

# mc<sup>2</sup>66 MKII

## Operators Manual

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[www.lawo.com/downloads](http://www.lawo.com/downloads)

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# 1. Introduction

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Welcome to the **mc<sup>2</sup>66 MKII** Operators Manual.

## About this Manual

This document describes the operation of the console. The specification is valid for mc<sup>2</sup> Version 5.14.0.x.

All included options are described in this manual. For more on the hardware, installation, configuration and maintenance, please see the "mc<sup>2</sup>66 MKII Technical Manual". All Lawo manuals are available from the **Download-Center** at [www.lawo.com](http://www.lawo.com) (after **Login**).

Look out for the following which indicate:

**Notes** - points of clarification.

**Tips** - useful tips and short cuts.

**WARNINGS:** Alert you when an action should *a/ways* be observed.

## Utility Software

The **mxGUI** installer is free to download from the Lawo website (after **Login**).

Once installed, you can launch the following applications from a computer connected to the Lawo system network:

- **mxGUI** - for offline setup or remote operation.
- **CFCard Creator** - to create backup CF Cards for the control system and, in a console, the bay server(s).
- **mxUpdater** - to update the software of the mc<sup>2</sup>/Nova control system, or backup and restore user data.

## Lawo User Registration

For access to the **Download-Center** and to receive regular product updates, please register at:

[www.lawo.com/user-registration](http://www.lawo.com/user-registration).

## 2. Important Safety Instructions

### General Safety

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.
- Do **NOT** use the system at extreme temperatures - observe the temperature range and humidity specified in the installation instructions.
- Do **NOT** expose devices to liquids which may drip or splash.
- Do **NOT** place objects filled with liquids, such as vases, upon a device.
- Only service staff may replace batteries.
- **CAUTION:** Danger of explosion if battery is incorrectly replaced - Replace only with the same or equivalent type.

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

- 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.

### Eye Safety

This equipment may use Class 1 Laser products which emit invisible laser radiation that may lead to eye injury.

- **NEVER** look directly into optical components or optical fibre cables.
- Fit protection caps to close any unused optical components.
- Connect all optical fibre cables **BEFORE** turning on the equipment.

### Defective Parts/Modules

mc<sup>2</sup>66 MKII contains 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. Please contact our service department before sending parts for repair.

### First Aid (in the case of electric shock)

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.

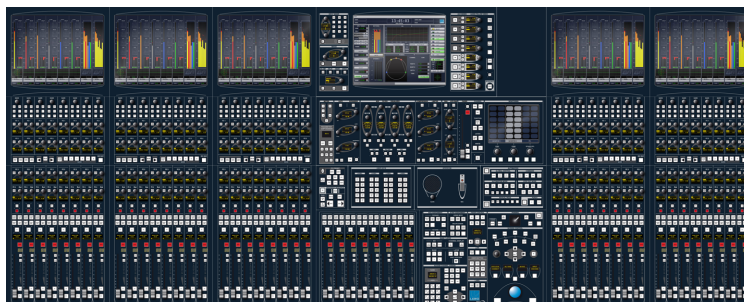
## 3. Overview

### System Components

The **mc<sup>2</sup>66 MKII** uses the same architecture, operating system and application software as other mc<sup>2</sup> products. As a result, it benefits from a powerful feature-set and can be networked to the other mc<sup>2</sup> and Nova systems. Each system consists of three main components: Control surface + Nova73 + Remote IO.

The **control surface** is available in a range of frame sizes. Every surface includes a centre section with 8 main faders plus a number of 8-fader channel bays. The minimum frame size is 16 + 8C = two channel bays plus the centre section.

*Example Frame Configuration: 24 + 8C + 16*



The **Nova73** handles all audio interfacing, signal processing, routing and control. It is available in two sizes: Nova73 HD (10RU) or Nova73 Compact (7RU). Both frames use the same plug-in Router, DSP and IO modules; the number and type determine the signal processing and IO capabilities of the system.

**Remote IO** devices can connect to the Nova73 to increase the IO capability. Options include the DALLIS modular IO system, the Compact IO stagebox and Virtual Devices such as Lawo's A\_\_line. If a new interface is installed, then the system configuration must be edited using AdminHD.

### Signal Processing

The DSP resources provide a mixture of input channels (INP), monitor return channels (MON), groups (GRP), main outputs (SUM) and auxiliary sends (AUX). All full processing channels include all DSP modules, allowing EQ, Dynamics, Delay, etc. to be applied to both inputs and outputs.

Two global channel types are supported: **Recording** or **Broadcast**. Recording channels have more signal processing and full flexibility, including up to 128 aux sends. Broadcast channels have simplified signal processing and a maximum of 32 aux sends. As a result, using Broadcast channels offers twice as many channels from the same amount of DSP resource.

*Signal Flow: Recording Channels*



*Signal Flow: Broadcast Channels*



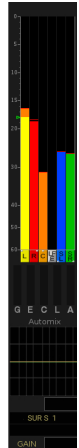
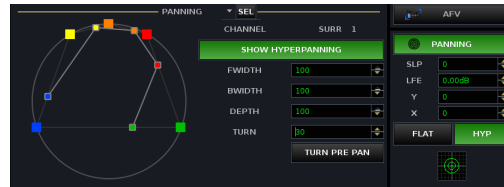
The global channel type and number of inputs, groups, sums, etc. are defined in the **DSP Configuration** display.

## Stereo & Surround

Any pair of odd/even channels can be configured for stereo, and adjacent channels for surround.

The following tools provide easy management of surround sources and outputs: **Surround VCAs** (multi-channel control from a single fader strip); **REVEAL** (reveal the surround slaves); **Hyper Pan** (reposition a surround source); **AMBIT** (upmix and spatialise processing); **Downmix Matrix** (convert surround back to stereo).

*Hyper Panning of a Surround VCA*



## Banks & Layers

Any physical fader strip can control any channel type. This allows you to position input channels and audio or control masters where you want them. The console supports six control surface banks (1 to 6), each with two layers - Layer 1 and Layer 2. Think of each bank as a separate console, with fast global switching from one bank to another. Within each bank, layers can be switched globally or individually. This makes layers ideal for related channels - for example, to flip between a presenter's input channel and their mix minus return.

## Console Reset & Automation

One of the major benefits of the mc266 MKII is the ability to store and recall your settings.

**Productions** form the top level for user data storage and store *all* the settings required to reset the system. If you only need one version of the system's settings, then it is enough to save (and load) a production. However, within a production you can also store multiple snapshots, cuelists and mixes.

**Snapshots** can be used to store different setups within the same production, or to reset the system during a show. To manage the recall, you can isolate individual channels, specific modules or global elements of the desk.

**Cuelists** are provided for convenient recall of snapshots and other events during a live show. A cuelist contains a series of "cue points" which can be loaded in sequence. Each cue point can load a snapshot, a series of output events, or a combination of both. When loading snapshots, continuous parameters can crossfade, and offsets can be applied to deal with changes such as a different artist.

**Mixes** store the console's automated settings referenced to timecode. Automation data can be written for any channel module, with modes to step in/out of write and trim existing moves. The 'Pass Tree' allows you to A/B between passes and perform offline edits such as a copy/paste or delete.

**Presets** are stored independently of productions and snapshots. They can store settings for individual modules or for a complete channel. For example, to save your favourite vocal EQ, or all settings for an announcer's channel.

All user data is stored on an internal flashcard (located on the Nova73 Router Module) and can be imported and exported to a USB memory stick, networked file server or mxGUI computer.

## Configuration

The console is delivered in a fully configured state and can be customised in a number of ways.

At an operator level, user buttons and other custom functions are programmed from the **Custom Functions** and **Command Triggers** displays. Operators can also create their own productions (and snapshots) to reset the system's routing, fader strip assignments, DSP settings, etc.

At a lower level, are a number of files which configure the system hardware components and the organisation of signals within the **Signal List** display. These files can be modified using a tool called **AdminHD** (described in your Technical Manual). The AdminHD configuration will need to be edited if you install a new interface or change the hardware setup in any way.

A number of other functions are factory-configured using **TCL** (Tool Command Language). TCL files can only be edited by Lawo personnel, and are designed to provide some flexibility at the specification stage. Console monitoring is one of the functions defined by TCL.

## Studio Integration

The system supports a wide range of options for further control and integration with third-party devices.

**mxGUI** is a free-of-charge application which provides offline setup or remote operation of any mc<sup>2</sup>/Nova system.

The **Lawo Remote App** is a free-of-charge app providing remote control of parameters from an iOS device.

The **Remote Desktop** function is programmed from the **Custom Functions** display and can switch any console TFT to a remote server. This allows you to view and control other applications from the mixing position - for example: KICK, the Waves plug-in server, an external DAW, etc.

**KICK** is a chargeable option designed for automated "close-ball" mixing. The software uses data from an external graphics tracking system to follow the position of the ball and other points of interest. It then produces an automatic mix of the close-ball action by controlling the relevant audio channels within the console.

The **Waves SoundGrid Plug-in Server** is a chargeable option requiring additional hardware. It allows Waves plug-ins to be controlled directly from the Central GUI and reset by snapshots and productions.

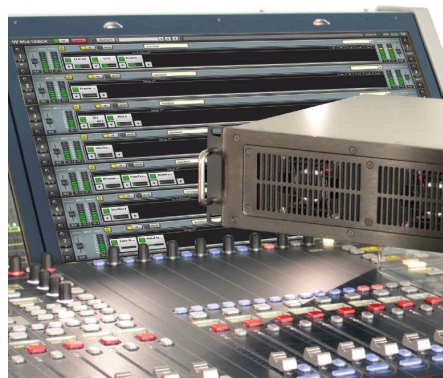
A range of **TCP/IP** protocols are supported including Lawo's Remote MNOPL, ROSS Audio Protocol (RAP), Ember+ and RTP MIDI. These can be used to communicate with external devices. Typical applications include:

- Third-party matrix control of crosspoints.
- Triggering of Audio Follow Video (AFV) events.
- General Purpose Channel (GPC) control of an external workstation (DAW) or Camera Control Unit (CCU).

*KICK - viewed on Central GUI*



*Waves SoundGrid Server*



Note that all included options are described in this manual.

For more information on chargeable options such as KICK or the Waves SoundGrid Plug-in Server, please refer to the separate manuals for those products.

## 4. Front Panel Controls

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This chapter describes the front panel controls.

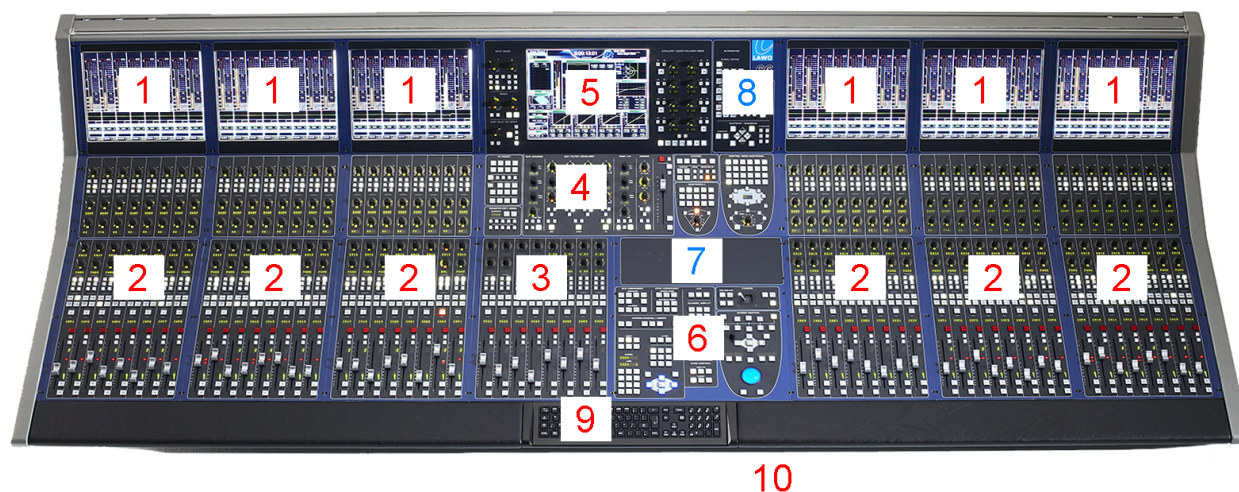
Topics include:

- [Surface Overview](#)
- [The Channel Display](#)
- [Channel Fader Strips](#)
- [Main Fader Strips](#)
- [The Central Control Section](#)
- [The Central GUI](#)
- [The Centre Section](#)
- [User Panels](#)



## 4.1 Surface Overview

The mc<sup>2</sup>66 MKII is available in a range of frame sizes scaling from 16 up to 112 faders. In each case, the control surface includes channel bays plus a centre section. All frame sizes have an identical set of controls except for the extra main faders configuration (described below), and the user panel/overbridge spaces (7 & 8). On a standard console, the controls are divided into the following areas:



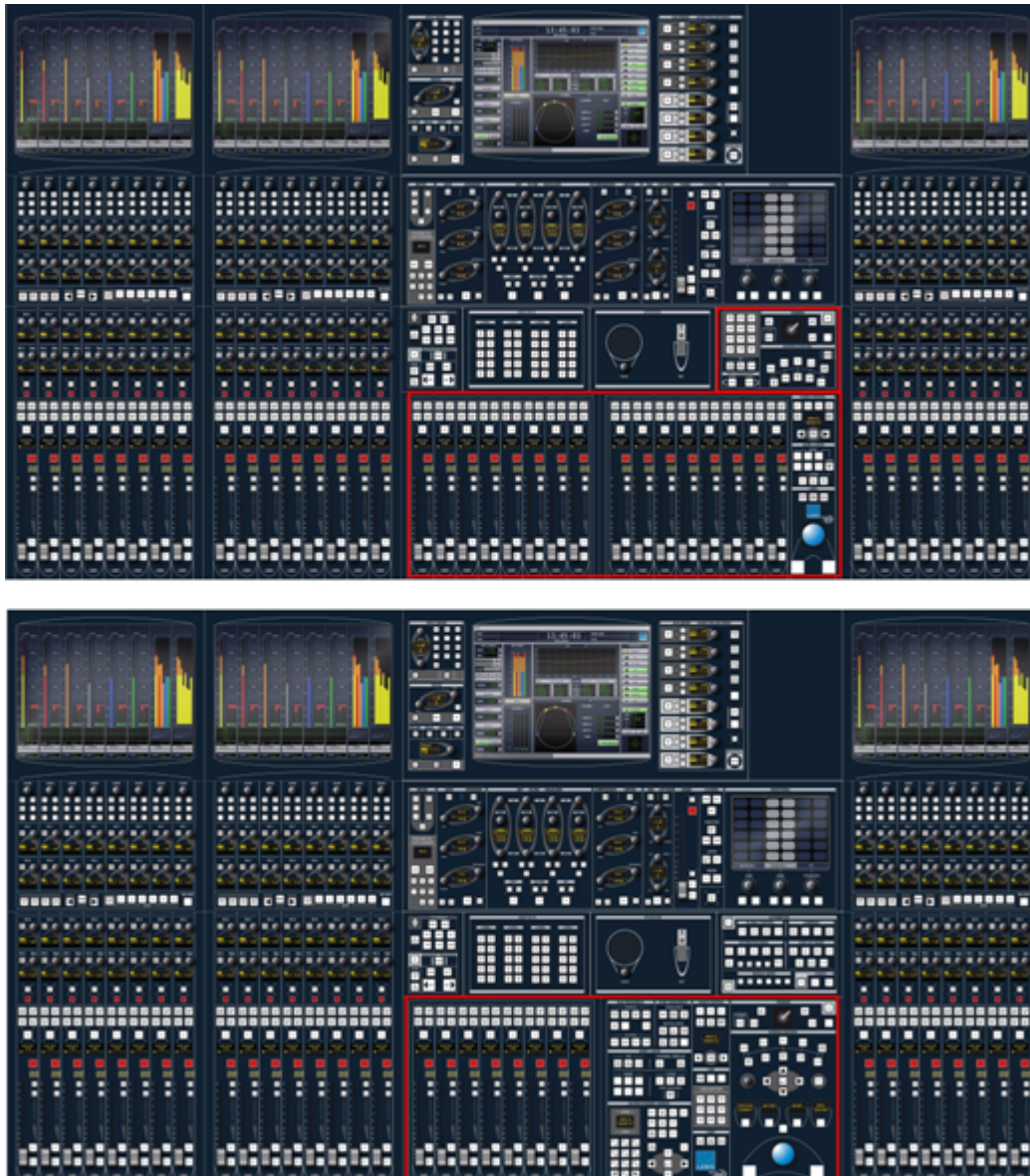
- 1 Channel Displays** - metering and information for channel assignments.
- 2 Channel Fader Strips** - dedicated mixing controls.
- 3 Main Fader Strips** - identical to the Channel Fader Strips but with fewer Free Controls.
- 4 Central Control Section** - parameter control for the channel in access: EQ, DYNAMICS, etc.
- 5 Central GUI** - metering and touch-screen operation of the console's setup displays.
- 6 Centre Section** - master controls including SCREEN CONTROL navigation.
- 7 User Panels** - space for either a 19" rack-mounting kit or up to three user panels (optional).
- 8 Overbridge** - space for either RTW metering or a user panel (optional).
- 9 Console Keyboard** - with flip-over access to hide the keyboard.
- 10 Headphone, Network & USB Ports** - 1 x stereo headphone out\*, 1 x ETHERNET A and 4 x USB ports.

\* A second stereo headphone out can be found further along the front buffer.

## 4.2 Console Variants

Optionally, the centre section can be fitted with eight additional main faders at the expense of some master controls. This adds 8 fader strips to the centre section, enabling 64 physical faders to fit across the width of standard OB-van.

The graphics below compare a 16+16+8 to a 16+8+8:

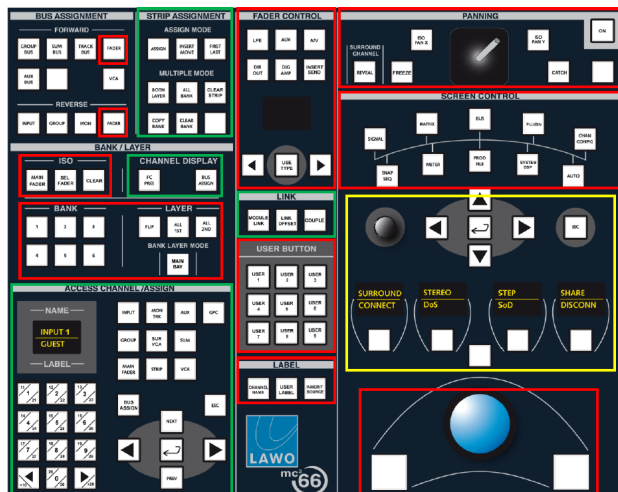


## 4. Front Panel Controls

### 4.2.1 Extra Main Faders

Full functionality is supported by both configurations. However, for 16 main fader consoles, there are some operational differences. These are summarised in the two pictures below: the controls outlined in red move to one of the new front panels; controls outlined in green move to the MONITORING panel touch-screen:

Standard Centre Section



Extra Main Faders Centre Section



Some controls have no alternate location as they can be operated in a different manner. This applies to:

- The **SCREEN CONTROL** soft keys (outlined in yellow) - instead, use the on-screen buttons or right-click context menus.
- The **GROUP BUS**, **SUM BUS** and other channel type buttons on the **BUS ASSIGNMENT** panel - instead, use the **REVERSE FADER** or **FORWARD FADER** buttons, see [Forward](#) and [Reverse](#) Assign.

Note that the User Panel Screen Control (962/30) *MUST* be fitted as one of the central [user panels](#). The position is flexible, but makes most sense on the right above the trackball and below the MONITORING panel as shown above. The Fader Panel Short Control is always fitted to the right of the extra main faders.

#### User Panel Screen Control (962/30)

This panel includes the joystick, **SCREEN CONTROL**, 12 **USER** buttons, **ISO** fader functions, **BUS ASSIGNMENT**, **PANNING** and **ESC**.

Note that the **FREEZE** function (for panning) is *NOT* supported.

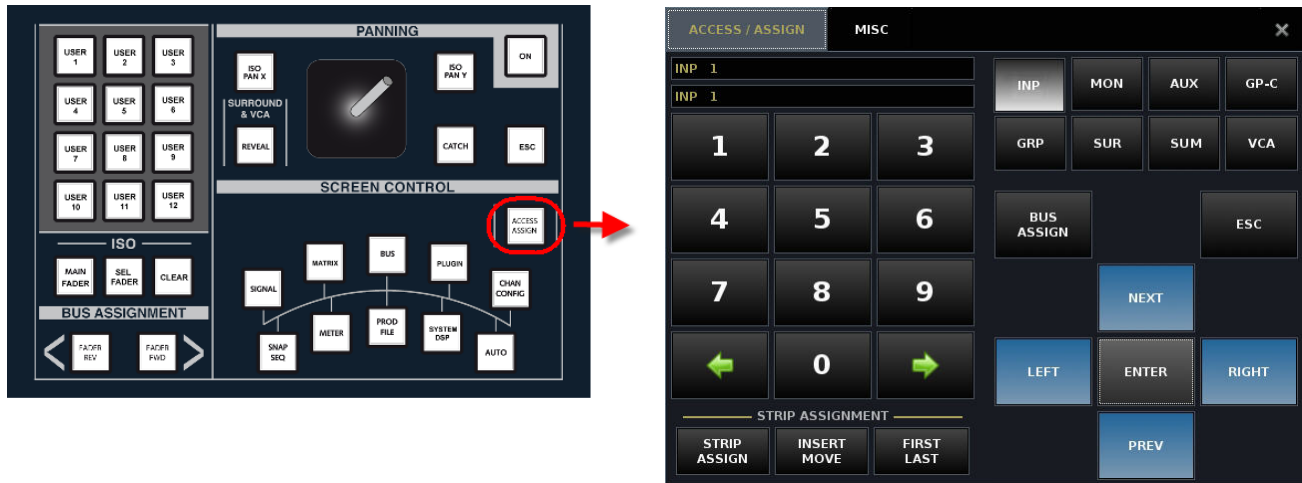
#### Fader Panel Short Control

This panel includes the trackball and mouse keys plus **FADER CONTROL** (of levels), **BANK/LAYER** and **LABEL** switching.

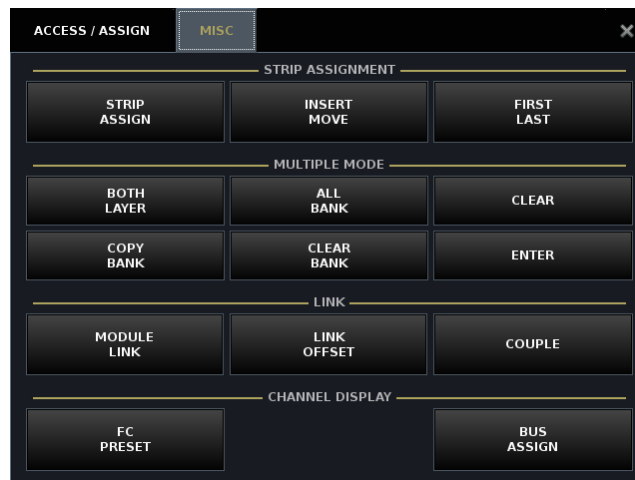
### ACCESS/ASSIGN Window

Functions which do not appear on either of the two new front panels are operated from the MONITORING panel touch-screen:

1. Press the **ACCESS/ASSIGN** button on the User Panel Screen Control - the ACCESS/ASSIGN window appears on the MONITORING panel's touch-screen:



2. Select the **ACCESS/ASSIGN** tab to operate ACCESS CHANNEL/ASSIGN functions. These include selecting channels and making fader strip assignments.
3. Select the **MISC** tab to access other functions such as STRIP ASSIGNMENT and MULTIPLE MODE, LINK groups and CHANNEL DISPLAY views.





### 4.3 The Channel Display

The **Channel** display is a high resolution, TFT display which provides visual feedback and metering for channel assignments.

Up to two metering rows can be enabled. The lower row *always* meters the active bank/layer, while the upper rows can be assigned to any bank/layer using the "[Multirow Metering](#)" options in the **System Settings** display.

The lower row includes the following elements. Note that some elements can be removed if you wish to simplify the display (using the "[Strip Layout](#)" options in the **System Settings**).

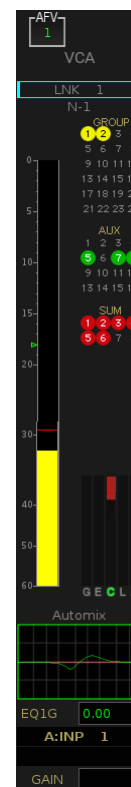
- **AFV** – the Audio Follow Video event number plus a camera icon if the event is active.
- **VCA** – the name and color coding of VCA or Surround VCA masters.
- **Link Group Name** – the name and color coding of link groups.
- **N-1** – the name and color coding of the N-1 bus.
- **Bus assignments** – onto the GROUP, TRACK, AUX and SUM busses.

TRACK busses are supported by Recording channels only.

AUX bus assignments are color coded to indicate pre-fader, pre-EQ (Recording channels only) or post-fader assignments.

You can choose how many buses are shown using the "[Bay Bus Count](#)" options in the **System Settings** display.

- **Channel Meter** – peak metering, loudness metering or both, see [Bargraph Types](#).
- **G E C L A** – gain reduction metering for the Gate, Expander, Compressor and Limiter, plus the Automix Level. If a module is enabled, then the corresponding letter lights in green. In our example, the Gate and Compressor are enabled, and the Compressor is active.
- **Automix** – the name and color coding of the Automix group.
- **Mini Display** – graphical feedback on parameter values (e.g. EQ). If the processing module is turned on, then the outline of the mini display is green. If nothing is assigned to the fader strip, then the console logo is shown.
- **Name or Label** – the name or label of the channels assigned to the 1st and 2nd layer. In our example, input 1 is assigned to the A input on the active layer (**A: INP 1**); there is nothing assigned to the alternate layer.
- **GAIN** – the source gain for the channel (mic/line or digital gain depending on the source).



### 4.3.1 Channel Display Views

The CHANNEL DISPLAY buttons in the centre section change what appears on the [Channel displays](#) across the console:



#### ➤ FC PRES

This button affects the Mini displays which provide graphical feedback on parameter values - EQ, Compressor, Pan, etc.



- **FC PRES** (off) - the displays follow the touch-sense of the Free Controls on the fader strip. For example, if you touch an EQ1G Free Control, then the display shows the EQ graph; touch a Compressor Threshold Free Control, and the display shows the Dynamics graph; etc.
- **FC PRES** (on) - the displays follow the FC PRESET selection in the centre section. For example, if you select an EQ FC PRESET, then all displays across the console update to show the EQ graph; select a Dynamics FC PRESET to view the Dynamics graph; etc.

The default mode is **FC PRES** (off) so that the Mini displays follow the Free Control touch-sense.

#### ➤ BUS ASSIGN

This button turns on the bus assignment display on multi-channel fader strips such as Surround VCAs, VCAs and Link masters:

- **BUS ASSIGN** (off) - bus assignments are *not* shown on multi-channel fader strips.
- **BUS ASSIGN** (on) - bus assignments are shown on multi-channel fader strips.

The default mode is **BUS ASSIGN** (off) to keep the metering area larger.

## 4. Front Panel Controls

### 4.4 Channel Fader Strips

Every channel bay includes 8 fader strips, each with the following controls.

#### 1 Input Gain

This control *always* adjusts source gain (mic/line or digital). The amount of **GAIN** is shown at the bottom of the [Channel display](#).

#### 2 A/B Input Switching

For any input channel, you can assign two sources (A and B) to provide a main and backup source for the channel. Press the **A** and **B** input select buttons to switch between the two sources. If nothing has been assigned to the **B** input, then the button cannot be selected. Note that the global "[Channel A/B Input Switch Enable](#)" option must be turned on to allow A/B input switching; the option defaults to off.

#### 3 Free Controls (FCs)

Every fader strip includes four Free Controls for local access to parameters such as aux send levels, EQ gain, etc. The controls are color-coded, making it easy to distinguish between Auxes (green), EQ (blue), Dynamics (magenta), etc.

Each control has its own push button and display. The button function depends on the assigned parameter (e.g. Aux on/off). The display shows the control function (AUX 1) and, when touched, its current value (0.00 dB). Note that the display mode can be changed from the [Extra Buttons](#) display.

Free Controls can be assigned to any channel parameter, and assignments can vary from channel to channel. For example, to access Compressor Threshold and EQ Gain on mic inputs; Aux send levels on music channels; etc.

You can temporarily override the default assignments by recalling an FC PRESET. These change the function of the Free Controls globally, and are great way to access say aux sends 1, 2, 3, etc. across the console. When you deselect an FC PRESET, the controls return to their default assignments.



#### 3a FC4/2nd

Free Control 4 can be switched to control the 2nd layer of channels. FC4 then controls the level of the alternate layer's channel; in addition you can **MUTE** or select (**SEL**) the channel.

All rotary controls support two modes of operation: turn for fine control, OR push down and turn for coarse adjustment. The modes can be reversed using the "[Console -> Potentiometer](#)" option in the **System Settings** display.

### 4 BANK/LAYER & ISO BAY

This section of controls affects all 8 fader strips in the bay.



The **BANK 1** to **6** and **LAYER FLIP** buttons provide local bank and layer switching for the 8 fader strips. They can be used with **ISO BAY** on or off. If **ISO BAY** is off, then the bank and layer will be reset by the global **BANK/LAYER** buttons in the centre section.

**ISO BAY ON** isolates the bay so that it is unaffected by the centre section **BANK** and **LAYER** switching. This makes it ideal for multi-operator mixing. Isolated bays can be excluded from snapshot loads, and can feed a separate **AFL/PFL** bus if the **ISO BAY AFL2/PFL2** option is enabled. In addition, you can work in expanded parameter mode as follows - first, select a channel within the bay; then press one of the **SHOW** buttons or **BUS** to spread the parameters across all Free Controls within the bay; use the left and right arrow keys to scroll through the available parameters.

### 5 Fader User Buttons

These four buttons can be customised, globally for all fader strips, and are labeled by the dual engraved key caps. By default, the upper functions apply to INPUT channels and are programmed for mix minus control (**CORD** and **CONF**) and talkback (**TALK**). The lower functions apply to MONITOR channels and are programmed for input switching and record arming (**SEND**, **RET** and **REC**). Snapshot isolate (**SNAP ISO**) applied to both channel types.

All user buttons are programmed from the [Custom Functions](#) display on the Central GUI. Note that custom functions are stored at a lower level to productions and, therefore, any changes will affect all users.

### 6 SEL (Select)

This button selects the channel - otherwise known as placing a channel "in access". It is used for lots of operations including assigning the channel to the Central Control Section.

### 7 Fader Label

This 8-character display shows the name or label of the channel assigned to the fader strip plus the channel level (in dB). The centre section's [LABEL](#) buttons determine what "label" is in view:

- **CHANNEL NAME** = the system name of the channel (e.g. INP 1, INP 2, etc).
- **USER LABEL** = the user label given to the channel (e.g. GUEST, MUSIC, etc).
- **INHERIT SOURCE** = the user label given to the source routed to the channel (e.g. MIC 1, CD, etc).

### 8 Mute

Press the **MUTE** button to mute the channel. Note the buttons can be disabled (globally) and their position altered (from after-fader to input) using the "Mute" and "Channel Mute" options in the **System Settings** display (under [Global -> Status](#)).

### 9 VCA Master Display

Displays the number of the VCA master if the channel is assigned to a VCA group.

### 10 Layer FLIP

Press **FLIP** to switch the fader strip from Layer 1 to 2, or vice versa. Note that layers can also be switched locally within the bay or globally from the centre section.

### 11 R/W (Read/Write)

This button will step the fader in and out of write when working with the timecode automation system.

### 12 Status Indicators

This area includes several LEDs. When lit, they show the following:

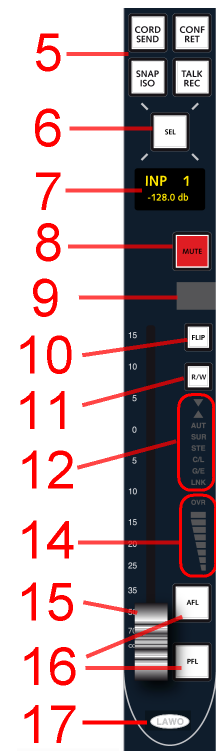
- **LNK** = processing modules within the channel are linked as part of a [link group](#).
- **AUT** = automation is [enabled](#) (for the fader).
- **SUR** = the channel is [surround](#); **STE** = the channel is [stereo](#).
- **C/L** = either the [compressor](#) or [limiter](#) is active; **G/E** = either the [gate](#) or [expander](#) is active.
- **ABV** = direction of play pass is higher than (above) the current fader level, see [automation](#).
- **BLW** = direction of play pass is lower than (below) the current fader level, see [automation](#).

### 13 Signal Present Meter

This meter *a/ways* shows the level of the channel input; the **OVR** LED indicates an overload.

### 14 Level

The 100mm fader is motorised and touch sensitive. Level can be adjusted from -128dB to +15dB.





## 4. Front Panel Controls

### 15 AFL & PFL

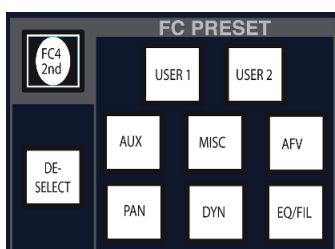
Press **AFL** to listen to the post-fade channel signal. Press **PFL** to listen to the pre-fade channel signal. The listen busses can be switched to different monitor outputs from the [MONITORING](#) panel.

### 16 LAWO Backlight

The **LAWO** backlight indicates the channel type: white = input channels, blue = VCAs, red = Sums, etc. See [Interrogating the Fader Strips](#).

### 4.4.1 Layer 2 Control

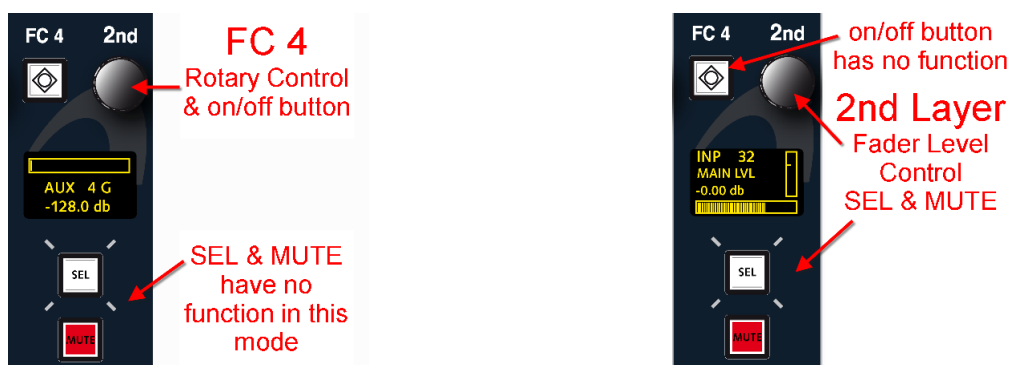
The lowest Free Control can act either as an assignable Free Control (FC4) or control the alternate layer of channels (2nd). The mode is switched globally across the console from the FC PRESET panel in the centre section:



1. Press the **FC4/2nd** button to change the mode.

When the button is off, FC4 acts as an assignable Free Control for the active layer's channel. In our example, it is assigned to Aux 4 Gain. In this mode, the **SEL** and **MUTE** buttons are inactive.

When the button is on, FC4 controls the level, **MUTE** and fader select (**SEL**) of the alternate layer's channel. Note that this could be either layer 1 or 2 depending on which layer is currently active. A vertical meter within the [Label](#) display provides an indication of the channel's signal level. In this mode, the function button beside the rotary control is inactive.

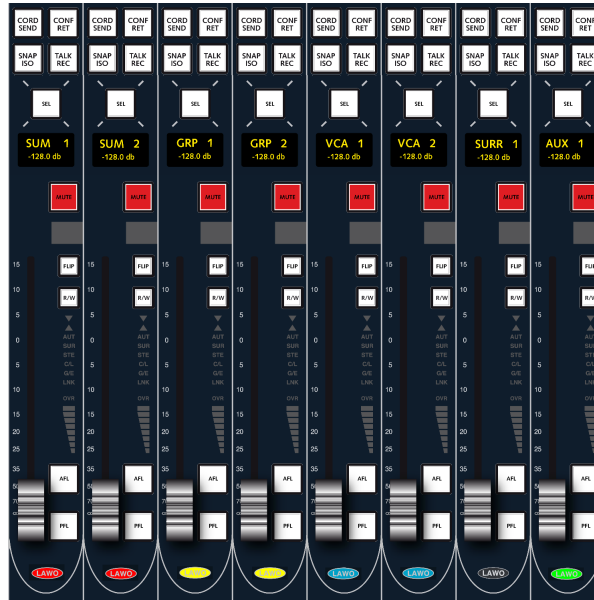


In each case, the FC4 or 2nd text illuminates to indicate the type of assignment: green for aux, white for input channel, etc.

## 4.5 Main Fader Strips

The centre section includes 8 fader strips known as the "main faders". These are identical to channel fader strips, except they do not have an input section, Free Controls, or **Channel** display.

Instead, use the [Central Control Section](#) to adjust channel parameters, and open the [Main Faders](#) display on the Central GUI for "Channel Display" functionality.



### 4.6 The Central Control Section



The Central Control Section provides parameter control for the channel in access:

1. Select a channel - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. Reach out to adjust a parameter - a pop-up window automatically appears whenever you touch a control. For a more permanent overview of channel parameters, open the [Main](#) display.

Rotary controls are color coded, making it easy to distinguish between gain (orange), dynamics (magenta), EQ (blue), etc. Note that controls will be black (unlit) if a processing module is not supported. This could be for a variety of reasons: for example, IMAGE is not available for mono channels; not all DSP modules are supported when using Broadcast channels; etc.

Use the [Couple](#) group to quickly adjust parameters across a range of channels.

The Central Control Section includes the following modules:

- **INPUT MIXER** - input gain, microphone preamplifier settings, stereo input balance/controls and tone to channel.
- **IMAGE** - width and positioning for a stereo channel.
- **DIG AMP** - digital amplifier (gain); **DELAY** - channel delay; **INSERT** - insert return on/off and send level; **DIROUT** - channel direct output level and mute.
- **AUX SENDS** - aux send levels, on/off and pickup points; **AUDIO FOLLOW VIDEO** - AFV parameters.
- **METER** - pickup point selection for the channel's peak and loudness metering.
- **DYNAMICS**: independent GATE, EXPANDER, COMPRESSOR and LIMITER. Recording Channels support sidechain filtering (SCF) and an external KEY input.
- **EQUALIZER** - 4-band equaliser (EQ) plus, on Recording Channels, 2-band filters (FILTER) and sidechain filters (SCF).
- **PANNING** - multi-channel panning onto the channel's mix bus outputs.

- **FADER / CHANNEL** - other channel parameters including MUTE and level (FADER).

Note that every module includes a **SEL** (select) button, and at the bottom of the CHANNEL area there is a **SEL ALL** button (to select or deselect all modules). During normal operation, these buttons perform no function. They are used whenever you need to make a selection - for example, to [copy or reset](#) a parameter, [link](#) modules between channels, select modules for [snapshot crossfades](#), etc. See [Selecting Channel Parameters](#) for details.

### 4.7 The Central GUI



The Central GUI (Graphical User Interface) is a high resolution touch-screen display above the console's centre section. It is used to setup the console, and provide visual feedback and metering. It can be operated using the touch-screen, trackball and mouse keys, SCREEN CONTROL panel or console keyboard. The operation is described in more detail [later](#).

## 4.8 The Centre Section

The rest of the centre section includes the following master controls:

### 1 PRODUCTION - UPDATE

This button saves the current console settings into the active production. Note that the button overwrites (updates) the active production. If new snapshots have been saved, then the button flashes as a reminder to save.



### 2 MONITORING

By default, the three sets of controls are configured for the 5.1 speaker output (**CRM 1**), stereo speaker output (**CRM 2**) and headphone 1,2 or PFL volume (**STUDIO/PFL**).

You can use the touch-screen buttons to change the monitor source and turn on other options such AFL to M1, PFL to M2, etc.

The full operation is described [later](#).



### 3 FC4/2nd

This button will flip all of the channel FC4 controls between their Free Control and second layer functionality as described [earlier](#).

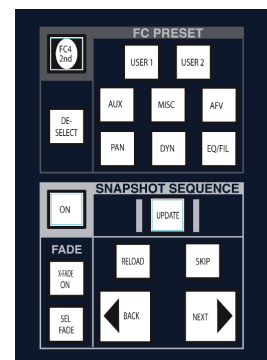
### 4 FC PRESETS

The FC PRESETs assign parameters onto the fader strip Free Controls. They temporarily override the default assignments, and are great way to access say aux sends 1, 2, 3, etc. globally across the console.

The first six presets are fixed: press **AUX** for aux sends; **MISC** for functions such as source gain; **AFV** for audio follow video; **PAN** for X/Y panning; **DYN** for dynamics; and **EQ/FIL** for equalisation. In each case, there are several pages so keep pressing to step through all available parameters.

The two **USER** presets can recall a custom set of functions. To store a preset: first, select a fader strip with the Free Control parameters you wish to store; then press and hold one of the **USER** preset buttons until it flashes - this stores the selected channel's Free Control assignments. To recall a preset, press the **USER** preset button quickly - the stored assignment is recalled globally across the console.

When all FC PRESET buttons are deselected (off), the fader strip Free Controls return to their default assignments.



### 5 SNAPSHOT/SEQUENCE

This area provides dedicated buttons for playing out a cue list. See [Cue list](#) automation for full details.

## 4. Front Panel Controls

### 6 BUS ASSIGNMENT

These buttons are used to make bus assignments, either forwards *from* the channel in access, or in reverse *to* the channel in access.

For example, to assign several input channels to a sum: first, select the SUM by pressing its fader **SEL** button; then press **REVERSE FADER** - the fader **SEL** buttons across the console show the current assignments (red = assigned; flashing green = unassigned); now press the fader **SEL** buttons to change the assignments.

Or, use **FORWARD FADER** to assign forwards from the channel in access - for example, from an input channel onto to group, sum, aux or VCA.

The other buttons can be used to filter the assignments - for example, to assign from only group channels.

### 7 STRIP ASSIGNMENT

These buttons assign channels to fader strips. You can assign a single or range of channels; insert, re-locate or swap channels; and make assignments across multiple banks and layers. These operations are described in more detail [later](#).

### 8 ISO

These buttons can be used to isolate fader strips from BANK switching. Turn on **MAIN FADER** to isolate *all* main fader strips. Or, press **SEL FADER** and then select the strips you wish to isolate (by pressing their fader **SEL** buttons: red = selected). To clear all isolations, press **CLEAR**.

### 9 CHANNEL DISPLAY

These buttons can be used to change the [view](#) used by the Channel Displays.

### 10 BANK & LAYER Switching

The BANK 1 to 6 buttons switch the fader strips, globally, between banks. One button is always lit; this is the active bank. Six banks are available.

Within each bank, you can press LAYER **FLIP** to invert the layers; **ALL 1ST** to switch to layer 1; and **ALL 2ND** to switch to layer 2. Note that the **ALL 1ST** and **ALL 2ND** buttons are temporary, so any **FLIP** states are reinstated when you deselect the button. To permanently reset the flip states, press and hold **ALL 1ST** or **ALL 2ND** for more than 3 seconds.

The **MAIN BAY** button can be used with both BANK and LAYER switching. When it is turned on, the bank/layer selections affect *only* the main faders. When it is turned off, the bank/layer selections affect *all* fader strips across the console, except for those in an isolated bay (ISO BAY on) or with an ISO state active (see 5).

### 11 ACCESS CHANNEL / ASSIGN

This panel can be used to select a channel, otherwise known as placing a channel "in access". It is described in more detail [later](#).



### 12 FADER CONTROL

These buttons temporarily assign another level parameter onto the console's faders. For example, press **AUX SENDS** to assign an aux send - the electronic label shows the name of the send (e.g. **AUX 1**). Then, use the arrow buttons to scroll through each aux. Alternatively, touch the aux send on the Central Control Section and then press **USE TYPE** - this switches the faders directly to say Aux Send 28 without scrolling.

The following level parameters can be controlled in this manner: AUX SENDS (send levels); DIG AMP (digital amplifier gain); INSERT SEND (insert send level); DIR OUT (direct output level); AFV (audio follow video On level); LFE (Subwoofer level).

When active, the fader labels across the console show the parameter name, and flash to warn you that you are now controlling something other than the main channel level!

### 13 LINK

The **MODULE LINK** and **LINK OFFSET** buttons are used to create and manage [link groups](#). The **COUPLE** button can be used to create a [couple](#).

### 14 USER BUTTON

These buttons can be customised for master functions. Typical applications include enabling the second metering row on [Channel displays](#); start/stop/reset for [integrated](#) loudness measurements; copy and paste for [copying levels](#) to auxes.

All user buttons are programmed from the [Custom Functions](#) display. Note that custom functions are stored at a lower level to productions and, therefore, any changes will affect all users.

### 15 LABEL

These buttons change the fader strip labels as described earlier. The options are:

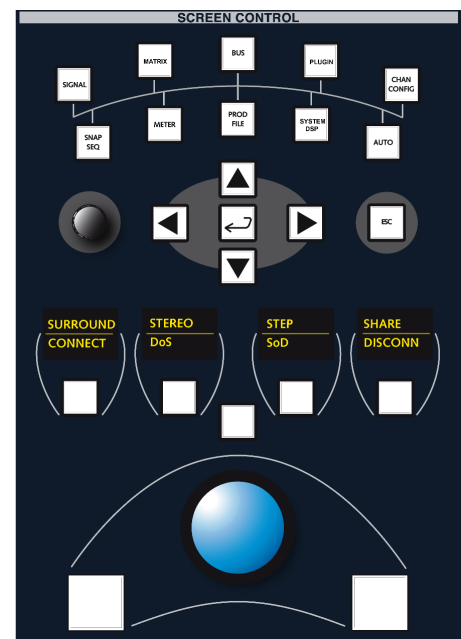
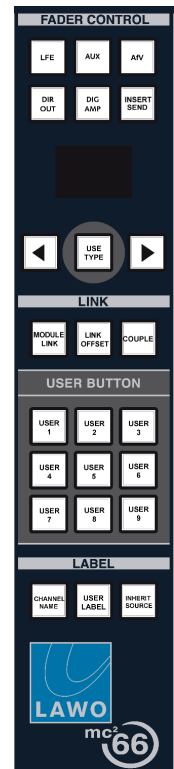
- **CHANNEL NAME** = the system name of the channel (e.g. INP 1, INP 2, etc).
- **USER LABEL** = the user label given to the channel (e.g. GUEST, MUSIC, etc).
- **INHERIT SOURCE** = the user label given to the source routed to the channel (e.g. MIC 1, CD, etc).

See [Working with User Labels](#).

### 16 SCREEN CONTROL

This area works in conjunction with the Central GUI and is described [later](#).

Note that you can press the **ESC** (ESCAPE) button at any time to cancel out of an operation - for example, to cancel a bus assign, a fader strip assign, etc.

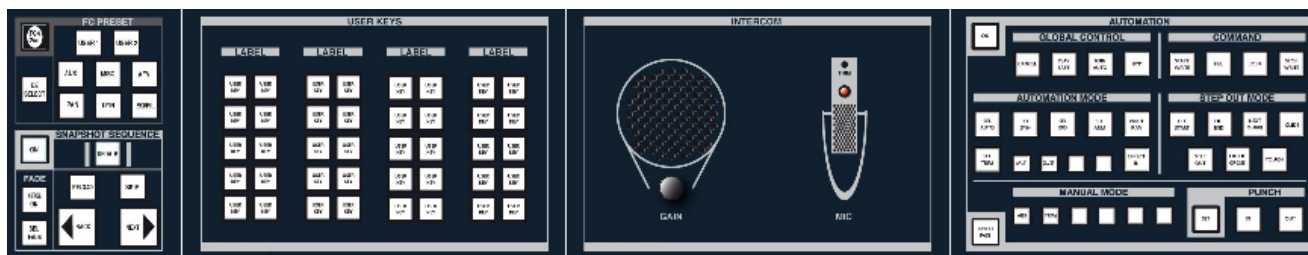




## 4. Front Panel Controls

### 4.9 Central User Panels

To the right of the FC PRESET and SNAPSHOT/SEQUENCE controls, you can fit either a single 19" 2RU rack mounting kit or up to three Lawo user panels. Our layout includes the USER KEYS, INTERCOM and AUTOMATION user panels:



The available user panel options are as follows. Note that some panels occupy more than one slot:

Part No	User Panel	Slots	Description
962/14	USER KEYS 40	1	40 user buttons, programmed by the <b>Custom Functions</b> display.
962/19	USER KEYS 80	2	80 user buttons, programmed by the <b>Custom Functions</b> display.
962/15	USER CONTROLS	1	8 rotary controls defined by the factory configuration.
962/16	INTERCOM	1	Integrated loudspeaker and internal talkback microphone.
962/18	AUTOMATION	1	Timecode automation controls.
962/29	REVEAL FADER	1	5 dedicated faders for revealing surround slaves.
962/17	MACHINE CONTROL	2	Remote control for external machines.
962/30	USER PANEL SCREEN CONTROL	1	Must be fitted to consoles with 8 extra main faders.

USER KEYS (40)



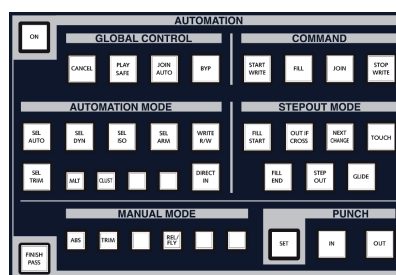
USER CONTROLS



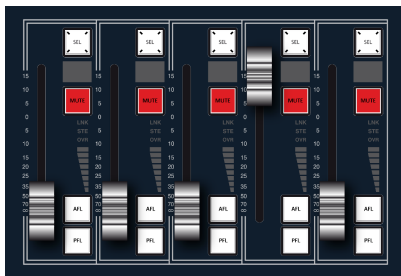
INTERCOM



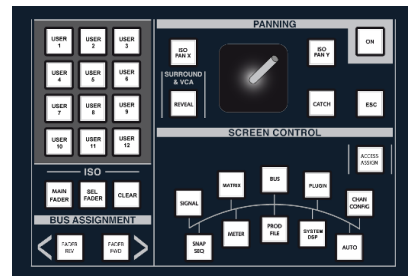
AUTOMATION



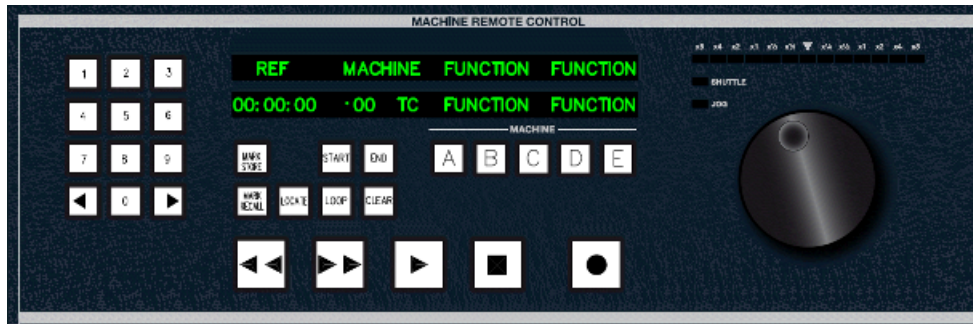
REVEAL FADER



USER PANEL SCREEN CONTROL



MACHINE REMOTE CONTROL



## 4. Front Panel Controls

### 4.10 Overbridge Options



Space is available in the Overbridge to fit either RTW metering or a blanking panel (shown above). The components of the overbridge fitting are delivered with the relevant cabling.

The default configuration usually sets the RTW to automatically follow the CRM 1 monitor source selector.

## 5. Working with the Central GUI

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This chapter describes the operation of the Central GUI.

Topics include:

- [Display Areas](#)
- [Changing the SCREEN CONTROL Display](#)
- [SCREEN CONTROL Panel Operations](#)
- [Navigation and Making Selections](#)
- [Adjusting Parameter Values](#)
- [Sorting & Resizing](#)
- [Using the Console Keyboard](#)

## 5. Working with the Central GUI

### 5.1 Display Areas

The Central GUI is divided into three separate areas.

The title bar (1) and status bar (3) are always visible, while the main working area (2) is switched between different SCREEN CONTROL displays.



#### 1 Title Bar (Headline)

Across the top you will *always* see the page select buttons, the name and label of the channel in access, the headline (local time, timecode or integrated loudness), and the name of the current production and snapshot.

#### 2 SCREEN CONTROL Displays

This area can be paged between different displays.

To change display, press one of the dedicated buttons on the SCREEN CONTROL panel (in the centre section); touch the page icon or Next/Previous buttons (in the title bar); or use a keyboard shortcut.

The **Signal List** display shown above is used to connect sources to destinations. For live mixing, the **Main Faders** display is recommended as it provides "Channel Display" functionality for the main fader strips.

#### 3 Status Bar

The status bar provides feedback on the amount of used data storage space (%) and the software release version. The icons on the right indicate the status of the sync source, control surface PSU(s) and any networked system connections.

### 5.1.1 Title Bar (Headline)



The title bar includes the following elements:

#### 1 PAGE Selection

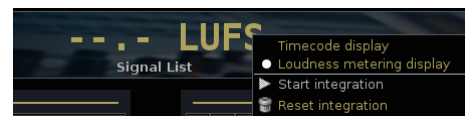
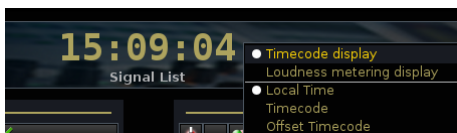
Select the PAGE icon to choose a SCREEN CONTROL display. Or, select the Left (or Right) arrow button to switch to the Previous (or Next) page. The name of the current display is shown below the headline (e.g. **Signal List**).

#### 2 Channel In Access

These two text fields *always* show the name and label of the [channel in access](#) – e.g. **INP 1**, **Kick**.

#### 3 Headline

The headline can display either **Timecode** or **Loudness metering**. Click on the current option to make a change:



Select **Timecode** to display one of the following:

- **Local** = the [local system time](#) in 24 hour clock.
- **Timecode** = SMPTE timecode from your selected [timecode reference](#).
- **Offset TC** = SMPTE timecode + the [Midnight offset](#).

Alternatively, select **Loudness metering** to display the [integrated](#) loudness measurement for a particular summing channel (in LUFs).

#### 4 Status Flags

To the right of the headline is an area which can show:

- A yellow warning triangle - if the global alarm is triggered. Click on the triangle to [interrogate](#) the error.
- A locked icon - if the console keyboard is [locked](#).

#### 5 Active Production & Snapshot

These two fields *always* show the name of the active production and current snapshot (if one has been loaded) – e.g. **production0015** and **snapshot0014**. The fields are for information only and cannot be edited.

#### 6 LAWO Logo

Click on the **LAWO** logo to manually time stamp the system logfile. This marks the **messages** file at a moment in time, and can assist Lawo's service department when diagnosing system behaviour.

Log files can be copied from the system via the [File](#) display.

### 5.1.2 SCREEN CONTROL Displays

One of the following displays will always appear in the main working area:

PAGE Button	Display Name	Application	Conditions
<b>SIGNAL</b>	<a href="#">Signal List</a>	signal routing; user labels; channel formats	
"	<a href="#">Signal Settings</a>	IO parameters; check the hardware status	
"	Thumbnail Assignment	image assignment for fader strip labels	mc <sup>2</sup> 96 only
<b>MATRIX</b>	<a href="#">mx Routing</a>	crosspoint control of signal routing	
"	<a href="#">mxDSP</a>	settings on mxDSP modules	see <sup>1</sup>
"	<a href="#">Downmix</a>	parameters for downmix matrices	see <sup>2</sup>
<b>BUS</b>	<a href="#">Bus Assign</a>	bus assign from the channel in access	
"	<a href="#">Busses Reverse</a>	bus assign to the channel in access	
"	<a href="#">Automix</a>	create and control automix groups	
<b>PLUGIN</b>	Plugin setup	set up the remote plug-in server	optional, see <sup>3</sup>
"	Plugin Edit	edit plug-in parameters	
<b>CHAN CONFIG</b>	<a href="#">Main Display</a>	parameters for the channel in access	
"	<a href="#">Channel Config</a>	signal flow for the channel in access	
<b>METER</b>	<a href="#">Meter 1 to 4</a>	assignable meters	
"	<a href="#">Main Faders</a>	"channel display" for the main faders	
<b>SYSTEM DSP</b>	<a href="#">System Settings</a>	system options	
"	<a href="#">DSP Config</a>	DSP Configuration	
"	<a href="#">Custom Functions</a>	program custom functions (e.g. user buttons)	
"	<a href="#">Command Triggers</a>	program command triggers (e.g. fader starts)	
<b>SNAP SEQ</b>	<a href="#">Snapshots List</a>	load, save and manage console snapshots	
"	<a href="#">Cuelist</a>	create and play out real-time automation	
"	<a href="#">Snapshot Trim Sets</a>	snapshot offset parameters	
"	<a href="#">Iso Sets</a>	module-specific snapshot isolates	
<b>AUTO</b>	<a href="#">Mixes</a>	record and play back timecode automation (mixes)	not supported by mc <sup>2</sup> 36 or MicroCore
"	<a href="#">Passes</a>	manage automation passes (within the active mix)	
"	<a href="#">Machine Locators</a>	create and manage timecode locators	
<b>PROD FILE</b>	<a href="#">Productions</a>	load, save and manage productions	
"	<a href="#">File</a>	import or export productions to/from USB or a network server	
<b>XTRA</b>	<a href="#">Extra Buttons</a>	additional functions	

#### Explanation of Conditions:

<sup>1</sup> To use this display, your system must be installed with at least one mxDSP module.

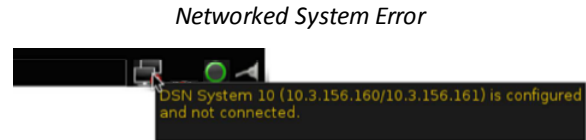
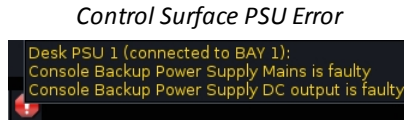
<sup>2</sup> To use this display, at least one Downmix Matrix must be configured. This can be defined by AdminHD if matrix resources are available.

<sup>3</sup> The PLUGIN pages are only available if the external plug-in server is installed. Please refer to the separate "Waves SoundGrid for mc<sup>2</sup> User Guide" for details.

### 5.1.3 Status Bar

The status bar provides feedback on the amount of used data storage space (%) and the software release version. You will also see the progress of operations when you perform tasks such as loading or saving production.

The icons on the right indicate the status of the sync source, control surface PSUs and, if applicable, the connection to another [networked](#) Lawo system. Green = all is ok. Hover over each icon to reveal more information.



If [cuelist](#) automation is enabled, then you will also see the names of the Previous, Current and Next cuepoints:





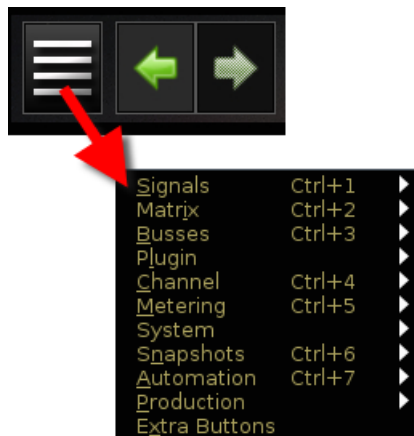
### 5.2 Changing the SCREEN CONTROL Display

There are a number of ways to change the display in the main working area:

1. Press one of the dedicated buttons on the SCREEN CONTROL [panel](#).

Each button can access more than one page, so keep pressing to cycle through all available [displays](#).

2. On the Central GUI, touch the PAGE icon (top left) and select a page:



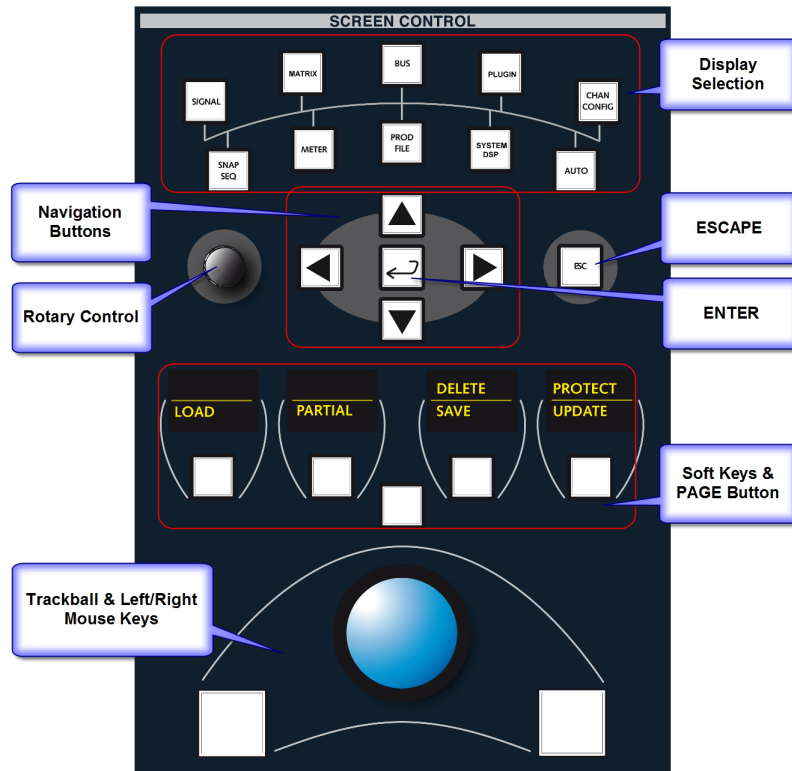
3. On the Central GUI, touch Next or Previous Page buttons - these are the arrows beside the PAGE icon:



The buttons work just like the Forward and Back buttons on a web browser. So, if you have viewed say the **DSP Configuration**, then the **Snapshots** list, and then the **Main** display, you can use the Left arrow to step backwards through this sequence. The last 16 page views are stored. When you reach the first (or last) page in the sequence, the button turns grey indicating that no further selections are available.

4. Use a keyboard shortcut as follows:
  - Press **ALT + P** to open the Page menu. Then press an underlined letter to select a display – for example, **S** to open **S**ignals, **M** to open **M**atrix, etc.
  - Use any of the key combinations shown - for example, press **[CTRL] + [1]** to cycle through the available Signals displays: **Signal List** and **Signal Settings**.
  - Press **[ALT] + [Cursor Left]/ [Cursor Right]** to select the Next or Previous page.

### 5.3 SCREEN CONTROL Panel Operations

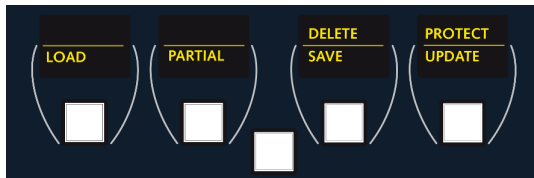


The following operations can be performed from the SCREEN CONTROL panel:

- Use the upper buttons (**SIGNAL**, etc.) to select a SCREEN CONTROL display. Each button can access more than one page, so keep pressing to cycle through all available displays.
- The Left/Right and Up/Down arrows change which part of the display is in focus.
- The rotary control can adjust values if a parameter field is selected, OR scroll up and down lists if a list is in focus.
- Press **ENTER** whenever you need to confirm an operation.
- Press **ESC** to cancel out of an operation.
- The eight [soft key](#) functions vary depending on the selected SCREEN CONTROL display and the area in focus. They are labeled by the electronic displays.
- Use the trackball to move the pointer around the Central GUI - left-click to make a selection or enable/disable on-screen buttons; right-click to view the [context menu](#) options.

### 5.3.1 Using the Soft Keys

The soft key functions update whenever you change the SCREEN CONTROL display or focus on a different area. In our example, the **Snapshot List** is in focus and, therefore, the keys can be used to **LOAD** the selected snapshot, save a **PARTIAL** snapshot, etc.



1. To access the second level of functions – e.g. **DELETE** and **PROTECT** – press the **PAGE** button (this is the central button below the soft keys). The displays update so that you can see which soft key to press for each operation.
2. Deselect **PAGE** to go back to the first level.

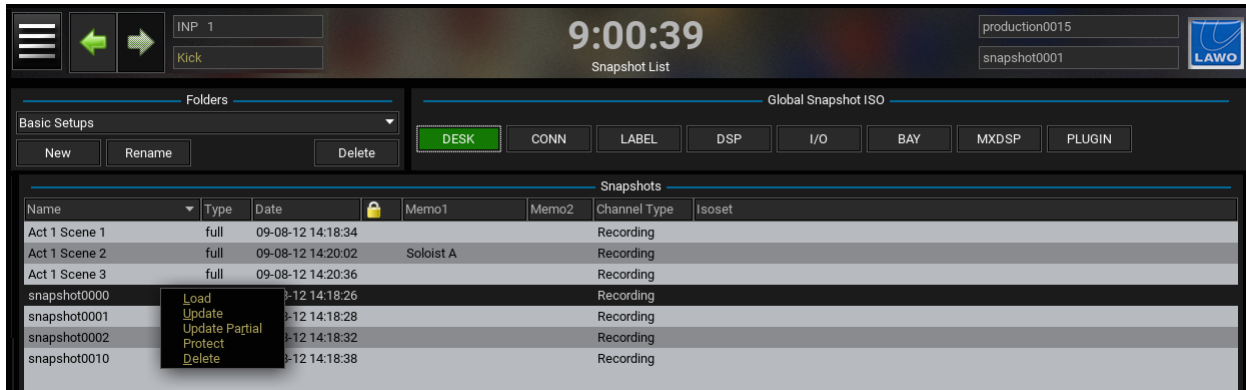
Soft key functions are duplicated on-screen, either as a dedicated button or [context menu](#) (right-click) option.

## 5.4 Navigation and Making Selections

To navigate around a display and make selections you can use the touch-screen, trackball & mouse keys, SCREEN CONTROL panel or console keyboard.

### Touch-screen

Anything which is a button or menu option can be selected by touching the screen. Buttons change color when enabled (e.g. the **DESK** Global Snapshot ISO). List selections are highlighted in black (e.g. **snapshot0000**):



### Trackball & Mouse Keys

Use the trackball to position the cursor and press the left mouse key to make a selection. Additional functions appear if you right-click on a selection.

### SCREEN CONTROL Panel

When focussed on a list, turn the rotary control on the SCREEN CONTROL [panel](#), or press the Up/Down arrow buttons, to scroll up and down the list and make a selection. You can tell which part of the display is "in focus" by the dotted outline.

### Console Keyboard

You can also use keyboard shortcuts ("Hot Keys") to move around the display and make selections:

- **[TAB]** or **[SHIFT] + [TAB]** - changes the focus area.
- **[Cursor Up]**/ **[Cursor Down]** - scrolls up or down through the entries in a list.

## 5.5 Adjusting Parameter Values

On some displays, you can adjust a value from the trackball, SCREEN CONTROL panel or console keyboard:

1. Using the trackball and mouse keys, left-click on the arrows beside a parameter (e.g. **GAIN**) to increase or decrease its value.
2. With the cursor inside a value field, turn the rotary control on the SCREEN CONTROL [panel](#).
3. With the cursor inside a value field, press the keyboard's UP or DOWN arrow keys to increase or decrease the value. Or, type in a value and press ENTER.



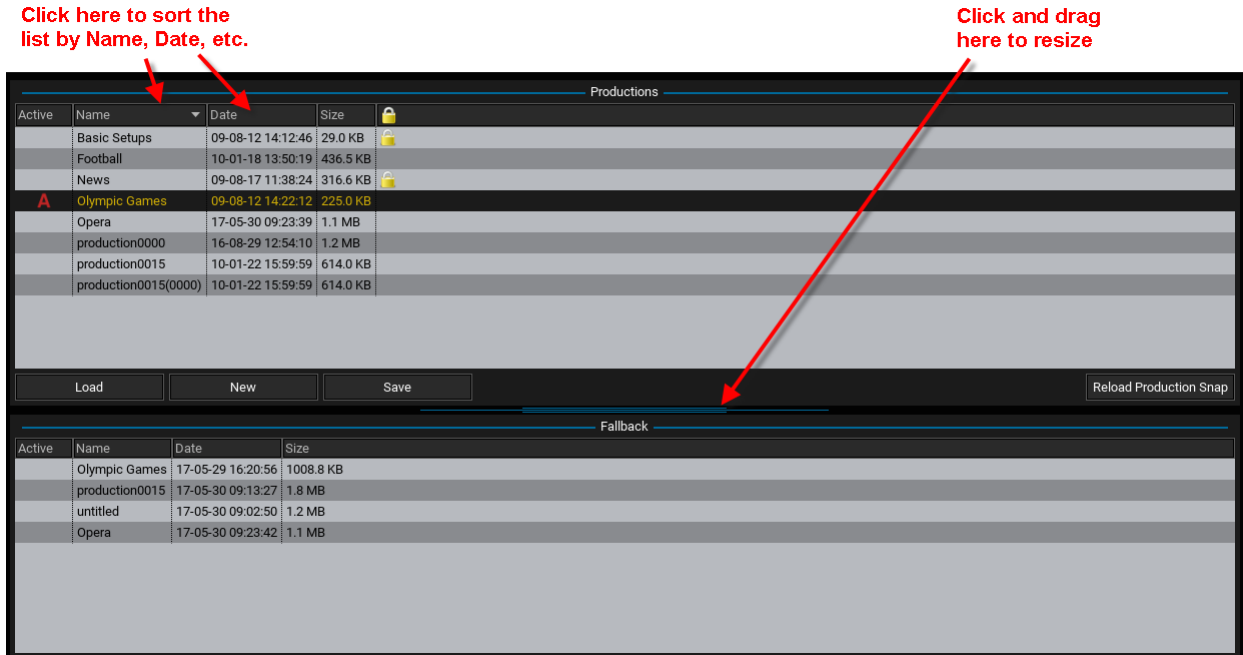
## 5.6 Sorting & Resizing

1. In "list" displays, you can sort the list by clicking on a column heading: e.g. **Name**, **Date** or **Size**.
2. If you see a blue separator bar, then a window area can be resized.

For example, to make the **Productions** list bigger (and **Fallback** productions list smaller), click and drag on the blue bar; the window areas resize accordingly. Note that if there is no blue separator bar, then resizing is not possible. You can also use this method to "hide" an area if you wish.

Click here to sort the list by Name, Date, etc.

Click and drag here to resize



Active	Name	Date	Size	
	Basic Setups	09-08-12 14:12:46	29.0 KB	
	Football	10-01-18 13:50:19	436.5 KB	
	News	09-08-17 11:38:24	316.6 KB	
A	Olympic Games	09-08-12 14:22:12	225.0 KB	
	Opera	17-05-30 09:23:39	1.1 MB	
	production0000	16-08-29 12:54:10	1.2 MB	
	production0015	10-01-22 15:59:59	614.0 KB	
	production0015(0000)	10-01-22 15:59:59	614.0 KB	

Load New Save Reload Production Snap

Active	Name	Date	Size
	Olympic Games	17-05-29 16:20:56	1008.8 KB
	production0015	17-05-30 09:13:27	1.8 MB
	untitled	17-05-30 09:02:50	1.2 MB
	Opera	17-05-30 09:23:42	1.1 MB

3. You can also change the order of columns within a list – for example, to move the padlock (protection) column, position the cursor above the column title, then click and drag the column to the left or to the right. Release the left mouse key when you are happy with the new position of the column.

Note that any changes you make to window sizes and list orders are reset after a system restart.

### 5.7 Using the Console Keyboard

The console keyboard is used primarily to edit text, but can also change the SCREEN CONTROL display, make selections and adjust parameter values.

The keyboard layout (English or German) is selected from the **System Settings** display (via the [Global -> System](#) options).

The console keyboard can be enabled (or disabled) as follows:

1. Press and hold the **Fn** button, and then press **ON**.

If the keyboard is disabled, you will see "kbd locked" in the Central GUI [title bar](#).

#### 5.7.1 Editing Text Fields

To edit a text field, such as a snapshot name:

1. Left-click on the text field - either once to overwrite (as shown below), or twice to modify an existing name (a flashing cursor will appear).



Name	Type	Date	🔒	Memo1	Memo2	Channel Type	Isoset
Act 1 Scene 1	full	09-08-12 14:18:34				Recording	
Act 1 Scene 2	full	09-08-12 14:20:02		Soloist A		Recording	
Act 1 Scene 3	full	09-08-12 14:20:36				Recording	
snapshot0000	full	09-08-12 14:18:26				Recording	
snapshot0001	full	09-08-12 14:18:28				Recording	
snapshot0002	full	09-08-12 14:18:32				Recording	
snapshot0010	full	09-08-12 14:18:38				Recording	
snapshot0011	full	17-05-29 13:13:01				Recording	

2. Type in your text using the console keyboard.

You can use the left or right arrow keys to move the position of the cursor within the field.

3. Press **ENTER** to confirm. OR, to exit without making any changes, press **ESC**.

Once text is selected, you can right-click to access **Cut**, **Copy**, **Paste**, **Delete** and **Select All**. Or, use the **CTRL+C** and **CTRL+V** keyboard shortcuts to copy and paste the selected text between fields.



Name	Type	Date	🔒	Memo1	Memo2	Channel Type	Isoset
Act 1 Scene 1	full	09-08-12 14:18:34				Recording	
Act 1 Scene 2	full	09-08-12 14:20:02		Soloist A		Recording	
Act 1 Scene 3	full	09-08-12 14:20:36				Recording	
Act 2 Scene 1	full	17-05-29 13:13:01		Update for Soloist B		Recording	
snapshot0000	full	09-08-12 14:18:26				Recording	
snapshot0001	full	09-08-12 14:18:28				Recording	
snapshot0002	full	09-08-12 14:18:32				Recording	
snapshot0010	full	09-08-12 14:18:38				Recording	

### 5.7.2 Keyboard Shortcuts (Hot Keys)

Below is a summary of all the keyboard shortcuts (known as "hot keys").

#### Global "Hot Keys"

- [ALT] + [Cursor Left] or [Cursor Right] - next or previous Page.
- [CTRL] + [1] to [8] - selects a SCREEN CONTROL display.
- [ALT] + [P] - opens the Page menu. Then press [S] to open **S**ignals, [M] to open **M**atrix, etc.
- [TAB] or [SHIFT] + [TAB] - changes the focus area of the SCREEN CONTROL display.
- [Cursor Up] or [Cursor Down] - when a list is in focus, step up or down the list entries. If a parameter value is in focus, press to increase or decrease the value.
- [CTRL] + [C]/ [V] - when the contents of a text field are selected, these keys can be used to copy and paste the entry.

#### Channel Config display

- [CTRL] + [Cursor Left]/ [Cursor Right] - moves the selected audio module left or right within the channel signal path.
- [CTRL] + [Cursor Up]/ [Cursor Down] - moves the selected audio module between the track bus, channel and direct output path.

#### Signal List display

- [SHIFT] + [Enter] - temporarily enables [Easy Edit](#) mode for fast labelling of consecutive signals.

#### Cue List & Command Trigger displays

- [Cursor Up] or [Cursor Down] - when a list is in focus, scrolls up or down the list entries. If a parameter value is in focus, press to increase or decrease the value.
- [Enter] or [Backspace] - step forwards or backwards to the next selection window.
- [Escape] - close the current window.

#### mxGUI only

- [Strg] + [^] - opens and closes the [Access/Assign](#) window (German QWERTZ keyboard layout only).



# 6. Selecting a Channel

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This chapter describes how to select a channel.

Topics include:

- [The Channel in Access](#)
- [Fader Strip SEL](#)
- [ACCESS CHANNEL / ASSIGN](#)
- [Signal List "Set Access"](#)

### 6.1 The Channel in Access

In order to adjust channel parameters from the Central Control Section, or to perform an assignment operation such as a fader strip or bus assign. This is known as placing a channel in access.

#### 6.1.1 Interrogating the Channel in Access

The name and label of the channel in access are *always* shown in the [title bar](#) at the top of the Central GUI - for example, **INP 1, Kick**:



#### 6.1.2 Channel in Access Operations

The channel in access is *always* the channel which is assigned to the [Central Control Section](#) for parameter control. It is also the channel which will be used when you perform an assign operation such as a [fader strip assignment](#) or [bus assignment](#). These operations are covered later in the relevant chapters.

#### 6.1.3 Locking the Channel in Access

The channel in access can be locked, to keep the same channel in access, by pressing the **Lock ACC** button located on the [Extra Buttons](#) display. Therefore, if you cannot change the current selection, check the status of this option.

## 6.2 Fader Strip SEL

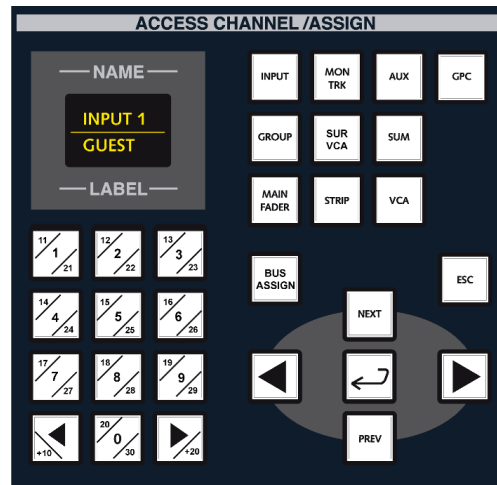
Usually the quickest method to select a channel is to press its fader strip **SEL** button:



The **SEL** button lights (in white) when selected.

### 6.3 ACCESS CHANNEL / ASSIGN

A channel can also be selected using the ACCESS CHANNEL / ASSIGN panel.



1. First, select a channel type - e.g. press **INPUT**. The button flashes and display shows TYPE NUM.
2. Using the numeric keypad, enter the channel number - e.g. press **1**, **5** and **ENTER** for the number fifteen.

Providing you make a valid selection, the display updates to show the name (and label): e.g. **INP 15**.

If you make an invalid selection, the display tells you by flashing NOTAVAIL for "Not Available". Press **ESC** to exit the operation and start again.

Note that to select a Surround VCA master, there is an extra step: first press **SUR VCA**, then the channel type (e.g. **SUM**); then enter a number (e.g. **1**) and confirm with **ENTER**.

#### Channel Types

The following channel types can be selected in this manner:

- **INP** – input channels.
- **MON TRK** – monitor channels/track buses.
- **GRP** – group masters.
- **SUM** – sum masters.
- **AUX** – auxiliary masters.
- **VCA** – VCA masters (up to 128).
- **SUR VCA** – Surround VCA masters (of any type).
- **GPC** – General Purpose Channels (up to 256).
- **MAIN FADER** or **STRIP** – selects the channel assigned to a main fader or channel strip.

Note that for DSP channels, the maximum number of channels available is determined by the preset loaded in the [DSP configuration](#) display.

#### Further Operations

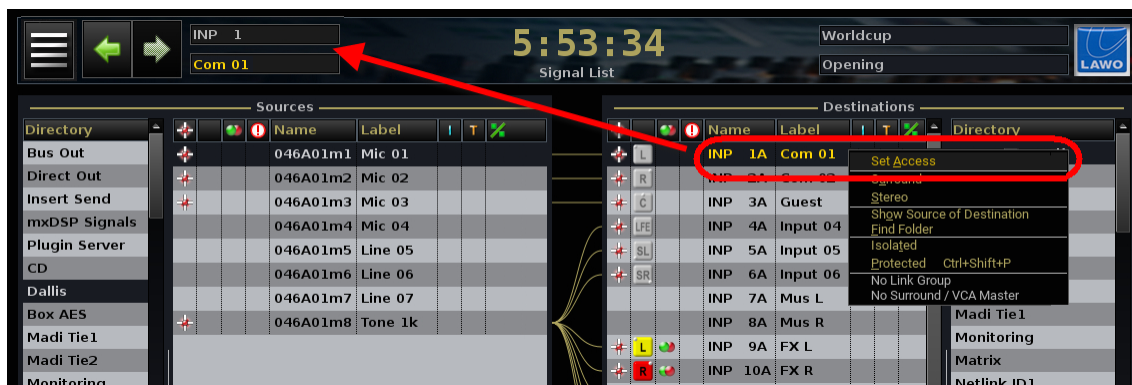
1. Press **NEXT** (or **PREV**) to increment (or decrement) the channel number - for example, if **AUX 1** is in access, press **NEXT** to select **AUX 2**.
2. Press the left (or right) arrow key to select the next channel assigned to the surface - for example, if the channel assigned to fader strip 8 is currently in access, press the left arrow to select the channel assigned to fader strip 7.

## 6. Selecting a Channel

### 6.4 Signal List "Set Access"

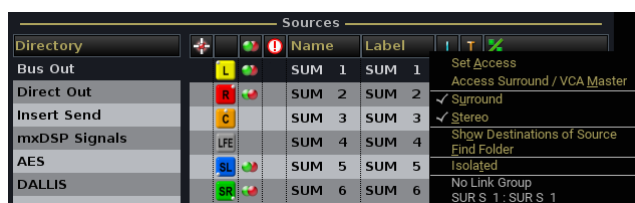
When working in the [Signal List](#) display, you can also select a channel using the **Set Access** option.

1. Right-click on the (source or) destination channel and choose **Set Access** - the channel in access updates:



Note that for surround channels, you can select either the component channel or its Surround VCA Master:

- **Set Access** - selects the component channel (e.g. SUM 1).
- **Access Surround / VCA Master** - selects the surround VCA Master (e.g. SUR S 1).



The **Set Access** option *only* appears if you right-click on a DSP channel; you cannot place an input or output signal into access.

The **Access Surround / VCA Master** option *only* appears if you right-click on a component of a surround DSP channel; if the channel is not part of a surround group, then you will not see this option.

## 7. Getting Started

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This chapter describes how to get up and running, and some of the most common operations.

Topics include:

- [Powering On](#)
- [Checking the System Components](#)
- [Resetting the System](#)
- [Interrogating the Fader Strips](#)
- [Assigning an Input Source](#)
- [Adjusting Input Gain](#)
- [Input Metering](#)
- [Checking Bus Assignments](#)
- [Monitoring Audio](#)
- [Creating Your Own Setup](#)
- [Loading a DSP Configuration](#)
- [Working with the Signal List](#)
- [Assigning Channels to Fader Strips](#)
- [Using the Couple Group](#)
- [Saving Settings](#)
- [Next Steps](#)

## 7. Getting Started

### 7.1 Powering On

To start the console, turn on power to both the control surface power supply and Nova73 (mains connections at front).

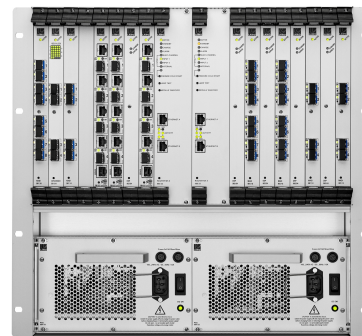
The components can be powered in either order but note that the control system resides within the Nova73. This means that the system will boot once you apply power to the Nova73.

The control system boots in a few seconds; during this time you will see the boot-up progress on the console's displays. Once boot-up is complete, the screens refresh to show the **Channel** displays and **Central GUI**. The console is now ready for operation.

*Control Surface*



*Nova73HD Front View*



The control surface and Nova73 can be booted before other remote devices. This enables you to prepare settings, including signal routing, before external stageboxes are connected and powered.

## 7.2 Checking the System Components

At this stage, it is a good idea to check the status of the system components.

In the event of a global alarm, a warning triangle appears in the title bar of the Central GUI. Hover over the triangle to view the last ten alarm messages. Messages in red indicate active alarms; messages in yellow are resolved.



You can interrogate any active alarms from the [Signal Settings](#) display.



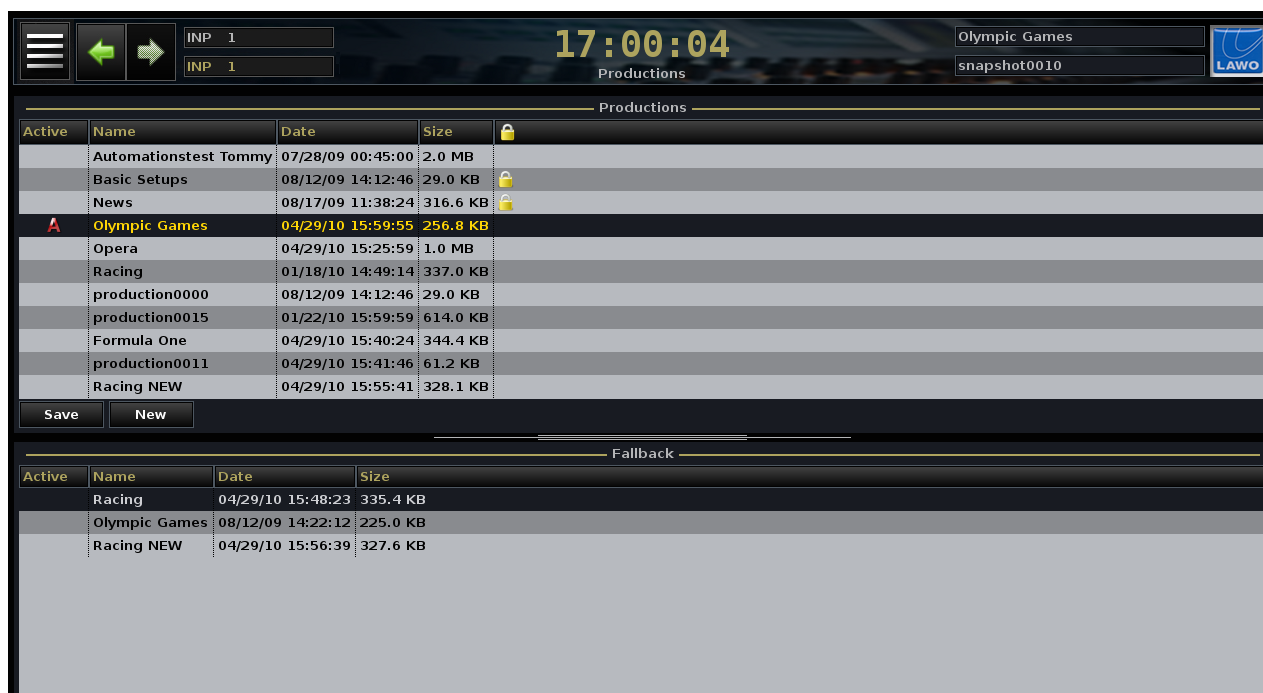
### 7.3 Resetting the System

At the end of boot-up process, the system loads its warm start data (the state of all settings at the last shutdown). This means that when you turn on, you will always get back to wherever you were at the last power off. Depending on who was last using the console, you may be sat in front of a fully configured control surface or a series of blank fader strips! In either case, the fastest way to reset the system is to load a production.

Productions form the top level for user data storage and store *all* the settings required for a production or type of job. It is good practice to have at least one **Basic Setups** or **Default** production which can be used as a common starting point for all new shows. You should load this production to reset the console, and then save a new production to store your own settings. If your system does not yet have a **Basic Setups** or **Default** production, then see [Creating Your Own Setup](#).

#### ➤ To load a production:

1. [Open](#) the **Productions** display on the Central GUI.



The **Productions** list, in the upper half of the display, shows all the productions stored on the internal user data flash card. This is where you can load, save, update, rename, protect or delete a production.

The active production (marked with an **A**) is *always* shown in the title bar of the Central GUI – in our example, it is named **Olympic Games**.

2. Right-click on a production - for example **Basic Setups** - and select **Load** from the drop-down options.

The console resets and the title bar updates to show that **Basic Setups** is now the active production.

For additional confirmation, watch the status bar at the bottom of the Central GUI; you should see a **loading...** message as the production data loads:



## 7.4 Interrogating the Fader Strips

You can interrogate which channels have been assigned to the fader strips by looking at the following areas.

### 7.4.1 Fader Strip Label Displays

*Fader Strip Labels (CHANNEL NAME)*



Here you will see the channel name (e.g. **INP x**), channel label or inherited source label depending on the LABEL button selected in the centre section:



- **CHANNEL NAME** = the system name of the channel (e.g. INP 1, INP 2, etc).
- **USER LABEL** = the user label given to the channel (e.g. GUEST, MUSIC, etc).
- **INHERIT SOURCE** = the user label given to the source routed to the channel (e.g. MIC 1, CD, etc).

### 7.4.2 Channel Color Coding

Each channel is also color coded for quick identification. The colors are used in the LAWO backlights, by buttons in their off state (if [Button-Glow](#) is enabled) and by the [Channel display](#) (if [Show Fadersense](#) is enabled).

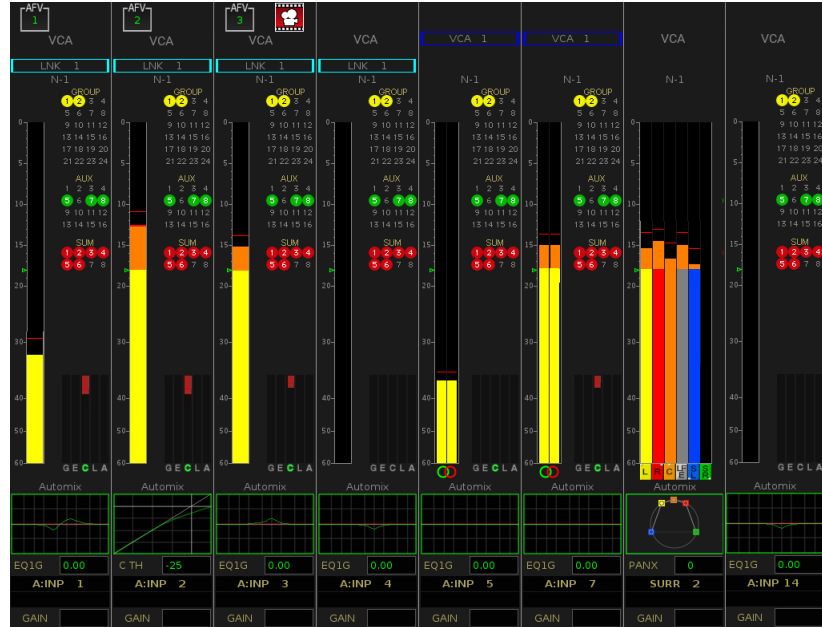


The default colors are **white** = input and monitor channels; **yellow** = groups; **green** = aux masters; **blue** = VCA masters; **red** = sums. Note that the colors can be customised from the [Channel Config](#) display.

## 7. Getting Started

### 7.4.3 Channel Display Metering

Look up at the **Channel** display for an overview of channel metering and other assignments. Up to two metering rows can be enabled; the lower row *always* meters the active bank/layer. The meters show which channels are mono, stereo and surround, and whether there is signal present. You can also see whether any bus assignments have been made to the Groups (yellow), Auxes (green) and Sums (red).



#### Show Fadersense

To help identify the channel you are working on, you can enable [Show Fadersense](#) in the **System Settings** display. From now on, each time you touch a fader or free control, the corresponding channel will be highlighted in the **Channel** display. The color used will match the channel color-coding selected in the **Channel Config** display.

### 7.4.4 Main Fader Metering

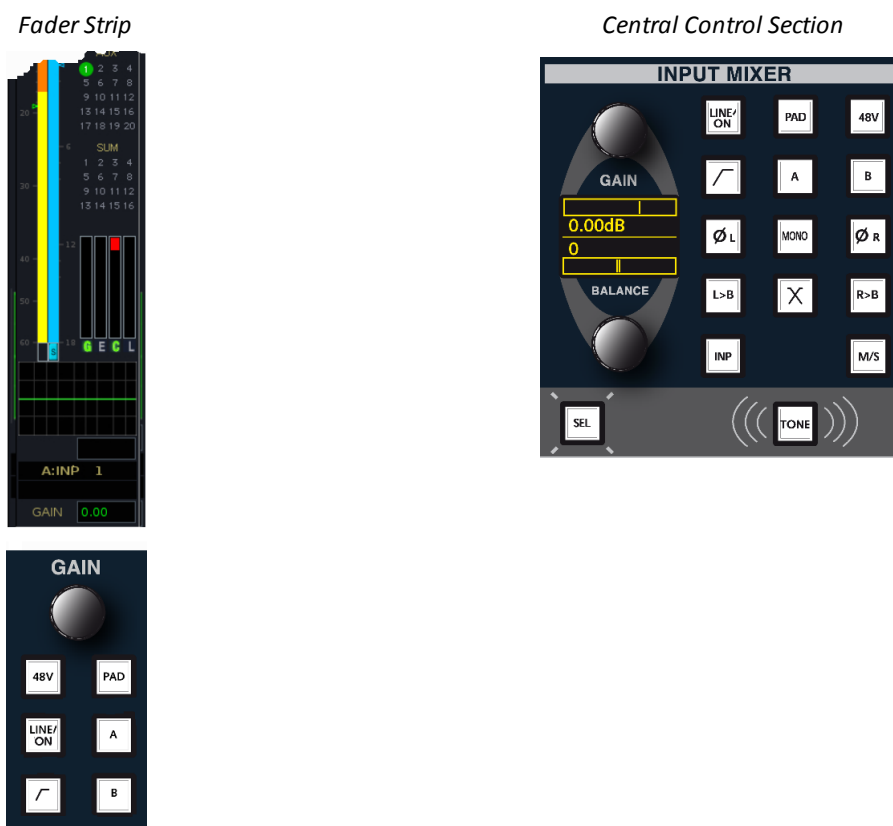
During a live mix, it is recommended to view the [Main Faders](#) display on the Central GUI. This provides an identical display to the one shown above, but for channels assigned to the main fader strips.

## 7.5 Assigning an Input Source

On input channels, you can assign any source connected to the console's routing matrix. This can be a local source (from the Rear Connector Panel), or a remote source (from a remote IO or networked system). Source routing can be changed from the Central GUI's [Signal List](#) display.

### 7.6 Adjusting Input Gain

Input gain can be adjusted from the fader strip or Central Control Section:



#### Fader Strip

The upper rotary control on the channel fader strip is dedicated to source gain - either mic/line or digital depending on the channel's source. The amount of **GAIN** is shown on the **Channel** display above the control. Source parameters, such as **48V** or the 20dB **PAD**, can also be controlled from here.

#### Central Control Section

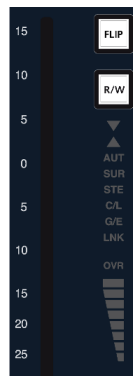
Alternatively, assign the channel to the Central Control Section, either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.

Now you can adjust source **GAIN** plus other parameters such as **48V**, high-pass filter and 20dB **PAD** (for mic/line sources); **BALANCE**, Left to Both, Right to Both, Left/Right reverse (for stereo sources); etc.

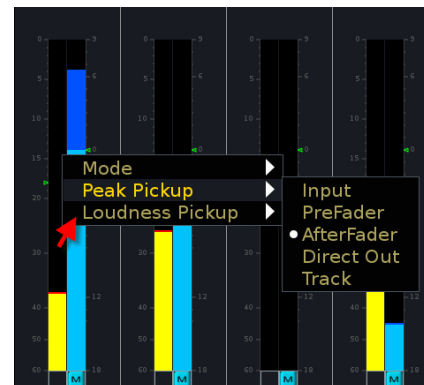
For full details, see [INPUT Control](#).

## 7.7 Input Metering

Fader Strips



Channel Display



The meter beside the fader *always* meter the channel input, while the meter on the **Channel** display can be switched to different positions using the [METER](#) buttons in the centre section.

1. Touch the meter on the **Channel** display, or use the METER buttons in the [Central Control Section](#), to change the **Pickup** points.

If you select **INP**, then you will see the level immediately after the source gain and before all signal processing.

Note that the pickup points for the peak and loudness bargraphs can be set independently, see [Meter Pickup Points](#).

## 7.8 Checking Bus Assignments

You can check each channel's bus assignments by looking up the **Channel** display:

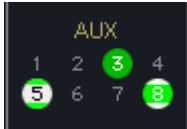


Here you will see the assignments onto the GROUP, TRACK, AUX and SUM buses. Note that the number of buses shown is set by the "[Bay Bus Count](#)" options in the **System Settings** display. Note also that TRACK buses are supported by Recording channel [DSP Configurations](#) only.

AUX bus assignments are color coded to indicate post-fader (e.g. Aux 3), pre-fader (e.g. Aux 5) or pre-EQ (e.g. Aux 8). Pre-EQ assignments are possible for Recording channels only.

The formats of all buses (mono, stereo or surround) are defined in the [Signal List](#) display, and are stored in snapshots and productions. The configuration is flexible. For example, Sums 1 to 8 could be used as four stereo buses (1/2, 3/4, 5/6, 7/8), or one 5.1 and one stereo. Each number on the display represents a mono bus. So, for a 5.1 Sum, you will see all six individual assignments: SUM 1 = L; SUM 2 = R; SUM 3 = C; SUM 4 = LFE; SUM 5 = Ls; SUM 6 = Rs.

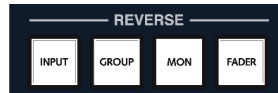
For simplicity at this stage, you should check that all channels are assigned to SUM 1 to 6 (if working in 5.1) or SUM 1 & 2 (if working in stereo). This ensures that once channel panning is turned ON, you will benefit from surround, or stereo, panning. There are several ways to change bus assignments. Below is one method to get you started.



### 7.8.1 FADER REVERSE Assign

This method uses the fader **SEL** buttons to make assignments to the channel in access. It is ideal for assigning channels onto a destination such as a group, aux or sum.

1. Select the destination channels (e.g. SUM 1) - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. Press **FADER** on the REVERSE BUS ASSIGNMENT panel:



The BUS ASSIGNMENT buttons can be locked, to protect existing assignments, using the **Lock ASN** button located on the [Extra Buttons](#) display. Therefore, if you cannot make a selection, check the status of this option.

The button starts to flash, and the fader **SEL** buttons across the console light to show the current status:

- Steady state red = channel assigned to destination.
- Flashing green = channel not assigned to destination.
- **SEL** not lit = channel cannot be assigned to destination (for example, you cannot assign another Sum channel onto SUM 1!)



