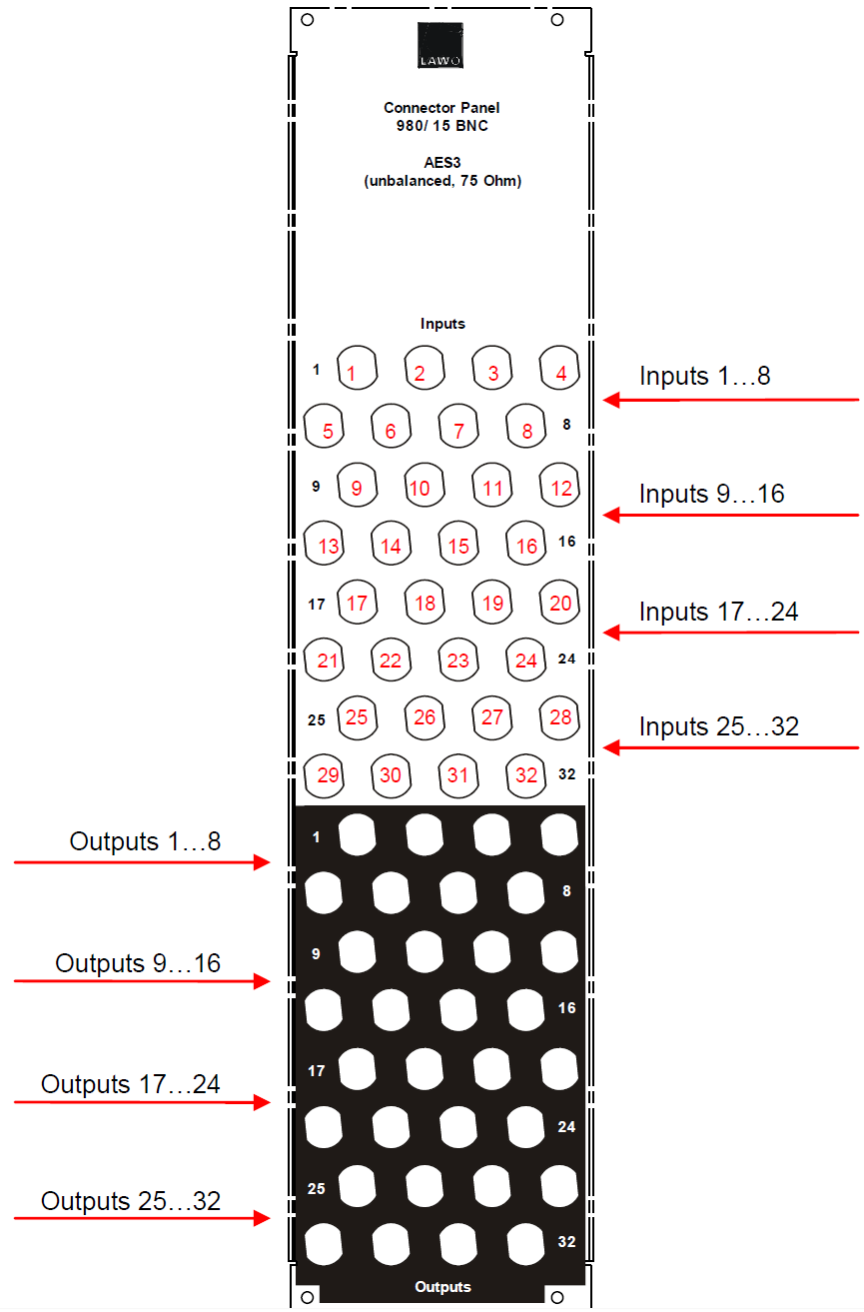
980/14 Connector Panel D-Sub

- Outputs: 4 plugs D-Sub 25-pin, each with 8 balanced contacts 110 ?
- Inputs: 4 plug sockets D-Sub 25-pin, each with 8 balanced contacts 110 ?



980/15 Connector Panel BNC

- Outputs: 32 BNC connector, unbalanced contacts 75 ?
- Inputs: 32 BNC connector, unbalanced contacts 75 ?



DALLIS Interface Options

The following tables summarise the DALLIS interfaces supported in this release of software. For more details, please refer to the relevant data sheet, available in the "mc2_Nova73_documentation" guide.

See also Installing the DALLIS Plug-in Cards and Service/Maintenance: DALLIS.

3RU DALLIS (example configuration)

Not every interface card can be used in every slot. As a general rule, if an interface card is permitted within AdminHD, then it can be fitted to your system.

The type of DALLIS master board, and hence the connection, determines the maximum number of audio channels to/from the Nova73: up to 60 (MADI), 80 (ATM) or 128 (RAVENNA).

The Maximum Analogue Level of the whole system is defined by the DALLIS card with the lowest GDA (General Device Address) - this is the card with the lowest address fitted to the DALLIS frame connected to the lowest port number of the first Nova73. (If a different fixed level analogue card is fitted elsewhere within the system, then a warning appears in the log file; however, the card with the lowest GDA still wins.)