3. Press a fader **SEL** button to modify the current assignment - the fader **SEL** changes state.

If the bus is stereo or surround, then assignments are made to both sides of the stereo bus, or to all surround component channels, in one operation. To edit individual assignments, use the [Bus Assign](#) or [Busses Reverse](#) display.

4. Deselect **FADER REVERSE**, or press **ESC** on the [ACCESS/ASSIGN panel](#), to exit the bus assign mode.



### 7.9 Monitoring Audio

#### 7.9.1 Monitor Source Selection, Cut & Dim

The console provides two **monitor outputs** with independent source selection, volume, cut and dim: **CRM 1** supports 5.1 surround, while **CRM 2** is stereo. There are also two stereo **headphone outputs** which follow the monitor source selectors and have their own level control (via STUDIO/PFL).

In each case, connections can be made via any IO (according to the IO card conditions described below).

All control is handled by the centre section MONITORING panel. This includes a touch-screen for monitor source selection and other options.

*Default Monitoring Configuration*



#### Monitor Source Selection

Monitor sources are selected from the touch-screen display. Use the top row of buttons to select **PAGE** of sources: **SUM**, **AUX**, **GRP**, etc. Then use the first and second pair of columns (outlined in red and blue) to select a source for the CRM 1 and CRM 2 outputs. In our example, nothing is feeding CRM 1 and SUM 3/4 is feeding CRM 2.

The first three pages provide "hard-wired" access to sums, auxes and groups, while pages 4 and 5 are reserved for external inputs (these will vary from one installation to another). In pages 4 and 5 it is a good idea to configure some "GUI" signals. These are virtual destinations which can be connected from any source using the [Signal List](#) display. This allows you to monitor any input to the system.

In the default monitoring configuration, headphone 1 follows the CRM 1 source selector and headphone 2 follows CRM 2.

#### Volume, CUT and DIM

Use the rotary controls to adjust the volume of each monitor output. The STUDIO/PFL control can adjust the volume of headphones 1, headphones 2 or PFL, according to the **HP 1**, **HP 2** and **PFL** touch-screen buttons.

The accompanying buttons will **CUT** or **DIM** each output; the amount of dim defaults to 20dB but can be adjusted from the **CTRL** page.

In each case, the current level and function appears on the touch-screen display.

## CTRL Page

The **Ctrl** page provides access to other functions such as individual loudspeaker cuts; mono the monitoring; assign left or right to both front speakers; reverse the phase of a front speaker; dim the volume; or switch to an alternate set of loudspeakers. The **SET** button allows you to adjust the dim level, stereo balance, etc. For example, press **SET** followed by **DIM** and then turn the corresponding rotary control - the electronic label shows that you are now adjusting the *Dim LVL* and its new value. For full details, see [Monitoring Parameters](#).

## IO Card Conditions

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

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

To use the headphone connectors mounted in the arm rest of the console frame, you must order one DALLIS 942-61 card, and wire it to the **HP A & B** 37-pin D-type connector on the console's rear panel.

### 7.10 Creating Your Own Setup

If the production contains all the connections and fader strip assignments you need, then you are ready to mix! However, at some point you will need to edit or create a new setup to suit the particular requirements of your show. The recommended steps are:

1. Load an existing production as described [earlier](#).

Choose something close to your own requirements or a default production if you have one. This will reset the console to a known starting point. If a default production does not yet exist, then you should create one. Follow the steps below, but keep the settings more generic so that they are suitable for the installation, rather than a specific user or show.

2. Check and, if necessary, [load](#) a DSP Configuration.

This will define the number of input channels, groups, sums and auxes, and the processing channel type for the console: Recording or Broadcast.

3. Using the [Signal List](#) display, configure your signal routing, user labels and channel formats: mono, stereo and surround.

By doing this you will know exactly which channels (and signals) are needed on the console surface.

4. Configure the desk layout by [assigning](#) your channels to fader strips.

Any type of channel (audio or control) can be assigned to any fader strip on any bank or layer. This allows you to control your input channel, groups, sums, etc. from the most convenient position.

Bank switching provides fast global access to different sets of channels, or channels in a different layout - for example, to bring the music channels in a live entertainment up onto the surface when the band are playing! Layers can be switched on individual fader strips, making them ideal for related signals - for example, to switch quickly between a presenter's input channel and their mix minus (N-1) return.

5. Set up the default mix parameters using either the [Fader Strip](#) controls or [Central Control Section](#).

You can use these areas to adjust any channel parameter - level, mute, AFL, PFL, EQ, Dynamics, Delay, Aux sends, etc. It is a good idea to check the EQ types (filter, shelf or parametric) and starting frequencies, so that when you turn on the EQ and start adjusting the gain, you will know what to expect!

6. [Save](#) all your settings into a new production.

The production can then be loaded at any time to recall the setup.

The rest of this chapter describes steps 2, 3, 4 and 6 in more detail.

## 7.11 Loading a DSP Configuration

The DSP configuration defines the number of input channels, groups, sums and auxes.

1. [Open](#) the **DSP Configuration** display on the Central GUI.



	Inputs	Tiny Inputs	Sums	Tiny Sums	Monitors	Groups	Auxes	Tiny Auxes	Index	Absolute Index
192	0	0	48	0	0	0	0	34	4.1 (48)	997
184	0	0	48	0	8	0	0	34	4.2 (48)	998
176	8	8	40	0	8	0	0	42	4.3 (48)	999
168	16	8	40	0	8	8	0	42	4.4 (48)	1000
160	24	8	40	0	8	16	0	42	4.5 (48)	1001
152	32	8	40	0	8	24	0	42	4.6 (48)	1002
144	40	8	40	0	8	32	0	40	4.7 (48)	1003
168	16	16	32	0	8	0	0	50	4.8 (48)	1004
160	24	16	32	0	8	8	0	50	4.9 (48)	1005
152	32	16	32	0	8	16	0	50	4.10 (48)	1006
144	40	16	32	0	8	24	0	48	4.11 (48)	1007
136	48	16	32	0	8	32	0	40	4.12 (48)	1008
168	8	8	40	0	16	0	0	42	4.13 (48)	1009
160	16	8	40	0	16	8	0	42	4.14 (48)	1010
152	24	8	40	0	16	16	0	42	4.15 (48)	1011
144	32	8	40	0	16	24	0	40	4.16 (48)	1012
136	40	8	40	0	16	32	0	32	4.17 (48)	1013

Active - 2.12 (48) Recording  
64/16 Inputs 16 Groups 8/24 Auxes 8/10 Sums

Selected - 4.14 (48) Recording  
160/16 Inputs 16 Groups 8/42 Auxes 8/40 Sums

The upper area lists the **Configuration Presets** available.

2. Click on the **Recording** or **Broadcast** buttons, and on the different DSP board numbers (e.g. **1** to **4**), to view the available options.

The **Active** summary at the bottom of the display shows the details of the current configuration. The channel numbers are color-coded and described as **x/y**, where **x** = the number of full processing channels and **y** = the number of reduced processing (Tiny) channels. The **Selected** summary provides similar details for the selected configuration. This allows you to interrogate an alternative configuration before making it active.

All resources are displayed in mono. For example, a configuration with 24 inputs can provide 24 mono or 12 stereo channels. Similarly, if you need a 5.1 sum, then this will use 6 of your sum channels.

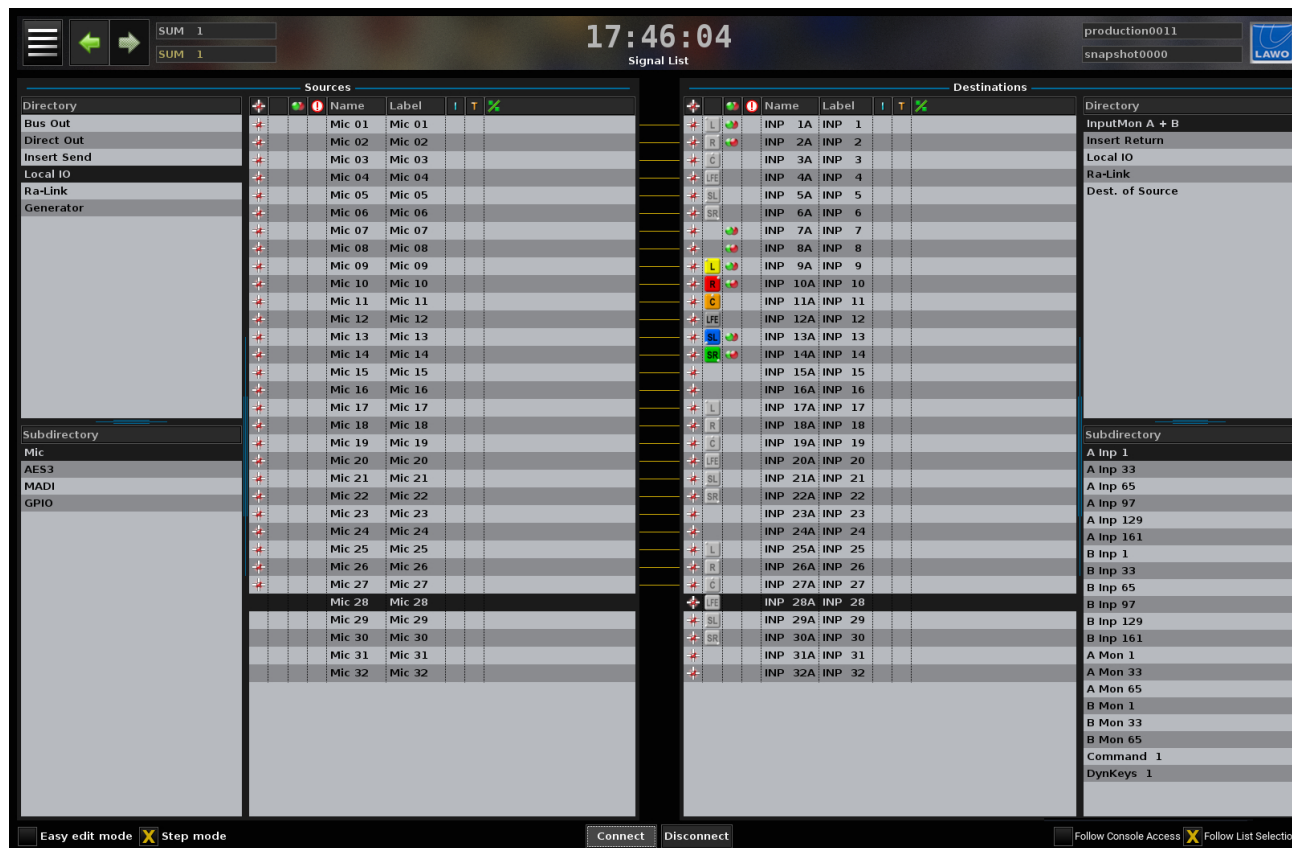
3. To change the configuration, select a preset and check the **Selected** summary.
4. Select the on-screen **Load** button.
5. Read the confirmation dialogue box and click **Yes** to proceed - the console updates and the new configuration appears in the **Active** summary.

## 7.12 Working with the Signal List

From the **Signal List** display, you can configure signal routing, edit user labels and define which channels are mono, stereo and surround.

1. [Open](#) the **Signal List** display on the Central GUI.

The display shows connections from **Sources** (on the left) to **Destinations** (on the right). To keep the list manageable, signals are divided into Directories and Subdirectories. Signals which are connected are indicated by a red/white cross:



### ➤ To route a source to an input channel:

1. Select a source directory, subdirectory and signal: e.g. **Local IO** -> **Mic** -> **Mic 28**.
2. Select a destination channel: e.g. **Input/Mon A + B** -> **A Inp 1** -> **INP 28A**.

Note that input channels have two inputs, A and B. For now, select the A input.

3. Press **CONNECT** - the **Signal List** updates with a line between the source and destination.

If the input channel is already assigned to a fader strip, and **INHERIT SOURCE** is selected (from the centre section LABEL buttons), then you will see the source label in the fader strip label [display](#). You will also see signal present on the input meter, and metering on the **Channel** display (according to the meter pickup point).

### ➤ To route consecutive sources to consecutive channels:

Follow the steps above, but **BEFORE** you press **CONNECT**, enable the on-screen **Step mode**. This time when you press **CONNECT**, the route is made, and both the source and destination selections automatically step down to the next entries in the list. Keep pressing **CONNECT** to continue. Note that **Step mode** can be used with an offset: for example, to route Microphones 1-16 to Input Channels 17-32. Take care when you reach the bottom of either list, as **Step mode** automatically rolls back up to select the first entry!

### ➤ To remove a route:

1. Select the destination you wish to disconnect: e.g. **Input/Mon A + B** -> **A Inp 1** -> **INP 28A**.
2. Press **DISCONNECT** - the line between the source and destination disappears.

If **Step mode** is enabled, you can keep pressing **DISCONNECT** to remove multiple connections quickly.

### 7.12.1 Editing User Labels

The user **Label** for each source and destination can be edited from the **Signal List** display. It is stored and recalled by both snapshots and productions:

Sources					Destinations				
	Name	Label	I	T		Name	Label	I	T
	046A01m1	Mic 01				INP 1A	Com 01		
	046A01m2	Mic 02				INP 2A	Com 02		
	046A01m3	Mic 03				INP 3A	Guest		
	046A01m4	Mic 04				INP 4A	Input 04		

The source and destination **Name** is defined by the AdminHD configuration, and cannot be edited from the Central GUI. This provides a fixed **Name**, relevant to the installation, which remains consistent for all users.

For input (and monitor return) channels, you can use the Source **Label** field to edit the INHERIT SOURCE labels, and the Destination **Label** field to edit the CHANNEL USER labels. You can also label Sums, Groups and Auxes in a similar manner.

#### ➤ To edit a label:

1. Click on the label field - either once to overwrite (the text highlights), or twice to modify the existing name (a flashing cursor will appear).
2. Enter a new name using the console keyboard.
3. Press **ENTER** to confirm the new name. Or, if you make a mistake or want to exit without making any changes, press **ESC**.

### Easy Edit Mode

You can use **Easy Edit** mode to speed up the labeling process. This mode carries forward your text, so that you can quickly enter the same label for multiple signals. Or, if the label ends with a number, then the number will increment.

1. *BEFORE* editing your first source or destination label, turn on **Easy Edit** at the bottom of the **Signal List** display.
2. Then select and edit your first source or destination label in the usual manner - e.g. **Mic 1**.
3. Press **ENTER** to confirm the new name - the system now steps down to the next signal in the list, and automatically carries forward the text label.

If the text ends with a number, then the number increments.

If the label does not end with a number, then the same text is carried into the next label field.

Sources				
	Name	Label	I	T
	010A01m1	Mic 1		
	010A01m2	Mic 2		
	010A01m3	ANA01.03		
	010A01m4	ANA01.04		
	010A01m5	ANA01.05		
	010A01m6	ANA01.06		
	010A01m7	ANA01.07		
	010A01m8	ANA01.08		

4. When you have entered the last label, press **ESC** to exit the labelling mode.

You can temporarily enable **Easy Edit** using the console keyboard **SHIFT** button as follows:

- Select the first signal label and enter a new label in the usual manner.
- Press and hold **SHIFT** and then press **ENTER** - the system steps down to the next signal in the list, and automatically carries forward the text label.
- Keep holding **SHIFT** and pressing **ENTER** until you have labeled all the required fields.
- Press **ESC** to exit the labeling mode.

## 7. Getting Started

### 7.12.2 Changing Channel Formats

Any odd/even pair of input or output channels can be configured for stereo and controlled from a single fader strip. Or, multiple channels can be configured for surround (up to 8-channel) and controlled from a single Surround VCA master.

#### ➤ To create a stereo input channel:

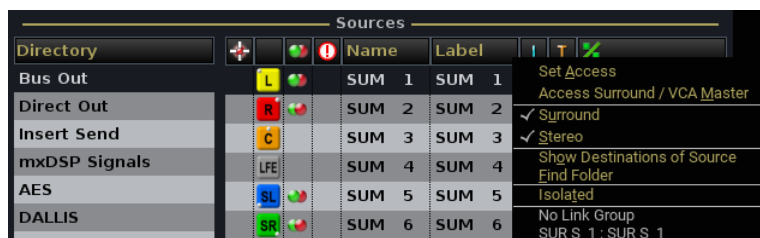
1. Select an odd numbered input channel from the **Destinations** list (e.g. **INP 7**).
2. Press the **STEREO** soft key (on the SCREEN CONTROL [panel](#)), or right-click and select the **Stereo** option - this links the selected channel to its adjacent DSP path. For example, INP 7 and INP 8.



You can link any odd/even pair of input or monitor channels using this method. Alternatively, select a **Bus Out** from the **Sources** list to create a stereo bus master.

#### ➤ To create a surround sum:

1. Select the first sum for the surround output from the **Sources** list (e.g. **SUM 1**).
2. Press the **SURROUND** soft key (on the SCREEN CONTROL [panel](#)), or right-click and select the **Surround** option:



This links consecutive sums, according to the global surround format, and automatically assigns a Surround VCA - in our example, **SUR S 1**.

You can configure surround sums, groups or auxes using this method. Alternatively, select **InputMon** from the **Sources** list to configure surround input or monitor channels.

For surround inputs, panning is automatically reset so that INP 9 feeds SUM 1, INP 10 feeds SUM 2, etc. The best way to position a surround channel within the surround field is using Hyper Pan.

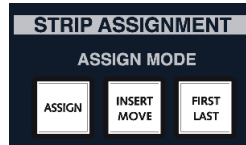
Surround channels can only be created in 8-channel blocks, so you must select Sum 1, 9, 17, etc. You cannot select **Surround** if you right-click on an invalid channel number.

Note that the front and rear left/right pairs of a surround channel are automatically linked for stereo. This is for convenience when revealing the component channels. The stereo linking is only a default state; you can deselect the stereo link at any time.

## 7.13 Assigning Channels to Fader Strips

### ➤ To assign a single fader strip:

1. Select a channel - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. Select the **ASSIGN** button (under STRIP ASSIGNMENT in the centre section):



The fader **SEL** buttons across the console flash, in green:



3. Press a fader **SEL** to complete the assignment - the fader strip updates and the **SEL** button changes color, from green to red.
4. Deselect the **ASSIGN** button or press **ESC** (on the SCREEN CONTROL [panel](#)) to exit the strip assign mode.

### ➤ To assign a range of channels to consecutive fader strips:

1. Put the first channel you wish to assign into access - e.g. **INP 1**.
2. Then press **FIRST LAST** (instead of **ASSIGN**).
3. This time press the fader **SEL** on the *first* fader you wish to assign (e.g. strip 1) followed by the fader **SEL** on the *last* fader (e.g. strip 24) - the console incrementally assigns channels from fader strip 1 to 24, and then cancels the **FIRST LAST** mode.
4. Deselect the **ASSIGN** button or press **ESC** to exit the strip assign mode.

If all the channels are mono, then you will have assigned INP 1 to 24 to fader strips 1 to 24.

If some channels are stereo, then they are automatically assigned to a single fader. For example, if INP 1&2 and INP 3&4 are stereo, then they are assigned to fader strips 1 and 2; INP 5 is assigned to fader strip 3, INP 6 to fader strip 4, and so on.

If some channels are surround, then it is the component channels which are assigned (e.g. Front L/R to fader strip 1, Front C to fader strip 2, etc). Note that the component channels can be controlled from a single Surround VCA master, but this must be assigned in a separate operation. See [Surround VCAs](#).

The start and end of the "FIRST LAST" range can be at any position across the control surface, and sources can be routed from left to right or from right to left by reversing the order of your first and last fader selection.



## 7.14 Using the Couple Group

The **Couple** group provides a quick way to adjust parameters across a range of channels.

### 7.14.1 Creating a Couple

To create a couple, there are two methods:

#### Direct Couple

1. Press and hold the fader **SEL** button on the first and last channels you wish to couple:



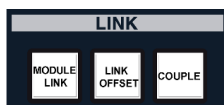
The fader **SELs** turn red to indicate that coupling is active.

2. Now adjust a parameter – for example, turn the EQ gain control on any channel within the couple group - all EQ gains across the coupled channels are adjusted, and any offsets are retained.
3. To dissolve the couple group, press the fader **SEL** button on any fader strip outside the couple range.

#### Using the COUPLE Button

Alternatively you can use the COUPLE button as follows:

1. Select **COUPLE** from the centre section LINK buttons (or [Extra Buttons](#) display) - the button flashes to indicate that it is active.



And the fader **SEL** buttons across the console flash, in green.

2. Press the first and last fader **SELs** on the strips you wish to couple - the fader **SELs** turn red to indicate that coupling is active.
3. To dissolve the couple group, deselect **COUPLE** or press the fader **SEL** on any fader strip outside the couple range.

## 7.15 Saving Settings

At any time you can save the current settings of the console into a new production using the **Save** button on the **Production List** display. Note that:

- **Save** keeps all the current settings, including any snapshot folders, and saves them under a new production name. (i.e. this operation performs a "Save As..".)
- **New** will clear all snapshots and folders and create an empty directory. Therefore, to start with an empty snapshots page, select **New** before saving.

➤ To save all current settings into a new production:

1. [Open](#) the **Productions** display on the Central GUI.
2. Select **Save** - a new file is created and given a default name (e.g. production 0012).

The production is time and date stamped, and automatically becomes the active production (**A**) as indicated in the title bar. For additional confirmation, watch the status bar at the bottom of the Central GUI; you should see a **saving...** message as the production data is saved.



To rename the production, click on its **Name** field - either once to select all existing text (white) or twice (black cursor) to modify the existing name. Enter a new name from the console keyboard, and then press **Enter**.

You can now continue to save regularly into the active production using the front panel **PRODUCTION UPDATE** button. Note that this button flashes if you have snapshots which have not been saved.



### Using Snapshots

Productions form the top level of user data storage and store *all* the settings required to reset the system. If you only need one version of the system's settings, then it is enough to save (and load) a production. However, within a production you can also store snapshots.

Snapshots can be used to load *different* settings within the same production, or to reset the system while you are live/on-air. For example, to recall a particular console layout before a live broadcast, a different mix for each band during an entertainment show, or a different setup for each scene in a theatre production.

When using snapshots, you should create a production for the studio or type of show. Then create "user" or "show" folders to store your snapshots. To manage the recall, snapshot isolates can be applied to protect individual channels, specific modules or global elements of the desk.

Snapshots, and their folders, are written onto the user data flash card when you **Save** or **Update** a production.

See [Console Reset: Snapshots](#) for more details.

### Transferring User Data

All user data is stored on the system's internal flashcard and can be imported or exported to a USB interface or mxGUI computer. In a networked installation, a central file server can be made accessible from each console within the network.

User data is fully compatible with any mc<sup>2</sup> or Nova, regardless of the hardware configuration. This enables the transfer of user data to and from any system (including any other mc<sup>2</sup>), in order to recall settings in a different studio.

See [Console Reset: File Import/Export](#) for more details.

## 7.16 Next Steps

Hopefully, you have enough information to being working with the console. Otherwise keep reading to learn more about each area of the console's operation:

- [Signal Flow Configuration](#)
- [Control Surface Configuration](#)
- [Channel Operations](#)
- [Stereo Channels](#)
- [Surround Channels](#)
- [Metering](#)
- [Monitoring & Talkback](#)
- [Control Channels & Grouping](#)
- [Console Reset](#)
- [Timecode Automation](#)
- [Signal Routing & Settings](#)
- [mxDSP](#)
- [System Configuration](#)
- [mxGUI](#)
- [Lawo Remote App](#)
- [Fault Finding & Diagnostics](#)

# 8. Signal Flow Configuration

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This chapter deals with configuring the console's signal flow.

Topics include:

- [Signal Flow Concepts](#)
- [The DSP Configuration Display](#)
- [DSP Channel Types](#)
- [The Channel Config Display](#)
- [Working with Monitor Channels](#)

## 8.1 Signal Flow Concepts

### System Hardware & AdminHD

The total amount of DSP resource is determined by the number of channel DSP boards fitted to the Nova73 and the sampling rate of the system (48/44.1kHz or 96/88.2kHz). Note that this cannot be modified by the user. If you wish to add more DSP boards or modify the sampling rate, then you will need to edit the [AdminHD](#) configuration.

### Operator Configuration

From the GUI, the available DSP resources can be configured for a mixture of input channels, monitor return channels, groups, sums and auxiliary sends. All full processing channels include all DSP modules, allowing EQ, Dynamics, Delay, etc. to be applied to both inputs and outputs. You will also find a number of reduced signal processing channels (known as tiny channels).

Two global channel types are supported: **Recording** or **Broadcast**.

- **Recording Channels** have more signal processing and full flexibility, including up to 128 aux sends.
- **Broadcast channels** have a simplified signal flow (no track bus send; no independent filter section; simpler dynamics; 32 aux sends). As a result, using Broadcast mode offers twice as many channels from the same amount of DSP resource.

### The DSP Configuration display

The global channel type and number of inputs, groups, etc. are defined by the preset loaded in the [DSP Configuration](#) display. Each preset supports one channel type; you cannot mix Recording and Broadcast channels. Note also that the DSP configuration is saved in productions, but not in snapshots (as changing the DSP configuration causes a brief interruption to audio).

### The Channel Config display

Once you have loaded a DSP configuration, you can modify the order of the processing modules (EQ, Delay, etc.) from the [Channel Config](#) display. This allows you to change the signal flow on a channel-by-channel basis. The signal flow order and all parameters are saved in both productions and snapshots.

### 8.2 The DSP Configuration Display

The **DSP Configuration** preset defines the number of input channels, groups, sums and auxes; the processing channel type for the console: Recording or Broadcast; and whether DSP redundancy is active.

1. [Open](#) the **DSP Configuration** display on the Central GUI.



2. Click on the **Recording** or **Broadcast** buttons, and on the different DSP board numbers (e.g. **1** to **4**), to view the available **Configuration Presets**. In each case, the columns provide the following information:
  - **A** – indicates the active preset. (If this is not in view, then a red outline indicates the path back to the active preset - in our example, around the **2** and **Recording** buttons.)
  - **Inputs** and **Tiny Inputs** – the number of fully featured and reduced processing input channels.
  - **Sums** and **Tiny Sums** – the number of fully featured and reduced processing sum channels.
  - **Monitors** – the number of monitor return channels (always full processing). Monitor channels are only available when using Recording channels. A track bus is automatically created for each monitor channel.
  - **Groups** – the number of group channels (always full processing).
  - **Auxes** and **Tiny Auxes** – the number of fully featured and reduced processing auxiliary channels.
  - **Index** – this number can be used to quickly identify a preset and states the <DSP-card-count>.<index-variation> (<Channel-count-variation>). It remains consistent through different software releases.
  - **Absolute Index** – this is a unique reference number which identifies the preset in the current release. You may be asked for this number when contacting Lawo for operational or technical support.

The **Active** and **Selected** summaries, at the bottom of the display, show the details of the current and the selected configuration. This allows you to interrogate an alternative configuration before making it active. The channel numbers are color-coded and described as **x/y**, where **x** = the number of full processing channels and **y** = the number of reduced processing (Tiny) channels.

All resources are displayed as mono channels. For example, a configuration with 24 inputs can provide 24 mono or 12 stereo channels. Similarly, if you configure a 5.1 sum, then this will use 6 of your sum channels.

The number of DSP boards is determined by your system hardware. By choosing a preset which leaves a DSP board in reserve, you will enable [DSP redundancy](#).

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).
- At higher sample rates (96kHz or 88.2kHz) there are fewer channels than at lower sample rates (48kHz or 44.1kHz).
- More channels, from the same DSP resource, become available if you use Broadcast channels.
- Up to 128 auxes are supported by some Recording channel DSP configurations.

### 8.2.1 Loading a DSP Configuration

DSP configurations can be changed at any time, making it easy to modify the mix structure if, for example, the production requires some additional groups or inputs.

Loading a new DSP configuration causes a brief interruption to audio. Therefore, it is not recommended to change DSP configuration while live on air!

Changing from **Recording** to **Broadcast** channels, or vice versa, midway through a production is not advised. This is because a mix started with Recording channels will not sound the same on Broadcast channels. Therefore, to avoid confusion, all channel DSP settings are reset to flat and VCA grouping assignments are canceled if you change the channel type.

1. First, select the number of DSP boards you wish to use and the channel type, **Recording** or **Broadcast**.

Note that the **Recording** and **Broadcast** buttons do NOT appear if your system cannot support Broadcast channels, see [Broadcast Channel Conditions](#).

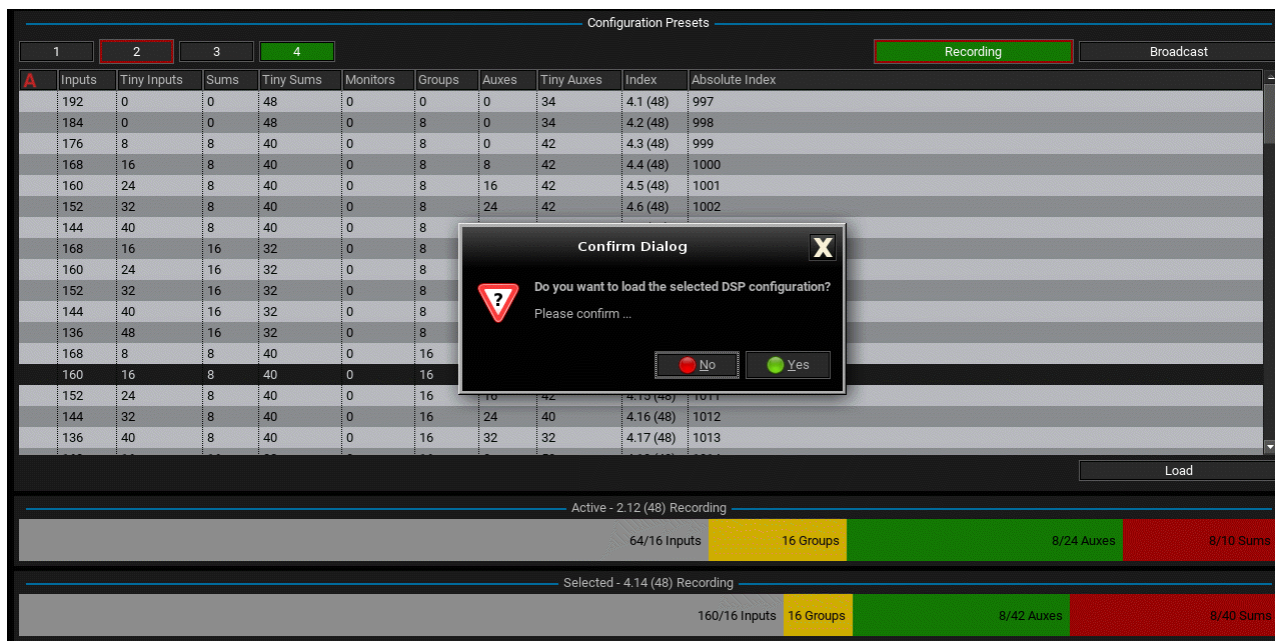
2. Select a **Configuration Preset** - the details are displayed in the **Selected** summary.
3. Select the on-screen **Load** button to continue - one of two possible dialogue confirmation boxes appears...



## 8. Signal Flow Configuration

### ➤ Loading a Preset (same channel type)

If the selected preset uses the same channel type (Recording or Broadcast), then loading will cause a brief interruption to audio, but will not interfere with your DSP settings. In this case, you will see the following confirmation box:



Select **Yes** to proceed - the console re-configures its processing, and the **Active** summary updates.

If the **Active** summary does not update, then the new DSP configuration could not be loaded. This can occur if you try to load an invalid selection – for example, a DSP configuration which requires more DSP boards than are physically available. See [Transferring User Data](#) for more details.

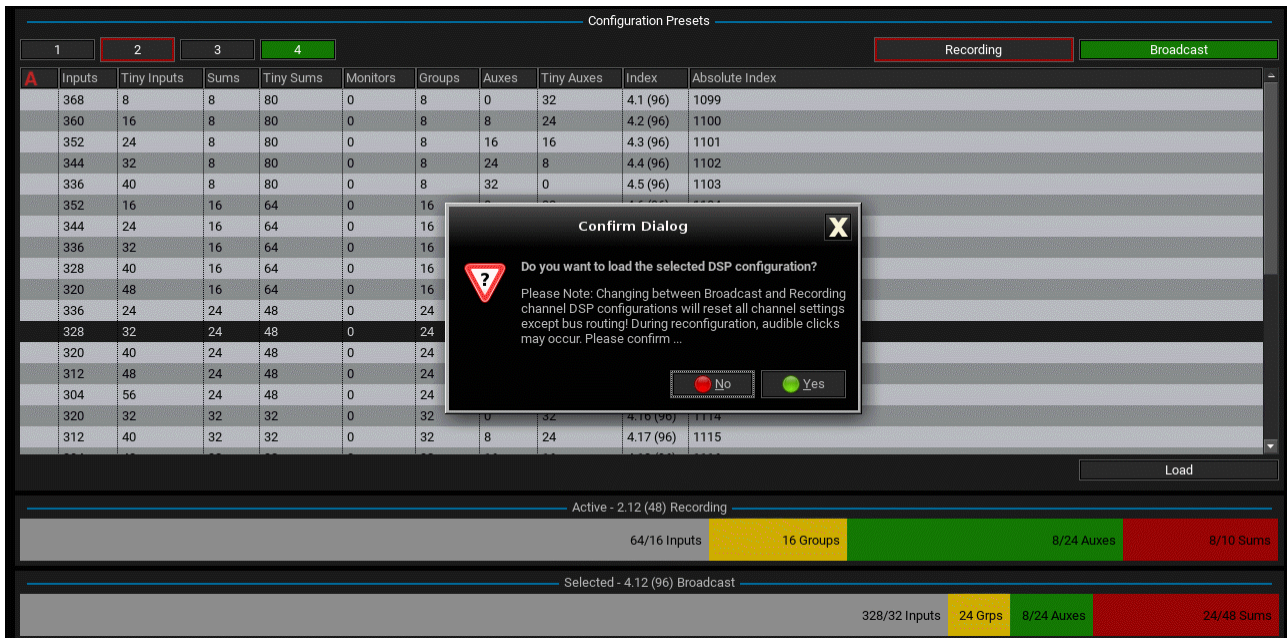
After a successful load, a number of things can happen to the DSP resource:

- If you have increased the amount of resource, for example you now have 16 groups rather than 8, any DSP settings applied to groups 1 to 8 remain intact, and the additional groups become available in the usual manner.
- If you have reduced the amount of full processing resource, the console will allocate tiny processing where possible. For example, you have reduced the number of Inputs from 24 to 20 but have 4 Tiny Input channels available - input channels 21 to 24 are automatically configured with tiny processing.
- If you have reduced the amount of full and tiny processing resource, then channels are removed but their settings remain in virtual memory. For example, if your input channel count has fallen some input channels are no longer available and are removed from the control surface. However, all settings for the previous configuration are stored. This means that if you recall the previous configuration, the settings for those channels are reinstated.

### ➤ Loading a Preset (different channel type)

If the selected preset uses a different channel type (Recording to Broadcast, or Broadcast to Recording), then loading will significantly change the signal processing. As a result, all channel DSP settings (including EQ, Dynamics, Delay, Fader levels, etc.) are reset to their factory defaults, with the exception of bus assignments. In addition, all VCA grouping assignments are canceled.

To warn you that this is about to occur, the following dialogue box appears:



Select **Yes** to proceed - the console re-configures its processing, including the channel type, and the **Active** summary updates.

After a successful change of channel type, all DSP settings are reset to flat and VCA grouping assignments are canceled.

If you change the channel type in error, then don't panic! The system automatically saves a [Fallback snapshot](#) before each DSP configuration load. This provides a way of recovering settings if required.

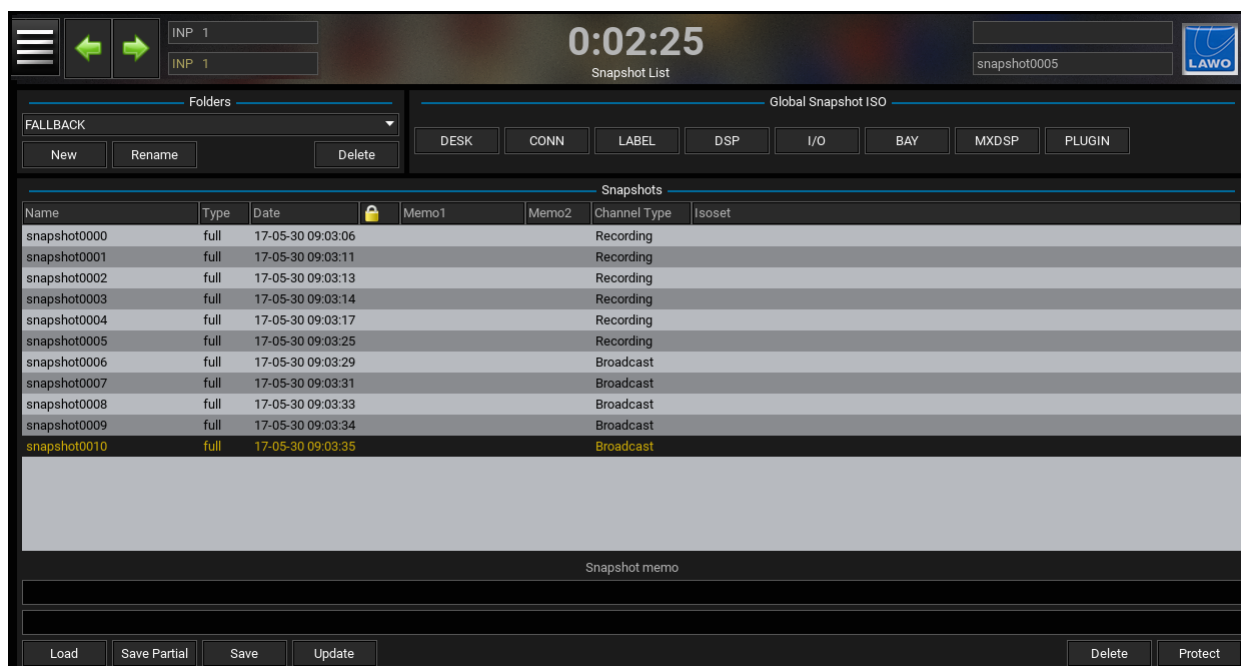
## 8. Signal Flow Configuration

### 8.2.2 Fallback Snapshots

The system automatically saves a fallback snapshot before each DSP configuration load. This provides a way of recovering settings should you change the channel type (Recording to Broadcast, or Broadcast to Recording) by accident.

➤ **To recover your settings:**

1. Make a note of the time when you loaded the wrong DSP configuration, and also the correct channel type for your mix – Recording or Broadcast.
2. Then load a compatible DSP configuration - Recording or Broadcast - from the **DSP Configuration** display.
3. Open the **Snapshots List** display and select the **FALLBACK** folder:



The screenshot shows the 'Snapshots List' window. At the top, there's a 'Global Snapshot ISO' section with buttons for DESK, CONN, LABEL, DSP, I/O, BAY, MXDSP, and PLUGIN. Below this is a table of snapshots. The 'FALLBACK' folder is selected, and the table lists 10 snapshots. The 'Channel Type' column shows 'Recording' for snapshots 0000-0005 and 'Broadcast' for snapshots 0006-0010. The 'snapshot0010' is highlighted in yellow.

Name	Type	Date	Channel Type
snapshot0000	full	17-05-30 09:03:06	Recording
snapshot0001	full	17-05-30 09:03:11	Recording
snapshot0002	full	17-05-30 09:03:13	Recording
snapshot0003	full	17-05-30 09:03:14	Recording
snapshot0004	full	17-05-30 09:03:17	Recording
snapshot0005	full	17-05-30 09:03:25	Recording
snapshot0006	full	17-05-30 09:03:29	Broadcast
snapshot0007	full	17-05-30 09:03:31	Broadcast
snapshot0008	full	17-05-30 09:03:33	Broadcast
snapshot0009	full	17-05-30 09:03:34	Broadcast
snapshot0010	full	17-05-30 09:03:35	Broadcast

A fallback snapshot is automatically saved every time a new DSP configuration is loaded. The **FALLBACK** folder holds 10 snapshots, providing 10 levels of undo before the oldest fallback snapshot is deleted.

The **Channel type** column shows whether the snapshot was saved when a Recording or Broadcast channel DSP configuration was active. In our example, we have been changing between channel types a lot!

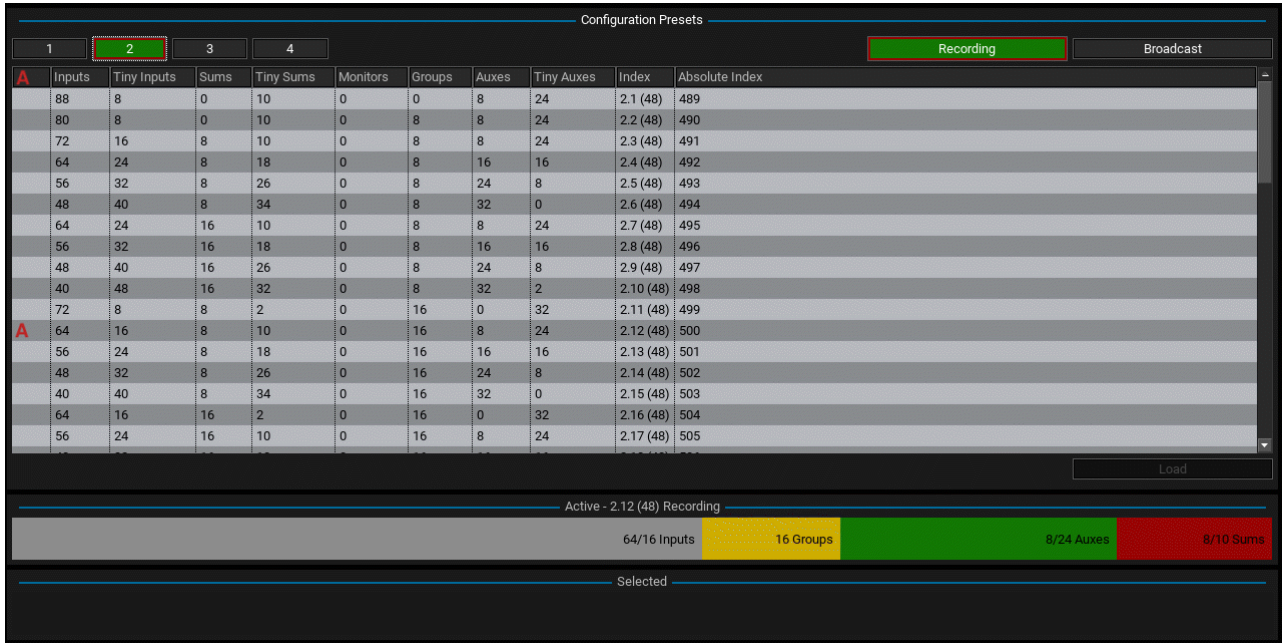
4. Load the correct fallback snapshot to match your chosen DSP configuration - your latest mix settings are reinstated.

Note that the 10 fallback snapshots are saved into the active production whenever you [save](#) or [update](#) the production.

### 8.2.3 Configuring DSP Redundancy

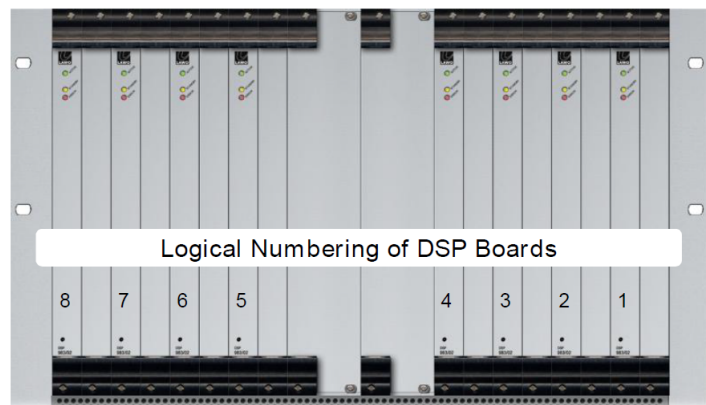
One or more DSP boards can be reserved to provide redundant processing in the event of a DSP board failure. The allocation occurs automatically depending on the active DSP configuration. For example, if the system is fitted with 4 DSP boards and the **Active** configuration uses only 2, then there will be 2 redundant DSP boards:

*DSP Configuration Display*



	Inputs	Tiny Inputs	Sums	Tiny Sums	Monitors	Groups	Auxes	Tiny Auxes	Index	Absolute Index
A	88	8	0	10	0	0	8	24	2.1 (48)	489
	80	8	0	10	0	8	8	24	2.2 (48)	490
	72	16	8	10	0	8	8	24	2.3 (48)	491
	64	24	8	18	0	8	16	16	2.4 (48)	492
	56	32	8	26	0	8	24	8	2.5 (48)	493
	48	40	8	34	0	8	32	0	2.6 (48)	494
	64	24	16	10	0	8	8	24	2.7 (48)	495
	56	32	16	18	0	8	16	16	2.8 (48)	496
	48	40	16	26	0	8	24	8	2.9 (48)	497
	40	48	16	32	0	8	32	2	2.10 (48)	498
	72	8	8	2	0	16	0	32	2.11 (48)	499
A	64	16	8	10	0	16	8	24	2.12 (48)	500
	56	24	8	18	0	16	16	16	2.13 (48)	501
	48	32	8	26	0	16	24	8	2.14 (48)	502
	40	40	8	34	0	16	32	0	2.15 (48)	503
	64	16	16	2	0	16	0	32	2.16 (48)	504
	56	24	16	10	0	16	8	24	2.17 (48)	505

On a Nova73, you can see this by looking at the front panel. The **STANDBY** LED lights (yellow) on all redundant DSP boards, while the **ACTIVE** LED lights (green, blinking) on all active DSP boards.



Note that in a Nova73, the DSP boards are utilized from right to left across the front of the unit. So if board 8 is redundant, it is the DSP board on the left of the core (when viewed from the front).

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

Once the replacement is fitted, it will act as the spare board until either the system is restarted or a new DSP configuration is loaded. The boards are then reset to their default mode of operation - for example, slots 1 to 7 for main DSP resources and slot 8 in standby.

### 8.2.4 Upgrading Your DSP Configuration

By now, your hardware specification will have been pre-determined. However, you can upgrade your system by retrofitting additional DSP boards at any time in the future.

Note that if you add a DSP board, then you will need to edit the [AdminHD](#) configuration and upload it to the system before the new resources become available from the GUI.

### 8.3 DSP Channel Types

This section describes the different channel types.

#### 8.3.1 Recording Channels

When using Recording channels, every full processing input channel (INP) includes all the following audio modules:



- **IN MIX** – channel input gain, phase and stereo input control.
- **AMBIT** – upmix and spatialise processing.
- **DELAY** – delay, adjusted in frames, ms or m.
- **DIGAMP** – digital gain trim.
- **FILTER** – 2-band filter/equaliser section.
- **EQUAL** – 4-band equaliser section offering a choice of characteristics.
- **IMAGE** – controls the image for a stereo channel. (Not active on mono channels.)
- **INSERT** – insert send and return for outboard processing. The insert send is always active providing an additional send.
- **GATE, EXPAND, COMP, LIMITER** – 4 independent dynamics.
- **FADER** – fader level, mute and AFL/PFL monitoring.
- **LOUD** – the channel's loudness meter pickup point.
- **PEAK** – the channel's peak meter pickup point.
- **AUX PEQ, PF, AF** – available pickup points for each aux send (1 to 32). For aux sends > 32, pickup points are PF and AF only.
- **TRKBUS** – pickup point for assignments to track busses (if configured).
- **BUS** – main signal flow feed to group and sum busses.
- **DIR-OUT** – pickup point for the direct output.
- **SCF** – the channel's dynamics sidechain processing.

Note that the [AMBIT](#) module replaces the Delay, Filter, Image, Gate and Expander.

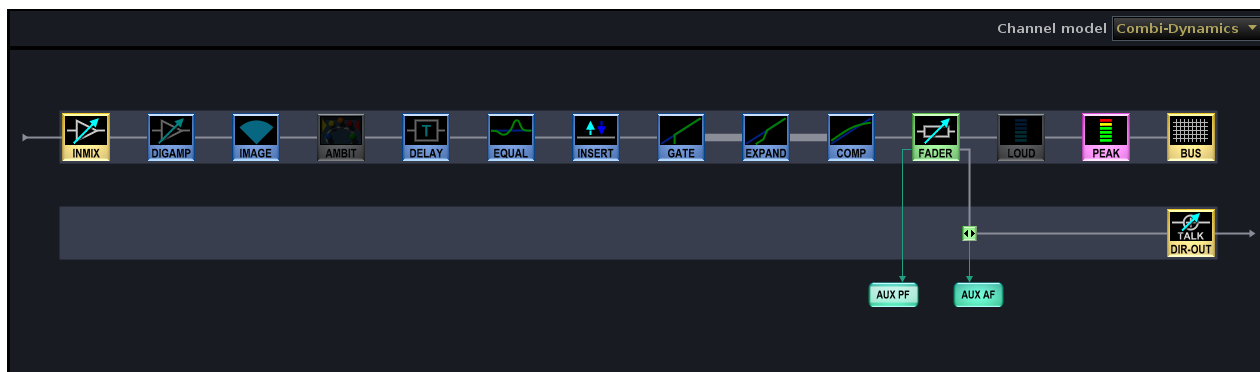
When [loudness metering](#) is active, the LOUD module replaces your choice of DSP modules.

With the exception of the yellow INMIX and BUS sections, modules can be positioned in any order in the [Channel Config](#) display.

## 8. Signal Flow Configuration

### 8.3.2 Broadcast Channels

When using Broadcast channels, the signal flow of a full processing input channel (INP) is simplified:



The main differences to [Recording Channels](#) are that a Broadcast channel has no track bus send, no Filter section and simplified Dynamics (Combi-Dynamics or Limiter).

In addition, there are some restrictions on module positioning in the [Channel Config](#) display; some limitations on DSP parameter values; and a maximum of 32 aux sends.

### 8.3.3 Broadcast vs Recording Channels

Choose **Recording channels** to use more than 32 aux busses; track busses (and monitor channels); or more flexible signal processing.

Choose **Broadcast channels** for a simpler signal flow and more channels from the same DSP resource.

The table below describes all the differences in more detail:

DSP Module/Function	Broadcast Channels	Recording Channels
INMIX (Input Section)	✓	✓
DIGAMP (Digital Gain)	✓ Fixed position.	✓ Variable position.
IMAGE (stereo ch only)	✓ Fixed position.	✓ Variable position.
AMBIT (upmix)	✓ Suspends Dynamics, Delay and Insert.	✓ Suspends Dynamics, Delay and Insert.
DELAY	✓ Min. = 18 smpl / 0.38ms Max. = 1.3 s	✓ Min. = 1 smpl / 0.02ms Max. = 1.8 s
EQ (4-band Filter/Shelf/Parametric)	✓ Max. 2nd order filter	✓ Max. 3rd order filter
FILTER (2-band filters)	✗	✓
SCF (2- band sidechain filters)	✗	✓
INSERT	✓	✓
Dynamics:	Combi-Dynamics OR Limiter	4 independent dynamics
GATE	✓      ✗	✓
EXPANDER	✓      ✗	✓
COMPRESSOR	✓      ✗	✓
LIMITER	✗      ✓	✓
	Combi-Dynamics move together and share Look Ahead Delay. On/off per module, but thresholds cannot overlap.	Modules are completely independent with own Look Ahead Delay. External keying and sidechain filtering available.



DSP Module/Function	Broadcast Channels	Recording Channels
FADER (Level, Mute, AFL, PFL)	✓	✓
LOUD (Loudness Meter)	✓ Suspends selected DSP modules.	✓ Suspends selected DSP modules.
PEAK (Peak Metering)	✓	✓
TRKBUS (Track Bus Send)	✗	✓ Defined by the DSP configuration.
BUS (Main Bus Send)	✓	✓
DIROUT (Direct Out)	✓	✓
Aux Sends:	32	Up to 128, as defined by the DSP configuration.
Pre EQ	✗	✓ (1 to 32 only)
Pre Fader	✓	✓
Post Fader (AF)	✓ (after-fader)	✓ (pre-bus, instead of after-fader)

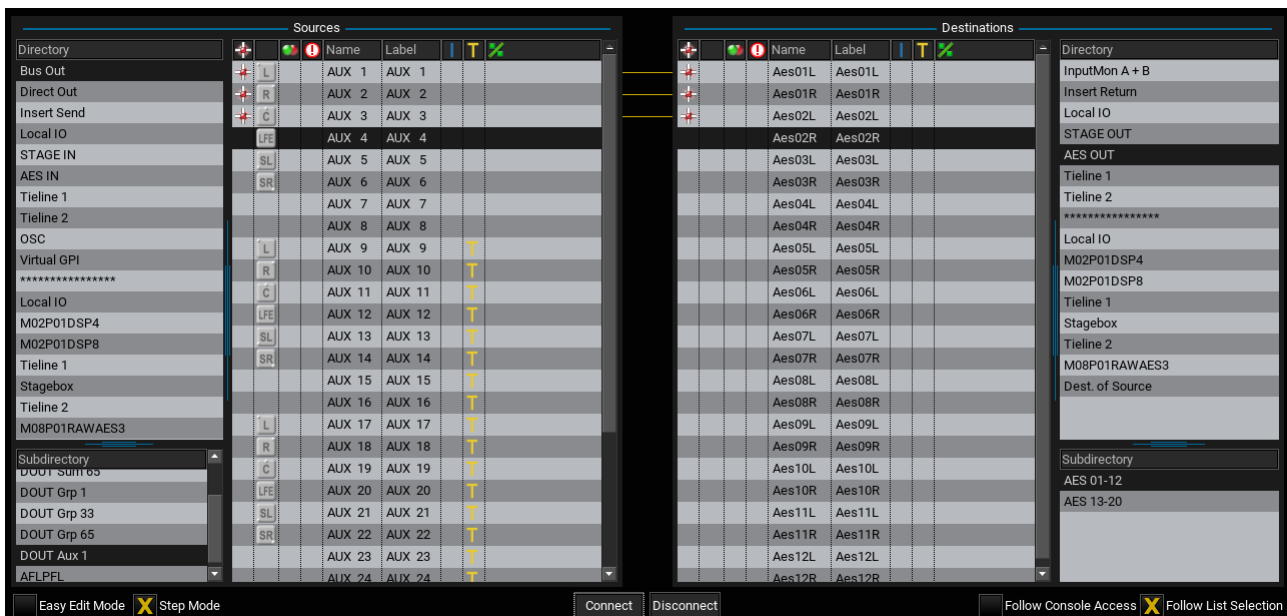
### 8.3.4 Broadcast Channel Conditions

Broadcast channels are *NOT* supported if:

- Your system is running at higher sample rates such as 96kHz.
- Your system uses a 3K MkI Router module (used in some older mc<sup>2</sup> systems).
- Your system has DSP 983/02 cards (used in some older mc<sup>2</sup> systems).

If any of the above are true, then you will not see the **Recording** or **Broadcast** radio buttons on the [DSP Configuration](#) display. In such cases, the channel type is always the default ([Recording channels](#)).

If you have upgraded from an earlier software release (to V4.16), then you will need to update your **Signal List** configuration (gui\_config.tcl), using AdminHD, in order to access the additional input channels, groups and sums. Once updated, you will see the additional resources (sums and groups up to 96) within the **Signal List** display under **Bus Out**:



The screenshot displays the Signal Flow Configuration interface. On the left, the 'Sources' panel lists various input channels and their destinations. The 'Destinations' panel on the right shows the output paths for these sources. The interface includes a 'Directory' pane on the far left for navigating through the signal list, and a 'Subdirectory' pane at the bottom left for more detailed views. The main area is divided into two columns: 'Sources' and 'Destinations', each with a table of channels and their associated settings. The 'Sources' table includes columns for Name, Label, and various status indicators. The 'Destinations' table includes columns for Name, Label, and status indicators. The interface also features a 'Connect' and 'Disconnect' button at the bottom center, and a 'Follow Console Access' and 'Follow List Selection' checkbox at the bottom right.



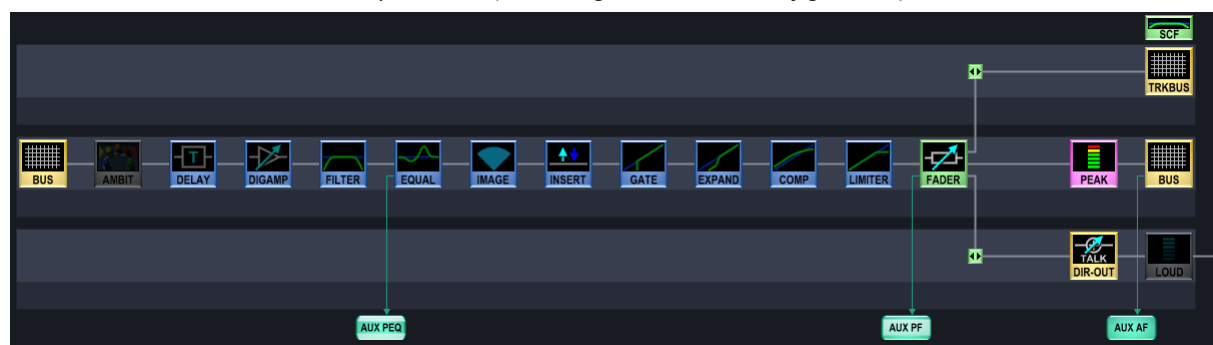
### 8.3.5 Other DSP Channel Types

In addition to input (INP) channels, the system supports the following channel types:

## Group Channels

A fully featured group (GRP) channel is identical to an input channel with the exception of no INMIX section:

### Group Channel (Recording channel DSP Configuration)



This means that a group can be reassigned to another group or sum, it can feed auxiliary sends, and it has an independently configured insert point, direct output path (and track bus if using a Recording channel DSP configuration).

### Sum and Aux Channels

A fully featured sum or aux channel is designed to be the final point in the signal chain. It features all signal processing modules, but cannot be reassigned to another bus (Sum, Group or Aux) and has no independent direct output path:

### Sum Channel (Recording channel DSP Configuration)



Use the Insert Send to take an independent feed from a Sum or Aux channel at any point in the signal chain.

Broadcast channel DSP configurations support a maximum of 32 Auxes, while up to 128 Auxes are available in some Recording channel DSP configurations (at the expense of Monitor Channels/Track Busses).

### Monitor Channels and Track Busses

Monitor channels (MON) are designed for monitoring the send or return from a multitrack recorder.

A monitor channel is *always* associated with its corresponding track bus. So, for example, track bus 1 always feeds the send to monitor channel 1, track bus 2 feeds monitor channel send 2, etc. This means you can make track busses mono, stereo or surround by configuring the corresponding monitor channels to be mono, stereo or surround.

A full processing monitor channel is identical to an input channel with the exception of the INMIX section which features a send/return switch. The signal flow below shows the monitor channel path and its associated track bus:

*Monitor Channel (Recording channel DSP Configuration)*



Broadcast channel DSP configurations do *NOT* support monitor channels, so you must select a Recording channel DSP configuration if you wish to use this feature.

The number of monitor channels within the DSP configuration determines the number of track busses.

#### 8.3.6 Reduced (Tiny) DSP Channels

Tiny channels have no signal processing modules (EQ, Dynamics, etc.) and, therefore, provide a channel with:

- **FADER** – fader level, mute and AFL/PFL monitoring.
- **BUS** – pickup point for group and sum bus assignments.
- **PEAK** – peak metering pickup point.
- **AUX SEND** – auxiliary sends which can be pre fader or post fader.
- **TRKBUS** – pickup point for track bus assignments (Recording Channels only).

Note that only input channels, auxiliaries and sums appear as tiny channels; groups and monitor channels are always configured with full audio processing.

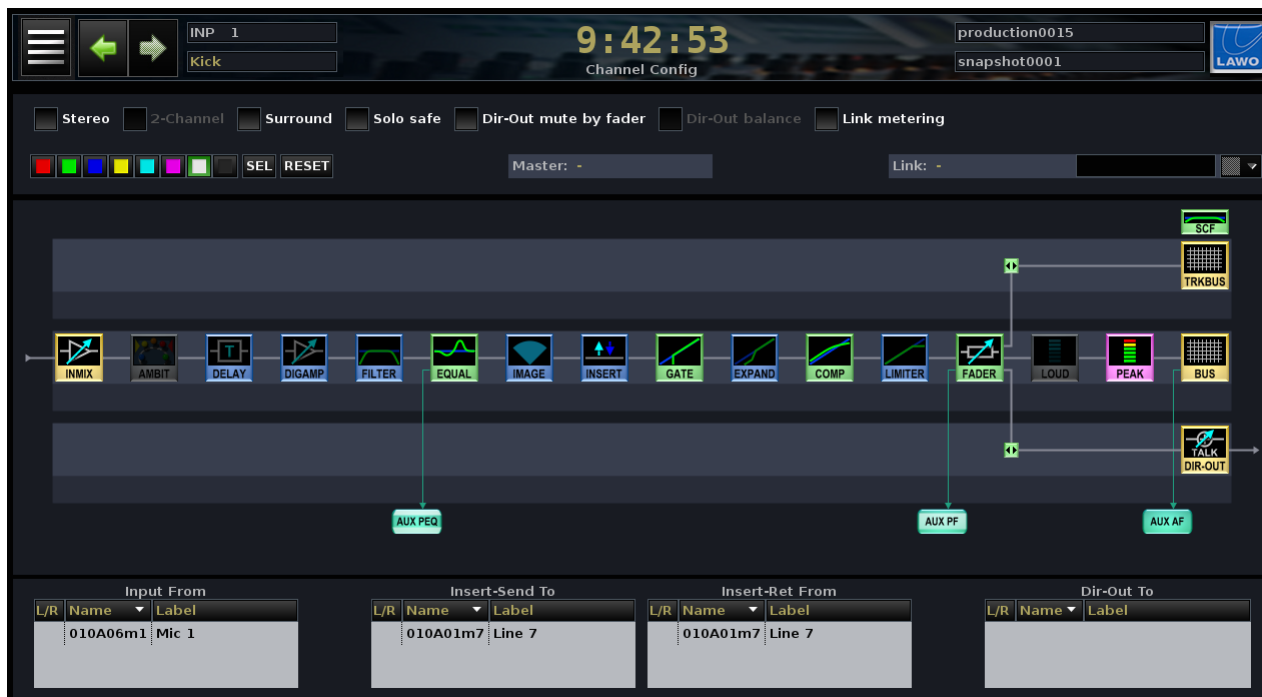
## 8. Signal Flow Configuration

### 8.4 The Channel Config Display

Each channel's signal flow can be interrogated and modified from the **Channel Config** display.

1. Select a channel - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. [Open](#) the **Channel Config** display - in our first example, we are using Recording channels.

*Input Channel (Recording channels)*



At the top of the display are a number of [channel options](#) (**Stereo**, **2-Channel**, **Surround**, etc.)

Below this you can apply [color coding](#) to the selected DSP channel. And to the right, in the **Master** and **Link** fields, you will see the name of any [VCA](#), [Surround](#) or [Link](#) masters (if assigned).

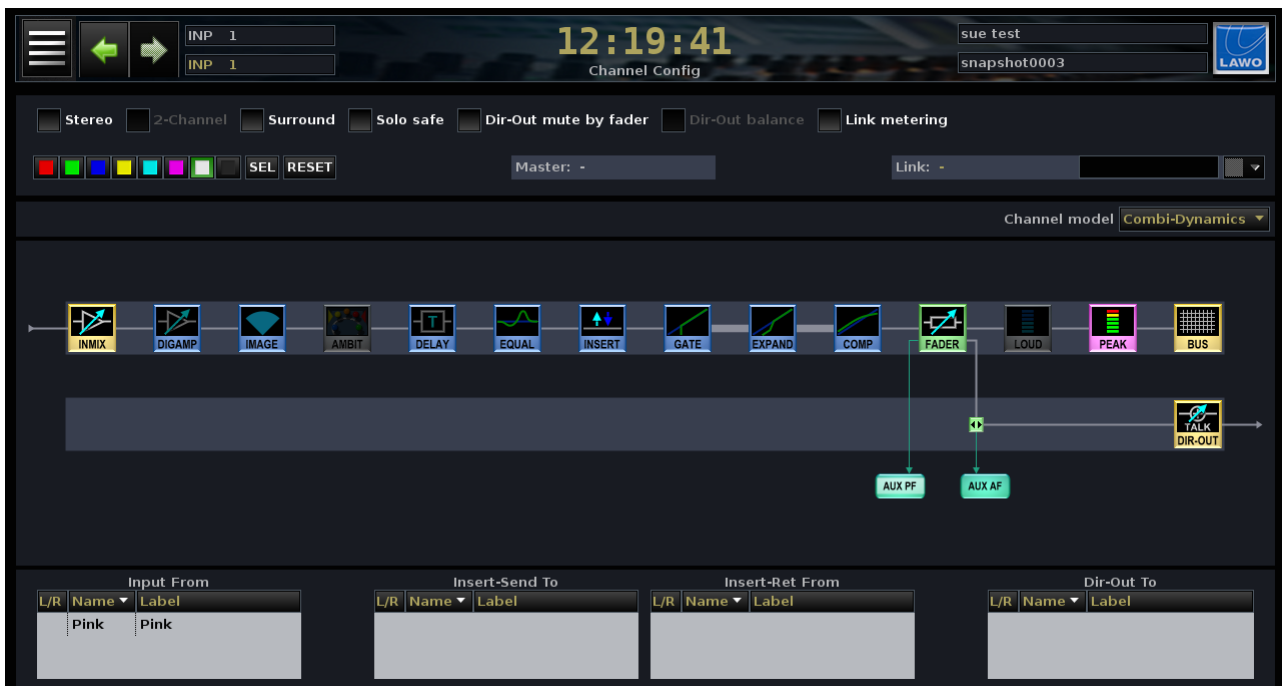
The main part of the display shows the signal flow for the channel in access – in our example, **INP 1**, a full processing input channel from a Recording channel DSP configuration. With the exception of the yellow **INMIX** and **BUS** assignment sections, audio modules can be positioned in any order in the chain. Audio modules colored blue are switched off; those shown in green are switched on; those in grey are unavailable.

Note that the [AMBIT](#) module replaces the Delay, Filter, Image, Gate and Expander.

When [loudness metering](#) is active, the **LOUD** module replaces your choice of DSP modules.

At the bottom of the display you will see the names and labels of any signals connected to and from the channel – the **Input**, **Insert Send**, **Insert Return** and **Direct Out**.

### Input Channel (Broadcast channels)



If Broadcast channels are the [active](#) channel type, then the same principles apply but with the following differences:

- Broadcast channels have no **Filter** or **SCF** module.
- Broadcast channels have no **Track bus** or **pre-EQ** aux send.
- The **DIGAMP** and **IMAGE** modules always follow the **INMIX** section and cannot be moved independently.
- The **Channel model** defines the dynamics processing for the channel: **Combi-Dynamics** or **Limiters**.

## 8. Signal Flow Configuration

### 8.4.1 Changing the Signal Processing Order

To change the signal processing order of the selected channel:

1. Using the trackball, select the processing module you wish to move - the selected module highlights, in our example, the Limiter:



2. Press one of the soft keys (on the SCREEN CONTROL [panel](#)), or right-click and select:
  - LEFT or RIGHT – moves the module left or right within the main channel signal path.
  - UP or DOWN – moves the module into or out of the Track Bus, Channel or Direct Output path.

You can also press [CTRL] + [Left/Right/Up/Down] on the console keyboard to move the selected module.

You cannot move the position of the **INMIX** or **BUS** modules.

When using Broadcast channels, you cannot move the **DIGAMP** or **IMAGE** modules.

3. If you select the **PEAK** or **LOUD** audio module (shown in pink), then the soft key/right-click options will set the meter's pickup point. Note that the available options are pre-defined; you cannot freely position the meters. See [Meter Pickup Points](#) for details.

The signal flow can be customised on a channel-by-channel basis for any input, sum, group, aux or monitor channel.

To adjust a range of channels, [couple](#) them and then make your changes. Or, copy and paste the channel signal flow (**CH**) using the [Parameter Copy/Assign](#) panel.

The channel signal flow is saved in snapshots and productions.

### 8.4.2 Choosing the Dynamics Model (on Broadcast Channels)

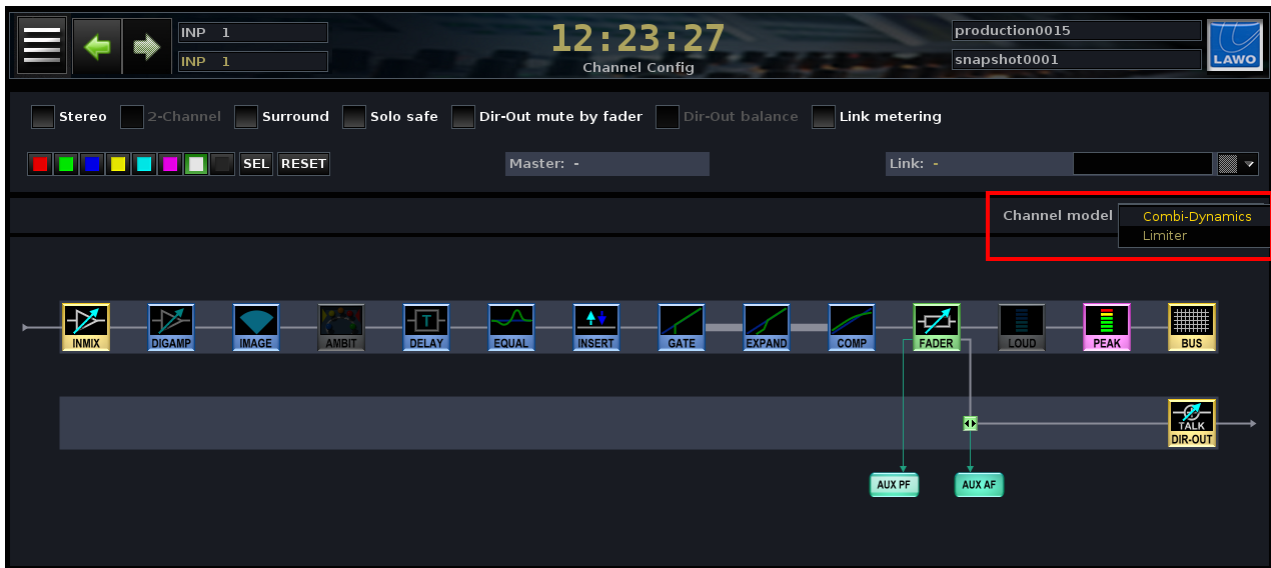
When using Broadcast channels, the dynamics can operate using one of two "Channel Models":

- **Combi-Dynamics** = a Gate, Expander and Compressor which move together as one block of processing within the channel signal flow. Each section can be turned on and off separately, but the thresholds cannot overlap and the order is *always* Gate, Expander and then Compressor. The three sections also share one Look Ahead Delay value. See [Combi-Dynamics Operation](#) for details.
- **Limiter** – a single Limiter module which operates in the usual manner.

If you wish to re-order the Gate/Expander/Compressor, or have both a Limiter and a Gate, Expander or Compressor, then you will need to switch to a [DSP Configuration](#) which uses Recording channels.

➤ To change the dynamic model on the selected channel:

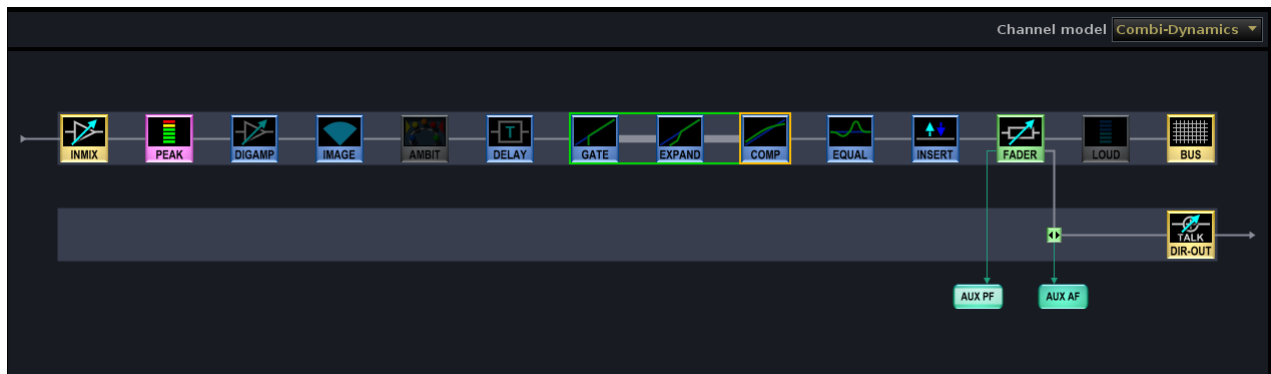
1. Using the trackball, click on the "Channel model" field and choose an option:



The **Channel model** field does not appear if a Recording channel DSP configuration is active.

For surround channels, you can only select the **Channel model** on the surround VCA. This is because all surround slaves must be switched to the same model – either **Limiter** or **Combi-Dynamics**.

2. Then select and position the dynamics module(s) in the [usual](#) manner. Note that if you are working with **Combi-Dynamics**, then the Gate, Expander and Compressor will move as one block:



To set a range of channels, [couple](#) them and then choose the option. Or, copy and paste the channel signal flow (**CH**) using the [Parameter Copy/Assign](#) panel.

The dynamics model is saved along with the rest of the channel signal flow in snapshots and productions.

## 8. Signal Flow Configuration

### 8.4.3 Channel Config Options

The **Channel Config** display includes a number of other options for the channel in access:



If an option is unavailable, then it is “greyed out” - for example, you cannot select **2-Channel** on input or aux channels (only on sums or groups).

In each case you can click to enable (or disable) the option:

- **Stereo** - enables [stereo channel](#) linking.
- **2-Channel** - enables [2-channel](#) operation, as an alternative to stereo. Available for sums and groups only.
- **Surround** - enables [surround channel](#) linking. Note that there are certain restrictions on which channels can be linked for surround, so this option is greyed out unless you have a valid channel in access.
- **Solo Safe** - enables solo safe to prevent the channel being muted when a [Solo-in-place](#) is active.
- **Dir-Out mute by fader** - sets the channel's [direct output](#) to mute automatically when the channel fader opens.
- **Dir-Out Balance** - determines whether the channel pan position affects the [direct output](#). Available for stereo channels only.
- **Link metering** - enables link group metering on the **Channel Display**. Available if the channel is part of a [link group](#).

### 8.4.4 Channel Color Coding

The **Channel Config** display can be used to color code the channel in access. For example, you might want to set all music channels to be white, presenter mics to be red and so on.

The colors are used in the LAWO backlights, by buttons in their off state (if [Button-Glow](#) is enabled) and by the [Channel display](#) (if [Show Fadersense](#) is enabled).



The default colors are **white** = input and monitor channels; **yellow** = groups; **green** = aux masters; **blue** = VCA masters; **red** = sums.

➤ **To change the color code of the channel in access:**

1. Select on an option at the top left of the **Channel Config** display - in our example, **INP 1** is set to white:



To assign a color to a range of channels, [couple](#) them and then select the color.

2. You can use the on-screen **SEL** button to copy the channel color, as part of a copy and paste operation (see [Parameter Copy/Assign](#)).
3. Click on **RESET** to reset the color code of an individual channel back to its system default.
4. Or, to reset all DSP channels to their default color codes, select [Reset colors \(default\)](#) from the **System Settings** display.

The channel color code is saved in snapshots and productions.



### 8.5 Working with Monitor Channels

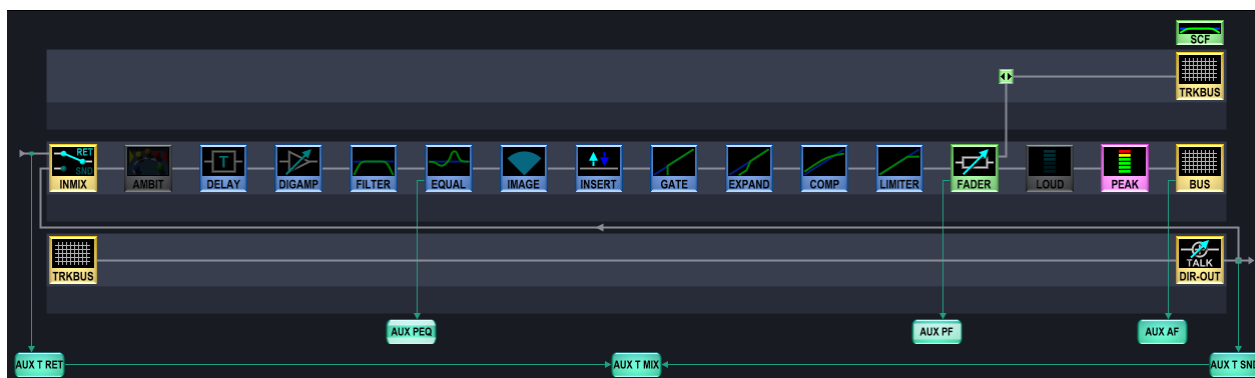
Monitor channels provide the ability to easily configure the mc<sup>2</sup>66 MKII for multitrack recording applications.

A monitor channel (MON) is identical to an input channel (INP) except for the following:

- Monitor channels feature a send/return switch in the INMIX section. Typically this is used to switch from monitoring the send to the return of the recorder.
- Monitor channels have no independent direct out (the direct out is used for the track bus).
- There are some special properties for [auxiliary sends 17 to 32](#).

The signal flow below shows the monitor channel path and its associated track bus:

*Monitor Channel (Recording channel DSP Configuration)*



Broadcast channel DSP configurations do *NOT* support monitor channels, so you must select a [Recording channel](#) DSP configuration if you wish to use this feature.

The number of monitor channels within the [DSP configuration](#) determines the number of track busses.

Each monitor channel is *always* associated with its corresponding track bus. So, for example, track bus 1 always feeds the send to monitor channel 1, track bus 2 feeds monitor channel send 2, etc. This means you can make track busses mono, stereo or surround by configuring the corresponding monitor channels to be mono, stereo or surround.

#### 8.5.1 In-Line Multitrack Recording

To simulate an in-line multitrack recording console:

1. Assign your input channels and monitor channels to the control surface, see [Fader Strip Assignment](#).

We recommend assigning input channels onto Layer 1 fader strips, and monitor return channels onto Layer 2, so that you can quickly switch between them using the fader strip **FLIP** buttons, see [Layer switching](#).

2. Assign the sources you wish to record to your input channels using the [Signal List](#) display, and open your faders to set the record levels.
3. Assign the returns from the multitrack machine to your monitor channels and open your faders to set the monitoring levels.
4. And use either Forward or Reverse [Bus Assign](#) to route your input channels onto the track busses.

Note that a fixed relationship exists between each track bus and monitor channel. So, track bus 1 = monitor channel 1, track bus 2 = monitor channel 2, etc. Therefore, to route input channels onto track busses 1-24, you would select the monitor channels (MON 1 to 24) as your destinations.

You can change the track bus pickup point from the [Channel Config](#) display.

You can make track busses mono, stereo or surround by configuring the corresponding monitor channels to be mono, [stereo](#) or [surround](#).

You can also record other busses, such as a group, by assigning group channels rather than input channels to the monitor channels/track sends.

- Now flip your monitor channels onto the layer 1 faders, and use the **SEND** and **RETURN** functions to switch the monitor channel input between the recorder send and return.

Note that these functions *must* be programmed onto two fader strip user buttons from the [Custom Functions](#) display.

You can switch multiple channels using the [Channel ALL](#) function.

- If machine control is configured, then a **REC** user button may be programmed to record arm the track.
- Use the [layer 2 controls](#) and/or [layer switching](#) buttons to flip between your input channels (to control the send levels to the recorder) and monitor channels (to control the monitor mix).

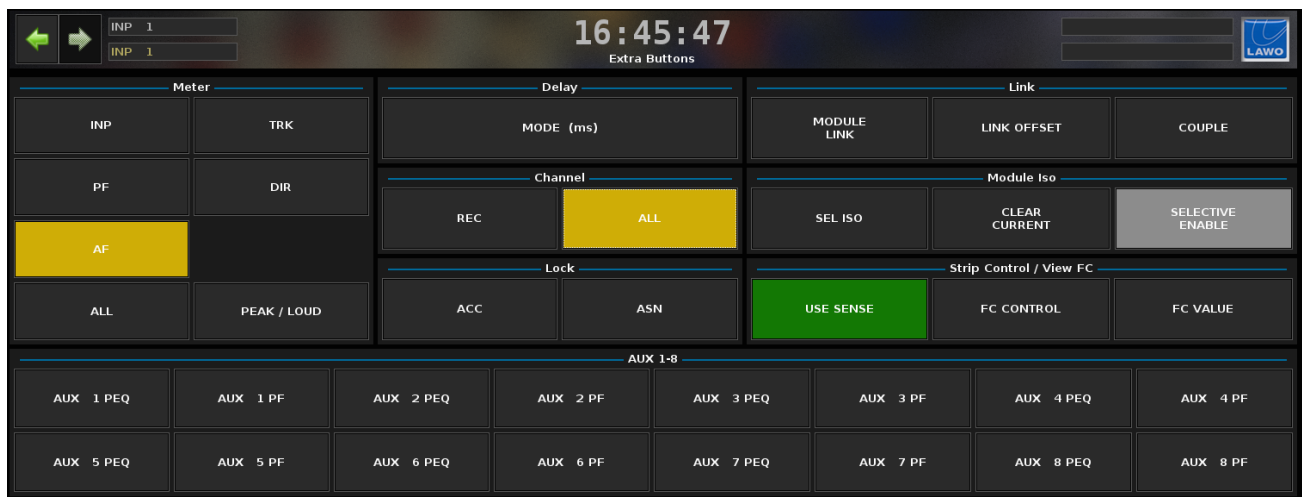
Normally for multitrack operation, a monitor channel cannot be assigned back to its associated track bus in order to prevent feedback. However, when using monitor channels for non-multitrack applications, you can override this feature using the [Track Self Assign](#) option in the **System Settings** display.

### 8.5.2 Switching the Input on Multiple Monitor Channels

The CHANNEL **ALL** button on the [Extra Buttons](#) display can be used to define a cluster of channels so that inputs are switched across multiple channels. For example, when recording, you can use this feature to switch all your monitor channels from send to return.

This function is *only* available for monitor channels.

- Press the **ALL** button, located in the **Channel** section of the [Extra Buttons](#) display:



The **ALL** button flashes and the fader **SEL** buttons across the console flash, in green.

- Add channels to the cluster by pressing their fader **SEL** buttons - selected channels change from green to red:



- Now press the **SEND** fader user button on any channel within the cluster - all channels within the cluster are switched to the send; channels not in the cluster are unaffected.

The **SEND** and **RET** input select buttons will continue to switch inputs within the cluster while the **ALL** button is lit.

(Note that **SEND** and **RET** must be programmed onto fader strip user buttons from the [Custom Functions](#) display.)

- To return to individual monitor channel switching, deselect **ALL** on the **Extra Buttons** display.

## 8. Signal Flow Configuration

Note that if you re-select the **ALL** button, the same cluster of channels as defined in step 2 will be reinstated.

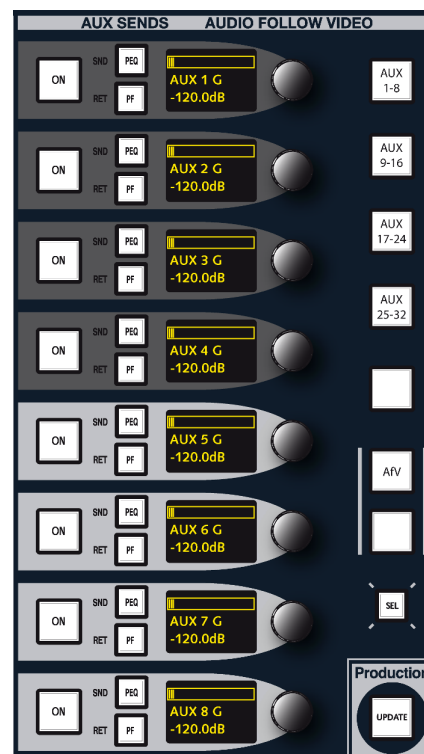
### 8.5.3 Monitor Channels and Auxiliary Sends

When auxiliary sends 17 to 32 are assigned from a monitor channel, their source can be switched between the monitor send and return from the AUX SENDS panel in the Central Control Section:

- Press the **PEQ** button to switch the monitor send signal to the auxiliary send.
- Press the **PF** button to switch the monitor return signal to the auxiliary send.

Note that this source selection occurs on auxiliary sends 17 to 32 from monitor channels *only*. It is designed for cue feeds when overdubbing a recording. All other aux sends behave in the usual manner.

To disable the automatic source selection for aux sends 17 to 32, use the [Cue Aux Send/Return](#) option in the **System Settings** display.



### 8.5.4 Non-Multitrack Applications

The only difference between input channels and monitor channels is that the monitor channel direct out is used to provide the track bus signal path. This means that you can also use monitor channels in non multitrack applications to handle any type of source with exactly the same processing facilities as an input channel, except there is no direct output.

When using monitor channels for non-multitrack applications, you may wish to adjust the [Track Self Assign](#) and [Cue Aux Send/Return](#) options in the **System Settings** display.

The track bus (from the monitor channel) can be used as a [mix minus](#) send.

## 9. Control Surface Configuration

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This chapter deals with configuring the control surface.

Topics include:

- [Customising the Control Surface](#)
- [Fader Strip Assignment](#)
- [Working with User Labels](#)
- [Banks and Layers](#)
- [Isolating Fader Bays \(ISO BAY\)](#)
- [Assigning Default Parameters to Free Controls](#)
- [Fader User Buttons](#)
- [Centre Section User Buttons](#)

### 9.1 Customising the Control Surface

The control surface operation can be customised in the following ways:

#### Fader Strip Assignment

The control surface includes both channel and main fader strips. Any fader strip can control any audio channel (input, monitor return, group, sum or aux), or any control channel ([VCA](#), [Surround VCA](#) or [GPC](#)). This allows you to lay out your source channels, audio masters and control masters exactly where you want them.

#### User Labels

Each audio and control channel can be labeled, making it easy to identify your source channels, output channels, VCAs, etc.

#### Banks and Layers

The physical size of the console does not restrict the number of channels contributing to the mix, as additional channels can be accessed by switching to different banks and layers.

You can use the six banks to switch globally through different channel layouts or to access different sets of channels. Within each bank, layers can be switched globally or individually, making them ideal for related channels such as an input and its mix minus return.

#### ISO Bay Operation

Isolated bays are unaffected by the centre section BANK and LAYER switching. This makes them ideal for multi-operator mixing or for working locally within a channel bay. If working with more than one operator, isolated bays can be excluded from snapshot loads, and can feed a separate AFL/PFL bus (for independent headphone monitoring).

#### Free Controls

Every fader strip includes four Free Controls for local access to parameters such as aux send levels, EQ gain, etc.

Free Controls can be assigned to any channel parameter, and assignments can vary from channel to channel. This allows you to assign exactly the functions needed for each channel.

#### User Buttons

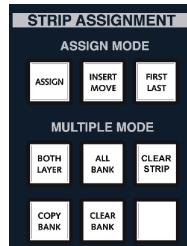
Every fader strip includes 4 user buttons which can be customised globally for all fader strips.

In addition, the CENTRAL USER BUTTON and TALKBACK areas include central user buttons for "master" functions.

You can also program user button functions onto a device running the [Lawo Remote App](#).

## 9.2 Fader Strip Assignment

Fader strips are assigned using the STRIP ASSIGNMENT buttons in the centre section of the console:



Any audio processing or control channel can be assigned to any physical fader - channel or main fader strips.

If the assigned channel is stereo, then both the left and right sides are automatically controlled from a single fader strip.

For surround channels, you can assign the [Surround VCA](#), for single fader strip control, and/or the individual component channels (e.g. L/R, C, LFE, Ls/Rs).

The STRIP ASSIGNMENT buttons can be locked, to protect the existing console layout, by pressing the **Lock ACC** button located on the [Extra Buttons](#) display. Therefore, if you cannot assign a channel to a fader strip, check the status of this option.

Fader strip assignments are stored and recalled in snapshots and productions. This allows you to store a single layout (in a production), or multiple layouts for recall during a show (using snapshots).

### 9.2.1 Assigning a Single Fader Strip

1. Select the channel you wish to assign - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. Press the **ASSIGN** button (under STRIP ASSIGNMENT in the centre section) - the fader **SEL** buttons across the console flash, in green:



3. Press a fader **SEL** to complete the assignment - the fader strip updates and the **SEL** button changes color, from green to red.

You can assign the same channel to multiple fader strips by keeping **ASSIGN** selected - for example, to assign the same channel to a different bank or layer. Note that this will assign the *same* channel to multiple places, so if you choose **SEL** buttons on the same bank or layer, then you will have lots of faders controlling a single channel!

4. Deselect the **ASSIGN** button or press **ESC** (on the [ACCESS/ASSIGN panel](#)) to exit the strip assign mode.

### 9.2.2 Assigning a Range of Channels to Consecutive Fader Strips

1. Select the first channel in the range - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. Then press **FIRST LAST** (under STRIP ASSIGNMENT in the centre section) - the fader **SEL** buttons across the console flash, in green.
3. Press the fader **SEL** on the *first* fader you wish to assign (e.g. strip 1) followed by the fader **SEL** on the *last* fader (e.g. strip 24) - the console incrementally assigns channels from fader strip 1 to 24, and then cancels the **FIRST LAST** mode.
4. Deselect the **ASSIGN** button or press **ESC** to exit the strip assign mode.

If all the channels are mono, then you will have assigned INP 1 to 24 to fader strips 1 to 24.

If some channels are stereo, then they are automatically assigned to a single fader. For example, if INP 1&2 and INP 3&4 are stereo, then they are assigned to fader strips 1 and 2; INP 5 is assigned to fader strip 3, INP 6 to fader strip 4, and so on.

If some channels are surround, then it is the component channels which are assigned (e.g. Front L/R to fader strip 1, Front C to fader strip 2, etc). Note that the component channels can be controlled from a single Surround VCA master, but this must be assigned in a separate operation. See [Surround VCAs](#).

The start and end of the "FIRST LAST" range can be at any position across the control surface, and sources can be routed from left to right or from right to left by reversing the order of your first and last fader selection.

**FIRST LAST** treats channel and main fader strips independently. This allows you to make changes to channel fader strips without affecting the main faders, or vice versa.

### 9.2.3 Clearing an Individual Fader Strip

To remove a channel so that it leaves a blank fader strip:

1. Press **CLEAR STRIP** (under STRIP ASSIGNMENT in the centre section) - the fader **SEL** buttons across the console flash, in green.
2. Press the fader **SEL** button(s) on any fader strips you wish to clear.
3. When you are finished, deselect **CLEAR STRIP** or press **ESC** to exit the strip assign mode.

### 9.2.4 Inserting a Channel

To insert a channel between two existing fader strips:

1. Select the channel you wish to insert - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. Press **INSERT MOVE** (under STRIP ASSIGNMENT in the centre section) - the fader **SEL** buttons across the console flash, in green.
3. Press the fader **SEL** button where you wish to insert the new channel - for example, on fader strip 5.

The replaced channel, and all channels to its right, move one step to the right across the control surface. If a channel is assigned to the last fader strip on the right, then this drops off the end of the console and becomes a virtual fader.

For example, on a 24-fader control surface, the above operation would shift fader strip 24 up onto a virtual fader strip 25. This fader cannot be accessed, but remains in this location and will be added back to the control surface if a fader strip assignment is [removed](#).

**INSERT MOVE** treats channel and main fader strips independently. This allows you to make changes to channel fader strips without affecting the main faders, or vice versa.

### 9.2.5 Removing a Channel

To remove a channel from a fader strip and automatically close the gap:

1. Select the channel by pressing its fader **SEL** button.
2. Press **INSERT MOVE** (under STRIP ASSIGNMENT in the centre section) - the fader **SEL** buttons across the console flash, in green, except for the channel in access which should be red.
3. Press the red fader **SEL** button again to confirm the remove - all channels to the right ripple down the control surface to fill in the gap.

If any virtual channels have been created, as the result of an [insert](#) operation, then these will be added back to the surface.

**INSERT MOVE** treats channel and main fader strips independently. This allows you to make changes to channel fader strips without affecting the main faders, or vice versa.

### 9.2.6 Swapping Fader Strips

This function can be used to swap two individual fader strips, or two different groups of consecutive fader strips.

➤ **To swap individual fader strips:**

1. Press the fader **SEL** button on the "source" fader (e.g. on strip 5).
2. Press **SWAP** (under STRIP ASSIGNMENT in the centre section) - the fader **SEL** buttons across the console flash, in green.
3. Press the fader **SEL** button on the "destination" fader (e.g. on strip 8).

The channel assignments are exchanged - in our example, the channel assigned to strip 5 moves to strip 8, and vice versa.

➤ **To swap two groups of consecutive fader strips:**

1. First, create a [Couple](#) group by pressing and holding the fader **SEL** buttons on the "source" faders - the fader **SELs** turn red to indicate that coupling is active (e.g. couple fader strips 3 to 6).
2. Press **SWAP** (under STRIP ASSIGNMENT in the centre section).
3. Now press the fader **SEL** button on the first "destination" fader (e.g. on strip 9).

The channel assignments are exchanged - in our example, the channels assigned to strips 3 to 6 move to strips 9 to 12, and vice versa.

You can use this method to exchange any number of fader strips as long as you observe the usual Couple group [conditions](#).



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### 9.2.7 Relocating Channels

This function can be used to relocate an individual fader strip, or a group of consecutive fader strips. In both cases, the "source" fader strips will be cleared (left unassigned).

➤ **To relocate an individual fader strip:**

1. Press the fader **SEL** button on the "source" fader (e.g. on strip 5).
2. Press **RELOCATE** (under STRIP ASSIGNMENT in the centre section) - the fader **SEL** buttons across the console flash, in green.
3. Press the fader **SEL** button on the "destination" fader (e.g. on strip 8).

The channel assigned to strip 5 moves to strip 8, and strip 5 is cleared (unassigned).

➤ **To relocate a group of consecutive fader strips:**

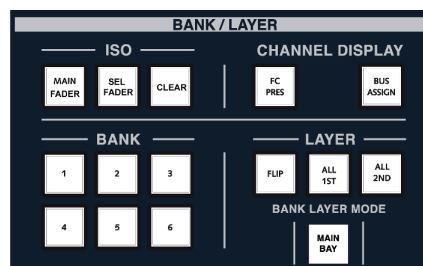
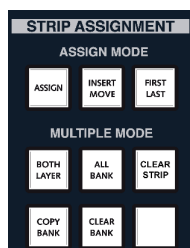
1. First, create a [Couple](#) group by pressing and holding the fader **SEL** buttons on the "source" faders - the fader **SEL**s turn red to indicate that coupling is active (e.g. couple fader strips 3 to 6).
2. Press **RELOCATE** (under STRIP ASSIGNMENT in the centre section).
3. Now press the fader **SEL** button on the first "destination" fader (e.g. on strip 9).

The channels assigned to strips 3 to 6 move to strips 9 to 12, and strips 3 to 6 are cleared (unassigned).

You can use this method to relocate any number of fader strips as long as you observe the usual [Couple group conditions](#).

### 9.2.8 Assigning Channels to All Banks/Both Layers

The STRIP ASSIGNMENT and BANK buttons can be used together to provide a number of useful short cuts when you are first laying out the surface:



For example, to assign input channel 1 to fader strip 1 across both layers of all six control surface banks:

1. Select **INP 1** - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. Select **ALL BANK** and **BOTH LAYERS** (under STRIP ASSIGNMENT in the centre section).

The fader **SEL** buttons across the console flash, in green, and the six BANK buttons **1** to **6** are illuminated.

3. Deselect any BANK numbers which you do *NOT* want to include in the assignment (you cannot deselect the current bank). For our example, keep all six BANK buttons lit.
4. Deselect **BOTH LAYERS** if you do *NOT* want to include both layers in the assignment. For our example, keep the button lit.
5. Then press a flashing green fader **SEL** button to complete the assignment - for example, on fader strip 1.

**INP 1** is assigned to fader strip 1 across both layers of all the selected banks.

You can assign a channel to any combination of banks, with or without both layers, in order to achieve the desired fader strip assignment.

### 9.2.9 Clearing a Bank of Fader Strips

To clear a complete bank of fader strip assignments (including both layers):

1. Press **CLEAR BANK** (under STRIP ASSIGNMENT in the centre section).
2. Then select the bank or banks you wish to clear using the BANK 1 to 6 buttons.
3. Press ENTER (on the ACCESS/ASSIGN [panel](#)) to complete the operation.

### 9.2.10 Copying Banks

To copy the control surface configuration to a different bank or banks:

1. Select the bank you wish to copy using the BANK 1 to 6 buttons - the control surface updates accordingly.
2. Press **COPY BANK** (under STRIP ASSIGNMENT in the centre section).
3. Then select the bank numbers to copy to, using the BANK 1 to 6 buttons.
4. Press ENTER (on the ACCESS/ASSIGN [panel](#)) to complete the operation.

### 9.3 Working with User Labels

The centre section LABEL buttons change what is viewed on the fader strip label displays (and the label fields in the Central GUI [Title Bar](#), [Channel display](#) and [Signal List display](#)).

Centre Section LABEL buttons



Fader Strip Labels (showing CHANNEL NAMES)



You can choose one of the following options; each switches the labels globally across the console:

- **CHANNEL NAME** = the system name of the channel (e.g. INP 1, INP 2, etc).
- **USER LABEL** = the user label given to the channel (e.g. GUEST, MUSIC, etc).
- **INHERIT SOURCE** = the user label given to the source routed to the channel (e.g. MIC 1, CD, etc).

To make the most of your user names and labels, here are some recommendations:

1. Select **CHANNEL NAME** while preparing the console.

This enables you to easily view where you are assigning your input channels, group masters, auxiliary masters, VCA masters, etc.

2. Select **USER LABEL** to see the generic label for each channel - e.g. PRESENTER, GUEST, etc.

This can be useful if you want to start laying out the surface, but do not yet know the final signal list. For example, if the presenter and guest mics change for each show.

3. Select **INHERIT SOURCE** once your console fader strips are configured and you have started to assign sources to your input channels.

If no source is assigned to an input or monitor channel, then the **USER LABEL** for the channel is displayed. (This also applies to other channel types: Group, Sum, Aux, VCA, Surround VCA or GPC.)

This means that you can use **INHERIT SOURCE** to check your signal routing as follows. For example, if you have used the names **Com1**, **Com2** and **Guest** as channel user labels, and **Mic1**, **Mic2** and **Mic3** as source labels for microphone inputs, then when you begin to route sources to channels, the fader strip label displays should update. If they don't and you see say **Mic1**, **Mic2** and then **Guest**, you know that first two mic channels are correctly routed, but the **Guest** channel has no connected source.

Note that for an individual source, the inherit function can be inhibited. This must be performed within the factory configuration. Please consult your console specification for details.

## 9.3.1 Editing User Labels

### ➤ CHANNEL NAME

This is the fixed system name for the DSP or control channel assigned to the fader strip. For example, **INP 1** for input channel 1, **GRP 4** for group channel 4, **VCA 7** for VCA master 7, etc. You cannot edit this name. Note that for DSP channels (inputs, monitors, groups, sums and auxes), this is the same as what you see in the **Name** field on the [Signal List](#) display.

### ➤ USER LABEL and SOURCE LABEL (input and monitor channels)

Either or both of these labels can be edited for input and monitor channels. The user label names the channel, while the source label names the signal routed to the channel.

Use the Source **Label** field (in the [Signal List](#) display) to edit the source label, and the Destination **Label** field to edit the channel user label:

Sources					Destinations				
	Name	Label	I	T		Name	Label	I	T
	046A01m1	Mic 01				INP 1A	Com 01		
	046A01m2	Mic 02				INP 2A	Com 02		
	046A01m3	Mic 03				INP 3A	Guest		
	046A01m4	Mic 04				INP 4A	Input 04		

### ➤ USER LABEL (other channel types)

For other channel types, the only relevant label is the USER LABEL as there is no inherited source.

For groups, sums and auxes, use the Source **Label** field (in the [Signal List](#) display) to edit the channel user label. You will find all groups, sums and auxes in the "Bus Out" directory:

Sources				
Directory		Name	Label	I T X
Bus Out		GRP 1	GRP 1	
Direct Out	R	GRP 2	GRP 2	
Insert Send	C	GRP 3	GRP 3	
mxDSP Signals	LFE	GRP 4	GRP 4	
Plugin Server	SL	GRP 5	GRP 5	
CD	SR	GRP 6	GRP 6	
Dallis		GRP 7	GRP 7	
Box AES		GRP 8	GRP 8	
Madi Tie1				
Madi Tie2				

For a control channel (VCA, Surround VCA or GPC), click in the label field in the Central GUI [Title Bar](#) to edit the channel user label. Note that the centre section LABEL buttons must be switched to **USER LABEL** to allow access to this field:





## 9.4 Banks and Layers

The console supports six control surface banks (1 to 6), each with two layers - Layer 1 and Layer 2.

Bank switching provides fast global access to different sets of channels, or channels in a different layout - for example, to bring the music channels in a live entertainment up onto the surface when the band are playing.

Layers can be switched on individual fader strips, making them ideal for related signals - for example, to switch quickly between a presenter's input channel and their mix minus (N-1) return.

Free control 4 (FC4) can be switched to adjust level and mute for the alternate layer, thus providing access to both layers simultaneously. See [Layer 2 Control](#).

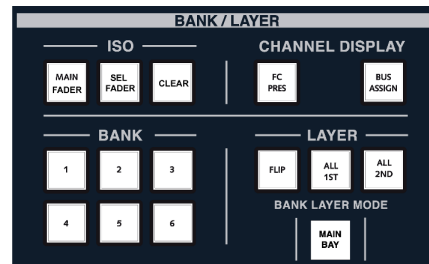
If you wish, you can [isolate](#) individual fader strips so that they never switch bank or layer. Or, [isolate](#) fader bays so they can be used by a second engineer.

### 9.4.1 Bank Switching

You can switch between the six fader banks either globally across the whole surface, or locally within each 8-fader bay:

#### ➤ To switch BANKs globally:

1. Locate the six BANK access buttons, numbered 1 to 6 in the centre section.



One button is always lit; this is the active bank. The BANK labels can be edited from the Central GUI via the touch-screen button side panel.

2. With **MAIN BAY** turned off, press one of the BANK numbers 1 to 6 to switch *all* fader strips: channel and main.

All fader labels, control positions and **Channel** displays update across the console to reflect the new settings. If there are no channels assigned to the bank, then you will switch to a series of blank fader strips.

3. Turn on **MAIN BAY** and press BANK 1 to 6 to switch *only* the main fader strips.

The global BANK selections affect *all* fader strips across the console, except for those in an [isolated bay](#) or with an individual [ISO state](#) active.

#### ➤ To switch BANKs locally within a channel bay:

1. Locate the BANK 1 to 6 buttons on the ISO BAY panel:



One button is always lit; this is the active bank.

2. Press one of the BANK numbers (1 to 6) to switch to a different bank.

This time only the 8 fader strips within the bay switch to the new bank.

If a fader strip is [isolated](#), then the fader is not switched by the local banking buttons.

If you press a global BANK button, this will reset the bank on the local bay (providing the bay is not [isolated](#)).

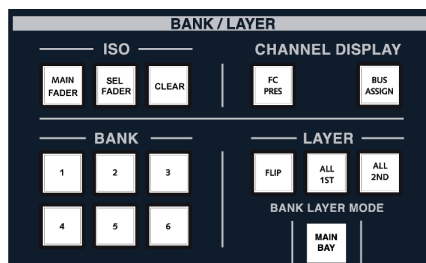
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### 9.4.2 Layer Switching

Within each of the six banks, you can switch between layers 1 and 2 globally across the whole surface, locally within each 8-fader bay, or individually on each fader strip:

#### ➤ To switch LAYERS globally:

1. Locate the LAYER access buttons in the centre section:



2. With **MAIN BAY** turned off, press **FLIP** to invert the layer of *all* fader strips: channel and main.

This inverts the individual fader strip **FLIP** buttons, allowing you to view all 'hidden' channels with one button push.

All fader labels, control positions and **Channel** displays update across the console to reflect the new settings. If there are no channels assigned to the alternate layer, then you will switch to a series of blank fader strips.

3. Turn on **MAIN BAY** and press **FLIP** to invert *only* the main fader strips.
4. To temporarily switch *all* fader strips to either Layer 1 or Layer 2, press **ALL 1ST** or **ALL 2ND**.

This overrides the individual fader strip **FLIP** buttons. However, when you deselect **ALL 1ST** or **ALL 2ND**, the fader strip **FLIPs** are reinstated so that you return to your previous layer status.

5. To permanently reset the layer of *all* fader strips, press and hold **ALL 1ST** or **ALL 2ND** for more than 3 seconds.

This resets the individual fader strip **FLIP** buttons to either all off or all on.

The global LAYER selections affect *all* fader strips across the console, except for those in an [isolated bay](#).

#### ➤ To switch LAYERS locally within a channel bay:

1. Press the **LAYER FLIP** button, on the ISO BAY panel, to invert *only* the fader strips within the 8-fader bay:



#### ➤ To switch the LAYER on an individual fader strip:

1. Press the fader strip **FLIP** button.

The fader's label, control positions and **Channel** display update to reflect the settings for the second layer. If there is nothing assigned to this layer, then you will switch to a blank fader strip.

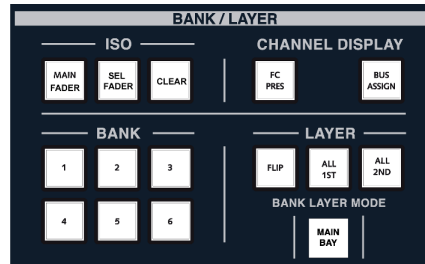
### 9.4.3 Isolating Fader Strips from Bank Switching

The following method can be used to isolate fader strips from bank switching (but not layer switching). For example, to keep a presenter's input channel or sum master on the control surface at all times.

To isolate a fader strip from both bank and layer switching, then an alternative approach is to assign the channel to the same position within every bank and layer using the [ALL BANKS/BOTH LAYERS](#) method.

Alternatively, if you are working with more than one engineer and wish to provide separate 8-fader bays for the second engineer, you can turn on [ISO bay](#).

1. Locate the ISO buttons in the centre section:



2. To isolate *all* 8 main fader strips from bank switching, press **MAIN FADER**.

If you switch banks and then deselect the **MAIN FADER** button, the fader strips update to reflect the settings for the selected bank.

3. Alternatively, to isolate some individual fader strips:

- Press **SEL FADER** - the fader **SEL** buttons across the console flash, in green:



- Press the **SEL** button(s) on the fader(s) you wish to isolate. You can select channel or main fader strips - the **SEL** buttons change color from green to red to indicate that they are now isolated from bank switching operations.
  - Deselect **SEL FADER** to cancel out of the selection mode - all selected isolations will remain active until cleared.
4. To clear *all* bank switching isolations, press **CLEAR**.



### 9.5 Isolating Fader Bays (ISO BAY)

To isolate a fader bay:

1. Press the **ON** button located on the ISO BAY access panel:



You can isolate multiple bays at any physical position.

All isolated bays are unaffected by the centre section BANK and LAYER switching. This makes them ideal for multi-operator mixing or for working locally within a channel bay.

#### 9.5.1 Bank and Layer Switching

The BANK 1 to 6 and **LAYER FLIP** buttons provide local bank and layer switching for the 8 fader strips. Note that they can be used with ISO BAY on or off (for convenience).

#### 9.5.2 Independent AFL and PFL

AFL and PFL selections made within isolated bay(s) can be split away from the main console, and routed onto a second AFL and PFL bus, by enabling the [ISO AFL2/PFL2](#) option in the **System Settings** display.

You can use this to provide the second engineer with independent headphone monitoring.

#### 9.5.3 Snapshot Isolate

To prevent snapshots recalled by the main engineer affecting the desk layout of isolated fader bays, use the [BAY Global Snapshot ISO](#) option.

With Global Snapshot ISO **BAY** enabled, the fader strip assignments on isolated bays are protected from a snapshot recall.

Note that only the fader strip assignments are isolated. Other settings such as DSP parameters and FC assignments will still be loaded. To prevent a snapshot from resetting all settings on a specific channel, turn on its [SNAP ISO](#) button.

#### 9.5.4 Fader SEL Behaviour

If you are working with more than one engineer, then the [Select Isolate](#) option in the **System Settings** display should be set to on - this will stop the fader **SEL** buttons in an isolated bay from changing the channel in access. Therefore, allowing the second engineer to select channels without affecting the main operator.

- **Select Isolate** (on) – the **SEL** buttons within isolated bays do NOT update the channel in access. Use this mode when you want isolated bays to work independently from the rest of the console. For example, when one engineer is working on an isolated fader bay and another with the rest of the console.
- **Select Isolate** (off) – the **SEL** buttons within isolated fader bays do update the channel in access. This mode is ideal for single operator use where you wish the channel in access to follow selections within isolated fader bays.

When working with **Select Isolate** on, note that if you deselect and then reselect the bay's **ISO ON** button, the console will remember the selected channel within the isolated bay so that you can return to adjusting its parameters easily.

## 9.5.5 Expanded Parameter Control

With ISO BAY **ON**, the **SHOW EQ**, **DYN**, **AUX**, **MISC** and **BUS** buttons can be used to temporarily assign the 32 Free Controls to DSP and Bus assign parameters for the selected channel.

1. If you haven't already done so, press ISO BAY **ON** to isolate the fader bay.
2. Next, select the parameters you wish to control – for example, press **SHOW AUX** to control aux sends.

All the Free Controls within the isolated bay update to show AUX parameters for the selected channel - reach out to adjust a parameter.



3. If there are more parameters available (for example, more aux sends), then press the same button again to scroll through the parameters.
4. At any time, you can press another fader **SEL** button to adjust settings for a different channel (within the isolated bay).
5. Deselect the **SHOW** or **BUS** button to return the Free Controls to their normal mode of operation.

All channel DSP, AUX sends and BUS assign parameters can be accessed in a similar manner.

When used for BUS assign, the Free Control buttons will route the selected channel to each bus (on or off). Note that the rotary controls have no function. Use the left and right arrow keys to page through all available group and sum busses.

For details on how DSP and AUX parameters are controlled, please see [Free Control Functions](#).

## 9.6 Assigning Default Parameters to Free Controls

The four Free Controls on each channel fader strip can be assigned to key functions for the source. For example, on a presenter's channel you might need access to the presenter's mix minus level and compressor threshold. Whereas, on a music replay channel, it is more important to access L/R Balance and Aux send level.

The default Free Control assignments are made from the PARAMETER assign panel shown below:



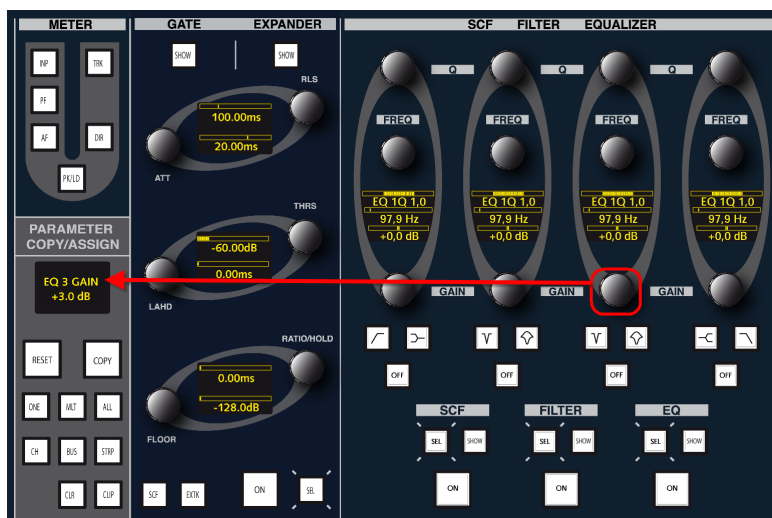
Free Controls can be assigned to any available channel parameter on an individual basis. The default assignments are then stored in snapshots and productions.

Note that the Free Control assignments relate to the DSP channel (i.e. they move with the channel, if the channel is assigned to a different fader strip).

At any time you can override the default assignments using an FC PRESET, selected from the [Centre Section](#).

### 9.6.1 Assigning a Single Free Control

1. Press the **ONE** button (on the PARAMETER assign panel) to activate a one-shot assignment - the button flashes to indicate that parameter assign is now active.
2. Select the parameter you wish to assign, by touching a rotary encoder on the [Central Control Section](#) - for example, touch the EQ Band 3 **GAIN** control - the parameter is placed into the PARAMETER clipboard:



- Now touch the Free Control on the destination channel strip - the assignment is made; the Free Control display updates; and the **ONE** button cancels automatically.



### 9.6.2 Assigning Multiple Free Controls

To assign more than one Free Control at a time, use the **MLT** button to latch on the parameter assign mode. This saves you having to reselect the **ONE** button before each assignment.

- Press the **MLT** button (on the PARAMETER assign panel) - the button flashes to indicate that parameter assign is now active.
- Select the parameter you wish to assign, by touching a rotary encoder on the [Central Control Section](#) - the parameter is placed into the PARAMETER clipboard.
- Now touch as many Free Controls across the surface as you wish - the clipboard parameter is assigned to each Free Control you touch.
- Remember to deselect **MLT**, or press **ESC** on the ACCESS/ASSIGN panel, to exit the parameter assign mode. If you don't, then the next time you touch a channel free control, you will re-assign it!



### 9.6.3 Assigning a Free Control on ALL Channels

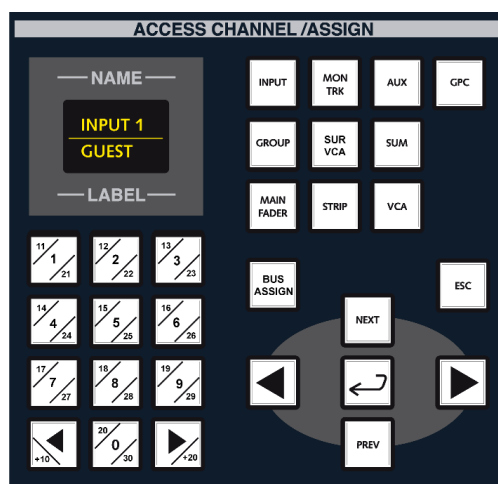
Another shortcut is to assign a parameter to the same Free Control position across *all* fader strips for a certain channel type. This is particularly useful when you are first building your layout.

- Press the **ALL** button (on the PARAMETER assign panel).

This automatically selects the **ONE** button for a one-shot assignment. If you wish to make multiple **ALL** assignments, then select **MLT** instead of **ONE**.

- Select the parameter you wish to assign, by touching a rotary encoder on the [Central Control Section](#) - the parameter is placed into the PARAMETER clipboard.
- Now choose the channel type you wish to assign to, from the [ACCESS CHANNEL/ASSIGN](#) panel – for example, select **INPUT**:

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Note that you can select multiple channel types if you wish – e.g. select **INP**, **GRP** and **SUM** to make a Free Control assignment across all input, group and sum channels.

- Now touch a Free Control (e.g. FC 1) on *any* input channel fader strip (INP) - **EQ 3 GAIN** is assigned to FC 1 across *all* input channels.

Note that the assignment is made to *all* input channels, even those not assigned to a fader strip.

### 9.6.4 Clearing a Free Control Assignment

To clear a Free Control assignment so that it becomes inactive:

- Press the **CLR** button (on the PARAMETER assign panel).

This automatically selects the **ONE** button for a one-shot assignment. If you wish to clear multiple assignments, then select **MLT** instead of **ONE**.

- Select the Free Control you wish to clear by touching it on the fader strip.

The assignment is cleared and Free Control display becomes blank.

- If you have selected **MLT**, remember to deselect **MLT**, or press **ESC** on the ACCESS/ASSIGN panel, to exit the parameter assign mode. If you don't, then the next time you touch a channel free control, you will clear it!

### 9.6.5 Free Control Functionality

When parameters are assigned to Free Controls, the functionality is allocated as follows:

#### ➤ EQ

EQ1, EQ2, EQ3, EQ4 = Gain, Frequency, Q and EQ Type for the 4-band parametric [EQ](#).

FI1, FI2 = Gain, Frequency, Q and EQ Type for the 2-band [Filter](#) section (Recording channels only).

SC1, SC2 = Gain, Frequency, Q and EQ Type for the 2-band dynamics [Sidechain Filters](#) (Recording channels only)

Press the button beside *any* of the EQ1 free controls to turn EQ band 1 on or off, and so on for the remaining bands/filters.

#### ➤ DYNAMICS

Threshold (THRS), ratio (RAT), attack time (ATT), release time (RLS), hold time (HOLD), floor level (FLR), make-up gain (GAIN) or look ahead delay (LAHD) for each of the [dynamics](#) sections: Gate, Expander, Compressor, Limiter.

Press the button beside any of the GATE free controls to turn the Gate on/off, and so on for the remaining sections.

If you are running a Broadcast channel DSP Configuration, then you will see either the Combi-Dynamics (Gate, Expander, Compressor) or Limiter parameters depending on the [dynamics model](#) of the selected channel.



➤ **AUX**

Aux send level and on/off for all available [aux sends](#).

If an aux is stereo, then you can adjust the gain and pan, or gain and balance, for the stereo send.

➤ **OTHER MODULES**

- IN GAIN = channel input gain ([INMIX gain](#)).
- IN BAL = channel input balance ([INMIX balance](#), if the input is stereo).
- DIGAMP = [digital amplifier gain](#).
- DELAY = [channel delay](#); press the button to switch in/out.
- INS SEND = [insert send/return](#); press the button to switch in/out.
- DOUT LVL = [direct output level](#); press the button to mute the direct output.
- PAN = [panning](#) parameters; press any of the PAN free control buttons to switch panning in/out of circuit.
- ON LEVEL, OFF LEVEL, etc. = Audio Follow Video ([AFV](#)) parameters.

### 9.7 Fader User Buttons

The fader strip user buttons are switched through their pages of functions from the centre section:

*Fader Strip*

*Centre Section*

Note that all fader strip user buttons are switched globally across the console. The functions are labeled by the . The labels are programmed along with the button functions from the [Custom Functions](#) display.

As Custom Functions are stored as part of the system configuration (and not in productions), any changes will affect all users.

#### Default Functions

The console ships with the following default functions unless specified otherwise.

##### ➤ Mix Minus Control: CORD, CONF & TALK

1. Press **CONF** to activate the [mix minus](#) (N-1) output for that channel.
2. Press **CORD** to activate a [conference-style](#) auxiliary send.
3. Press **TALK** to talk to the channel's N-1 bus. The talkback source can be edited from the [Custom Functions](#) display.

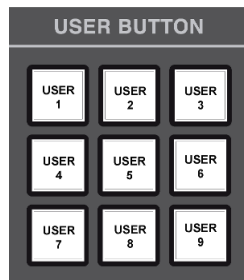
##### ➤ Snapshot Isolate: SNAP ISO

1. Enable **SNAP ISO** to isolate the channel strip from a snapshot recall. See [Snapshot Isolate](#) for more details.

## 9.8 Centre Section User Buttons

The centre section includes 9 CENTRAL USER BUTTONS.

*CENTRAL USER BUTTONS*



*TALKBACK panel*

The labels are programmed along with the button functions from the [Custom Functions](#) display. Note that the four TALKBACK buttons can be assigned to *any* user button function, not only talkback switching.

As Custom Functions are stored as part of the system configuration (and not in productions), any changes will affect all users.

### Default Functions

The console ships with the first TALKBACK panel user button programmed to switch your talkback source to the N-1 bus of the channel in access. No other button functions are defined, unless specified otherwise.



## 10. Channel Operations

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This chapter describes all channel operations.

Topics include:

- [Source Routing \(Input Patching\)](#)
- [Bus Assign \(Routing\)](#)
- [Channel Processing Modules](#)
- [The Main Display](#)
- [INPUT Control](#)
- [Digital Amplifier \(DIG AMP\)](#)
- [Channel Delay \(DELAY\)](#)
- [Channel Insert \(INSERT\)](#)
- [Direct Output \(DIROUT\)](#)
- [IMAGE](#)
- [DYNAMICS](#)
- [EQUALIZER/FILTER/SCF](#)
- [CHANNEL](#)
- [PANNING](#)
- [AUX SENDS](#)
- [AUDIO FOLLOW VIDEO](#)
- [Automix Groups](#)
- [Mix Minus \(N-1\) Sends](#)
- [DSP Presets](#)
- [Copy & Reset](#)

## 10.1 Source Routing (Input Patching)

Any source connected to the routing matrix can be routed to any input or monitor channel. In addition, you can assign a backup source so that the channel can be switched quickly from [A to B](#).

Source routing can be changed using one of the following methods: from the [Signal List](#) display (recommended); or from the [mx Routing](#) display (to view routing as a crosspoint matrix).

## 10.2 Bus Assign (Routing)

The number and type of mix busses are defined by the DSP Configuration [preset](#). Note that:

- Input channels (INP) can assign to any bus - Track bus, Aux, Group or Sum.
- Monitor channels (MON) can assign to any Track bus\*, Aux, Group or Sum. (\*A monitor channel cannot be assigned to its associated track bus unless the [Track Self Assign](#) option is turned on).
- Group channels (GRP) can assign to any Aux, another Group or any Sum.
- Sum and Aux channels (SUM and AUX) are designed to be the final point in the signal chain, and cannot be reassigned to another bus. (To do this, you would need to route the Sum or Aux output back into an input channel).

Any bus can be configured as mono, [stereo](#) or [surround](#), such that the corresponding pan law is applied.

You can use any of the bus assignment methods to adjust Aux on/off or to assign channels to a [VCA](#) master.

There are several ways to assign channels onto mix busses:

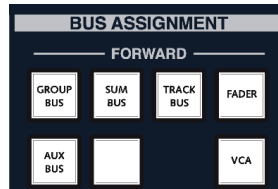
- FADER FORWARD Assign (using the fader **SEL** buttons).
- FADER REVERSE Assign (using the fader **SEL** buttons).
- The **Bus Assign** display (on the Central GUI).
- The **Busses Reverse** display (on the Central GUI).
- ISO BAY Bus Assign (available in isolated Channel bays).
- The ACCESS CHANNEL / ASSIGN panel.

The rest of this topic describes each method in detail.

### 10.2.1 FADER FORWARD Assign

This method uses the fader **SEL** buttons to make assignments *from* the channel in access. It is ideal for assigning a single channel *to* multiple bus outputs (if the outputs are assigned to fader strips).

1. Select the source channel (e.g. INP 1) - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. Press **FADER** on the FORWARD BUS ASSIGNMENT panel:



The BUS ASSIGNMENT buttons can be locked, to protect existing assignments, using the **Lock ASN** button located on the [Extra Buttons](#) display. Therefore, if you cannot make a selection, check the status of this option.

The button starts to flash, and the fader **SEL** buttons across the console light to show the current status:

- Steady state red = channel assigned to destination.
- Flashing green = channel not assigned to destination.
- **SEL** not lit = channel cannot be assigned to destination (for example, you cannot assign INP 1 onto another input channel!)



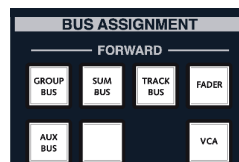
3. Press the fader **SEL** buttons to modify the current assignments - the fader **SEL**s change state.

If the bus is stereo or surround, then assignments are made to both sides of the stereo bus, or to all surround component channels, in one operation. To edit individual assignments, use the [Bus Assign](#) or [Busses Reverse](#) display.

4. Deselect **FADER FORWARD**, or press **ESC** on the [ACCESS/ASSIGN](#) panel, to exit the bus assign mode.

### Restricting Forward Bus Assign

You can restrict the available destinations by using the **GROUP BUS**, **SUM BUS**, **TRACK BUS**, **AUX BUS** or **VCA** buttons (as opposed to **FADER**):



This can be useful if you wish to *only* assign onto a particular bus type. For example:

1. Select an input channel in the usual manner - e.g. **INP 1**.
2. Press **GROUP BUS** on the FORWARD BUS ASSIGNMENT panel - only the fader **SEL** buttons on group channels illuminate:



3. Change the FORWARD BUS ASSIGNMENT selection to **VCA** - only the fader **SEL** buttons on VCA channels illuminate.

And so on, for the remaining bus types.

4. Use the fader **SEL** buttons to assign (or de-assign) the channel in access to the selected bus type.

## 10.2.2 FADER REVERSE Assign

This method uses the fader **SEL** buttons to make assignments to the channel in access. It is ideal for assigning channels onto a destination such as a group, aux or sum.

1. Select the destination channels (e.g. SUM 1) - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. Press **FADER** on the REVERSE BUS ASSIGNMENT panel:



The BUS ASSIGNMENT buttons can be locked, to protect existing assignments, using the **Lock ASN** button located on the [Extra Buttons](#) display. Therefore, if you cannot make a selection, check the status of this option.

The button starts to flash, and the fader **SEL** buttons across the console light to show the current status:

- Steady state red = channel assigned to destination.
- Flashing green = channel not assigned to destination.
- **SEL** not lit = channel cannot be assigned to destination (for example, you cannot assign another Sum channel onto SUM 1!)



3. Press a fader **SEL** button to modify the current assignment - the fader **SEL** changes state.

If the bus is stereo or surround, then assignments are made to both sides of the stereo bus, or to all surround component channels, in one operation. To edit individual assignments, use the [Bus Assign](#) or [Busses Reverse](#) display.

4. Deselect **FADER REVERSE**, or press **ESC** on the [ACCESS/ASSIGN panel](#), to exit the bus assign mode.

## Restricting Reverse Bus Assign

You can restrict the available sources by using the **INPUT**, **GROUP** and **MON** buttons (as opposed to **FADER**):



This can be useful if you wish to *only* assign from a particular channel type. For example:

1. Select the destination in the usual manner - e.g. **SUM 1**.

- Press **INPUT** on the REVERSE BUS ASSIGNMENT panel - only the fader **SEL** buttons on input channels illuminate:



- Change the REVERSE BUS ASSIGNMENT selection to **GROUP** - only the fader **SEL** buttons on group channels illuminate.

And so on, for the remaining source types.

- Use the fader **SEL** buttons to assign (or de-assign) channels to SUM 1.

## 10.2.3 The Bus Assign display

The **Bus Assign** display provides control of all assignments *from* the channel in access. This is a great way to check all the bus assignments from an individual channel.

It can also be used to edit a stereo or surround bus assignment. For example, to remove a channel from the Right side of a stereo SUM.

- [Open](#) the **Bus Assign** display on the Central GUI.

The display shows all bus assignments from the [channel in access](#) (e.g. from INP 1).



If the channel is assigned to a bus, then the buttons are color-coded with groups shown in yellow; track sends in blue; auxes in green; and sums in red.

The number and type of busses available is defined by the [DSP configuration](#).

For convenience, VCA, surround VCA and link group assignments are also shown at the bottom of the display. However, you cannot change VCA or link grouping from this display.

- To change the assignments, select the on-screen buttons.

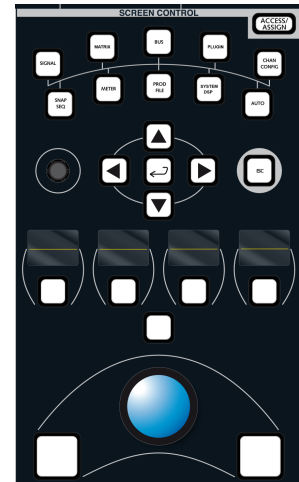
Or, use the SCREEN CONTROL [panel](#) as follows:

1. Select a bus.
2. Press the **ASSIGN** soft key to make, or unmake, the bus assignment.

If the bus is an aux, then you can also adjust the level of the send:

3. Press the **SET** soft key - it highlights.
4. Turn the rotary control to adjust the aux send level.
5. Or click on the up/down arrows beside the send level.
6. Or, type in an aux send value using the console keyboard.

For stereo aux sends, you can use the same method to adjust aux pan/balance.



### 10.2.4 The Busses Reverse display

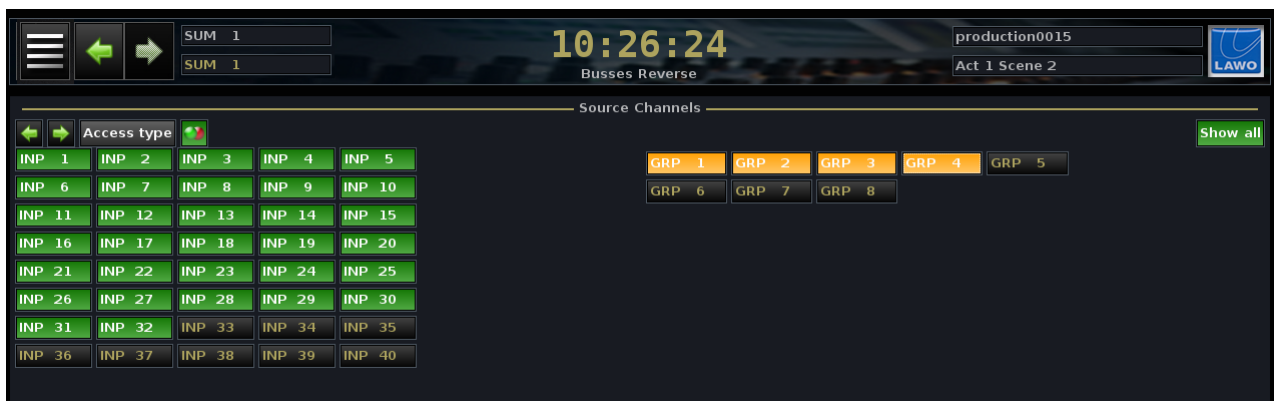
The **Busses Reverse** display provides control of all assignments to the channel in access. This is a great way to reverse interrogate an output.

It can also be used to edit a stereo or surround bus assignment. For example, to remove a channel from the LFE channel of a surround SUM.

1. [Open](#) the **Busses Reverse** display on the Central GUI.
2. Select a bus master either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel - for example, select **SUM 1/2** if working in stereo, or **SUR S 1** (the surround VCA master of SUMs 1 to 6) if working in surround.

The display now shows all assignments to the [channel in access](#).

3. Select **Show All** to reveal all available source channels. In our example, INP channels 1 to 24 and GRPs 1 to 4 are assigned to SUM 1:



The number and type of channels available is defined by the [DSP configuration](#).

4. To change the assignments, select the on-screen buttons.

## Changing the Channel in Access

You can also change the [channel in access](#) from the **Busses Reverse** display as follows:

1. Click on the left/right arrows beside **Access Type** to increment or decrement the channel in access.
2. Click on **Access Type** to cycle through the different DSP channel types: inputs, monitors (track busses), groups, sums and auxes.
3. Right-click on one of the source channels (e.g INP 1) and select **Access** to change to Input 1:



You can also change the mono/stereo status of the channel in access, by selecting (or unselecting) the green/red circle icon - in our example, SUM 1 is set to stereo.

## Bus Assign Mute

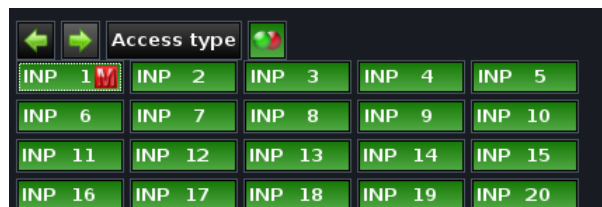
The **Busses Reverse** display also allows you to mute individual channel feeds to the bus in access. This provides an alternative to removing the bus assignment (useful for temporary overrides), or using the channel's MUTE (which will mute all bus assignments from the channel).

1. Right-click on the channel you wish to mute:



2. And select the **Mute** option.

The display updates showing that the bus assignment from Input 1 is still made but is now in a muted state:



## 10.2.5 ISO BAY Bus Assign



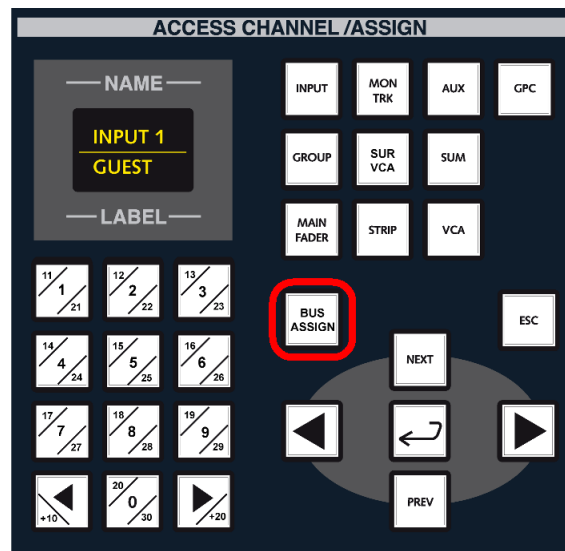
The **BUS** and arrow keys on the ISO BAY panel can also be used to make bus assignments within an isolated channel bay. See [Expanded Parameter Control](#) for details.

## 10.2.6 Bus Assign from the ACCESS CHANNEL/ASSIGN panel

If the bus you wish to access is not assigned to the control surface, then you can use the **BUS ASSIGN** button to change the operation of the [ACCESS CHANNEL/ASSIGN](#) panel. This method routes onto Track, Group, Sum or Aux busses (up to 30):

1. First select the channel you wish to assign (e.g. INP 1) - either by pressing its fader **SEL** button or entering the channel type and number from the ACCESS CHANNEL/ASSIGN panel.
2. Then press **BUS ASSIGN** on the ACCESS CHANNEL/ASSIGN panel:





3. Select the bus you want to assign to by choosing a channel type:

- **MON TRK** – Track busses.
- **GROUP** – Groups.
- **SUM** – Sum.
- **AUX** – Auxiliary sends.

4. And then a number:

- For busses 1 to 9, press **1** to **9**.
- For bus 10, press **0**.
- To access busses 11 to 20, press the left arrow (+10) button.
- To access busses 21 to 30, press the right arrow (+20) button.

The channel in access (INP 1) is assigned onto the selected bus; the numeric keypad illuminates to show the assignment.

5. Exit bus assign by deselecting the **BUS ASSIGN** button.

### 10.3 Channel Processing Modules

The next series of topics cover the different modules available on a fully-featured DSP channel.

We will concentrate on operation from the [Central Control Section](#) as this offers maximum control.

However, remember that parameters can also be adjusted from the channel fader strip (using normal Free Control operation or [expanded parameter control](#)).

The system supports two channel types – **Recording** and **Broadcast**. This section deals with the operation of both channel types.

## 10.4 The Main Display

The **Main Display** provides a useful visual accompaniment to the [Central Control Section](#).

1. Press the **CHAN/CONFIG** button, located on the [SCREEN CONTROL](#) panel, to view this display - you will see an overview of parameters for the channel in access (e.g. INP 1):



The **Main Display** is divided into the same sub sections as the Central Control Section front panel. And, as you adjust controls, the display updates to reflect your settings. In addition, you can change parameters from any of the screen buttons.

Green buttons indicate that a section or option is active (ON); on the right of the display, you can see the on/off status for all MODULES on the channel.

Any modules not supported by the selected DSP channel are greyed out.

The **Main Display** *always* shows the following sections:

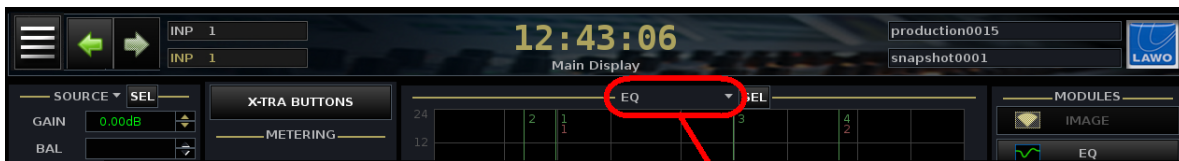
- **SOURCE/INMIX** – source and inmix parameters.
- **FADER** – main channel level.
- **DIGAMP** – digital amplifier.
- **DELAY** – channel delay.
- **INSERT** – insert return switching and send level.
- **DIROUT** – direct output.
- **METERING** – channel meter.
- **MUTE** – channel mute.
- **DYNAMICS** – gain reduction metering for the Gate, Expander, Compressor and Limiter sections. Note that if the section is switched on, the **G**, **E**, **C** or **L** is green.
- **MODULES** – on/off status for all processing modules.
- **PANNING** – X/Y pan parameters.

Some sections include an on-screen **SEL** button. This mimics the operation of the Central Control Section [SEL](#) button and can be used to select the module for copy, reset, and other operations.

## 10.4.1 Assignable Display Areas

The two central areas can be assigned to other processing sections:

1. Click on the drop-down menu, at the top of each area, to select an audio module:



If you select **SENSE**, then the area automatically follows the last control touched, so that you will see the processing section that you are working on.

## 10. Channel Operations

### 10.5 INPUT Control

The INPUT MIXER panel provides access to *all* available SOURCE and INMIX parameters:

- **SOURCE** – parameters applied to the source.
- **INMIX** – parameters applied to the INMIX channel DSP module.

Parameters are displayed on the SOURCE/INMIX area of the [Main Display](#).

Central Control Section



Main Display



The available parameters depend on the type of source routed to the channel (mic/line or digital) and the channel format (mono or stereo). Any parameters which are not available for your input are greyed out on the **Main Display** and cannot be selected from the front panel.

The INPUT MIXER panel also provides access to [TONE switching](#). When **TONE** is enabled, all other INPUT controls are temporarily disabled.

Note that the **INP** button is reserved for future implementation.

#### 10.5.1 SOURCE & INMIX Modes

The default mode for the INPUT MIXER panel is to control **SOURCE** parameters. However, it can be switched to **INMIX** mode to adjust the channel input gain.

1. Using the trackball select either **INMIX** or **SOURCE** from the drop-down menu in the **Main Display**.

Alternatively, program a user button from the [Custom Functions](#) display to switch the mode.

The mode affects **GAIN**, **BALANCE** and sometimes phase depending on the type of source. It also affects the on-screen **SEL** button; select **SOURCE** + **SEL** to select source gain, or **INMIX** + **SEL** to select channel input gain.

Changes made to **SOURCE** parameters affect *all* destinations routed from the source.

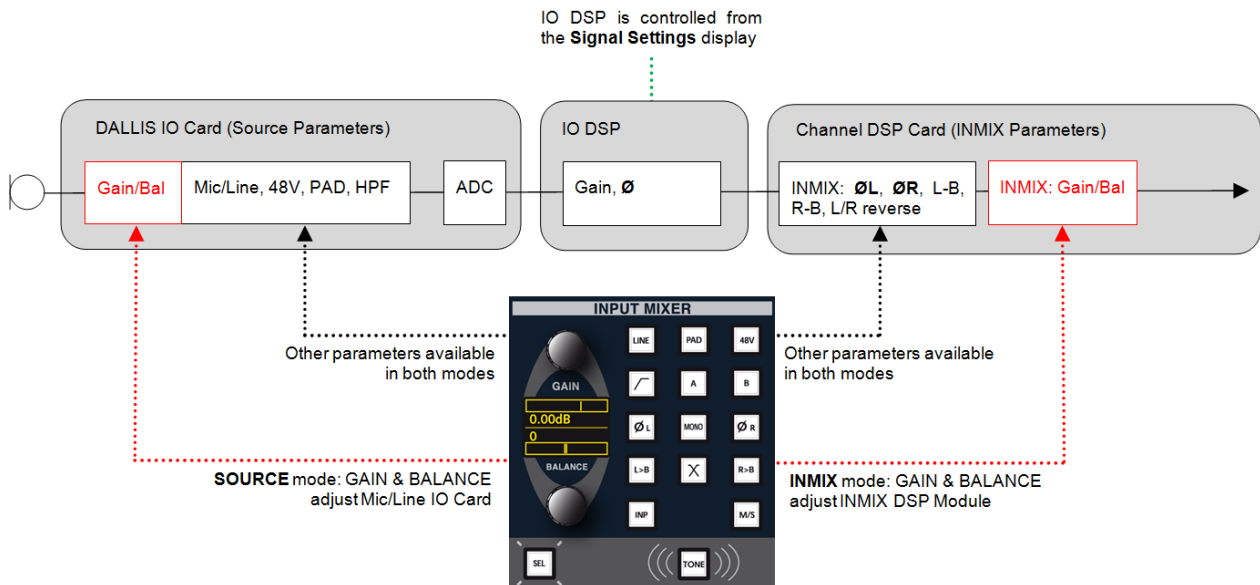
Changes to **INMIX** parameters affect *only* the selected channel.



## 10.5.2 Mic/Line Inputs

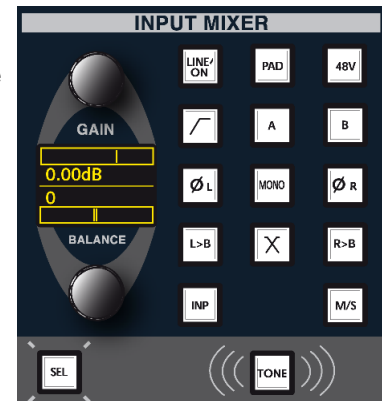
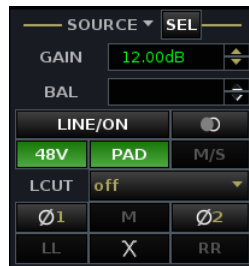
Channels routed from a mic/line input card (with variable analog gain) have access to:

- **IO Card Parameters** (SOURCE mode) – mic/line switching, gain, balance, 48V, PAD and a high pass filter are applied in the analog domain before analog-to-digital conversion.
- **IO DSP** – volume and phase can also be applied by DSP on the IO card. These parameters are adjusted from the [Signal Settings](#) display.
- **INMIX DSP Parameters** (INMIX mode) – gain, balance, phase and stereo input control are applied within the channel's INMIX DSP.



### ➤ SOURCE Parameters

1. Make sure that the INPUT MIXER panel is switched to **SOURCE** mode (the default); the mode is shown on the **Main Display**:



For a mic level signal:

1. Deselect the **LINE/ON** button.
2. Use the **GAIN** control to remotely set the mic preamp gain within the analog domain prior to A-D conversion.

Mic gain can be adjusted from -20dB to +70dB, although this can vary depending on your hardware configuration. Please refer to the IO card's data sheet for details.

3. Press the **48V** button to select 48V phantom power.
4. Press **PAD** to insert the PAD.
5. Press the high pass filter button to insert an analog subsonic filter prior to the A-D conversion.
6. Toggle the high pass filter button to cycle through the roll-off frequency options: **Off**, **40Hz**, **80Hz** and **140Hz**.

For a line level signal:

1. Select the **LINE/ON** button.

The **LINE/ON** indicator lights, and **48V** and **PAD** are cancelled; they cannot be selected for a line input.

2. Use the **GAIN** control to remotely set the input gain within the analog domain prior to the A-D conversion.
3. Set the high pass filter as described above.

If gain compensation is enabled for an input, then it cannot be switched from mic to line, and will operate permanently in mic mode.

Gain compensation (IP-Share) can be configured within a RAVENNA network and allows up to eight consoles to set an independent gain value for the same DALLIS mic/line input.

### ➤ INMIX Parameters

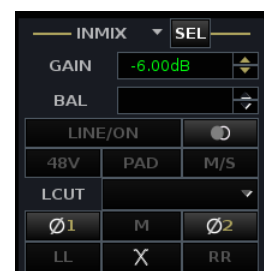
1. To adjust the channel input gain, switch to **INMIX** on the **Main Display**.
2. Use the **GAIN** control to adjust the INMIX gain within the digital domain.

Gain can be adjusted from -128dB to +70dB.

3. On a mono channel, press the **Ø L** button to reverse the phase.

For a mic/line input, the **Ø** buttons adjust the phase within the INMIX DSP module. Therefore, this reverses the phase of the channel and not the source.

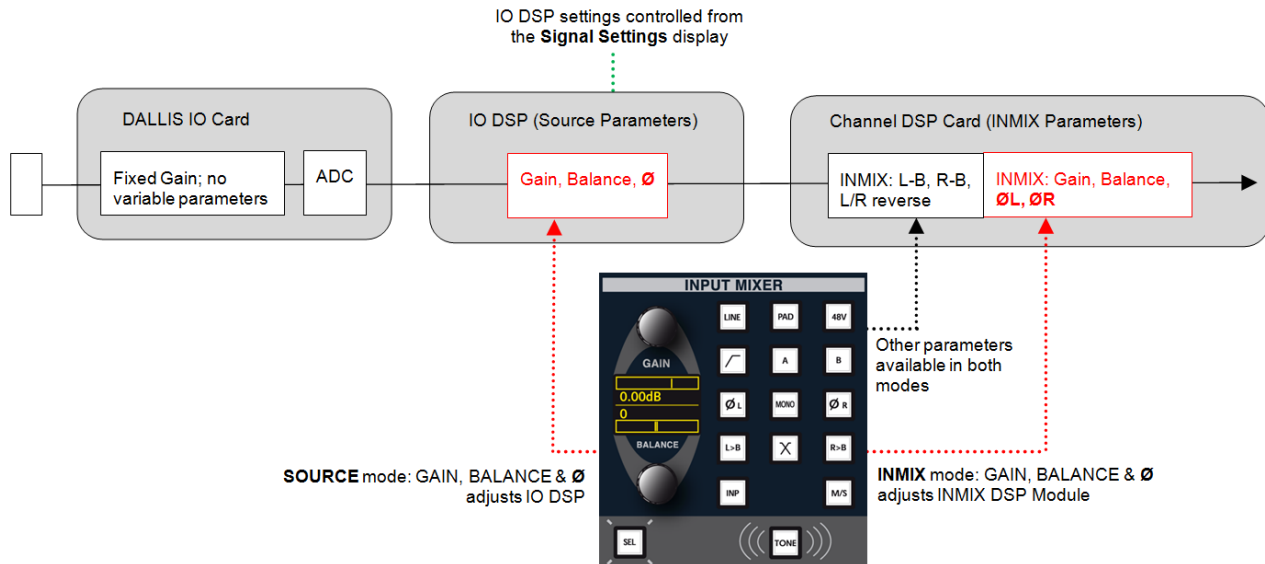
To reverse the phase of the source, then use the IO DSP **Ø** in the [Signal Settings](#) display.



## 10.5.3 Analog Inputs

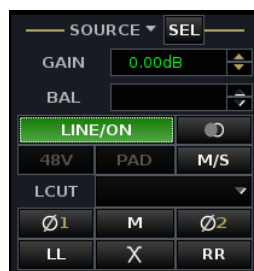
Channels routed from a line level input card (with fixed analog gain) have no variable IO card parameters. Therefore, the IO DSP is used to provide source parameter control. Channels have access to:

- **IO DSP Parameters** (SOURCE mode) – digital gain, balance and phase are applied by DSP on the IO card.
- **INMIX DSP Parameters** (INMIX mode) – gain, balance, phase and stereo input control are applied within the channel's INMIX DSP module.



### ➤ SOURCE Parameters

1. Make sure that the INPUT MIXER panel is switched to **SOURCE** mode (the default); the mode is shown on the **Main Display**:



2. Select the **LINE/ON** button - this button turns the IO DSP on or off:
  - **LINE/ON** lit = IO DSP On
  - **LINE/ON** unlit = IO DSP Off
3. Use the **GAIN** control to adjust the IO DSP gain (volume).

Gain can be adjusted from -128dB to +15dB.

4. Press the **Ø L** button to reverse the phase of the mono source.

Note that any changes you make to the IO DSP will also appear on the [Signal Settings](#) display.



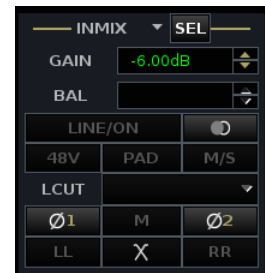
### ➤ INMIX Parameters

1. To adjust the channel input gain, switch to **INMIX** on the **Main Display**.
2. Use the **GAIN** control to adjust the INMIX gain within the digital domain.

Gain can be adjusted from -128dB to +70dB.

3. Press the **Ø L** button to reverse the phase of the channel (INMIX phase).

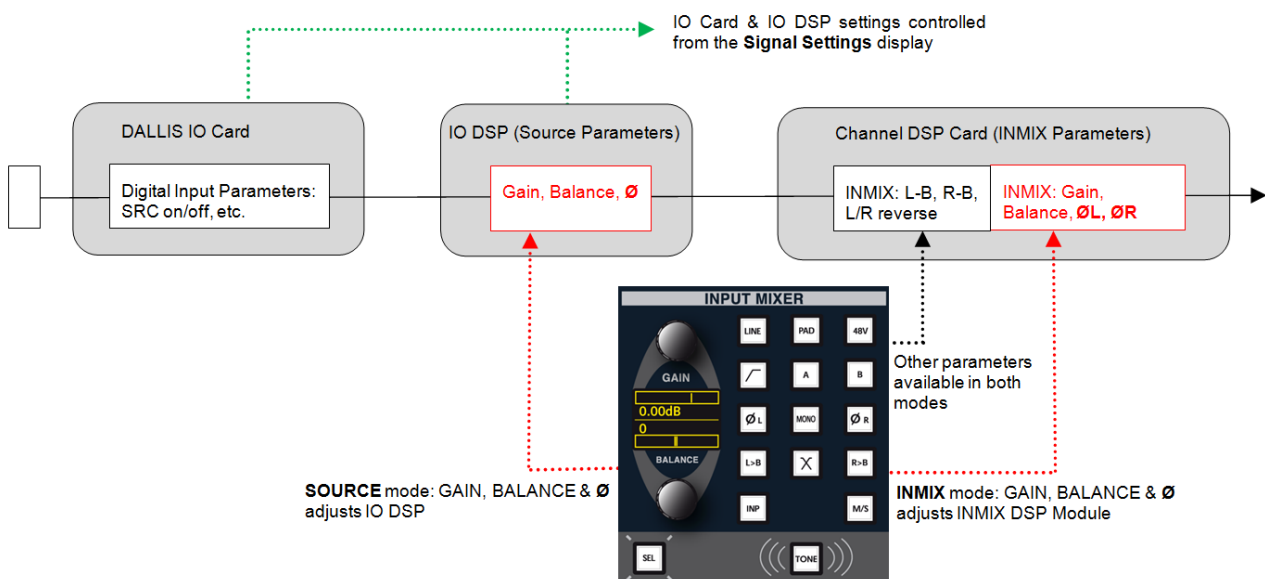
Note that the **48V**, **PAD** and analog filter buttons are inactive.



## 10.5.4 Digital Inputs

Channels routed from a digital input card may have some IO card parameters, such as SRC on/off, which are adjusted from the **Signal Settings** display. The IO DSP is used to provide source parameters. Therefore, channels have access to:

- **IO Card Parameters** – for example, SRC on/off. These parameters are adjusted from the **Signal Settings** display, see [AES/EBU Input Parameters](#).
- **IO DSP Parameters (SOURCE mode)** – digital gain, balance and phase are applied by DSP on the IO card.
- **INMIX DSP Parameters (INMIX mode)** – gain, balance, phase and stereo input control are applied within the channel's INMIX DSP module.



Parameters are controlled in an identical manner to a line level input, please see the [previous topic](#).

## 10.5.5 Internal Signals

Input channels routed from an internal signal such as a summing bus have no IO card or IO DSP parameters. This leaves the INMIX parameters:

### ➤ INMIX Parameters

1. To adjust the channel input gain, switch to **INMIX** on the **Main Display**.
2. Use the **GAIN** control to adjust the INMIX gain within the digital domain.

Gain can be adjusted from -128dB to +70dB.

3. Press the **Ø L** button to reverse the phase of the channel (INMIX phase).

Note that the **48V**, **PAD** and analog filter buttons are inactive.



## 10.5.6 A/B Input Switching

For any input channel, you can assign two sources (A and B) to provide a main and backup source for the channel.

The sources are assigned from the **Signal List** display, see [A/B Input Sources](#).

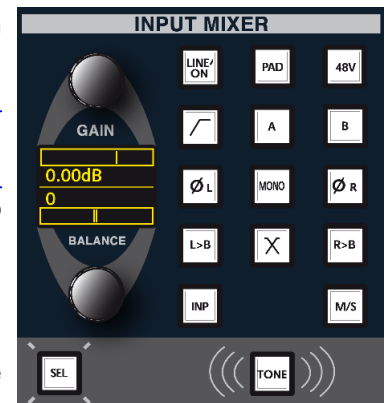
The **Channel A/B Input Switch Enable** option in the [System Settings](#) globally enables (or disables) the A/B input switching; the option defaults to off.

Once global switching is enabled:

1. Use the **A** and **B** buttons to switch the input.

If there is no source assigned to the B input, then the **B** button cannot be selected.

2. Use the **GAIN** control (in [SOURCE](#) mode) to set an independent gain value for source A and source B. Depending on the type of input, you can adjust the mic/line gain before A-D conversion, or digital IO DSP gain.
3. Use the **GAIN** control (in [INMIX](#) mode) to adjust the channel input gain after the A/B input switch.



## 10.5.7 Stereo Input Control

When an input channel is stereo, a number of additional controls become available: **BALANCE**, **Ø R** plus **Left to Both**, **Right to Both**, etc. See [Stereo Balance & Input Control](#) for details.

### 10.5.8 TONE to Channel

The **TONE** button switches test tone to the channel.

Note that this function can *only* be selected on Input, Monitor or Surround VCA channels, and temporarily replaces the channel's source.

By default, the first internal tone generator signal (sine 1) is used as the test tone source. However, you can use the [Test Tone Button](#), programmed from the **Custom Functions** display, to specify a different tone source - for example, to use one of other internal generator signals (sine 2, white noise, pink noise) or an external source.

When using the internal tone generator, select the signal (e.g. **sine 1**), in the [Signal Settings](#) display, to adjust the level and frequency of the tone.

When **TONE** is enabled, all other INPUT MIXER controls are temporarily disabled.

Switch **TONE** off to return the channel to its assigned source (displayed in the **Signal List / mx Routing** displays).



On systems upgraded to V4.24, you must use the [Test Tone Button](#), programmed from the **Custom Functions** display, to activate the test tone source. On all new systems (>V4.24) or those updated by creating new CF cards, tone is automatically activated.

You can program a fader strip user button to emulate the **TONE** button. This can be used to provide fast, direct access to tone switching across the console.

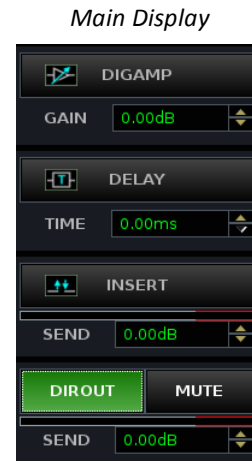
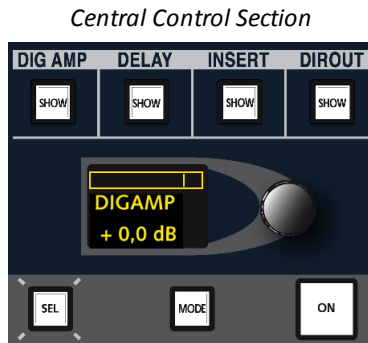
From V5.0 onwards, you can program a central user button to globally turn off all **TONE** to channel selections. This allows you to switch off tone to all channels, globally, from a single button push.

Both functions are programmed using the [Test Tone Button](#) in the **Custom Functions** display.

## 10.6 Digital Amplifier (DIG AMP)

The DIG AMP provides an additional gain value which can be moved within the channel signal flow. See [Changing the Signal Processing Order](#).

1. Press the DIG AMP **SHOW** button to switch the DIG AMP/DELAY/INSERT/DIR OUT controls to the digital amplifier.



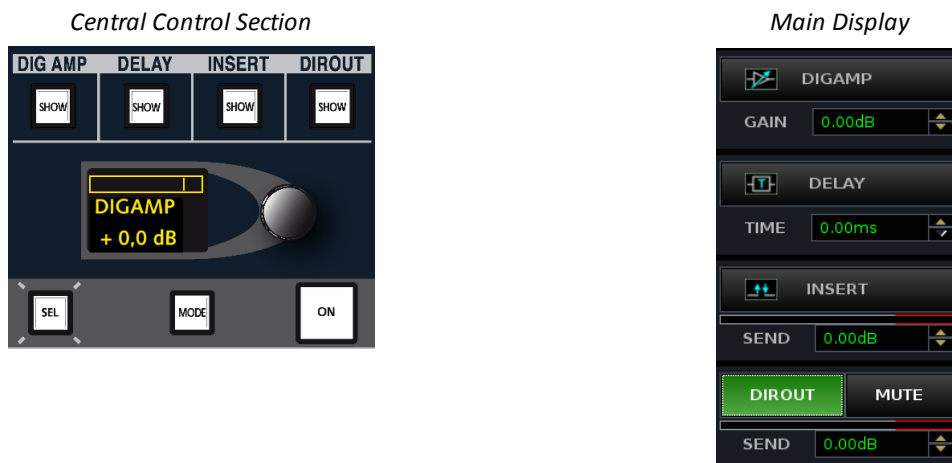
2. Press **ON** to switch the gain element in and out of circuit.
3. Move the rotary control to adjust the digital gain - gain can be adjusted from -128dB to +15dB.

The gain value is displayed beside the control and in the **DIGAMP GAIN** box on the **Main Display**.

## 10.7 Channel Delay (DELAY)

The channel delay can be positioned at any point in the channel signal flow. See [Changing the Signal Processing Order](#).

1. Press the DELAY **SHOW** button to switch the DIG AMP/DELAY/INSERT/DIR OUT controls to the digital amplifier.



2. Press **ON** to switch the delay in and out of circuit
3. Move the rotary control to adjust the delay time.

The amount of delay is displayed beside the control and in the **TIME** box on the **Main Display**.

To enter a specific delay time, click on the **TIME** box on the **Main Display** and type in a value from the console keyboard.

4. You can change the delay mode using the **MODE** button. Press the **MODE** button to cycle around the options – milliseconds (ms), frames (frms) or meters (m). The delay mode can also be changed from the [Extra Buttons](#) display.
  - Set Delay in ms or frames when you are dealing with a specific time delay, for example, to delay the channel's audio relative to an incoming video feed.
  - Set Delay in meters when you are time aligning microphones positioned on the studio floor and know the distance between the microphones.

The available channel delay varies slightly between Recording and Broadcast channels:

Recording channels	Broadcast channels
Min. = 1 samples (0.02 ms)	Min. = 18 samples (0.38 ms)
Max. = 1.8 seconds	Max. = 1.3 seconds

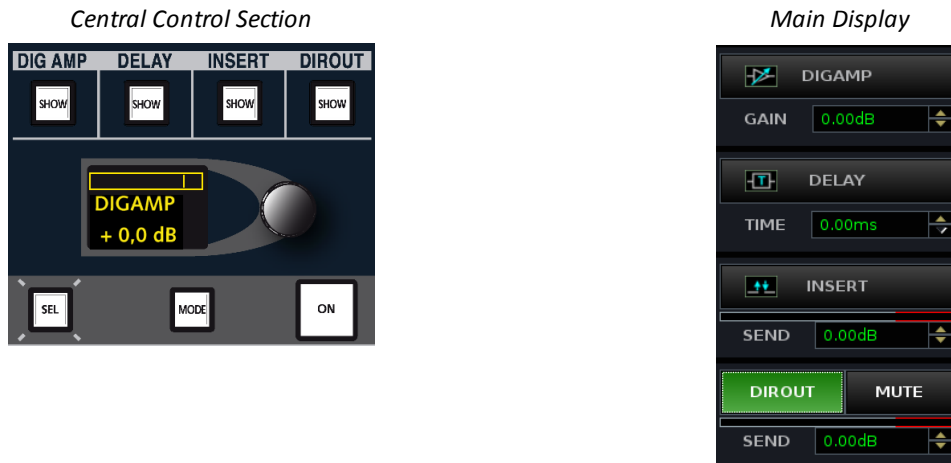
Note that if you load a Recording channel delay to a Broadcast channel (e.g. using a Preset), and the stored parameter lies outside the range supported by Broadcast channels, then the closest available value is applied. For example, if the preset is attempting to load a delay of 5 samples, then 18 samples (the minimum) is applied.

If you require more delay processing, then 48 additional delays can be made available by configuring a 983-04 mxDSP module. These will operate as fixed time delays which can be inserted into any routing crosspoint via the [mxDSP Settings](#) display. See the [mxDSP](#) chapter for more details on this option.

## 10.8 Channel Insert (INSERT)

The insert can be positioned at any point in the channel signal flow. See [Changing the Signal Processing Order](#). Routes to and from the channel insert send and return are made from the [Signal List](#) display. You should route the channel's insert send to the output feeding the insert device, and then route the output from the external device to the corresponding insert return.

The Central Control Section can then be used to control the insert on/off switching and send level:



1. Press the INSERT **SHOW** button to switch the DIG AMP/DELAY/INSERT/DIR OUT controls to the channel insert.
2. Press **ON** to switch the insert return in and out of circuit.

If an insert return is not assigned, you will get silence when you switch the insert into circuit.

3. Adjust the rotary control to set the level of the insert send.

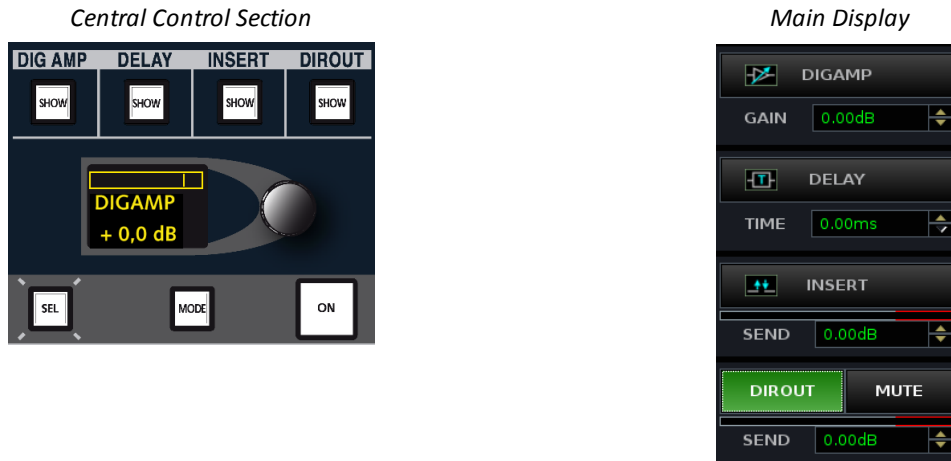
The SEND level is shown beside the control and on the Main Display. It can be adjusted from -128dB to +15dB.

The channel insert send is always active even when the return is not inserted. This allows the insert send to be used to generate an extra clean feed from the channel, with level control, which can be taken from any point in the channel signal flow, see [Changing the Signal Processing Order](#).

## 10.9 Direct Output (DIROUT)

Every channel has a direct output, with its own independent send level. The pickup point can be moved within the channel signal flow. See [Changing the Signal Processing](#).

Routing from the channel direct output is made from the [Signal List](#) display. The Central Control Section can then be used to control the direct output level:



1. Press the DIROUT **SHOW** button to switch the DIG AMP/DELAY/INSERT/DIR OUT controls to the direct output.
2. Move the rotary control to adjust the direct output send level.

The **SEND** level is displayed beside the control and on the **Main Display**. It can be adjusted from -128dB to +15dB.

3. Press **ON** to enable the direct output.

### Direct Out Options

The following options can be configured in the [Channel Config](#) display:

#### ➤ Dir-Out Pickup Point

The direct output can be fed from any position in the channel signal flow. For example, you could use the direct output to create a pre fader send to feed a multitrack recorder, while using the post fader output for the live production mix. See [Changing the Signal Processing Order](#).

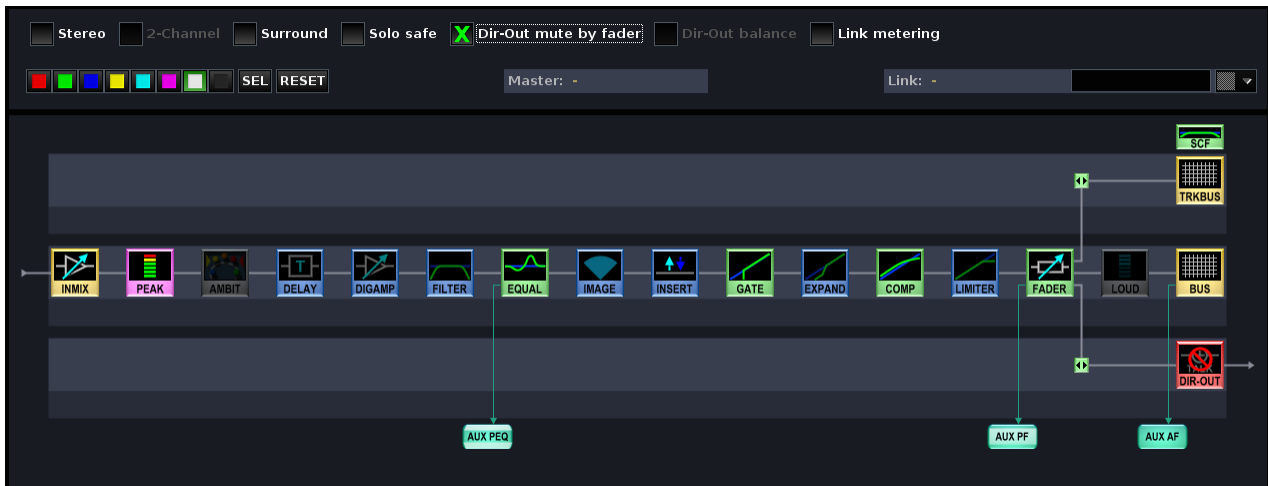


## ➤ Dir-Out Mute by Fader

This option sets the direct output to mute automatically when the channel fader opens.

It is designed for live broadcast applications where the direct out is positioned pre-fader to feed an intercom system, and the main programme feed is delayed (for example, when working with HD Cameras). By muting the intercom feed (direct out) when the channel sends to programme (fader open), echoes between the direct out and programme can be avoided.

Note that when the fader opens on the selected channel, the **DIR-OUT** module on the **Channel Config** display turns red to indicate the status of this option:



## ➤ Dir-Out Balance

This option determines whether the channel pan position affects the direct output on a stereo channel:

- **Dir-Out Balance disabled** (default) – the direct output does *NOT* follow the channel pan.
- **Dir-Out Balance enabled** – the direct output follows the channel pan position.

This is particularly useful for sum or aux masters as the left/right balance of the stereo master output can be readjusted using the channel pan control rather than having to use two mono faders.

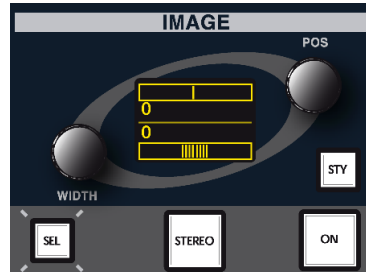
**Dir-Out Balance** can only be enabled if the channel in access is stereo.



## 10.10 IMAGE

The IMAGE controls deal with image positioning and width on stereo channels. The controls are blank (unlit) if the Central Control Section is assigned to a mono channel.

*Central Control Section*



1. Press the **STEREO** button to make (or unmake) a stereo channel from two adjacent mono DSP channel paths.

Once **STEREO** is enabled, you can adjust the image using the two rotary controls, see [Stereo Channels: Image Width & Positioning](#) for details.

## 10.11 DYNAMICS

The operation of the DYNAMICS section varies depending on whether you are using Recording or Broadcast channels:

### 10.11.1 Recording Channels

On Recording channels, each full processing channel contains four independent blocks of dynamics processing (Gate, Expander, Compressor and Limiter).

Any of the four modules can be placed anywhere within the channel signal flow. For example, to gate pre EQ and compress post EQ, or to limit the channel signal post fader while compressing the feed to the direct output. See [Changing the Signal Processing Order](#).

The **SCF** (Sidechain Filter) button can be used to insert the 2-band SCF filter section into the sidechain of either the compressor or gate, see [Filtering the Dynamics Sidechain](#).

The **KEY** (External Key) button can be used to trigger the gate and compressor from an [external dynamics key](#).

### 10.11.2 Broadcast Channels

On Broadcast channels, the each full processing channel can operate using one of two "Channel Models":

- **Combi-Dynamics** – three modules: Gate, Expander and Compressor, which move together as one block of processing within the channel signal flow. Each module can be turned on and off separately, but the thresholds cannot overlap and the order is *always* Gate, Expander and then Compressor. The three modules also share one Look Ahead Delay value.
- **Limiter** – a single Limiter module which operates in the usual manner.

The channel model is selected from the **Channel Config** display, see [Changing the Dynamics Model](#), and can be selected on a channel-by-channel basis. This allows you to apply say gating, expansion and compression to all input channels, and then have limiting on all sums. If you try to access an unavailable module from the DYNAMICS front panel, then the controls will have no function and their displays will be unlit.

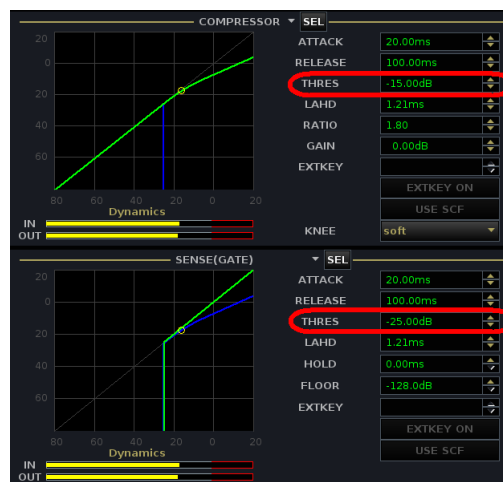
Note that Broadcast channels do not support sidechain filtering or external key inputs, and so the **SCF** and **EXTK** buttons perform no function.

## Combi-Dynamics Conditions

When using the **Combi-Dynamics model**, each module can be turned on or off independently, and has separate threshold, ratio and other parameter values. However, because the **Combi-Dynamics** works as a single block of processing, the following restrictions apply:

- The thresholds of the Gate, Expander and Compressor cannot overlap:
  - The Gate Threshold must be equal to or lower than the Expander Threshold.
  - The Expander Threshold must be at least 10dB lower than the Compressor Threshold (due to the soft knee operation of the compressor).

If you move a threshold outside of these limits, then the corresponding thresholds move up or down accordingly. For example, with the Compressor Threshold set to -20dB, and the Gate Threshold to -40dB, if you move the Gate Threshold above -30dB, the Compressor Threshold is also raised, to maintain the 10dB gap:



- There is one look ahead delay (LAHD) for the **Combi-Dynamics** sidechain. In otherwords, you cannot delay the Gate independently from the Compressor.

If you adjust the **LAHD** control on the Gate, then you will see the **LAHD** value on the Compressor and Expander follow, and vice versa:



- The **IN** and **OUT** meters on the **Main Display** represent the levels to and from the complete **Combi-Dynamics**. In other words, the **IN** meter shows the level at the input to the Gate, and the **OUT** meter shows the level at the output from the Compressor.
- Each of the **Main Display** graphs reflects the combined result of the **Combi-Dynamics**: the green line shows the parameter curve for the sensed or selected section; the blue line shows the resultant curve of the active dynamics.

- When you pre-listen any of the **Combi-Dynamics** modules, you are switching the output of the **Combi-Dynamics** to the AFL bus. In other words you are listening to the combined result of the Gate, Expander and Compressor. See [CHANNEL: LISTEN](#).

## 10.11.3 DYNAMICS Control

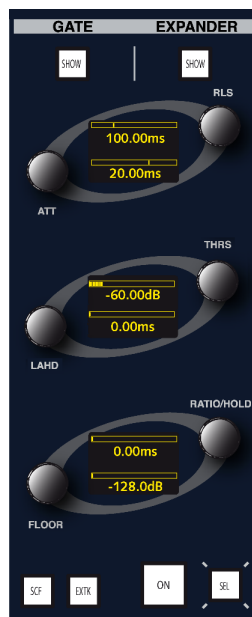
Parameters are adjusted from the Central Control Section as follows:

1. Press **SHOW GATE**, **SHOW EXP**, **SHOW COMP** or **SHOW LIM** to page the controls between the four DYNAMICS modules.

Note that for Broadcast channels, not all modules are supported (depending on the channel model).

2. Press **ON** to switch on the module.
3. Use the six rotary controls to set the parameters.

*Central Control Section*



The action of each module is best described by looking at the graphical representations on the [Main Display](#).

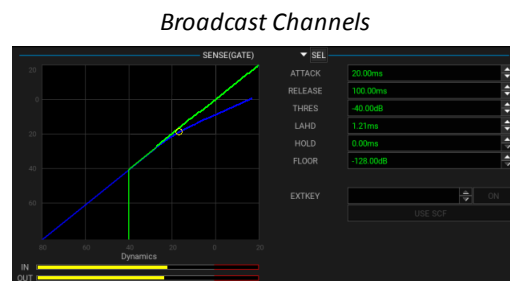
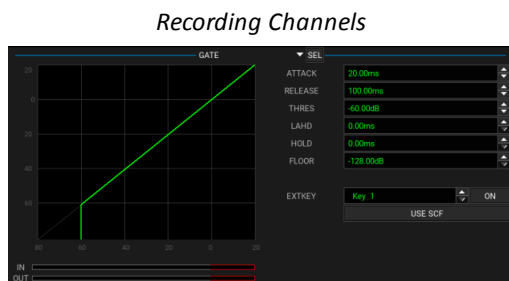


The **Main Display** includes gain reduction metering (**DYNAMICS**); the **G**, **E**, **C** and **L** light in green if the module is turned on.

The graphical area shows the action of the processing and all parameter values. The **IN** and **OUT** meters below each graph show the levels to and from the module.

The **MODULE** buttons on the right of the display can also be used to turn a module on (green) or off (grey).

#### 10.11.4 Setting a Gate



The gate parameters can be set as follows:

- **Threshold Level** – from -80dB to 0dB<sup>1</sup>.
- **Floor Level** – from 0dB to -128dB.
- **Attack Time** – from 0.10ms to 250ms.
- **Release Time** – from 40ms to 10s.
- **Hold Time** – from 0ms to 500ms.
- **Look Ahead Delay** – from 0ms to 10ms<sup>2</sup>.

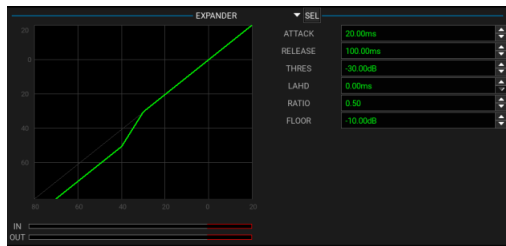
<sup>1</sup> On Broadcast channels, the Gate Threshold must be equal to or lower than the Expander Threshold, see [Combi-Dynamics Conditions](#).

<sup>2</sup> On Broadcast channels, the Look Ahead Delay affects all three [Combi-Dynamics](#) modules.

Note that the **DYNAMICS** gain reduction metering follows the attack and release settings for each dynamics section. So, if you have a very fast gate attack, the metering will reflect this.

### 10.11.5 Using the Expander

*Recording Channels*



*Broadcast Channels*



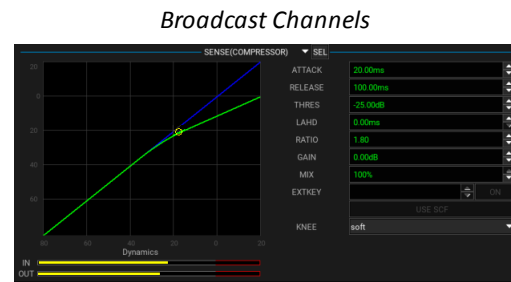
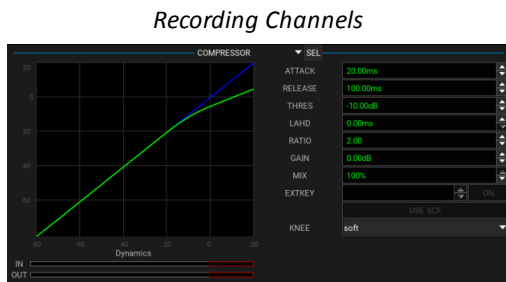
The expander parameters can be set as follows:

- **Threshold Level** – from -80dB to 0dB<sup>1</sup>.
- **Ratio** – from 0.1:1 to 1:1.
- **Floor Level** – from 0dB to -40dB.
- **Attack Time** – from 0.10ms to 250ms.
- **Release Time** – from 40ms to 10s.
- **Look Ahead Delay** – from 0ms to 10ms<sup>2</sup>.

<sup>1</sup> On Broadcast channels, the Expander Threshold must be equal to or higher than the Gate Threshold, and at least 10dB lower than the Compressor Threshold, see [Combi-Dynamics Conditions](#).

<sup>2</sup> On Broadcast channels, the Look Ahead Delay affects all three [Combi-Dynamics](#) modules.

### 10.11.6 Setting a Compressor



The compressor parameters can be set as follows:

- **Threshold Level** – from -70dB to +20dB<sup>1</sup>.
- **Ratio** – from 1:1 to 10:1.
- **Attack Time** – from 0.10ms to 20ms.
- **Release Time** – from 40ms to 10s.
- **Look Ahead Delay** – from 0ms to 10ms<sup>2</sup>.
- **Gain** – from -20dB to +20dB.
- **Mix Level** – from 0% to 100%. Use this parameter to achieve parallel compression (described below).
- **Knee** – hard or soft. This parameter can only be set from the GUI. Use the trackball to set the **KNEE** option to either **hard** or **soft**.

<sup>1</sup> On Broadcast channels, the Compressor Threshold must be at least 10dB higher than the Expander Threshold, see [Combi-Dynamics Conditions](#).

<sup>2</sup> On Broadcast channels, the Look Ahead Delay affects all three [Combi-Dynamics](#) modules.

When using Recording channels, you can achieve smoother compression by assigning the [sidechain filters](#) to the compressor and setting -10dB gain for an 18dB/octave low shelf at around 125Hz to remove unwanted low frequencies.

#### ➤ Using Parallel Compression

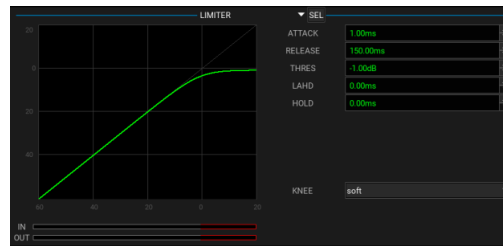
Parallel compression, also known as New York compression, is a dynamic range compression technique achieved by blending a dry signal with a compressed version of the same signal. Rather than lowering the level of the highest peaks to reduce the dynamic range, it raises the level of the softest sounds. Thus, the result is to add audible detail.

Parallel compression can be applied to any DSP channel type - input, monitor, group, aux or sum - for either Recording or Broadcast channels.

Use the MIX level to adjust the balance between compressed and uncompressed signal. To hear only compressed signal, set the value to 100%. Reduce the value to achieve parallel compression. If you reduce the value to 0%, then the module outputs uncompressed signal only.

On the mc²66 MKII, the MIX level can be controlled from the GUI. In addition, you can assign the parameter to a Free Control. First, right-click on the MIX level field and choose **Copy to Clipboard** - the PARAMETER clipboard updates accordingly. From here, it can be assigned to any fader strip Free Control in the [usual](#) manner.

### 10.11.7 Setting a Limiter



The limiter parameters (for both Recording and Broadcast channels) can be set as follows:

- Threshold Level – from -40dB to +20dB.
- Attack Time – from 0.10ms to 20ms.
- Release Time – from 40ms to 10s.
- Hold Time – from 0ms to 500ms.
- Look Ahead Delay – from 0ms to 10ms.
- Knee – hard or soft. This parameter is set from the **Main Display**. Use the trackball to set the **KNEE** option to either **hard** or **soft**.

For best results you should give the limiter the chance to 'see' signal peaks in advance by setting a look ahead delay of 5ms.

### 10.11.8 Filtering the Dynamics Sidechain

On Recording channels, the 2-band SCF section can be used to filter the sidechain of either the compressor or gate section. Note that:

- The 2-band SCF section is not available on Broadcast channels.
- Sidechain filters can only be applied to either the compressor OR gate (and not both), and cannot be applied to the expander or limiter.
- Although the section is called SCF - sidechain filtering - the 2-bands can be assigned to any EQ type: high/low pass filter, shelf or parametric EQ.

#### ➤ To apply sidechain filtering:

1. On the GATE/EXPANDER or COMPRESSOR/LIMITER panels, press the GATE or COMPRESSOR **SHOW** button to access the correct dynamics section.
2. Turn on the **SCF** button to insert the 2-band filter/EQ section.
3. Now move across to the [EQUALIZER/FILTER/SCF](#) panel and use the **SCF** (Sidechain Filter) controls to process the sidechain signal.

As soon as you touch a sidechain filter control, you will see the SCF parameters and graphical overview in the **SENSE** area of the [Main Display](#):



You can audition the sidechain signal by using the [CHANNEL: LISTEN](#) function.



### 10.11.9 Dynamics External Key Inputs

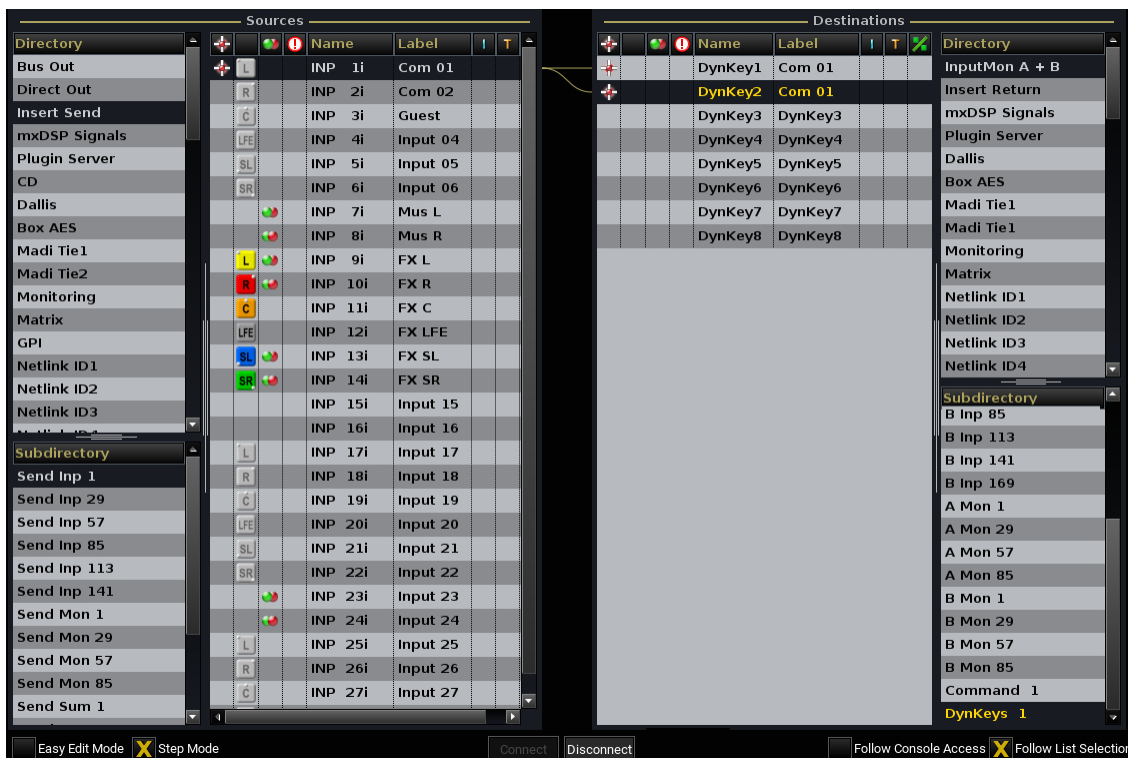
The system supports eight external dynamics key inputs which can be assigned to a Gate or Compressor on any full processing channel. Note that:

- The external key inputs cannot be used on Broadcast channels.
- Each key can be routed from any source, and be assigned to one or more Gate or Compressor sections.
- Dynamics keys cannot be assigned to an Expander or Limiter.

#### Assigning the External Key Signals

Any source can be routed to a dynamics key signal from the [Signal List](#) display:

1. Select the **Input/Mon A+B** directory as your destination to reveal the **DynKeys 1-8** subdirectory:



2. Select the subdirectory and connect sources to each dynamics key in the usual manner.

You can assign a physical input or internal signals such as a mix bus, insert send or direct out. For example, if you wish to trigger a gate from another channel, choose the channel insert send as the source for the key signal.

#### Activating the Key Input

1. Select the channel you wish to key - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. On the GATE/EXPANDER or COMPRESSOR/LIMITER panels, press the GATE or COMPRESSOR **SHOW** button to access the correct dynamics section.
3. Touch a control to view the **GATE** or **COMPRESSOR** parameters in the **SENSE** area of the [Main Display](#):



4. Using the trackball, select the **EXTKEY** field and enter the external key number (**1** to **8**).

Note that you can use the same key signal more than once if you wish. For example, to trigger the gates on multiple channels from the Kick drum mic.

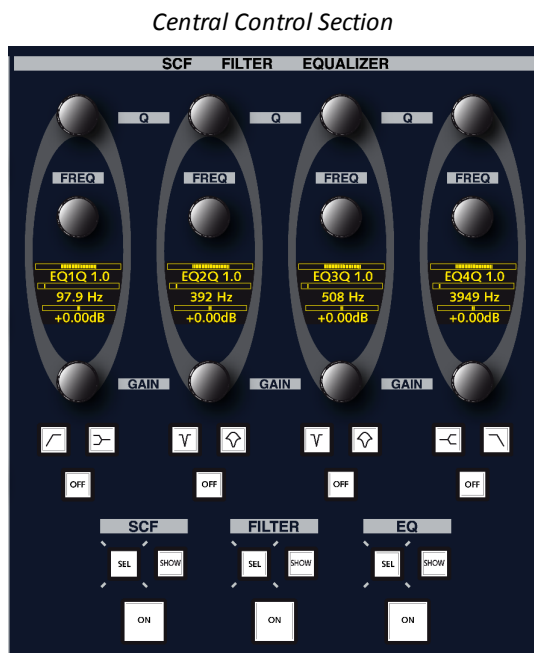
5. Activate the key signal by enabling **EXTKEY ON** or pressing the **EXTK** button on the **DYNAMICS** front panel.

## 10.12 EQUALIZER/FILTER/SCF

Recording channels provide a 4-band equaliser (EQ) plus two 2-band high and low pass filter modules; one dedicated to the main channel (FILTER) and one dedicated to the dynamics sidechain (SCF).

Broadcast channels provide a single 4-band equaliser (EQ), and do not support separate filter or sidechain filter modules. However, the upper and lower bands of the equaliser can operate as a filter, shelf or parametric EQ.

The modules can be arranged in any order within the channel [signal flow](#) and are controlled from the SCF/FILTER/EQUALIZER control area.



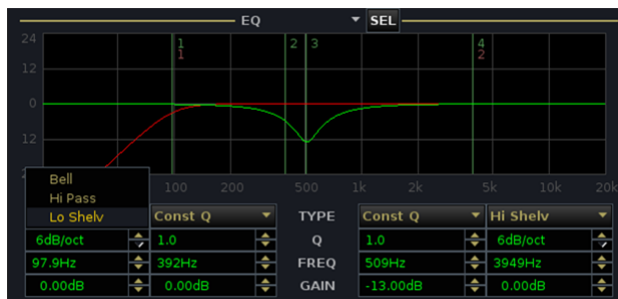
Four sets of dedicated **GAIN**, **FREQ** and **Q** controls are provided:

1. Switch the four sets of controls between sidechain filters, main channel filters and the 4-band equaliser using the SCF, FILTER and EQ **SHOW** buttons at the bottom of the panel.

Note that for Broadcast channels, you cannot select **SCF** or **FILTER**, as these modules are not supported.

2. Press the **ON** buttons to turn each section on or off.
3. Now adjust the **GAIN**, **FREQ** and **Q** settings.

The [Main Display](#) provides feedback on your parameter values; you will see the EQ, (and FILTER or SCF processing on Recording channels):



All 4-bands of EQ (and 2-bands of filters on Recording channels) operate across the full frequency range (20Hz to 20kHz), and offer a variety of different EQ types. The frequency for each band is marked by a vertical line labeled 1, 2, 3 and 4 to show which band is acting at a particular frequency.

4. Press **OFF** to switch any individual band out of circuit.
5. Use the two EQ type buttons to switch between bell, shelf and pass band filters for the high and low bands, and bell, constant Q and notch for the middle bands.

The filter and shelf parameters vary slightly between Recording and Broadcast channels:

Recording channels	Broadcast channels
Max. 3rd order filter	Max. 2nd order filter
Max. 18dB/octave shelf	Max. 12dB/octave shelf

Note that if you load a Recording channel EQ setting to a Broadcast channel (e.g. using a Preset), and the stored parameter lies outside the range supported by Broadcast channels, then the closest available value is applied. For example, if the preset is attempting to load a 3rd order filter, then a 2nd order filter (the maximum) is applied.

## 10.13 CHANNEL

The CHANNEL section includes the following controls:

### FUNCTION Buttons

The **SEND**, **RET** and **REC** buttons are used to input switch and record arm [Monitor Channels](#).

The **CORD** and **CONF** buttons are used for [mix minus](#) control.

### LISTEN

These buttons can be used to AFL an individual audio module within the Central Control Section. Note that the [Key mode](#) in the **System Settings** display sets latching or momentary operation.

#### ➤ TOUCH SENSE

This function turns each module's **SEL** button into its own AFL enable. For example, to AFL the channel post EQ:

1. Press **TOUCH SNS** - the button flashes.
2. Now touch an EQ control - the output of the EQ section feeds the AFL bus.

The EQUALISER **SEL** button illuminates to indicate this.

If the [Key mode](#) is sensing, the AFL automatically cancels when you stop touching the control.

Alternatively, if the [Key mode](#) is latching, deselect **TOUCH SNS**, press **ESC** or press **CLEAR AFL/PFL** to cancel the AFL monitoring.

Note that you can listen to any audio module within the Central Control Section except DIG AMP and DELAY. You cannot listen to a module, if AFL on a fader is already selected!

#### ➤ KEY (Recording Channels only)

This function will AFL the dynamics sidechain on a Recording channel. For example, to AFL the compressor sidechain signal:

1. Press **KEY** - the button flashes.
2. Touch any of the compressor controls - the output of the compressor sidechain feeds the AFL bus.

The Sidechain Filter **SEL** button illuminates to indicate this.

If the [Key mode](#) is sensing, the AFL automatically cancels when you stop touching the control.

Alternatively, if the [Key mode](#) is latching, deselect **TOUCH SNS**, press **ESC** or press **CLEAR AFL/PFL** to cancel the AFL monitoring.

### SNAPSHOT OFFSET

The **TRIM** and **ABS** buttons can be used to select parameters for [snapshot offsets](#).

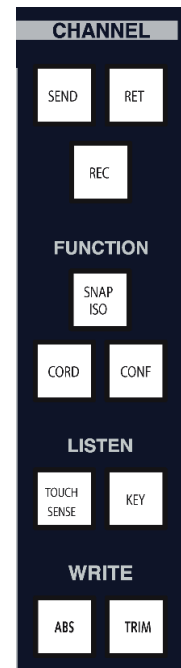
### SNAP ISO

Turn on this button to isolate the complete channel from a snapshot load, see [Snapshot Isolate](#).

### FADER, MUTE, AFL & PFL

These controls duplicate the fader level, **MUTE**, **AFL** and **PFL** on the fader strip, and are provided for convenience.

Note that independent [SEL](#) buttons are provided for the **MUTE** and FADER level, so that they can be selected independently (for copy/reset, link groups, etc.) You will also see the FADER level and **MUTE** status on the [Main Display](#).



## 10.14 PANNING

Central Control Section

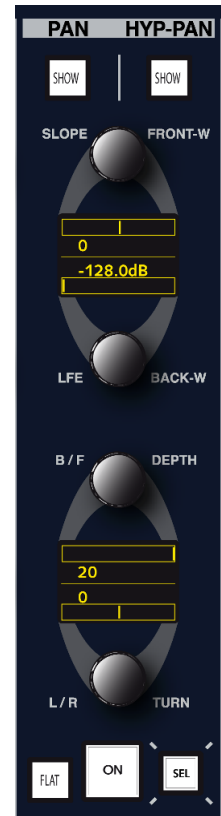


The PANNING controls provide stereo or surround panning onto Group, Sum, Aux and Track busses assigned from the channel. Whether stereo or surround panning is applied depends on the format of the bus masters.

The controls operate in one of two modes:

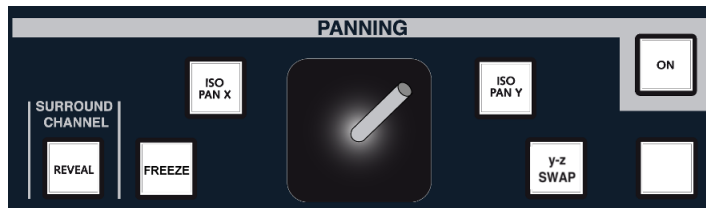
- [PANNING](#) – conventional X/Y pan positioning.
- [HYPER PAN](#) – a new mode, ideal for adjusting the position of a surround source within a surround field.

The joystick panel also houses the SURROUND CHANNEL **REVEAL** button. See [Revealing Surround/VCA Slaves](#) for details.



### 10.14.1 X/Y Panning

Central Control Section

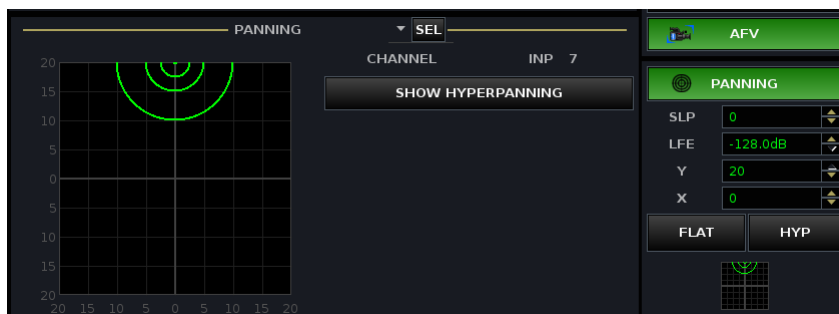


1. Switch the panning section into circuit by pressing **ON**.

The channel must be assigned to either a stereo or surround bus for panning to be active. If your channel is *only* assigned to a mono bus, then panning cannot be turned on.

The status of the PANNING module is always shown on the [Main Display](#). You can also view a graphical representation of the pan position by assigning PANNING to one of the central display areas:

Main Display



Note that if you are using the [FREEZE function](#) to lock the joystick to a particular channel, then the Central Control channel and the panning channel can be different. Therefore, the PANNING CHANNEL name is always shown on the **Main Display** – in our example, **INP 7**.

2. To pan in conventional X/Y mode, panning must be enabled with Hyper Pan off.

Either press the HYP-PAN **SHOW** button and check that the **ON** button is off. Then return to X/Y pan mode by pressing PAN **SHOW**.

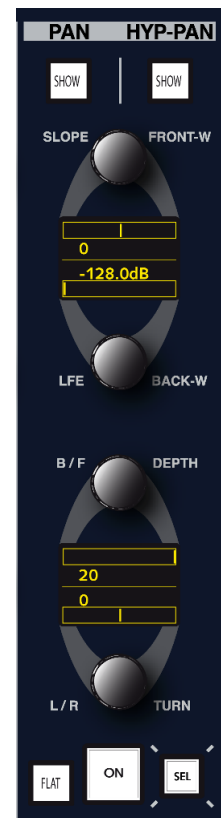
Or, on the **Main Display**, check that **PANNING** is on (green) and **HYP** is off (grey).

#### ➤ Panning onto a stereo bus:

Use the **L-R** rotary control to adjust the left/right pan position. (Or left/right balance if panning from a stereo channel).

#### ➤ Panning onto a surround bus:

1. Use the **L-R** control to adjust the left/centre/right pan position.
2. Use the **B-F** control to adjust the Back to Front pan position.
3. Use the **LFE** control to adjust the level to the Low Frequency Effect channel - the LFE level can be set from -128dB to +15dB.
4. Use the **SLOPE** control to adjust the slope.