DALLIS Master Boards		Connects to:
947/05 MADI	1 port MADI (optical, multi-mode fibre)	981/02, 31, 38
947/07 MADI	2 double ports MADI, redundant fibre (optical, multi-mode fibre)	981/32, 36
947/15 MADI	1 port MADI (optical, single-mode fibre)	981/41
947/03 ATM	1 port ATM (optical, multi-mode fibre)	981/53, 56
947/21 RAVENNA	1 port RAVENNA (CAT 5 Ethernet *and* SFP option for single or multi-mode optical fibre). See RAVENNA Interfaces.	981/61

DALLIS I/O Cards	Part Number & Connector Type			Inputs	Outputs
Analogue	**D-Sub**	**XLR**	**BNC**		
Mic/Line (trafo-balanced)	941/52	941/62	-	4 mono	-
Line in (trafo-balanced)	941/02, 04, 06	941/12, 14, 16	-	4 mono	-
Line out (trafo-balanced)	942/02, 04, 06	942/12, 14, 16	-	-	4 mono
Mic/Line (elect-balanced)	941/51, 53, 55	-	-	8 mono	-
Line in (elect-balanced)	941/84, 86	-	-	8 mono	-
Line in/out (elect-balanced)	941/83, 85	-	-	8 mono	8 mono
Line out (elect-balanced)	942/84, 86	-	-	-	8 mono

DALLIS I/O Cards	Part Number & Connector Type			Inputs	Outputs
AES3	**D-Sub**	**XLR**	**BNC**		
AES3 in (SRC)	943/02, 03	943/12, 13	-	4 stereo	-
AES3 in (SRC) Hi-Z/Thru	943/01, 84, 85	-	-	4 stereo	4 thru
AES3 in/out (SRC in)	943/52, 53	-	943/72, 73	4 stereo	4 stereo
AES3 in/out (SRC in/out)	943/54, 55	-	943/74, 75	4 stereo	4 stereo
AES3 out	944/01, 02	944/11, 12	-	-	4 stereo

DALLIS I/O Cards	Part Number	Description	Connector Type
Special			
Headphones	942/61	4 stereo headphone outputs	1 x D-Sub
Intercom (Riedel interface)	943/81, 82	4 AES3 in/out	4 x BNC (bi-directional)
Optical Switch	945/61	Optical to BNC change-over switch for MADI or ATM.	2 x BNC: 1 in, 1 out 3 x MT-RJ
ADAT in/out	946/31	8 channel ADAT interface	2 x ADAT: 1 in, 1 out
IP Codec	946/34	Real-time audio streaming over IP: up to 2 channels sim encode/decode	1 x RJ45 (Ethernet) 1 x RJ45 (RS232)
RAVENNA (Audio over IP)	946/41	8 channel RAVENNA interface.	1 x RJ45 (Ethernet) 1 x SFP (optical fibre)
Phantom Power	947/10	48 V supply for transformer-balanced Mic/Line cards	n/a

DALLIS I/O Cards GPI	Part Number	Description	Connector Type
GPI/Opto Relays	945/01	8 opto-coupler in; 8 relay out	1 x D-Sub
GPI/Opto/VCA Relays	945/05	8 opto-coupler in; 8 relay out; 4 VCA in	1 x D-Sub

DALLIS I/O Cards SDI	Part Number	Audio de-embedder / embedder	Connector Type
3G/HD/SD SDI	946/17	up to 8 AES3 in/out (stereo)	4 x BNC: in, thru, 2 out 2 x D-Sub: metadata
HD/SD SDI SD SDI	946/13 946/09	up to 4 AES3 in/out (stereo)	4 x BNC: in, thru, 2 out
HD/SD SDI SDI SDI	946/05 946/01	up to 4 AES3 in/out (stereo)	3 x BNC: in, thru, out

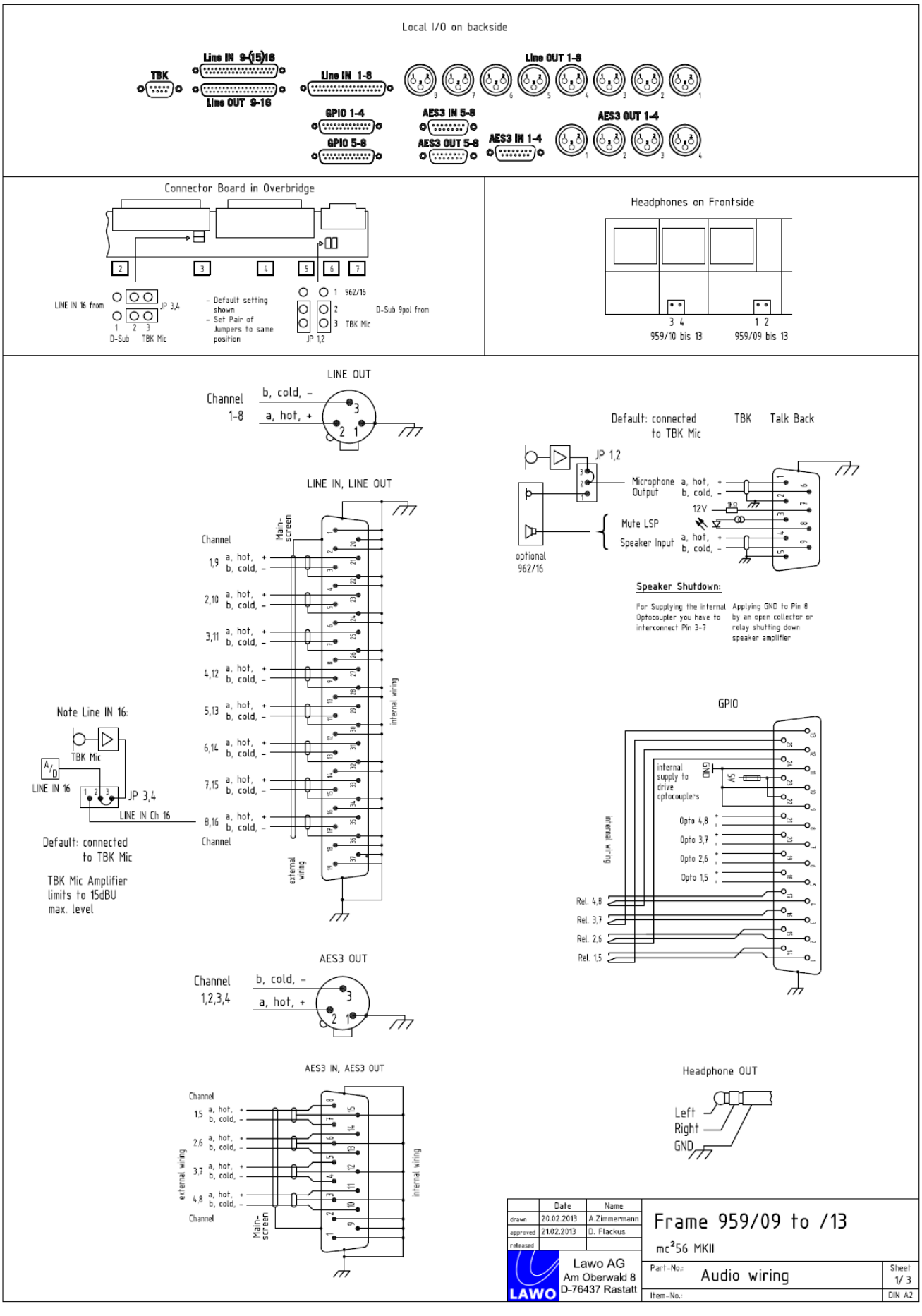
DALLIS I/O Cards DSP	Part Number	Description	Connector Type
Summing matrix	947/41, 42	8 in/out internal summing matrix with signal generator	n/a