## Slope

The **SLOPE** adjusts signals feeding to the discrete centre channel within the surround field, and can be used to adjust the balance between discrete and phantom centre signals.

To see the effect, position your channel to front centre, and adjust the **SLOPE** control to a setting of +20; the signal feeds only the discrete centre channel. Move the **SLOPE** control anticlockwise to a setting of -20; the signal now feeds only the left and right channels (phantom centre). Please refer to the [Appendix: Pan Slope](#) for more details on the effect of the **SLOPE** control.

## Flat

The level of signal feeding the centre channel is also affected by the selection of the **FLAT** button. You can change this from the front panel, or **Main Display**.

The default (**FLAT** off) is to apply level compensation as you pan across left, centre, right channels. Select **FLAT** on if you wish the level feeding the centre channel to remain constant as you pan across LCR.

### 10.14.2 The Joystick

In [X/Y PANNING](#) mode, the joystick provides another method of controlling the channel's XY pan position. The joystick follows the channel in access unless you use the **FREEZE** function.

The joystick motors are enabled or disabled from the [Joystick Motor](#) option in the **System Settings** display and saved within the production.

You can customise the feel of the joystick or add a notch at a particular position (e.g. Front Center) using the [Fader/Joystick](#) options in the **System Settings** display.

#### ➤ Freezing the Joystick

1. First make sure that the **FREEZE** button is deselected.
2. Update the channel in access, either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.

The channel is assigned to the Central Control Section (and the joystick).

3. Select **FREEZE** to lock the assignment.

The joystick now remains 'locked' to the assigned channel until you deselect **FREEZE**.

Note that when **FREEZE** is active, the channel in access can be different to that assigned to the joystick. Therefore, the channel name is always shown in the PANNING module on the **Main Display** – in our example, **INP 7**.

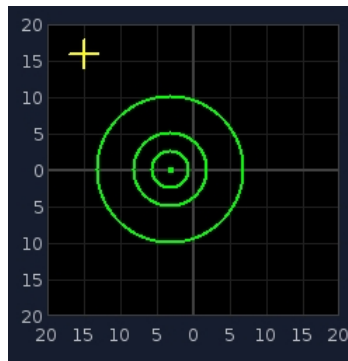


### ➤ Using the Joystick

Once assigned, you can use the joystick to control the channel's X/Y pan position:

1. Make sure that the panning section is switched into circuit by pressing **ON**.
  - If the joystick is motorised, it will automatically move to the current pan position of the channel. Move the joystick to change the pan position.
  - If the joystick is not motorised, then it may be in a different position to the current pan position.
    - Move the joystick to 'catch' the channel; nothing happens until you move the joystick through the current pan position.

If the joystick position is different from the current pan position, then this is indicated within the **Main Display**. A yellow cross indicates the joystick position. Once you move the joystick through the current pan position and 'catch' the channel, the yellow cross disappears:



2. Move the joystick left or right to control the Left-Right pan position, or left/right balance if panning from a stereo channel.
3. Move the joystick up or down to control Front-Back (Y-axis).

In either of these two modes, you can restrict the joystick to provide more control for a particular axis by selecting:

- **ISO PAN X** - this isolates the X-axis so that any left-centre-right movements are ignored.
- **ISO PAN Y** - this isolates the Y-axis so that any up/down (Front-Back) movements are ignored.

### 10.14.3 X/Z Panning

The **Y-Z SWAP** button becomes operational when working with external 3-D panning tools.

When the **Y-Z SWAP** button is active, the joystick can be used to change the X/Z pan position.

### 10.14.4 Hyper Pan

**HYPER PAN** is an alternate mode of panning ideal for positioning a surround source within a surround field. It can be used on mono, stereo or surround channels but is designed with surround sources in mind. Therefore, this topic is covered later, see [Surround Channels: Hyper Pan](#).

## 10.15 AUX SENDS

Each input, monitor or group channel can access up to 32\* auxiliary sends. (\* From Version 5.10.0, up to 128 auxiliary sends are supported by some Recording channel [DSP configurations](#).)

From Version 5.4 onwards, you can define two central user buttons to **COPY** and **PASTE** fader levels to an aux. See [Central User Button, Copy channel levels to Aux](#).

1. Press **AUX 1..8**, **AUX 9..16**, etc. to assign eight auxiliary sends onto the rotary controls - the names (e.g. AUX 1 to AUX 8) appear in the displays.
2. Press the **ON** button to activate the send - the AUX bus assign boxes on the [Channel display](#) update to reflect your assignments:

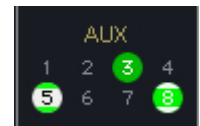
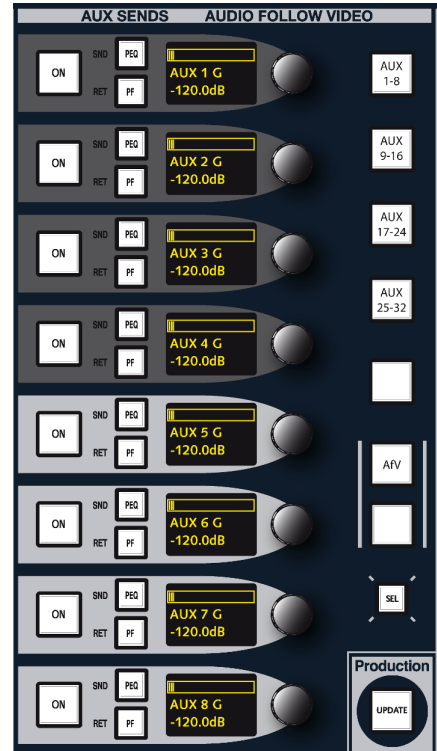


3. Use the rotary control to adjust the send level. The send level can be adjusted from -128dB to +15dB.
4. The send level defaults to be post fader. Press **PF** to switch the send pre fader or **PEQ** (Recording channels, Auxes 1-32 only) to switch to pre EQ.

Note that the bus assign boxes are color coded to reflect the different assignments:

- Post-fader – white writing on green (e.g. Aux 3).
- Pre-fader – black writing on white/green (e.g. Aux 5).
- Pre-EQ (recording channels only) – white writing on green/white (e.g. Aux 8).

5. The [SEL](#) button can be used to select the aux sends, in groups of 8, for operations such as copy or reset, link groups, etc.



Note that the aux send options vary slightly between Recording and Broadcast channels:

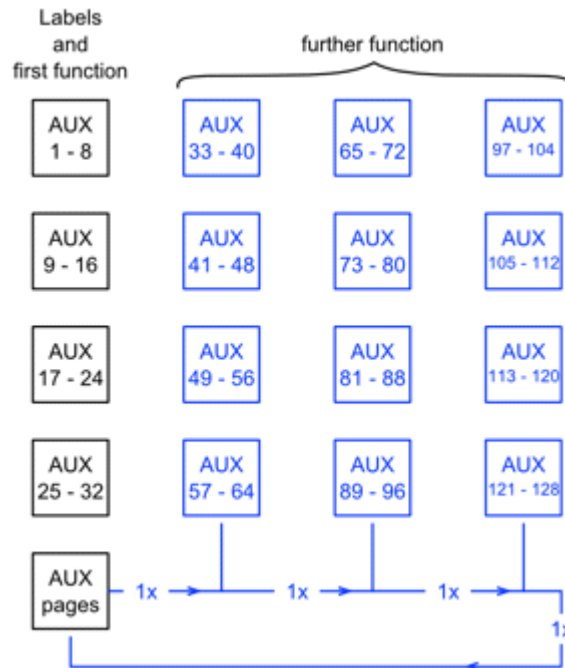
Aux Send	Recording channels	Broadcast channels
Pre EQ	✓ (sends 1 to 32 only)	✗
Pre Fader	✓	✓
Post Fader	✓ (pre-bus)	✓ (after fader)

On Recording channels the pre EQ option follows any changes made to the position of EQ in the channel signal flow. This allows you to move the aux send to virtually any channel pickup position.

On Broadcast channels, the aux post fader send is a real post fader send, and not pre-bus as in a Recording channel. This means that you can position another module, for example delay, after the fader, and the delay will affect the main busses, but not the post fade aux send. See [Changing the Signal Processing Order](#).

If you are using a Recording channel [DSP configuration](#) which supports more than 32 auxiliary sends, then the **AUX OFFSET** button provides access to the additional aux pages. Each button press changes the function of the **AUX 1..8**, **AUX 9..16**, **AUX 17..24** and **AUX 25..32** buttons. The diagram below illustrates the operation:

*AUX OFFSET Operation*



### 10.15.1 Stereo & Surround Auxiliary Sends

Any odd/even pair of mono sends can be linked for stereo operation. Or, you can create surround sends (up to 8-channel) from Auxes 1-8, 9-16, etc. This is handled in the same way as creating any other stereo or surround channel, see [Stereo Channels](#) and [Surround Channels](#).

#### ➤ When an Aux is Stereo:

1. Press either of the linked Aux **ON** buttons (e.g. on Aux 1 or Aux 2) to activate the send.
2. Use the upper rotary control to set the level (Gain) of the aux send.
3. Use the lower rotary control to adjust the pan position, or stereo balance if routed from a stereo input channel.

By default, the pan (balance) onto a stereo aux send is linked to the channel XY pan position. You can disable this using the [Delta Panpot to Aux Sends](#) option in the **System Settings** display.

#### ➤ When an Aux is Surround:

1. Press any of the linked Aux **ON** buttons (e.g. on Aux 1 to 6) to activate the send.

All Aux send channels are enabled.

Note that you can deselect individual **ON** buttons to switch off particular elements of the surround send – for example, to turn off the send to the LFE channel.

2. Use the first Aux (e.g. Aux 1) to adjust the level of *all* surround Aux sends.

Note that the panning onto a surround aux send is *always* linked to the channel pan position.

### 10.15.2 Aux Masters

Each Aux channel can be assigned onto any fader strip, in the same way as you would assign an input channel to a fader, and provide full or tiny signal processing depending on your DSP configuration.

To control your Aux masters:

1. Assign AUX channels to fader strips in the usual manner, see [Fader Strip Assignment](#).

To get instant access to your Aux masters, assign them to a lower fader [bank](#) (e.g. Bank 5).

2. Control the level, mute, AFL and PFL and assign free controls as you would for an input channel.
3. If the AUX is a full processing channel, then can apply signal processing from the [Central Control Section](#).

## 10.16 AUDIO FOLLOW VIDEO

The Audio Follow Video (AFV) feature provides the ability to open and close a channel or main fader from an external event. For example, during coverage of a live motor racing event, you can program the audio channels associated with each camera to automatically open and close as the picture cuts between different shots.

Events can be received via TCP/IP Ethernet (using Lawo's Remote MNOPL protocol) or GPIO.

Up to 128 events can be programmed, with each event corresponding to a different camera tally. An event can control an individual channel or a group of channels. Parameters for the Hold Time, Rise Time, Max Event Time, On Time and Fall Time control the envelope of the fade allowing smooth fades from one camera to another.

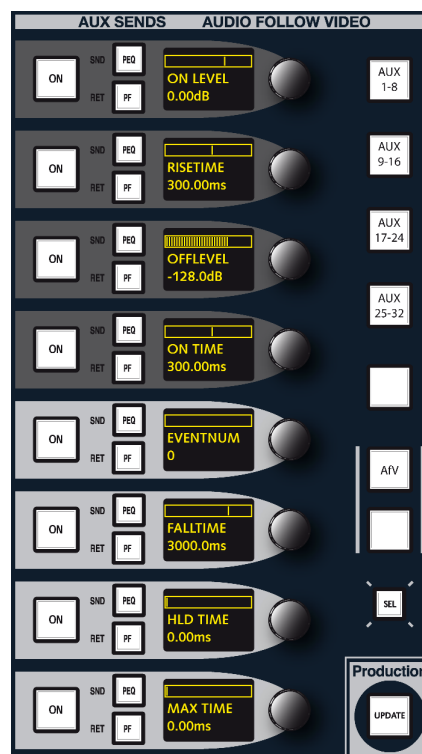
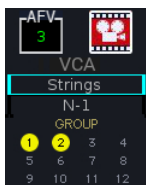
To configure the AFV parameters:

1. Press **AFV** on the AUX SENDS/AUDIO FOLLOW VIDEO panel.

The eight rotary controls switch to AFV functions as indicated on the alphanumeric displays.

2. Turn the **EVENTNUM** control to assign the external event.

Active events are numbered from 1 to 128. Select 0 for no event. The event number appears beside the control and on the **Main** and **Channel** displays:

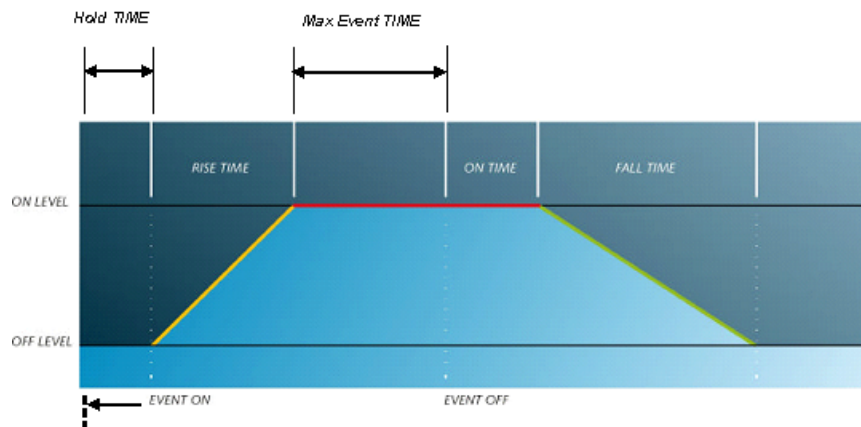


3. Enable AFV by selecting the **ON** button beside the **ON LEVEL** control.

4. To action the event locally from the console, press the **ON** button beside the **EVENTNUM** control.

The fader opens (and closes) according to the AFV parameters.

5. Use the remaining rotary controls to adjust the AFV behaviour:



- **ON LEVEL** – the level which the fader opens to when the event is switched on.
- **OFF LEVEL** - the level which the fader closes to when the event is switched off.
- **HOLD TIME** – use this control to delay the opening of the fader after the event on trigger.
- **RISE TIME** – the time taken for the fader to move from off to on level after the hold time has expired.
- **MAX TIME** – the maximum amount of time the fader stays open (if no event off).
- **ON TIME** – the amount of time the fader stays at the on level, after the event is switched off.
- **FALL TIME** - the time taken for the fader to move from on to off level.

6. Once you have connected and configured the external controller, sit back and watch your fader(s) open and close from the AFV event controller.

The **Main Display** shows the progress of the AFV event: the line for rise time is red as the fader rises; the line for on time is red while the event is on; the line for fall time is red as the fader falls.



You can override a fader at any time, for example, to adjust the level of an open camera mic.

In addition, if you touch the fader while the camera is cut (AFV switched off), the fader remains open. This allows you to perform a manual fade out.

You can link as many channel or main faders to external events as you wish, providing flexible AFV control for individual and groups of faders.

If channels are grouped to a VCA master which is controlled by Audio Follow Video, then the slave faders will be automated by the AFV master event. If you do not wish this to occur, deselect the AFV enable (**ON** button beside the **On Level** control) on the slave channels.

7. To set Audio Follow Video either on or off for all channels, use the [All AFV on/off option](#) in the **System Settings** display.

## 10.17 Automix Groups

Automix groups provide automatic level adjustment for any collection of mono, stereo and surround channels. The feature is ideal for balancing active and inactive microphones such as in a panel discussion, or balancing commentators against international sound.

Up to 8 independent Automix groups can be created. Any number of input, monitor or group channels can be added to each group, and channels can be of any format - mono, stereo or surround.

Within each group, the Lawo Automix algorithm monitors the signal power of each channel, and then automatically adjusts the mix levels accordingly. For example, if there are four guests plus a presenter, then the algorithm automatically mutes the guest channels while the presenter is speaking. This frees the operator to concentrate on other aspects of the audio production.

The name of each Automix group and gain reduction metering are shown on the [Channel display](#). This allows you to instantly see which channels are assigned to an Automix group, and the resulting level balance:

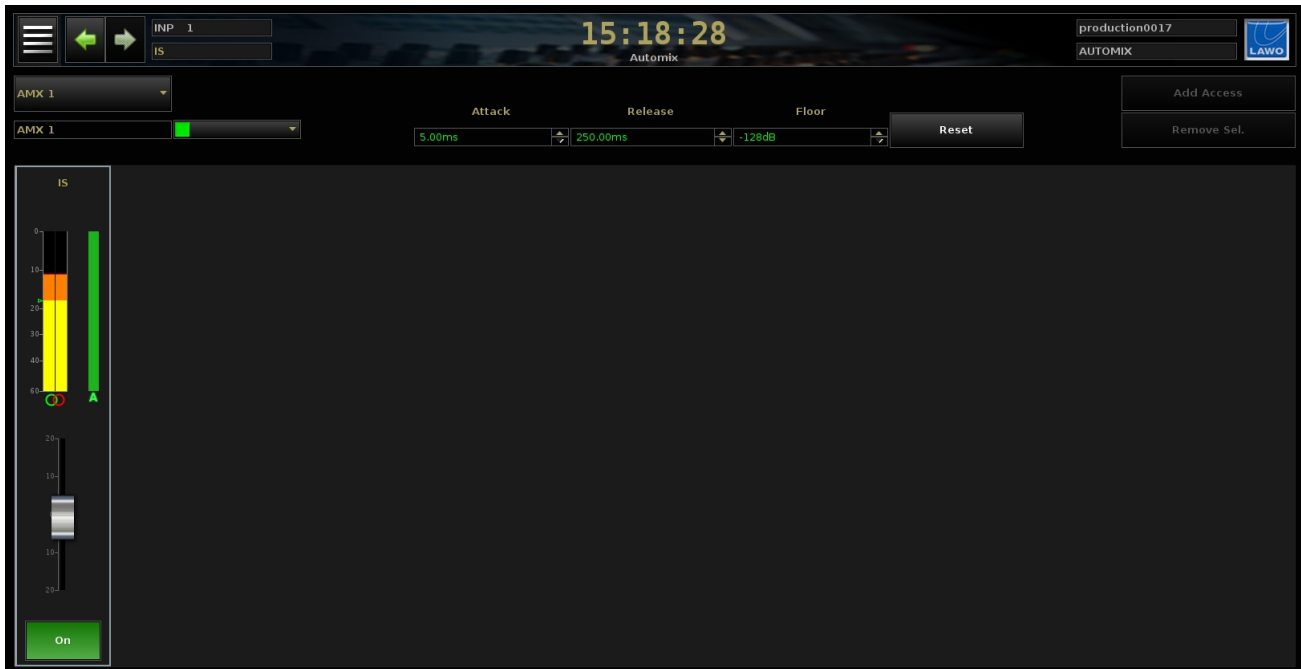


### Automix Conditions

- You cannot add Auxes, Sums or VCAs to an Automix group.
- A channel can only be assigned to a single Automix group.
- When stereo or surround channels are added to an Automix group, the algorithm calculates the average power of the summed component channels.
- The Automix level adjustment affects the main channel level - i.e. the level to the mix busses (Groups and/or Sums). Therefore, it has no effect on Aux send level.
- Automix parameters are stored in snapshots and productions (as part of the channel DSP).
- Automix parameters are not stored by the timecode automation system.

## 10.17.1 Creating an Automix Group

1. [Open](#) the **Automix** display on the Central GUI.
2. Select an Automix group - **AMX 1** to **AMX 8** - from the drop-down menu (top left).
3. Choose the channel you wish to add by placing it [in access](#) - e.g. press its fader **SEL** button. For surround channels, you must select the [Surround VCA](#) master.
4. Then select the on-screen **Add Access** button (top right) - the channel is added to the Automix group:



The **Add Access** button is *only* available if a valid channel is in access. This can be any mono or stereo input, monitor or group channel, or a [Surround VCA](#) master.

You cannot add surround component channels, Auxes, Sums or VCA masters to an Automix group. If an invalid channel is in access, then the **Add Access** button is greyed out.

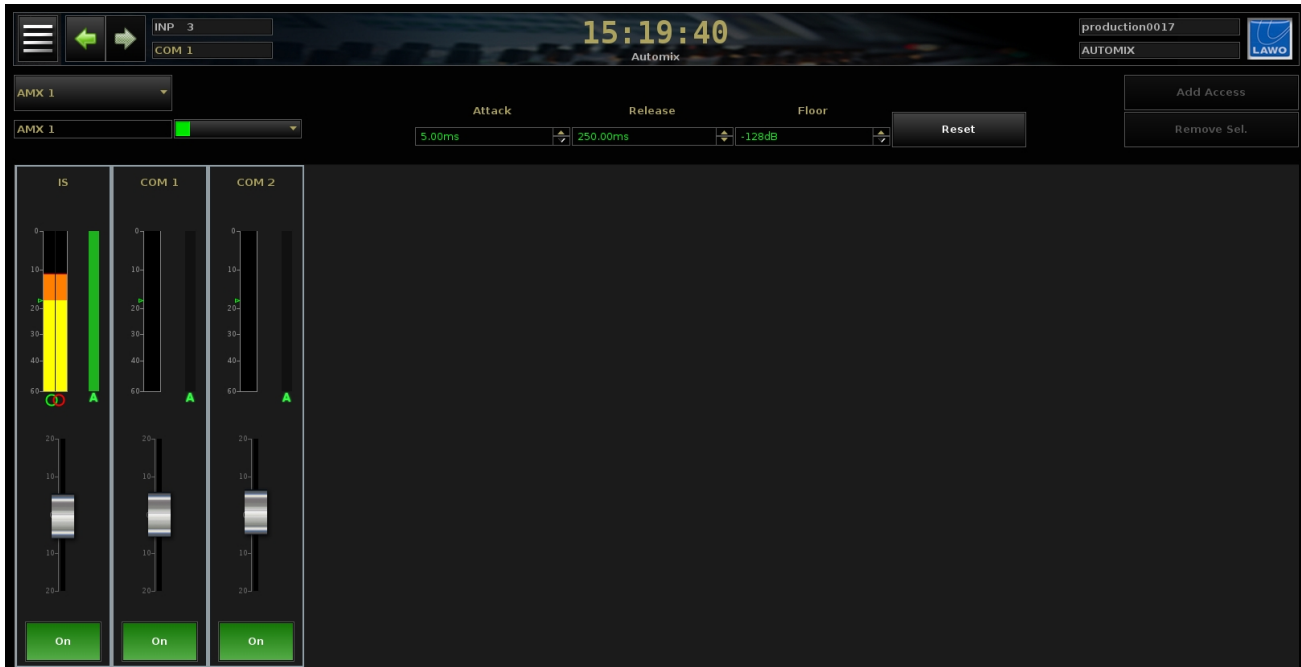
If you add a channel which is assigned to another Automix group, then the existing assignment is removed.



- Repeat steps 3 and 4 to add more channels to the group.

To add a range of channels, create a [couple](#) and then select **Add Access**.

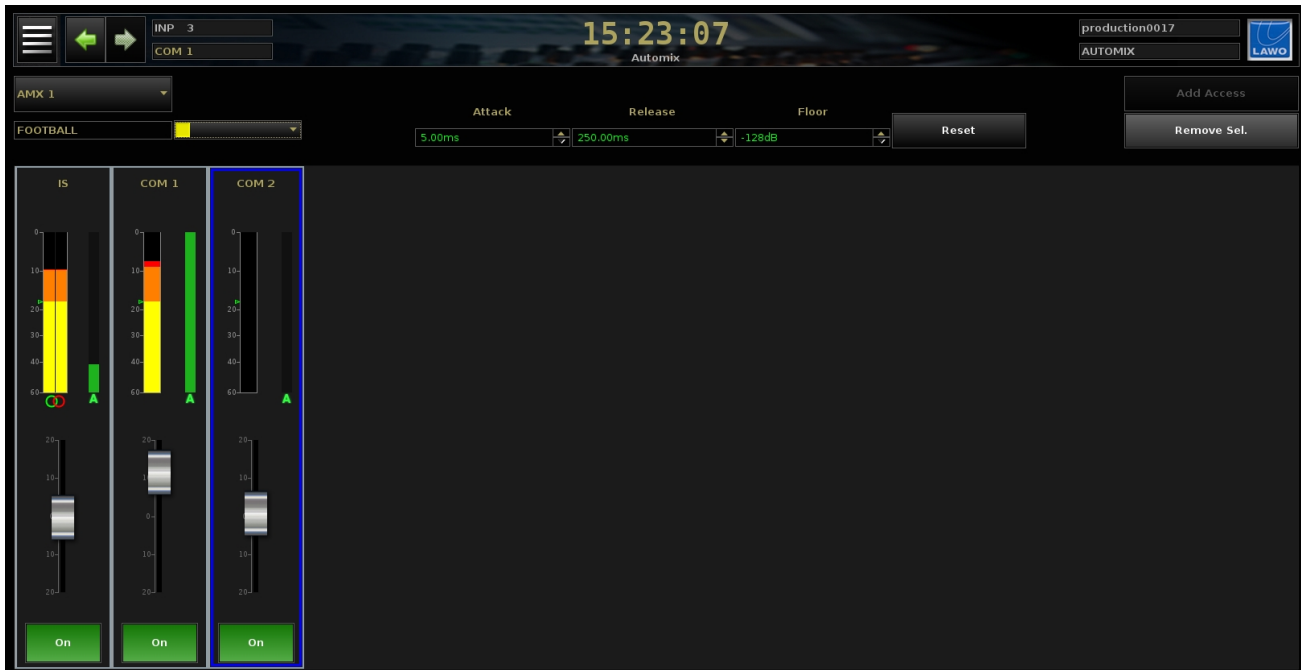
In our example, we have added three channels: stereo International Sound (**IS**) plus two commentators (**COM 1** and **COM 2**):



When channels are added to an Automix group, they are enabled (**On**) and the [weighting factor](#) is set to 0dB.

## 10.17.2 Removing Channels from an Automix Group

1. Click on the channel's outline - it highlights in blue:



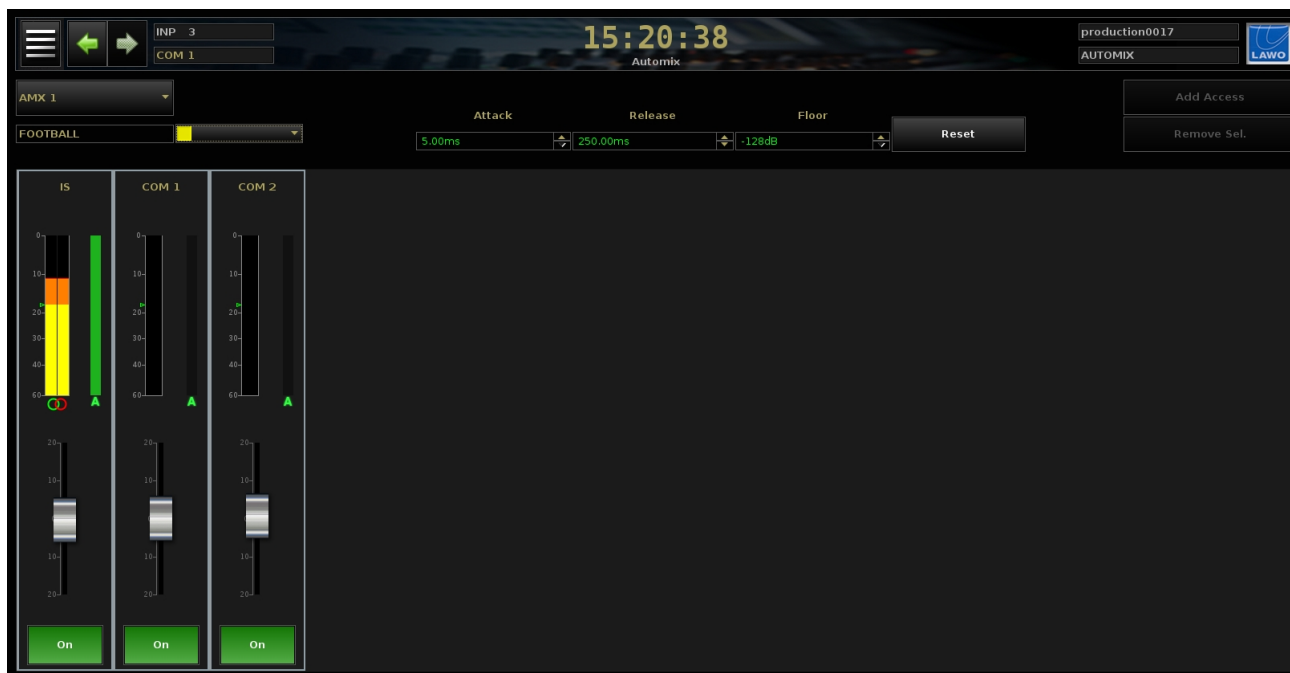
You can select multiple channels if you wish.

2. Then select the on-screen **Remove Sel.** button (top right) - the selected channels are removed from the Automix group.

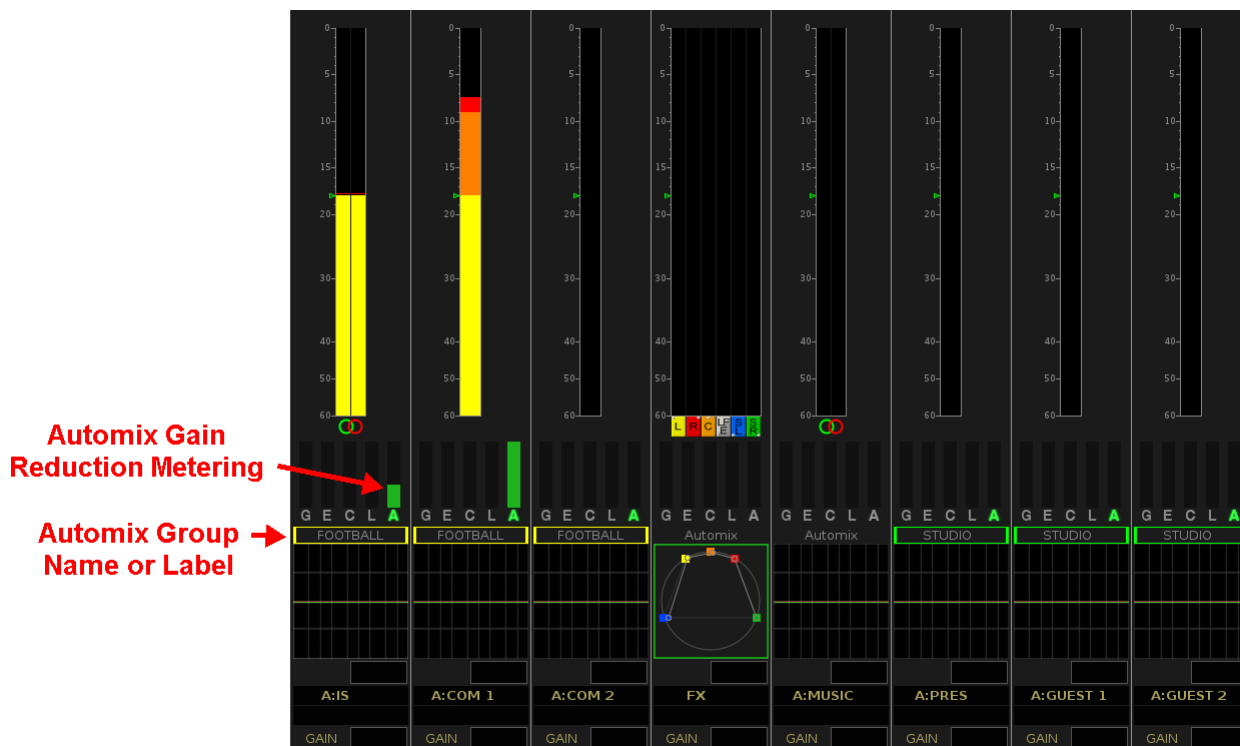
### 10.17.3 Labelling & Colour Coding an Automix Group

By default, the Automix groups are named **AMX 1** to **AMX 8**. Each one can be given a user label and color code as follows:

1. Select the Automix group - **AMX 1** to **AMX 8** - from the drop-down menu (top left).
2. Select the group label field and enter a new name - e.g. **FOOTBALL**.
3. Then assign a color from the drop-down menu - e.g. yellow:



The user labels and color coding appear on the [Channel display](#):

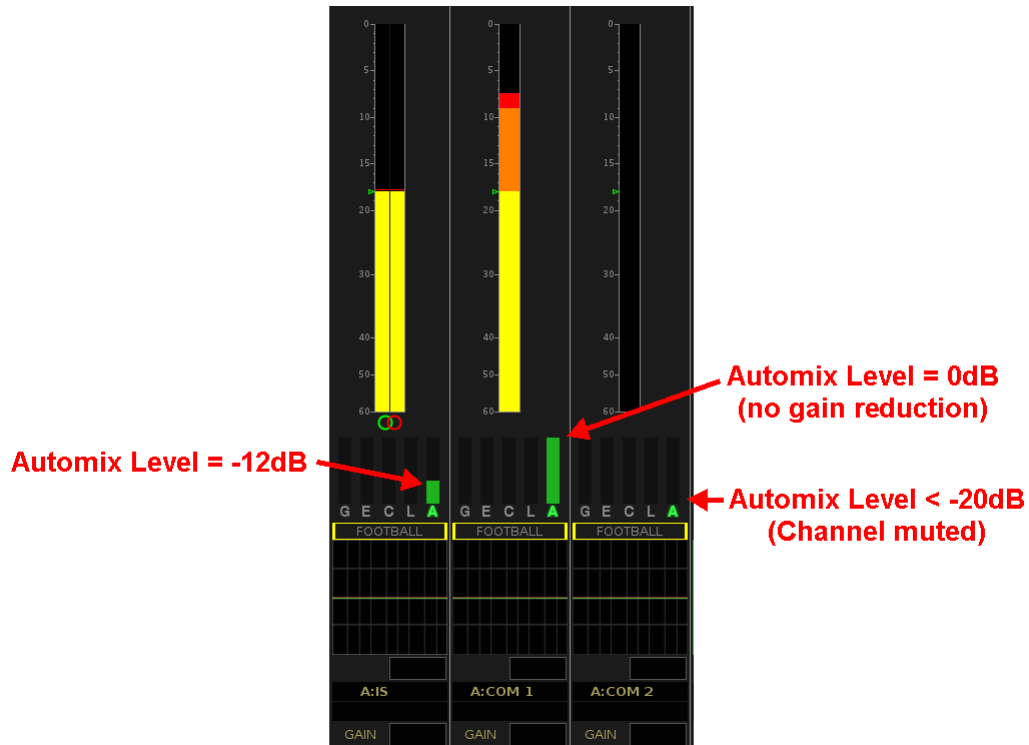


### 10.17.4 Automix Metering

Once more than one channel is added to an Automix group, gain reduction becomes active. The Automix algorithm monitors the signal power of each channel within the group, and then automatically adjusts the mix levels accordingly.

Each channel's gain reduction is shown using the **A** meter (which can be seen on both the **Automix** and **Channel** displays). The meter uses a negative scale ranging from 0dB (green, fully lit) to -20dB. This allows you to quickly view the Automix balance.

In our example, the International Sound (**IS**) has been reduced by around 12dB while the first commentator (**COM 1**) speaks. The second commentator (**COM 2**) is currently silent and is muted:

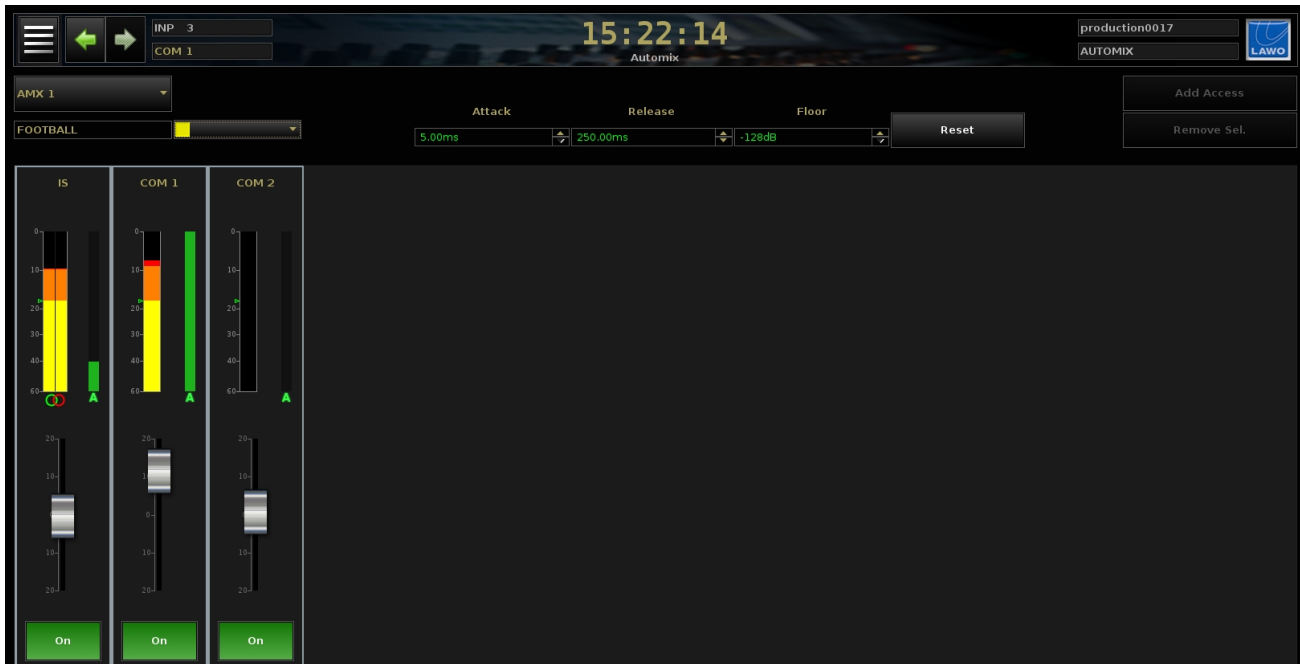


### 10.17.5 Automix Channel Parameters

For each channel within an Automix group, you can adjust its weighting factor and **On** button:

1. Select the Automix group - **AMX 1** to **AMX 8** - from the drop-down menu (top left).
2. Click and drag the on-screen faders to adjust the weighting factor of each channel - the weighting factor scales from +20 to -20 dB, with the default mid point = 0dB.

In our example, we have chosen to add more weight to the first commentator (**COM 1**) so that the International Sound (**IS**) is quieter when the commentator speaks:



The weighting factor can be assigned to a channel Free Control so that it can be adjusted on-the-fly. Right-click on the on-screen fader to copy the weighting factor to the PARAMETER clipboard. It can then be assigned to any Free Control in the usual manner, see [FC Parameter Assign](#). And stored and recalled globally across the console by a user-defined FC PRESET.

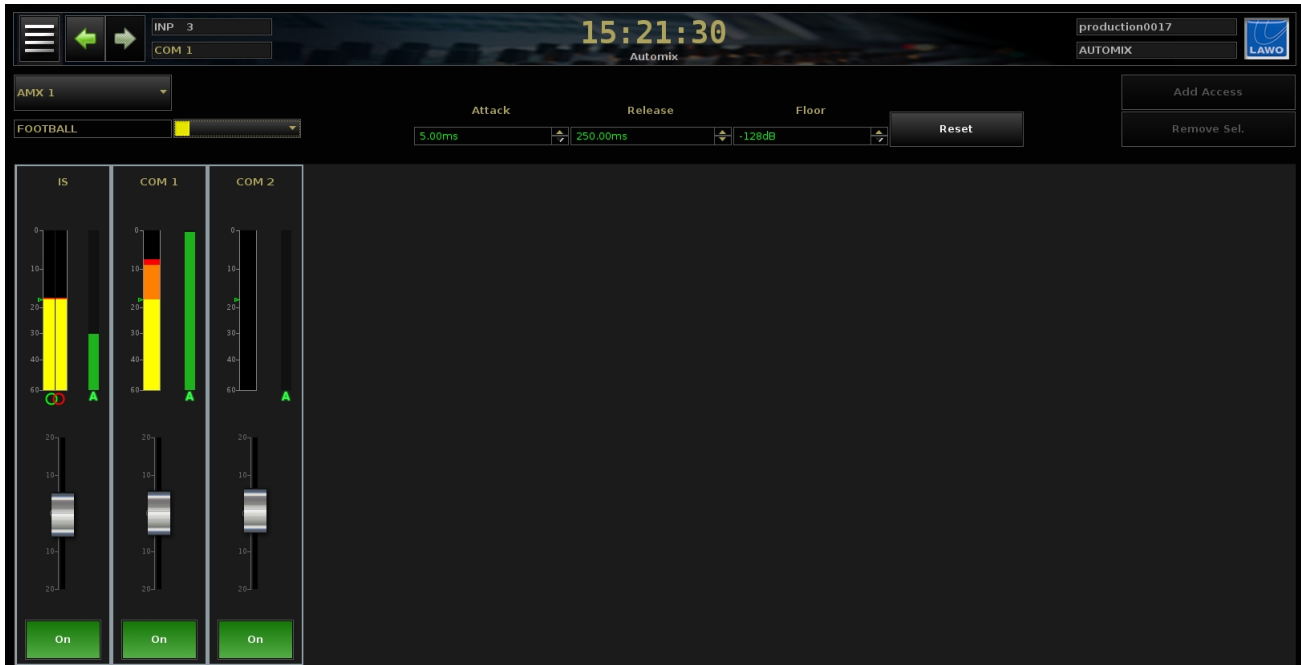
Free Controls assigned to the Automix weighting factor are labelled as **AMX WT** in the OLED display.

3. The **On** button can be used to temporarily remove a channel from the Automix group. **On** = green when enabled.

## 10.17.6 Automix Group Parameters

For each of the 8 Automix groups, you can use the **Attack**, **Release** and **Floor** parameters to control how the Automixer behaves:

1. Select the Automix group you wish to adjust - **AMX 1** to **AMX 8** - from the drop-down menu (top left):



2. Use the **Attack** and **Release** times to change how quickly the Automixer responds to changes in signal level.
3. Use the **Floor** level to set the maximum amount of gain reduction.

For example, if the **Floor** level is set to -128dB, then channels will mute when no signal is present. To add a little ambient sound from inactive microphone channels, increase the **Floor** level accordingly.

4. The **Reset** button can be used to reset the **Attack**, **Release** and **Floor** parameters to their default values.

## 10.18 Mix Minus (N-1) Sends

The mc<sup>2</sup>66 MKII can use any of its auxiliary sends (or track busses in [Recording Channels](#) mode) to create mix minus feeds. There are several applications including an N-1 send back to a commentator; an N-many send to multiple guests in a studio; or a pre-talk conference send where participants can chat off-air prior to their on-air contribution.

The only difference between using an aux and a track bus is that track busses do not offer a send control. If you need to adjust the mix minus send level from a channel, then you can create a track bus send level by moving the DIGAMP module into the track bus path (from the [Channel Config](#) display).

Any number of aux sends and/or track busses can be configured for mix minus operation, and controlled directly from the fader strip by programming the **CORD** and **CONF** functions onto the fader strip [user buttons](#).

[Broadcast Channel](#) DSP configurations do not support track busses. Therefore, you *MUST* use auxiliary busses for mix minus sends when running in this mode.

To create a mix minus from [tiny](#) channels, you must enable the [Tiny Channels for Conference](#) option in the **System Settings** display.

When using a [Recording Channel](#) DSP configuration, and creating a mix minus from [tiny](#) channels, you *MUST* use auxiliary busses for mix minus sends (as track bus conference facilities are not supported from tiny DSP channels).

### 10.18.1 Assigning the Mix Minus Busses

The first step is to assign a mix minus bus to each source requiring a mix minus send.

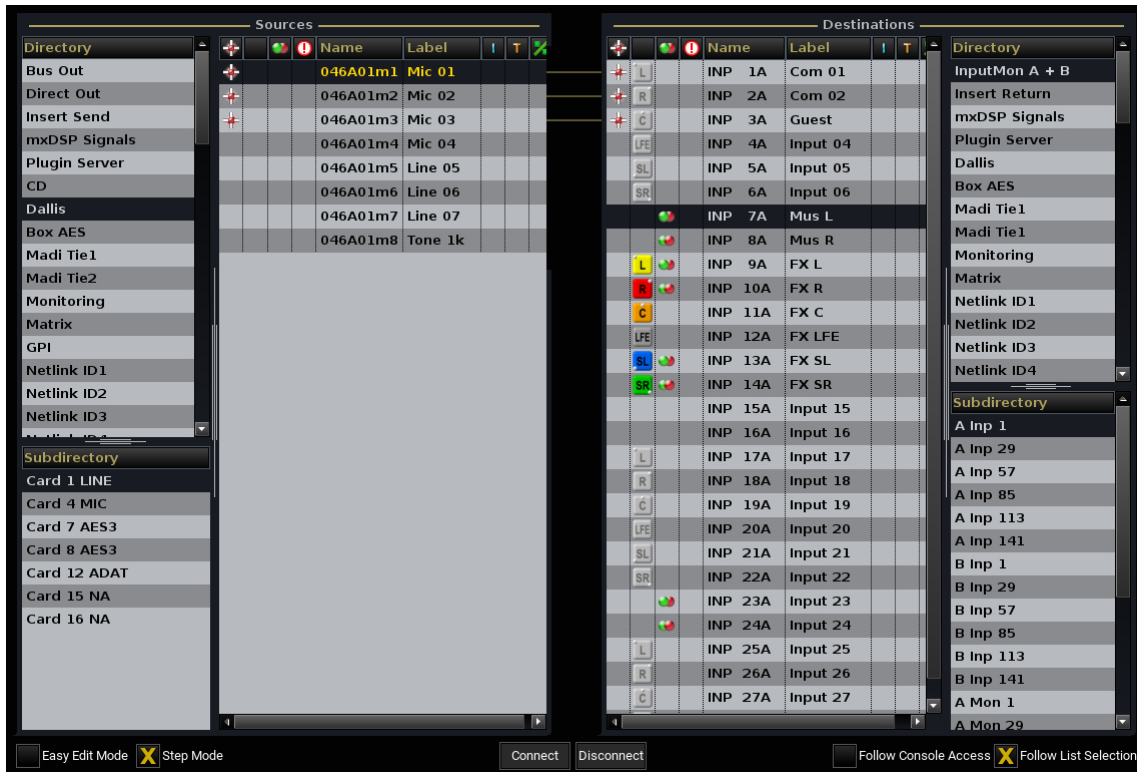
To generate N-1 sends, you should assign a different bus to each source. To generate an N-many send, assign the same bus to multiple sources.

The mix minus bus assignment is linked to the source routed to a channel (and not the DSP channel itself). This means that if you route the source to a different channel, the mix minus bus and its controls follow.

Let's assume you have three microphone sources, each requiring an N-1 feed. The mic sources should be routed to three input channels and the input channels assigned to some fader strips.

To assign a mix minus bus to each source:

1. [Open](#) the **Signal List** display on the Central GUI.
2. Select the source you wish to configure - for example, **Mic 1**:



3. Make sure that the **Follow list selection** option is checked at the bottom of the display.
4. Then press the SCREEN CONTROL **SIGNAL** button again to open the [Signal Settings](#) display - the **System** tree on the left should automatically open to reveal the selected source.
5. With the correct source selected, click on the **Conference** tab to access the Mix Minus parameters:



6. Use the **Mix Minus Bus** field to assign an auxiliary send or track bus as the mix minus send for the selected input signal.
7. Repeat these steps for each source.

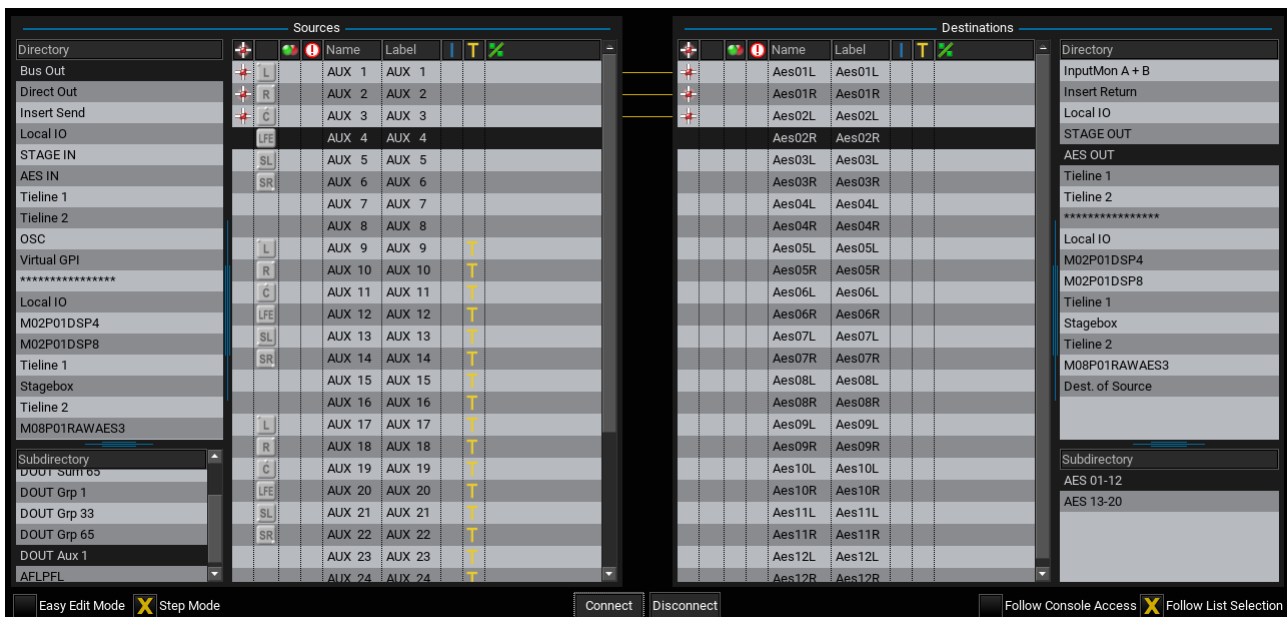


The mix minus bus names (e.g. **AUX 1**, **AUX 2**, **AUX 3**) are shown in the **N-1** field at the top of the [Channel display](#). This provides feedback on which aux (or track bus) is assigned as the N-1 bus for each source/fader strip:

VCA	VCA	VCA	VCA
AUX 1	AUX 2	AUX 3	N-1
GROUP	GROUP	GROUP	GROUP
1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
5 6 7 8	5 6 7 8	5 6 7 8	5 6 7 8
9 10 11 12	9 10 11 12	9 10 11 12	9 10 11 12
13 14 15 16	13 14 15 16	13 14 15 16	13 14 15 16
17 18 19 20	17 18 19 20	17 18 19 20	17 18 19 20
21 22 23 24	21 22 23 24	21 22 23 24	21 22 23 24
AUX	AUX	AUX	AUX
1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
5 6 7 8	5 6 7 8	5 6 7 8	5 6 7 8
9 10 11 12	9 10 11 12	9 10 11 12	9 10 11 12
13 14 15 16	13 14 15 16	13 14 15 16	13 14 15 16
SUM	SUM	SUM	SUM
1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
5 6 7 8	5 6 7 8	5 6 7 8	5 6 7 8

### 10.18.2 Routing the Mix Minus to its Destination

Next, route each mix minus bus back to its destination - for example, route Aux 1 to the earpiece for Mic 1, etc. You can make these routes either from the [Signal List](#) or [mx Routing](#) displays. When using the **Signal List** display, you will find the Aux outputs under the **Bus Out** Source Directory:

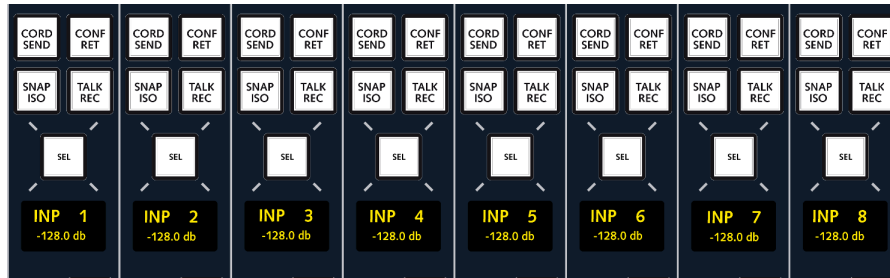


### 10.18.3 Controlling the Mix Minus Sends

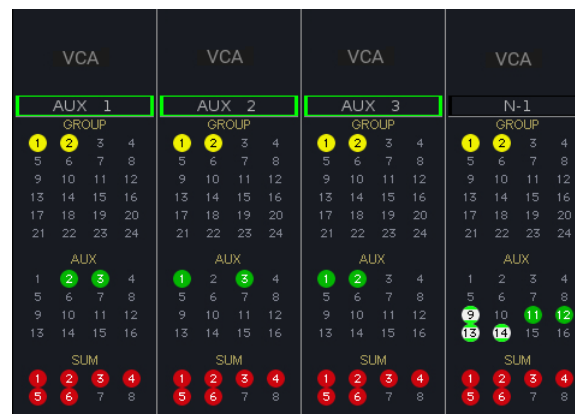
Having assigned a mix minus bus to each source, you can now activate and control the sends from the fader strip using the **CONF** buttons.

To activate a mix minus, the **CONF** function *MUST* be programmed onto a fader strip [user button](#) from the [Custom Functions](#) display.

1. Go to the fader strips controlling each source and press the **CONF** buttons on all three channels:



The mix minus is automatically activated for each of the three channels; you can see this reflected in the bus routing on the **Channel** display. For example, fader strip 1 (mic 1) is assigned to all mix minus busses except its own (Aux 2 & 3); fader strip 2 (mic 2) is assigned all all mix minus busses except its own (Aux 1 & 3); fader strip 3 (mic 3) is assigned all all mix minus busses except its own (Aux 1 & 2):



The automatic assignments are made with a send level of 0dB. You can adjust the individual channel send levels by assigning channels to the Central Control Section and using the [Aux send](#) level controls.

2. To add channels not within the conference group to the mix minus, press their **CONF** buttons - the channels are routed onto all mix minus sends (e.g. Aux 1, 2 & 3).
3. To control the output level or AFL/PFL a mix minus send, assign the AUX master channels onto fader strips and use the fader, **AFL** and **PFL**.
4. To meter the mix minus sends, look at the [Channel display](#) metering on the AUX master channels. Or, assign the AUX masters to the [Metering display](#).
5. To talk to the mix minus send, press the **TALK** [user button](#). (Note that this function *must* be programmed from the [Custom Functions](#) display.)

If you activate **CONF** or **CORD** on a stereo channel, then Left+Right feeds the mix minus bus.

If you activate **CONF** or **CORD** on a [surround VCA](#) channel then you can choose which of the surround slaves feeds the mix minus bus from the **System Settings** display (see [Surround Mix Minus](#) options).

### 10.18.4 Conference (Pre-Talk) Mix Minus Sends

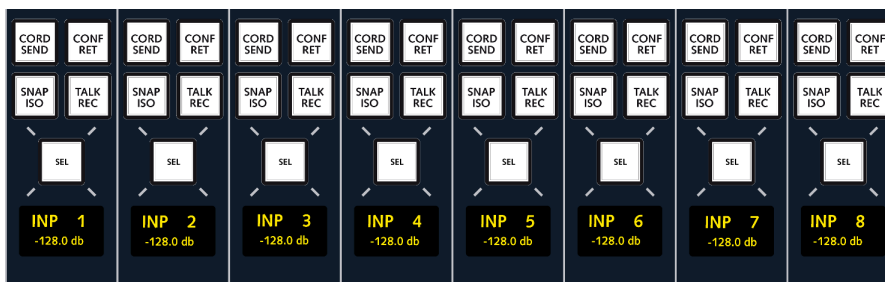
The **CORD** button changes the mix minus from an N-1 into a pre-talk conference send.

This is a great facility for enabling guests and presenters to talk to each other while off-air. As long as their channel fader is closed, each conference bus receives a pre-fader mix of all **CORD** contributors minus themselves. As soon as the channel fader is opened, and they are on-air, the pre-fader bus reverts to a post fader mix minus.

To use this function, both **CONF** and **CORD** functions *MUST* be programmed onto the fader strip [user buttons](#) either from the [Custom Functions](#) display or the factory configuration. Please refer to your system specification for details.

1. Go to the fader strips controlling each source and press the **CONF** and **CORD** buttons on the channels you wish to act a pre-talk sends.

Note you will only be able to active **CORD** if the channel fader is closed.



You can select a mixture of buttons across channels to configure pre-talk sends (**CONF** plus **CORD**) for some presenters and post-fader mix minus sends (**CONF** only) for others. For example, your guest in New York may wish to talk to the studio presenters, but not to the guest in Australia!

## 10.19 DSP Presets

DSP presets provide a way of saving and loading settings for individual modules – EQ, Gate, Compressor, Panning, etc. – or for a complete channel. For example, to save your favourite Kick Drum EQ, or the complete settings for an announcer channel.

Presets are stored independently of the production, and therefore, you can load back a preset to any channel within any production. They can also be transferred to any other mc<sup>2</sup> system.

Note that it is possible to load a preset saved on a Broadcast channel to a Recording channel, or vice versa. If you do so, all matching parameter values are recalled. However, as not all parameters are included, the result may not sound the same. For example, if you attempt to load a 3rd order filter setting from a Recording channel preset to a Broadcast channel, then a 2nd order filter (the maximum) is applied.

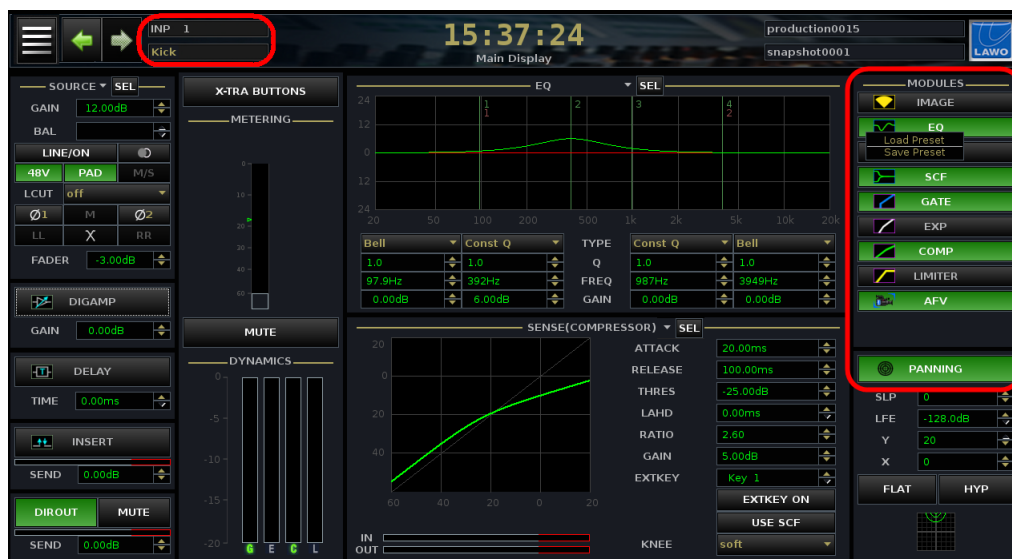
Two different types of preset can be stored:

- **Module presets** – these store settings for individual processing modules: Image, EQ, Filters, Sidechain Filters, Gate, Expander, Compressor, Limiter, AFV settings, Panning and AMBIT. (Note that module presets *cannot* be stored for the input mixer, digamp, delay, insert, direct out or fader level. AMBIT module presets can only be saved and loaded to/from surround VCAs.)
- **Channel presets** – store settings for the complete channel. This includes all the processing modules listed above plus the input mixer, digamp, delay, insert, direct out and fader level. The only settings *NOT* stored by a channel preset are bus routing assignments.

Both types of preset are saved and loaded from the [Main Display](#):

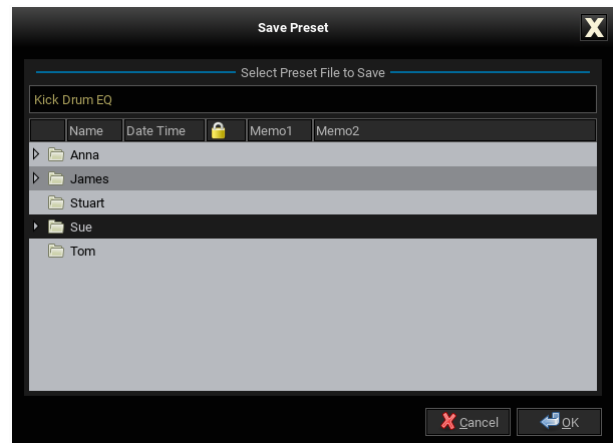
1. [Open](#) the **Main Display** on the Central GUI.

Presets are saved and loaded from the module on/off buttons on the right of the display. You are always saving from and loading to the channel in access – in our example, **INP 1**:



### 10.19.1 Saving a Module Preset

1. Select the channel you wish to save from - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. Using the trackball, right-click on the module you wish to save (e.g. **EQ**) and select **Save Preset** - the 'Save Preset' window appears:



3. Create or select a [folder](#) (recommended).
4. Type in a filename (e.g. **Kick Drum EQ**) and select **OK** - the EQ module settings are saved as a preset into the selected folder, and the 'Save Preset' window closes.

Preset names within each folder must be unique. If you enter an identical name to an existing preset, then the existing preset will be overwritten.

5. Repeat these steps to save settings for other modules by right-clicking on the appropriate module on/off button.

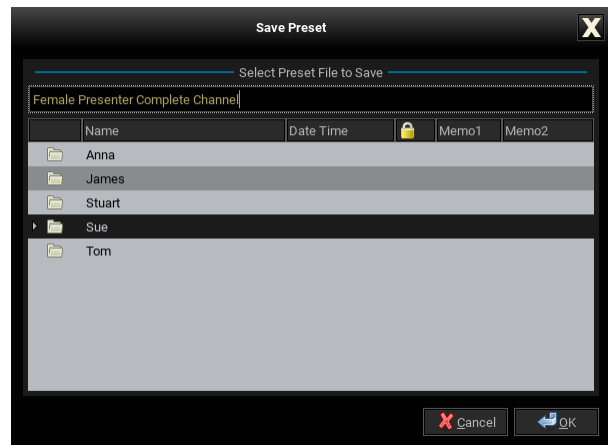
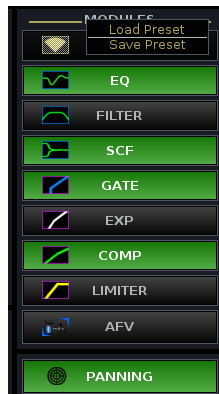
You can save presets for Image, EQ, Filters, Sidechain Filters, Gate, Expander, Compressor, Limiter, AFV settings and Panning modules, but *NOT* for the input mixer, digamp, delay, insert, direct out or fader level.

To save an AMBIT module preset, you must have the surround VCA channel in access.

Presets are stored as different file types to help distinguish EQ presets (**.peq**) from Compressor presets (**.pco**) and so on.

## 10.19.2 Saving a Channel Preset

1. To save a preset for the complete channel, right-click on the word **MODULES** and select **Save Preset**:



2. Create or select a [folder](#) (recommended).
3. Type in a filename (e.g. **Female Presenter Complete Channel**) and select **OK** - the complete channel settings are saved as a channel preset into the selected folder, and the 'Save Preset' window closes.

Preset names within each folder must be unique. If you enter an identical name to an existing channel preset, then the existing preset is overwritten.

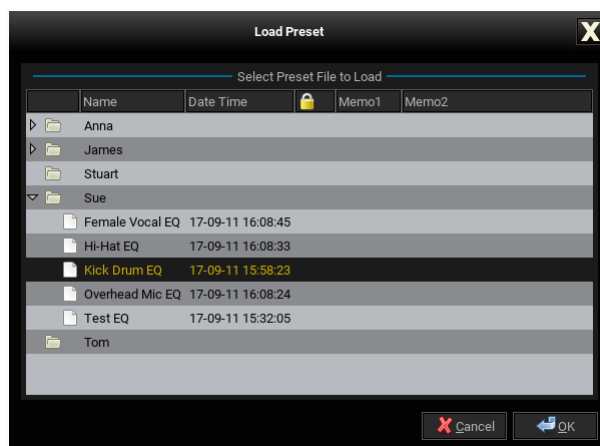
A channel preset stores *all* processing modules including the input mixer, digamp, delay, insert, direct out or fader level. The only channel settings *not* stored by a channel preset are bus assignments.

Channel presets have a **.pch** suffix to identify their file type.

### 10.19.3 Loading a Preset

Presets are stored independently of the production, and can be loaded to *any* channel within *any* production.

1. Select the channel you wish to load to - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. Using the trackball, right-click on the module you wish to load (e.g. **EQ**), or right-click on the word **MODULES** to load a channel preset, and select **Load Preset** - the 'Load Preset' window opens:



3. Click on the arrows to open up a [folder](#) (if you using folders). Note that you will only see presets applicable to the selected module - in our example, EQ presets. This avoids you accidentally loading say a compressor preset to an EQ module!
4. Select a preset and **OK** - the preset is loaded to the EQ module, resetting all parameters including the status of the module on/off button, and the 'Load Preset' window closes.

### 10.19.4 Organising Presets in Folders

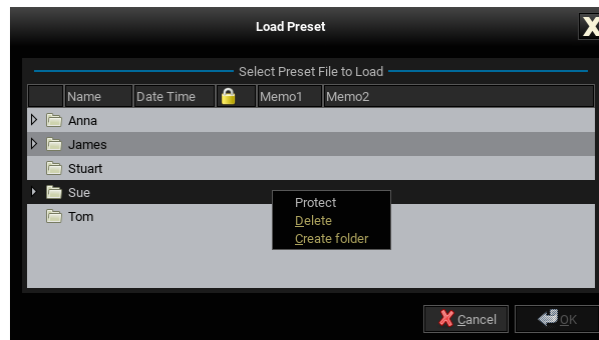
Folders can be created to help organise presets on the system. For example, to create a separate folder for each user. It is recommended that you use folders to stop the list of presets growing too quickly!

From Version 5.10.2, you *cannot* create sub folders. Therefore, if you have presets stored in a sub folder from an earlier version, you will need to export them to USB and import them back into a single level folder structure in the new release. This can be handled from the [File](#) display (on the console) or [File Transfer](#) display (on mxGUI).

You can also use the File displays to move presets between folders.

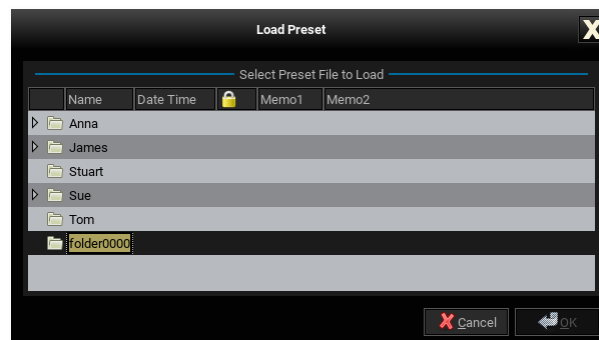
➤ **To create a new folder:**

1. Open the 'Load Preset' window by right-clicking on any audio module and selecting **Load Preset**.
2. Right-click anywhere inside the window and select **Create folder**:



A folder is created with a default name (e.g. **folder0000**).

3. To rename the folder, click on its name field - click once to select all text or double-click to insert a cursor:



4. Type in the new name and press ENTER to confirm. Or, to exit without making a change, press ESCAPE.
5. Select **Cancel** to exit the 'Load Preset' window.

When you next [save](#) or [load](#) a preset, you will see the new folder name.

Note that while you can [protect](#) individual presets, you cannot protect folders - the right-click Protect option is "greyed out".



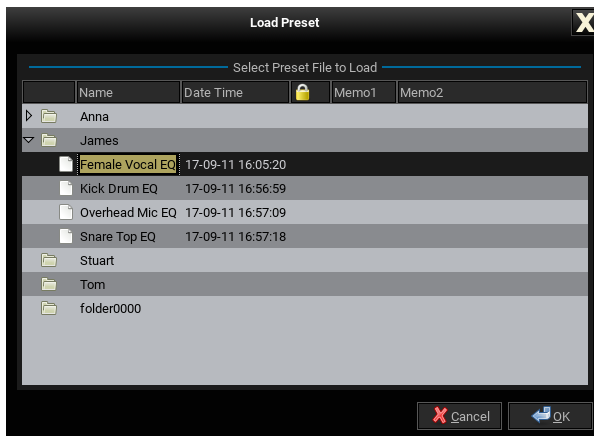
### 10.19.5 Renaming, Protecting & Deleting Presets

An individual preset can be renamed, protected or deleted from the 'Load Preset' window.

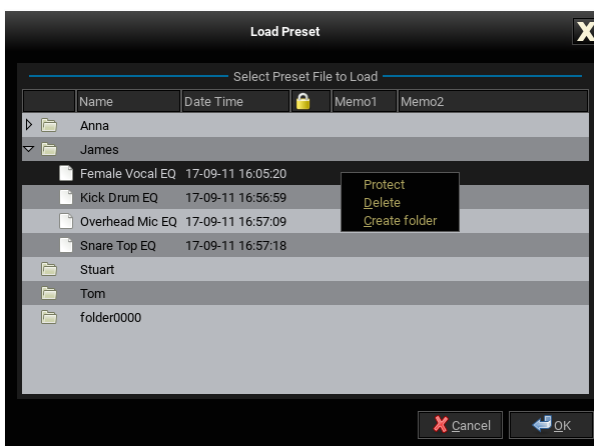
1. Open the correct window by right-clicking on the audio module and selecting **Load Preset**.

Note that you will only see presets applicable to your selection. So, for example, to rename an EQ preset, right-click on the **EQ** module; to delete a channel preset, right-click on the word **MODULES** ; and so on.

2. To rename a preset, click on the name field - click once to select all text or double-click to insert a cursor:



3. Type in the new name and press ENTER to confirm. Or, to exit without making a change, press ESCAPE.
4. To protect a preset, right-click and select **Protect** - when a preset is protected, a padlock icon appears beside its name.
5. To delete a preset, right-click and select **Delete** - note that there is no level of confirmation, so please take care when using **Delete**.



6. When you have completed all operations, select **Cancel** to exit the 'Load Preset' window.

### 10.19.6 Importing and Exporting Presets

Individual presets and folders can be imported and exported to a USB interface, mxGUI computer or network drive. This allows you to archive or transfer presets between systems. See [File Import/Export](#) for details.

## 10.20 Copy & Reset

The PARAMETER COPY/ASSIGN panel, located within the [Central Control Section](#), can be used to copy and reset DSP parameters, bus assignments, channel signal flow, channel color coding and fader strip free control assignments.



Individual or groups of settings can be copied or reset. When performing a copy, you can copy to single or multiple destinations.

Note that this panel is also used to make [Free Control assignments](#). The **CLR** button is used to [clear](#) a Free Control, and has no function (when working with **COPY** or **RESET**).

### 10.20.1 Copying to a Single Channel

To copy parameters from one channel to another:

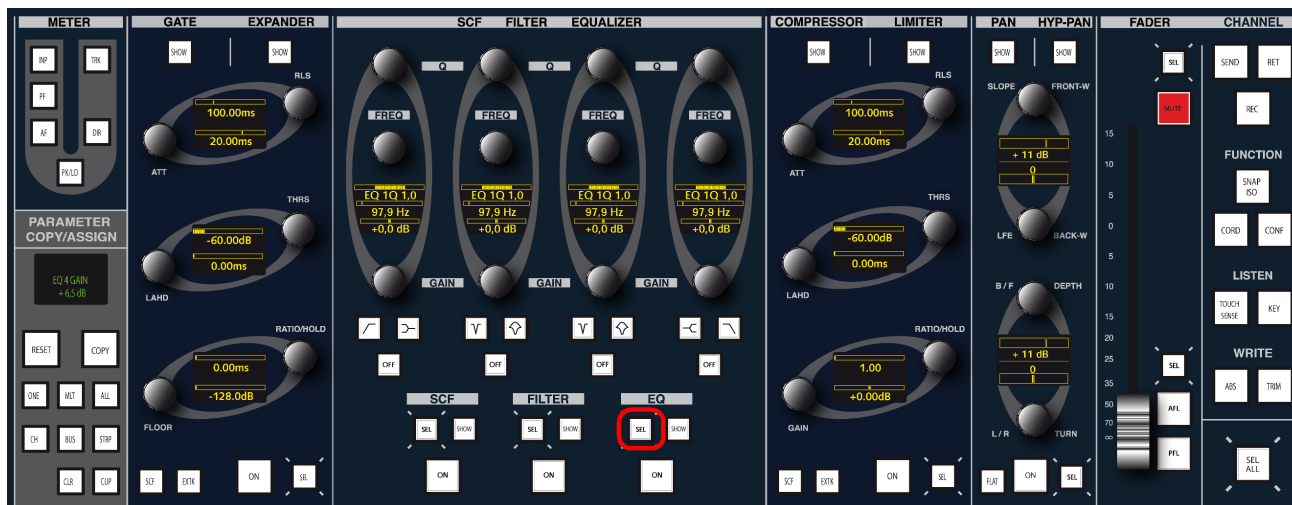
1. Select the source channel - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. Press the **COPY** and **ONE** buttons, located on the PARAMETER COPY/ASSIGN panel, to activate a one-shot assignment.

The fader **SEL** buttons across the console flash, in green:



3. Select the audio module(s) you wish to copy using the **SEL** buttons on the Central Control Section, see [Selecting Channel Parameters](#).

You can choose multiple modules and other channel parameters if you wish. In our example, the EQ **SEL** button has been used to select all parameters from the 4-band EQ module:



4. Choose the destination channel by pressing its fader **SEL** button.

The selected parameters are copied, and the **COPY** and **ONE** buttons cancel.

If you wish to exit without copying any settings, just deselect the **COPY** button or press **ESC**, on the ACCESS/ASSIGN [panel](#), at any point during the operation.

### 10.20.2 Copying to Multiple Channels

You can copy the selected parameters to multiple channels by selecting **COPY** and **MLT** (rather than **COPY** and **ONE**):

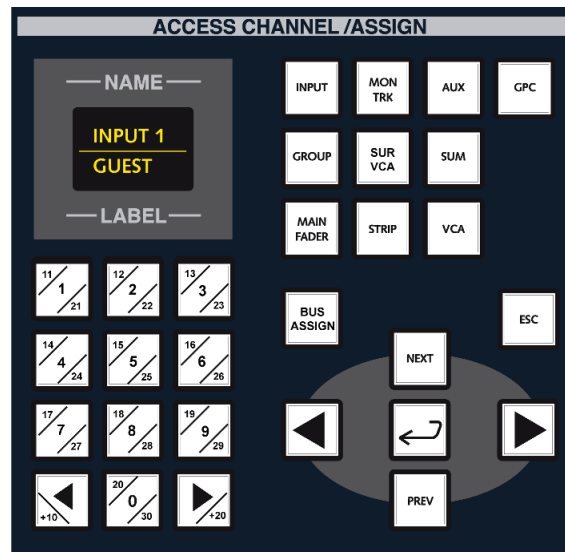
1. Select the source channel - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. Press the **COPY** and **MLT** buttons (on the PARAMETER COPY/ASSIGN panel) - the fader **SEL** buttons across the console flash, in green.
3. Select the audio module(s) you wish to copy, by enabling the **SEL** buttons on the Central Control Section, see [Selecting Channel Parameters](#).
4. Choose the destination channels by pressing their fader **SEL** buttons - you can copy to as many channels as you wish by pressing multiple fader SELs.
5. Remember to deselect **MLT**, or press **ESC** on the ACCESS/ASSIGN [panel](#), to exit the copy and paste mode.



### 10.20.3 Copying to ALL Channels

You can also copy parameters to *all* channels of a particular type. This is particularly useful when you are first building your layout. For example, to copy your favourite EQ Band types, frequencies and Q values to all input channels.

1. Select the source channel - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. Press the **COPY** and **ALL** buttons (on the PARAMETER COPY/ASSIGN panel) - the fader **SEL** buttons across the console flash, in green.
3. Select the audio module(s) you wish to copy, by enabling the **SEL** buttons on the Central Control Section, see [Selecting Channel Parameters](#).
4. Now choose the channel type(s) you wish to copy to, using the [ACCESS CHANNEL/ASSIGN](#) panel – for example, select **INPUT**:



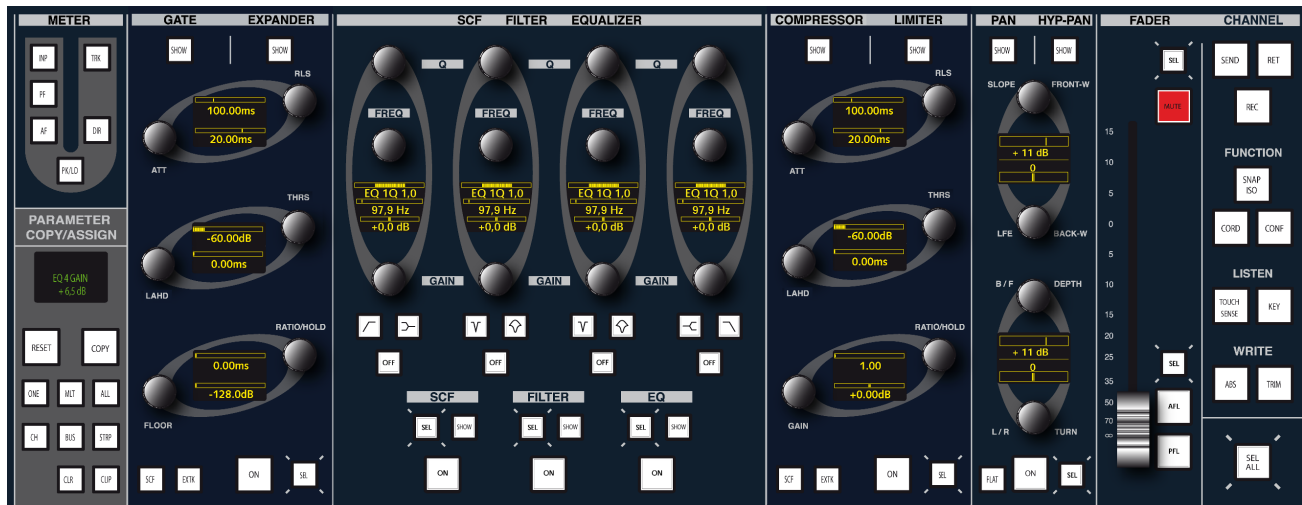
Note that you can select multiple channel types if you wish – e.g. select **INP**, **GRP** and **SUM** to copy the selected parameter(s) across all input, group and sum channels.

5. Press ENTER on the [ACCESS CHANNEL/ASSIGN](#) panel to complete the copy operation.

### 10.20.4 Selecting Channel Parameters

#### Audio Modules

To select a complete audio module, use the **SEL** buttons in the [Central Control Section](#):



To clear down any existing selections, toggle the **SEL ALL** button (this selects and then deselects all modules). This ensures that there are no "hidden" selections.

- **INPUT MIXER** – the **SEL** button selects *either* the source *or* channel input parameters, depending on the current [SOURCE/INMIX mode](#).
- **DIG AMP, DELAY, INSERT, DIROUT** – you can enable the **SEL** button for each section independently, to select the digital amplifier gain, channel delay, insert send or direct output parameters.
- **IMAGE** – selects the stereo image and position.
- **DYNAMICS** – you can enable the **SEL** button for each section independently, to select the gate, expander, compressor or limiter parameters.
- **SCF** – selects the sidechain filter parameters (Recording channels only).
- **FILTER** – selects the 2-band filter parameters (Recording channels only).
- **EQ** – selects the 4-band EQ parameters.
- **MUTE SEL** – selects the status of the mute button.
- **Fader SEL** – selects the main channel level.
- **AUX SENDS/ AUDIO FOLLOW VIDEO** – you can enable the **SEL** button for each page of aux sends and AFV independently. This allows you to select eight aux sends at a time (Aux 1-8, Aux 9-16, Aux 17-24 or Aux 25-32).
- **PANNING** – selects the stereo/surround pan parameters.

## Bus Assignments, Channel Signal Flow and Free Controls

You can select other channel parameters using the buttons on the PARAMETER COPY/ASSIGN panel:



- **CH** - selects the channel signal processing order as defined from the [Channel Config](#) display. (On Broadcast channels, this includes the dynamics model).
- **BUS** - selects the channel's [bus assignments](#) to groups, track busses and sums. (Note that aux assignments are not included; you should use the AUX SENDS panel).
- **STRIP** - selects the fader strip's [Free Control assignments](#).

## Channel color Coding

In addition, you can select the channel's color code using the on-screen **SEL** button on the [Channel Config](#) display:



## Select All/Clearing Selections

Every time you re-enter the copy or reset mode, any previous selections are retained.

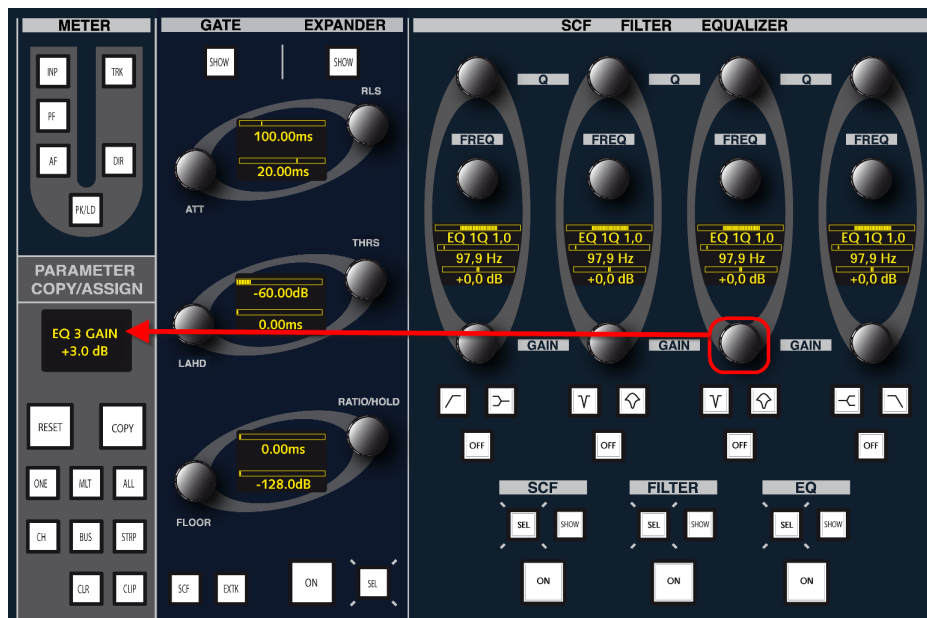


**SEL ALL**, below the CHANNEL buttons, will select, or deselect, all available channel parameters (including **CH**, **BUS** and **STRIP**.)

### 10.20.5 Copying an Individual Parameter

To copy just one parameter from an audio module – for example **EQ 3 Gain** – use **COPY** and **CLIP** as follows:

1. Select the source channel - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. Select the parameter you wish to copy, by touching a rotary encoder on the [Central Control Section](#) - the parameter is placed into the **PARAMETER** clipboard:



3. Press the **COPY** and **CLIP** buttons on the **PARAMETER COPY/ASSIGN** panel.

This automatically selects the **ONE** button for a one-shot copy. (To copy to multiple channels, press **MLT** instead of **ONE**.)

4. Choose the destination channel(s) by pressing the fader **SEL** button(s).

The EQ 3 Gain parameter is copied to the destination channel(s); all other EQ parameters are unchanged.

### 10.20.6 Resetting Channel Parameters

The **RESET** button, located on the **PARAMETER COPY/ASSIGN** panel, can be used to reset channel parameters to their default values.

This works in a similar manner to [copying parameters](#). However, as you are not copying from a source to a destination channel, any channel can be assigned to the Central Control Section.

1. Press **RESET** and then **ONE**, **MLT** or **ALL** depending on whether you wish to reset parameters on a single, multiple or all channels.
2. Select the audio module(s) you wish to reset from the Central Control Section, see [Selecting Channel Parameters](#).
3. Choose the channels to reset by pressing the fader strip **SEL** button(s), or entering the channel type (if using **ALL**).

In each case, parameters are reset to their factory default values.



## 11. Stereo Channels

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This chapter includes additional information for stereo channels.

Topics include:

- [Creating a Stereo Channel](#)
- [Stereo Channel Operation](#)
- [Stereo Balance & Input Control](#)
- [Image Width & Positioning](#)
- [Panning from a Stereo Channel](#)
- [2-Channel Mode](#)



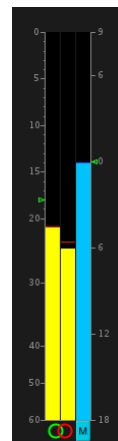
## 11.1 Creating a Stereo Channel

Any odd/even pair of input or output channels can be configured for stereo and controlled from a single fader strip.

The easiest way to see which channels are stereo is to look at the metering on the [Channel display](#) - here you will see stereo bargraphs (where applicable), and green/red circles below the stereo peak meter.

There are three ways to create a stereo channel.

Note that when a stereo channel is created, settings from the left channel are copied to the right and the two sides are automatically panned left and right for stereo operation. This means that if the stereo link is removed, the resulting left and right mono channels have identical settings and are panned centre.



### Using the Signal List

If you have yet to assign your channels to the surface, then it is best to define the channel formats from the **Signal List** display before assigning your fader strips.

1. [Open](#) the **Signal List** display on the Central GUI.
2. Select an odd numbered input channel from the **Destinations** list (e.g. INP 7).
3. Press the **STEREO** soft key (on the SCREEN CONTROL [panel](#)), or right-click and select the **Stereo** option - this links the selected channel to its adjacent DSP path. For example, INP 7 and INP 8.

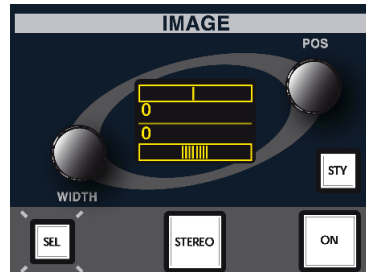


You can link any odd/even pair of input or monitor channels using this method. Alternatively, select a **Bus Out** from the **Sources** list to create a stereo bus master.

## Using the IMAGE Panel

If the channels you wish to link are already assigned to a fader strip, then it may be simpler to use the **STEREO** button on IMAGE panel in the [Central Control Section](#).

1. Assign the odd channel, of the odd/even pair, to the Central Control Section by pressing its fader strip **SEL** button.
2. Locate the IMAGE controls on the Central Control Section:



3. Press **STEREO**.

This links the selected channel to its adjacent DSP path. For example, pressing **STEREO** on INP 7 creates a stereo channel from INP 7 and INP 8.

If the two mono channels used to create a stereo channel are present on the control surface, then the right hand channel (e.g. input 8) will disappear from the surface leaving a blank fader strip. If you unmake the stereo channel, and the blank fader strip is still available, then input 8 will return to the active surface. However, if you have assigned another channel to its old position, you will need to reassign input 8 to a different fader strip location.

## Using the Channel Config display

The third method is to use the **Stereo** configuration option in the [Channel Config](#) display.

### 11.2 Stereo Channel Operation

The operation of a stereo channel is identical to that of a mono channel, with the following additional features:

- [Stereo Balance and Input Control](#)
- [Image Width and Positioning](#)
- [Panning from a Stereo Channel](#)

All other processing (EQ, Dynamics, Delay, etc.) is applied equally to both left and right sides.

Note that for groups or sums, any odd/even pair of channels can use [2-Channel mode](#), as an alternative to stereo. This provides independent fader strip control for the left and right sides of the output master.

### 11.3 Stereo Balance & Input Control


When an input channel is stereo, a number of additional controls become available: **BALANCE**, **Ø R** and stereo input management.

Note that **GAIN**, **BALANCE** and **Ø** can be applied to the source or channel depending on the [SOURCE/INMIX](#) mode.

1. With the INPUT MIXER panel switched to **SOURCE** mode (the default), use the **GAIN** control to adjust source gain - the gain range depends on the type of input ([mic/line](#) or [analog fixed gain/digital](#)).

The gain for left and right inputs is adjusted in parallel; any offsets are retained and represented by a positive or negative **BALANCE** value.

To adjust source gain independently for the left and right inputs, you can use the [Mic/Line Gain](#) or [IO DSP Volume](#) parameters from the **Signal Settings** display.

2. Use the **BALANCE** control to set the Left/Right input balance for the stereo input.
3. Press the **MONO** button to sum the Left and Right inputs.
4. Press the  button to reverse the Left and Right inputs.
5. Press the **Ø L** or **Ø R** buttons to reverse the phase.
6. Press either **L>B** (Left to Both) or **R>B** (Right to Both) to route either the left or right source to both sides of the stereo channel.
7. Select **M/S** for sources recorded using sum and difference coding (see below).
8. Switch the INPUT panel to **INMIX** mode if you wish to adjust the GAIN and BALANCE for the channel.

The status of all settings is indicated on the **Main Display**.

#### M/S (Middle & Side)

M/S is a stereo recording technique which uses two coincident microphones, one pointing to the front (Middle) and the other (bi-directional) at right angles to provide the stereo ambience (Side). The mc<sup>2</sup> consoles provide M-S to X-Y decoding to turn the Middle and Side signal into normal Left and Right stereo.

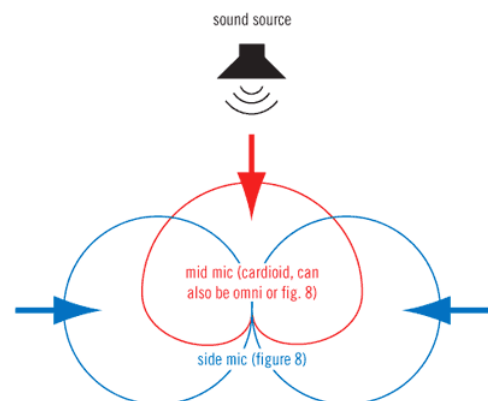
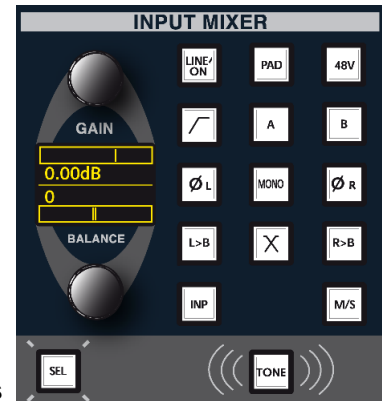
First create a stereo channel and assign its inputs as follows:

- Left Input - from the Middle (M) signal, usually a cardioid or omni-directional mic.
- Right Input - from the Side (S) signal, always a figure-of-eight.

When the **M/S** button is active, the following matrix calculations are applied:

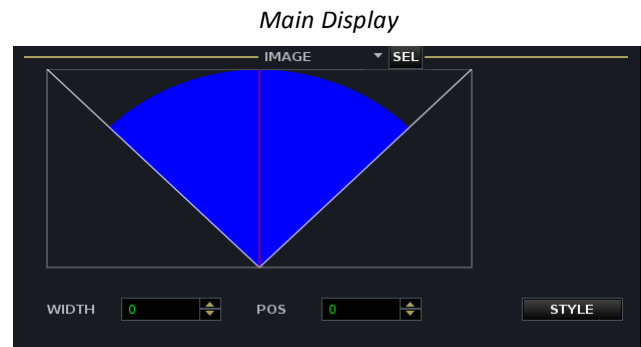
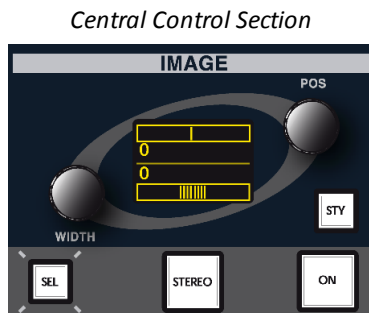
- Left channel = L+R (M+S)
- Right channel = L-R (M-S)

By adjusting the **BALANCE** control, you can vary the ratio of Middle to Side, and thereby adjust the width of the stereo field.



## 11.4 Image Width & Positioning

The IMAGE controls can be used to adjust the width and positioning of a stereo channel:



1. Select **ON** to switch the Image section into circuit.
2. Choose the style, using the **STYLE** button:
  - **STYLE** off (default) - retains the width of the stereo image and offsets its position within the stereo field.
  - **STYLE** on - collapses the width of the stereo image as you adjust the left/right position.
3. Use the **WIDTH** control to widen or narrow the stereo image.
4. Adjust the **POS** control to move the narrowed or widened image within the stereo field.

In our example, the image width is retained, and the red line on the Image graph moves as you adjust this control to represent the direction of the image control:



Be careful not to widen the stereo image too far. If you do so, you may create phasing problems.

## 11.5 Panning from a Stereo Channel

The channel panning controls on a stereo channel behave in a very similar fashion to a mono channel, allowing you to pan a stereo channel in surround when routed to a surround bus destination. The only difference in control is that the L/R pan control now adjusts the left/right balance of the stereo channel.

Similarly, the X-axis movement of the joystick adjusts the left/right balance when panning a stereo channel.

See [X/Y PANNING](#) for details.

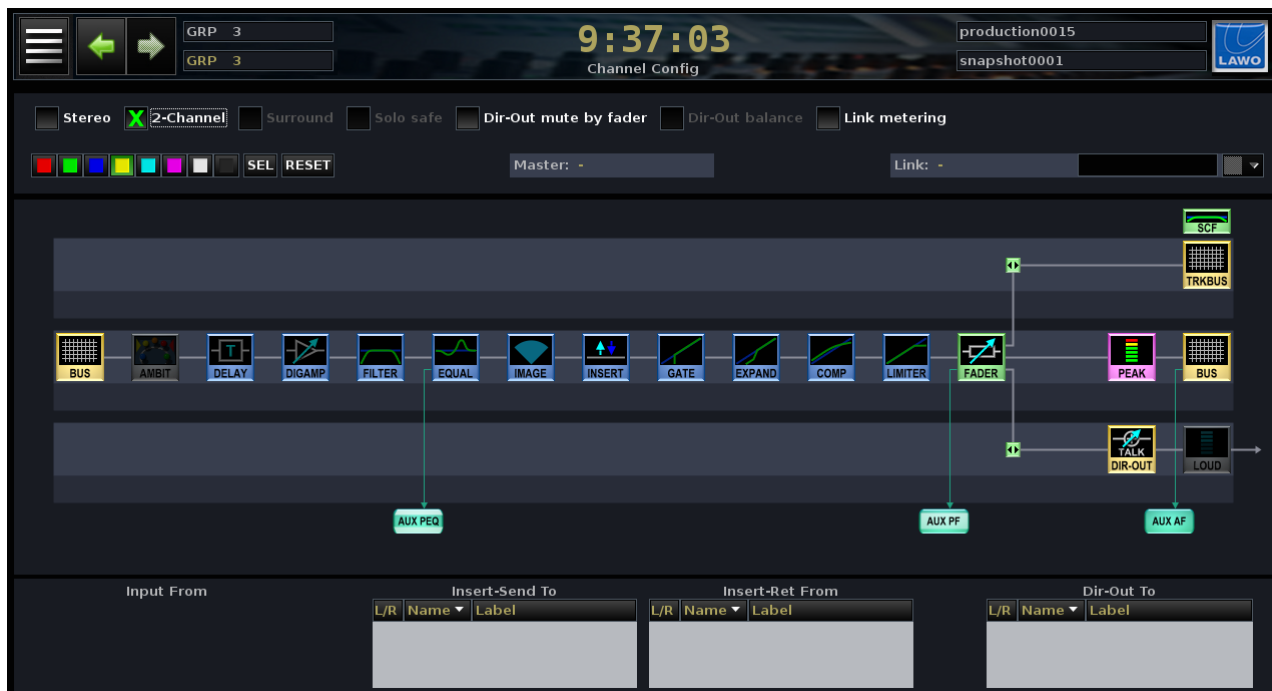
## 11.6 2-Channel Mode

Any odd/even pair of sum or group channels can be configured as 2-channel as an alternative to stereo. This provides independent fader strip control for the left and right sides of the output channel.

Note that 2-channel mode cannot be selected for aux channels.

1. Assign the odd sum or group channel, of the odd/even pair, to the Central Control Section by pressing its fader strip **SEL** button or using the [ACCESS CHANNEL/ASSIGN](#) panel.
2. [Open](#) the **Channel Config** display on the Central GUI.
3. Press the **2-CHANNEL** soft key or select the **2-Channel** screen option.

This configures the selected channel and its adjacent DSP path for 2-Channel operation. In our example, GRP 1 and GRP 2:



If you now [bus assign](#) an input channel onto GRP 1, then the input will be assigned to GRP 1 and 2, and panned with a left/right pan law, just as for a stereo group.

The difference from stereo operation is that you can assign GRP 1 and GRP 2 independently to the console surface. This allows you to adjust the left and right sides of the 2-channel output independently.

4. To undo the 2-channel configuration, put GRP 1 back into access and deselect the **2-CHANNEL** soft key.

## 12. Surround Channels

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This chapter includes additional information for surround channels.

Topics include:

- [Defining the Global Surround Format](#)
- [Creating a Surround Channel](#)
- [Bus Assign to a Surround Output](#)
- [Monitoring in Surround](#)
- [Surround VCAs](#)
- [Revealing the VCA Slaves](#)
- [Hyper Pan](#)
- [AMBIT](#)
- [The Downmix Display](#)

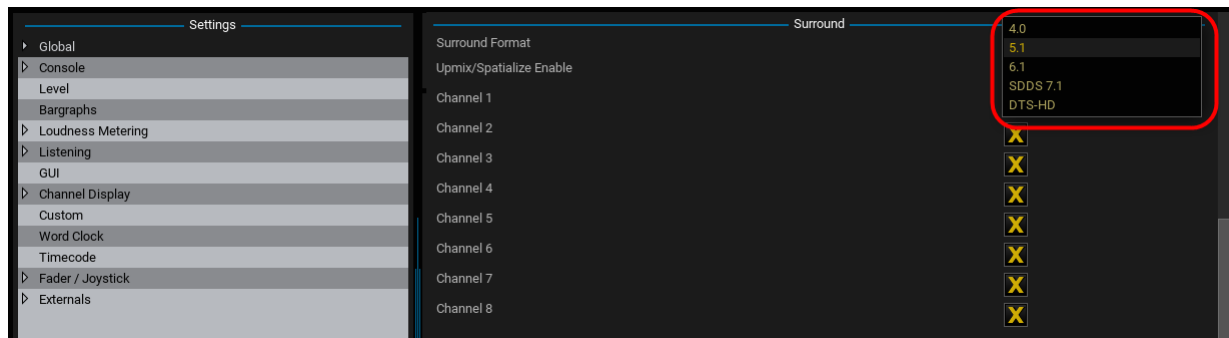


## 12.1 Defining the Global Surround Format

This option defines the global surround format used for surround channels, pan laws and monitoring. For example, if you select Dolby Digital 5.1, then component channels 1 to 6 are configured as L, R, C, LFE, Ls and Rs.

To select the global surround format:

1. [Open](#) the **System Settings** display on the Central GUI.
2. And navigate to the **Global** topic.
3. Select the **Surround Format** option, and use the drop-down menu to make your selection:



- **4.0** – L, R, C, S for Dolby ProLogic.
- **5.1** – L, R, C, LFE, Ls, Rs for Dolby Digital and DTS.
- **6.1** – L, R, C, LFE, Ls, Rs, Cs for Dolby Digital EX and DTS ES.
- **SDDS 7.1** – L, R, Lc, Rc, C, LFE, Ls, Rs for SDDS 7.1.
- **DTS-HD** – L, R, C, LFE, Lm, Rm, Ls, Rs for DTS-HD 7.1.

## 12.2 Creating a Surround Channel

Surround channels are *always* created in 8-channel blocks, even if the surround format uses less channels. For example, to create a surround sum, the first component *MUST* be SUM 1, 9, 17, etc. If the format is Dolby Digital 5.1, then this creates a 6-channel surround channel as follows:

- Sum 1, 9, 17 = Front Left
- Sum 2, 10, 18 = Front Right
- Sum 3, 11, 19 = Front Centre
- Sum 4, 12, 20 = LFE
- Sum 5, 13, 21 = Surround Left
- Sum 6, 14, 22 = Surround Right
- Sums 7 & 8, 15 & 16, 23 & 24 – are free to be configured as mono or stereo.

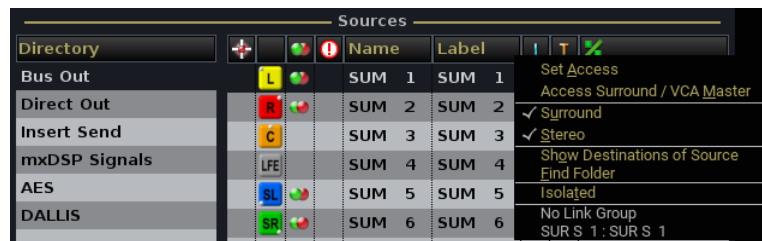
It is a good idea to bear this in mind while choosing a [DSP Configuration](#).

Note that you can configure channels as surround, even if they use [tiny](#) processing.

There are two ways to create a surround channel.

### Using the Signal List

1. [Open](#) the **Signal List** display on the Central GUI.
2. Select the first sum for the surround output from the **Sources** list (e.g. **SUM 1**).
3. Press the **SURROUND** soft key (on the SCREEN CONTROL [panel](#)), or right-click and select the **Surround** option:



This links consecutive sums, according to the [global surround format](#), and automatically assigns a [Surround VCA](#) - in our example, **SUR S 1**.

You can configure surround sums, groups or auxes using this method. Alternatively, select **InputMon** from the **Sources** list to configure surround input or monitor channels.

For surround inputs, panning is automatically reset so that INP 9 feeds SUM 1, INP 10 feeds SUM 2, etc. The best way to position a surround channel within the surround field is using [Hyper Pan](#).

Surround channels can only be created in 8-channel blocks, so you must select Sum 1, 9, 17, etc. You cannot select **Surround** if you right-click on an invalid channel number.

Note that the front and rear left/right pairs of a surround channel are automatically linked for stereo. This is for convenience when [revealing](#) the component channels. The stereo linking is only a default state; you can deselect the stereo link at any time.

### Using the Channel Config display

The second method is to use the **Surround** configuration option in the [Channel Config](#) display.

### 12.3 Bus Assign to a Surround Output

Having configured a surround output, bus assignments from your source channels can be made using any of the usual [bus assign](#) methods.

Note that when you *make* an assignment onto a surround bus, the console assumes you wish to route to *all* outputs (e.g. to all six Sums of a 5.1 output). If this is not the case, then you can *deselect* an individual assignment - for example, remove the channel from Sum 4 to remove the assignment onto the LFE output.

Note that if you use the [Bus Assign](#) display, then assignments are always made to surround component channels individually.

## 12.4 Monitoring in Surround

The main control room monitor output (**CRM 1**) usually provides monitor source selection and level control in surround. Therefore, if you are working in 5.1 surround, select **SUM 1-6** as your monitor source. Then use the **CRM 1** level control to adjust the monitor level. See [Control Room Monitoring](#) for details.

## 12.5 Surround VCAs

Surround VCAs provide master control of a surround channel from a single fader strip.

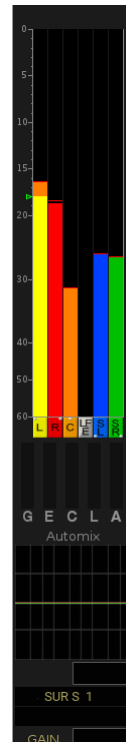
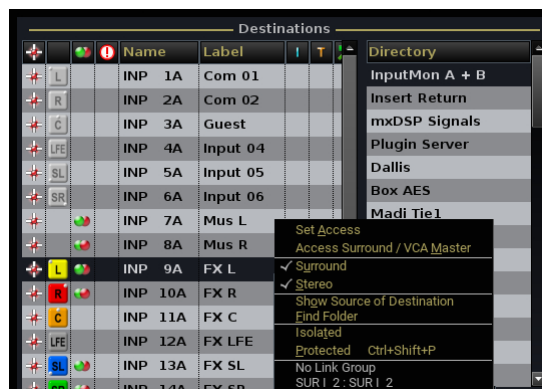
A surround VCA is automatically designated each time you [create](#) a surround channel.

By assigning the surround VCA to a fader strip, you can control the overall level of the surround channel and adjust master parameters. You will also be able to meter all the surround component channels on the [Channel display](#).

### Interrogating the Surround VCA Number

To assign a surround VCA to a fader strip, you will need to know its system name. This is shown on the **Signal List** and **Channel Config** displays.

From the **Signal List** display, right-click on any surround component channel - for example, on **INP 9**. The surround VCA name is indicated at the bottom of the drop-down list - e.g. **SUR I 2**:



From the **Channel Config** display, select any surround component channel - for example, **SUM 1**. The surround VCA name is indicated in the **Master** field - e.g. **SUR S 1**:



Note that the naming convention is always the same on every mc<sup>2</sup> system. So:

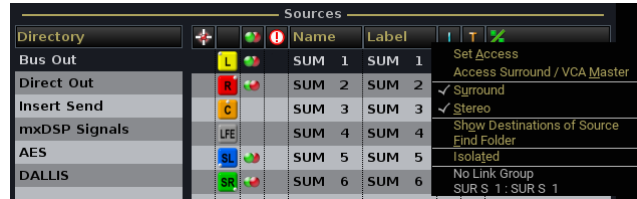
- **SUR I 1, SUR I 2, SUR I 3, etc.** = the surround VCA for input channels 1-8, 9-16, 17-24...
- **SUR S 1, SUR S 2, SUR S 3, etc.** = the surround VCA for sum channels 1-8, 9-16, 17-24...
- **SUR G 1, SUR G 2, SUR G 3, etc.** = the surround VCA for group channels 1-8, 9-16, 17-24...
- **SUR A 1, SUR A 2, SUR A 3, etc.** = the surround VCA for aux master channels 1-8, 9-16, 17-24...

### Assigning a Surround VCA to a Fader Strip

Once you know the Surround VCA name (e.g. **SUR S 1**), it can be assigned to any fader strip - channel or main.

1. First, select the Surround VCA:

Either, select a component channel in the [Signal List](#) and right-click to select **Access Surround / VCA Master**:



Or, use the [ACCESS/ASSIGN](#) panel to type in the Surround VCA name - press **SUR**, then the channel type (e.g. **SUM**) and then the number (e.g. **1**).

2. Then, use any of the usual methods to make the [fader strip assignment](#) - for example, press **ASSIGN** (under STRIP ASSIGNMENT) and then a fader **SEL**.

The fader strip label updates and you will see metering for the surround component channels on the [Channel display](#).

### Using the Surround VCA

You can now control the overall level of the surround channel from the Surround VCA fader, and adjust other master parameters such as EQ, Compression, AMBIT Upmix & Spatialise, etc.

The master/slave behaviour varies depending on the parameter. For example, main level and input gain are controlled relatively so that you can offset the slave positions; EQ frequency and Q are *always* set by the master (absolute), so that any change is inherited by all slaves; the MUTE is switched ON from a Surround VCA master but not OFF. For full details, see the Master/Slave Behaviour [Appendices](#).

### Renaming a Surround VCA

The user label of the surround VCA can be edited from the Central GUI [Title Bar](#) when the surround VCA is in access. See [Editing User Labels](#).

## 12.6 Revealing the VCA Slaves

The **REVEAL** button provides quick access to the Surround VCA (or normal VCA) slaves so that you can offset fader levels and other parameters.

The faders used to "reveal" slaves can be any bay of fader strips or the optional [Reveal](#) user panel.

Note that if you are using the [Reveal](#) user panel, then you can *only* reveal surround VCAs (and not the slaves of a normal VCA).

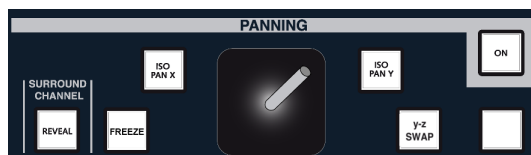
### 12.6.1 Reveal on Fader Strips

This method can be used to reveal Surround VCAs or normal VCAs.

Before using **REVEAL**, you should check where the slave faders will appear, using the [Reveal options](#) in the **System Settings** display. You can also use these options to disable **REVEAL** if you wish.

➤ **To reveal the slaves of a VCA master:**

1. Select the VCA channel - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. Now press the SURROUND CHANNEL **REVEAL** button located on the [joystick](#) panel:



The slaves appear in their predetermined position on the control surface (as set by the [Reveal options](#) in the **System Settings** display).

3. You can now adjust the slave fader positions and other relative parameters. (For details on which parameters are relative, see the Master/Slave Behaviour [Appendices](#).)

For Surround VCA masters, faders are *always* moving. Therefore, you will need to open the surround VCA master fader in order to offset the slaves.

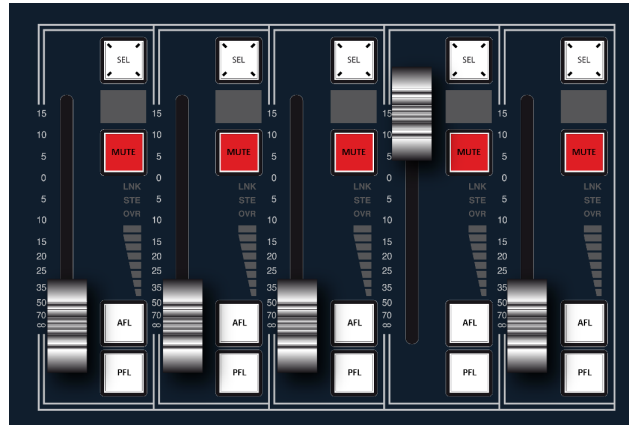
When surround channels are created, the front and rear left/right pairs of the surround channel are automatically linked for stereo. This means that when you reveal the slaves, the front L/R and rear L/R components appear on two stereo fader strips. If you wish to control the Left and Right independently, then [unmake](#) the stereo link: e.g. press **SEL** on the L/R slave channel and deselect the **STEREO** button on the **IMAGE** panel.

4. Deselect **REVEAL** to revert the fader strips to their previous assignments.

A VCA can be the master of a Surround VCA. If this is the case, first select the VCA fader **SEL** button and press **REVEAL** to reveal the VCA group; then press the Surround VCA fader **SEL** to reveal the surround slaves.

## 12.6.2 The Reveal User Panel

*Reveal Fader User Panel (optional)*



This panel can be fitted to the [user panel](#) space in the centre section. It provides five dedicated faders for controlling surround VCA slaves.

The main differences to revealing on normal fader strips are:

- You cannot reveal normal VCAs on this panel.
- The last selected surround VCA remains assigned to the reveal faders even if you select a different channel type. (Note that from Version 5.10.2 onwards, you can change this from the **System Settings**. If the [Reveal Panel Assign Mode](#) option is enabled, the reveal panel is cleared and performs no function unless the channel in access is a surround VCA.)

### ➤ To reveal the slaves of a Surround VCA master:

1. Select the Surround VCA channel - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.

The slaves automatically appear on the five faders; you will see the name of the component channel (e.g. Lr, C, LF, etc.) in the fader display.

2. Adjust the fader and **MUTE** buttons as required. You can also **AFL**, **PFL** or select (**SEL**) each slave.
3. Select a different surround VCA to reveal its slaves.

The layout of the slave channels varies depending on the surround format, and whether channels are linked for stereo. For example, if the [global surround format](#) is **5.1**, you will see:

- Fader 1 = Lr (front LR linked for stereo)
- Fader 2 = C
- Fader 3 = LF (LFE)
- Fader 4 = Su (surround LR linked for stereo)
- Fader 5 = blank

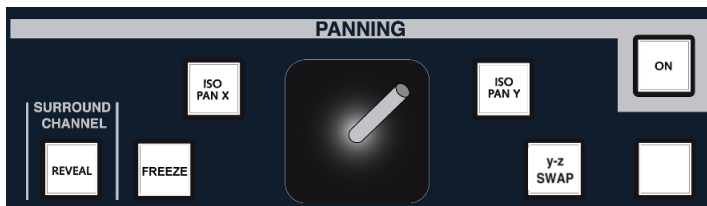
If you remove the stereo linking for both the front LR and surround LR slaves you will have 6 fader levels (too many for the user panel). To access the additional channels, a [central user button](#) can be factory-configured to switch say fader 3 between Centre and LFE.

You can reveal to both console fader strips and the user panel if you wish. Or, set the [Reveal bay count](#) option to **0** to disable reveal on normal fader strips.



## 12.7 Hyper Pan

Central Control Section



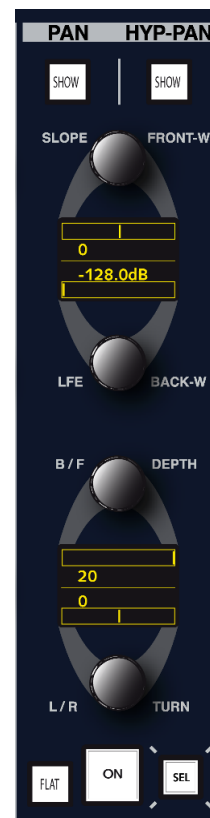
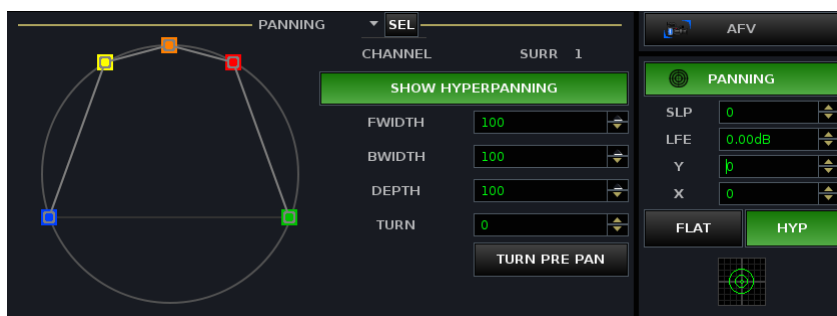
The console's Hyper Pan section is designed to help reposition surround sources within a surround field. For example, you may have to deal with a surround microphone where the left and right inputs are out of phase, or maybe you wish to rotate the surround source around the sweet spot axis.

To adjust the Hyper Panning of a surround channel:

1. Put the surround VCA (e.g. **SUR I 1**) into access by pressing its fader **SEL** button.
2. Select the Central Control Section PAN **SHOW** button. Check that **ON** is enabled (this switches panning into circuit), and the current XY pan position - the default starting point should be the sweet spot.
3. Then select HYP-PAN **SHOW** and enable its **ON** button (this switches panning from XY to Hyper Pan mode).

You can double-check all your selections from the **Main Display** - both **PANNING** and **HYP** should be on (green), and the XY position should be at the sweet spot ( $X = 0$  and  $Y = 0$ ):

Main Display



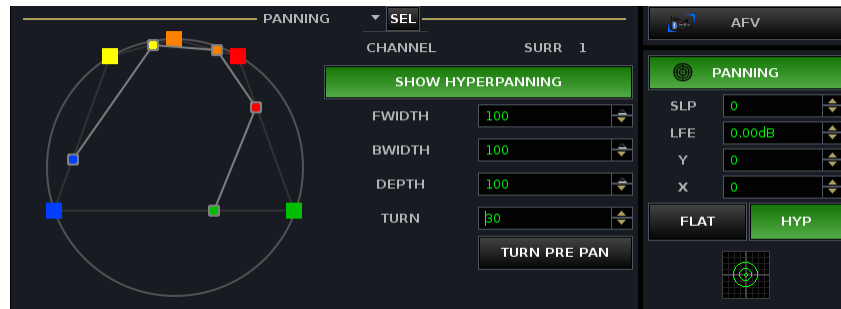
If you are unsure about any of the current settings, then reset panning using the [RESET](#) function.

Hyper Pan is best explained by looking at the [Main Display](#). The current positions of each node are color coded according to the surround format (as defined by the AES). In our 5.1 example, the colors are:

- Yellow = Front Left
  - Orange = Front Centre
  - Red = Front Right
  - Blue = Surround Left
  - Green = Surround Right
4. Use the rotary controls to adjust each Hyper Pan parameter. In the examples which follow, we have reset each control before adjusting the next to show the affect of each parameter. However, you can combine parameters as you wish.

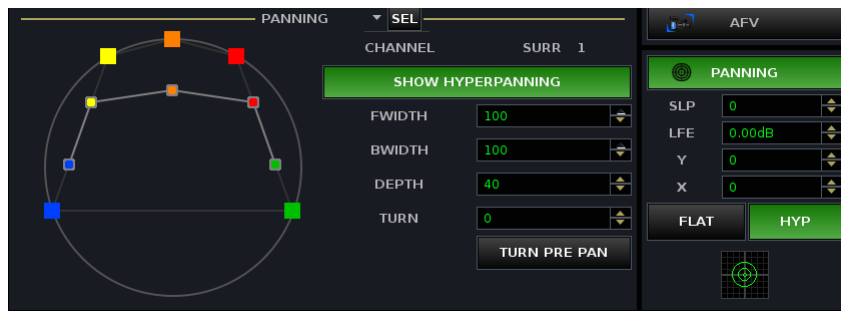
### ➤ TURN

This parameter rotates the surround source within the surround field. It can be adjusted from 0 degrees to +180 or -180 degrees:



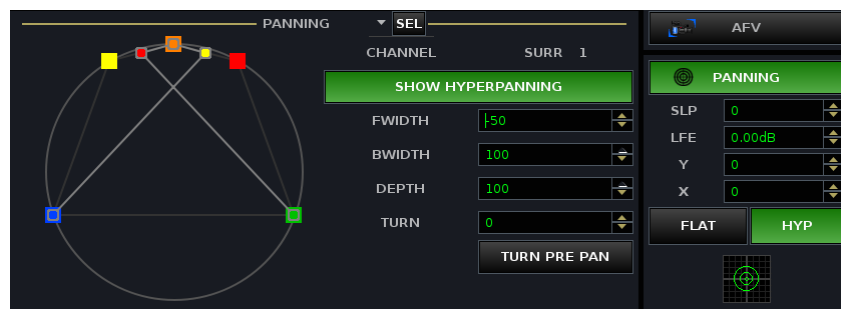
### ➤ DEPTH

This parameter reduces the depth of the surround source with respect to the sweet spot. It can be adjusted from +100% through 0% (all nodes are aligned at the sweet spot) to -100% (front and rear nodes are reversed) – our example shows the depth reduced to +40%:



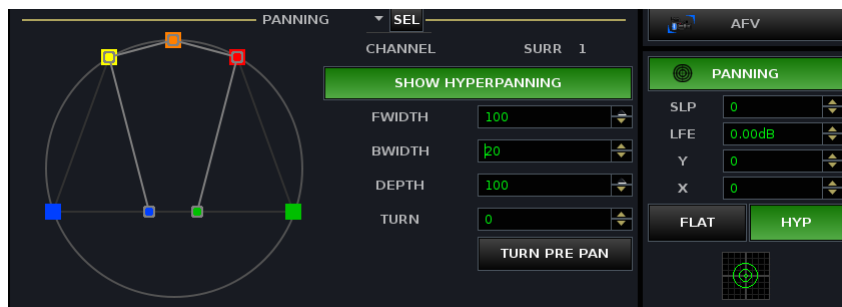
### ➤ FWIDTH (Front Width)

This parameter adjusts the width of the front channels. It can be adjusted from +100% (full width) through 0% (all channels centered) to -100% (left and right channels are reversed):



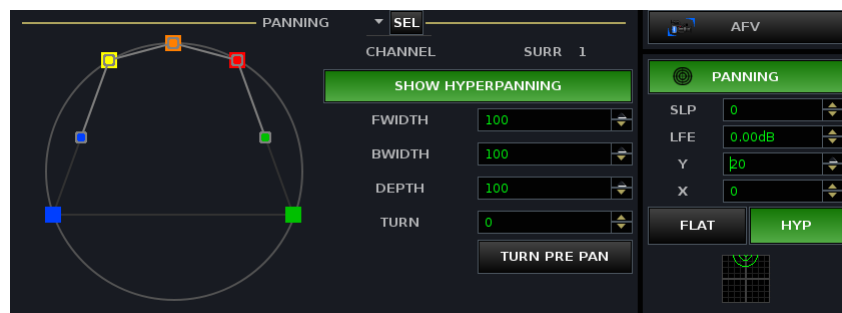
### ➤ BWIDTH (Back Width)

This parameter adjusts the width of the rear channels. It can be adjusted from +100% (full width) through 0% (all channels centered) to -100% (left and right channels are reversed) - our example shows Back Width set to +20%:



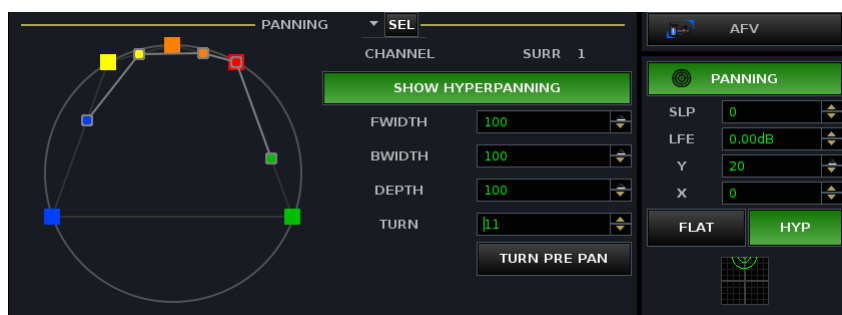
### ➤ Adjusting the Sweet Spot

Use the joystick to reposition the sweet spot – the example below shows all parameters set to their defaults, but with the joystick position set forward, effectively bringing the surround channels closer to the front field:



### ➤ Combining Parameters

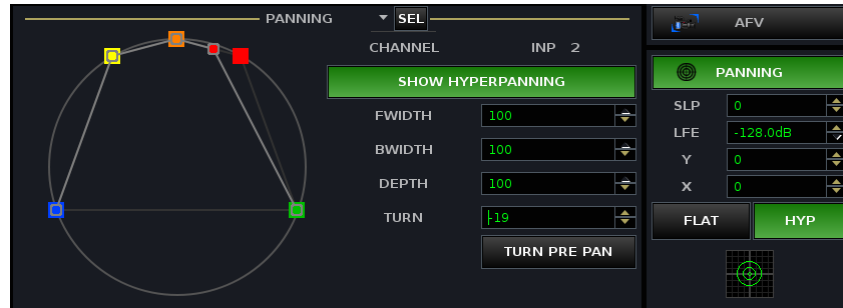
If you now adjust the **TURN** control, you will find that the surround source rotates around front centre (the current joystick position):



By enabling the **TURN PRE PAN** button (on-screen), you can turn the surround source and then position the rotated source using the joystick.

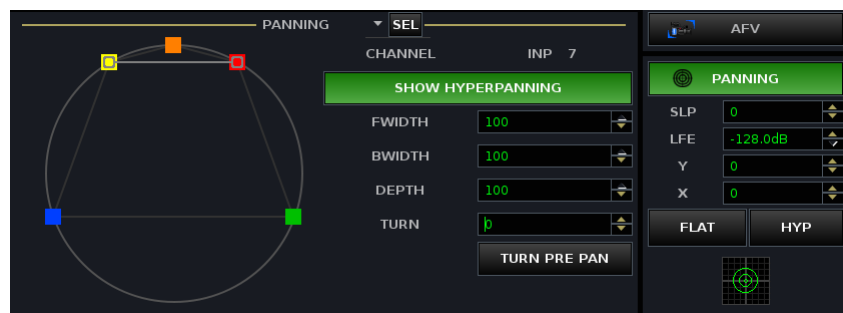
## 12.7.1 Hyper Pan on Surround Slave Channels

You can use Hyper Pan on individual surround slaves to adjust the relative position of an individual channel – for example, if a surround source is offset slightly to the right, then put the right channel (e.g. INP 18) into access and use the Hyper Pan **TURN** control to adjust the offset independently from the other slaves. Remember to undo the stereo linking for inputs 1 and 2 first!

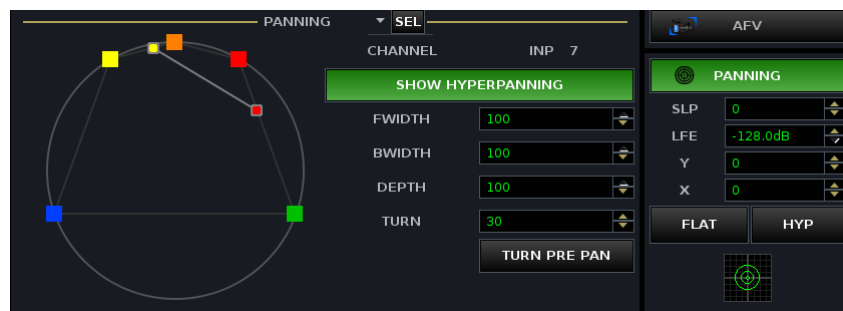


## 12.7.2 Hyper Pan on Mono or Stereo Channels

The Hyper Pan controls can also be used on mono or stereo channels which are assigned to a surround output. The example below shows the default position of a stereo source when working in Hyper Pan mode:

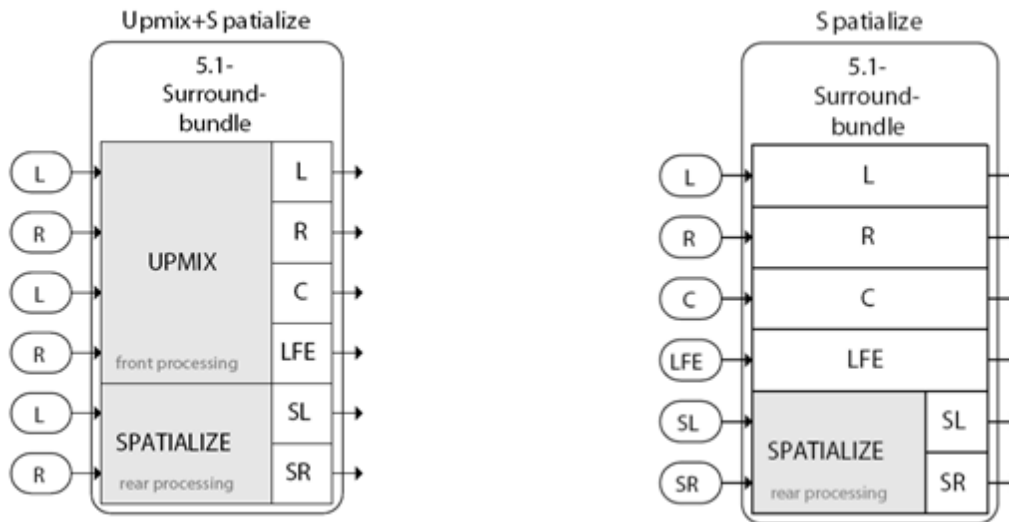


Set the **Y** pan position (front/rear) to **0** and then use the **TURN** control to rotate the stereo source within the surround field.



## 12.8 AMBIT

The Lawo AMBIT (AMBIence IT) is a DSP module specifically designed for 5.1 surround channels providing upmix and spatialise processing. It can operate in one of two modes:



- **Upmix (& Spatialise)** – a 2 in, 6 out upmixer which, using sophisticated algorithms, converts stereo signals into 5.1 surround.
- **Spatialise Only** – a 6 in, 6 out spatialiser which processes the surround left and right channels only, ideal for treating incoming 5.1 signals.

The module is available in all full processing channels configured for 5.1 surround, except auxes. In other words, AMBIT can be applied to 5.1 input channels, monitor channels, groups and sums.

### AMBIT Conditions

- AMBIT processing can be applied to Inputs, Monitor channels, Groups or Sums, but not to Auxes.
- The [global surround format](#) must be 5.1. If a different format is selected, the AMBIT module is not available.
- AMBIT processing must be enabled from the **System Settings** display (using the [Upmix/Spatialize Enable](#) option).
- Once an AMBIT module is active, the 5.1 component channels lose some of their other DSP. This is necessary to support the extra processing required for the AMBIT algorithm:
  - On Recording channels, the Delay, Filter, Image, Gate and Expander modules are suspended.
  - On Broadcast channels, the Delay, Insert and Dynamics modules are suspended.
- All AMBIT parameters are stored in productions, snapshots and presets.
- AMBIT processing is fully compatible with any downmix.
- The following functions are *NOT* supported by the AMBIT module - [Link Groups](#); [COUPLE](#); [LISTEN](#); [Snapshot crossfades](#); [Timecode Automation](#).

## 12.8.1 How AMBIT Works

The Upmix & Spatialise mode uses sophisticated algorithms to convert 2-channel stereo signals into 5.1 surround. It can be used on an Input or Monitor channel, or on an output Group or Sum.

### Applications

Here are some examples of when you might apply AMBIT processing to different channel types:

- **Inputs** – you could use the AMBIT module within a 5.1 Input channel to create a surround upmix from a stereo ambience microphone.
- **Sums** – you can create a 5.1 upmix from your stereo master by applying the AMBIT processing to a Sum.
- **Groups** – to upmix some stereo sources but not others, then apply the AMBIT processing to a 5.1 Group which feeds a 5.1 Sum. Route all the stereo sources you wish to upmix to the Group. Then route any channels you wish to bus and pan manually onto the 5.1 Sum.

### Parameters

Imagine that you are sitting in a virtual room, listening to the source from a pair of stereo loudspeakers. You are the target. Using AMBIT you can define:

- **The Virtual Room** – the size of the room and how it handles reflections.
- **The Source position** – the position and width of the source playback loudspeakers.
- **The Target position** – your listening position.

Having defined how the source signal is “heard”, you can then determine how the 5.1 output is processed:

- **Front Processing** – these parameters define how much correlated signal (mono signal) feeds the discrete centre channel, as opposed to left and right (phantom centre). There are two modes in which you can work:
  - **Auto-centre** – in this mode the AMBIT module decides automatically how much correlated signal feeds the discrete centre channel versus left and right (phantom centre), based on the correlation threshold and time. The algorithm works dynamically, according to changes in the correlated signal level, producing a stable front image for any content:



- **Manual centre** – with Auto-centre turned off, the correlated signal feeding the centre channel is set manually. You can adjust the left/right width (Basewidth) and discrete centre channel level (Centering). You can also choose to link Centering and Basewidth in order to maintain a consistent ratio.
- **Rear Processing** – these parameters define the processing applied to the surround left and right channels. Parameters are available to control the left/right width (Basewidth), high pass filtering and the virtual room simulation:

In Spatialise mode, only the rear processing is applied to the incoming surround left and surround right channels.

### 12.8.2 Turning On AMBIT

The AMBIT DSP module is enabled, disabled and controlled from the surround VCA master of a 5.1 channel.

AMBIT processing can be applied to Inputs, Monitor channels, Groups or Sums, but not to Auxes.

The [global surround format](#) must be 5.1. If a different format is selected, the AMBIT module is not available.

AMBIT processing must be enabled from the **System Settings** display (using the [Upmix/Spatialize Enable](#) option).

1. Select the [Surround VCA](#) master by pressing its fader **SEL** button.
2. Press the **CHAN/CONFIG** button, located on the [SCREEN CONTROL](#) panel, to view the **Main Display**:

With the surround VCA in access, the buttons to control the AMBIT module appear at the bottom of the MODULES list on the right of the display:



If you cannot see the Upmix (**UPX**) and Spatialise (**SPZ**) buttons, then check the following:

- Is the surround VCA [in access](#)?
- Is the [global surround format](#) set to 5.1?
- Is the [Upmix/Spatialize Enable](#) option turned off within the **System Settings** display?

3. Turn on the Upmix & Spatialise mode (2 in: 6 out) by selecting the **UPX** touch-screen button.

Both **UPX** and **SPZ** are enabled (green).

4. Alternatively, turn on Spatialise mode (6 in: 6 out, rear processing only) by selecting **SPZ** only.

When AMBIT processing is turned on, then the component channels lose some of their other DSP:

- Delay, Filter, Image, Gate and Expander (Recording channels).
- Delay, Insert and Dynamics (Broadcast channels).

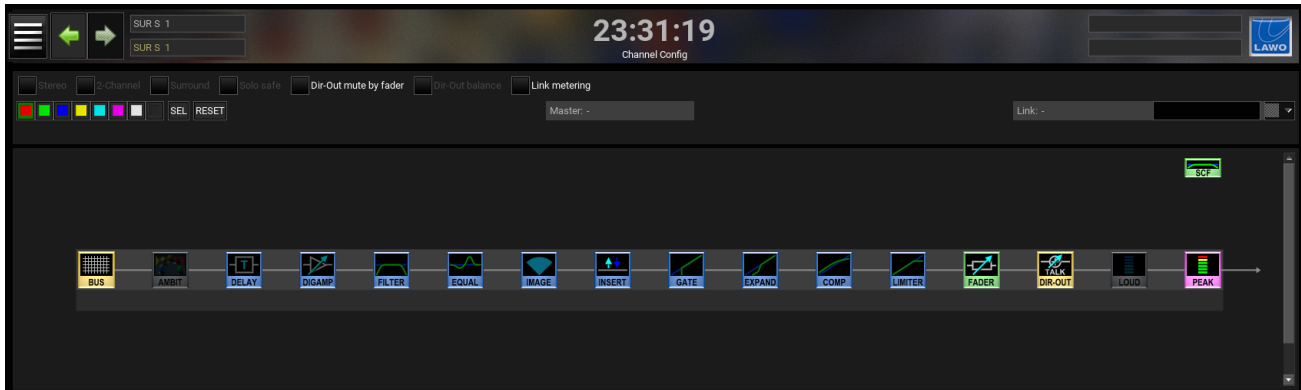
This is reflected by the greyed-out module icons on the **Main Display**.

5. To reinstate the suspended DSP modules, you must turn off the AMBIT processing - deselect **UPX** and **SPZ**.

## 12.8.3 Changing the Signal Flow

The AMBIT module can be moved within the channel signal flow in the same manner as other DSP modules.

1. Put the surround VCA into access – press **SEL** on its fader strip.
2. Open the **Channel Config** display.
3. Select the AMBIT module and adjust its position using either the **LEFT/RIGHT** or **UP/DOWN** soft keys:



For more details, see [Changing the Signal Processing Order](#).

## 12.8.4 Controlling AMBIT Processing

All AMBIT parameters are adjusted from the [Main Display](#) on the Central GUI.

1. Make sure that the surround VCA is in access and assign the **AMBIT** module to one of the assignable views on the **Main Display**:

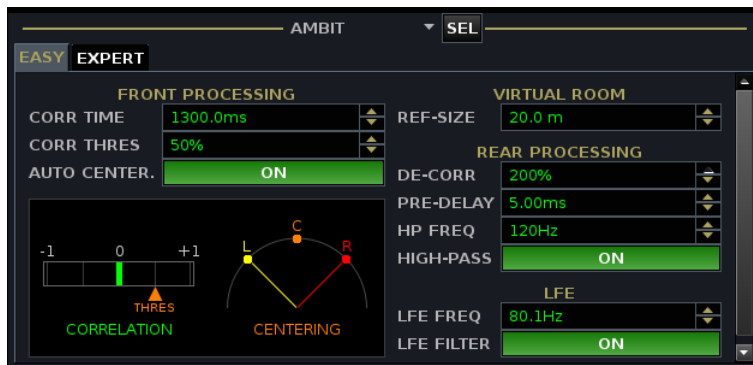


3. Make sure that the AMBIT module is turned on – either **UPX** and **SPZ**, or **SPZ** only.
4. Adjust the parameters from the on-screen buttons. You have a choice of two modes: Easy or Expert.



### 12.8.5 AMBIT Easy Setup

The **Easy** tab allows you to configure AMBIT processing using just 10 parameter options:



1. First set the **REF-SIZE** for the VIRTUAL ROOM.

This defines the virtual room size in metres (m).

2. Then determine the FRONT PROCESSING parameters as follows:

In Easy setup keep **AUTO CENTER** turned **ON**. In this mode the AMBIT module decides automatically how much correlated signal (mono source signal) feeds the discrete centre channel versus left and right (phantom centre) according to the Correlation Threshold and Time. The algorithm works dynamically, following changes in the correlated signal level, producing a stable front image for any type of content.

The correlated signal threshold and time determine the working point for the auto-centering algorithm:

- **CORR THRES** – sets the correlated signal threshold (100% = +1, 0% = 0).

Correlated signals above the threshold feed the centre channel and those below feed left and right equally (phantom centre).

- **CORR TIME** – sets how quickly the auto-centering reacts to correlated signals falling above/below the threshold.

You can monitor the affect of the auto-centering algorithm using the on-screen graphics:



If you wish to control the front processing parameters manually, then use [Expert setup](#).

3. Next adjust the REAR PROCESSING parameters:

- **DE-CORR** – sets the amount of de-correlated signal applied to the rear. In other words, the impact of mono source content on the rear channels.

100% is the default value. You can increase it to 200% (only de-correlated signal) or reduce it to 0% (only correlated signal).

- **PRE-DELAY** – sets the amount of pre-delay in milliseconds (ms) applied to the rear channels.

The bigger the pre-delay, the more reflective the virtual room will appear.

- **HP FREQ** – sets the roll-off frequency for the high pass filter in Hz (see below).
- **HIGH-PASS** – turns the high pass filter on or off.

The rear processing high pass filter is a 2nd order (12dB/octave) filter which can be applied to the rear channels.

4. Finally adjust the LFE low pass filter parameters:

- **LFE FREQ** – sets the roll-off frequency for the low pass filter in Hz (see below).
- **LFE FILTER** – turns the LFE filter on or off.

The LFE low pass filter is a 4th order (24dB/octave) filter which can be applied to the Low Frequency Effect (subwoofer) channel.

## 12.8.6 AMBIT Expert Setup

The **Expert** tab provides access to more advanced parameters.

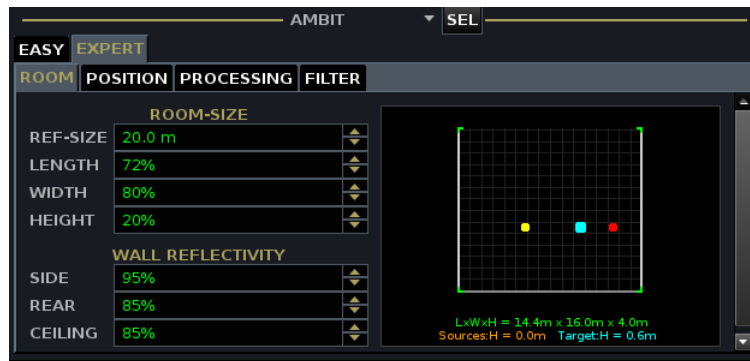
When working in **Expert** setup, assign the AMBIT module to both assignable views within the **Main Display**. This allows you to view different tabs simultaneously.

For example, it makes sense to view the Reflection Patterns for the Surround Left/Right channels (**POSITION** tab) while adjusting **ROOM** and then **PROCESSING** parameters, as both have an effect on the reflection patterns:



## ROOM

1. Select **ROOM** to define the virtual room:



2. Use the ROOM-SIZE parameters to define the shape and size of the virtual room:
  - **REF-SIZE** - Room size in metres (m). Also available in [Easy setup](#).
  - **LENGTH** - Length as a % of the room size.
  - **WIDTH** - Width as a % of the room size.
  - **HEIGHT** - Height as a % of the room size.

Any changes are represented by the on-screen graphics.

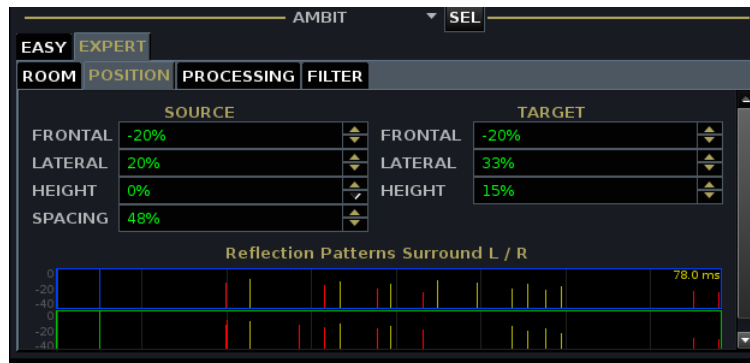
3. Use the WALL REFLECTIVITY parameters to define the reflectivity of the surfaces within the virtual room.

100% = very reflective; 0% = not reflective:

- **SIDE** - Reflectivity of the side walls (left/right).
- **REAR** - Reflectivity of the rear wall.
- **CEILING** - Reflectivity of the ceiling.

## POSITION

1. Select **POSITION** to define the source and target positions:



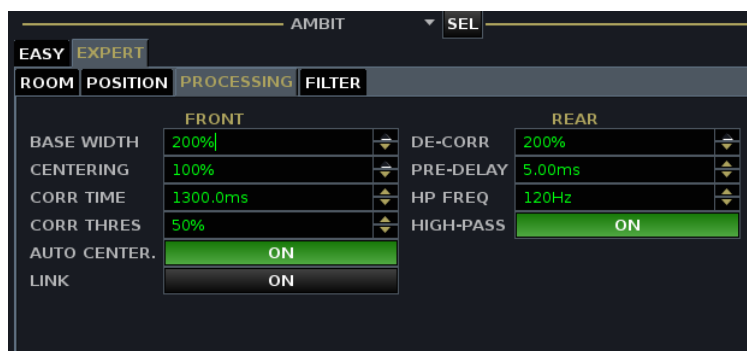
2. Use the SOURCE parameters to define the position and spacing of the stereo source loudspeakers:
  - **FRONTAL** - front/rear speaker position: 100% = front; 0% = middle of the room; -100% = rear.
  - **LATERAL** - left/right speaker position: 100% = right; 0% = centre; -100% = left.
  - **HEIGHT** - height of speaker position: 100% = top; 0% = middle; -100% = bottom.
  - **SPACING** – left/right spacing: 100% = full width; 0% = mono.
3. Use the TARGET parameters to define the position of the listening target:
  - **FRONTAL** - front/rear target position: 100% = front; 0% = middle of the room; -100% = rear.
  - **LATERAL** - left/right target position: 100% = default.
  - **HEIGHT** - height of target position: 100% = default.

The on-screen graphic provides a visualization of the resulting reflection pattern.

4. If not already visible, select the **ROOM** tab and you will see that the source and target positions are represented by the yellow (left channel), red (right channel) and turquoise (target) dots.

## PROCESSING

1. Select **PROCESSING** to define the front and rear processing parameters.



2. When dealing with the FRONT processing parameters, it is best to work with **AUTO CENTER** either on or off:

- **AUTO CENTER ON** - use the correlated signal threshold and time as described for [Easy Setup](#).
- **AUTO CENTER OFF** – control the front upmix processing manually:
  - **BASEWIDTH** – sets the left/right width: 100% = default; 200% = overwidth; 0% = mono.
  - **CENTERING** – sets the amount of correlated signal feeding the discrete centre channel: 100% = discrete centre only; 0% = phantom centre, no discrete.
  - **LINK** - turn on this option to link **BASEWIDTH** and **CENTERING**. This ensures that the correlated signal level remains constant and that there is an equal distribution of power between the three front channels.

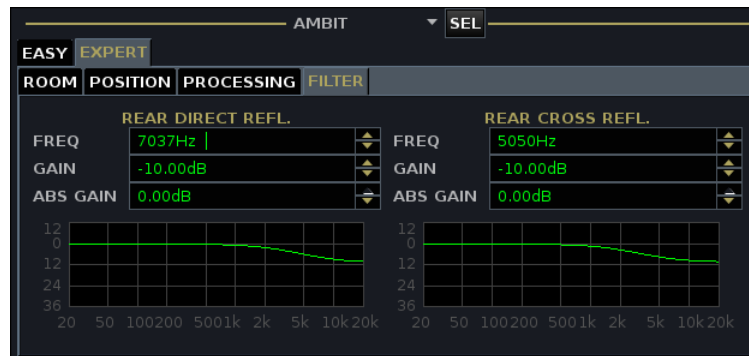
The results are best represented by the on-screen graphic within the Easy tab:



3. The REAR processing parameters are identical to those in [Easy setup](#).

## FILTER

1. Select **FILTER** to define the remaining parameters:



2. Use the REAR DIRECT REFL. and REAR CROSS REFL. parameters to adjust the virtual room reflections applied by the Spatialiser to surround left and right.

Note that these parameters affect the room simulation, and are completely separate from the rear processing high pass filter (controlled from the [PROCESSING](#) tab).

Direct reflections describe reflections from the closest wall; cross reflections come from an opposing wall. So, if a signal emanates from the left source loudspeaker, then direct reflections come from the left and cross reflections from the right.

For each pattern, you can apply a shelving filter with parameters for:

- **FREQ** - the roll-off frequency of the shelving EQ.
- **GAIN** – the gain of the shelving EQ.
- **ABS GAIN** – offsets the resultant shelving pattern.

### 12.8.7 Save, Load, Select and Copy/Reset

#### ➤ Saving and Loading AMBIT Parameters

All AMBIT parameters are stored in [productions](#) and [snapshots](#). Therefore, you can easily store and recall upmix processing as part of your mix.

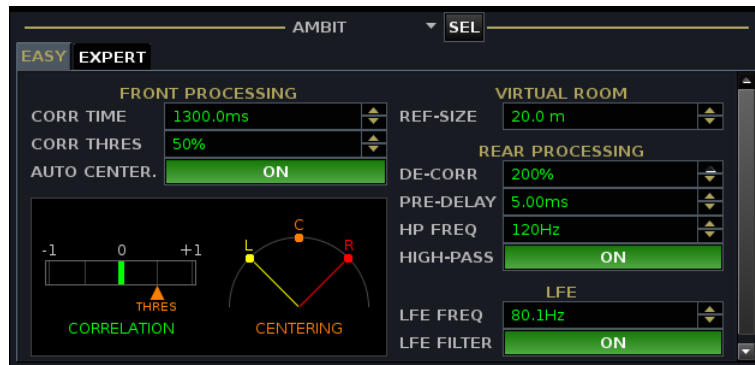
AMBIT parameters can also be stored as [presets](#) in order to save and load favourite settings. To save or load a preset:

1. Right-click on either the **UPX** or **SPZ** button on the right of the **Main Display** and select **Load** or **Save Preset**:



### ➤ Selecting the AMBIT Module

Some operations, such as copy channel, require you to select the AMBIT module. This is achieved by using the on-screen **SEL** button within the **Main Display**:



The **SEL** button turns green when selected.

Note that the AMBIT module is automatically selected by pressing [SEL ALL](#) on the Central Control Section.

### ➤ Copy and Reset for AMBIT

- **Copy Parameters** - AMBIT parameters can be copied between surround VCAs. You cannot copy AMBIT parameters to other channel types.
- **Reset Parameters** - AMBIT parameters can be reset.

See [Copy & Reset](#) for more details.

## 12.9 The Downmix Display

The **Downmix** display provides on-screen control of any downmix matrices supported by your system. For example, if you have a 5.1 surround to stereo downmix, then you can adjust how much level from the front LR, Centre, LFE and rear LR channels feed the stereo output.

Note that the required DSP resources must be available (in hardware) and configured using AdminHD. For details, please refer to your Technical Manual. If there are no Downmix matrices configured, then the display will appear empty.

1. [Open](#) the **Downmix** display in the usual manner.

In the top half of the display you will see a list of all available downmixes for your system. In our example, we have one downmix named **5.1 Mains**:



Name	Label	Isolate
5.1 Mains	5.1 Mains	<input checked="" type="checkbox"/>

Channel	Level	Level	Level	Level
Front	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Center	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
LFE	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Surround	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Alt. Center	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Output	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	Reset levels	Reset levels	Reset levels	Reset levels

The downmix matrix **Name** is defined by AdminHD.

2. You can edit the Downmix **Label** field to apply a user name to the matrix.

User labels are inherited into the [Signal List](#) and [mx Routing](#) displays.



### 12.9.1 Controlling Downmix Parameters

1. Select a downmix from the **Available Downmixes** list to view its parameters.

Our example shows an 8 x 8 matrix which is configured to produce 4 stereo outputs (Downmix 1 to 4) from a 5.1 input:



2. Using any of the [usual](#) methods, adjust the following parameter values for Downmix 1 to 4:
  - **Front** level – from inputs 1 (Left) and 2 (Right).
  - **Center** level – from input 3 (Centre), unless **Alt Center** is active, see below.
  - **LFE** level – from input 4 (LFE).
  - **Surround** level – from inputs 5 (Surround Left) and 6 (Surround Right).
  - **Alt Center** – use this option to replace the Center input with an alternate centre channel:
    - **Off** = no alternate centre is used. Input 3 feeds the Centre channel.
    - **1** = input 7 replaces input 3.
    - **2** = input 8 replaces input 3.

You can use this option to generate a clean feed or alternate language downmix. For example, Downmix 1 might be your main programme output, Downmix 2 the clean feed, and Downmix 3 an alternate language version.

- **Output** level – adjusts the output level for the stereo downmix.

3. Select **Reset levels** to reset the downmix to its default parameters, and **Yes** to confirm.

All parameters are reset to the default values stored in the AdminHD configuration.

## 12.9.2 Saving and Loading Downmix Settings

The settings for each Downmix matrix are stored within snapshots and productions, so remember to [save](#) or [update](#) a production to save any changes.

By default each matrix is isolated so that it will not be affected by a snapshot load. You can adjust this by selecting the **Isolate** box beside the matrix name in the **Downmix** display:



## 13. Metering

---

This chapter describes the console's metering.

Topics include:

- [Metering Locations](#)
- [Multi-row Metering](#)
- [Bargraph Types](#)
- [Peak Metering](#)
- [Loudness Metering](#)
- [Meter Pickup Points](#)
- [The Metering Display](#)
- [The Main Faders Display](#)

## 13.1 Metering Locations

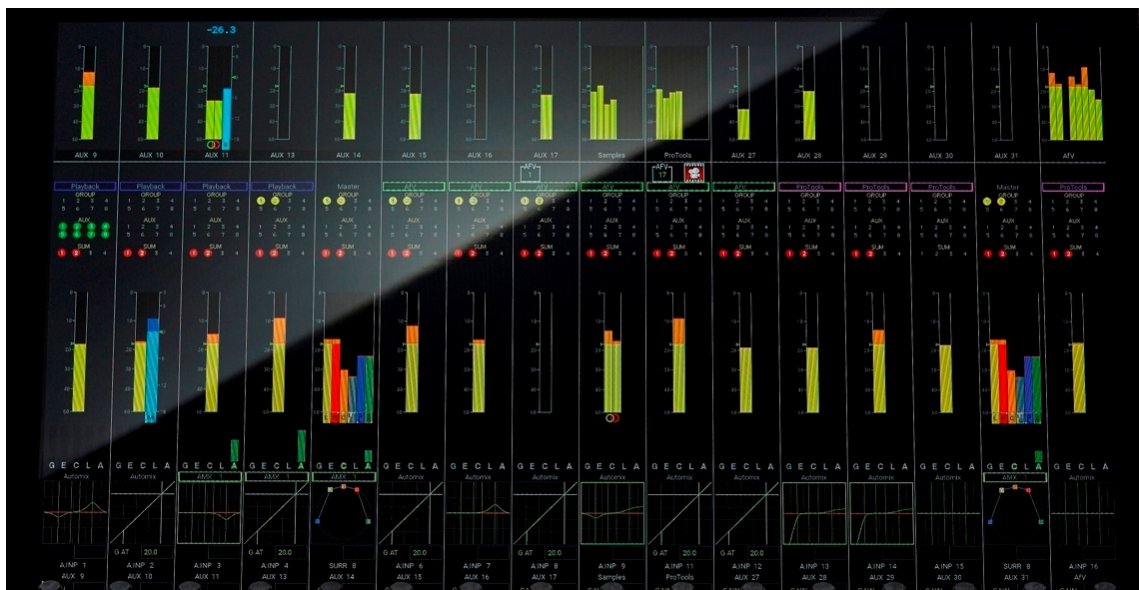
There are several places where signals can be metered:

- The [Channel display](#) provides dedicated metering for every fader strip. The bargraphs can be set to peak metering, loudness metering or both (see [Bargraph Types](#)).
- The [Main Faders](#) display (on the Central GUI) provides the same functionality as the **Channel** display but for channels assigned to the main fader strips.
- The signal present meter on the fader strip always monitor the channel input. You can use this to check that signal is present before opening a fader.
- The [Main Display](#) (on the Central GUI) includes a meter which follows the same bargraph options as the **Channel** display, and also meters signals at other points such as the insert send, direct out and dynamics.
- The [Metering display](#) (on the Central GUI) contains four pages of assignable meters.
- The Overbridge is fitted with an RTW TM9 as standard. This is usually connected to the rear panel AES outputs (1-8) and fed from the main program output (e.g. SUM 1-6).

## 13.2 Multi-row Metering

All [Channel displays](#) across the console can support up to two metering rows:

*Multi-row Metering Example*



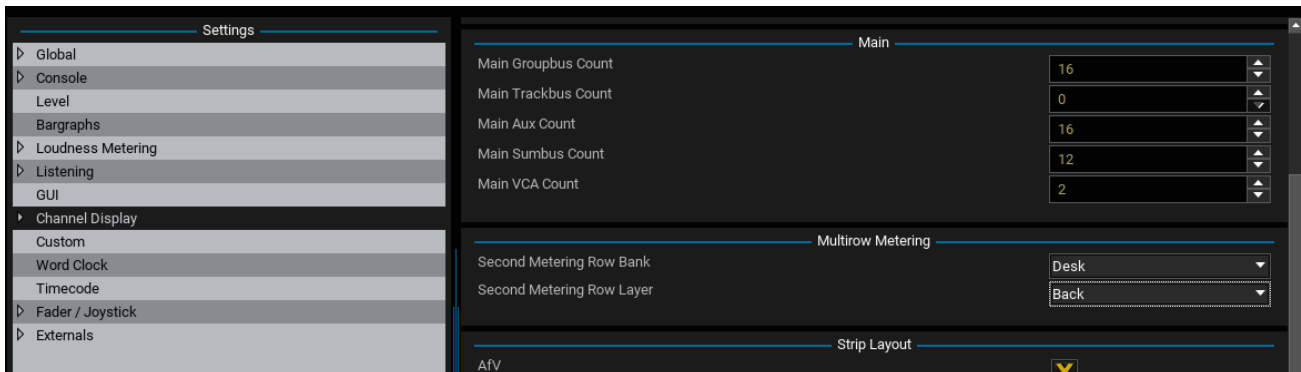
The first (lower) row *always* meters the active bank/layer, while the upper row can be assigned to a "hidden" bank/layer of channels.

The additional row can either be turned on and saved in the production, or enabled/disabled via user buttons programmed by the [Custom Functions](#) display.

Note that you can *only* assign a complete Bank and Layer to a metering row. Therefore, the channels you wish to meter *must* be assigned to either the first or second Layer of a fader strip Bank (1-6). and the order of meters within the row follows the selected Bank/Layer fader strip assignments.

### ➤ To Configure Multi-row Metering:

1. From the [System Settings](#) display, select **Channel Display -> Multirow Metering**.



2. Select the **Second Metering Row Bank** option and choose from:
  - **Bank 1 to Bank 6** - assigns a specific bank.
  - **Desk** - the metering row follows the desk's BANK switching.
  - **None** - the metering row is disabled.
3. Select the **Second Metering Row Layer** option and choose from:
  - **First or Second** - assigns a specific layer.
  - **Front** - the metering row follows the desk's LAYER switching, and displays the channels at the front (on the active layer).
  - **Back** - the metering row follows the desk's LAYER switching, and display the channels at the back (on the inactive layer).

For example:

To *always* meter channels assigned to the alternate Layer of the active Bank, you would select **Desk + Back**.

To *always* meter channels assigned to the Bank 4, Layer 1, you would select **Bank 4 + First**, and then assign the channels you wish to meter to Bank 4, Layer 1.

To disable a metering row, select **None** from the **Metering Row Bank** option.

Once the **Metering Row Bank** option is set to anything other than **None**, the lower row resizes. Note that adding more metering rows affects the size of the channel meter and number of displayed bus assignments.

Use the [Bay Bus Count](#) and [Strip Layout](#) options to adjust the size of the lower row.

The settings affect all **Channel** displays across the console, and are saved and loaded by the production.

### 13.3 Bargraph Types

For all on-screen meters you can choose to display peak metering, loudness metering, or a combination of both.

Note that the bargraph type affects all on-screen meters, including the **Channel**, **Main** and **Metering** displays.

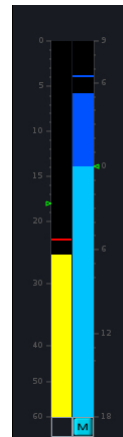
Also note that loudness metering must be [active](#), before any loudness measurements are displayed.

The default option can be set independently for input channels and summing channels (groups, sums, auxes) from the [System Settings](#) display.

In each case, you can choose from:

- **Combi** – peak and loudness metering side by side.
- **Peak** – peak metering only.
- **Loudness** – loudness metering only.

You can then edit the bargraph type, individually for each channel, from the [Main display](#). Click anywhere in the METERING area and select **Peak**, **Combi** or **Loudness** from the pop-up window:



*Main Display on Central GUI*



## 13.4 Peak Metering

Peak metering bargraphs are mono, stereo or multi-channel according to the format of the channel.

### Pickup Point

The meter can be switched to different points within the channel signal flow by adjusting the [peak meter pickup point](#).

### Peak Meter Scales and Characteristics

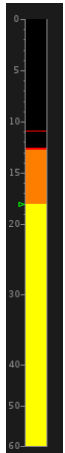
A range of meter scales and characteristics are available from the **System Settings** display, see [Bargraph options](#).

For ITU compliant operation, you should choose **True Peak** as the [Full Channel Mode](#) characteristic, and **dBFS** as the [Scale mode](#). Then set the [Reference Level](#) equal to your maximum analog Level and the [Headroom](#) to 0dB. This ensures that the dBFS metering across the console matches any external AES metering you may have. You can use the [Safe Area, Operation Range and Line Up Level options](#) to help manage your own headroom.

### Peak Hold

This function is also enabled from the **System Settings** display, see [Peakhold options](#).

When enabled, the system monitors and marks the peak level reached on each meter across the console. You can set the peak hold indicator to clear automatically after a certain time period, or manually using the **CLEAR** peak hold soft key. You can also set the color for the peak hold indicator.





## 13.5 Loudness Metering

The **mc²66 MKII** provides loudness metering conforming to the ITU-R BS1770.

### Loudness Metering Bargraphs

A single bargraph (blue) represents the average energy of the summed component channels: mono, stereo or surround. The color indicates whether loudness is above or below the [Target Level](#):

- **Light Blue** = equal to, or below, the Target Level.
- **Dark Blue** = above the Target Level.

The dark and light blue scale markers indicate a tolerance of +/- 1 LU/LK.

The **M** or **S** at the bottom of the bargraph represents the integration time for the measurement:

- **M** = Momentary integration time (400ms sliding window)
- **S** = Short term integration time (3s sliding window)

This and other options are defined within the [System Settings](#) display.

### Integrated Loudness Measurement

On summing channels, you can also start an [integrated](#) loudness measurement. The result is displayed above the bargraph. In our example, **PGM 5.1** is reading **-23.6** LUFS (Loudness Units Full Scale).

The integrated measurement provides a very useful tool for measuring loudness over long periods of time. For example to measure the loudness of a complete program transmission.



### Pickup Point

The loudness meter can be positioned independently from the peak meter by adjusting the loudness meter [pickup point](#).

### Presets and Options

All options for loudness metering are adjusted from the **System Settings** display, see [Loudness Metering](#). A choice of **Active Presets** recall the default settings specified by the EBU R128 or ATSC A/85 & ARIB.

You can find more information on loudness metering, and the international standards, in a white paper titled "Loudness Metering" available from the Lawo website:

English: <http://www.lawo.com/en/products/mixing-consoles/loudness-metering.html>

German: <http://www.lawo.com/de/produkte/mischpulte/loudness-metering.html>

### 13.5.1 Configuring Loudness Metering

When loudness metering is activated you must disable (suspend) some DSP from the processing channel in order to provide resources for the metering algorithm.

You can choose which DSP modules you would like to suspend on a channel by channel basis. The choice of suspended DSP module(s) is saved in the production.

Note that:

- If you suspend the EQ DSP module, then on Recording channels, you will lose the pre-EQ Aux send. This is due to the fact that the send is taken from the input to the EQ module.
- If wish to activate loudness metering and [AMBIT](#) (upmix processing), then:
  - ☐ On Recording channels, you must choose DSP modules which do not include the Delay, Filter, Image, Gate or Expander (disabled when AMBIT is active).
  - ☐ On Broadcast channels, you must suspend the EQ (the only module not suspended by AMBIT processing).

The default suspended DSP module can be set independently for input channels and summing channels (groups, sums, auxes) from the [System Settings](#) display.

#### ➤ To modify the suspended DSP module on an individual channel:

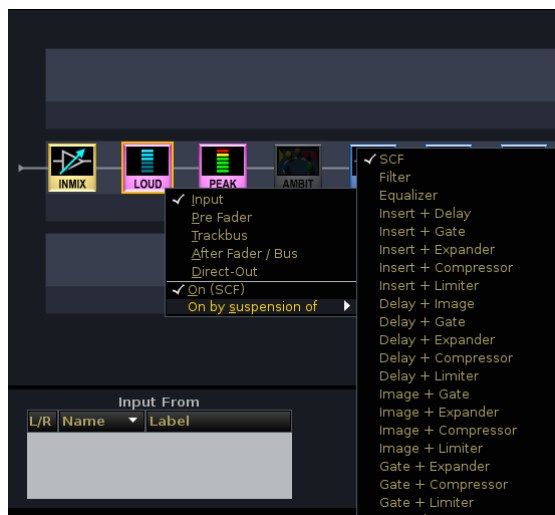
1. Select the channel you wish to modify by pressing its fader **SEL** button.
2. [Open](#) the **Channel Config** display on the Central GUI.
3. Right-click on the **LOUD** DSP module to access the loudness metering options.

The suspended module is indicated at the bottom of the drop-down menu, in our example, the SCF:

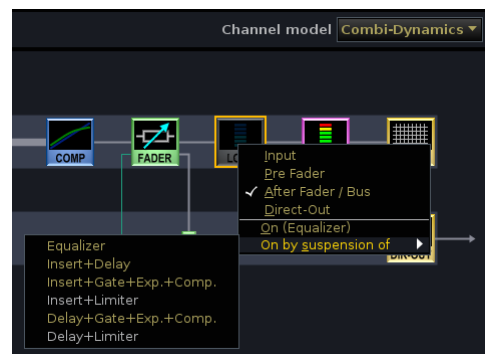


4. To change the module, select **On by suspension of** and choose an option:

Options for Recording Channels



Options for Broadcast Channels



For example, when using Recording channels, select **Delay + Image** - the display updates accordingly:



Selecting an option also [activates](#) loudness metering. This is indicated by the pink **LOUD** module, and the greyed out suspended modules (e.g. **DELAY** and **IMAGE**).

Note that if you subsequently change the **Default Module Suspend Set** (in the [System Settings](#) display), then this will reset any individual channel modifications.

### 13.5.2 Activating the Loudness Meter Bargraphs

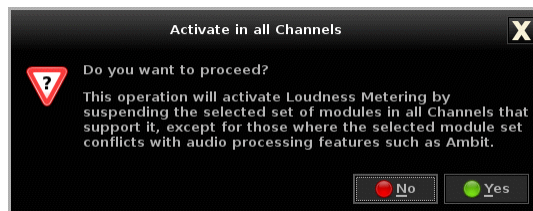
Before activating loudness metering, check that you have:

- Configured your [Bargraph Types](#) (to show **Loudness** or **Combi** metering).
- Recalled an [Active Preset](#) and adjusted the loudness metering [options](#).

Then activate loudness metering either globally or for individual channels (recommended) as follows:

#### ➤ To Activate Loudness Metering (across all channels):

1. From the **System Settings** display, select the [Activate In All Channels Loudness Metering](#) option - a confirmation pop-up appears:



2. Select **Yes** to proceed.

Loudness metering is activated for all channels that support it across the console. This could be for all input channels, all summing channels or both according to your [Bargraph Type](#).

## ➤ To Activate Loudness Metering (on a single channel)

1. From the **Channel Config** display, right-click on the **LOUD** DSP module to access the loudness metering options:



2. Select the **On (xxx)** option to enable or disable the loudness metering DSP:
  - Loudness metering is off when the **LOUD** module is grey (as above).
  - Loudness metering is on when the **LOUD** module is pink and the suspended DSP modules are in grey (e.g. **SCF**):



## ➤ To Disable Loudness Metering (and reinstate any suspended DSP modules):

1. Right-click on the **LOUD** DSP module and deselect the **On (xxx)** option so that it becomes unticked.

### 13.5.3 Integrated Loudness Measurement

On any summing or monitor channel you can start and stop an integrated loudness measurement. This allows you to measure the loudness of channels, such as main programme or a clean feed, from start to finish. You can even pause the measurement during any unwanted periods such as an advert break.

Note that the integrated loudness measurement is only available on summing channels (Sums, Groups, Auxes) and monitor channels. It is not available for input channels.

The result of the integrated measurement is displayed above the loudness bargraph either in LU/LUFS or LK/LKFS according to the choice of EBU or ATSC/ARIB [presets](#). In our example, **PGM 5.1** is reading **-23.6** LUFS.

In addition, you can display the integrated loudness measurement for a particular summing channel, such as main program, in the [title bar](#) of the central GUI. This allows you to keep track of its loudness while working in other displays, or selecting different channels.

When you first activate loudness metering, the integrated loudness measurement remains blank. This indicates that either the integration has not been started, or that there is no signal to measure.

Note that to comply with the ITU standard, the signal's loudness must be greater than -70 LUFS before an integrated measurement is registered.



#### Starting the Integrated Loudness Measurement

1. Select the summing channel by pressing its fader **SEL** button, or using the [ACCESS CHANNEL/ASSIGN](#) panel.

Note that that on a surround channel, you must select the Surround VCA (e.g. **SUR S 1**), and *NOT* one of the component channels.

2. Press the **CHAN/CONFIG** button, located on the [SCREEN CONTROL](#) panel, to view the **Main Display**.
3. Click anywhere in the **METERING** area and select **Start integration** from the pop-up window:



Providing that there is signal > -70 LUFS at the loudness meter pickup point, the integrated loudness reading updates. This figure represents the integrated loudness over time, and continually updates during your transmission.

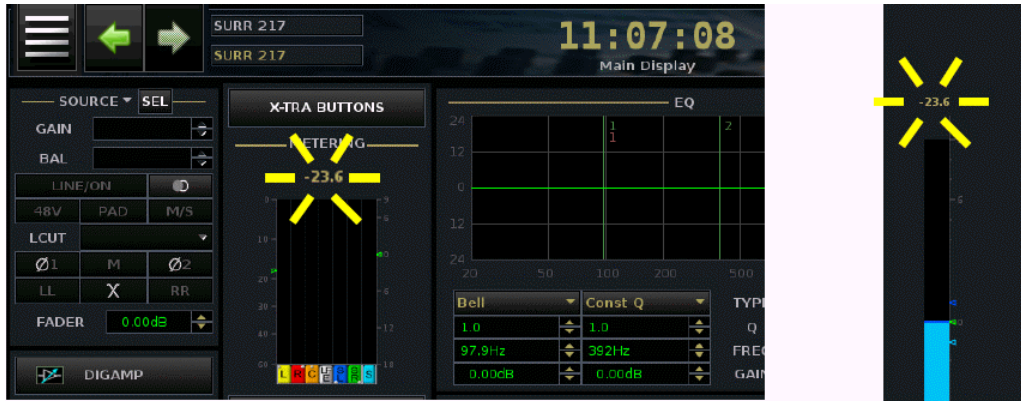
The measurement is displayed either as an absolute value in LUFS, or relative to the Target Level in LU, as defined in the [System Settings](#) display.

Note that when you start the integration, the channel's **SNAP ISO** button can also be enabled. This protects the summing channel from snapshot recalls which may destroy the integrated loudness measurement. This default option can be modified from the [System Settings](#) display.

## Stop (Pause) and Reset

1. To pause the integration, make sure that the correct channel is in access (**SEL** lit).
2. Click in the **METERING** area on the **Main** display and select **Pause integration** from the pop-up window.

As long as the integrated loudness measurement is paused, the reading flashes on the metering displays:



This value represents the average loudness of the channel since you started the measurement.

3. To restart the measurement, select the channel, click in the **METERING** area of the **Main** display, and select **Start integration**:



The integrated loudness measurement restarts, continuing from before the pause. The readings stop flashing to indicate that integration is active.

You can pause and restart the integrated loudness measurement as many times as you wish. For example, you can exclude any advert breaks from the program loudness measurement.

4. If you wish to clear and restart the measurement, then select **Reset integration**.

This clears the current reading, and starts a new integrated loudness measurement.

As an alternative to using the on-screen **METERING** pop-up window, you can program user buttons to start, pause and reset the integrated loudness measurement. These functions are available from the [Custom Functions](#) display.

## Displaying Integrated Loudness in the Title Bar

The integrated loudness measurement for a particular channel, such as main programme, can be displayed in the [title bar](#) of the central GUI. This allows the Loudness measurement for a particular channel to remain in view at all times, regardless of which display or which channel is selected.

### ➤ To change the title bar display:

1. Click on the headline and select **Loudness metering display** from the pop-up window:



The measurement is displayed either as an absolute value in LUFS, or relative to the Target Level in LU, as defined in the [System Settings](#) display.

### ➤ To assign the summing channel you wish to meter:

1. Select the channel by pressing its fader **SEL** button – in our example, we have selected **SUR S 1**, the Surround VCA master for our 5.1 programme output.
2. Press the **CHAN/CONFIG** button to view the **Main Display**.
3. Click anywhere in the **METERING** area and select **Show in Title** from the pop-up window:



The channel is assigned, and if integration has been started, you will see the value update.

You can confirm the assignment by hovering the cursor over the reading; a message appears stating the name of the assigned channel.

Once assigned, you can start, pause or reset the integrated loudness measurement from the title bar:



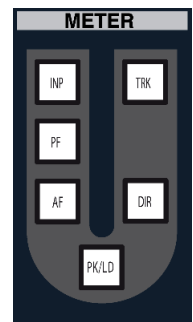
## 13.6 Meter Pickup Points

The meter pickup point can be selected independently for the peak and loudness meters. There are several methods you can use (see below). In each case, the pickup options are:

- **INP** – meters the channel input (post the INMIX section).
- **PF** – meters the pre-fader signal.
- **AF** – meters the post fader signal.
- **DIR** – meters the direct output.
- **TRK** (Recording channels only) – meters the track bus output.

### ➤ Using the METER Buttons (in the Central Control Section)

1. Select a channel - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. Choose either the peak or loudness metering point using the **PK/LD** button:
  - **PK/LD** (off) – meter pickup selection is applied to peak metering.
  - **PK/LD** (on) – meter pickup selection is applied to loudness metering.



Then enable one of the **INP**, **PF**, **AF**, **TRK** or **DIR** buttons.



### ➤ Using the Channel Config display

1. Select a channel - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. [Open](#) the **Channel Config** display on the Central GUI.
3. Then select either the **PEAK** or **LOUD** modules to move their position:

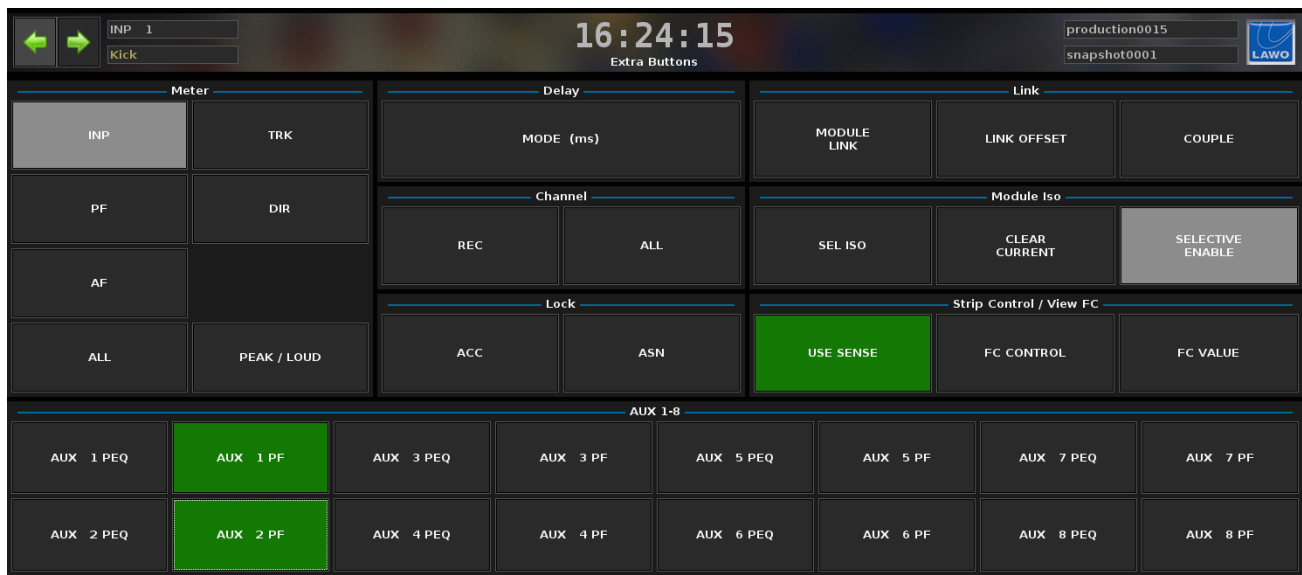


And use the soft key/right-click options to change the pickup point.



➤ **Using the Extra Buttons display**

1. Select a channel - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. [Open](#) the **Extra Buttons** display on the Central GUI.
3. Then use the **Meter** select buttons to adjust the pickup - the **PEAK/LOUD** button determines whether you are choosing a pickup point for the peak or loudness meter.



The METER **ALL** button can be used to define a cluster of channels so that the meter point is switched across multiple channels:

1. Select **ALL**, located in the **Meter** section - the fader **SEL** buttons across the console flash, in green.
2. Add channels to the cluster by pressing their fader **SEL** buttons - the fader **SEL** buttons turn red:



## 13.7 The Metering Display

The **Metering** display contains four pages of assignable meters.

1. [Open](#) the **Metering** display on the Central GUI.

There are four pages - the current page is always named at the top – in our example, **Metering 1**:



2. Select the channel you wish to meter - either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
3. Select a meter and press the **ASSIGN** soft key (on the SCREEN CONTROL [panel](#)). Or, right-click on the meter and select **Assign**.

The selected channel is assigned to the meter; its label updates and the display automatically selects the next meter. This makes it easy to make multiple assignments quickly.

Note that the format of the meter depends upon the channel format - mono, stereo or surround.

4. To remove an assignment, select the meter and press the **CLEAR** soft key. Or, right-click and select **Clear**.

The **Metering display** assignments are saved within productions, but not in snapshots.

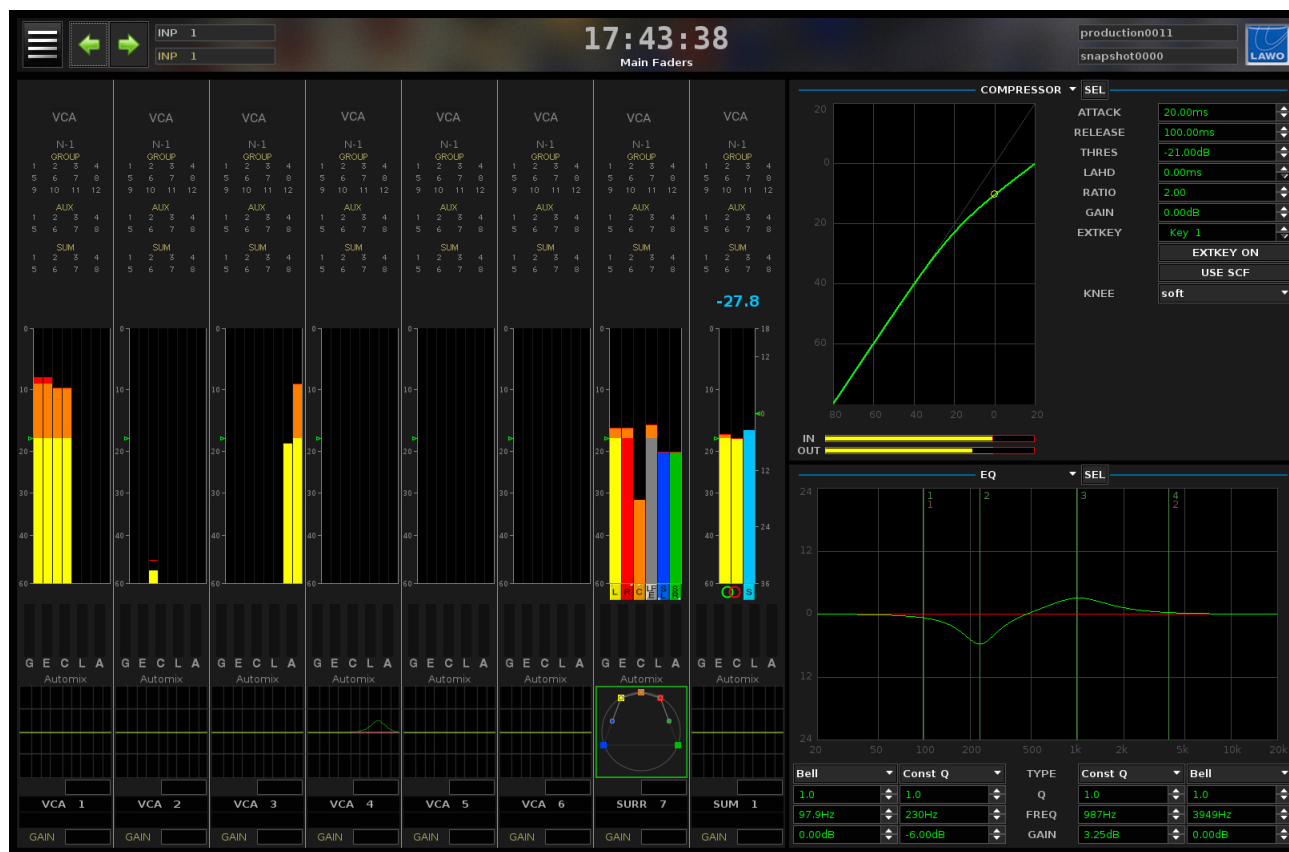
## 13.8 The Main Faders Display

The **Main Faders** display provides [Channel Display](#) functionality for channels assigned to the main fader strips.

1. [Open](#) the **Metering** display on the Central GUI and keep cycling through the page options until the **Main Faders** display appears.

On the left you will see metering and assignment options for the centre section's main faders.

On the right is an overview of the Compressor and EQ settings for the [channel in access](#).



## 14. Monitoring & Talkback

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This chapter covers monitoring and talkback.

Topics include:

- [Control Room Monitoring](#)
- [AFL & PFL](#)
- [Monitoring Parameters](#)
- [Talkback](#)

## 14.1 Control Room Monitoring

### 14.1.1 Monitor Source Selection, Cut & Dim

The console provides two **monitor outputs** with independent source selection, volume, cut and dim: **CRM 1** supports 5.1 surround, while **CRM 2** is stereo. There are also two stereo **headphone outputs** which follow the monitor source selectors and have their own level control (via STUDIO/PFL).

In each case, connections can be made via any IO (according to the IO card conditions described below).

All control is handled by the centre section MONITORING panel. This includes a touch-screen for monitor source selection and other options.

*Default Monitoring Configuration*



#### Monitor Source Selection

Monitor sources are selected from the touch-screen display. Use the top row of buttons to select **PAGE** of sources: **SUM**, **AUX**, **GRP**, etc. Then use the first and second pair of columns (outlined in red and blue) to select a source for the CRM 1 and CRM 2 outputs. In our example, nothing is feeding CRM 1 and SUM 3/4 is feeding CRM 2.

The first three pages provide "hard-wired" access to sums, auxes and groups, while pages 4 and 5 are reserved for external inputs (these will vary from one installation to another). In pages 4 and 5 it is a good idea to configure some "GUI" signals. These are virtual destinations which can be connected from any source using the [Signal List](#) display. This allows you to monitor any input to the system.

In the default monitoring configuration, headphone 1 follows the CRM 1 source selector and headphone 2 follows CRM 2.

#### Volume, CUT and DIM

Use the rotary controls to adjust the volume of each monitor output. The STUDIO/PFL control can adjust the volume of headphones 1, headphones 2 or PFL, according to the **HP 1**, **HP 2** and **PFL** touch-screen buttons.

The accompanying buttons will **CUT** or **DIM** each output; the amount of dim defaults to 20dB but can be adjusted from the **CTRL** page.

In each case, the current level and function appears on the touch-screen display.

## CTRL Page

The **Ctrl** page provides access to other functions such as individual loudspeaker cuts; mono the monitoring; assign left or right to both front speakers; reverse the phase of a front speaker; dim the volume; or switch to an alternate set of loudspeakers. The **SET** button allows you to adjust the dim level, stereo balance, etc. For example, press **SET** followed by **DIM** and then turn the corresponding rotary control - the electronic label shows that you are now adjusting the *Dim LVL* and its new value. For full details, see [Monitoring Parameters](#).

## IO Card Conditions

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

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

To use the headphone connectors mounted in the arm rest of the console frame, you must order one DALLIS 942-61 card, and wire it to the **HP A & B** 37-pin D-type connector on the console's rear panel.

### 14.1.2 AFL & PFL

The AFL and PFL busses can be switched to CRM 1 and/or CRM 2.

On the MONITORING panel touch-screen, use the **PFL M1**, **AFL M1**, **PFL M2** and **AFL M2** buttons to assign AFL and/or PFL to each monitor output. You can assign more than one bus to each output if you wish.



AFL1 is surround; while PFL1, PFL2 and AFL2 are always stereo. Note that AFL2 and PFL2 can be used to provide independent monitoring within [isolated](#) bays.

Press the **PFL/AFL CLEAR** button, on the MONITORING panel touch-screen, to quickly clear all AFL and PFL selections.

To route AFL or PFL to an external output, use the [Signal List](#) display. You will find all the listen bus outputs under the **Bus Out** Source Directory:



To change the level of a listen bus, or to assign it to a meter, put the listen bus into access (via a [right-click](#) in the **Signal List**).

A variety of [AFL](#), [PFL](#) and [Solo button](#) options are also available from the **System Settings** display. Or, AFL can be set to operate as [Solo-in-place](#).

### 14.1.3 Monitoring Parameters

The following parameters can be adjusted via the **CTRL** page and **SET** button. Note that, depending on your monitoring configuration, not all parameters may be supported.

#### Dim Levels

The console features two independent monitor dim settings:

- **Monitor Dim** – actioned by pressing the **DIM** button.
- **Talkback Monitor Dim** – actioned by a user button or external GPI trigger (defined in the monitoring configuration). This can be used to automatically dim the main monitoring when you press a Talkback button.

To adjust the amount of dim:

1. Press **SET** and **DIM** - the touch-screen displays *DIM LVL*. Use the rotary control to adjust the monitor dim level.
2. Press **SET** again to set the amount of talkback dim - the touch-screen displays *TB DIM LVL*. Use the rotary control to adjust the talkback dim level.

#### Mono Left/Right

1. Press the **MONO** button to mono the Left and Right monitor outputs to both speakers. This automatically applies a 3dB reduction to the left and right channels to compensate for the mono sum.

2. To adjust the mono gain reduction, press **SET** and **MONO** - the touch-screen displays *TRIM MONO*. Use the rotary control to adjust the mono trim level.

### Stereo Monitoring Functions

1. Press **LtoB** to assign the Left monitor output to both left and right speakers.
2. Press **RtoB** to assign the Right monitor output to both left and right speakers.
3. Press **PH L** to reverse the phase of the Left monitor output.
4. Press **PH R** to reverse the phase of the Right monitor output.

The two phase reverse buttons allows you to deal with phasing issues on either front speaker.

### Left/Right Monitor Balance

The monitor balance control allows you to offset the Left and Right monitor output levels to compensate for poorly aligned stereo speakers.

1. Press **SET** - the touch-screen displays *BALANCE*. Use the rotary control to adjust the left/right balance.

Balance can be adjusted from -20dB to +20dB.

### Individual Loudspeaker Mutes

The **L**, **C**, **R**, **SL**, **SR** and **LFE** touch-screen buttons are used to mute the individual surround speakers and select parameters for setting balance and volume trim settings.

1. To mute a speaker, touch the corresponding mute button - the mute button turns red when selected.

Note that the active mute buttons are determined by the [surround format](#).

### Individual Loudspeaker Level Trims

Each of the monitor outputs can be individually trimmed to help align your surround loudspeakers.

1. Press **SET** and one of the speaker mute buttons (**L**, **C**, **R**, **SL**, **SR** or **LFE**) - the touch-screen updates to display the speaker trim level (e.g. *TRIM FL* for Trim Front Left). Use the rotary control to trim the speaker level.

Levels can be trimmed between -128 and +15dB.

For more details on the available surround formats and how they correspond to the front panel mute buttons, see the [Appendix: Surround Levels](#).

### Individual Loudspeaker Solos

The **L**, **C**, **R**, **SL**, **SR**, and **LFE** touch-screen buttons can be used to solo individual surround loudspeakers. The solos are additive.

1. To solo a speaker, touch the **SOLO** button followed by the corresponding mute button - the mute button turns green.

Note that if a speaker mute button was activated before the **SOLO** mode, then if you try and solo the same speaker its LED turns orange to indicate that you are now attempting to solo a muted speaker!

### Alternate Loudspeaker Switching

1. Press the **ALT** touch-screen button to cut the main speakers and switch the monitor output to an alternate set of speakers.

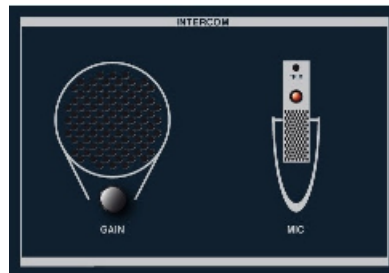
To use this feature, the alternate speaker outputs must be defined in the monitoring configuration.



## 14.2 Talkback

### 14.2.1 Configuring Talkback

*INTERCOM User Panel (982/16)*



For integrated talkback, you must order the INTERCOM [user panel](#) (982/16) and wire this to the **TBK** 15-pin D-type connector on the console's rear panel. The user panel includes an internal talkback microphone (with gain control and preamp), and integrated loudspeaker (with gain control) for return talkback. For more details on how to connect and wire the system, please refer to the 982/16 Technical Documentation.

Talkback switching is programmed from the **Custom Functions** display. It can be switched from the fader strip using a Fader User Button, or from a central user button (on the CENTRAL USER BUTTON panel). Please refer to the following **Custom Functions** for more details:

- [Fader User Button, Talkback to Channel](#)
- [Central User Button, Talkback to Access Channel](#)
- [Central User Button, Talkback to DSP Channel](#)

## 15. Control Channels & Grouping

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This chapter describes all grouping and control channel operations.

Topics include:

- [Group Types & Hierarchy](#)
- [The Couple Group](#)
- [VCA Grouping](#)
- [Link Groups](#)
- [Fader Control of Levels](#)
- [General Purpose Channels \(GPCs\)](#)

## 15.1 Group Types & Hierarchy

To control parameters across multiple channels, you can use any of the following:

- **The Couple Group** - a temporary way of adjusting parameters across a range of channels.
- **VCA Groups** - a permanent group which links all parameters across multiple channels and provides master control from a single fader strip.
- **Surround VCAs** - created automatically whenever you create a surround channel.
- **Link Groups** - a permanent group where every member is a master. You can choose to link (or not link) individual parameters. For example, to link EQ across multiple channels, while keeping fader levels and other parameters independent.

Note that the hierarchy of the different group types is: Couple; Link; VCA; Surround VCA. This means that:

- Whenever a channel is part of a couple, all other groups are temporarily suspended. This means that the couple can be used at any time and across all types of channels and groupings.
- A channel can be assigned to *both* a link group and a VCA. For example, the vocal soloists within a choir can be controlled by a link group for the choir, and by a separate VCA for the soloists; the link group takes overall priority.

Please take care with the overall gain structure through the system, especially if you are [nesting](#) VCAs, adding a [VCA](#) master to a [Link](#) group or combining the [Couple](#) function with other types of group. Offset values can wrap around and result in very loud volumes when adjusting the overall master!

## 15.2 The Couple Group

The couple group provides a quick way of adjusting parameters across a range of channels. Unlike other types of group, it is temporary and will be dissolved once the desired changes have been completed.

### Couple Group Conditions

- There is only ever *one* couple group – you cannot create multiple couples.
- Channels assigned to the couple group *must* be on adjacent fader strips – i.e. you cannot couple non-consecutive faders.
- The couple group links *all* channel parameters.
- The coupled channels can be of any channel type, as long as they are assigned to adjacent faders.
- When working with a couple group, faders are *always* moving.
- The master/slave behaviour varies depending on the parameter (please refer to the master/slave [Appendices](#)).
- Whenever a channel is coupled, all other groups are temporarily suspended. This means that the couple can be used at any time and across all types of channels and groupings.
- Please take care when combining the Couple with other types of group. Offset values can wrap around and result in very loud volumes when adjusting the overall master!

### 15.2.1 Creating a Couple

To create a couple, there are two methods:

#### Direct Couple

1. Press and hold the fader **SEL** button on the first and last channels you wish to couple:



The fader **SEL**s turn red to indicate that coupling is active.

2. Now adjust a parameter – for example, turn the EQ gain control on any channel within the couple group - all EQ gains across the coupled channels are adjusted, and any offsets are retained.
3. To dissolve the couple group, press the fader **SEL** button on any fader strip outside the couple range.

#### Using the COUPLE Button

Alternatively you can use the COUPLE button as follows:

1. Select **COUPLE** from the centre section LINK buttons (or [Extra Buttons](#) display) - the button flashes to indicate that it is active.



And the fader **SEL** buttons across the console flash, in green.

2. Press the first and last fader **SEL**s on the strips you wish to couple - the fader **SEL**s turn red to indicate that coupling is active.
3. To dissolve the couple group, deselect **COUPLE** or press the fader **SEL** on any fader strip outside the couple range.

## 15.3 VCA Grouping

You can use VCAs to create permanent groups which link all parameters across multiple channels and provide master control from a single fader strip.

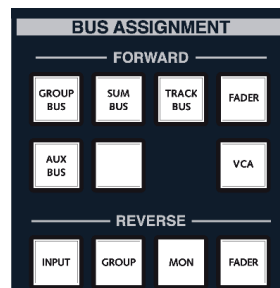
### VCA Grouping Conditions

- The system supports up to 128 VCA masters.
- Any number of channel or main fader strips can be assigned to each VCA. This allows you to control not only input channels but also groups, sums, aux masters, GPCs, Surround VCAs and other VCAs.
- A channel can only be assigned to a *single* VCA. However, a VCA can be assigned to another VCA, see [Nested VCAs](#). And, a VCA can be assigned to a [Link group](#).
- The VCA master will adjust *all* slave channel parameters; individual offsets are retained. The master/slave behaviour varies depending on the parameter (please refer to the master/slave [Appendices](#)).
- VCA groups can use moving or non-moving slave faders, defined by the [Relative Slave faders](#) option in the **System Settings** display.
- Please take care when combining VCAs with other types of group. Offset values can wrap around and result in very loud volumes when adjusting the overall master!
- VCA assignments are stored in snapshots and productions.

The channels assigned to a VCA can be on any Bank or Layer. This allows you to have a single VCA master controlling a number of slave channels on a "hidden" Bank or Layer.

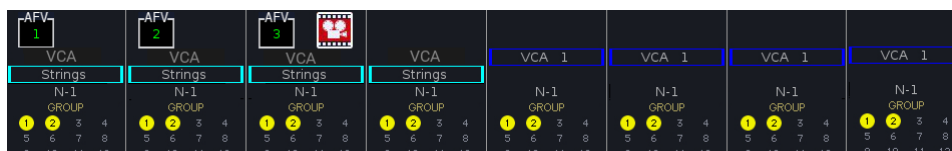
### 15.3.1 Creating a VCA Group

You can use any of the usual [bus assign](#) methods to assign channels to a VCA:



- **FADER FORWARD Assign** - put the slave channel [into access](#); press **FADER FWD** and then select the VCA master.
- **FADER REVERSE Assign** - put the VCA master [into access](#); press **FADER REV** and then select the slave channels.

VCA assignments are shown at the top of the [Channel Display](#) - in our example, the last three channels are assigned to VCA 1:



You will also see the VCA number on the fader strip's [VCA Master display](#).

## 15.3.2 Working with VCAs

1. Assign the VCA master to a fader strip in the usual manner, see [Fader Strip Assignment](#).

The fader strip updates, and you will see metering for the first 8 slave channels on the [Channel display](#). The meters display the lowest to highest fader strip slave from left to right. For example, if the VCA master is controlling fader strips 1, 3, 5 and 6, then you will see the slave channels in that order on the VCA master meters.

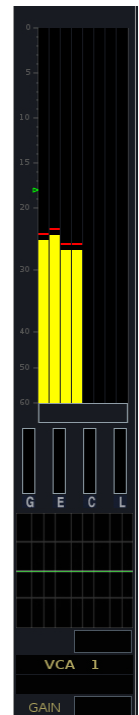
Note that the pickup point for the slave channel metering is set from the VCA master. Therefore, make sure you have the VCA master is in access when changing the [pickup point](#).

2. You can now adjust the level (and other parameters) of all slave channels from the VCA master.

If the [Relative Slave faders](#) option is set to non-moving faders, then the slave faders remain stationary when the master moves; you will see the level change applied to each slave channel in its fader label display.

The master/slave behaviour varies depending on the parameter. For example, main level and input gain are controlled relatively so that you can offset the slave positions; EQ frequency and Q are *always* set by the master (absolute), so that any change is inherited by all slaves; the MUTE is switched ON from a Surround VCA master but not OFF. For full details, see the Master/Slave Behaviour [Appendices](#).

Please take care with the overall gain structure through the system, especially if you are [nesting](#) VCAs or adding the VCA to a [Link](#) group or [Couple](#). Offset values can wrap around and result in very loud volumes when adjusting the overall master!



### Renaming a VCA

The user label of the VCA master can be edited from the [Title Bar](#) when the VCA master is in access.

### Revealing the VCA Slaves

Use the [REVEAL](#) function to temporarily reveal VCA slaves onto fader strips.

This is particularly useful if the slave channels are on a hidden Bank or Layer, as you can use Reveal to quickly access the slaves to offset fader levels and other relative parameters.

## 15.3.3 Nested VCAs

From Version 5.10.0 onwards, a VCA master can be assigned to another VCA, allowing VCA groups to be nested. For example, to create VCAs for the drums, guitars and vocals within a band, and then control these from an overall "Band" VCA master. Any of the usual [methods](#) can be used to nest a VCA.

Note that:

- Technically, there is no limit on the number of the VCAs which can be nested (e.g. VCA 1 to VCA 2 to VCA 3, etc.). However, offset values can wrap around and this can result in very loud volumes when adjusting the overall master! In practice, we recommend keeping the number of nested VCAs to a minimum (less than six).
- Each VCA can control a mixture of channel types. This allows you to combine nested VCAs with other channel types such as input channels and surround VCA masters.

You can display the nested VCAs which a channel is assigned to by increasing the [Bay VCA Count](#) option in the **System Settings**. For example, if INP 1 is assigned to VCA 1, and then VCA 1 is assigned to VCA 8, you will see both VCA 1 and VCA 8 at the top of the [Channel Display](#) for INP 1.

## 15.4 Link Groups

Link groups can be used to create a permanent group where every channel within the link group is a master. You can choose to link (or not link) individual parameters. For example, to link EQ across multiple channels, while keeping fader levels and other parameters independent.