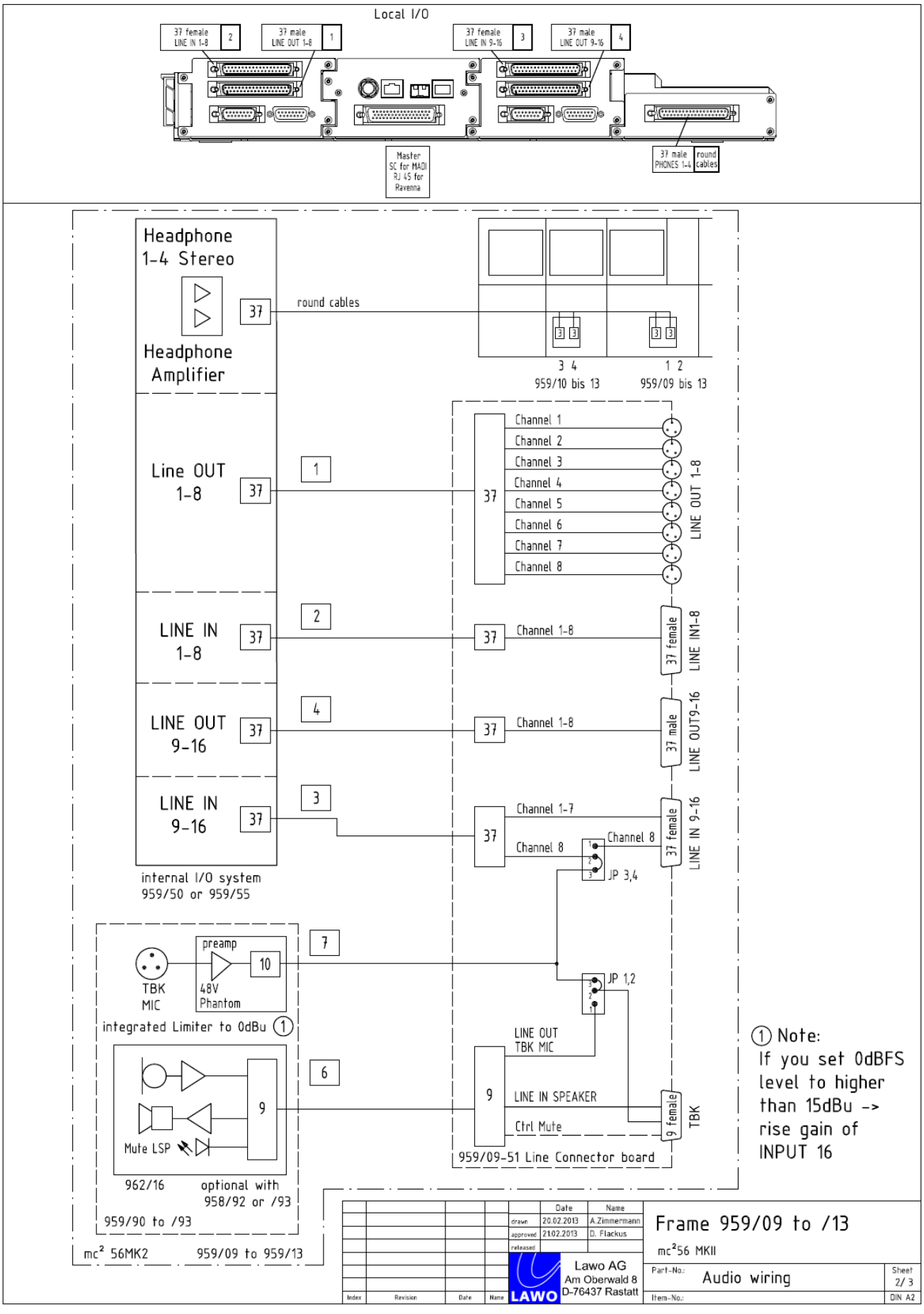
DALLIS I/O Cards Data	Part Number	Description	Connector Type
RS422	945/21	4 bi-directional data ports for RS422	4 x RJ45
Serial Data	945/22	4 bi-directional data ports for RS232, RS422 or MIDI	4 x RJ45

Local I/O Wiring

The following diagrams illustrate the wiring, pin-outs and default jumper switch positions for the local I/O.

Note that **AES IN 5-8** and **AES OUT 5-8** connect to the RTW meter if either of the TM 7 or TM 9 Overbridge options are fitted.


Local I/O on backside
TBK
Line IN 9-(15)16
Line OUT 9-16
Line IN 1-8
Line OUT 1-8
GPIO 1-4
GPIO 5-8
AES3 IN 5-8
AES3 OUT 5-8
AES3 IN 1-4
AES3 OUT 1-4
Connector Board in Overbridge
LINE IN 16 from
JP 3,4
D-Sub
TBK Mic
- Default setting shown
- Set Pair of Jumpers to same position
962/16
D-Sub 9pol from
JP 1,2
Headphones on Frontside
3 4
959/10 bis 13
1 2
959/09 bis 13
LINE OUT
Channel
1-8
b, cold, -
a, hot, +
LINE IN, LINE OUT
Main-screen
Channel
1,9
2,10
3,11
4,12
5,13
6,14
7,15
8,16
internal wiring
external wiring
Note Line IN 16:
TBK Mic
LINE IN 16
JP 3,4
LINE IN Ch 16
Default: connected to TBK Mic
TBK Mic Amplifier limits to 15dBU max. level
Default: connected to TBK Mic
TBK Talk Back
JP 1,2
Microphone Output
Mute LSP
Speaker Input
12V
optional 962/16
Speaker Shutdown:
For Supplying the internal Optocoupler you have to interconnect Pin 3-7
Applying GND to Pin 8 by an open collector or relay shutting down speaker amplifier
GPIO
internal supply to drive optocouplers
GND
5V
Opto 4,8
Opto 3,7
Opto 2,6
Opto 1,5
Rel. 4,8
Rel. 3,7
Rel. 2,6
Rel. 1,5
AES3 OUT
Channel
1,2,3,4
AES3 IN, AES3 OUT
1,5
2,6
3,7
4,8
Headphone OUT
Left
Right
GND
Date
Name
drawn
20.02.2013
A.Zimmermann
approved
21.02.2013
D. Flackus
released
Lawo AG
Am Oberwald 8
D-76437 Rastatt
Frame 959/09 to /13
mc²56 MKII
Part-No.:
Audio wiring
Item-No.:
Sheet
1/ 3
DIN A2