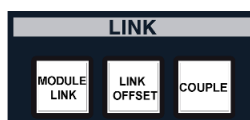
### Link Group Conditions

- The system supports an unlimited number of link groups.
- Any number of channels can be assigned to each link group, including channels of a different DSP type: inputs, groups, sums, etc.
- The link can apply to all channel parameters or to individual processing sections – for example, to link EQ sections but not faders.
- A channel can only be assigned to a *single* link group. However, a channel can be assigned to both a link group and a [VCA master](#).
- Every channel within a link group is a master. For example, moving any of the 8 faders within a link group adjusts the level of all 8 channels; individual offsets are retained. The master/slave behaviour varies depending on the parameter (please refer to the master/slave [Appendices](#)).
- When working with Link groups, faders are *always* moving.
- Please take care when combining Link Groups with other types of group. Offset values can wrap around and result in very loud volumes when adjusting the overall master!
- Link group assignments are stored in snapshots and productions.

The channels assigned to a link group can be on any Bank or Layer. This allows you to assign one member of the link group to your working Bank/Layer, and have it control other channels on a "hidden" Bank or Layer.

### 15.4.1 Creating a Link Group

1. Select one of the channels you wish to link - either by pressing its fader **SEL** button or using the [ACCESS CHANNEL/ASSIGN](#) panel.
2. Select **MODULE LINK** from the centre section LINK buttons (or [Extra Buttons](#) display):



The fader **SEL** buttons across the console flash, in green.

3. *BEFORE* selecting any faders, first select the audio module(s) you wish to link, by pressing the **SEL** buttons on the [Central Control Section](#).

You can select any audio module using the **SEL** buttons. You can also link bus assignments by selecting **BUS** on the [PARAMETER COPY/ASSIGN](#) panel. See [Selecting Channel Parameters](#).

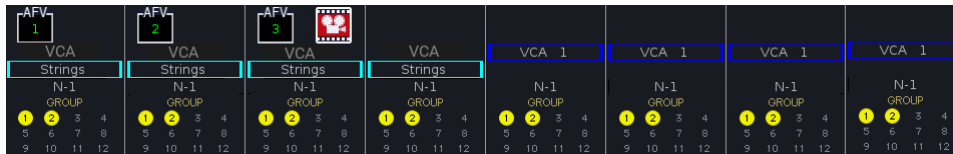
4. Now press the fader **SEL** buttons on the channels you wish to link:



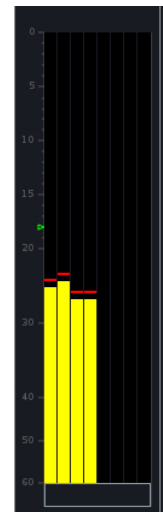
## 15.4.2 Link Group Options

Link groups are indicated at the top of the [Channel display](#) where you will see:

- The link group name – e.g. **Strings**.
- The link group color code – e.g. turquoise.



In addition, you can choose to meter the first 8 linked channels on each of the grouped channels. This allows you to assign one member of the link group to your working Bank/Layer, and move the other members to a "hidden" Bank or Layer.



Each option is edited from the **Channel Config** display:

1. Select one of the linked channels, either by pressing its fader **SEL** button or using the [ACCESS CHANNEL/ASSIGN](#) panel.
2. Press the **CHAN/CONFIG** button, located on the [SCREEN CONTROL](#) panel, to view the **Channel Config** display.

Our example shows that the channel in access (INP 1) is assigned to Link group 1:



3. To edit the link group name, click within the **LNK 1** field and type a new name – e.g. **Strings**.
4. To assign a color, use the drop-down menu:



5. To enable multi-channel metering on each of the link group channels, select the **Link metering** option:





### 15.4.3 Working with Link Groups

Once a link group is created, any channel within the link group can be used as the master; moving a control adjusts the parameter across all the linked channels. The master/slave behaviour varies depending on the parameter, see the [Appendices](#).

Any offsets which were present when the link was created are retained. To adjust offsets, there are two methods:

#### Touch-Sense

1. Hold the first control so that its touch-sense is active – e.g. fader 1.
2. While holding fader 1, adjust another control within the link group – e.g. fader 5.

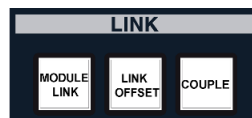
You are now adjusting the offset position of fader 5 relative to the rest of the link group.

You can use this method for any touch-sensitive control: fader or rotary encoder.

#### Link Offset

Alternatively, if you want to change the offsets for lots of controls it is better to use **LINK OFFSET**. This temporarily suspends the link group to allow adjustments to individual control positions:

1. Select **LINK OFFSET** from the centre section LINK buttons (or [Extra Buttons](#) display):



The button flashes to indicate that it is active.

2. Now adjust the position of your controls.

While **LINK OFFSET** is active, any link groups are temporarily suspended. This allows you to completely change the balance within a group quickly and easily.

3. When you are happy, deselect **LINK OFFSET**.

The link groups now return to their normal “grouped” mode of operation.

Please take care with the overall gain structure through the system, especially if you are adding a [VCA](#) master to the Link group or using [Couple](#). Offset values can wrap around and result in very loud volumes when adjusting the overall master!

### 15.4.4 Link Group Numbering

Every time you link channel parameters, a link group number is automatically assigned by the system. Thus, the first set of linked parameters form link group 1, the second link group 2, and so on. You can verify the link group number from the **Link** field in the **Channel Config** display:



The next link group to be created will automatically take the next available link group number.

## 15.5 Fader Control of Levels



The FADER CONTROL buttons temporarily switch the faders to other objects than channel level. For example, to control auxiliary send levels from the channel faders to set up a quick headphone balance.

Note that the buttons switch all faders - channel and main - globally across the console.

There are two different assignment methods:

- Select and scroll through the available level objects - for example, to scroll through Aux Sends 1 to 32.
- Pre-select a level object, by copying it to the FADER CONTROL clipboard, and then assign it to the faders. This allows you to switch directly to say Aux Send 28 without scrolling.

The FADER CONTROL and [PARAMETER COPY/ASSIGN](#) CLIPBOARD are one and the same. Therefore, if you select an object for FADER CONTROL, this will remain in the parameter CLIPBOARD, and vice versa.

You can [Bank](#) and [Layer](#) switch while in the FADER CONTROL mode to gain access to all assigned levels across multiple banks and layers of channels.

➤ **To scroll through the level objects:**

1. Select a level object by pressing:
  - **AUX** – Send levels for the console's 32 [auxiliaries](#).
  - **DIG AMP** – [Digital amplifier](#) gain.
  - **INSERT SEND** – [Insert send](#) level.
  - **DIR OUT** – [Direct output](#) level.
  - **AFV** – [Audio Follow Video](#) On level.
  - **LFE** – Low Frequency Effect (Subwoofer) level, see [Panning](#).

The name of the selected object (e.g. **AUX 1**) flashes in the clipboard display and the faders move to reflect the current Aux send values.

The fader label displays also update to show the parameter name; the name flashes to warn you that you are now controlling something other than channel level!

2. If you have selected **AUX SENDS**, then use the Left or Right arrow buttons to scroll up or down through the 32 sends.

Each time a new send or level object is selected, the faders across the console update accordingly.

3. Move the faders to adjust the levels.
4. When you have finished, deselect the level object button to return the faders to their normal operation.

To quickly set *all* aux sends from a channel to the same level (e.g. unity gain), switch **AUX 1** to the faders and set the fader to 0dB. Keep touching the fader and scroll through the aux sends using the Left and Right arrow buttons – each aux send is set in turn to 0dB.

➤ **To pre-select a level object:**

1. Select the level object by touching its rotary control on the [Central Control Section](#). For example, touch Aux send 1 gain to place AUX 1 into the FADER CONTROL clipboard.
2. When you are ready to switch the object to the faders, press **USE TYPE**.

The faders are now controlling the clipboard object.

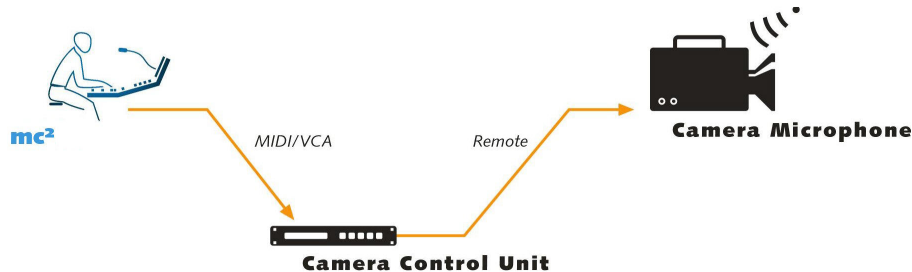
3. To switch back to normal fader level operation, deselect **USE TYPE**.

You can only assign valid level objects to the faders; if you try to select EQ gain, for example, then the **USE TYPE** button cannot be enabled.

## 15.6 General Purpose Channels (GPCs)

GPCs (General Purpose Channels) are control channels, assigned to any fader strip, which provide remote control of external devices (via MIDI). Typical applications include:

- Adjusting and storing camera microphone levels via MIDI to VCA converters:



- Adjusting fader levels and other parameters within a digital audio workstation (DAW):



The console supports up to 256 General Purpose Channels and each channel features the same control objects as a normal DSP channel – EQ, Delay, Compressor, Limiter, etc. Remember that these channels are for control only, and the parameters they adjust depend on the mapping within the MIDI protocol. For example, you may be using channel Delay to set the reverb time within an outboard effects unit.

From Version 5.4, the consoles support native RTP MIDI (MIDI over Ethernet). Thus, control of up to 32 channels (four conventional MIDI devices) can be achieved using an Ethernet connection to the Lawo network. RTP MIDI support is native within MAC computers and can be achieved on PCs using dedicated software tools. Alternatively, your system can be fitted with the Recording Com Kit to provide MIDI in/out connections.

The assignment of channel objects to MIDI program changes and controller values can be defined within the factory configuration or programmed from the [Custom Functions](#) display.

### Fader Strip Assignment

GPCs can be assigned to any channel or main fader strip in the [usual manner](#), by selecting **GPC** as the channel type.

### Storing Settings

The settings for GPCs are stored in snapshots in exactly the same way as normal DSP channels.

Therefore, use [SNAP ISO](#) to isolate an individual GPC from snapshot recall, or protect all GPCs using the [Global Snapshot ISO DSP](#) option.

### DSP Parameter to GPC Mapping

In addition to controlling external devices, GPCs can be used to control and automate DSP channel parameters. For example, to change a specific DSP parameter (e.g. Delay) from an Audio Follow Video event. By mapping the Delay parameter to a GPC fader, and then assigning the Audio Follow Video event to the GPC channel, the delay will be triggered when the AFV event is active.

This type of function is programmed from the [Custom Functions](#) display.

## 16. Console Reset

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This chapter explains the reset capabilities and file management.

Topics include:

- [User Data: Overview](#)
- [What's Stored in a Production/Snapshot?](#)
- [Productions](#)
- [Snapshots](#)
- [Cuelists](#)
- [Snapshot Offsets](#)
- [Module ISO](#)
- [File Import/Export](#)

## 16.1 User Data: Overview

One of the major benefits of the **mc<sup>2</sup>66 MKII** is the ability to store and recall all settings.

### Productions

[Productions](#) form the top level of user data storage and store *all* the settings required to reset the system.

If you only need one version of the system's settings, then it is enough to save (and load) a production. However, within a production you can also store snapshots, cuelists and mixes.

### Snapshots

[Snapshots](#) can be used to load different settings within the same production, or to reset the system while you are live/on-air. For example, to recall a particular console layout before a live broadcast, a different mix for each band during an entertainment show, or a different setup for each scene in a theatre production.

When using snapshots, you should create a production for the studio or type of show. Then create "user" or "show" folders to store your snapshots. To manage the recall, snapshot isolates can be applied to individual channels, specific modules or global elements of the desk.

### Cuelists

[Cuelists](#) are provided for convenient recall of snapshots and other events during a live show.

A cuelist contains a series of "cue points" which can be loaded in sequence. Each cue point can load a snapshot, a series of output events or a combination of both. The transition between snapshots can be crossfaded if required. In addition, offsets can be applied to deal with last minute changes such as a change of artist. By combining a snapshot load with multiple output events, you can execute a complex set of changes from each change of cue!

Note that, from Version 5.10.2 software, **Cuelists** replace **Sequences**.

### Mixes

[Mixes](#) store the console's automated settings referenced to timecode. Multiple mixes, each with its own Pass Tree, can be stored in a production.

### Presets

[Presets](#) are stored independently of productions, and save and load settings for processing modules (EQ, Gate, Compressor, Panning, etc.) or for a complete channel. For example, to save your favourite vocal EQ, or the complete settings for an announcer channel.

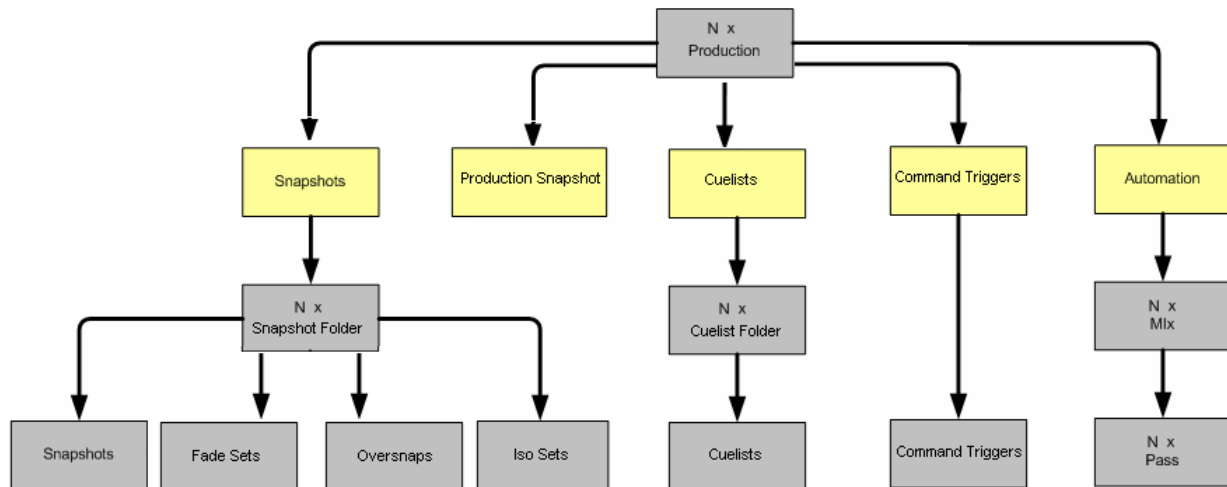
### Transferring User Data

All user data is stored on the system's internal flashcard and can be imported and exported to a USB memory stick, networked file server or mxGUI computer..

User data is fully compatible with any mc<sup>2</sup> or Nova, regardless of the hardware configuration. This enables the transfer of user data to and from any system (including any other mc<sup>2</sup>), in order to recall settings in a different studio.

## 16.2 What's Stored in a Production/Snapshot?

### Productions



Each production can store multiple snapshots, cuelists, command triggers and mixes, plus the following settings which are NOT included in snapshots:

- [DSP configuration](#)
- Input and Output sample rate converter settings, see [IO Parameters](#).
- [System Settings display](#) - the status of *all* system options including Levels, Metering, the surround format, etc.
- [Metering display](#) setup.
- [ISO BAY status](#) for each fader bay.

Note that every time you [save](#) or [update](#) a production, a special hidden snapshot (called the production snapshot) stores everything included in normal full snapshot. This means that loading a production will reset the complete system, and you only need to use snapshots if you wish to load *different* settings within the same production, or recall settings while live/on-air.

Note also that separate folders are used to organise snapshots and cuelists, while command triggers are stored as a single set of events, and automation as multiple mixes (each with its own Pass Tree).

### Snapshots

Snapshots are one-shot memories which can be used to recall settings either before or during a live show.

Every full snapshot includes:

- **DESK**: the assignment of channels to fader strips across all banks and layers, and the current status of bank and layer switching.
- **CONN**: signal connections for all sources and destinations (via the **Signal List** or **mx Routing** display).
- **LABEL**: User and Source Labels.
- **DSP**: all channel DSP settings including analog input control.
- **IO**: remote mic preamp and router IO settings (e.g. router level and word length).
- **BAY**: the assignment of channels to fader strips across all banks and layers, and the current status of bank and layer switching for all isolated (ISO) fader bays.
- **MXDSP**: all settings for the optional mxDSP modules.
- **PLUGIN** - all settings stored on the optional remote plug-in server.

Note that the system also supports partial snapshots for storing selected routing crosspoints only. See [mx Routing](#) for more details.

## 16.3 Productions

Productions form the top level for user data storage and store *all* the settings required to reset the system.

If you only need one version of the system's settings, then it is enough to save (and load) a production. However, within a production you can also store snapshots, cuelists, mixes and command triggers.

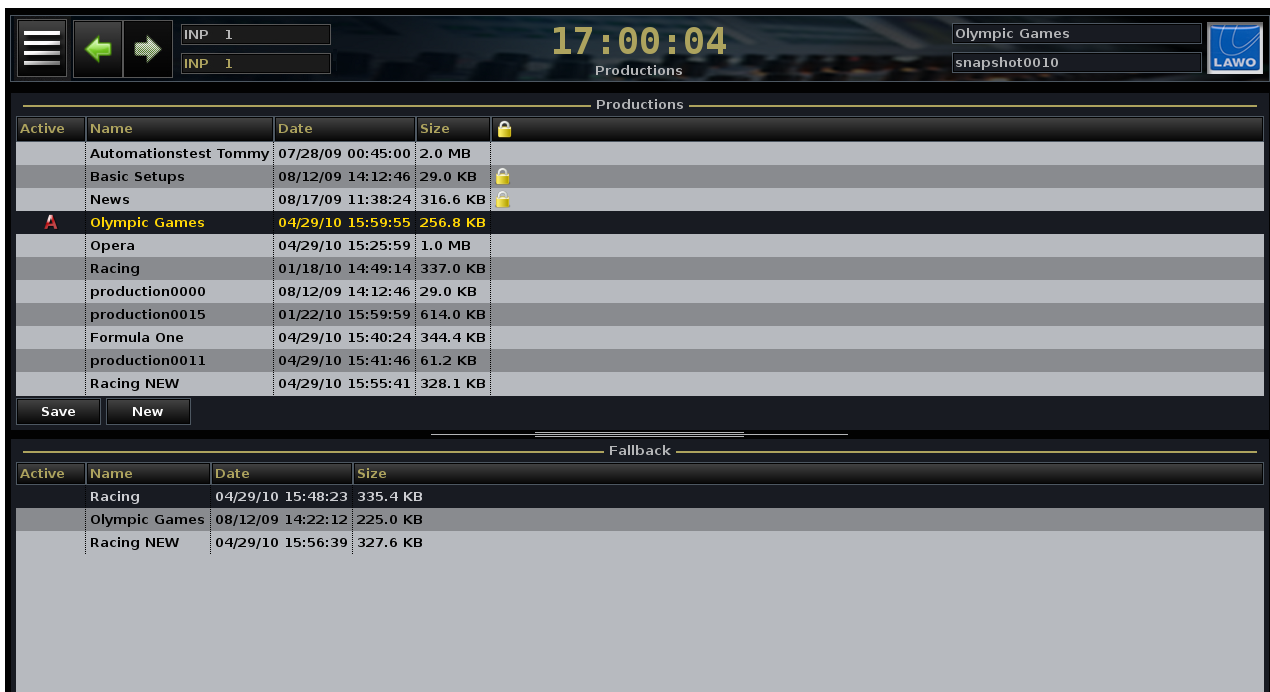
Note that every time you [save](#) or [update](#) a production, a special hidden snapshot (called the production snapshot) stores everything included in normal full snapshot, plus other lower level settings (not included in snapshots). See [What's Stored in a Production/Snapshot](#).

It is good practice for a studio to have a **Basic Setups** or **Default** production (note that the name may vary). This is a production which will provide a common starting point for all new users or shows. Load this production to reset the system; then save a new production to store your own settings.

Productions are managed from the **Productions** display.

### 16.3.1 The Productions Display

1. [Open](#) the **Productions** display on the Central GUI:



The display is divided into two halves:

- **Productions** – lists all the productions stored on the internal user data flash card. This is where you can load, save, update rename, protect or delete a production.
- **Fallback** – lists any fallback productions stored in temporary memory. [Fallback productions](#) provide a level of undo in case you update or delete your production accidentally.

The active production (marked with an **A**) is also shown in the [title bar](#) – in our example, **Olympic Games**. Therefore, you will *always* see the active production name across all displays.

To the right of each production name you will see the date and time when the production was last [saved](#) or [updated](#), and the size of the production file. You will also see a padlock icon if the production is [protected](#).

If the list of **Productions** or **Fallback** Productions is longer than the available window space, focus on the list and use the rotary scroller on the SCREEN CONTROL [panel](#) to navigate up and down the list. You can also [resize](#) the windows and/or use the on-screen scroll bars.



Operations are available from the dedicated screen buttons (**Save** and **New**), the SCREEN CONTROL [soft keys](#) or by right-clicking on a production:

- [Load](#) – loads the selected production settings to the console.
- [New](#) – clears all existing snapshot and cue list folders plus automation mixes from memory, to create a new empty production.
- [Save](#) – creates a new production by saving the current console settings. ("Save As...")
- [Update](#) – saves the current console settings into an existing production. ("Save")
- [Delete](#) – deletes the selected production.
- [Protect](#) – protects the selected production.

### 16.3.2 Loading a Production

You can load stored settings to the console at any time by loading a production.

When you load a production you will reset the console, so make sure that the current settings are saved if you wish to retrieve them later.

If you do make a mistake, don't panic! When a production is loaded, a backup of the current settings is created in the **Fallback** list, see [Fallback Productions](#).

**WARNING:** Productions store and recall low level settings which can cause a brief interruption to audio. Therefore, do *not* load a production during a live show. Instead, use [snapshots](#) to recall settings while live on-air.

#### ➤ To load a production:

1. Select a production from the **Productions** list (e.g. **Football**):



2. Right-click and select **Load**, or press the **LOAD** soft key, to complete the operation.

The console status updates, and the [title bar](#) shows that **Football** is now the active production:



For additional confirmation, watch the status bar at the bottom of the Central GUI; you should see a **loading...** message as the production data loads:



## 16.3.3 Saving a New Production

You can save the current settings of the console into a new production using **SAVE**. (i.e. this operation performs a "Save As..".)

**SAVE** keeps all the current settings and saves them under a new production name.

It is a good idea to save and organise your productions carefully. Don't overwrite another production with your own settings by using [update](#)! Instead, use the **SAVE** function to save into a new production.

### ➤ To save a new production:

1. Select the on-screen **Save** button, or focus on the list of **Productions** and press the **SAVE** soft key.

The current settings are saved into a new production which is given a default name (e.g. **production 0012**):



The production is time and date stamped, and automatically becomes the active production (**A**) as indicated in the [title bar](#). For additional confirmation, watch the [status bar](#) at the bottom of the Central GUI; you should see a **saving...** message as the production data is saved.

### 16.3.4 Renaming a Production

1. Click on the production name:



Click once to select all the text, or twice to modify an existing name (you will see a flashing cursor).

2. Enter a new name using the keyboard.
3. Press **ENTER** to confirm the new name (e.g. **Formula One**):



Or, to exit without making a change, press **ESCAPE**.

### 16.3.5 Updating a Production

You can save the current settings of the console into an existing production using **UPDATE**.

Updating a production overwrites it. Therefore, make sure you select the correct production to update. If you do make a mistake, don't panic! When a production is updated, a backup of the "old" production is created in the **Fallback** list, see [Fallback Productions](#).

If a production is [protected](#), then you will not be able to update it. (Use **Protect** to safeguard any important productions which you do not want to accidentally overwrite).

There are two ways to update a production:

#### ➤ The **UPDATE** button



This button *always* updates the active production, marked with an **A** and named in the [title bar](#). (i.e. this operation performs a "Save".)

You can use the button at any time; the **Productions** display does not need to be selected. But, remember that a [protected](#) production cannot be updated.

The button also flashes if you have snapshots or automation which have not been saved.

### ➤ Update from the Productions display

From the **Productions** display, you can update *any* existing production, not only the active one.

1. Select a production from the **Productions** list (e.g. **Formula One**):



2. Right-click and select **Update**, or press the **UPDATE** soft key, to complete the operation. (Remember that a [protected](#) production cannot be updated.)

The selected production is overwritten with the current console settings. You can confirm this by looking at the new date and time stamp. For additional confirmation, watch the status bar at the bottom of the Central GUI; you should see a **saving...** message as the production data is saved.

## 16.3.6 New Production

**NEW** clears any existing snapshot and cue list folders and mixes from memory, so that when you [save](#) a production you can start from an empty [Folders](#) or [Mixes](#) list.

Note that **NEW** only clears folders and mixes; it does *not* alter the current state of the console and it does not save any data.

1. Select the on-screen **New** button, or focus on the list of **Productions** and press the **NEW** soft key.

The snapshot and cue list folders and mixes are cleared, and you will see an empty active production name in the [title bar](#) at the top of the display:



You can now save the current state of the console using either [Save](#) or [Update](#).

## 16. Console Reset

### 16.3.7 Protect & Delete

#### Protect

A protected production cannot be [updated](#) or deleted. You can use this safeguard any important productions which you do not want to accidentally overwrite or delete.

1. Select a production from the **Productions** list (e.g. **News**).
2. Right-click and select **Protect**, or press the **PROTECT** soft key, to complete the operation - a padlock icon indicates that the production is now protected:

Productions				
Active	Name	Date	Size	
	Automationtest Tommy	07/28/09 00:45:00	2.0 MB	
	Basic Setups	08/12/09 14:12:46	29.0 KB	
	<b>News</b>	<b>08/17/09 11:38:24</b>	<b>316.6 KB</b>	
	Olympic Games	08/12/09 14:22:12	225.0 KB	
	Opera	04/29/10 15:25:59	1.0 MB	
	Racing	01/18/10 14:49:14	337.0 KB	
	production0000	08/12/09 14:12:46	29.0 KB	
	production0015	01/22/10 15:59:59	614.0 KB	
	Formula One	04/29/10 15:40:24	344.4 KB	
	production0011	04/29/10 15:41:46	61.2 KB	
Save New				

#### Delete

Delete removes a production and all of its contents – snapshots, cuelists and mixes - from the internal user data flash card.

To prevent accidental deletion, protected productions cannot be deleted.

1. Select a production from the **Productions** list (e.g. **Football**).
2. Right-click and select **Delete**, or press the **DELETE** soft key, to complete the operation:

INP 1

INP 1

11:32:59

Production List

Productions

Active	Name	Date	Size	
	Basic Setups	08/12/09 14:12:46	29.0 KB	
	Football	01/18/10 13:50:19	436.5 KB	
	News	09 11:38:24	316.6 KB	
	OFO Default	12 13:20:06	215.0 KB	
	Olympic Games	08/12/09 14:22:12	225.0 KB	
	Opera	04/29/10 15:26:00	1.0 MB	
	Racing	01/18/10 14:49:14	337.0 KB	
	Training Production	10/27/11 12:39:28	849.6 KB	
	production0000	08/12/09 14:12:46	29.0 KB	
	production0001	01/12/12 15:44:32	883.9 KB	
	production0004	01/18/10 14:49:24	338.3 KB	

Save

New

Load

Protect

Update

Delete

### 16.3.8 Reloading the Production Snapshot

Every time you [save](#) or [update](#) a production, the production snapshot stores everything included in a normal full snapshot - see [What's Stored in a Snapshot](#).

From Version 5.0 software onwards, you can reload the production snapshot from the **Active** production. This provides a convenient way of loading only the production snapshot data, without other lower level settings:

1. Select the **Reload Production Snap** button to load the snapshot:



The console status updates, and the snapshot field in the [title bar](#) is cleared - this indicates that an unnamed snapshot is now the last one to be saved or loaded.

This function *a/ways* loads the production snapshot from the **Active** production, which may differ from the selected production in the **Productions** list.

### 16.3.9 Fallback Productions

When a production is [loaded](#), [updated](#), [deleted](#) or cleared (using [NEW](#) production), a temporary copy of the current console settings or overwritten/deleted production is created in the fallback productions memory.

Five fallback productions are stored providing five levels of undo.

For example, whilst setting up for **Racing**, the operator forgets to update the production. He/she decides to load a different production to check the settings for **Olympic Games**. In the background, before the load is performed, the console automatically stores the current settings into a fallback production.

The name of the fallback production is taken from the active production when the mistake was made, in our example **Racing**. However, note that the fallback is *not* a copy **Racing** but a backup of the unsaved settings before the load operation was performed. You can see this from the different time and date stamp date between productions called **Racing** in the Productions and Fallback lists:

Productions				
Active	Name	Date	Size	
	Automationtest Tommy	07/28/09 00:45:00	2.0 MB	
	Basic Setups	08/12/09 14:12:46	29.0 KB	
	News	08/17/09 11:38:24	316.6 KB	
A	Olympic Games	08/12/09 14:22:12	225.0 KB	
	Opera	04/29/10 15:25:59	1.0 MB	
	Racing	01/18/10 14:49:14	337.0 KB	
	production0000	08/12/09 14:12:46	29.0 KB	
	production0015	01/22/10 15:59:59	614.0 KB	
	Formula One	04/29/10 15:40:24	344.4 KB	
	production0011	04/29/10 15:41:46	61.2 KB	
Save New				
Fallback				
Active	Name	Date	Size	
	Racing	04/29/10 15:48:23	335.4 KB	

To recover the unsaved settings:

1. Select the **Racing** production from the **Fallback** list.

Productions				
Active	Name	Date	Size	
	Automationtest Tommy	07/28/09 00:45:00	2.0 MB	
	Basic Setups	08/12/09 14:12:46	29.0 KB	
	News	08/17/09 11:38:24	316.6 KB	
	Olympic Games	08/12/09 14:22:12	225.0 KB	
	Opera	04/29/10 15:25:59	1.0 MB	
	Racing	01/18/10 14:49:14	337.0 KB	
	production0000	08/12/09 14:12:46	29.0 KB	
	production0015	01/22/10 15:59:59	614.0 KB	
	Formula One	04/29/10 15:40:24	344.4 KB	
	production0011	04/29/10 15:41:46	61.2 KB	
Save New				
Fallback				
Active	Name	Date	Size	
	Racing	04/29/10 15:48:23	335.4 KB	

2. Right-click and select **Load**, or press the **LOAD** soft key, to complete the operation - the fallback production settings are loaded into the console and the operator's settings are restored!
3. To save these settings permanently, you must now [save](#) the settings into a new production, or [update](#) the original **Racing** production.

### Warning

The fallback productions memory is a first-in first-out memory holding a maximum of 5 fallback productions.

### 16.3.10 Importing and Exporting Productions

A complete production, or elements of a production (such as a folder, snapshot or mix) can be imported or exported to a USB interface, mxGUI computer or network drive. This allows you to archive or transfer productions between systems. In addition, you can use this function to copy elements from one production to another. See [File Import/Export](#) for details.



## 16.4 Snapshots

Snapshots can be used to load *different* settings within the same production, or to reset the system while you are live/on-air. For example, to recall a particular console layout before a live broadcast, a different mix for each band during an entertainment show, or a different setup for each scene in a theatre production.

When using snapshots, you should create a production for the studio or type of show. Then create "user" or "show" folders to store your snapshots.

To manage the recall, snapshot isolates can be applied to protect individual channels, specific modules or global elements of the desk.

Note that a production stores the same settings as a snapshot plus other lower level settings. See [What's Stored in a Production/Snapshot](#).

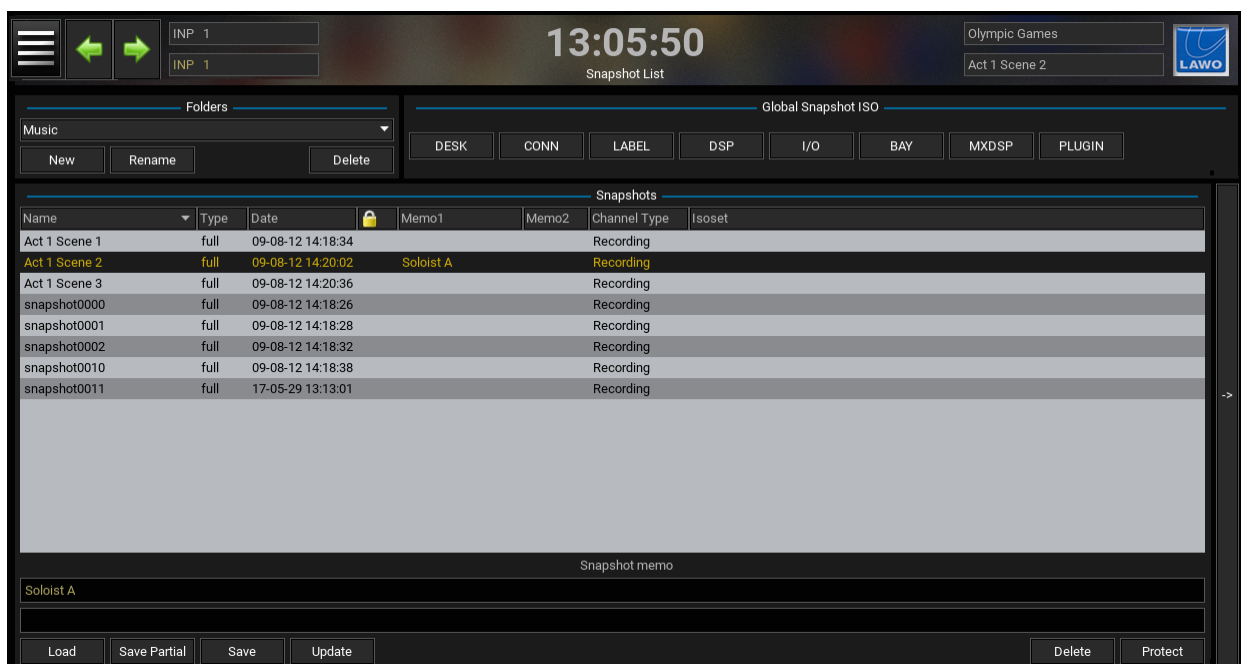
Note also that there are two types of snapshot - **full** and **partial**. A full snapshot stores all snapshot settings, while a partial snapshot stores selected routing crosspoints only. In this section we will be dealing with full snapshots. However, the same principles of load, save, delete, etc. can be applied to [partial snapshots](#).

Snapshots and their folders are written onto the user data flash card when you [save](#) or [update](#) a production.

Snapshots are managed from the **Snapshot List** display.

### 16.4.1 The Snapshot List Display

1. [Open](#) the **Snapshots List** on the Central GUI:



At the top of the display you can manage the snapshot [folders](#), and [isolate](#) global elements from a snapshot load (**Global Snapshot ISO**).

The main **Snapshots** area lists all the snapshots stored in the selected folder. Here you will see:

- **Name** - the snapshot name.
- **Type** - indicates whether it is a **full** or **partial** snapshot, see [What's Stored in a Snapshot](#).
- **Date/Time** - the date and time when the snapshot was saved or last updated.
- **Padlock Icon** - identifies snapshots which have been [write-protected](#).
- **Memo 1 & 2** - a summary of any notes added to the snapshot.



- **Channel Type** - indicates the [DSP channel type](#) which was active when the snapshot was saved or last updated. This is important as you cannot load a **Broadcast** snapshot to **Recording** channels, or vice versa. See [Transferring User Data](#).
- **IsoSet** - can be used to link an [Iso Set](#) to a snapshot in order to apply snapshot-specific filtering. See [Linking Iso Sets to Snapshots](#).

If the list is longer than the available window space, then on-screen scroll bars will appear.

The **Snapshot memo** area can be used to [add notes](#) to the selected snapshot.

The buttons at the bottom of the display provide access to snapshot operations: [Load](#), [Save](#), [Update](#), [Delete](#) and [Protect](#). These functions are also available from the SCREEN CONTROL [soft keys](#) when you are focussed on the **Snapshots** list. Or, if you select a snapshot and right-click.

The name of the last snapshot saved or loaded is *always* shown in the [title bar](#) of the Central GUI across all displays – in our example, **Act 1 Scene 2**.

Use the access bar on the far right of display to show or hide the **Fade Sets** area. Fade Sets are used to define which channels and modules will crossfade when loading Fade Snapshots from a cuelist. See [Fade Sets](#) for details.

### 16.4.2 Snapshot Folders

Snapshot folders are used to organise the snapshots within a production. Each production can contain any number of folders, and within each folder you can store multiple snapshots

If necessary, use [File Import/Export](#) to copy snapshots between folders.

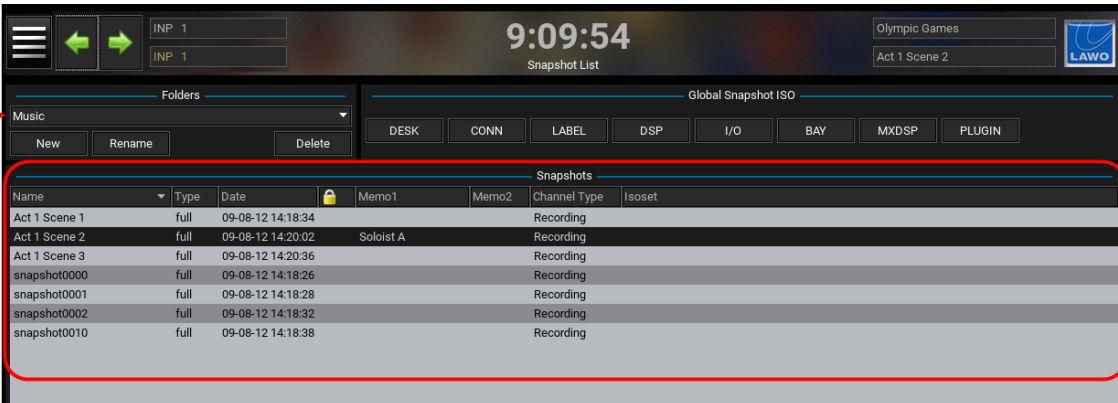
Note that the Folders list includes two special folders:

- **FALLBACK** - contains [fallback snapshots](#), which provide a way of recovering settings should you change the DSP Configuration (Recording to Broadcast, or Broadcast to Recording) by accident. This folder cannot be renamed or deleted.
- **BACKUP** - contains [backup snapshots](#), which provide levels of undo by periodically saving snapshots. This folder appears when backup snapshots are enabled.

Snapshot folders can be accessed from the [Snapshot List](#), [Cuelist](#), [Snapshot Trim Sets](#) or [Iso Sets](#) display. The operation is identical, and so here we will show the **Snapshots List** display.

1. [Open](#) the **Snapshot List** display on the Central GUI.

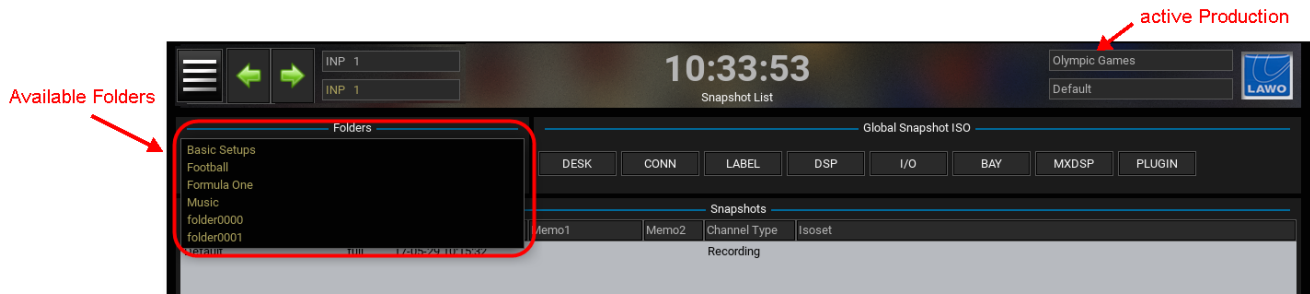
The displays lists all **Snapshots** stored in the current folder, e.g. **Music**:



The screenshot shows the 'Snapshot List' interface. At the top, there's a header with '9:09:54' and 'Snapshot List'. Below this, there's a 'Folders' section with a dropdown menu currently showing 'Music'. To the right of the folders are buttons: DESK, CONN, LABEL, DSP, I/O, BAY, MXDSP, and PLUGIN. The main area is a table titled 'Snapshots' with columns: Name, Type, Date, Memo1, Memo2, Channel Type, and IsoSet. The table lists several snapshots, including 'Act 1 Scene 1', 'Act 1 Scene 2', 'Act 1 Scene 3', and several 'snapshot0000' through 'snapshot0010' entries, all with a 'full' type and 'Recording' channel type.

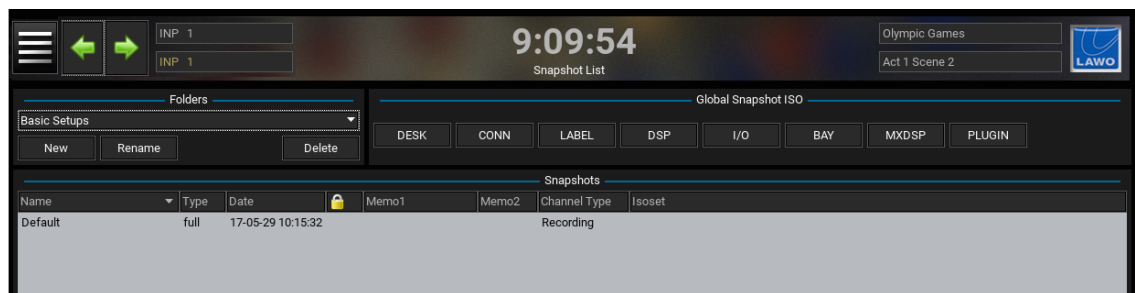
Name	Type	Date	Memo1	Memo2	Channel Type	IsoSet
Act 1 Scene 1	full	09-08-12 14:18:34			Recording	
Act 1 Scene 2	full	09-08-12 14:20:02	Soloist A		Recording	
Act 1 Scene 3	full	09-08-12 14:20:36			Recording	
snapshot0000	full	09-08-12 14:18:26			Recording	
snapshot0001	full	09-08-12 14:18:28			Recording	
snapshot0002	full	09-08-12 14:18:32			Recording	
snapshot0010	full	09-08-12 14:18:38			Recording	

2. To change folder, click on the folder name - a drop-down menu appears listing all Folders stored in the active Production:



Note that the active Production is always shown in the top right of the Title Bar (e.g. **Olympic Games**). If you wish to change production, then go to the [Productions](#) display.

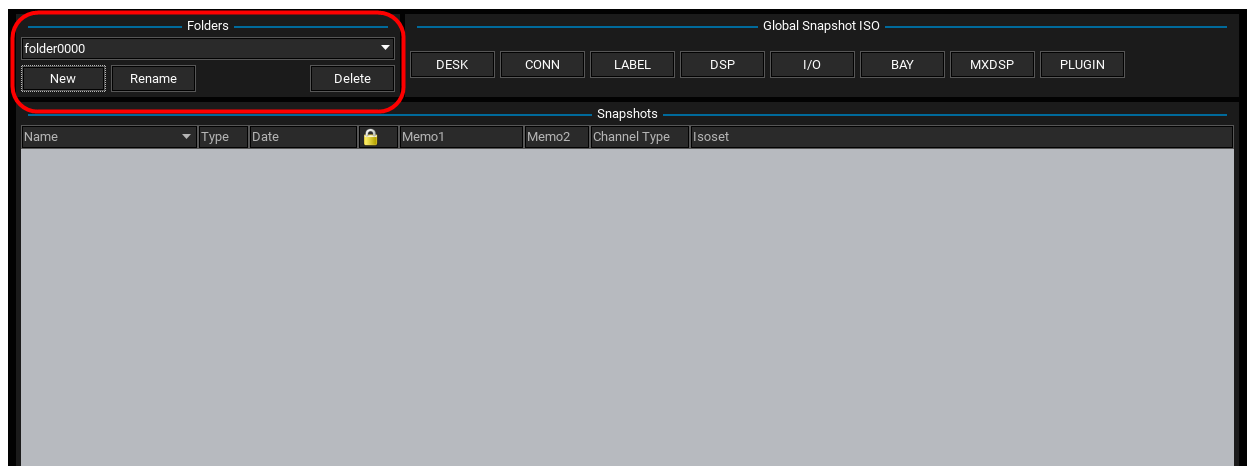
Having made a selection, the **Snapshots** list updates accordingly - in our example, there is one snapshot (named **Default**) stored in the **Basic Setups** folder:



## Folder Operations

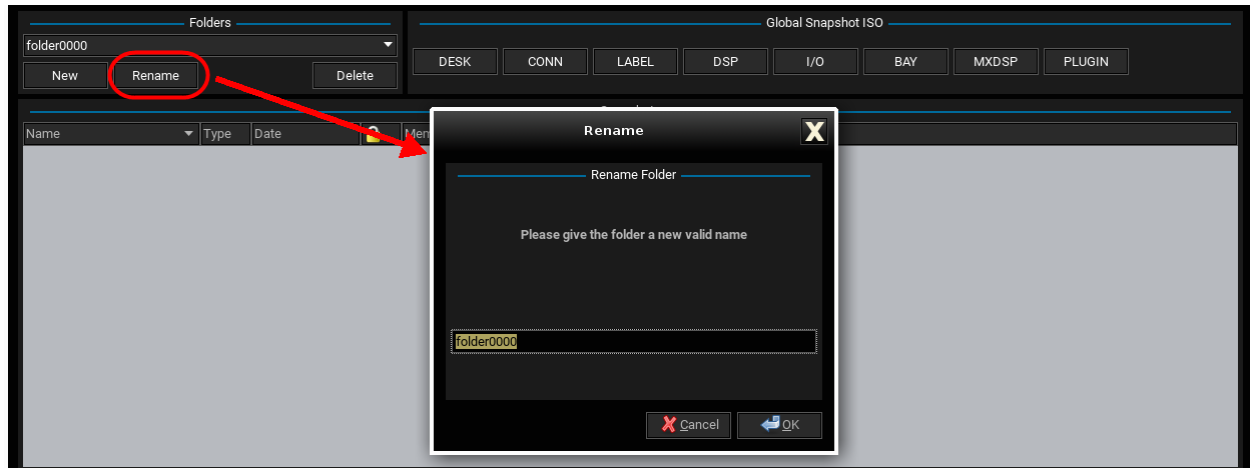
### ➤ To create a new folder:

1. From the **Folders** area select the **NEW** button, or press the **NEW** [soft key](#) - a new folder appears with a default name (e.g. **folder 0000**):



### ➤ To rename a folder:

1. Select **Rename** to rename the current folder - a pop-up window appears:



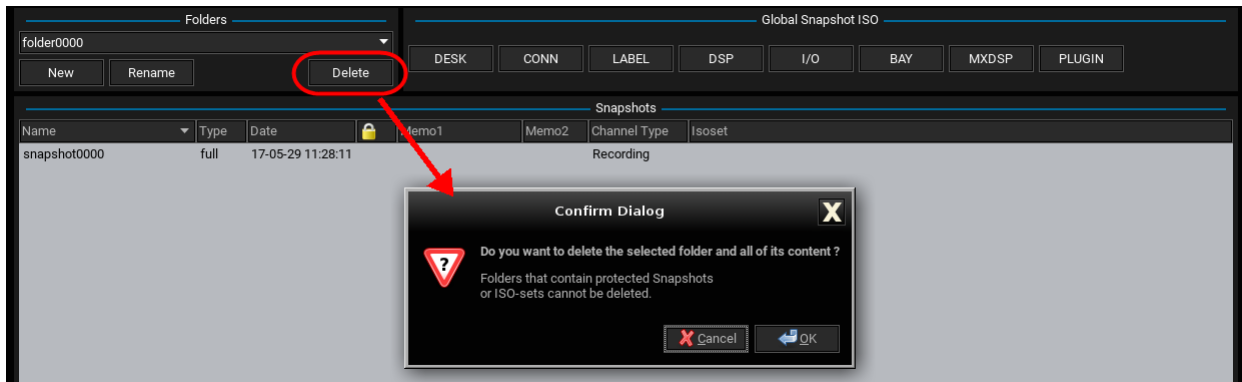
2. Enter a new name using the keyboard.

Click once to select all the text, or twice to modify an existing name (you will see a flashing cursor).

3. To confirm, press ENTER/**OK**. Or, to exit without making a change, press ESCAPE/**Cancel**.

➤ **To delete a folder:**

1. Select the folder you wish to delete from the **Folders** list.
2. Select the **Delete** button or press the **DELETE** [soft key](#):



If a folder contains snapshots, fade sets, oversnaps or ISO-sets that are protected, then it cannot be deleted. Therefore, you will need to unprotect or delete these items (from the relevant displays) if you wish to continue.

3. To confirm, select **OK**. Or, **Cancel** to abort the operation.

➤ **Importing and Exporting Folders**

A complete folder can be imported and exported to a USB interface, mxGUI computer or network drive. This allows you to archive or transfer folders between systems. See [File Import/Export](#) for details.

### 16.4.3 Loading a Snapshot

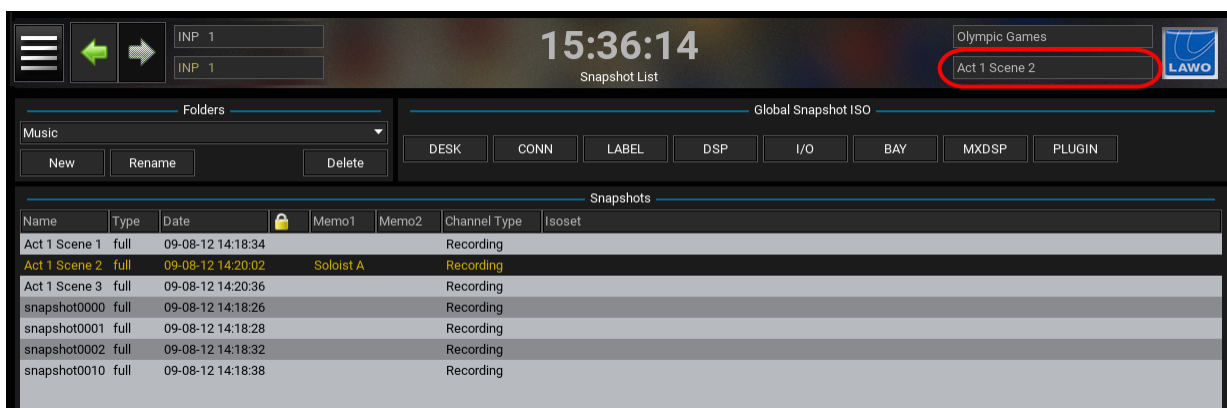
You can load stored settings to the console at any time, even while on-air, by loading a snapshot.

If [snapshot offsets](#) are active, then they are applied to the loaded parameters.

Any isolated objects are *not* reset by the snapshot load. You can isolate individual channels, individual signals, or global console elements, see [Snapshot Isolate](#).

1. Select a snapshot from the **Snapshots** list (e.g. **Act 1 Scene 2**).
2. Select the on-screen **Load** button, press the **LOAD** soft key, or right-click and select **Load** to complete the operation.

The console instantly updates and the [title bar](#) shows that **Act 1 Scene 2** is now the active snapshot:



### 16.4.4 Snapshot Isolate

Before loading a snapshot you can isolate certain objects, so that they are *not* reset by the snapshot load. You can choose to isolate individual channels, individual modules within specific channels, individual signals, or global console elements. Snapshot isolates are stored and recalled by productions.

#### Isolating Channels (SNAP ISO)

To isolate a complete channel, select its **SNAP ISO** button. This isolates all the channel's DSP settings including analog input control, see [Channel processing](#).

**SNAP ISO** can be programmed onto a fader strip [user button](#), or selected from the Central Control Section [CHANNEL](#) buttons.

Note that the [Isolate](#) option, on the **System Settings** display, prohibits the selection of **SNAP ISO** buttons across the console.

#### Isolating Channel DSP Modules (Module ISO)

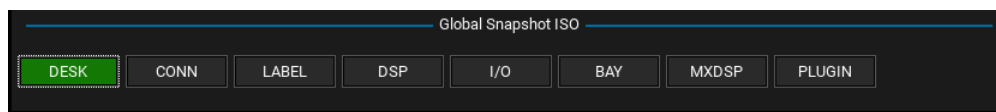
To isolate individual channel DSP modules, on a per channel basis, you can apply a Module [ISO Set](#). Different ISO sets can be stored and recalled, and linked to individual snapshots, providing a powerful tool for both front of house and live theatre applications.

#### Isolating Signals

To isolate an individual source or destination, select the [Isolate](#) function on the **Signal List** display.

#### Global Snapshot ISO

To isolate global console elements from a snapshot recall, enable the following buttons on the [Snapshot List](#) display:



The buttons apply globally across the system; for example, select **DESK** to protect the layout of your fader strips, but still recall all of your DSP settings, signal routing, etc.

- **DESK**: the assignment of channels to fader strips across all banks and layers, and the current status of bank and layer switching.
- **CONN**: signal routing connections for all sources and destinations (via the **Signal List** or **mx Routing** displays).
- **LABEL**: User and Source Labels.
- **DSP**: all channel DSP settings including analog input control.
- **IO**: remote mic preamp and router IO settings such as router level and word length.
- **BAY**: the assignment of channels to fader strips across all banks and layers, and the current status of bank and layer switching for [isolated](#) fader bays.
- **MXDSP**: all settings for the optional mxDSP modules.
- **PLUGIN** - all settings stored on the optional remote plug-in server.

### 16.4.5 Saving a Snapshot

You can save the current settings of the console into a new snapshot using **SAVE**.

All settings are always saved into a snapshot regardless of the [snapshot isolate](#) status.

1. Select the folder you wish to save into on the left of the **Snapshot List** display.
2. Then select the on-screen **Save** button.

The current settings are saved into a new snapshot which is given a default name (e.g. **snapshot 0011**):

Snapshots							
Name	Type	Date		Memo1	Memo2	Channel Type	Isoset
Act 1 Scene 1	full	09-08-12 14:18:34				Recording	
Act 1 Scene 2	full	09-08-12 14:20:02		Soloist A		Recording	
Act 1 Scene 3	full	09-08-12 14:20:36				Recording	
snapshot0000	full	09-08-12 14:18:26				Recording	
snapshot0001	full	09-08-12 14:18:28				Recording	
snapshot0002	full	09-08-12 14:18:32				Recording	
snapshot0010	full	09-08-12 14:18:38				Recording	
snapshot0011	full	17-05-29 15:52:17				Recording	

The snapshot is time and date stamped, marked as a **full** snapshot, and automatically becomes the active snapshot as indicated in the [title bar](#).

Note that the **Save Partial** screen button or **PARTIAL** soft key is used to save a [partial snapshot](#).

### 16.4.6 Renaming a Snapshot

1. Click on the snapshot name:

Snapshots							
Name	Type	Date		Memo1	Memo2	Channel Type	Isoset
Act 1 Scene 1	full	09-08-12 14:18:34				Recording	
Act 1 Scene 2	full	09-08-12 14:20:02		Soloist A		Recording	
Act 1 Scene 3	full	09-08-12 14:20:36				Recording	
snapshot0000	full	09-08-12 14:18:26				Recording	
snapshot0001	full	09-08-12 14:18:28				Recording	
snapshot0002	full	09-08-12 14:18:32				Recording	
snapshot0010	full	09-08-12 14:18:38				Recording	
snapshot0011	full	17-05-29 13:13:01				Recording	

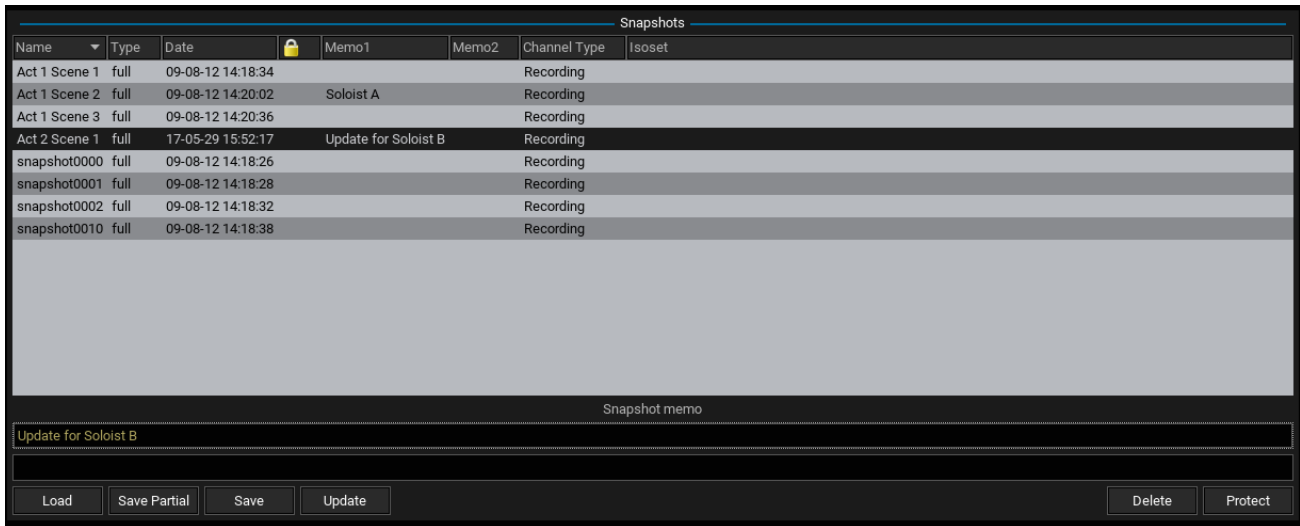
Click once to select all the text, or twice to modify an existing name (you will see a flashing cursor).

2. Enter a new name using the keyboard.
3. To confirm, press **ENTER**. Or, to exit without making a change, press **ESCAPE**.

### 16.4.7 Adding a Memo

You can use the two **Snapshot Memo** lines to add memo information. For example, you may wish to remind yourself about the artist's position on stage for a particular snapshot.

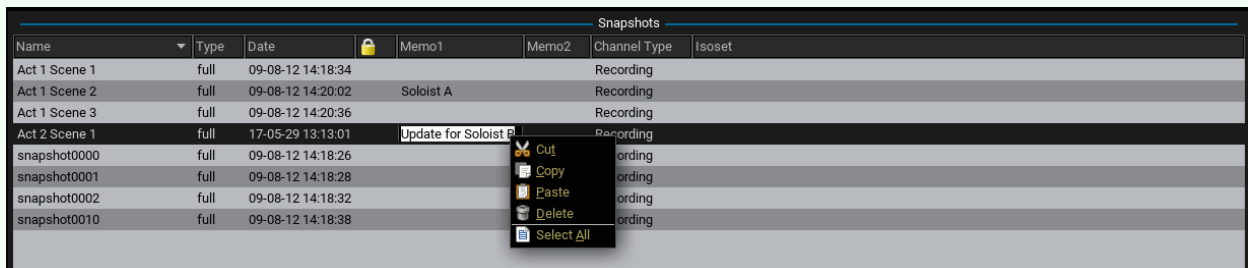
1. Select the snapshot and then select a line in the **Snapshot Memo** field - a black cursor appears.
2. You can now type to enter your information from the keyboard:



The first and second memo lines appear beside the snapshot name in the **Snapshots** list. You can enter as many characters as you wish in each line; the list will automatically resize to fit.

If you cannot enter any memo text, check that the snapshot is not [protected](#).

Right-click on the memo field to **Copy** and **Paste** the text to another snapshot:



You can also [drag and drop](#) the **Memo** columns to change their position on the display.

### 16.4.8 Updating a Snapshot

You can save the current settings of the console into an existing snapshot using **UPDATE**.

Updating a snapshot overwrites it. Therefore, make sure you select the correct snapshot to update; there is no undo from this operation!

If a snapshot is [protected](#), then it cannot be updated. (Use **Protect** to safeguard any important snapshots which you do not want to accidentally overwrite).

1. Select the snapshot you wish to update from the **Snapshots** list (e.g. **Act 1 Scene 3**):

Snapshots							
Name	Type	Date		Memo1	Memo2	Channel Type	Isoset
Act 1 Scene 1	full	09-08-12 14:18:34				Recording	
Act 1 Scene 2	full	09-08-12 14:20:02		Soloist A		Recording	
Act 1 Scene 3	full	09-08-12 14:20:36				Recording	
Act 2 Scene 1	full	17-05-29 15:52:17		Update for Soloist B		Recording	
snapshot0000	full	09-08-12 14:18:26				Recording	
snapshot0001	full	09-08-12 14:18:28				Recording	
snapshot0002	full	09-08-12 14:18:32				Recording	
snapshot0010	full	09-08-12 14:18:38				Recording	

Snapshot memo

Load

Save Partial

Save

Update

Delete

Protect

2. Select the on-screen **Update** button, press the **UPDATE** soft key, or right-click and select **Update**.

The selected snapshot is overwritten with the current settings. You can confirm this by looking at the new date and time stamp.



## 16. Console Reset

### 16.4.9 Protect & Delete

#### Protect

A protected snapshot cannot be [updated](#) or deleted. You can use this safeguard any important snapshots which you do not want to accidentally overwrite or delete.

1. Select a snapshot from the **Snapshots** list.
2. Select the on-screen **Protect** button, press the **PROTECT** soft key, or right-click and select **Protect**.

The padlock icon indicates that the snapshot is now protected:

Snapshots						
Name	Type	Date		Memo1	Memo2	Channel Type
Act 1 Scene 1	full	09-08-12 14:18:34				Recording
Act 1 Scene 2	full	09-08-12 14:20:02		Soloist A		Recording
Act 1 Scene 3	full	09-08-12 14:20:36				Recording
Act 2 Scene 1	full	17-05-29 15:52:17		Update for Soloist B		Recording
snapshot0000	full	09-08-12 14:18:26				Recording
snapshot0001	full	09-08-12 14:18:28				Recording
snapshot0002	full	09-08-12 14:18:32				Recording
snapshot0010	full	09-08-12 14:18:38				Recording

Snapshot memo						

Load

Save Partial

Save

Update

Delete

Unprotect

3. Select the snapshot followed by **Unprotect** to remove the protection - the padlock icon disappears.

#### Delete

Delete removes the snapshot from the internal memory.

1. Select a snapshot from the **Snapshots** list.
2. Select the on-screen **Delete** button, or press the **DELETE** soft key, or right-click and select **Delete**:

Snapshots						
Name	Type	Date		Memo1	Memo2	Channel Type
Act 1 Scene 1	full	09-08-12 14:18:34				Recording
Act 1 Scene 2	full	09-08-12 14:20:02		Soloist A		Recording
Act 1 Scene 3	full	09-08-12 14:20:36				Recording
snapshot0000		09-08-12 14:18:26				Recording
snapshot0001		09-08-12 14:18:28				Recording
snapshot0002		09-08-12 14:18:32				Recording
snapshot0010		09-08-12 14:18:38				Recording

Load

Update

Update Partial

Protect

Delete

If a snapshot is [protected](#), then it cannot be deleted. (Use **Protect** to safeguard any important snapshots which you do not want to accidentally delete).

### 16.4.10 Backup Snapshots

Backup snapshots can be used to provide levels of undo.

You can set how often the backup snapshots are stored and how many are held in memory from the **System Settings** display, using the [Backup Snapshot](#) options.

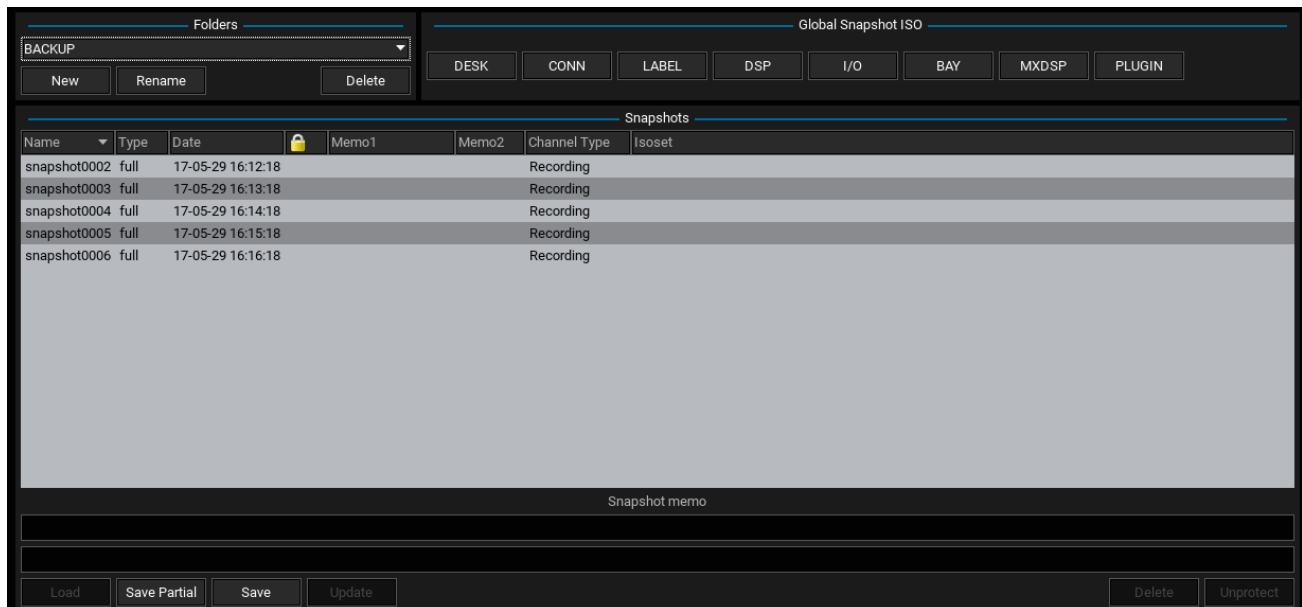
For example, you can set the backup snapshot interval to every 5 minutes, and limit the number to 12 backup snapshots giving yourself a 1 hour 'undo' window.

Note that you can disable backup snapshots by setting the number to 0. This can be a good idea during on-air operation, as each automatic save causes a brief interruption to console control.

All the backup snapshots for a particular production are stored within a special [folder](#) named **BACKUP**; this folder cannot be deleted. However, you can rename the folder if you wish to keep the last set of backup snapshots. After the next backup snapshot interval, a new **BACKUP** folder will be created.

At any time, you can use the backup snapshot system to revert to an earlier configuration:

1. Select the **BACKUP** folder at the top left of the **Snapshot List** display - the **Snapshots** list now shows all the backup snapshots, each one date and time stamped:



Name	Type	Date	Memo1	Memo2	Channel Type	Isoset
snapshot0002	full	17-05-29 16:12:18			Recording	
snapshot0003	full	17-05-29 16:13:18			Recording	
snapshot0004	full	17-05-29 16:14:18			Recording	
snapshot0005	full	17-05-29 16:15:18			Recording	
snapshot0006	full	17-05-29 16:16:18			Recording	

2. Select a backup snapshot from the list, and select **Load** - the console updates to the backup snapshot settings.

Note that the backup snapshot load works in the same manner as a normal snapshot [load](#). Therefore, any snapshot isolates will be applied.

### 16.4.11 Importing and Exporting Snapshots

Individual snapshots can be imported and exported to a USB interface, mxGUI computer or network drive. This allows you to archive or transfer snapshots between systems. See [File Import/Export](#) for details.

## 16.5 Cuelists

For convenient recall of [snapshots](#) and other output events during a live show, the **mc²66 MKII** provides real-time "cuelist" automation.

A cuelist contains a series of "cue points" which can be loaded in sequence. Each cue point can load a snapshot, a series of output events or a combination of both. Output events can be specific channel parameters (e.g. open a fader), load events (e.g. load a DSP preset), global operations (e.g. clear snapshot ISOs) or remote events such as GPIOs or MIDI messages. By combining a snapshot load with multiple output events, you can execute a complex set of changes from each change of cue!

Note that cue points do not store any actual settings, but are pointers to snapshots and output events within the active production. Multiple cuelists can be created and stored in [folders](#). This allows you to create a cuelist for each version of a show. Cuelists and their folders are written onto the user data flash card when you [save](#) or [update](#) a production.

The [Cuelist](#) display is used to create, edit and play out the automation. In summary:

- You can save snapshots and cue points into a cuelist as you work through a rehearsal. This approach works well when the rehearsal runs in the same order as the show, as you can save each snapshot and add it to the cuelist in one operation.
- You can add existing snapshots into a cuelist at any time. For example, if the rehearsal is unlikely to follow the same running order as the show, then it may be better to save your snapshots into a folder from the [Snapshot List](#) display, and then create the cuelist at a later time.
- Cue points can load any snapshot stored in the active production (in any folder), but NOT snapshots stored in a different production. Therefore, if you are saving snapshots which you intend to use in a cuelist later, make sure that they are saved in the same production. If not, you will need to copy the snapshot folder(s), see [Copying Files Internally](#).
- To fade automatically from one cue to the next, the cue points must load a snapshot and a fade set. The fade set specifies the channels and modules which will crossfade. You can link the same fade set to multiple snapshots, or fade sets can be snapshot-specific. Thus, you can define exactly which parameters will crossfade at each change of cue.
- At any time you can edit a cue point to change its snapshot or include other output events.
- During play out, you can load the cue points in sequence, or choose to skip or revert to the previous cue at the touch of a button.
- Finally, cue points themselves can be triggered by an event. For example, to trigger a specific cue change from a GPI input.

Use the [SNAPSHOT/SEQUENCE](#) front panel to access the most important play out functions.

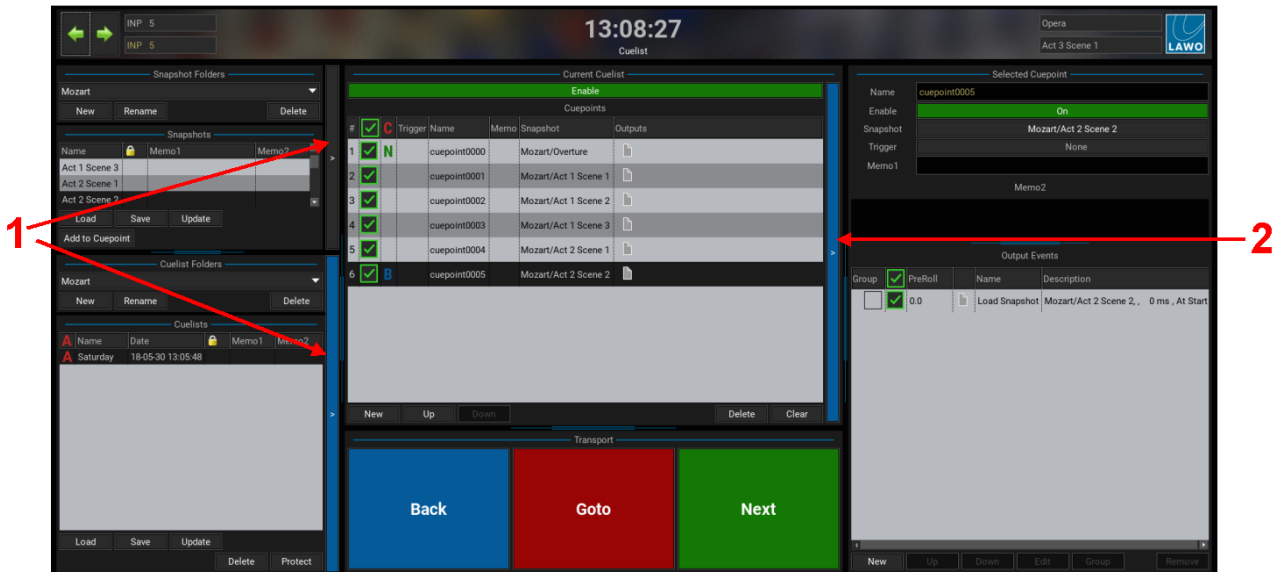
You can apply offsets to each snapshot load using the [Snapshot Trim Sets](#) display. This is great if there are last minute changes you wish to make to the whole show.

You can also apply snapshot isolates to protect global elements, individual channels or DSP modules, see [Snapshot Isolate](#) and [Module ISO](#).

The **Cuelist** display is used to create, edit and play out cuelists.

## 16.5.1 The Cuelist Display

1. [Open](#) the **Cuelist** display on the Central GUI. Our example shows a pre-prepared cuelist:



On the left you will see all the **Snapshots** within the selected **Snapshot Folder**, and all the **Cuelists** within the selected **Cuelist Folder**. From here you can manage the folders, save new snapshots and manage the cuelists. If a cuelist has already been saved, then it will appear in the **Cuelists** area (e.g. **Saturday**).

The middle of the display can be toggled between two views: the **Snapshots** stored in the selected Snapshot Folder OR the **Current Cuelist** - click on the blue access bars (1) to change the view.

When viewing the **Current Cuelist**, you will see the following information for each cuepoint:

- **#** - the cuepoint index.
- Individual Enable (Tickbox) - enables (or disables) a cuepoint during payout.
- **B, C or N** - indicates the Back, Current or Next cue point to be actioned during payout
- **Trigger** - assigns an input trigger to the cue point.
- **Name & Memo** - here you can name the cuepoint and add a memo.
- **Snapshot** - shows the snapshot assigned to the cuepoint in the format: "SnapshotFolderName" / "SnapshotName"
- **Outputs** - here you will see icons indicating the type of event(s) assigned to the cuepoint.

Use the **Enable** button (at the top of the area) to enable or disable the cuelist automation.

The **New**, **Up/Down**, **Delete** and **Clear** buttons can be used to manage cuepoints in the list. The **Back**, **Goto** and **Next** buttons (in the Transport area) will play out the cuelist.

On the right, you can reveal which **Output Events** are assigned to the **Selected Cuepoint** - in our example, **cuepoint0005** will recall the snapshot named "**Act 2 Scene 2**" from the snapshots folder "**Mozart**". The blue access bar (2) can be used to show or hide this area.

Note that you will see the names of the Back, Current and Next cuepoints in the status bar once cuelist automation is enabled) - for example:



## 16.5.2 Changing Views

The middle of the display can be toggled between two views by clicking on the blue access bars (upper or lower): the **Snapshots** stored in the selected Snapshot Folder OR the **Current Cuelist**. In each case, you can show or hide a further area by clicking on the right access bar. The following screenshots show the four possible views:

*Snapshots list*



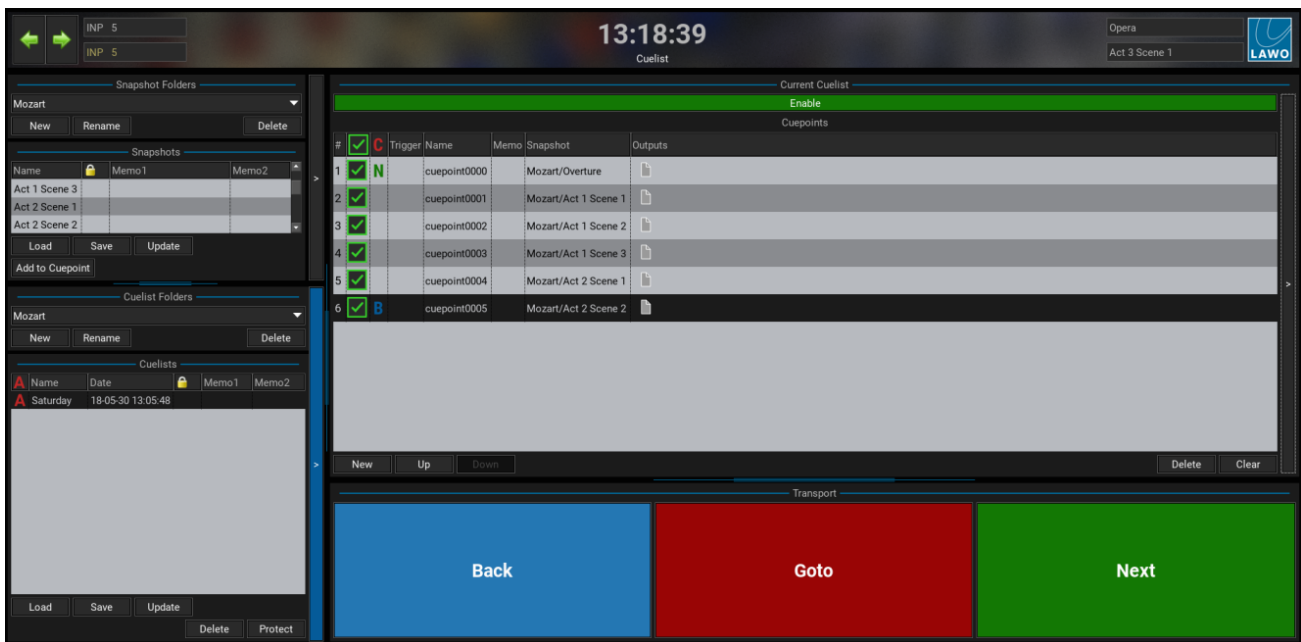
Name	Type	Date	Memo1	Memo2	Channel Type	Isoset
Act 1 Scene 1	full	10-04-29 13:11:46	Soloist appears from left		Recording	
Act 1 Scene 2	full	10-04-29 13:11:38			Recording	
Act 1 Scene 3	full	09-08-12 14:20:36			Recording	
Act 2 Scene 1	full	10-04-29 13:11:38			Recording	
Act 2 Scene 2	full	09-08-12 14:18:26			Recording	
Act 3 Scene 1	full	17-05-30 16:55:40			Recording	
Act 3 Scene 2	full	10-04-29 14:06:44			Recording	
Act 3 Scene 3	full	10-04-29 14:04:28			Recording	
Act 3 Scene 4	full	10-04-29 14:04:34			Recording	
Act 3 Scene 5	full	10-04-29 14:04:38			Recording	
Overture	full	10-04-29 14:04:06			Recording	

*Snapshots list with Fade Sets revealed*



Name	Type	Date	Memo1	Memo2	Channel Type	Isoset
Act 1 Scene 1	full	10-04-29 13:11:46	Soloist appears from left		Recording	
Act 1 Scene 2	full	10-04-29 13:11:38			Recording	
Act 1 Scene 3	full	09-08-12 14:20:36			Recording	
Act 2 Scene 1	full	10-04-29 13:11:38			Recording	
Act 2 Scene 2	full	09-08-12 14:18:26			Recording	
Act 3 Scene 1	full	17-05-30 16:55:40			Recording	
Act 3 Scene 2	full	10-04-29 14:06:44			Recording	
Act 3 Scene 3	full	10-04-29 14:04:28			Recording	
Act 3 Scene 4	full	10-04-29 14:04:34			Recording	
Act 3 Scene 5	full	10-04-29 14:04:38			Recording	
Overture	full	10-04-29 14:04:06			Recording	

*Current Cuelist*

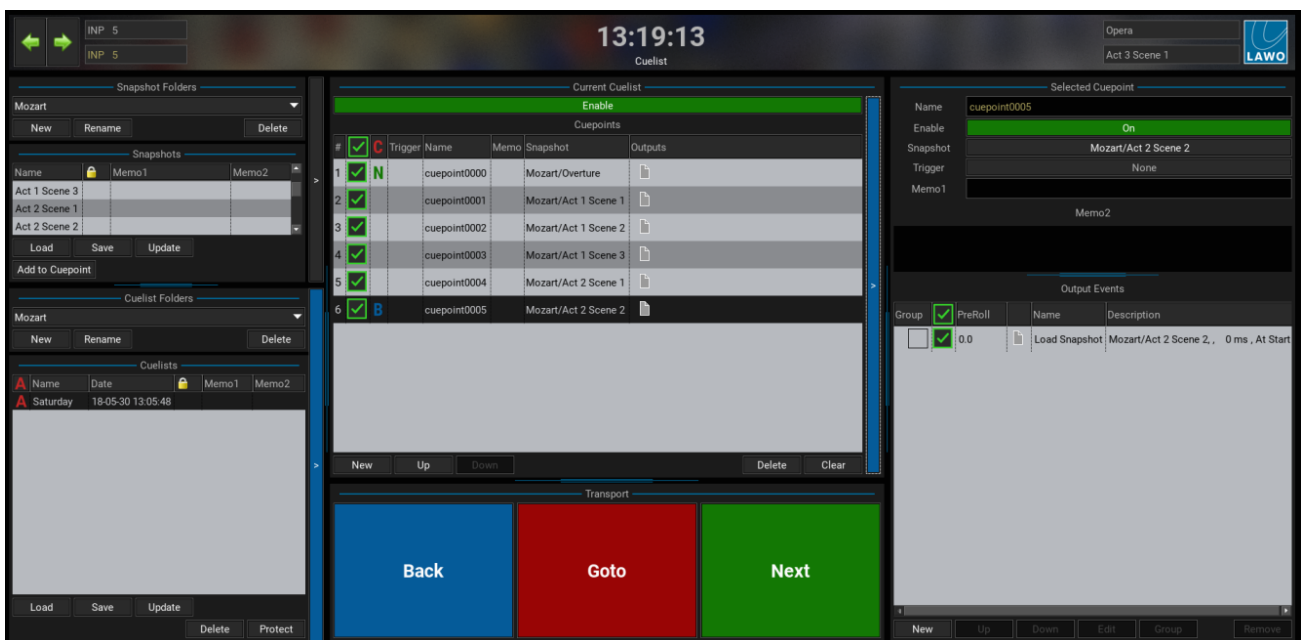


The screenshot shows the 'Current Cuelist' interface. At the top, the time is 13:18:39. The interface is divided into several sections:

- Left Panel:** Contains 'Snapshot Folders' and 'Cuepoint Folders' for 'Mozart'. It also has a 'Snapshots' table with columns for Name, Memo1, and Memo2. Below this are buttons for 'Load', 'Save', 'Update', 'Add to Cuepoint', 'Delete', and 'Protect'.
- Center Panel:** Displays the 'Current Cuelist' table with columns: #, Trigger, Name, Memo, Snapshot, and Outputs. The table contains 6 rows of cuepoints.
- Right Panel:** Shows 'Transport' controls with three large buttons: 'Back' (blue), 'Goto' (red), and 'Next' (green).

#	Trigger	Name	Memo	Snapshot	Outputs
1	<input checked="" type="checkbox"/> N	cuepoint000	Mozart/Overture		
2	<input checked="" type="checkbox"/>	cuepoint001	Mozart/Act 1 Scene 1		
3	<input checked="" type="checkbox"/>	cuepoint002	Mozart/Act 1 Scene 2		
4	<input checked="" type="checkbox"/>	cuepoint003	Mozart/Act 1 Scene 3		
5	<input checked="" type="checkbox"/>	cuepoint004	Mozart/Act 2 Scene 1		
6	<input checked="" type="checkbox"/> B	cuepoint005	Mozart/Act 2 Scene 2		

*Current Cuelist with Selected Cuepoint/Output Events revealed*



This screenshot shows the same 'Current Cuelist' interface, but with the 'Selected Cuepoint' and 'Output Events' panels expanded on the right side.

**Selected Cuepoint:**

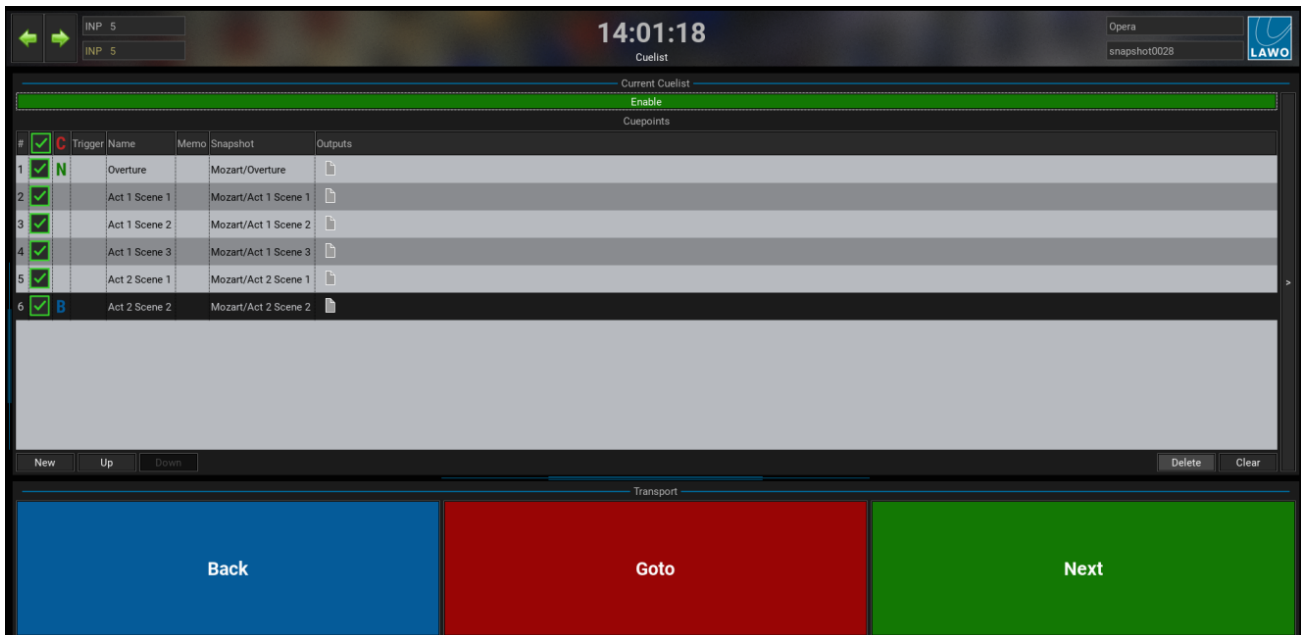
- Name: cuepoint005
- Enable: ☒ On
- Snapshot: Mozart/Act 2 Scene 2
- Trigger: None
- Memo1:
- Memo2:

**Output Events:**

Group	PreRoll	Name	Description
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0.0	Load Snapshot: Mozart/Act 2 Scene 2, 0 ms, At Start

In addition, you can click and drag on the blue dividing lines to increase or decrease the size of an area. For example, to hide the **Snapshots** and **Cuelists** areas (usually on the left of the display). This is ideal once a cuelist is prepared and you are ready for playback:

*Current Cuelist area maximised*

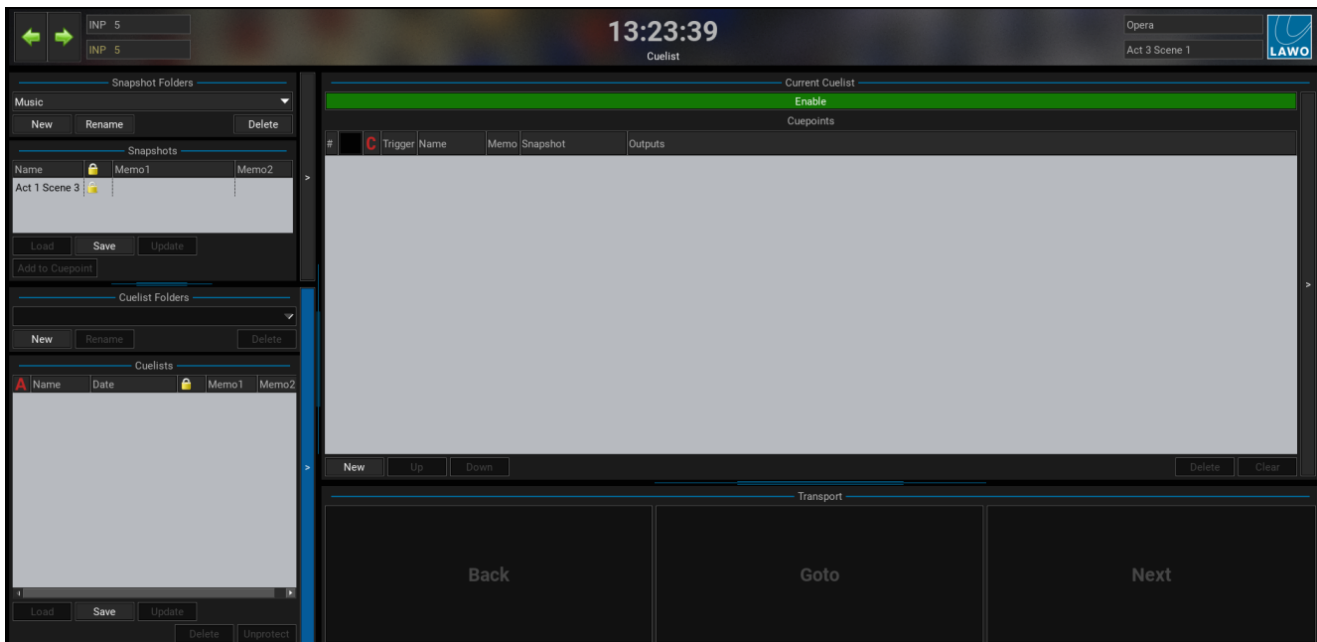


### 16.5.3 First Steps

To prepare a simple cuelist:

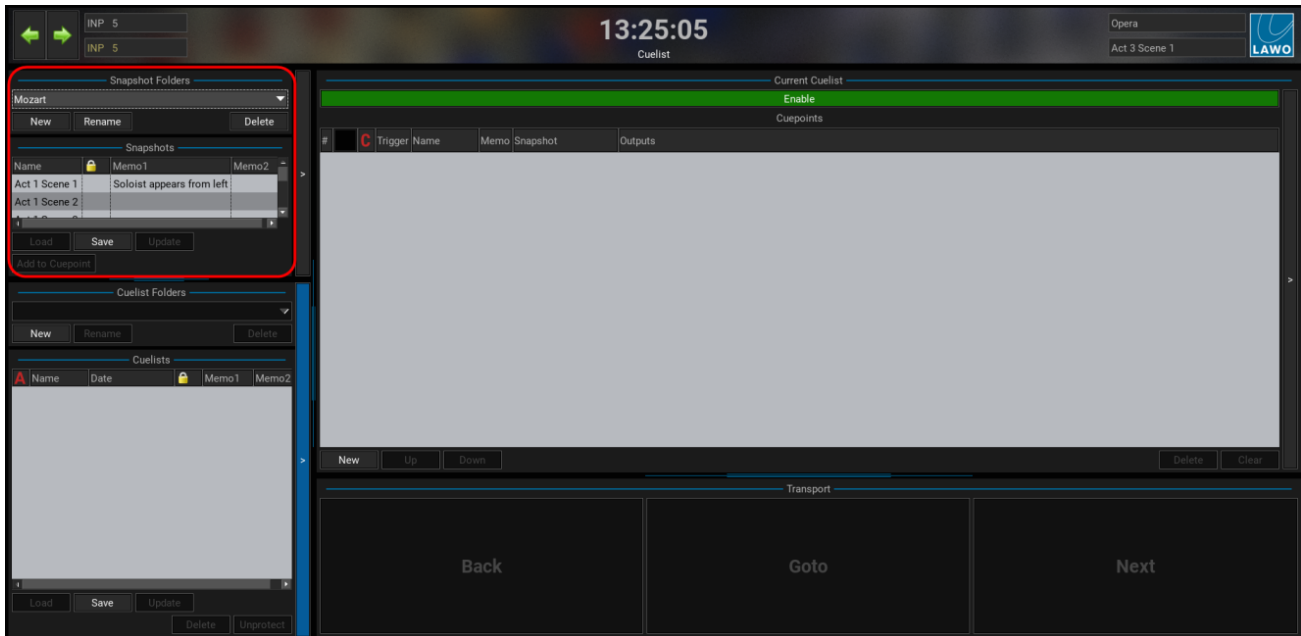
1. [Open](#) the **Cuelist** display on the Central GUI.

If there are no cuelists saved in the active production, then you will see an empty display like this:



## 2. First, select a **Snapshot Folder**.

This can be a folder containing existing snapshots OR the folder you wish to use to save new snapshots (via [Save](#) or [Save to Cuelist](#)). In our example, we have selected a folder named "Mozart" which contains some snapshots taken earlier (**Act 1 Scene 1**, **Act 1 Scene 2**, etc.). The contents of the selected folder appears in the **Snapshots** list:

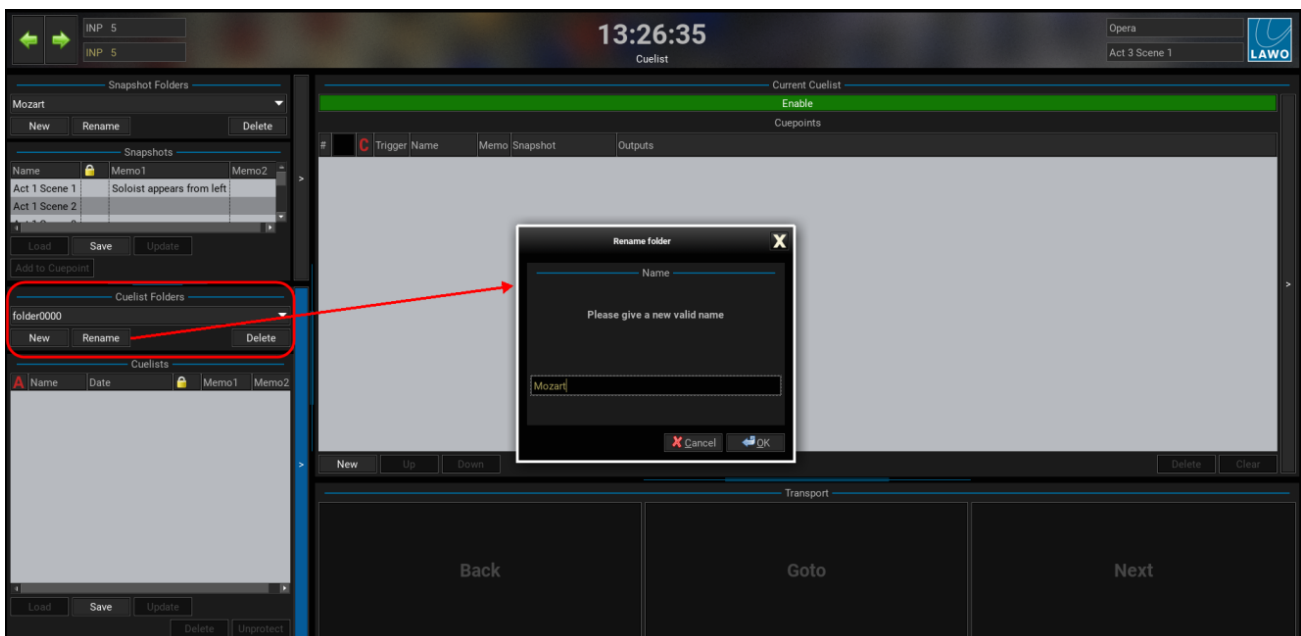


## 3. Next, select a **Cuelist Folder**, or create a [New](#) folder, to store your cuelist(s).

Multiple cuelists can be stored in each folder making it easy to store different versions of a cuelist for the same show.

Note that the cuelist folder is separate from the snapshot folder, and a cuelist can reference any snapshot in any snapshot folder as long as it is stored in the same production.

In our example, we have chosen to rename the folder (click on **Rename**). A pop-up window opens where can type in a new name. In our example, we are using the same name as for the snapshots folder. This is a good idea if the cuelists and snapshots are closely related.