Local I/O
37 female LINE IN 1-8
2
37 male LINE OUT 1-8
1
37 female LINE IN 9-16
3
37 male LINE OUT 9-16
4
Master SC for MADI RJ 45 for Ravenna
37 male PHONES 1-4
round cables
Headphone 1-4 Stereo
37
round cables
Headphone Amplifier
3 4
959/10 bis 13
1 2
959/09 bis 13
Line OUT 1-8
37
1
Channel 1
Channel 2
Channel 3
Channel 4
Channel 5
Channel 6
Channel 7
Channel 8
LINE OUT 1-8
LINE IN 1-8
37
2
Channel 1-8
37 female
LINE IN1-8
LINE OUT 9-16
37
4
Channel 1-8
37 male
LINE OUT9-16
LINE IN 9-16
37
3
Channel 1-7
Channel 8
Channel 8
JP 3,4
37 female
LINE IN 9-16
internal I/O system
959/50 or 959/55
preamp
TBK MIC
48V Phantom
10
7
integrated Limiter to 0dBu (1)
JP 1,2
LINE OUT
TBK MIC
9
6
Mute LSP
LINE IN SPEAKER
Ctrl Mute
9 female
TBK
962/16
optional with 958/92 or /93
959/09-51 Line Connector board
959/90 to /93
mc² 56MK2
959/09 to 959/13
(1) Note:
If you set 0dBFS level to higher than 15dBu -> rise gain of INPUT 16
Date
Name
drawn
20.02.2013
A.Zimmermann
approved
21.02.2013
D. Flackus
released
Lawo AG
Am Oberwald 8
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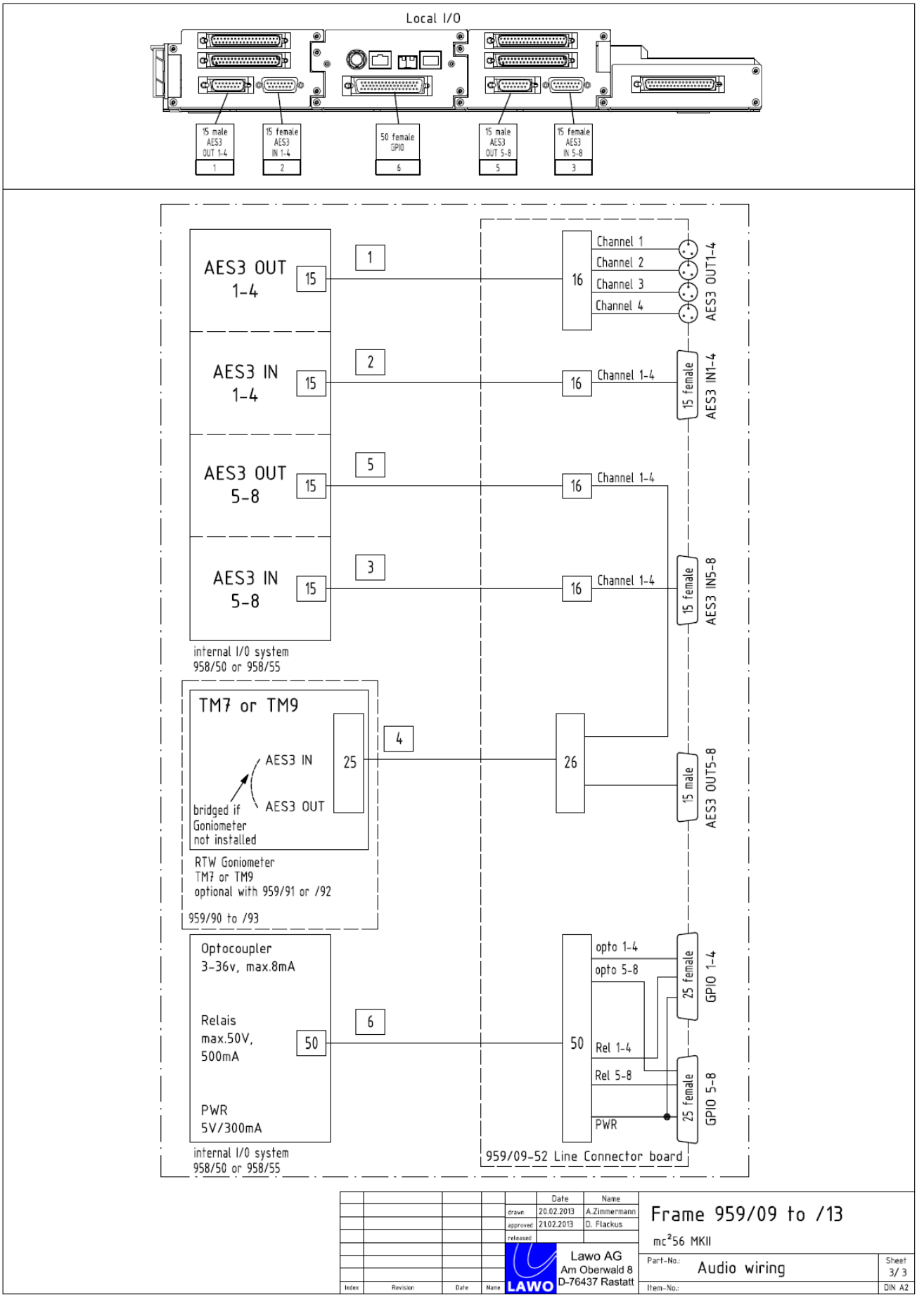
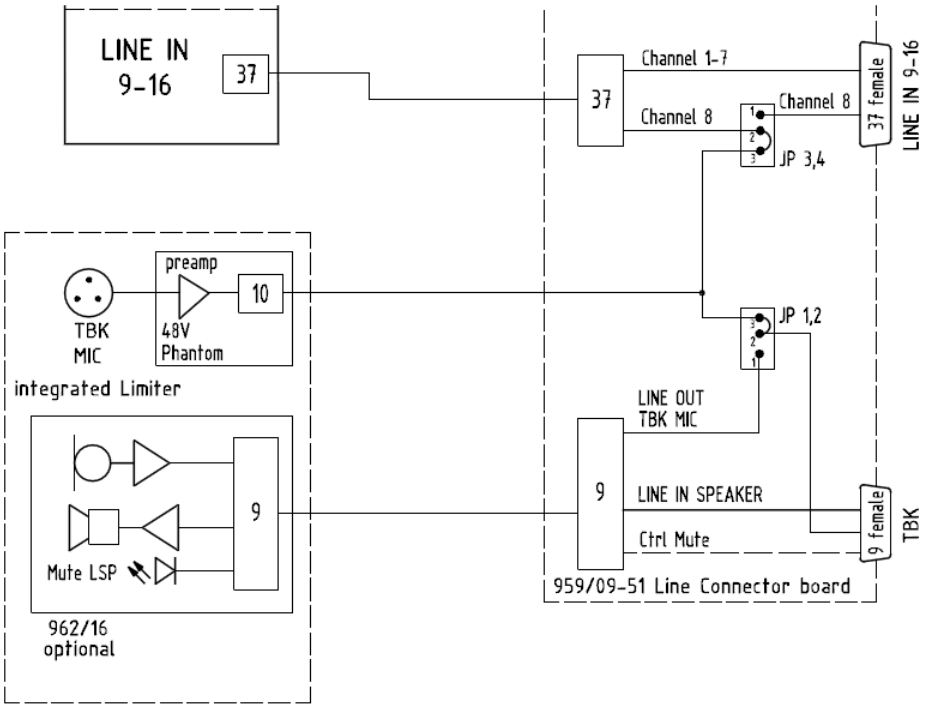
Index
Revision
Date
Name


Local I/O
15 male AES3 OUT 1-4
1
15 female AES3 IN 1-4
2
50 female GPIO
6
15 male AES3 OUT 5-8
5
15 female AES3 IN 5-8
3
AES3 OUT 1-4
AES3 IN 1-4
AES3 OUT 5-8
AES3 IN 5-8
internal I/O system 958/50 or 958/55
TM7 or TM9
AES3 IN
AES3 OUT
bridged if Goniometer not installed
RTW Goniometer TM7 or TM9 optional with 959/91 or /92
959/90 to /93
Optocoupler 3-36v, max.8mA
Relais max.50V, 500mA
PWR 5V/300mA
internal I/O system 958/50 or 958/55
Channel 1
Channel 2
Channel 3
Channel 4
AES3 OUT1-4
Channel 1-4
15 female
AES3 IN1-4
AES3 IN5-8
15 male
AES3 OUT5-8
opto 1-4
opto 5-8
Rel 1-4
Rel 5-8
PWR
25 female
GPIO 1-4
GPIO 5-8
959/09-52 Line Connector board
Frame 959/09 to /13
mc²56 MKII
Audio wiring
Lawo AG
Am Oberwald 8
D-76437 Rastatt
drawn 20.02.2013 A.Zimmermann
approved 21.02.2013 D. Flackus
released
Part-No.:
Item-No.:
Sheet 3/ 3
DIN A2

Local I/O Jumper Switch Positions



There are four jumper switches on the local I/O connector board, which control two settings:

- **JP 3,4** - set the connection to the **Line input 16** A-D converter. This can be taken from:
  - an "internal talkback mic preamp" (set by **JP 1,2**).
  - the **LINE IN 16** connection from the rear panel.
- **JP 1,2** - set the "internal talkback mic preamp" to:
  - the integrated talkback mic preamp (fitted as standard).
  - the talkback mic preamp fitted to the optional 962/16 INTERCOM user panel.