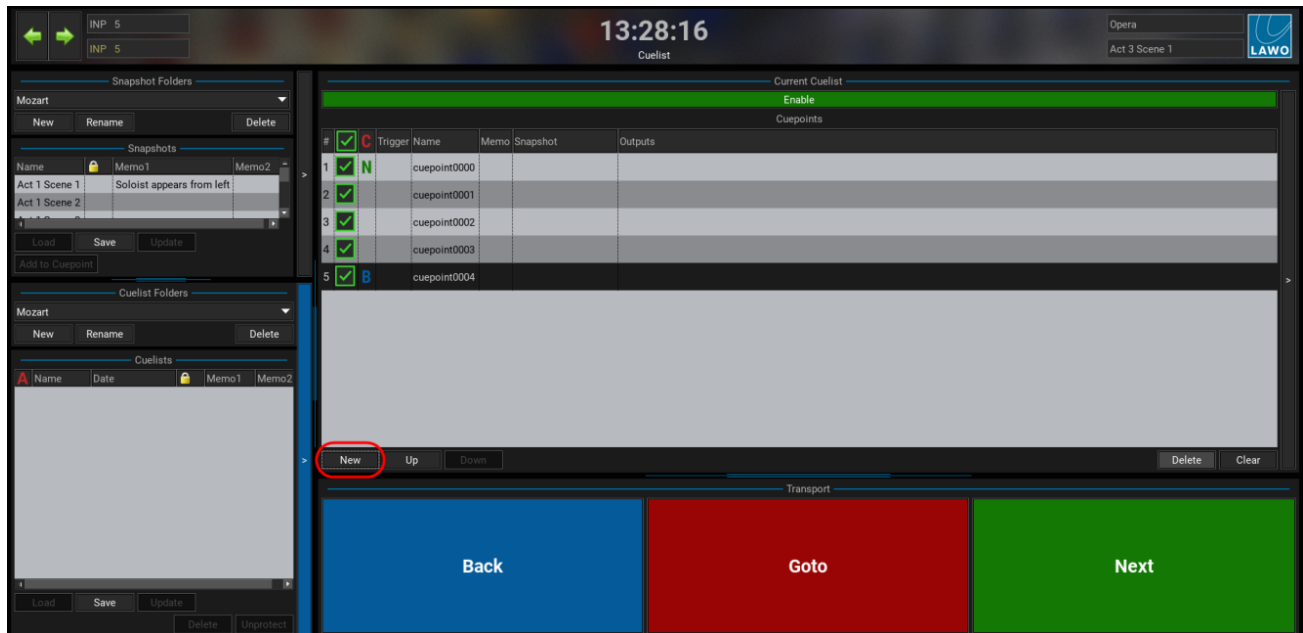


## 4. Next, add some cuepoints to the cuelist using either of the following methods:

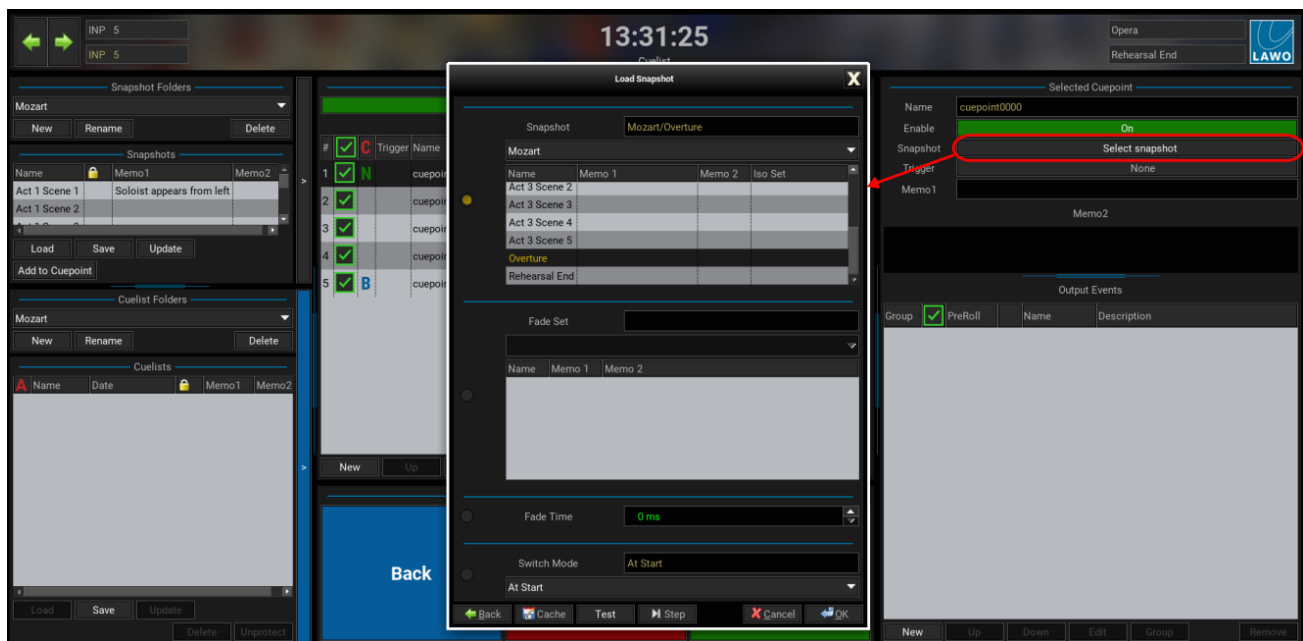


➤ **To add existing snapshots:**

Select **New** to add some new "empty" cue points:

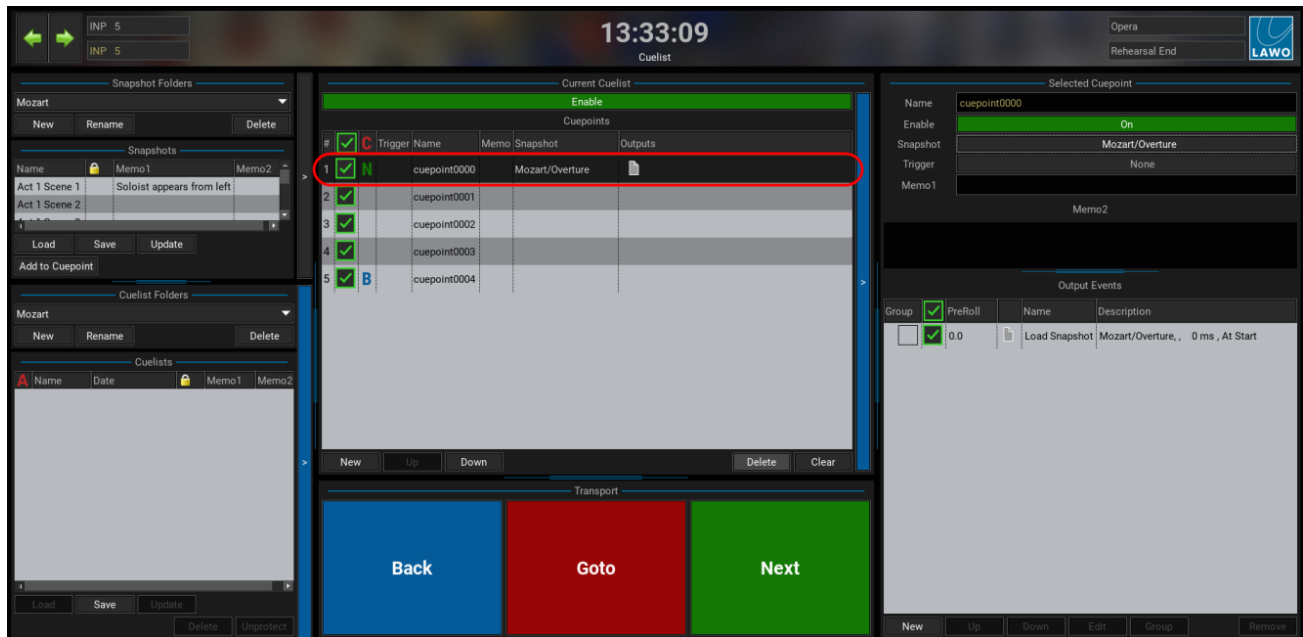


Then select a cuepoint, click on **Select snapshot** (from the **Selected Cuepoint** area) and choose the snapshot you wish to assign (from the pop-up window). Here you will see all the snapshots available in the selected **Snapshot Folder**. Confirm by selecting **OK**:



To assign consecutive snapshots to consecutive cuepoints, click on **Step** to make all the assignments before selecting **OK**. See [Using the Step Function](#) for more details.

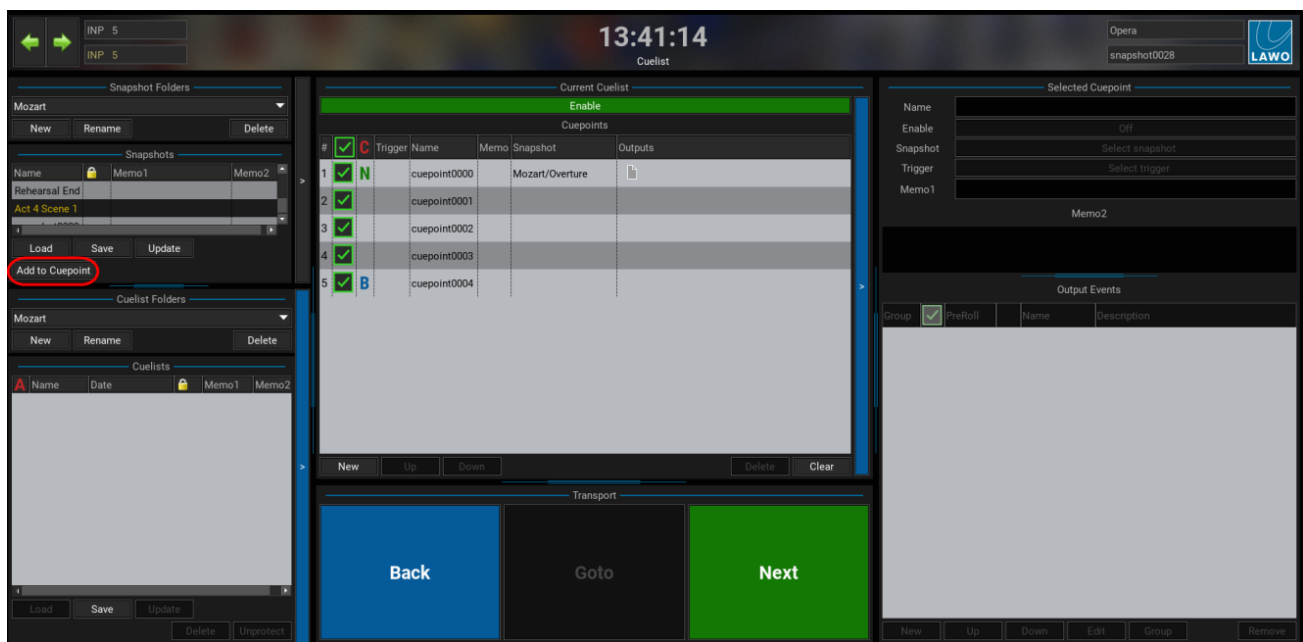
In our example, the snapshot **Overture** (stored in the snapshot folder **Mozart**) has been assigned to **cuepoint0000**:



## ➤ To save a new snapshot and add it as a cuepoint:

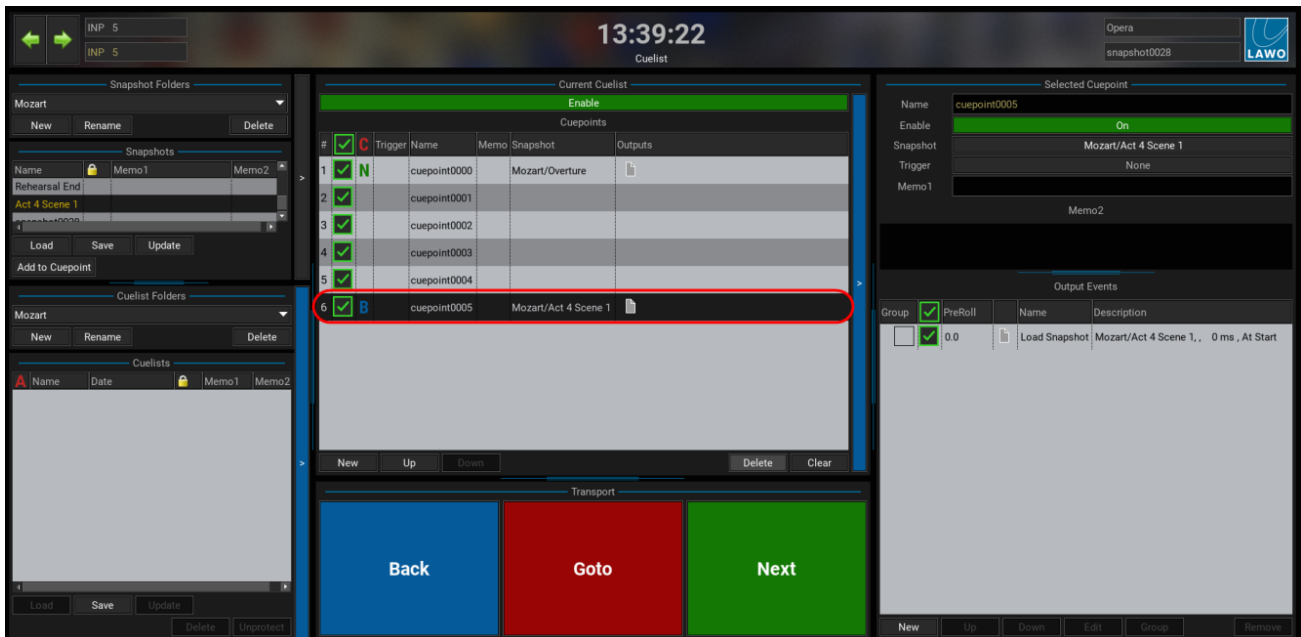
First select **Save** in the **Snapshots** area to save a new snapshot. You can rename it if you wish.

Then, select the snapshot and click on **Add to Cuepoint**:



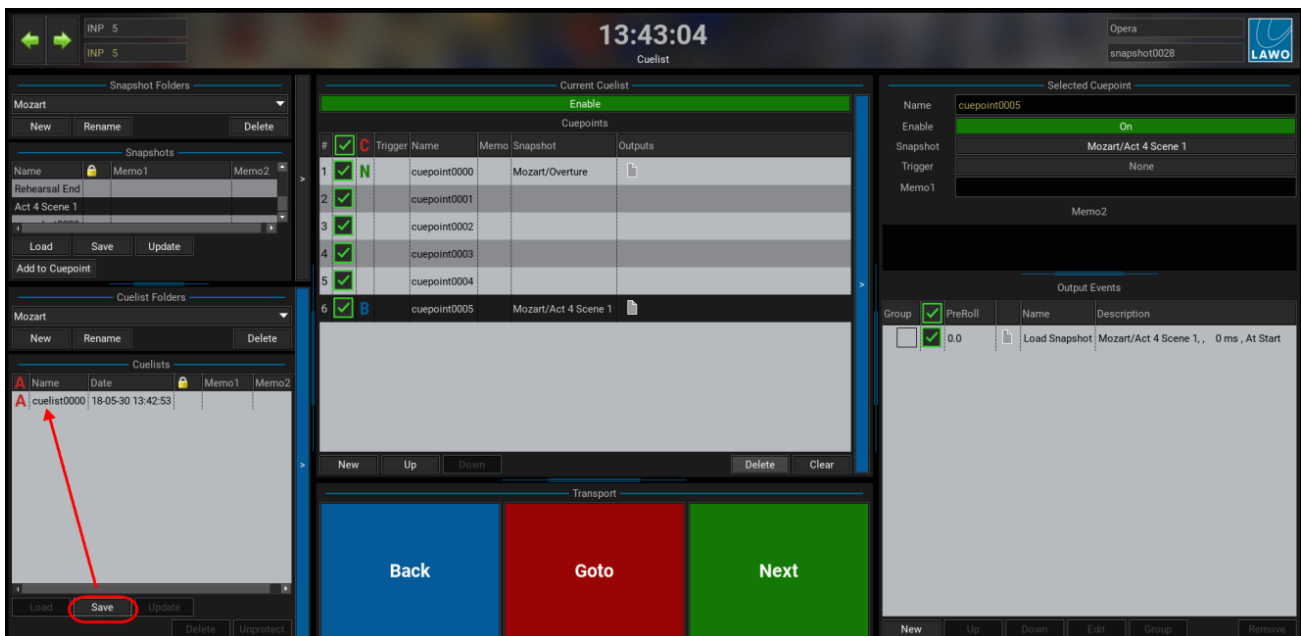
The snapshot is added as a new cuepoint.

Note that the snapshot takes the entered name (e.g. **Act 4 Scene 1**), while the cuepoint takes the next default name (e.g. **cuepoint0005**). You can [rename](#) the cuepoint later if you wish.



At any time, you can use the **Delete** button to delete the selected cue point, or **Clear** to clear the entire contents of the cuelist. Note that **Clear** will remove ALL cuepoints from the list and should be used with caution!

- Next, save the contents of the cuelist by clicking on **Save** (in the **Cuelists** area) - the cuelist is saved and named automatically (e.g. **cuelist0000**):

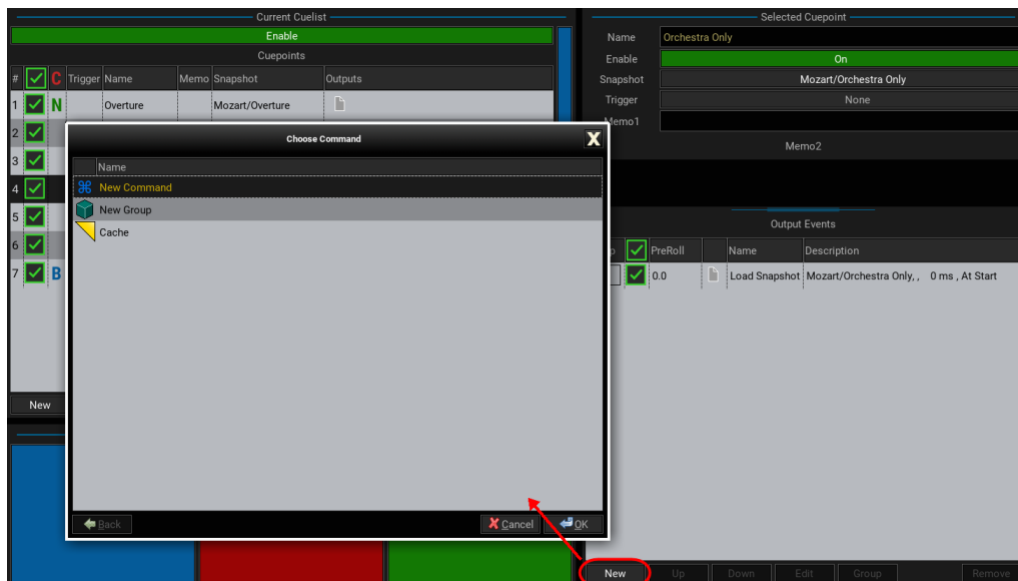


You can rename the cuelist by clicking in the name field and typing in a new name (e.g. **Saturday**).

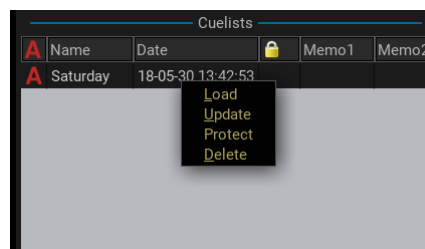
The cuelist is now prepared, saved and named, and you can use the **Back**, **Goto** and **Next** buttons (in the Transport area) to [playout](#) the cuelist.

6. At any time you can edit its contents by selecting a cuepoint and assigning a different snapshot or output event (from [Selected Cuepoint](#) area):

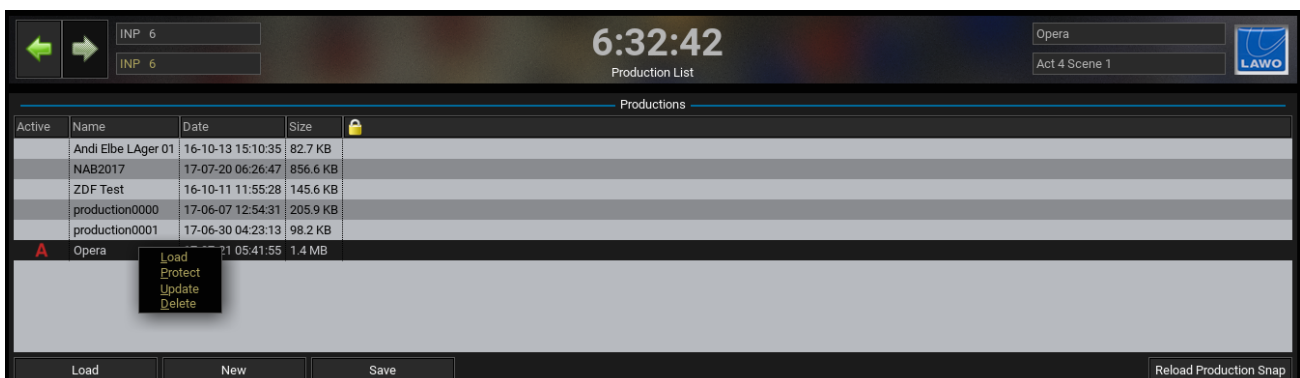
## Assign Output Event



7. If you make any changes, then you must update the cuelist (right-click and select **Update**):



8. And then either [update](#) (or [save](#)) the production:



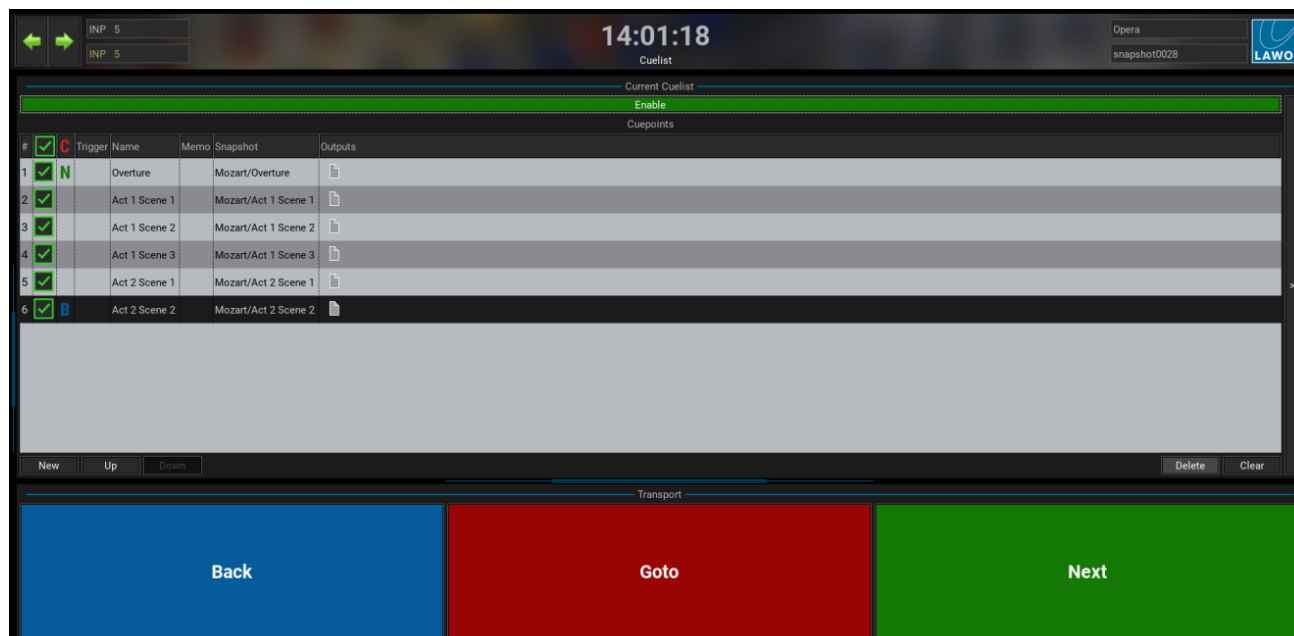
Note that you *MUST* perform steps 7 and 8 in order to save any changes, as Cuelists and their Folders are only written onto the user data flashcard when you update (or save) a production.

### 16.5.4 Running a Cuelist (Playout)

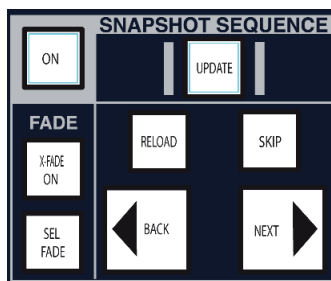
Once you have [prepared](#) some cuepoints, you can play out the cuelist in real time.

To do this, use the on-screen **Next** button in the **Cuelist** display's Transport area, or on the SNAPSHOT/SEQUENCE front panel. You may also wish to maximise the **Current Cuelist** area as shown in our example below, see [Changing Views](#).

*Cuelist Display*



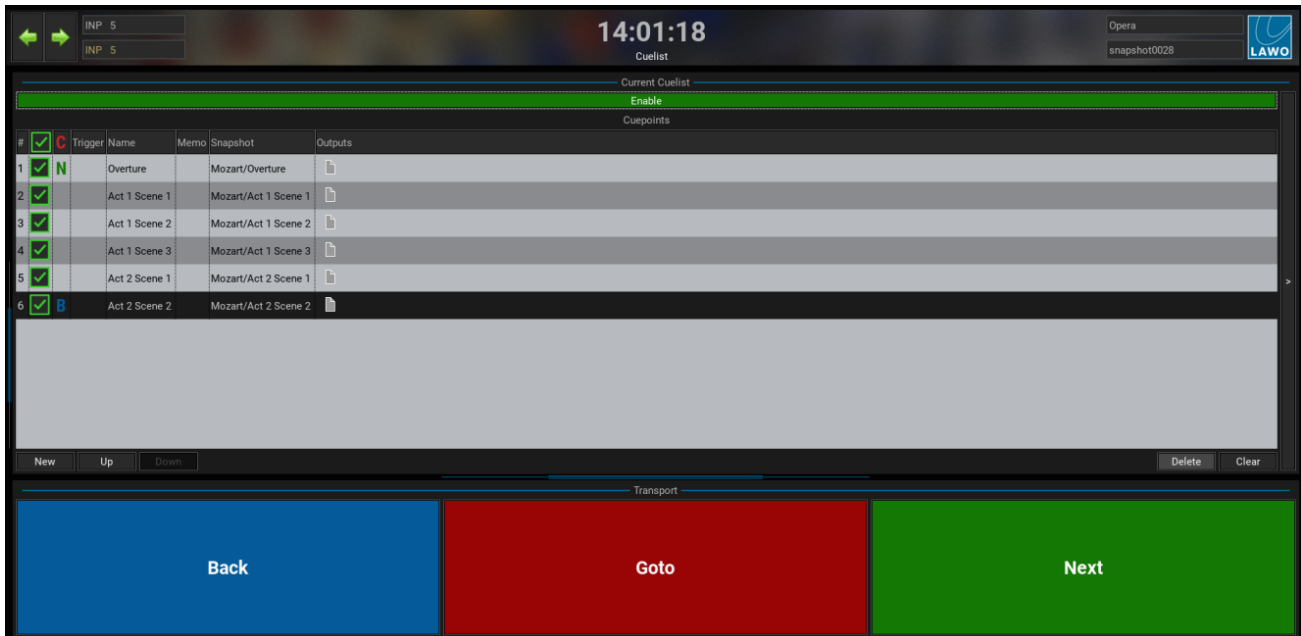
*SNAPSHOT/SEQUENCE Panel*



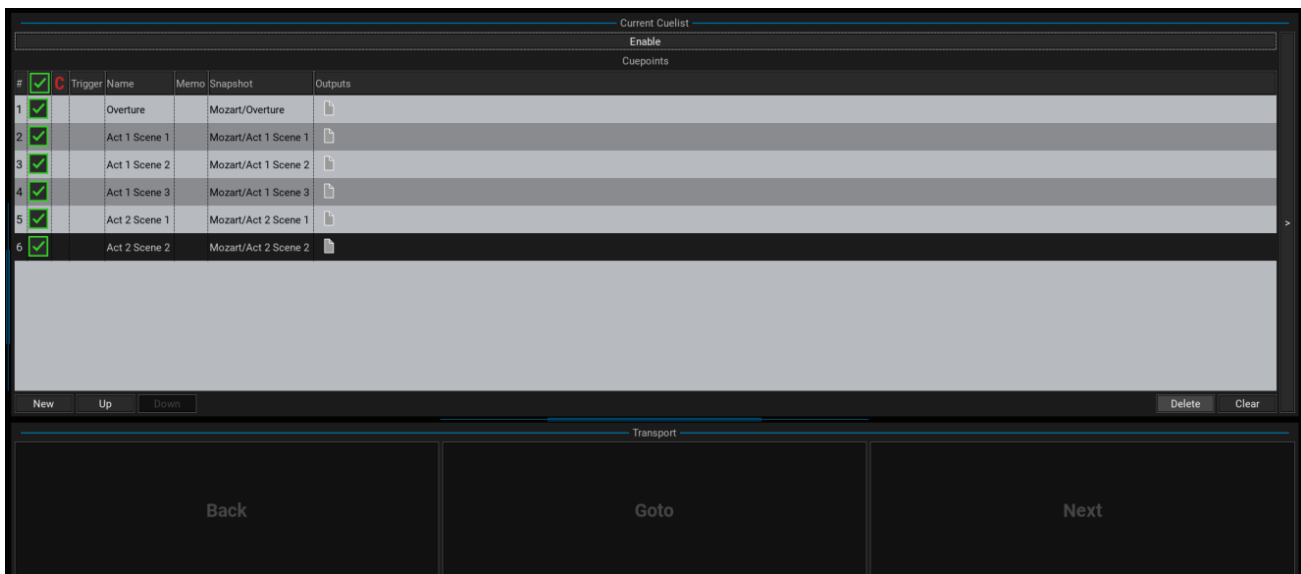
## Preparing for Payout

First, make sure that the cue list and its cuepoints are enabled for automation as follows:

1. Select either the **Enable** button (at the top of the **Current Cue list** area), or the [front panel ON](#) button, to enable the cue list automation:



If **Enable/ON** is turned off, then the **Transport** buttons are disabled (and greyed out like this):

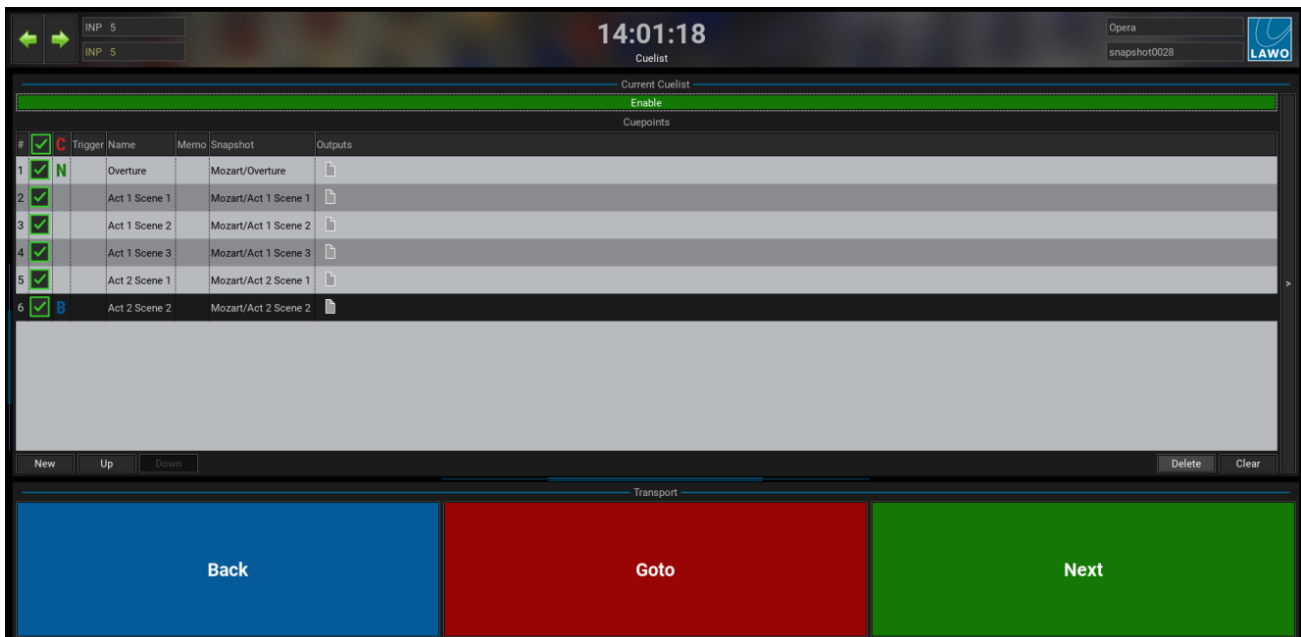


2. Make sure that the individual cuepoints are enabled (via the "enable" tickboxes).

You can use the tickboxes to include or exclude (skip) a cue if you wish.

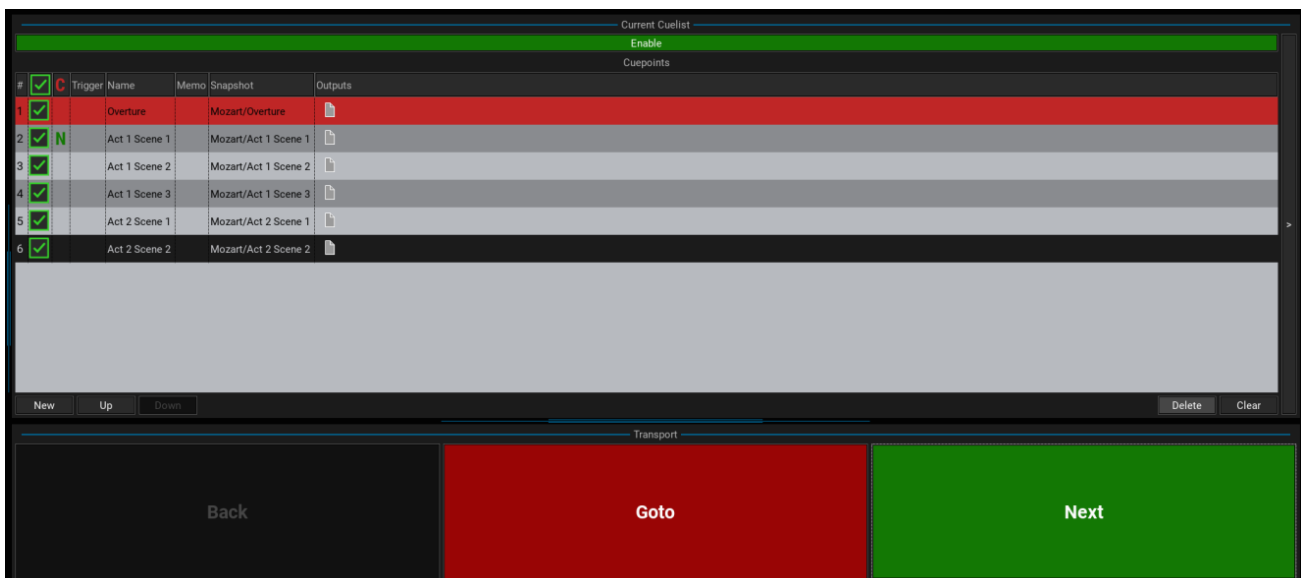
## Playout Operations

The first time you **Enable** the **Current Cuelist**, the **N** flag appears beside the first cuepoint in the list (e.g. **Overture**). This tells you that this cuepoint will be the next to play out when you press the **NEXT** button:



1. Press **NEXT** to start the play out.

If the cuepoint specifies a snapshot, then the snapshot is loaded according to any [snapshot isolates](#) and [offsets](#) you have applied. The cuepoint is marked with a **C** for Current and highlighted in red. In addition, the **N** flag moves down to the next cuepoint in the list:



If the snapshot does not load, check your [snapshot isolate](#) settings.

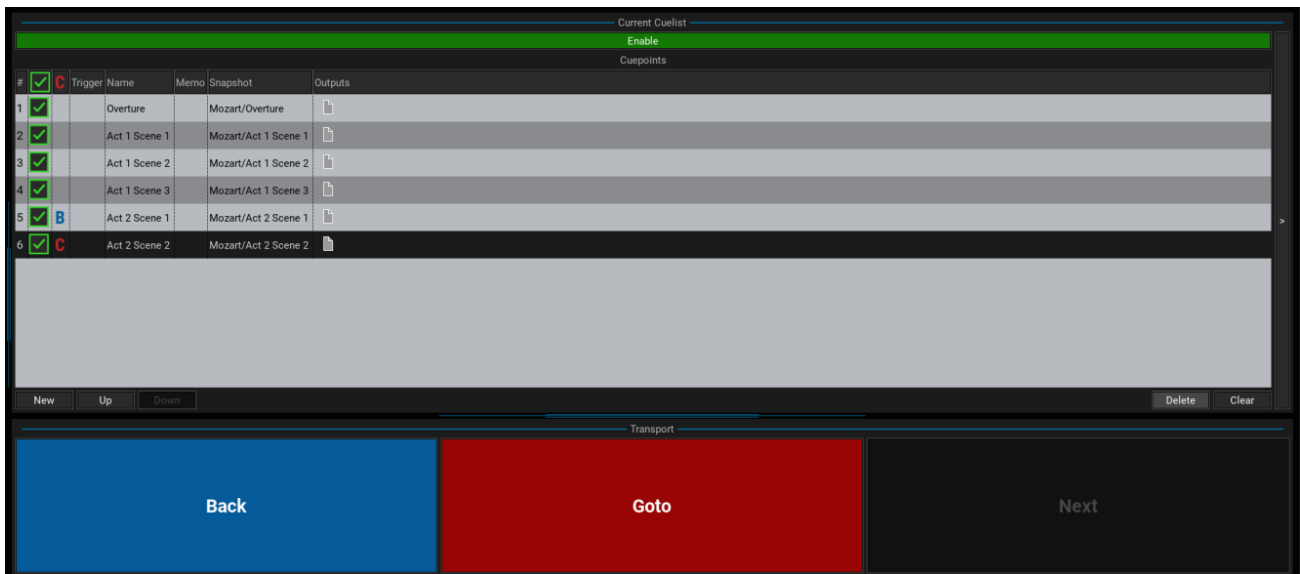
- Keep pressing **NEXT** to step down through the cues in turn.

In each case, the cuepoint loads its assigned snapshot and/or output events, and the **N**, **C** and **B** flags update:

- N** indicates the Next cuepoint to be loaded. This shows you exactly what will be recalled when you press the **NEXT** button.
- C** indicates the Current cuepoint. This is always the current cue (the last one loaded).
- B** indicates the Back cuepoint.

- To play out the cuelist from beginning to end, then keep pressing **NEXT** repeatedly.

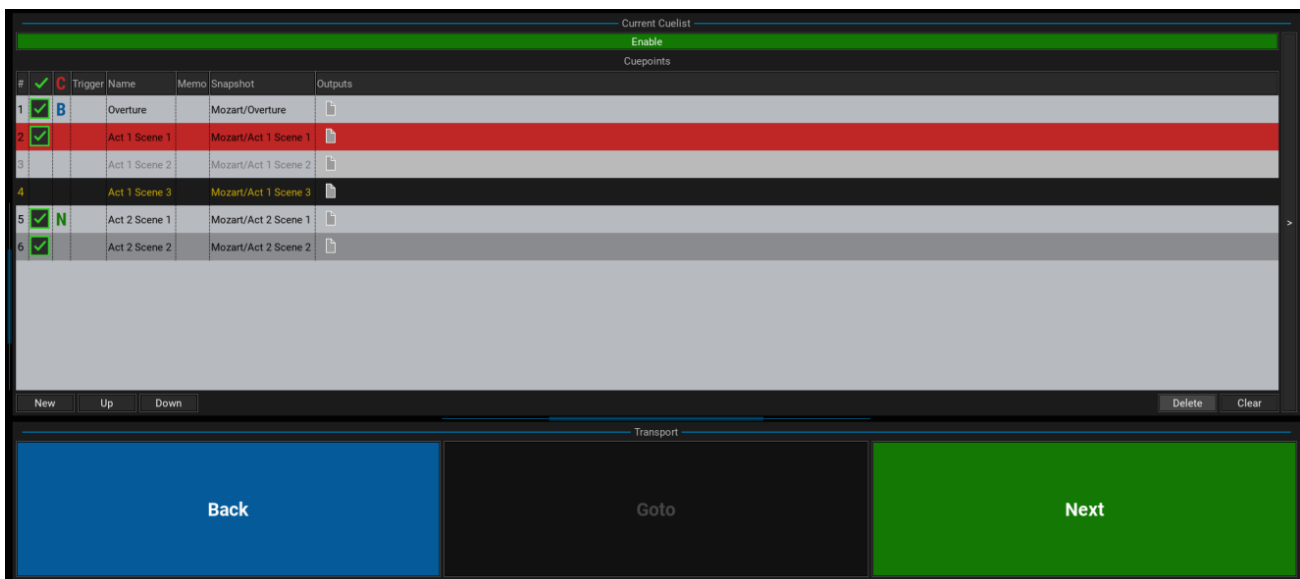
When you reach the last cuepoint in the list, the playout ends and the **NEXT** button performs no further function:



- At any time, you can press the **BACK** button to quickly return to the previous cue's settings. For example, if an artist misses their entrance or you press the **NEXT** button too early!

- To skip a cuepoint, deselect its green tickbox. If the cuepoint is next to playout, then the **N** flag moves one position down the list. You can skip any number of cuepoints.

In our example below, we have chosen to skip the Act 1 Scenes 2 and 3:

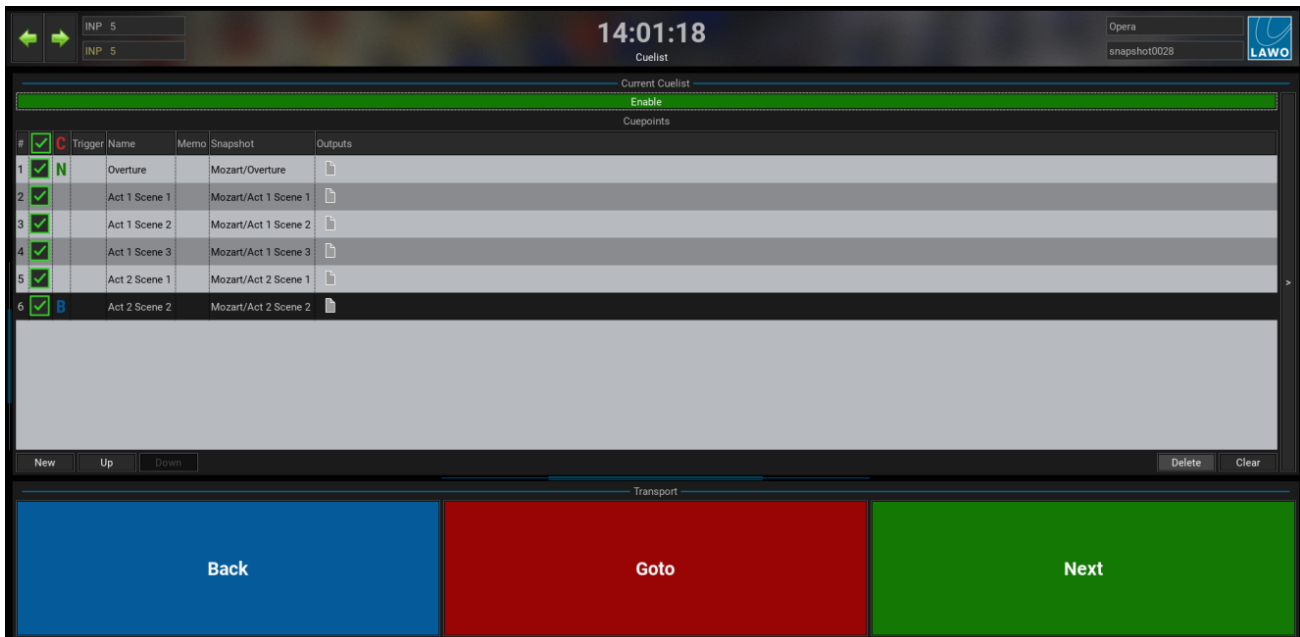


- To restart the playout from a different position, select the cuepoint you wish to return to and select the **Goto** button - the **N** flag updates accordingly. Now press **NEXT** to restart the cuelist playout from this point.



### 16.5.5 The Current Cuelist

Having [prepared](#) some cuepoints, you can use the **Current Cuelist** (in the middle of the display) to manage the cuelist:



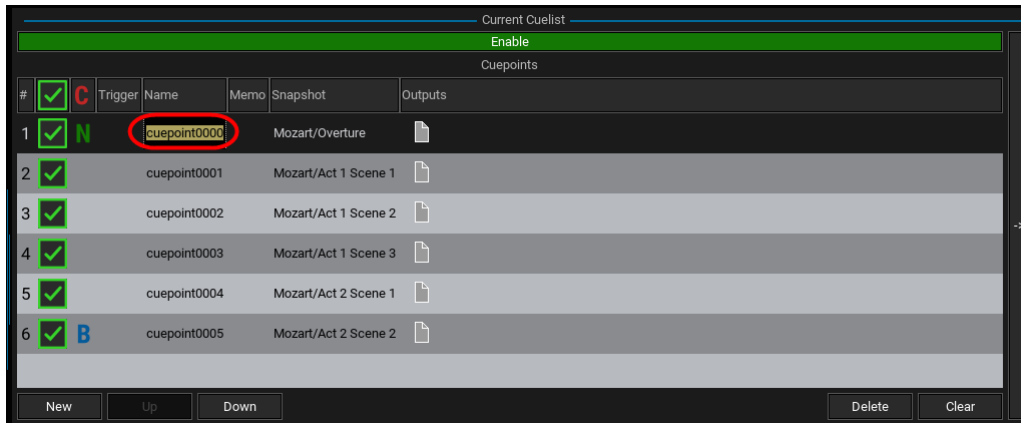
For each cuepoint, you will see:

- **#** - the cuepoint index.
  - Individual Enable (Tickbox) - enables (or disables) a cuepoint during playback.
  - **B, C or N** - indicates the Back, Current or Next cue point to be actioned during playback
  - **Trigger** - assigns an [input trigger](#) to the cue point.
  - **Name & Memo** - here you can name the cuepoint and add a memo.
  - **Snapshot** - shows the snapshot assigned to the cuepoint in the format: "SnapshotFolderName" / "SnapshotName"
  - **Outputs** - here you will see icons indicating the type of event(s) assigned to the cuepoint.
1. Use the **Enable** button (at the top of the area) to enable or disable the cuelist automation.
  2. Use the **New** button to add a new (empty) cuepoint to the list. You can then [assign](#) a snapshot or output event later.
  3. The **Up/Down**, **Delete** and **Clear** buttons can be used to [manage](#) cuepoints in the list.
  4. The **Back**, **Goto** and **Next** buttons (in the Transport area) will [playout](#) the cuelist.

## Renaming Cuepoints

1. Click in the name field and enter a new name using the keyboard.

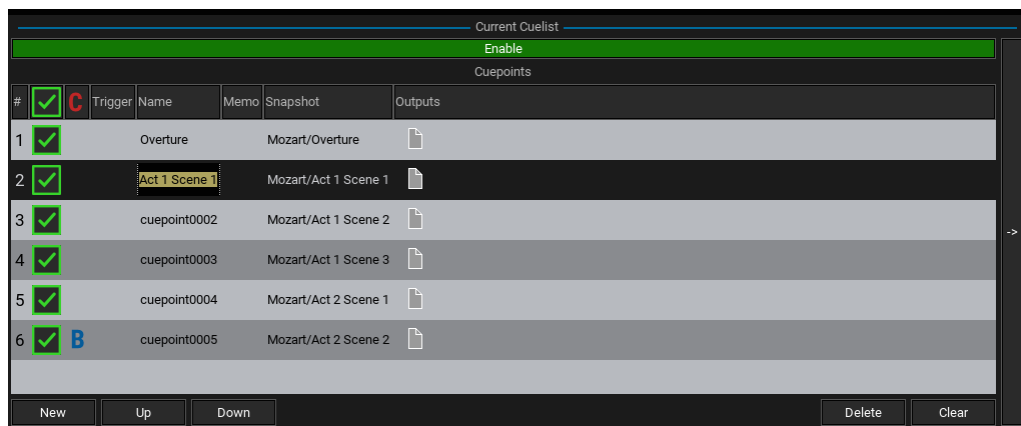
Click once to select all the text, or twice to modify an existing name (you will see a flashing cursor).



2. To confirm, press ENTER. Or, to exit without making a change, press ESCAPE.

You can use the following keyboard shortcuts to quickly rename multiple cuepoints:

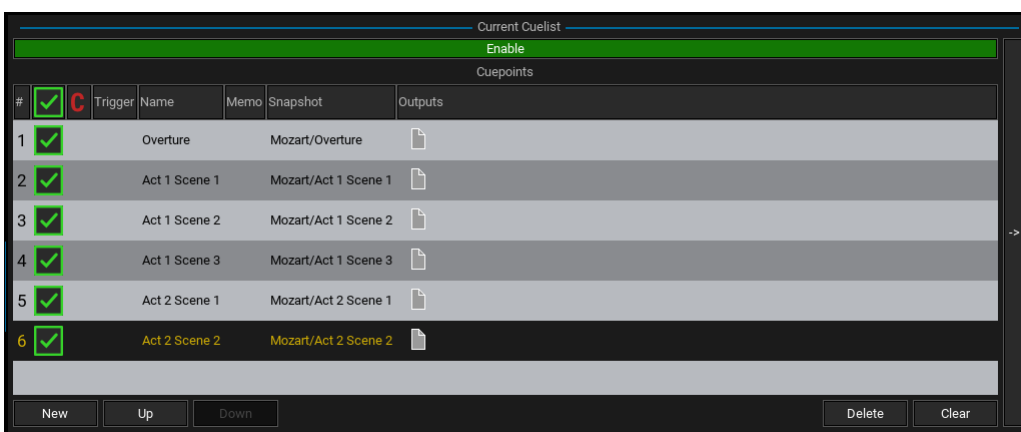
1. Click in the name field and press CTRL + A to select all text, and then CTRL + C to copy the text field:



2. Press the keyboard's Down arrow to select the next cuepoint name field, and press CTRL + V to paste in the copied text.

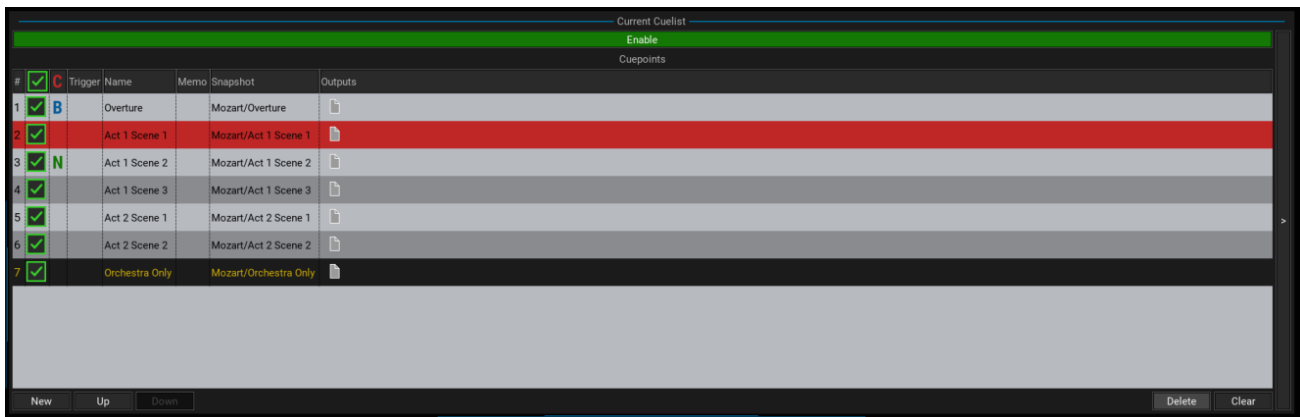
3. Now edit the text as you wish and press ENTER to confirm the name change.

4. Repeat this process to quickly rename all the cuepoints in the list:

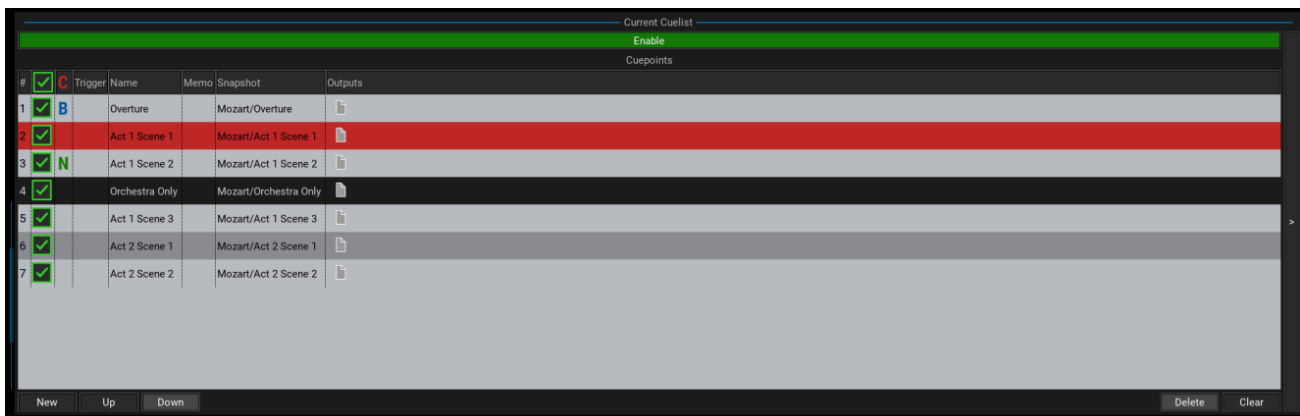


## Changing the Order of Cuepoints

1. Select the cuepoint you wish to move (e.g. **Orchestra Only**):



2. Then select either the **Up** or **Down** button to move the selected cuepoint up or down the list:



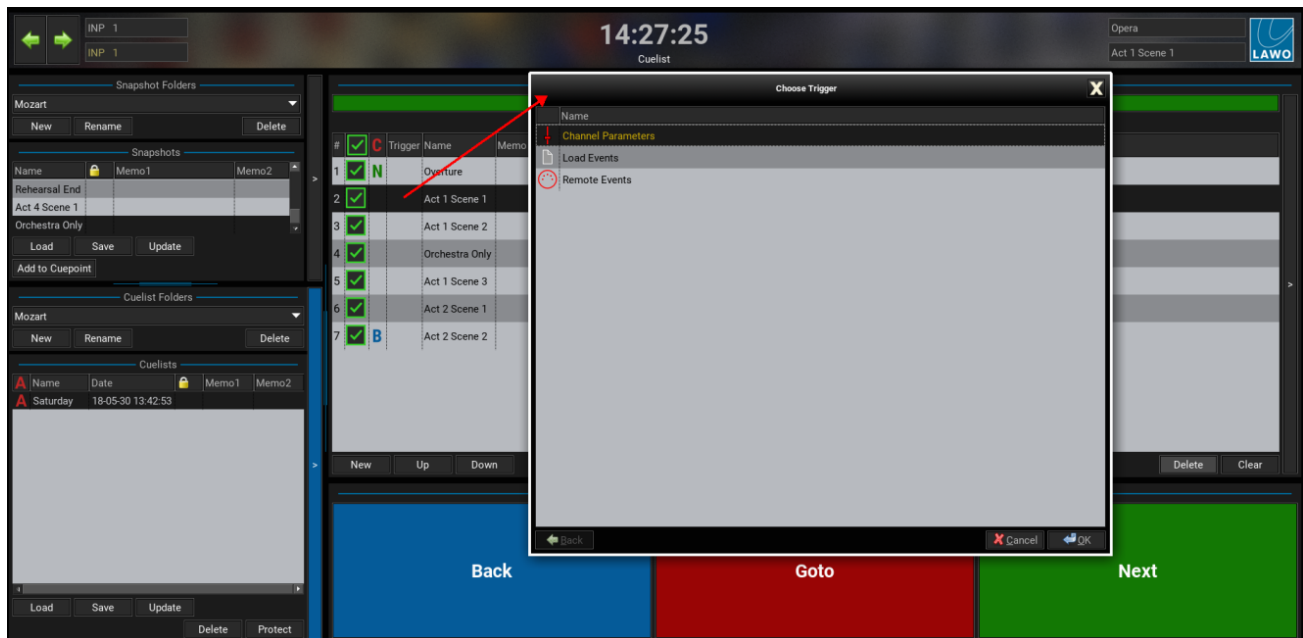
At any time, you can use the **Delete** button to delete the selected cue point, or **Clear** to clear the entire contents of the cuelist. Note that **Clear** will remove ALL cuepoints from the list and should be used with caution!

## Assigning an Input Trigger

Each cuepoint in the **Current Cuelist** can be assigned an input trigger such as a GPI or fader open. This can be useful if you wish to execute a cue automatically.

1. Click on the cuepoint's **Trigger** field (in the **Current Cuelist**) to open the "Choose Trigger" window.

The system supports a wide variety of input triggers, and so you will see the following categories:



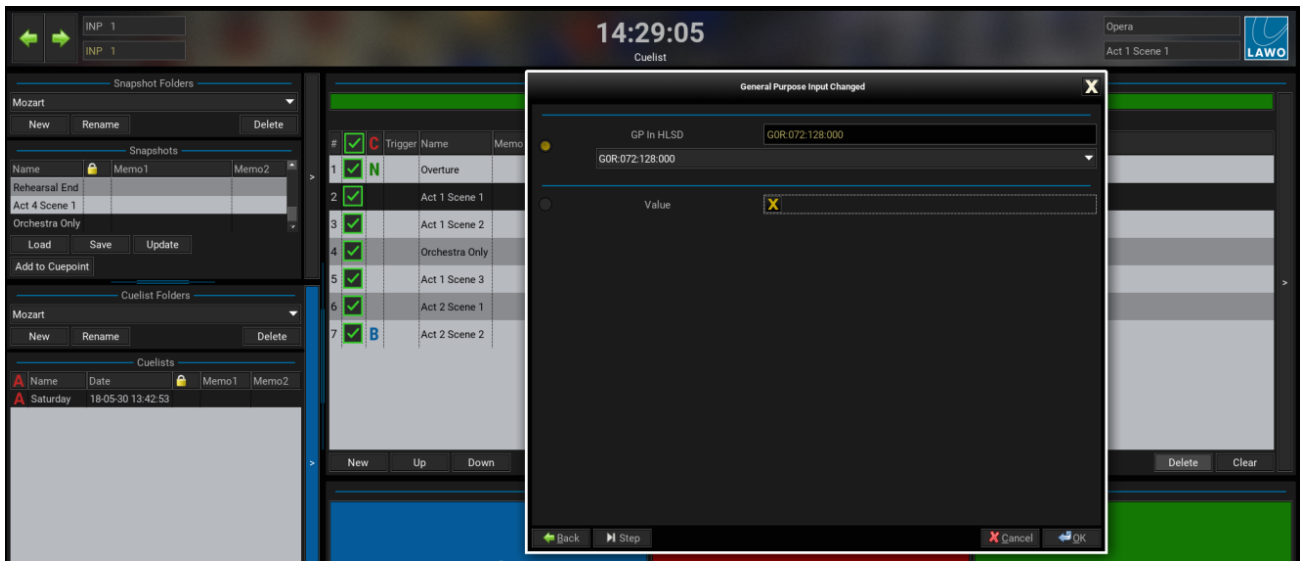
- **Channel Parameters** - specific channel events (e.g. main fader level above/below, channel cut set, aux send level above/below).
- **Load Events** - such as a snapshot load.
- **Remote Events** - such as a GPI, incoming timecode position passed or MIDI message.

For screenshots showing all available options, see [Input Triggers](#).

2. Select a category (e.g. **Remote Events**), an input trigger (e.g. **General Purpose Input Changed**) and then define its parameters.

In the example below, click to select a GPI from the drop-down menu and then set its **Value** (state):

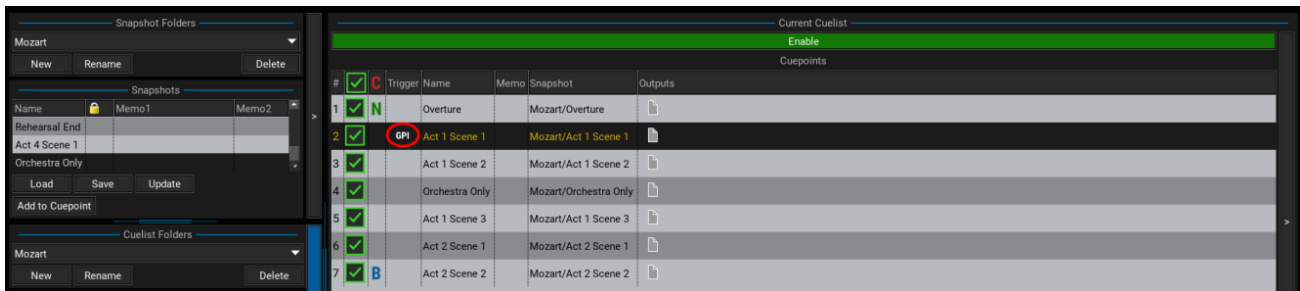
- **Value** checked = state high
- **Value** NOT checked = state low



Note that at the bottom of the window are a number of useful functions:

- **Back** - click to step back to the last operation; in this instance, to the previous window
  - **Step** - click to step forwards to the next cuepoint AND automatically increment the step field (marked by the yellow dot). In our example, this will assign consecutive GPI inputs to consecutive cuepoints. See [Using the Step Function](#).
3. Confirm all changes with **OK** or, to exit without making a change, select **Cancel**.

Once confirmed, an icon appears beside the cuepoint in the **Current Cuelist** representing the input trigger (e.g. **GPI**, **TC**, **MIDI**, a fader icon, etc.):

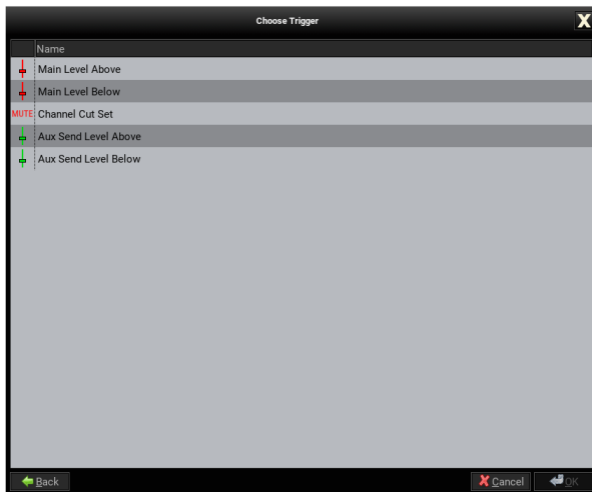


4. To remove an existing input trigger, click on the icon (to re-open the trigger assign window) and select **Remove**.

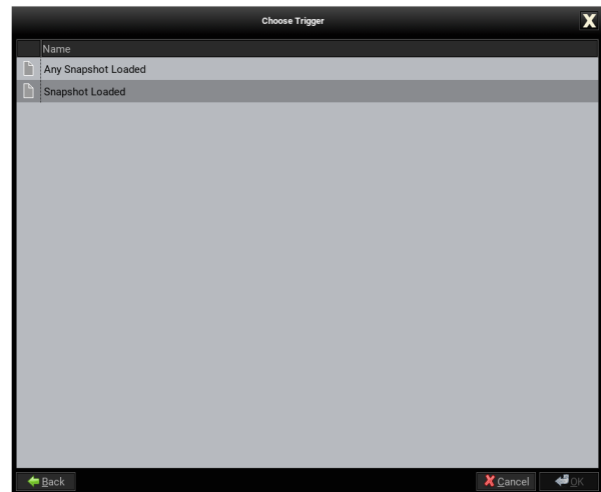
## Input Triggers

The screenshots below show the options available when assigning an input trigger:

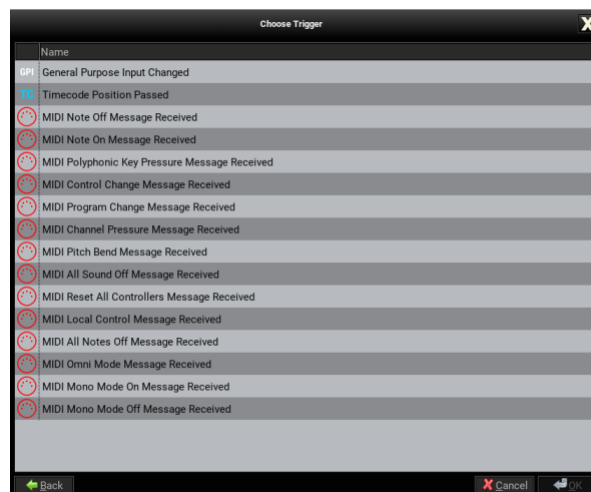
*Channel Parameters*



*Load Events*



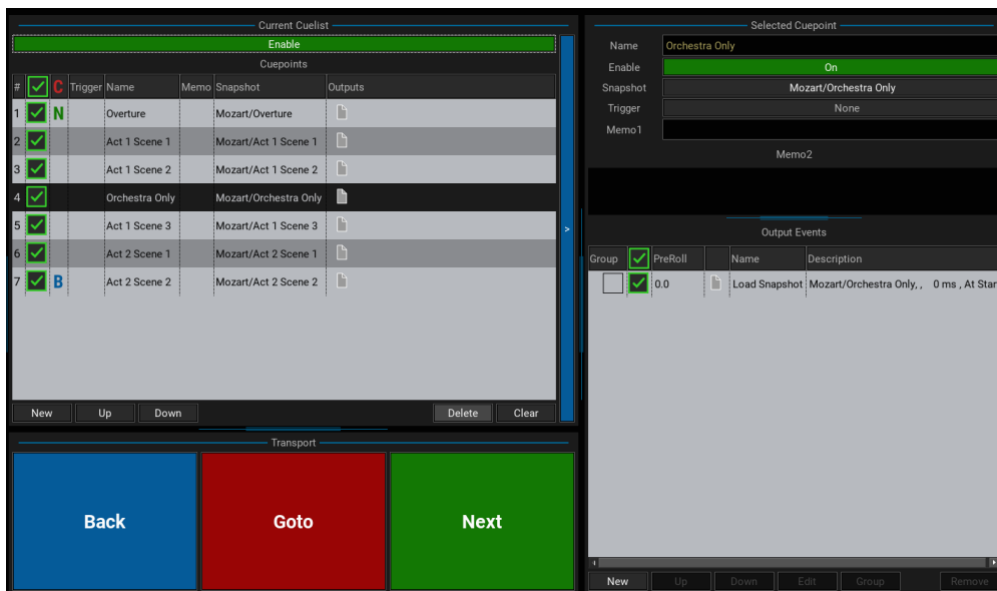
*Remote Events*



### 16.5.6 The Selected Cuepoint

The **Selected Cuepoint** area (on the right of the display) can be used to interrogate or assign new functions to a cuepoint. If you cannot see this area, the check the current [view](#).

1. Select a cuepoint (e.g. **Orchestra Only**) - the **Selected Cuepoint** and **Output Events** areas update:



Under **Selected Cuepoint** you will see:

- **Name** - click to edit the name of the cuepoint.
- **Enable** - click to enable (or disable) the cuepoint during playback.
- **Snapshot** - click to [assign](#) a snapshot to the cuepoint.
- **Trigger** - click to assign an [input trigger](#) to the cue point.
- **Memo1 & Memo2** - click here to enter notes about the cuepoint:
  - ☐ the **Memo1** field is displayed in the **Current Cuelist** (in the middle of the display) and accepts up to 32 characters.
  - ☐ the **Memo2** field is only displayed in the **Selected Cuepoint** area, but can accept more text than Memo1. Press SHIFT + ENTER to start a new line.

Under **Output Events** you will see:

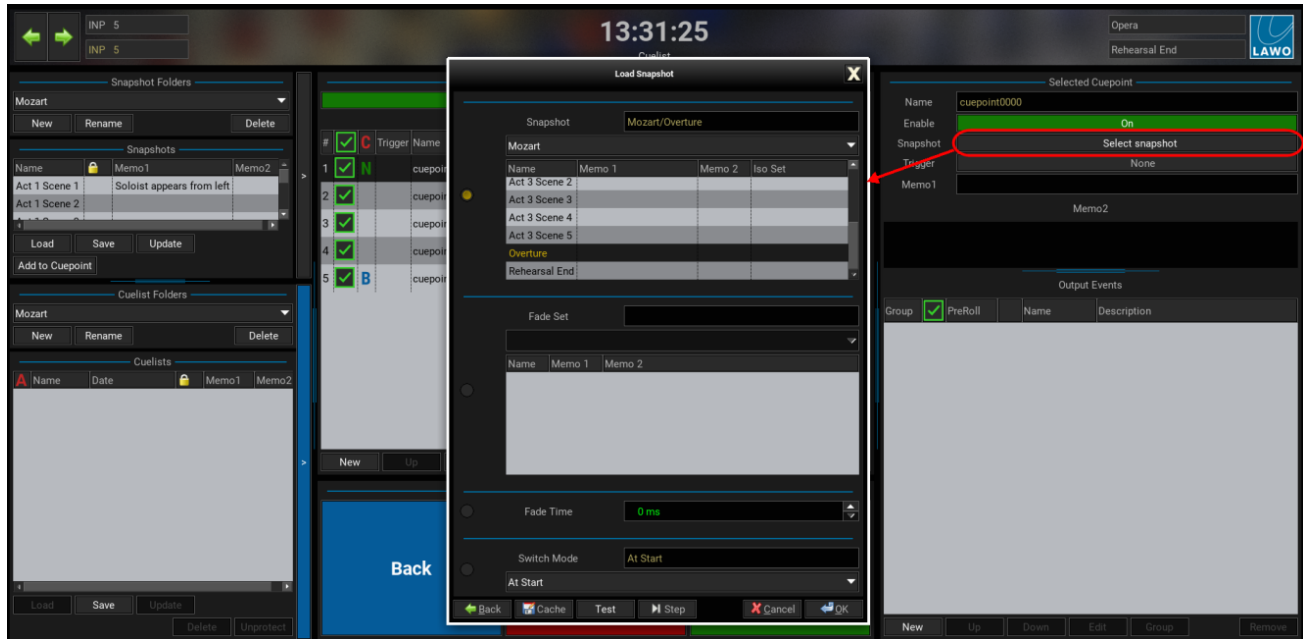
- Select (tickbox) - click to select the event (for example, to [Remove](#) the event).
  - Individual Enable (tickbox) - click to enable (or disable) the event during playback.
  - **PreRoll** - click to enter the amount of preroll (in seconds). You can use this to delay the start of an event after the cuepoint is loaded.
  - Icon - here you will see an icon indicating the type of event (e.g. a file icon).
  - **Name & Description** - here you will see the system name of the output event (e.g. **Load Snapshot**) and a more detailed description (e.g. the name of the snapshot in the format: "SnapshotFolderName" / "SnapshotName").
2. Use the **New** button to add a new (empty) output event to the cuepoint. You can then [assign](#) an event type later.
  3. The **Up/Down**, **Edit**, **Group** and **Remove** buttons can be used to [manage](#) the Output Events.

## Assigning a Snapshot

A snapshot can be assigned to a cuepoint as follows:

To apply crossfades to cue changes, you will need to assign a fade snapshot (and not a normal snapshot as described in this topic). See [Snapshot Crossfades](#) for details.

1. Select a cuepoint and open the **Selected Cuepoint** area (on the right of the display).
2. Click on **Select snapshot** - the "Load Snapshot" window appears:



3. Choose a Snapshot folder and a snapshot.

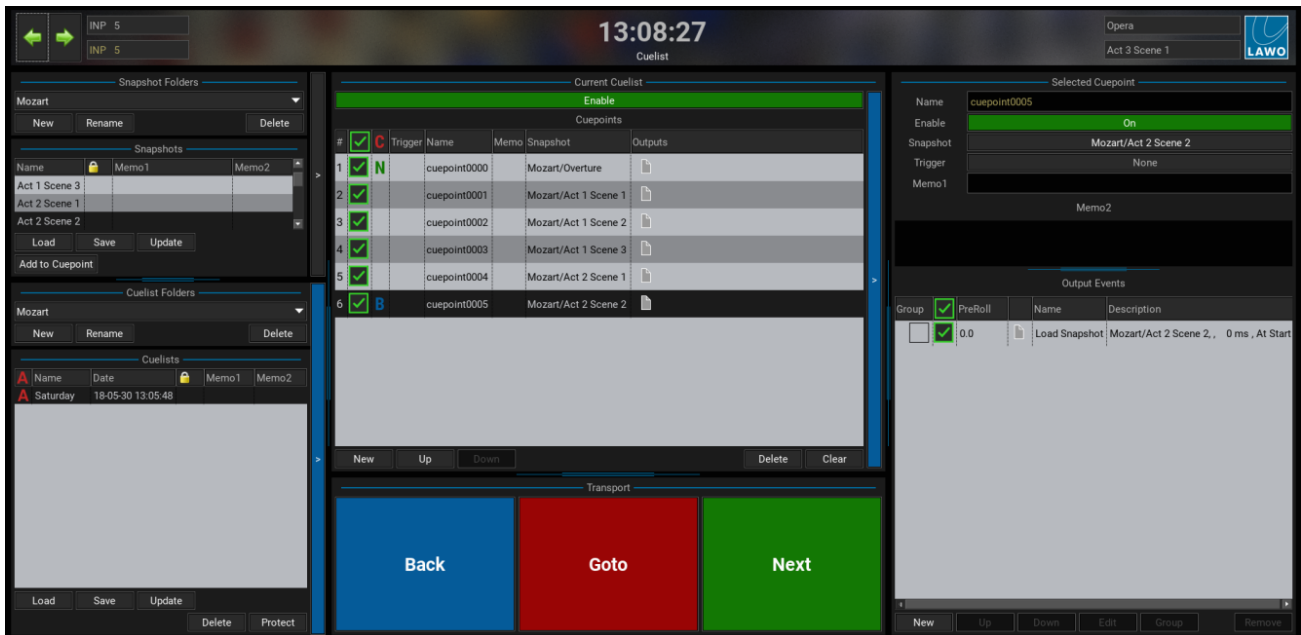
Note that at the bottom of the window are a number of useful functions:

- **Back** - click to step back to the last operation; in this instance, it closes the snapshot assign window.
- **Cache** - click to add the snapshot load to the [Cache](#).
- **Test** - click to load the selected snapshot (to "test" its contents).
- **Step** - click to step forwards to the next cuepoint AND automatically increment the step field (marked by the yellow dot). In our example, this will assign consecutive snapshots to consecutive cuepoints. See [Using the Step Function](#).

4. Confirm all changes with **OK** or, to exit without making a change, select **Cancel**.



In the example below, snapshots from the snapshot folder named **Mozart** have been assigned to each of the cuepoints:



Note that once a snapshot is assigned, it automatically appears in the **Output Events** list. Therefore, another way to access the "Load Snapshot" window is to select the event and click on **Edit**. See [Managing Output Events](#) for more details.

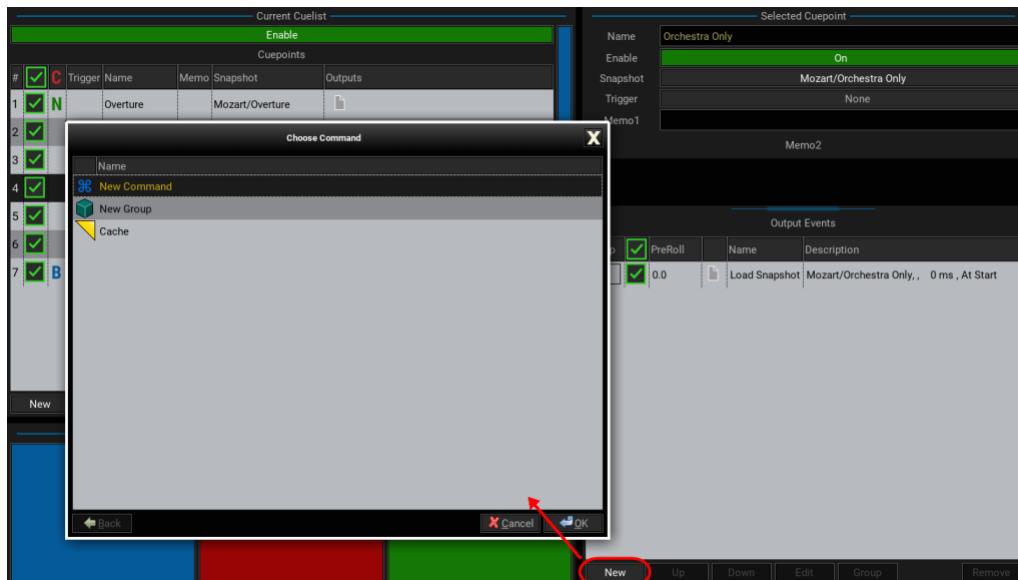
- To remove a snapshot assignment, select the "Load Snapshot" from the **Output Events** list and click on **Remove**.

## Assigning an Output Event

An output event can be assigned to a cuepoint as follows.

Note that you can assign multiple events to each cuepoint, and combine output events with a snapshot load. This allows you to execute a complex set of changes from each change of cue!

1. Select a cuepoint and open the **Selected Cuepoint** area (on the right of the display).
2. Click on the **New** button (at the bottom of the **Output Events** area) - the "Choose Command" window appears:



3. To assign a single output event, select **New Command** followed by the type of command. Alternatively, you can use **New Group** to create a [group](#) of events, or **Cache** to select events previously stored to the [cache](#).

When you select **New Command**, you will see the following categories:



- **Channel Parameters** - specific channel events (e.g. main fader level above/below, channel cut set, aux send level above/below).
- **Load Events** - such as a channel preset, snapshot, iso set or oversnap.
- **Global Operations** - such as clearing all iso sets.
- **Remote Events** - such as a GPO or MIDI message.

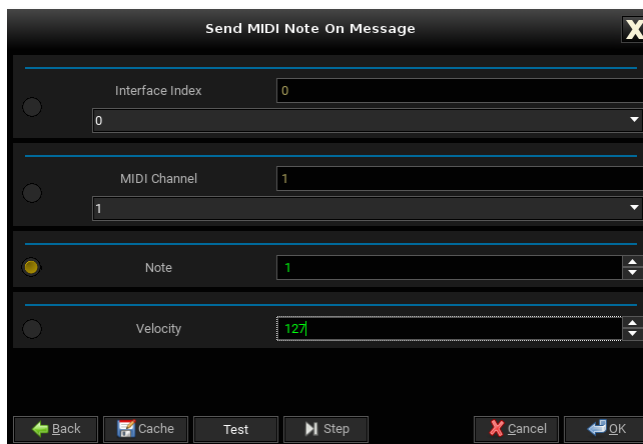
For screenshots showing all available options, see [Output Events](#).

To apply crossfades between cue changes, choose **Load Events** and assign a **Snapshot** and **Fade Set** to each cuepoint. See [Snapshot Crossfades](#).

4. Select a category (e.g. **Remote Events**), an option (e.g. **Send MIDI Note On Message**) and then define its parameters.

In the example below, select an **Interface Index** and **MIDI Channel** from the drop-down menus, and then enter the **Note** and **Velocity** values:

- **Interface Index** - is defined in the "post\_config.tcl" file during commissioning, and is used to distinguish the optional KISS box MIDI interface from RTP MIDI.
- **MIDI Channel** - from 1 to 16 (as defined by the MIDI 1.0 standard).
- **Note** - from 0 to 127 (as defined by the MIDI 1.0 standard).
- **Velocity** - from 1 to 127 (as defined by the MIDI 1.0 standard).

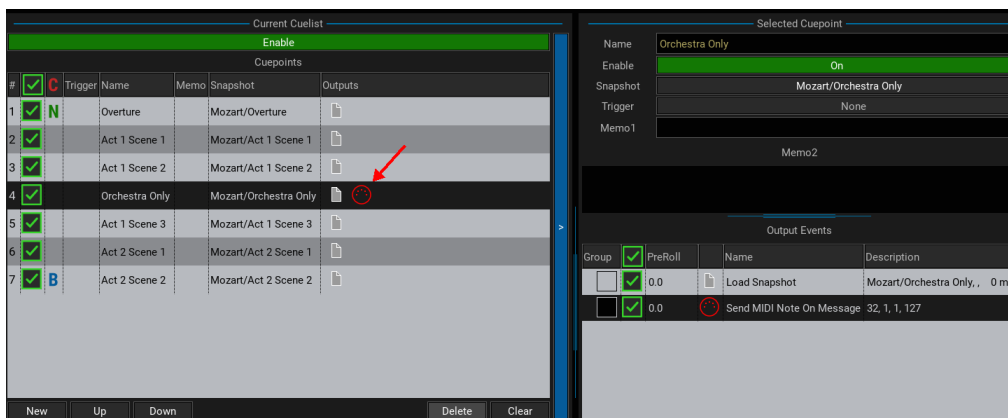



Note that at the bottom of the window are a number of useful functions:

- **Back** - click to step back to the last operation; in this instance, to the previous window.
- **Cache** - click to add the event to the [Cache](#).
- **Test** - click to load the output event (to "test" its contents).
- **Step** - click to step forwards to the next cuepoint AND automatically increment the step field (marked by the yellow dot). In our example, this will assign consecutive **Note** values to consecutive cuepoints. See [Using the Step Function](#).

5. Confirm all changes with **OK** or, to exit without making a change, select **Cancel**.

Once confirmed an icon appears in the **Outputs** field to represent the assigned event (e.g. a MIDI connector icon):



Current Cuelist					
Enable					
#	Trigger	Name	Memo	Snapshot	Outputs
1	✓	N	Overture	Mozart/Overture	
2	✓		Act 1 Scene 1	Mozart/Act 1 Scene 1	
3	✓		Act 1 Scene 2	Mozart/Act 1 Scene 2	
4	✓		Orchestra Only	Mozart/Orchestra Only	
5	✓		Act 1 Scene 3	Mozart/Act 1 Scene 3	
6	✓		Act 2 Scene 1	Mozart/Act 2 Scene 1	
7	✓	B	Act 2 Scene 2	Mozart/Act 2 Scene 2	

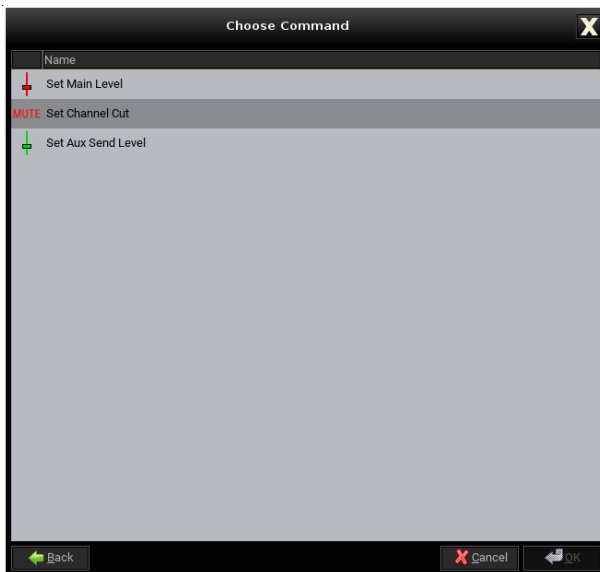
Selected Cuepoint			
Name	Orchestra Only		
Enable	On		
Snapshot	Mozart/Orchestra Only		
Trigger	None		
Memo1			
Memo2			
Output Events			
Group	PreRoll	Name	Description
	✓	0.0	Load Snapshot
	✓	0.0	Send MIDI Note On Message 32, 1, 1, 127

6. To remove an event from the selected cuepoint, select it from the **Output Events** list and click on **Remove**.

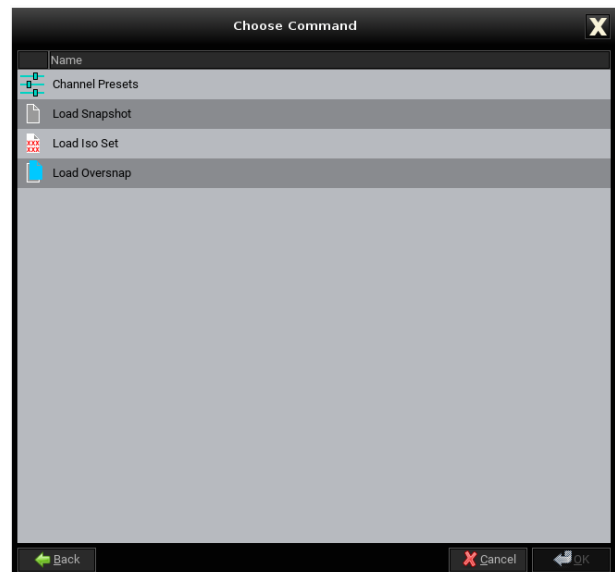
## Output Events

The screenshots below show the options available from the "New Command" window:

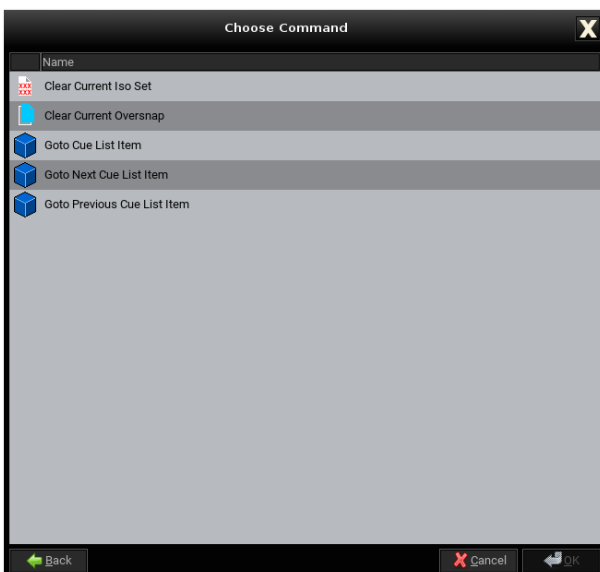
*Channel Parameters*



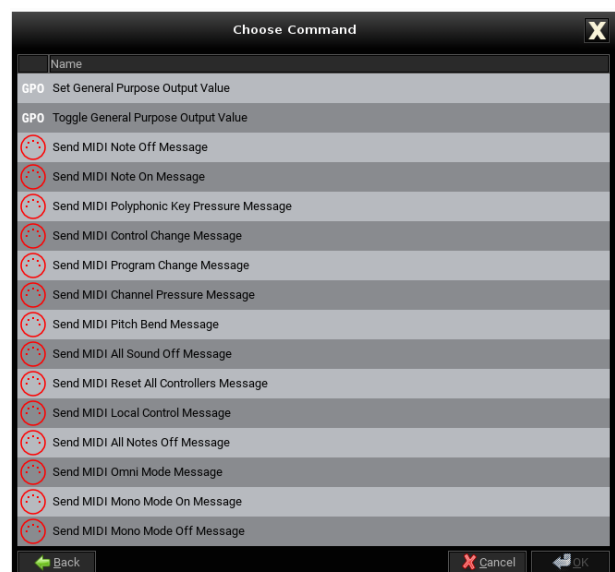
*Load Events*



*Global Operations*

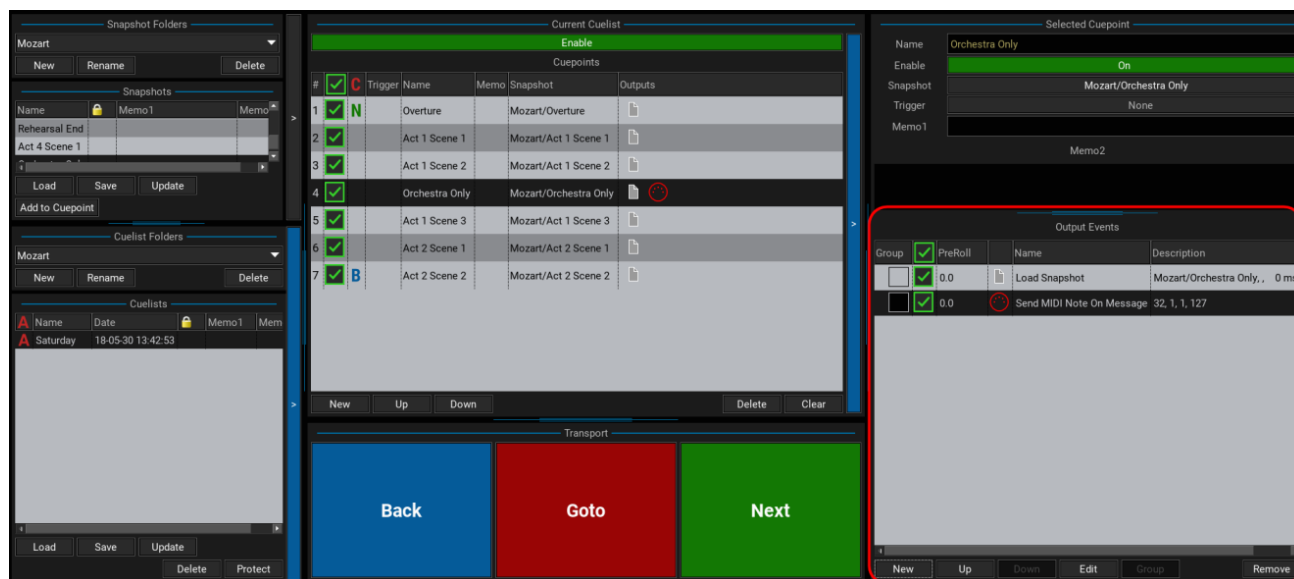


*Remote Events*



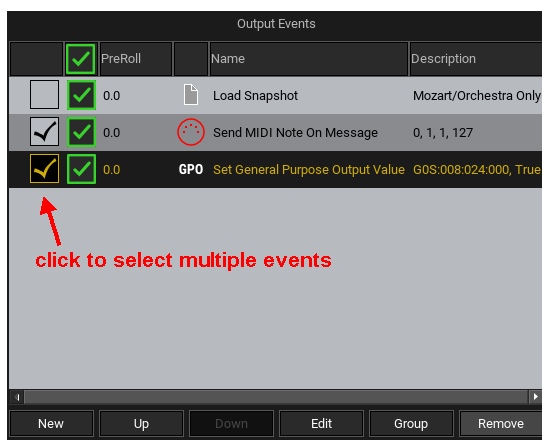
## Managing Output Events

All the events assigned to the selected cuepoint, including snapshots, are listed in the **Output Events** area. Note that output events cannot be renamed, as the name field shows the system name (e.g. **Load Snapshot**, **Send MIDI Note on Message**, **Set General Purpose Output Val**, etc.):



1. To remove an output event from a cuepoint, first select the cuepoint (from the **Current Cuelist**), then select the event (from the **Output Events** list), and click on **Remove**.

Note you can select multiple events and remove them in one operation by using the select tick boxes. However, there is no level of confirmation, and so you should use this feature with caution!



2. To change the function of an event, first select the cuepoint (from the **Current Cuelist**), then select the event (from the **Output Events** list), and click on **Edit** - either the [Load Snapshot](#) or [Choose Command](#) window appears, allowing you to assign a different snapshot or event.
3. To change the order of events for a cuepoint, select the event you wish to move. Then click on either the **Up** or **Down** button to move the selected event up or down the list.

Note that, depending on the type of event, the order can be important. For example, if a specific channel parameter event is placed after a load snapshot, then this may be reset by the values stored in the snapshot!

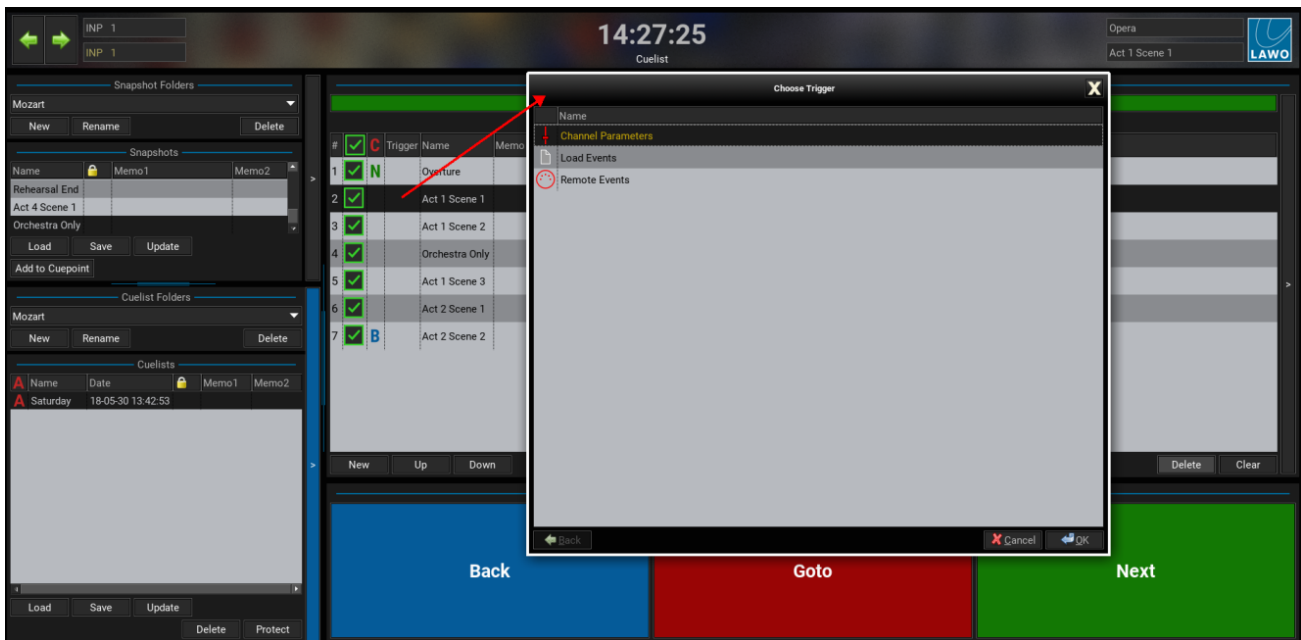
4. To delay the start of an event, enter a value into the **PreRoll** field (in seconds).
5. To create a group of events, select multiple events using the select tickboxes (as shown above), and click on **Group**. See [Using Groups](#).

### 16.5.7 Using Keyboard Shortcuts

When assigning a trigger or event, you can use the following keyboard shortcuts to speed up the navigation and selection process:

- **[Cursor Up]** or **[Cursor Down]** - scrolls up or down through the list entries.
- **[Enter]** or **[Backspace]** - step forwards or backwards to the next window.
- **[Escape]** - closes the current window.

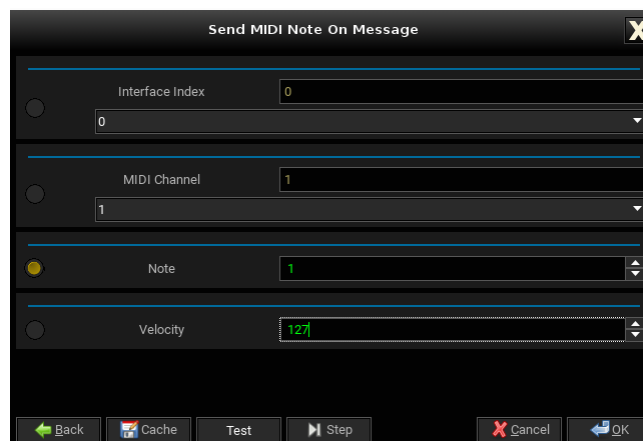
#### Assigning an Input Trigger



Once an event window parameter window is open, you can also use the keyboard to adjust the parameter values:

- **[Cursor Up]** or **[Cursor Down]** - increments or decrements the value of the selected field.
- **[TAB]** or **[CTRL] + [TAB]** - selects the next or previous field.

#### MIDI Event Parameter Window

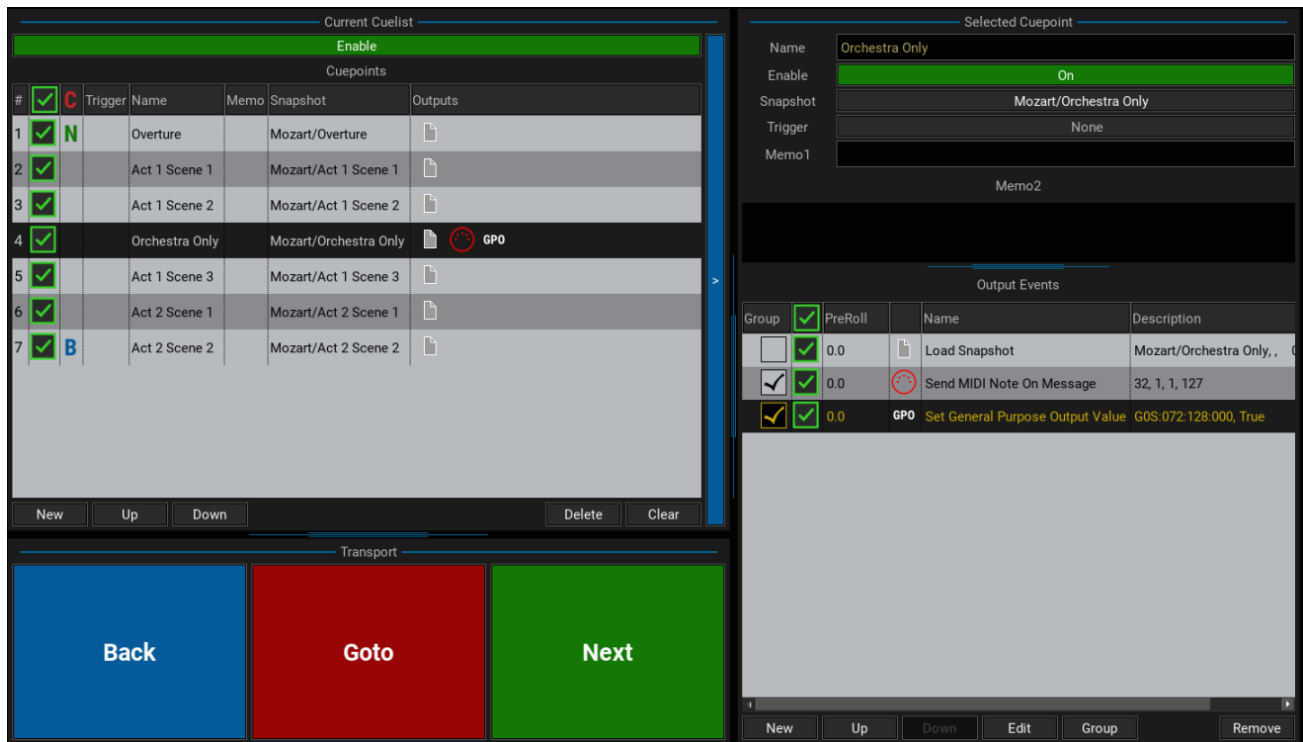


### 16.5.8 Using Groups

If you have multiple events which relate to a single operation, then it can be useful to create a group. Note that there are two ways to create a group: either group some existing events OR create new events as a group from "Choose Command" window.