Note that the **JP 1,2** switch positions affect both the connection to the **Line input 16** A-D converter, and the line level talkback output available via the **TBK** connector.

The factory default positions, shown above, support talkback via the integrated talkback mic preamp.

You may need to adjust the jumper switches if:

- the 962/16 INTERCOM user panel is fitted. Move **JP 1,2** to connect talkback from the INTERCOM panel's talkback mic preamp.
- you are using an external talkback source, and wish to "free up" **Line input 16** for another application. Move **JP 3,4** to connect Line input 16 from the **LINE IN 9-16** connector.

Please see Adjusting the Local I/O Jumper Switch Positions for details.

For more details on the 962/16 INTERCOM user panel, please refer to the relevant data sheet.

DSP Configurations

DSP resources are allocated using DSP configurations.

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).

Higher sample rates use twice as much DSP resource as lower sample rates.

More channels, from the same DSP resource, become available if you use Broadcast channels.

For further details on the variations available, we recommend installing mxGUI and viewing the **DSP Configurations** display.

SDI Parameters

AdminHD can define a number of parameters for the SDI Card, SDI Signal In and SDI Signal Out. The parameters are what the system resets to after a cold start. Users can change these parameters later from the GUI.

The parameters are similar to those on the mc² GUI's **Signal settings** display, and vary depending on the type card:

- SDI Parameters (3G SDI Card)
- SDI Parameters (non 3G SDI Cards)

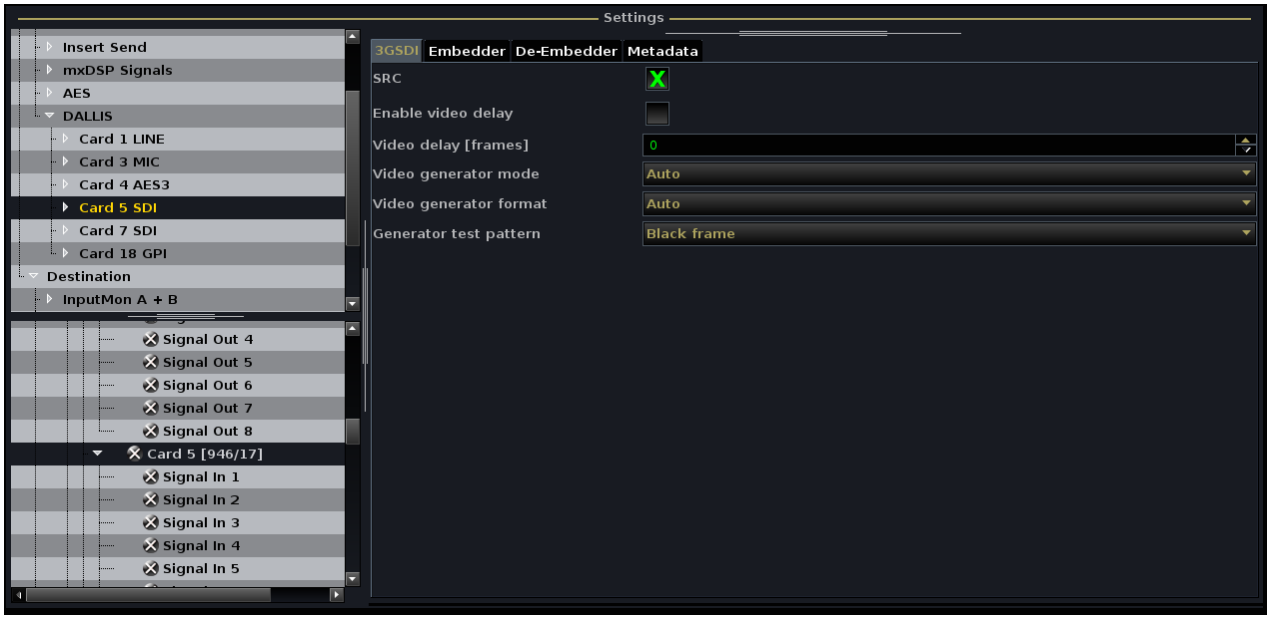
SDI Parameters (3G SDI Card)

The DALLIS 3G/HD/SD SDI card (946/17) is a multi-rate SDI card with BNC input, thru and two outputs. It contains an audio embedder and de-embedder for up to 16 audio channels, and a VANC embedder and de-embedder for two independent Dolby E Metadata streams. There is onboard video and audio delay, and an integrated sample rate converter. It occupies two DALLIS card slots and may be configured to run in a number of different modes using AdminHD.

Further information can be found in the data sheet, available in the "mc2_Nova73_documentation" guide.

Note that SDI signals have parameters for both the signal and the card. The SDI parameters are adjusted by selecting the card:

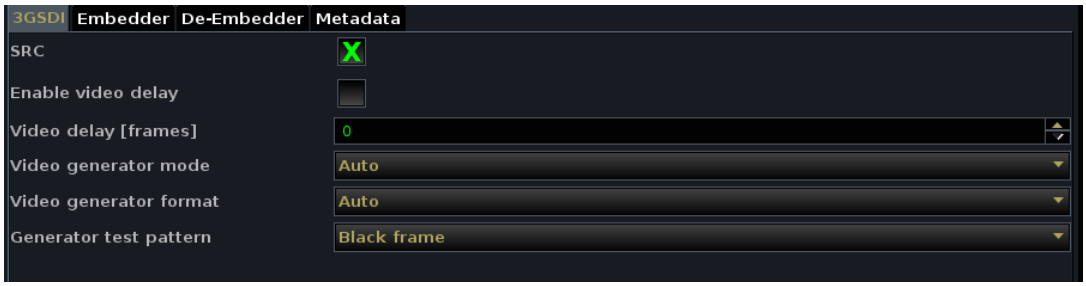
1. Select the **946/17** card from the **System** tree.
2. Then select one of the four parameter tabs:



Note that SDI card parameters may be adjusted whether the card is local to the system, or fitted to a remote network partner.

Note that SDI parameters are never stored by snapshots. From Version 4.8.0.2 onwards, they are stored and recalled by productions. You may use the Global isolate of SDI parameters custom function to isolate SDI parameters so that settings are not affected by a production load.

3G SDI



- **SRC** – check this option to enable sample rate conversion. Note that SRC is applied to all channels on the card. Normally, SRC should be enabled. If SRC is off (unchecked), then the system must be clocked to the same reference as the sending device.
- **Enable video delay** & **Video delay** (frames) – this option applies a delay to the SDI data from the de-embedder to embedder. Video and audio containted in the stream are delayed by the same amount. Set the amount of Video delay in steps of 1 video frame.
- **Video generator mode**, **format** & **test pattern** – the SDI card is equipped with a free-running video test pattern generator. Set the mode to either:
  - **Auto** – if the input is locked to an incoming video signal, then the output will automatically track the format of the input. If the input fails, then the video test pattern generator transmits the last received video format. When the SDI module is part of a SDI chain, this option is recommended.
  - **Force On** – in this mode it is assumed that the card is used as a video master and that no SDI input signal is applied. The test pattern generator is forced on all the time. Use the **Video generator format** and **Generator test pattern** options to define the video signal. In this mode the embedder sample rate is derived from the generator, and the SDI receiver is switched off. Note that the de-embedder cannot be used.

Embedder

- **Clean** – check this option to set the embedder mode to “Clean”. In this mode the incoming audio stream is deleted and a new data structure generated according to your embedder settings. Note that if you select this mode any existing audio data will be lost.
- **Embedder Group Enable** – audio is embedded in groups of four channels into SDI. There is a total of four groups per SDI, resulting in 16 audio channels. For each group, this checkbox determines whether the incoming SDI stream is replaced:
  - Enable the checkbox to replace the audio group content.
  - Disable the checkbox to leave the audio group untouched.

If there is no audio at the SDI input, then a new audio group will be generated.

Note that in AdminHD modes 16/0 and 8/0, all embedder group enables are turned off as the whole embedder section is bypassed.

- **Embedder source 1 to 16** – use these options to define the source for each embedder.

De-Embedder

- **DALLIS signal in source 1 to 16** – use these options to define the source for each de-embedder.

Metadata

The SDI module offers 2 metadata ports according to SMPTE RDD-2008. This allows embedding, de-embedding and transport of two independent Dolby metadata streams alongside with the video. The streams can be accessed via two D-Sub connectors at the front panel.

- **Metadata de-emb. & emb. to port 1, 2** - use these options to define the streams for the Metadata ports.
- **Metadata embedder mode & line** – set the mode to **Auto** to track the input, or select **Pre-selected line** and define a **Metdata embedder line**.

SDI Parameters (non 3G SDI Cards)

The DALLIS HD or SD SDI cards (946/13, 09, 05, 01) provide the ability to route a maximum of 8 channels to/from the SDI stream. Sample rate conversion may be applied to the whole card (all 8 channels), and delay may be applied to either the embedded or de-embedded signals.

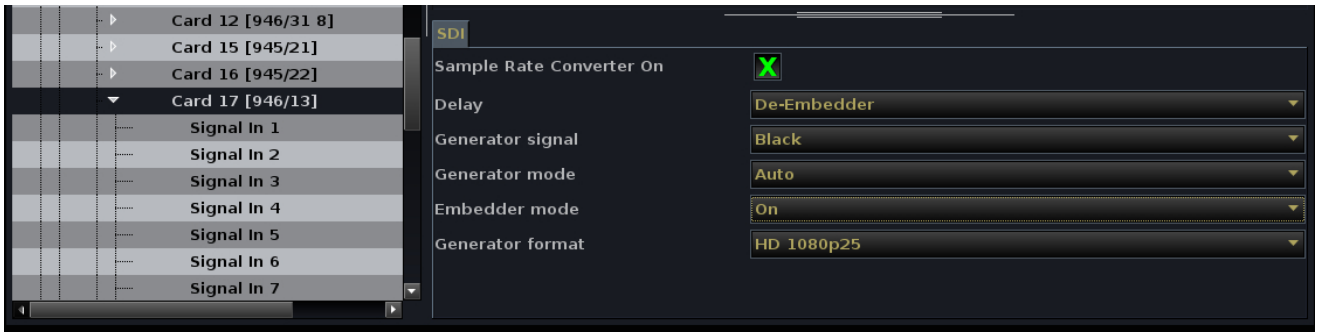
Further information can be found in the data sheet, available in the "mc2_Nova73_documentation" guide.

SDI parameters can be adjusted for the card and for individual input and output signals.

Note that SDI parameters are never stored by snapshots. From Version 4.8.0.2 onwards, they are stored and recalled by productions. You may use the Global isolate of SDI parameters custom function to isolate SDI parameters so that settings are not affected by a production load.

SDI Card

Select an SDI card from the **System** tree, and click on **SDI** to adjust the following card parameters:



- **SRC** – check this option to enable sample rate conversion. Note that SRC is applied to all 8 channels on the card. Normally, SRC should be enabled. If **SRC** is off (unchecked), then the system must be clocked to the same reference as the sending device.
- **Delay** – select whether delay is enabled for the **Embedded** (SDI output) or **De-embedded** (SDI input) signals; delay cannot be applied to both.
- **Generator signal**, **mode** and **format** – defines the output generator signal for the SDI stream.
- **Embedder mode** – select from:
  - **On** – audio channels will be replaced within the existing SDI data structure according to your SDI output group selections.
  - **Off** – no audio replacement; the SDI stream remains unaltered.
  - **Clean** – deletes the incoming audio stream and generates a new data structure according to your embedder settings. Note that if you select this mode any existing audio data will be lost.

SDI Inputs

Select an SDI input signal from the **System** tree, and click on **SDI** to adjust the following signal parameters:

- **Group select** – this field defines which pair of SDI channels will map to the selected SDI card input. In our example, **Group 2 Channels 3&4** from the SDI stream will be de-embedded to **SDI Signal In 1** and **2**.
- **Delay time** & **Delay** – check the Delay option to enable delay for the stereo input, and set the delay time in ms. Delay time can be adjusted from 0 to 240ms.

Delay is only applied to SDI inputs if the SDI card **Delay** parameter is set to **De-embedder**.

SDI Outputs

Select an SDI output signal from the **System** tree, and click on **SDI** to adjust the following parameters:

- **Group select** – this field defines which pair of SDI channels will map to the selected SDI card output. In our example, **Group 1 Channels 1&2** from the SDI stream will be embedded to **SDI Signal Out 1** and **2**.

The assignment is only active if the SDI card **Embedder mode** is set to **On** or **Clean**.

- **Delay time** & **Delay** – check the **Delay** option to enable delay for the stereo output, and set the delay time in ms.

Delay is only applied to SDI outputs if the SDI card **Delay** parameter is set to **Embedder**.

- **Wordlength** – choose from the available drop-down menu options.

When 16 or 20-bit are selected, dither is automatically applied.

GNU Public License

The following modules are used in the Nova73:

	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.

Control System Locations

The table below shows the location of the control system for different mc² and Nova73 products.

Note that:

- The Router Module MKII (980/33) control system provides two network ports: **ETHERNET A** connects to the mc² control surface; **ETHERNET B** connects to the Lawo system network.
- For control systems located inside the control surface, you may use any console **ETHERNET** port to connect to the Lawo system network.

System	Router Module	Control System	Location	System Network Port
mc² 56 classic	980/33	Intel	Nova73	ETHERNET B
mc² 56 MKII	980/33	Intel	Nova73	ETHERNET B
mc² 66 classic	980/31, 32	Intel	control surface	ETHERNET (any)
mc² 66 top1	980/31, 32	Intel	control surface	ETHERNET (any)
mc² 66 MKII	980/33	Intel	Nova73	ETHERNET B
mc² 90	980/31, 32	Intel	control surface	ETHERNET (any)
mc² 90	980/33	Intel	Nova73	ETHERNET B
mc² 90 star²	980/33	Intel	Nova73	ETHERNET B
Nova73 Standalone MKI	980/31, 32	Motorola	Nova73	ETHERNET
Nova73 Ripper MKI	980/31, 32	Intel	1HE Ripper	see Technical Documentation
Nova73 DSHS MKI	980/32	Intel	1HE Ripper	see Technical Documentation
Nova73 HD MKII	980/33	Intel	Nova73	ETHERNET B
Nova73 Compact MKII	980/33	Intel	Nova73	ETHERNET B
Nova73 HD DSHS MKII	980/33	Intel	Nova73	ETHERNET B

TCP/IP Addresses

Default IP Addresses

The default IP addresses, for different Lawo product control systems, are:

- **mc²56** = 192.168.102.56
- **mc²66** = 192.168.102.65
- **mc²90** = 192.168.102.90
- **Nova73** (HD & Compact) = 192.168.102.143
- **Nova73 HD DSHS**: primary 'star' = 192.168.102.32; secondary 'star' = 192.168.102.160
- **mxGUI** (local control system) = 192.168.56.101

You can check the IP address of your control system from the GUI (using the Signal Settings display).

Subnet Mask

For all products, the default Subnet Mask is **255.255.255.0**.

Other IP Addresses

The table below lists the other IP addresses used within a mc²56 MKII installation:

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.xxx	Default address of the control system (as listed above). This address can be modified by AdminHD.
Router Module Slot B (optional)	ETHERNET A	192.168.106.1	Fixed address.
Router Module Slot B (optional)	ETHERNET B	192.168.102.xxx	This address is *always* one digit higher than that of the main control system. It is set automatically by AdminHD.
Ethernet Switch (optional)	-	192.168.102.250	Default address.
ISDN Dialup Router (optional)	-	192.168.102.200	Default address.

We recommend keeping the default IP addresses, where possible, as this will simplify remote maintenance.

Glossary

48kHz or 44.1kHz
See Sample Rate.

Access
On mc² consoles, 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 Nova73 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 Nova73 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.
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.
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. Within mc² consoles and the Nova73, DSP is also used as the collective name given to the processing cards, within the Nova73, which provide audio signal processing such as equalization, dynamics and delay.
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 (IEEE488) is a standardised platform independent short-range digital interface, to allow switching connections between broadcast equipment from different manufacturers.
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 mc² consoles provide 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 mc² and Nova73 systems. The software runs GUI displays from an external PC and can be used either online or offline.
Nova73	The heart of the mc² system (includes the routing matrix, control system, I/O modules and DSP). Can exist as a stand-alone routing matrix with networking capabilities.
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.
RAS	Radio Automation System control protocol is Lawo's universal protocol for communication between a mixing console (MIXER) and a radio automation system (RAS).
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.
Remote MNOPL	The remote control protocol RemoteMNOPL is a LAN based client-server network byte order protocol to enable third party systems to control Lawo's digital mixing consoles or standalone routers.
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 mc² consoles, 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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