#### ➤ To group existing events:

1. First select the cuepoint containing your events (from the **Current Cuelist**).
2. Select the events you wish to group using the select tickboxes (in the **Output Events** list) - in our example, a **MIDI Note On** and **GPO** event:



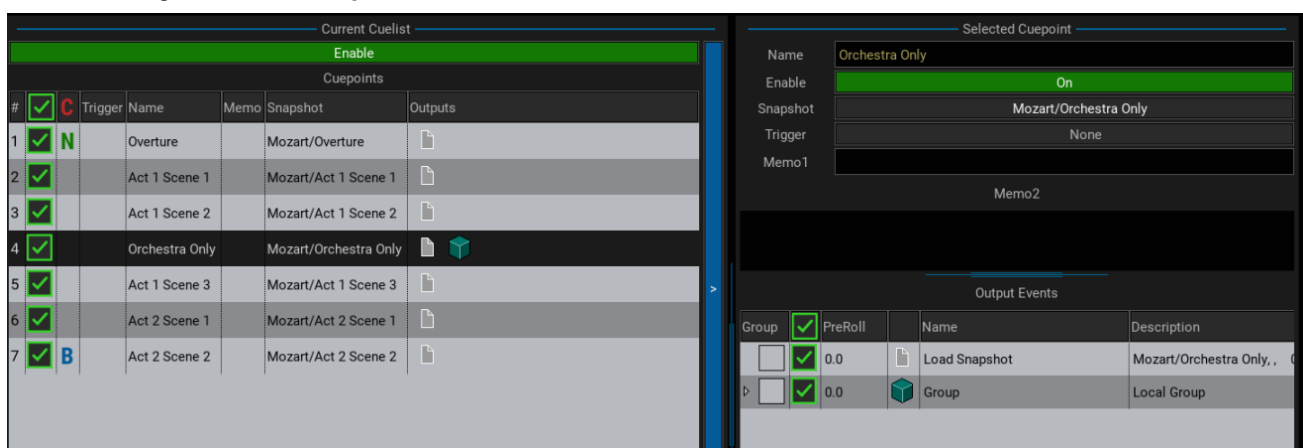
The screenshot shows the console interface. The 'Current Cuelist' panel displays a table of cuepoints:

#	Trigger	Name	Memo	Snapshot	Outputs
1	N	Overture	Mozart/Overture		
2		Act 1 Scene 1	Mozart/Act 1 Scene 1		
3		Act 1 Scene 2	Mozart/Act 1 Scene 2		
4		Orchestra Only	Mozart/Orchestra Only		GPO
5		Act 1 Scene 3	Mozart/Act 1 Scene 3		
6		Act 2 Scene 1	Mozart/Act 2 Scene 1		
7	B	Act 2 Scene 2	Mozart/Act 2 Scene 2		

The 'Selected Cuepoint' panel shows details for 'Orchestra Only' and a list of 'Output Events':

Group	PreRoll	Name	Description
<input type="checkbox"/>	0.0	Load Snapshot	Mozart/Orchestra Only, ,
<input checked="" type="checkbox"/>	0.0	Send MIDI Note On Message	32, 1, 1, 127
<input checked="" type="checkbox"/>	0.0	GPO Set General Purpose Output Value	GOS:072.128.000, True

3. Then click on **Group** (at the bottom of the **Output Events** area) - the group is created and indicated by the following icon in the **Output Events** area and **Current Cuelist**:



The screenshot shows the console interface after creating a group. The 'Current Cuelist' panel displays a table of cuepoints:

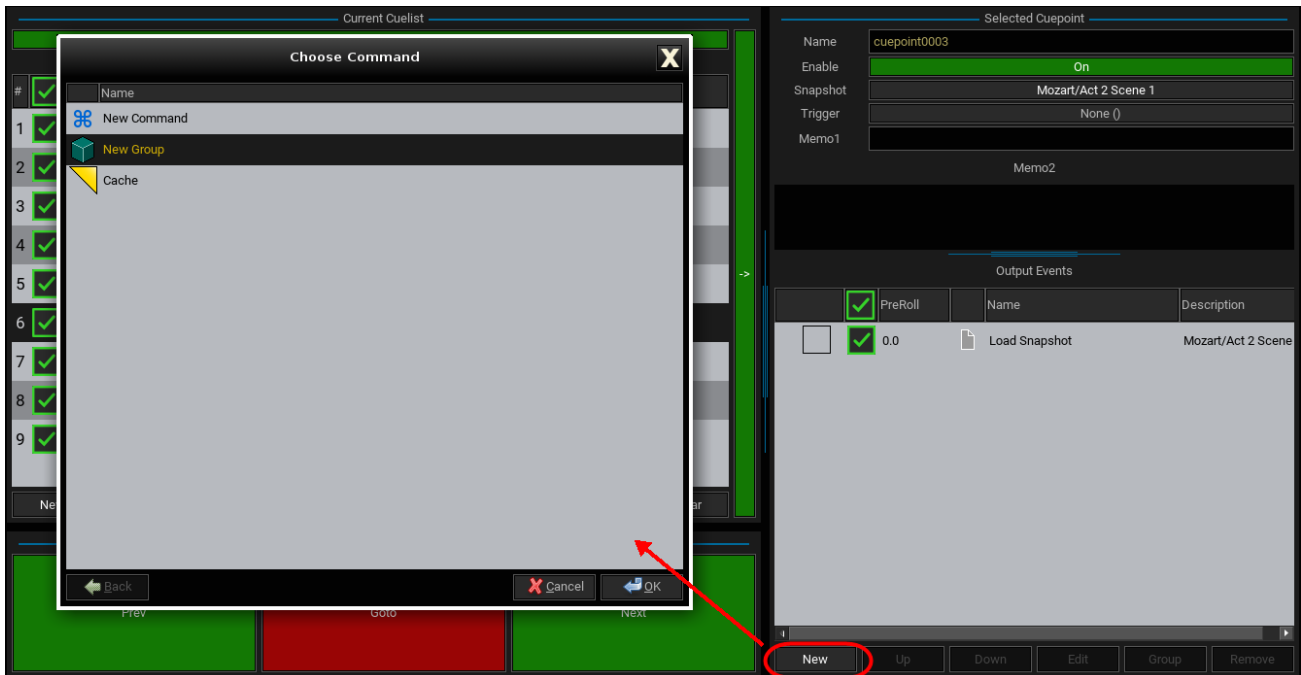
#	Trigger	Name	Memo	Snapshot	Outputs
1	N	Overture	Mozart/Overture		
2		Act 1 Scene 1	Mozart/Act 1 Scene 1		
3		Act 1 Scene 2	Mozart/Act 1 Scene 2		
4		Orchestra Only	Mozart/Orchestra Only		
5		Act 1 Scene 3	Mozart/Act 1 Scene 3		
6		Act 2 Scene 1	Mozart/Act 2 Scene 1		
7	B	Act 2 Scene 2	Mozart/Act 2 Scene 2		

The 'Selected Cuepoint' panel shows details for 'Orchestra Only' and a list of 'Output Events':

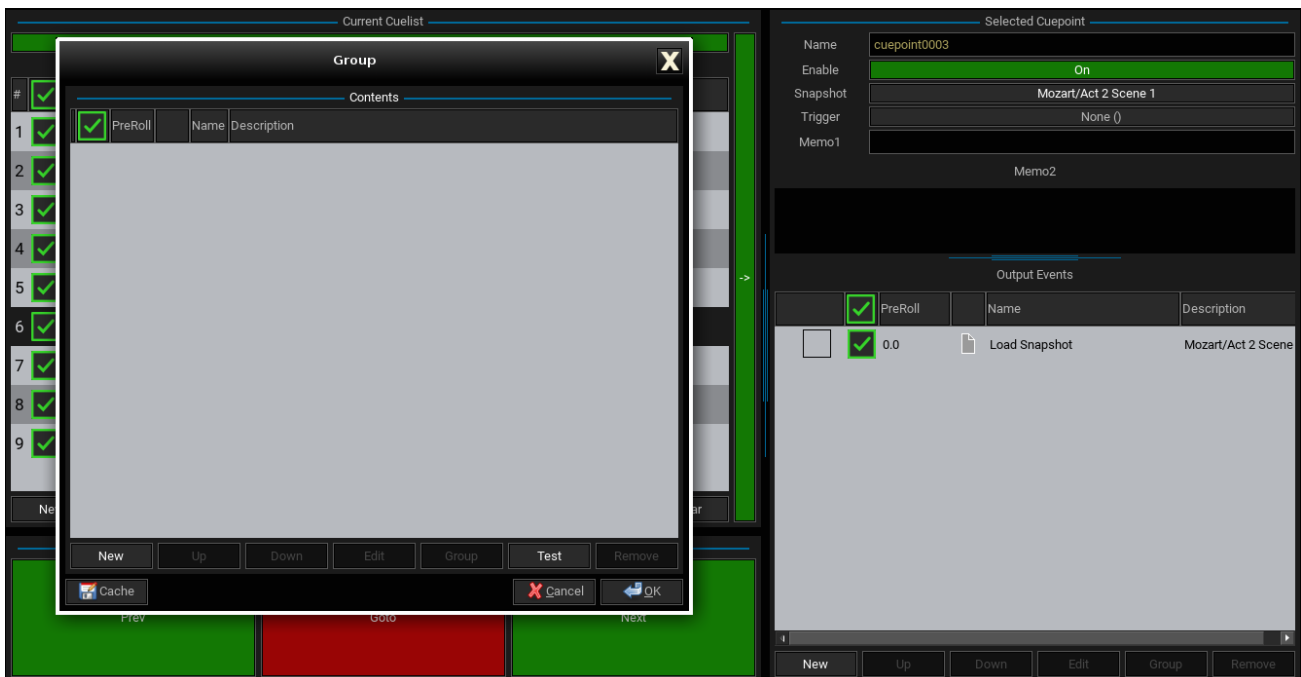
Group	PreRoll	Name	Description
<input type="checkbox"/>	0.0	Load Snapshot	Mozart/Orchestra Only, ,
<input checked="" type="checkbox"/>	0.0	Group	Local Group

➤ **To create new events as a group:**

1. First select a cuepoint (from the **Current Cuelist**) and click on **New** (at the bottom of the **Output Events** area) to open the "Choose Command" window:



2. Select **New Group** and **OK** to open the "Group" window:

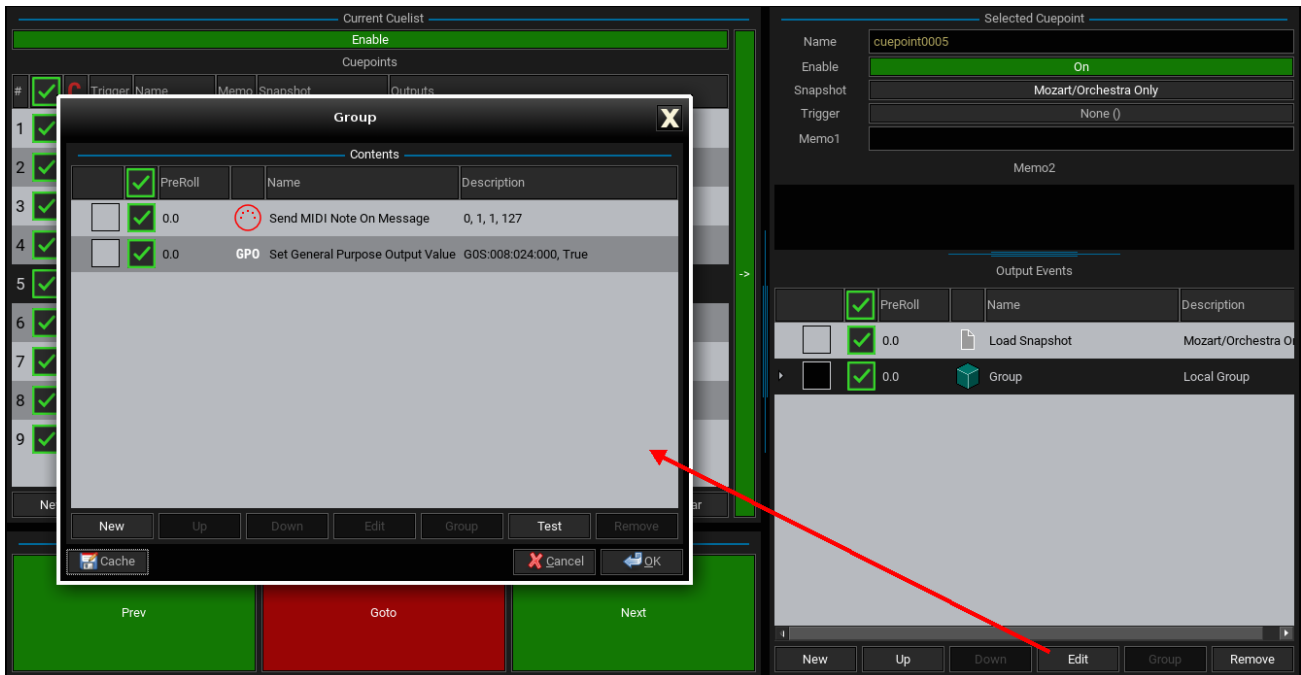


From here you can click on **New** to add new events as described on the next page.



### ➤ Group Operations

For an existing group, select the Group (in the **Output Events** list) and click on **Edit** to open the "Group" window:

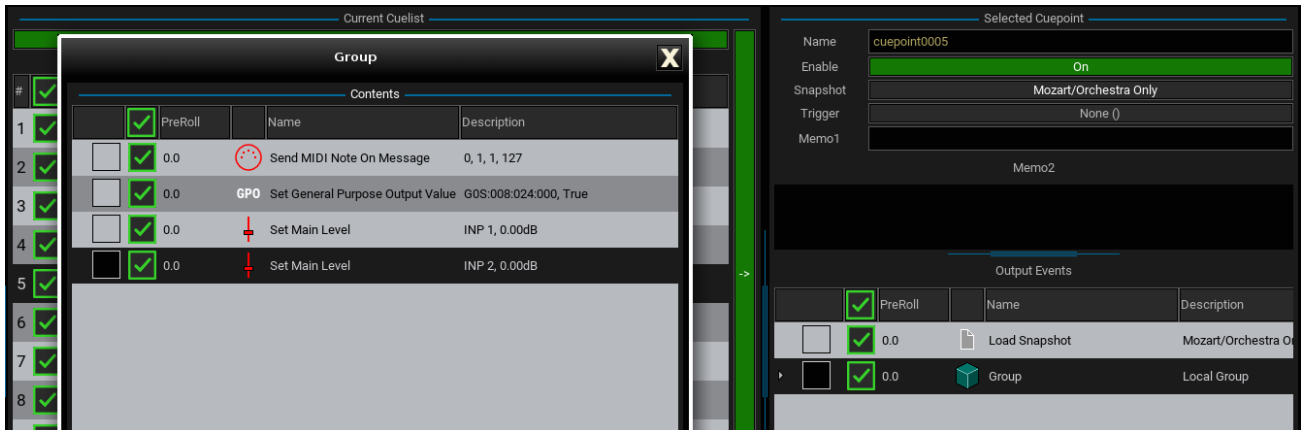


If you are creating new events in a new group, then this window should already be open.

From here you can edit and test the grouped events, or add the grouped events to the cache as follows:

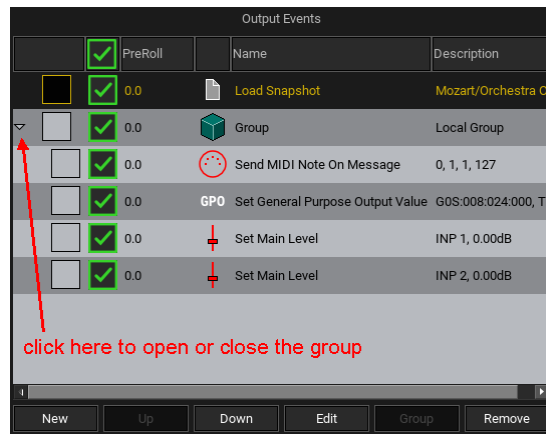
1. To add more events to the group, select **New** -> **New Command** -> choose a category (e.g. **Channel Parameters**) -> choose an option (e.g. **Main Level**), and edit the parameters.

In our example, we have added two new Main Level events which set the levels of Input channels 1 and 2 to 0dB:



2. To test the grouped events, click on **Test**.
3. To change the order of events, select an event and click on **Up/Down**.
4. To remove an event, select it and click on **Remove**.
5. To add the grouped events to the [cache](#), click on **Cache**.
6. Once you have finished making changes, confirm with **OK**, or click on **Cancel** to exit without making a change.

7. At any time, you can click on the small arrow beside the group to interrogate the its contents:



### 16.5.9 Using the Cache

The cache is a storage area which is saved in the active production. It is useful for storing events which you wish to recall later when making assignments to a cuepoint or command trigger. For example, to store the setup of an event, or group of events, which you wish to use repeatedly in several cuepoints.

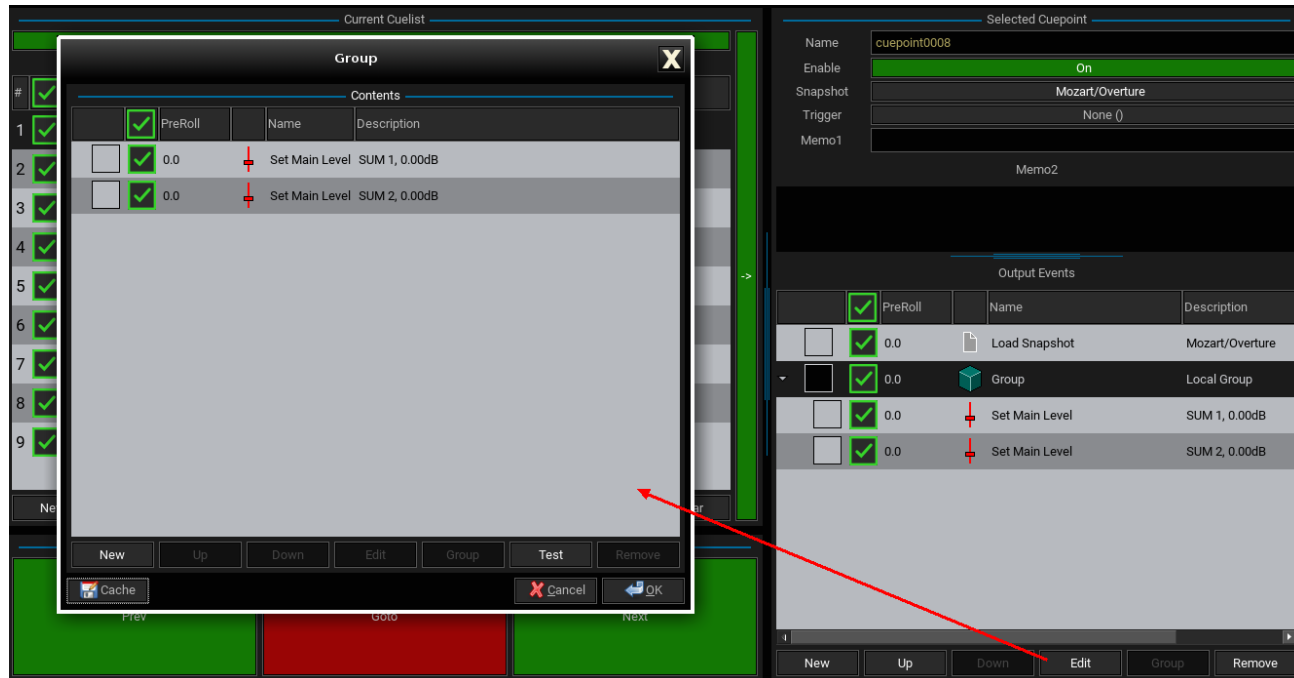
The cache can be accessed from the **Cuelist** display (when assigning a [snapshot](#) or [output event](#) to a cuepoint), or from the **Command Triggers** display (when [assigning](#) a command to a trigger).

Note that the contents of the cache are stored onto the user data flashcard whenever you [update](#) or [save](#) a production. In the current release, there is no way to clear or edit the contents of the cache, other than to save a [new](#) production. Therefore, it is recommended to only store items to the cache where necessary.

The example below describes how to save a group of events to the cache and then recall it to another cuepoint, but the same principles can be applied to single events and command trigger assignments.

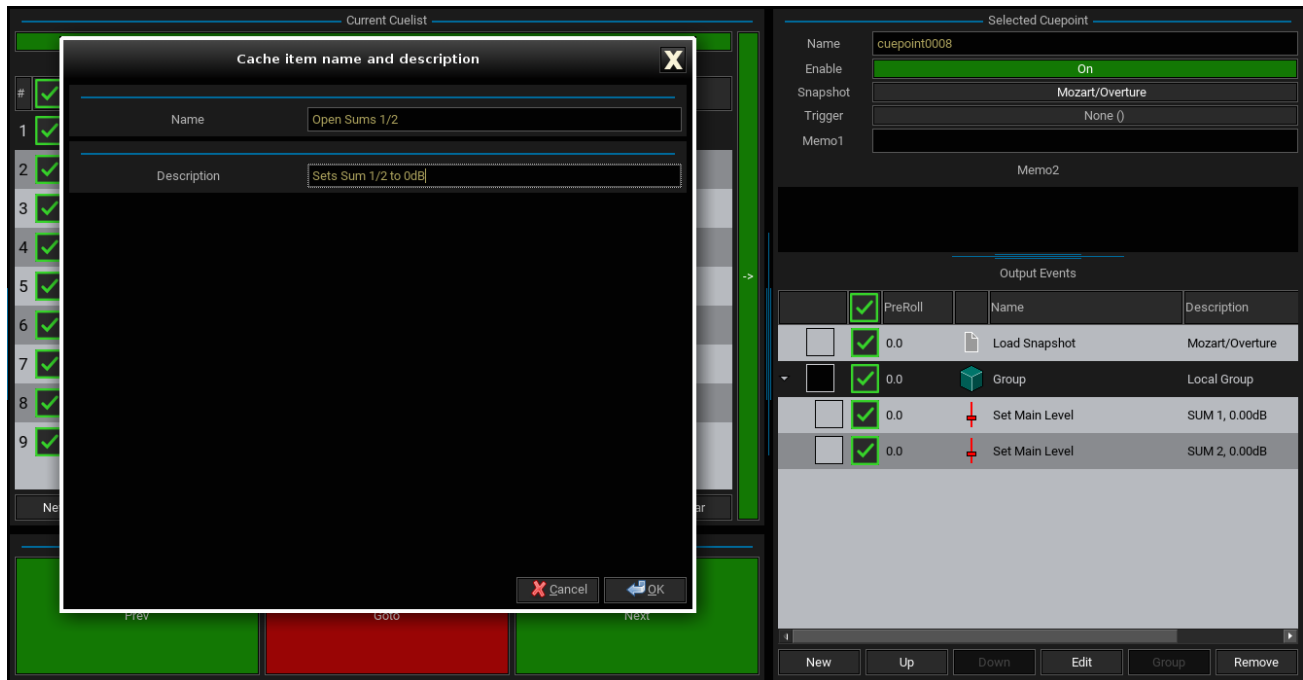
#### ➤ To save events to the cache:

- First define the event(s) you wish to cache in the usual manner - for our example:
  - Select a cuepoint from the **Current Cuelist** area (e.g. **Overture**).
  - Click on the **New** button (at the bottom of the **Output Events** area) to open the "Choose Command" window.
  - Select **Channel Parameters** -> **Main Level**, and define the parameters - in our example, to set the main level of Sum channel 1 to 0dB.
  - Repeat for Sum channel 2 so that there are two "Set Main Level" events in the **Output Events** area.
  - Then select and group the events as described [earlier](#). (Note that this step is optional, but for our example, it makes sense to use a group).
- Now select the event or group (from the **Output Events** area) and click on **Edit** to open the "Group" window:



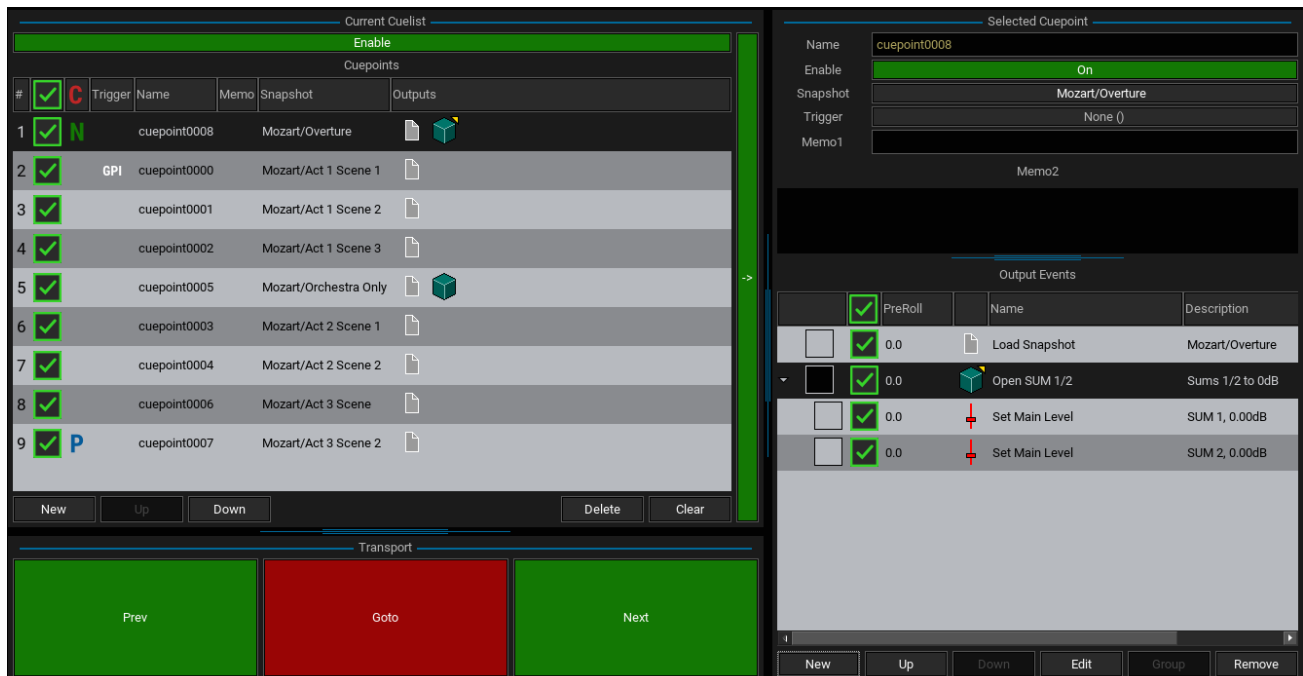
- Click on **Cache** to save the event/group to the cache - you are asked to enter a **Name** and **Description**.

Note that a **Name** must be entered while the **Description** is optional. It is good idea to give cached items a short name, for easy identification, and use the description field to add more detail as necessary:



4. Select **OK** to confirm - your event/group is now saved to the cache.

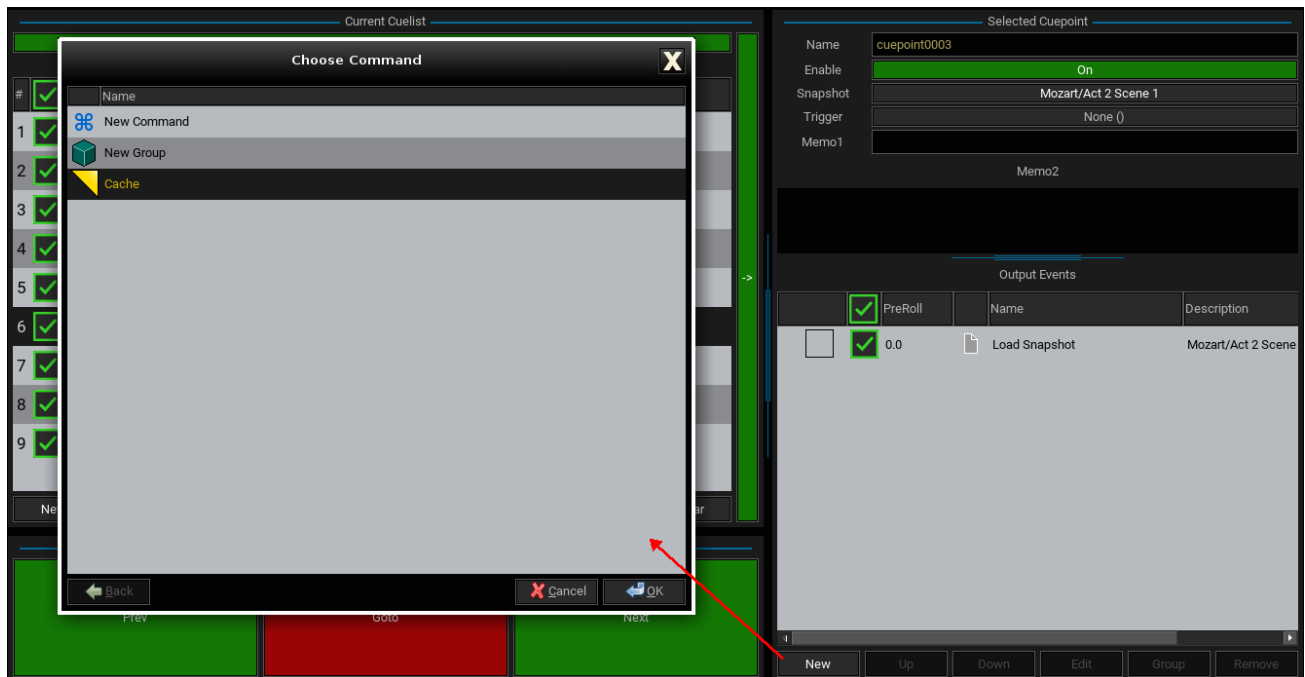
Note that you will see a yellow triangle appear beside the event/group in the **Current Cuelist** and **Output Events** areas. This indicates that the the event/group is a child of the cache, meaning that if you subsequently edit its contents, any changes will be carried forward. You can prevent this from happening by re-opening the **Edit** window and choosing **In Place Save**. This is described in more detail [later](#).



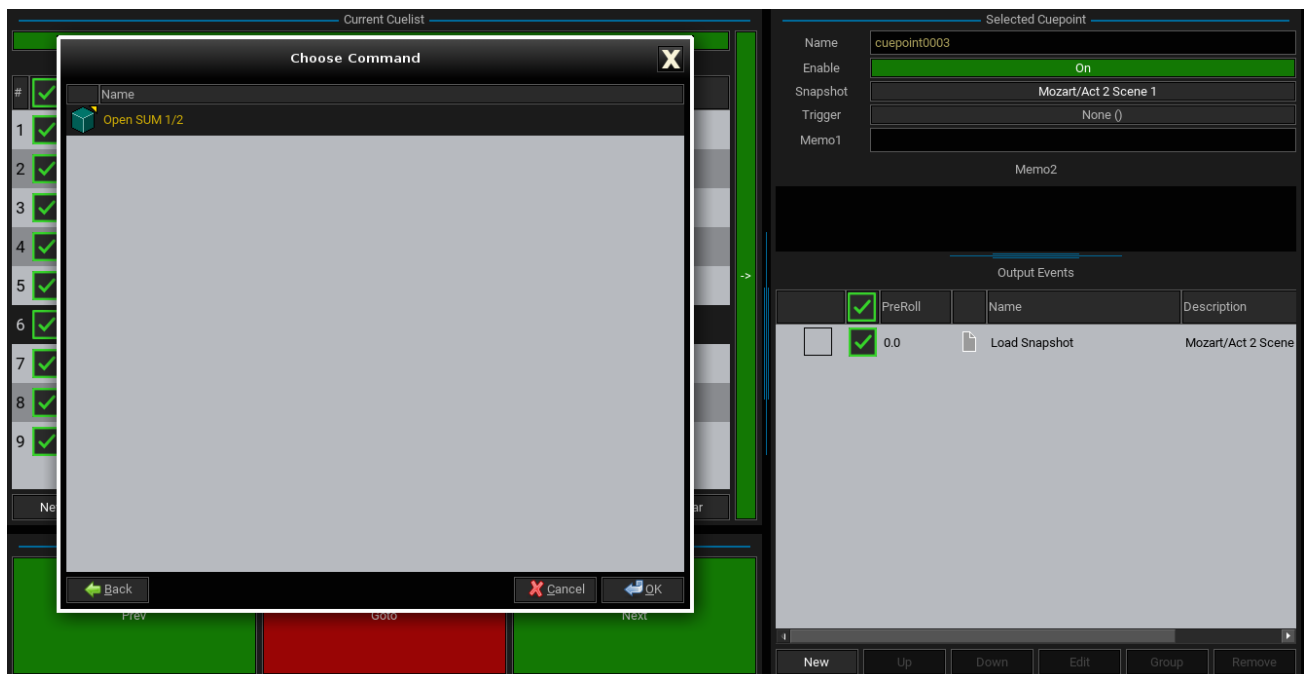
### ➤ Assigning a cached event to a cuepoint

Once you have added an event or group to the cache, then it can be assigned to a different cuepoint as follows:

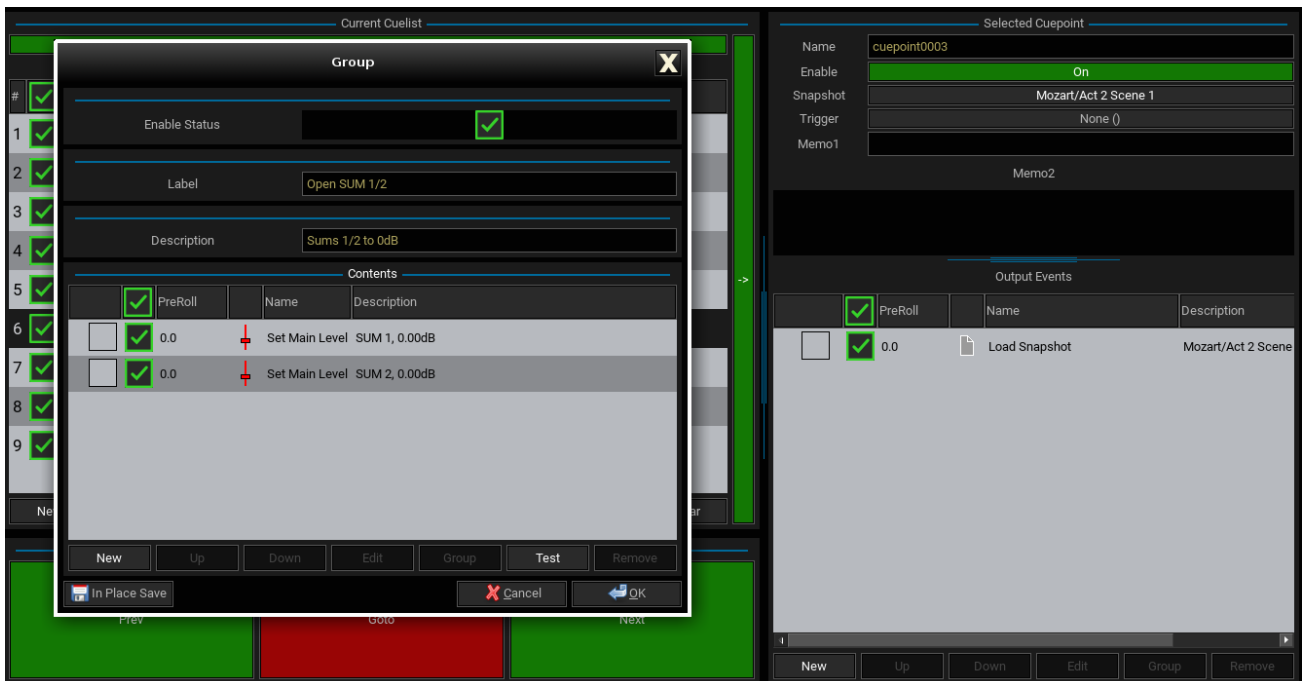
1. First select a cuepoint (from the **Current Cuelist**) and click on **New** (at the bottom of the **Output Events** area) to open the "Choose Command" window:



2. Select **Cache** and **OK** to open the contents of the cache - in our example, there is only one item available (our group named **Open SUM 1/2**):



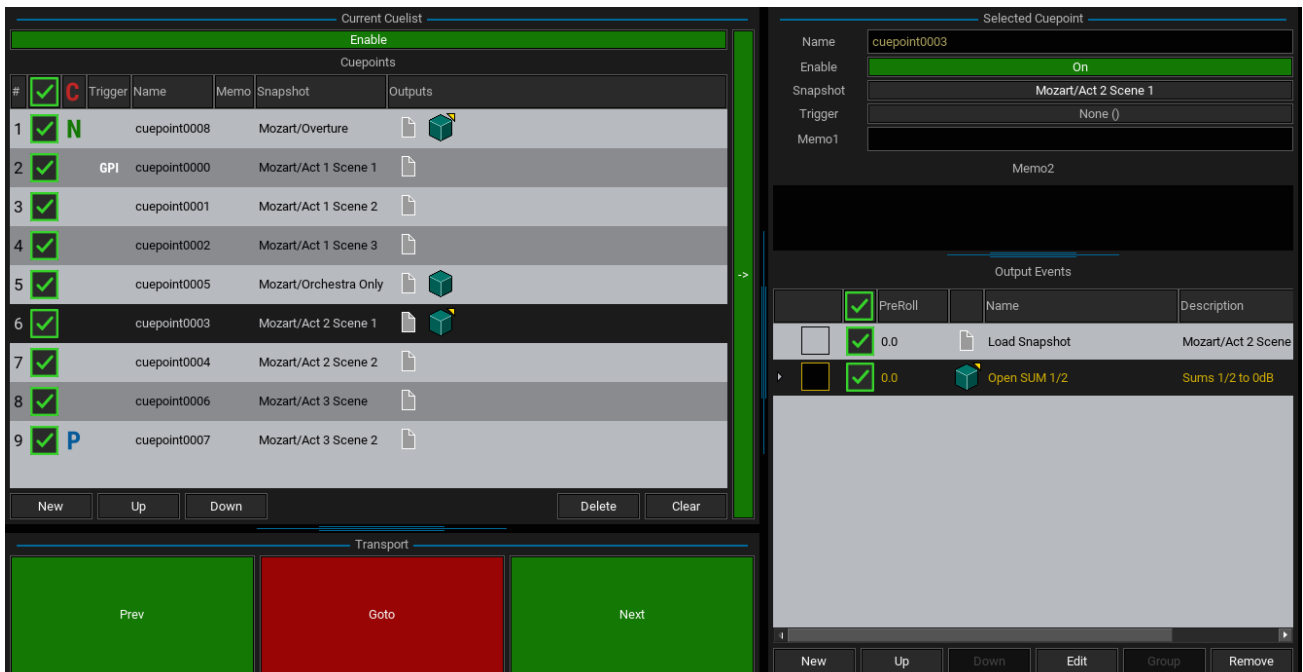
3. Select an entry and **OK** - the following window now opens:



There are now two ways in which you can add the cached event/group to the cuepoint:

4. Select **OK** to add the event/group as a child of the cache. This means that any changes you make to the event/group at a later time will be carried forward.
5. Alternatively, select **In Place Save** to add the event/group as a one-time copy of the cache. (i.e. subsequent changes to the cached event/group will NOT apply).

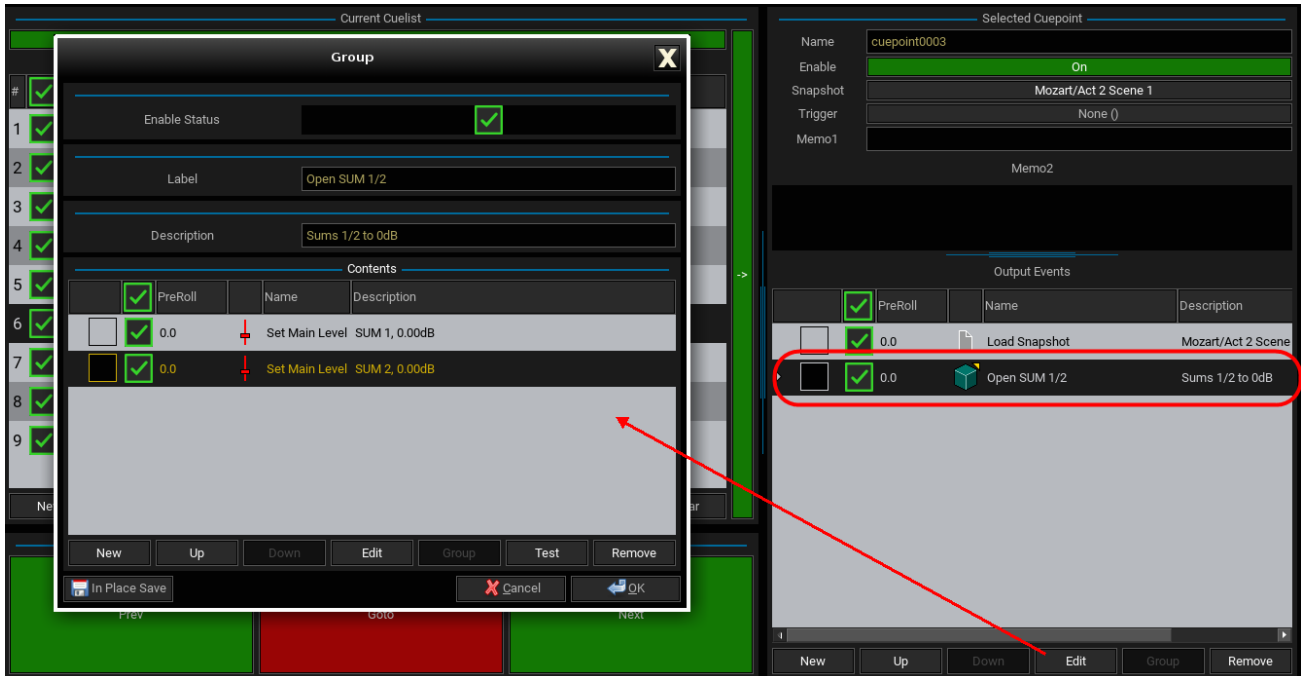
Note that an event or group which is a child of the cache is indicated by a small yellow triangle in the **Current Cuelist** and **Output Events** areas - in our example, both of the "Open SUM 1/2" groups remain a child of the cache:



### ➤ Child of the Cache Operations

At any time you can re-open an event or group which is a child of the cache as follows. This allows you to edit or test its contents, or re-save the event/group using **In Place Save**.

1. Select the child event or group (in the **Output Events** list) and click on **Edit**:



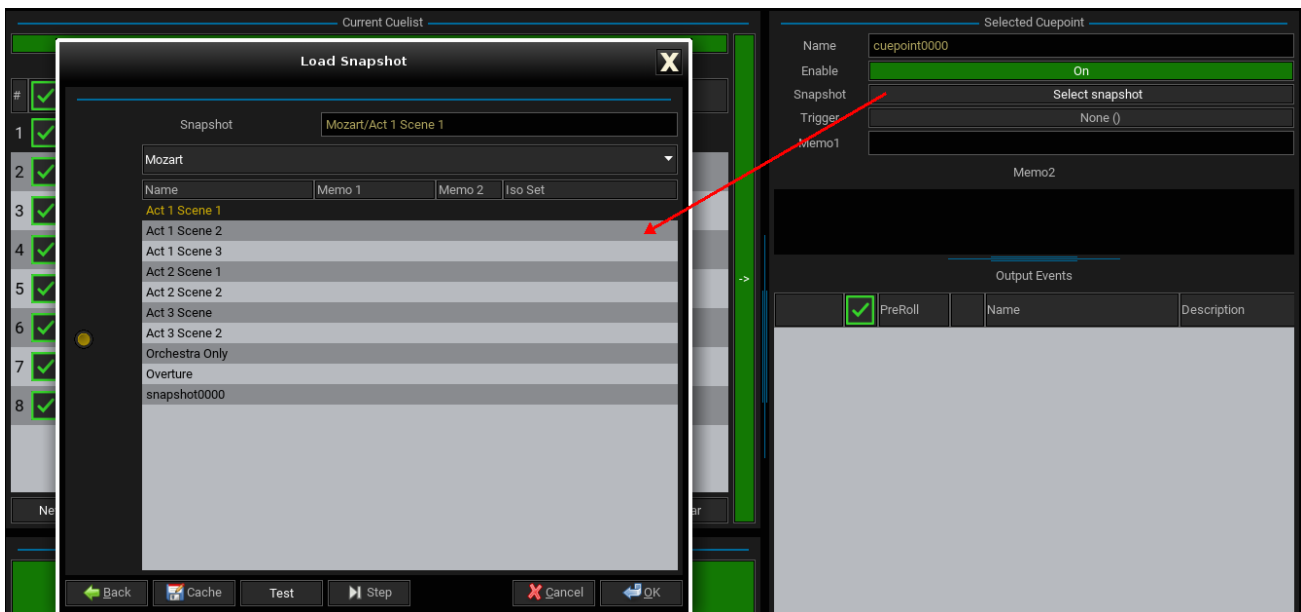
2. In our example, we can use any of the group editing commands (**New**, **Up/Down**, **Edit** or **Remove**) to change the contents of the group as described [earlier](#). Note that these will not appear for a single cached event.
3. To test the cached event/group, click on **Test**.
4. Once you have finished making changes, confirm with **OK**, or click on **Cancel** to exit without making a change. Or, to re-save the event/group to the cuepoint as a copy of the cache, click on **In Place Save**.

### 16.5.10 Using the Step Function

The **Step** function can be used make consecutive assignments to consecutive cuepoints very quickly. The function is available when assigning an [input trigger](#), [snapshot](#) or [output event](#) to a cuepoint.

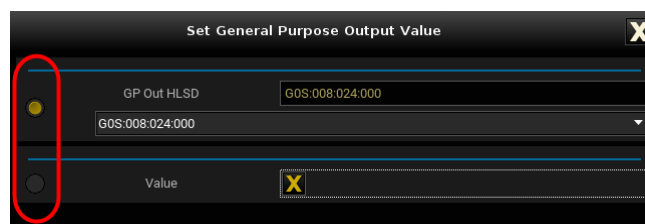
The example below describes how to assign consecutive snapshots to consecutive cuepoints, but the same principles can be applied to any event type:

1. Select the first cuepoint you wish to assign and open the **Selected Cuepoint** area (on the right of the display).
2. Click on **Select snapshot** - the "Load Snapshot" window appears:



3. Choose a Snapshot folder and the first snapshot - e.g. **Act 1 Scene 1**.
4. Then, instead of selecting **OK**, click on **Step** - automatically, the system makes current assignment, and then selects the next cuepoint AND automatically increments the step field (marked by the yellow dot).
5. Keep pressing **Step** to work through the assignments.
6. When you reach the end of the snapshots you wish to assign, confirm all changes with **OK**.

Note that if you use **Step** with an output event, then it is the selected step field which will auto-increment. Choose this by clicking on a circle to the left the parameter field - the selection is marked with a yellow dot:



In the example above, **Step** will auto-increment the GPO output address, and so this is a quick way of assigning incremental GPOs to consecutive cuepoints.



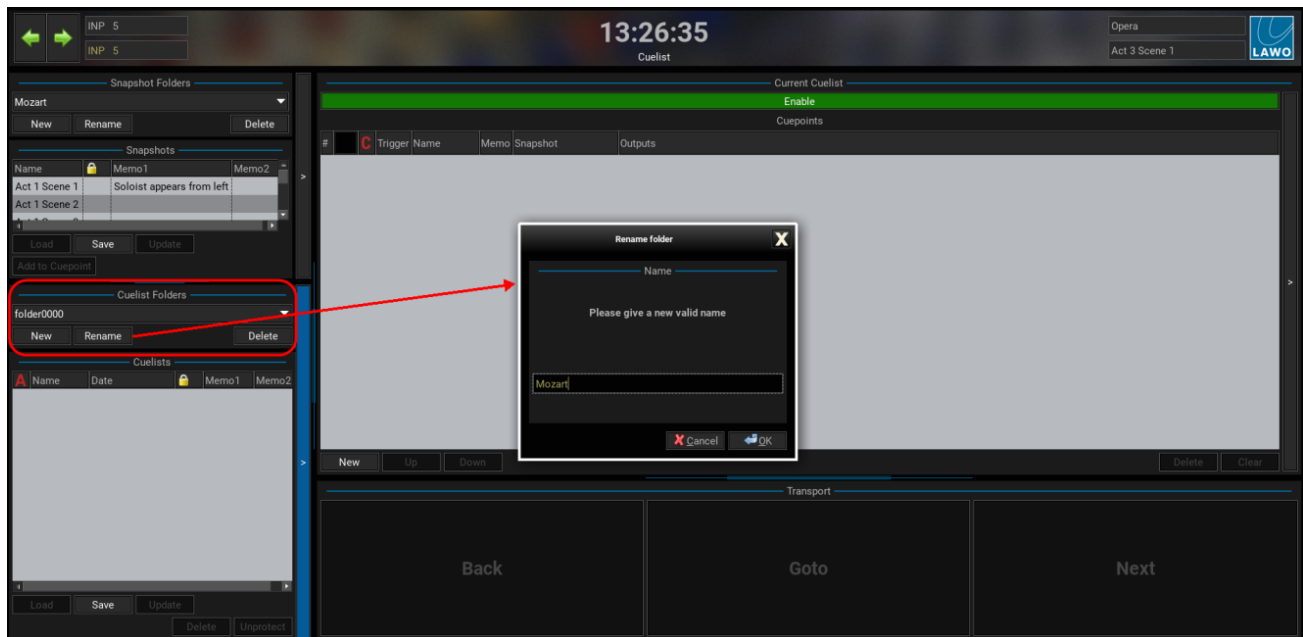
### 16.5.11 Cuelists and Folders

Cuelists are stored in folders within the active production.

Note that the cuelist folder is separate from the snapshot folder, and a cuelist can reference any snapshot in any snapshot folder as long as it is stored in the same production.

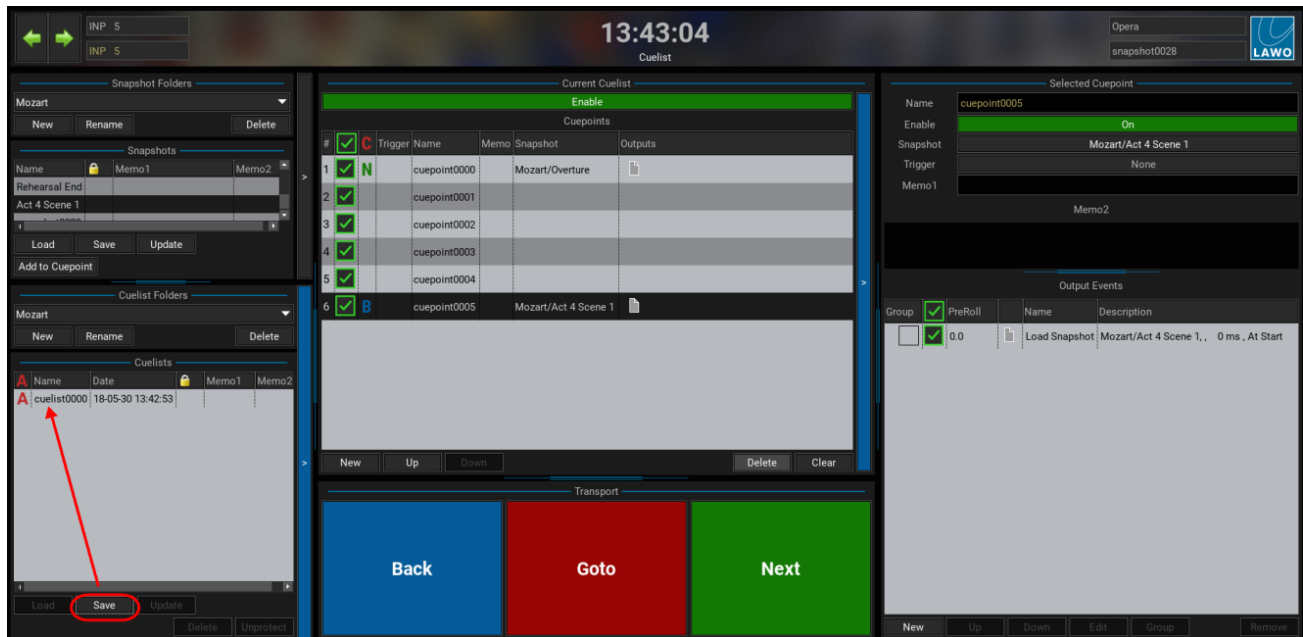
Use the **Cuelist Folders** and **Cuelists** areas on the lower left of the display to manage the cuelists and their folders as follows:

#### Cuelist Folders

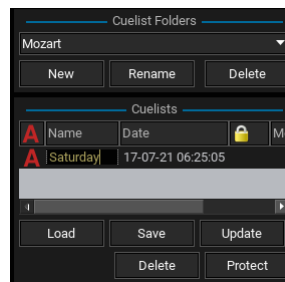


1. Select **New** to create a new cuelist folder - each folder is named automatically (e.g. **folder0000**).
2. Select **Rename** to rename the current folder - a pop-up window appears asking for a new name (as shown above).
3. Once more than one folder has been created, click on the drop-down menu to change folder.
4. Select **Delete** to delete the current folder.

## Cuelists



1. Select **Save** to save the contents of the **Current Cuelist** into a new cuelist - each cuelist is named automatically (e.g. **cuepoint0000**) as shown above.
2. Click in the cuelist **Name** field to edit the name:



Click once to select all the text, or twice to modify an existing name (you will see a flashing cursor).

3. If you add more cuepoints to the **Current Cuelist** or edit the **Selected Cuepoint** contents, then either select **Update** (to update the selected cuelist), or **Save** (to save the contents in a new cuelist).
4. At any time, you can load the contents of a cuelist by selecting the cuelist followed by **Load** - the **Current Cuelist** updates accordingly.

Note that this will replace the entire contents of the **Current Cuelist**, so be sure to save any changes first (see step 3) before you a load a different cuelist!

The active cuelist is indicated by the **A** in the "active" column.

5. Select **Delete** to delete the selected cuelist.
4. Select **Protect** to protect the selected cueslit - a padlock icon appears in the "protect" column.

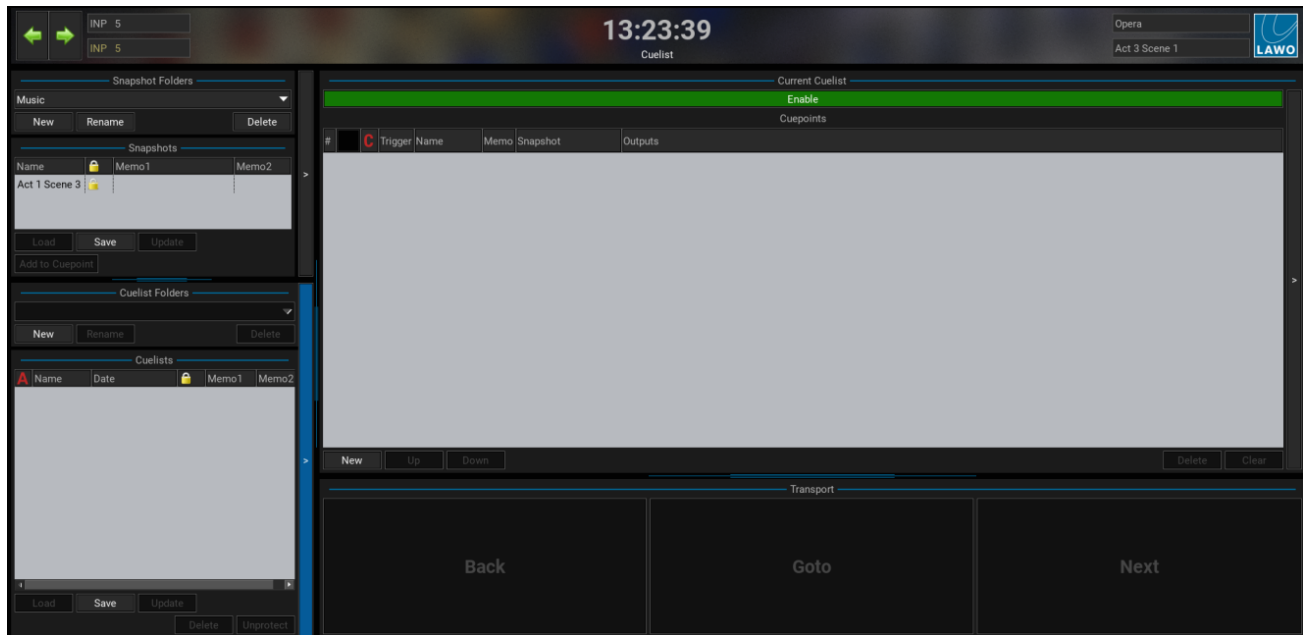
Remember to save all your cuelists and cuelist folders by [updating](#) (or [saving](#)) the production.

### 16.5.12 Cuelists and Snapshots

The **Snapshot Folders** and **Snapshots** listed at the top left of the display are identical to those in the [Snapshot List](#). This means that any changes will be applied throughout the system - for example, updating a snapshot from the **Cuelist** display is the same as updating a snapshot from the **Snapshot List**.

The **Snapshot Folders** and **Snapshots** are provided for convenience so that you can manage your snapshots as you create a cuelist.

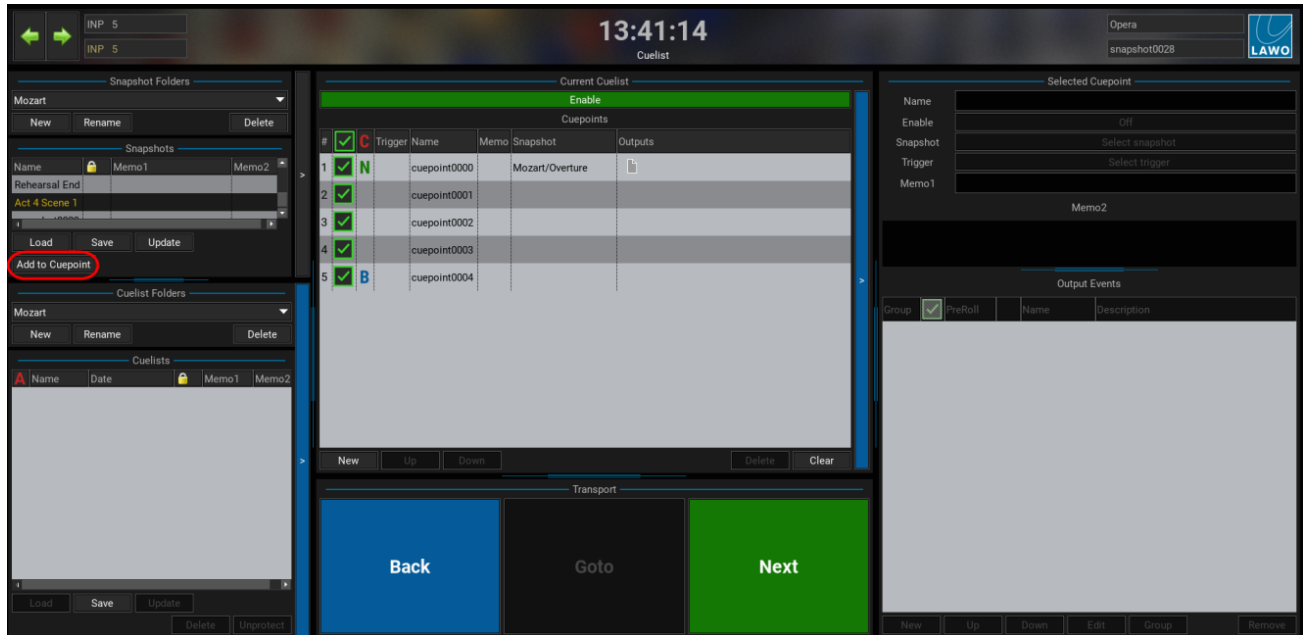
#### Snapshot Folders



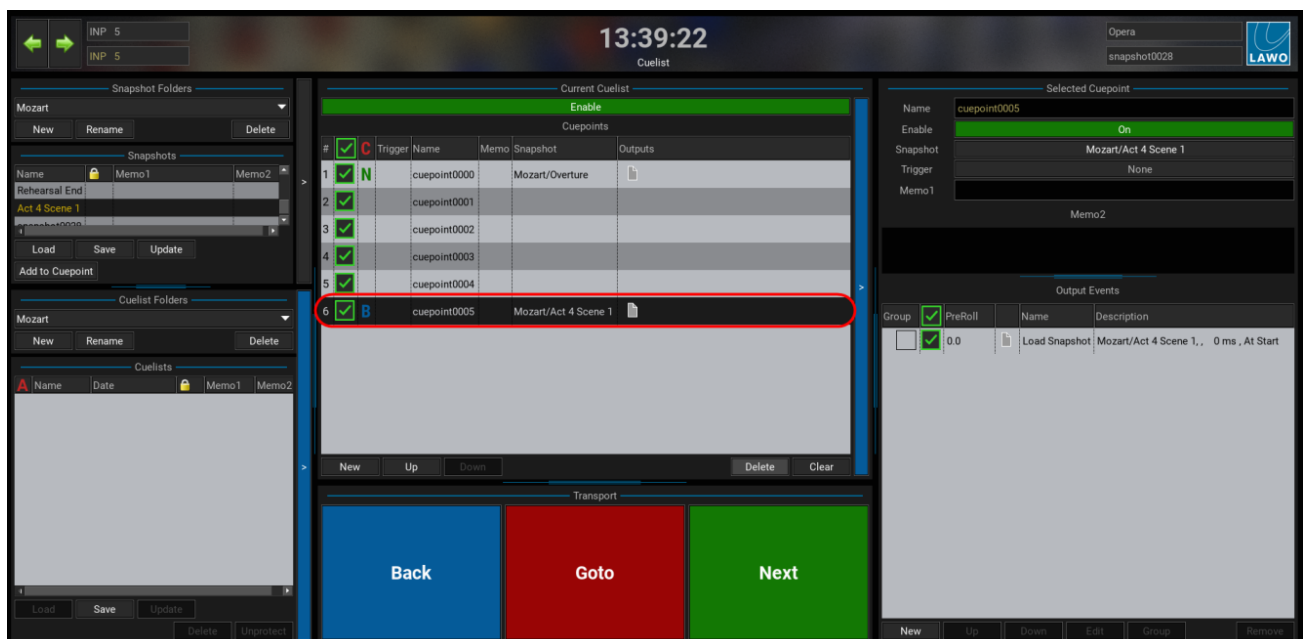
1. If your system already has snapshots saved, then select a **Snapshot Folder** from the drop-down menu - the **Snapshots** area shows its contents accordingly.
2. Alternatively, select **New** to create a new snapshot folder - each folder is named automatically (e.g. **folder0000**).
3. Select **Rename** to rename the current folder - a pop-up window appears asking for a new name.
4. Select **Delete** to delete the current folder.

## Snapshots

1. Select **Save** to save a new snapshot into the selected folder - the snapshot is named automatically. You can click on the name field to rename it if you wish.
2. Select **Add to Cuelist** to add the selected snapshot to the list of cuepoints:



Note that the snapshot uses its own name (e.g. Act 4 Scene 1), while the cuepoint takes the next default name (e.g. cuepoint0005). You can [rename](#) the cuepoint later if you wish:



3. The remaining functions - **Load** and **Update** - are provided for convenience:
  - Select **Load** to load the selected snapshot. This allows you to check its settings before [assigning](#) it to a cuepoint.
  - Select **Update** to update the selected snapshot. This allows you to overwrite the snapshot with the current console settings.

Remember to save all your snapshots and snapshot folders by [updating](#) (or [saving](#)) the production.

### 16.5.13 Snapshot Crossfades

When playing out snapshots from a cuelist, you can choose to crossfade from one snapshot to another.

For each cuepoint, you will need to assign a snapshot AND a fade set. The fade set specifies the channels and modules which will crossfade. You can link the same fade set to multiple snapshots, or fade sets can be snapshot-specific. Thus, you can define exactly which parameters will crossfade at each change of cue.

The fade snapshot also defines the crossfade time (in milliseconds) and whether switched functions (e.g. mutes) will change state at the start or the end of the crossfade. Note that these parameters are applied to the cuepoint which you are fading *to*.

For example, if cuepoint 0001 loads fade snapshot 0001 with a crossfade time of 1 second, and cuepoint 0002 loads fade snapshot 0002 with a crossfade time of 2 seconds, then:

- if you step from cuepoint 0001 to 0002, using the **NEXT** button, a crossfade time of 2 seconds is applied.
- if you then step back to cuepoint 0002 from cuepoint 0001, using the **BACK** button, a crossfade time of 1 second is applied.

To apply crossfades, you must play out fade snapshots from a cuelist.

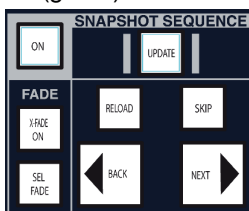
Crossfade are NOT applied when you load normal snapshots from either the **Cuelist** or [Snapshots List](#) displays.

### Fade Sets

A fade set is used to specify the channels and modules which will crossfade when fade snapshots are loaded from a cuelist. For convenience, they can be managed from both the **Snapshot List** and **Cuelist** displays. Here we will use the **Cuelist** display, but the operations are identical from the [Snapshot List](#).

#### ➤ To create a new fade set:

1. Press the **SEL FADE** button - it flashes (green) when active:



2. Select the DSP module(s) you wish to fade, by enabling the **SEL** buttons on the Central Control Section, see [Selecting Channel Parameters](#).

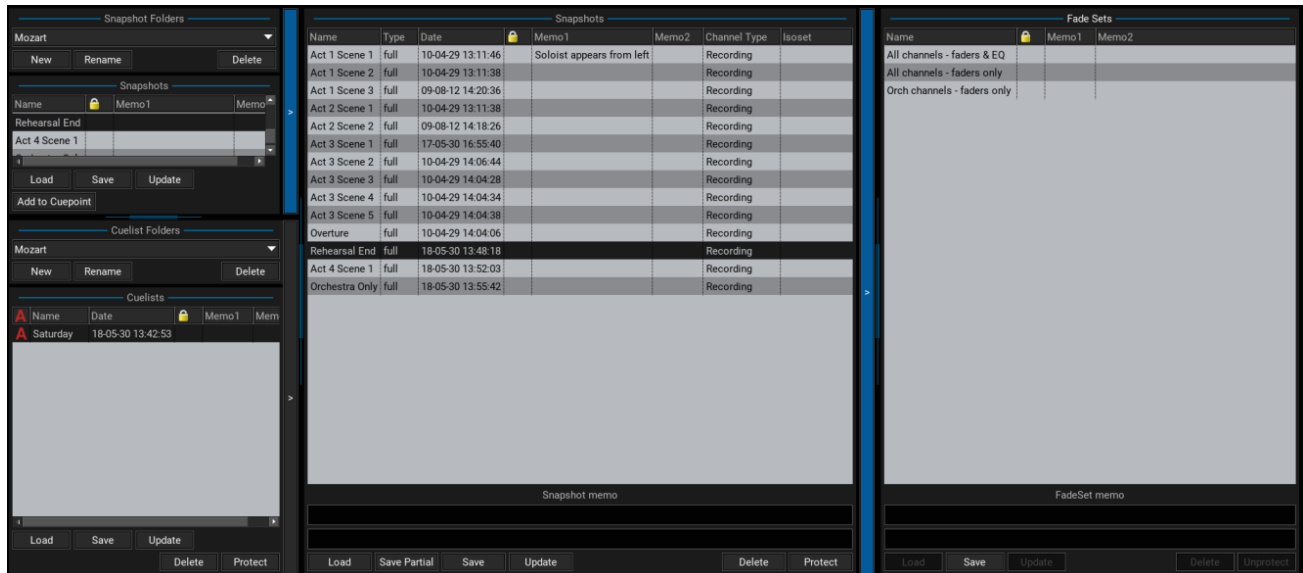
For example, to select the fader and EQ, press **SEL** beside the fader and EQ sections.

3. Then press the fader **SEL** buttons to apply your chosen selections across multiple channels:



4. Now open the **Fade Sets** area (on either the **Snapshots List** or **Cuelist** display) and select **Save** - a new fade set is saved and automatically named.
5. Repeat steps 1 to 4 to save the different fade sets required for the cuelist.

In our example, we have created three different fade sets:



If you cannot see the **Fade Sets** area, then check the current [view](#).

Fade sets are stored in the current snapshot folder (e.g. Mozart). If the fade sets apply to specific snapshots, then it makes sense to save them in the same folder. However, if they are more generic, then you could use a separate snapshot folder. A fade set can be linked to any snapshot (stored in any snapshot folder) as long as they are saved in the same production.

### ➤ Other Fade Set Operations

You can manage fade sets in a similar manner to snapshots:

- **Name** - click in the **Name** field to rename a fade set.
- **Memo** - click and type into the **Memo1** or **Memo2** fields to enter memo text..
- **Load** - loads the selected fade set.
- **Save** - saves the current module and channel selections into a new fade set.
- **Update** - updates the selected fade set with current module and channel selections.
- **Delete** - deletes the selected fade set.
- **Protect** - protects (or unprotects) the selected fade set.

Remember to save the fade sets by [updating](#) (or [saving](#)) the production.

### Importing and Exporting Fade Sets

Fade Sets cannot be accessed individually from the **File** display, but they can be imported and exported by copying the snapshot folder:

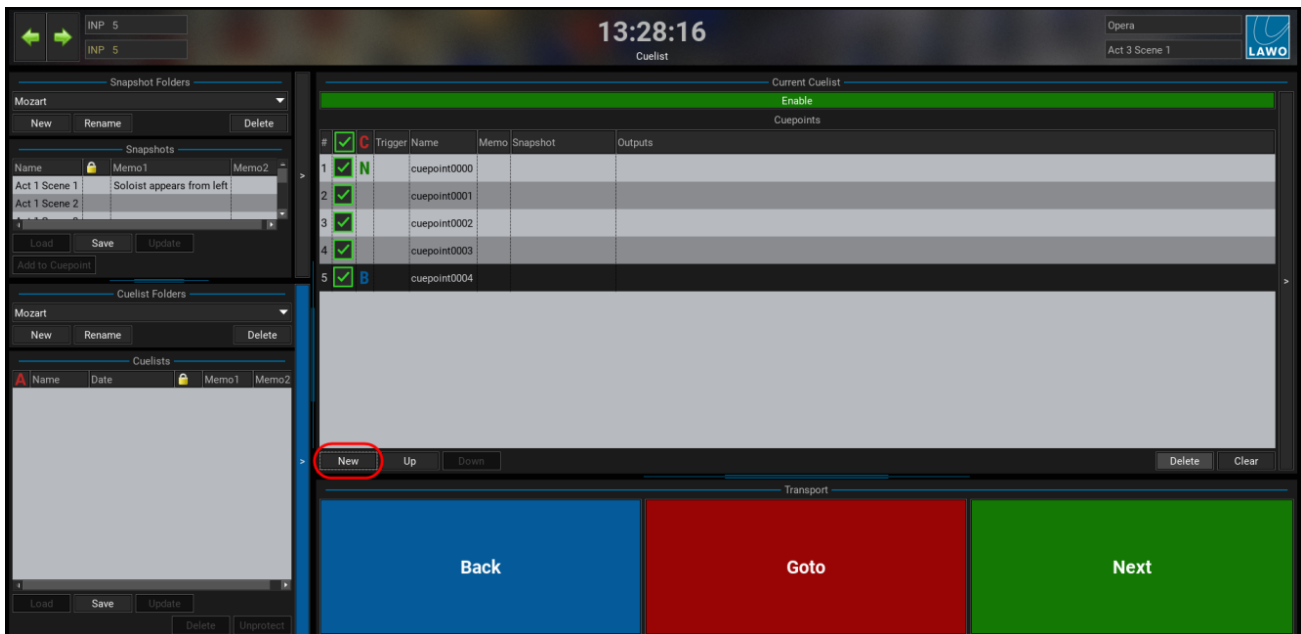
1. Copy the snapshot folder containing your fade sets to a USB interface or network drive using the [File Export](#) function from the **File** display.
2. Connect your USB interface or network drive to the destination console.
3. And import the snapshot folder into the current production using [File Import](#) from the **File** display.

If you now open the **Fade Sets** area (in either the **Snapshot List** or **Cuelist** displays) and select the imported folder, you will see your fade sets.

## Assigning Fade Snapshots to Cuepoints

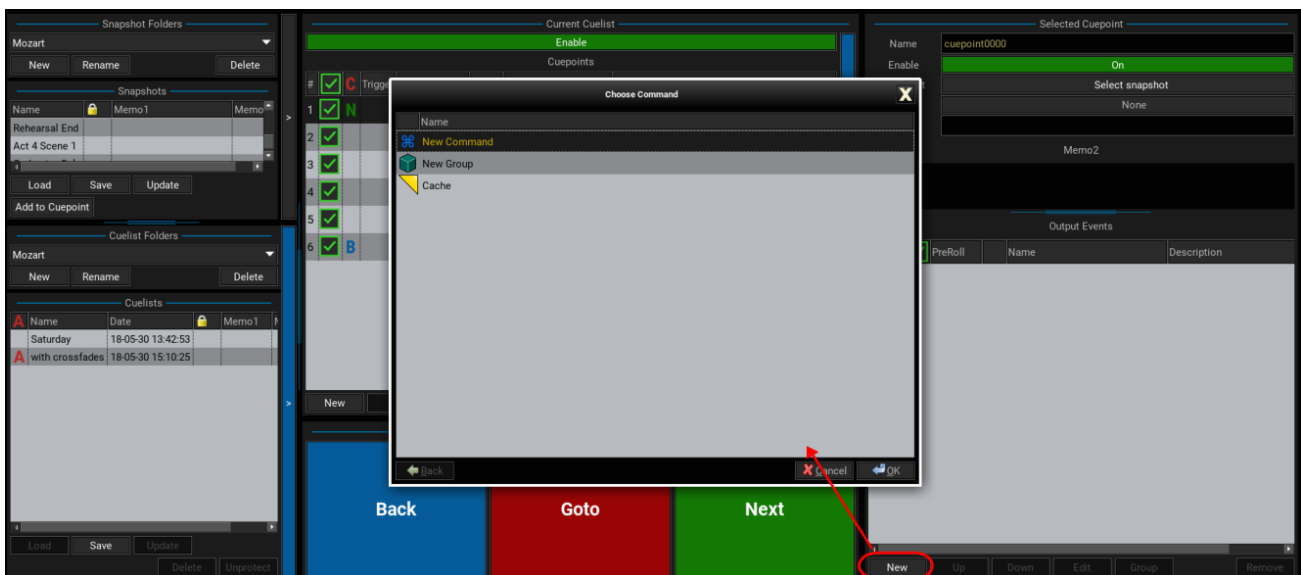
To apply crossfades to a change of cue, you must assign a **Snapshot** AND a **Fade Set** to each cuepoint in the **Current Cuelist**.

1. First save all the snapshots and fade sets you wish to use for the cuelist.
2. Then click on **New** (at the bottom of the **Current Cuelist**) to create some new "empty" cuepoints:



If you have already assigned snapshots to cuepoints using the **Select Snapshot** method, then you will need to [remove](#) these assignments, and replace them with fade snapshots as described below.

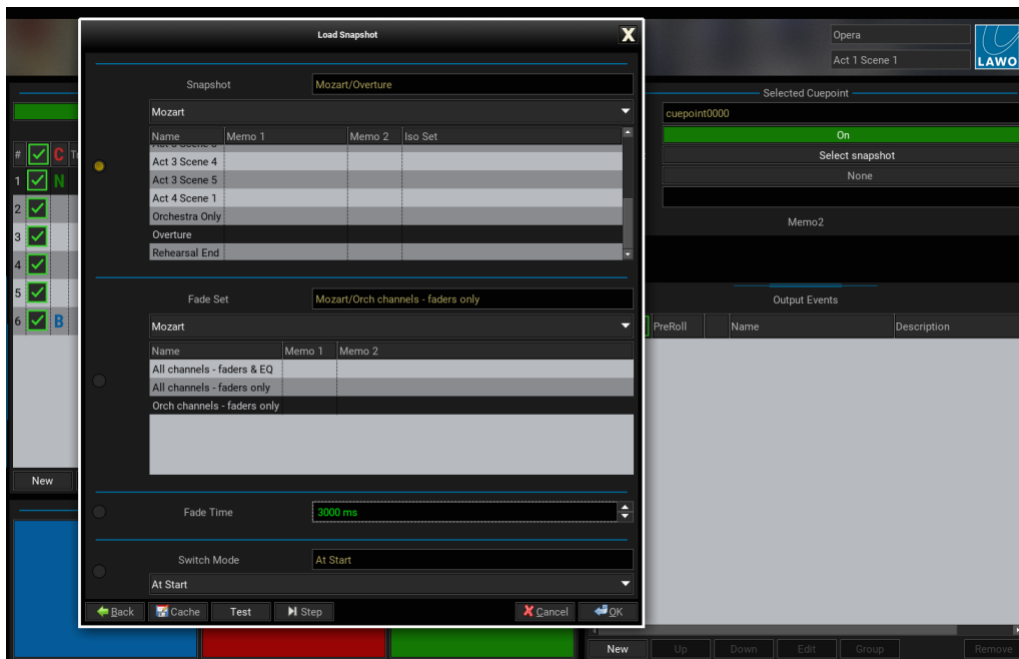
3. Select the first cuepoint and open the **Selected Cuepoint** area (on the right of the display).
4. Click on the **New** button (at the bottom of the **Output Events** area) - the "Choose Command" window appears:



5. Select **New Command** -> **Load Events** -> **Load Snapshot** - the "Load Snapshot" window appears. Resize this window so that you can see all of the fields for both the **Snapshot** selection and **Fade Set**.

6. First, select the snapshot you wish to load, and then select a fade set.

In our example, the snapshot and fade set are stored in the same snapshot folder, but you can choose snapshots and fade sets from any folder as long as they are stored in the same production.



7. Now enter the parameters for the crossfade using the following fields:

- **Fade Time** - enter a value in ms.
- **Switch Mode:**
  - ☐ **At Start** = switched functions change state at the start of the crossfade.
  - ☐ **At End** = switched functions change state at the end of the crossfade.

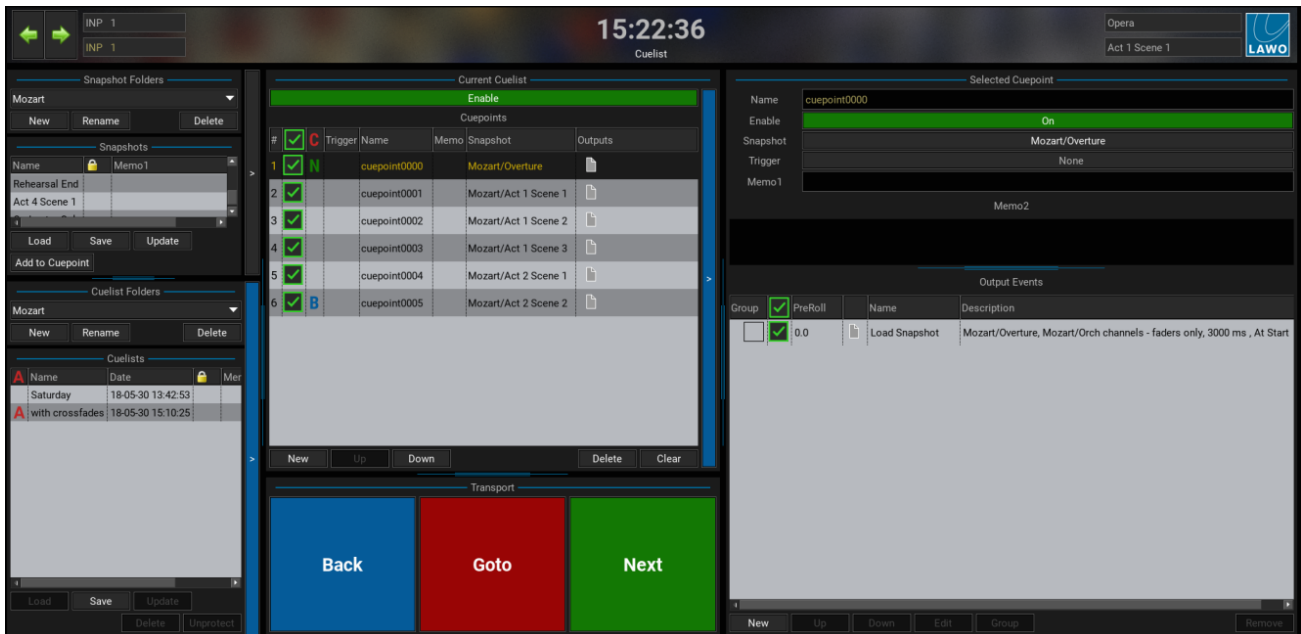
Note that at the bottom of the window are a number of useful functions:

- **Back** - click to step back to the last operation; in this instance, it go back a page.
- **Cache** - click to add the fade snapshot to the [Cache](#).
- **Test** - click to load the selected snapshot (to "test" its contents).
- **Step** - click to step forwards to the next cuepoint AND automatically increment the step field (marked by the yellow dot). In our example, this will assign consecutive snapshots to consecutive cuepoints using the same fade set and crossfade time/switch mode. See [Using the Step Function](#).

8. Confirm all changes with **OK** or, to exit without making a change, select **Cancel**.



In our example, the fade snapshot assigned to **cuepoint0000** will load the snapshot named **Overture** and apply the fade set named **Orchestra channels - faders only**. We have then used **Step** to assign fade snapshots to the other cuepoints in the list:



Remember to save your assignments by [saving or updating](#) a cuepoint, and then [updating](#) (or [saving](#)) the production.

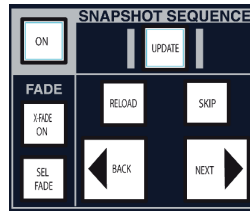
The cuepoint can now be played out in the [usual](#) manner, so press **NEXT** to crossfade into the first cuepoint (**cuepoint0000**). In our example, this will apply a fade time of 3 seconds and change switched functions at the start of the fade.

If nothing happens when you recall your cuepoint, check the following:

- Is cuepoint automation enabled (**Enable** button on)?
- Are the channels and modules defined by the fade set isolated from the snapshot recall (using [snapshot isolate](#))?
- Have you entered a crossfade time greater than 0ms?!
- Make sure that you're not crossfading between snapshots with the same parameters!

### 16.5.14 SNAPSHOT/SEQUENCE Front Panel Summary

The SNAPSHOT/SEQUENCE panel provides quick access to the following functions:



- **ON** - press to enable (or disable) [cuelist automation](#).
- **UPDATE** - in the current release, this button has no function.
- **FADE: XFADE ON** - in the current release, this button has no function.
- **FADE: SEL** - used to select channels and modules for inclusion in a [fade set](#).
- **SKIP** - press to skip the next cuepoint in the cuelist.
- **RELOAD** - press to reload the [current](#) cuepoint. This is useful if you have made manual updates to the console's settings and want to reload the current snapshot/output events
- **BACK** - press to load the [previous cuepoint](#).
- **NEXT** - press the load the [next cuepoint](#).

## 16.6 Snapshot Offsets

Whenever a snapshot is recalled, either from the **Snapshots** or **Cuelist** display, it can be recalled with offset parameters.

For example, if you are running an opera where different soloists will perform on different nights, you can store a basic set of snapshots for the show, and then apply offset parameters for soloist A, soloist B, etc. without affecting the original snapshot values.

Any number of offsets can be applied, and can include a mixture of absolute and trim values:

- Use an absolute offset when you want a new static value throughout the cuelist – for example, to apply a new EQ setting for soloist B.
- Use a trim offset when you want to keep the relative changes from the snapshots within the cuelist – for example, to make soloist B's fader level +3dB louder throughout the show.

The active snapshot offsets are known as the [Current Trim Set](#). This is a temporary buffer which you can update at any time allowing you to modify offset parameters during a show. For example, if soloist B sings louder than during rehearsal you can wish to adjust their trim offset!

You can also store offsets by saving the contents of the **Current Trim Set** into memories called [Oversnaps](#). Each oversnap can store any number of offset parameters, and different combinations of oversnaps can be added to the Current Trim Set. This allows you to make any combination of offsets active – for example, to combine the offsets for soloist A with those for trombonist B.

Oversnaps are stored in the current snapshot folder within the active production. Oversnaps are written onto the user data flash card when you [save](#) or [update](#) a production. Note that you *must* use oversnaps to store and recall snapshot offset parameters. (The **Current Trim Set** is a temporary buffer which is saved in the system's warm start data to protect you from a system restart. However, if you clear the **Current Trim Set**, or change production, then any active snapshot offsets will be lost.)

Whilst snapshot offsets are designed for cuelist play out, active offsets are applied to *any* snapshot load.

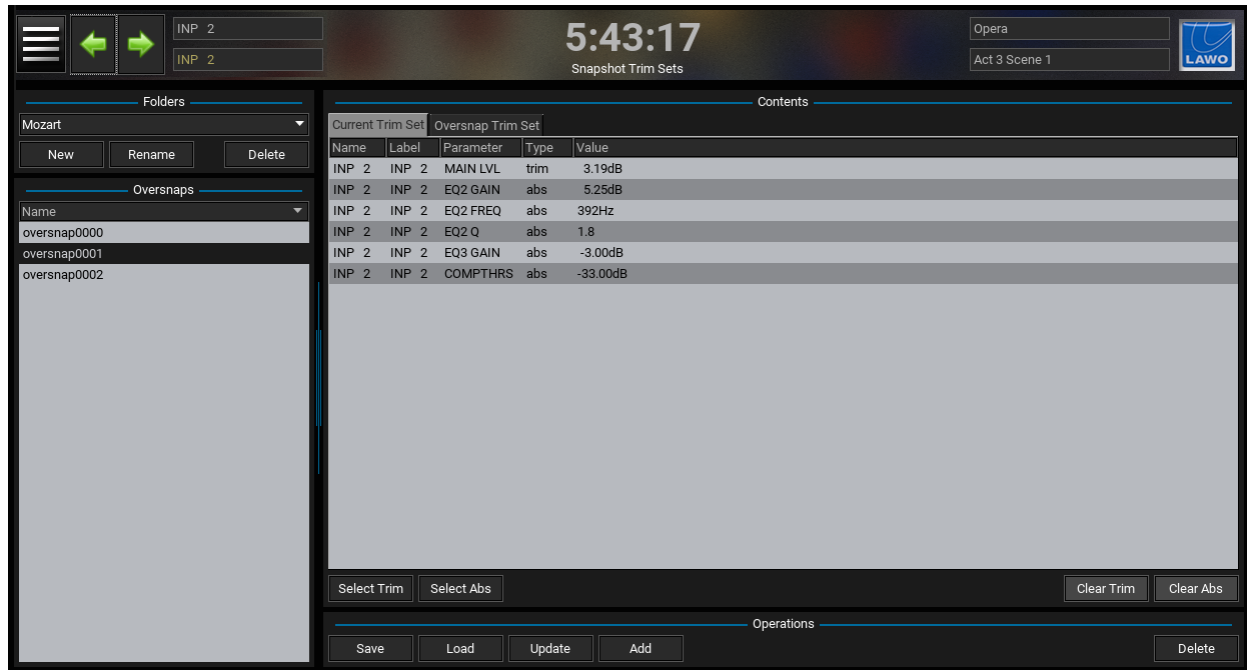
When trimming [input GAIN](#), you can only trim the SOURCE gain for mic/line inputs, and not for fixed gain or digital sources. In other words, you cannot trim the IO DSP gain (Volume).

For any type of input, you can apply trim to the INMIX channel input gain.

Snapshot offsets are managed from the **Snapshot Trim Sets** display.

## 16.6.1 The Snapshot Trim Sets Display

1. [Open](#) the **Snapshot Trim Sets** display on the Central GUI.



The display is divided into four areas:

- **Folders** – manages the folders stored in the current production; one will be selected, in our example, **Mozart**.
- **Oversnaps** - lists any oversnaps stored in the selected folder.
- **Contents** - shows either the **Current Trim Set** or **Oversnap Trim Set** – click on the headings to toggle between the options:
  - ☐ **Current Trim Set** - lists the active snapshot offset parameters. If the list is empty, then a snapshot will load with its original values. If the list contains offsets, then the offset values will be applied. Use the **Current Trim Set** to update the active offset parameters. This can be done [live](#) from the console, or by loading an [oversnap](#).
  - ☐ **Oversnap Trim Set** – lists the offset parameters which are stored in the selected [oversnap](#). This allows you to view offset parameters before you load the oversnap.
- **Operations** – this area contains buttons for managing Oversnaps.

During a live show, it is best to show the **Current Trim Set** in the **Contents** area. This way you can be sure that you are viewing the active offset parameters which will be applied to your next snapshot load.

### 16.6.2 First Steps

The **Current Trim Set** lists the active snapshot offset parameters. Offsets listed here are applied to *all* snapshot loads.

To update the list, you can either add offset parameters live from the console, or load a stored [oversnap](#). Here we will look at adding offsets to the **Current Trim Set** from the console.

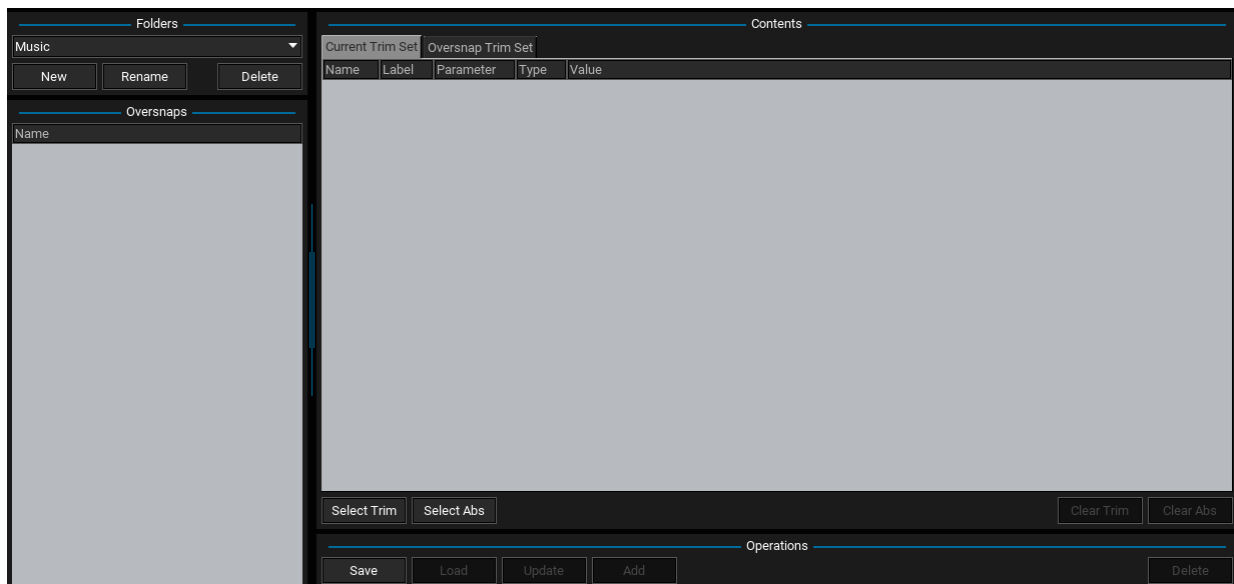
The contents of the **Current Trim Set** are applied to *all* snapshot loads, including loads from the **Snapshots** and **Cuelist** displays.

When adding offsets, the console compares the current desk position to the value stored in the last loaded snapshot. Therefore, it's a good idea to start by loading the snapshot you want to use as a reference point for the comparison. (In our workflow, this will be the last snapshot played out from the cuelist.)

1. Load a snapshot - the console updates to the stored positions.
2. Open the **Snapshot Trim Sets** display.
3. Click on **Current Trim Set** to view any active snapshot offsets.

The **Current Trim Set** will be empty, unless you have already been working with snapshot offsets.

4. You can clear the **Current Trim Set** by clicking on the **clear abs** and **clear trim** buttons (lower right of display):

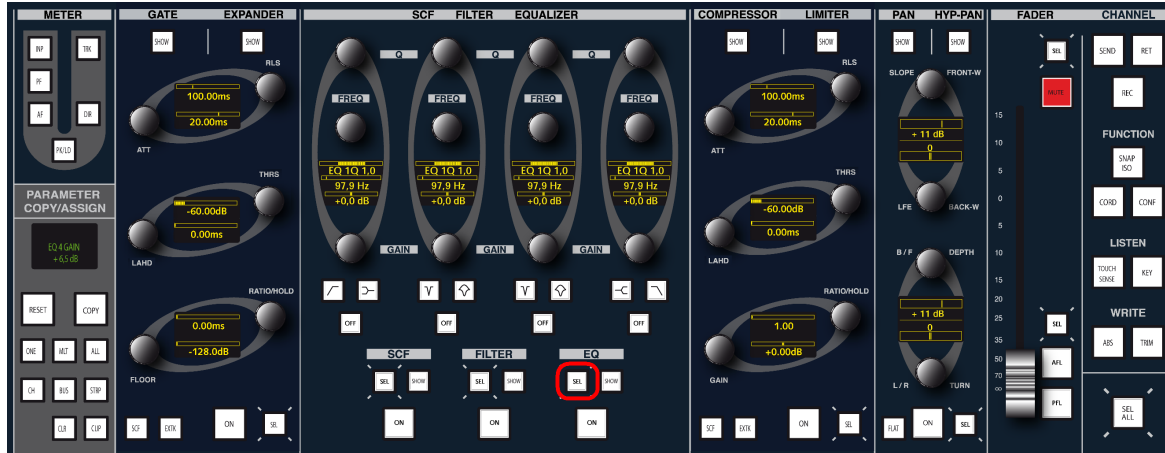


5. Now adjust the console parameters you wish to offset – for example, some fader levels and an EQ setting.

Let's assume that we want the new EQ setting to be static for the whole show (an absolute offset), but that the level changes should be relative (trim offsets).

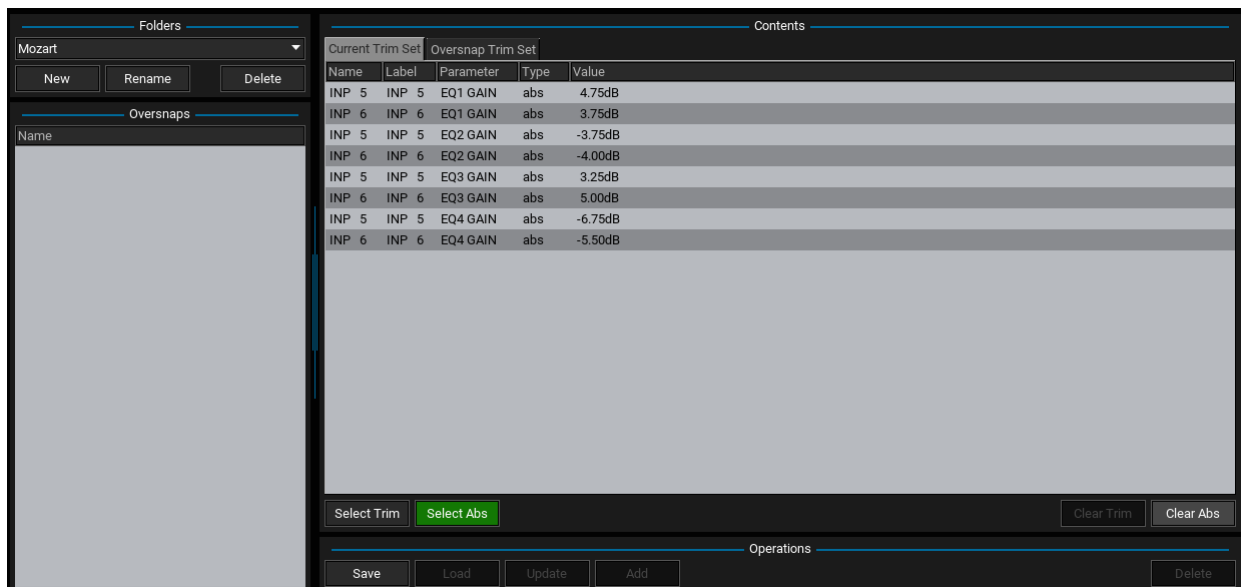
6. Press **ABS** (under [CHANNEL](#) in the Central Control Section), or the on-screen **Select Abs** button, to activate the absolute offset parameter selection - the **ABS** button flashes.
7. Assign the channel with the EQ setting to the [Central Control Section](#), by pressing its fader **SEL** button.

Any audio modules which have a different setting to that stored in the last loaded snapshot are displayed with green **SEL** buttons – in our example, the **SEL** button on the EQ section:



8. To add the new EQ setting to the **Current Trim Set**, press the green EQ **SEL** button.

The **SEL** button turns red and each modified EQ parameter is added to the **Current Trim Set** as an absolute (**ABS**) offset on the **Snapshot Trim Sets** display:



9. Now repeat the last three steps, but select the **TRIM** button (or the on-screen **Select Trim**) - the **TRIM** button flashes to show that you are now selecting trim offset parameters.

10. Assign one of the channels with a new fader level to the Central Control Section.

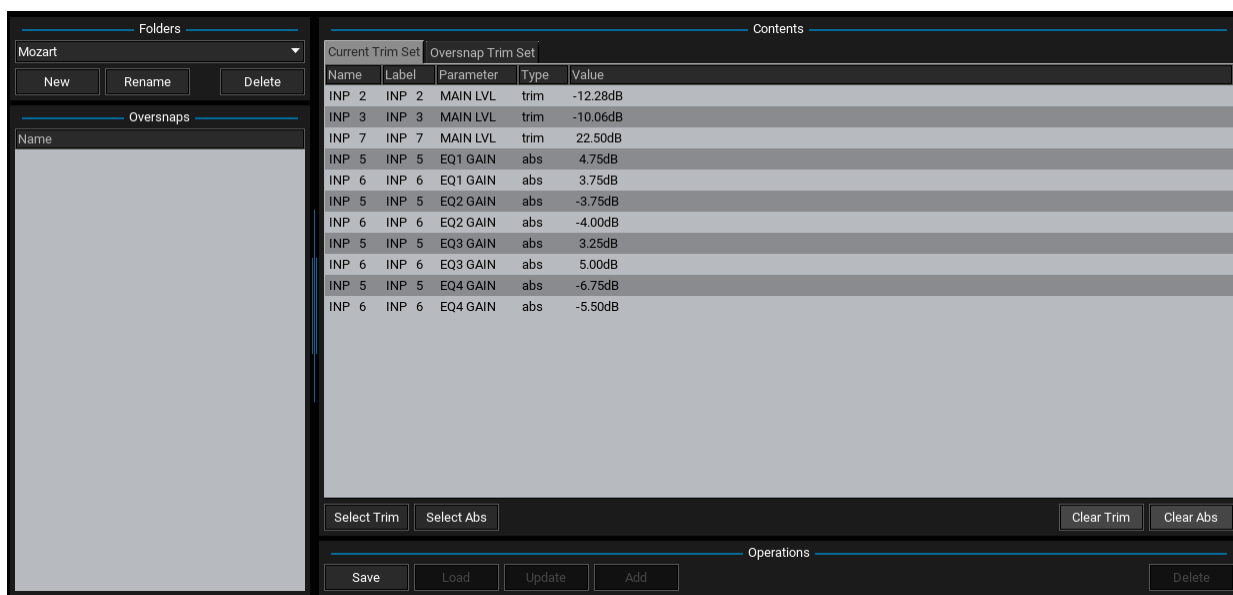
This time the fader **SEL** button lights (green) to indicate that the level has changed from that stored in the last loaded snapshot.

11. Press the green **SEL** button to add the trimmed fader level to the **Current Trim Set**.

The **SEL** button turns red and the trimmed fader level is added to the **Current Trim Set** on the **Snapshot Trim Sets** display.

12. Repeat for each new fader level, by assigning the channel to the Central Control Section and then pressing the green parameter **SEL** buttons.

As each offset parameter is selected, it is added to the **Current Trim Set** on the **Snapshot Trim Sets** display:



Name	Label	Parameter	Type	Value
INP 2	INP 2	MAIN LVL	trim	-12.28dB
INP 3	INP 3	MAIN LVL	trim	-10.06dB
INP 7	INP 7	MAIN LVL	trim	22.50dB
INP 5	INP 5	EQ1 GAIN	abs	4.75dB
INP 6	INP 6	EQ1 GAIN	abs	3.75dB
INP 5	INP 5	EQ2 GAIN	abs	-3.75dB
INP 6	INP 6	EQ2 GAIN	abs	-4.00dB
INP 5	INP 5	EQ3 GAIN	abs	3.25dB
INP 6	INP 6	EQ3 GAIN	abs	5.00dB
INP 5	INP 5	EQ4 GAIN	abs	-6.75dB
INP 6	INP 6	EQ4 GAIN	abs	-5.50dB

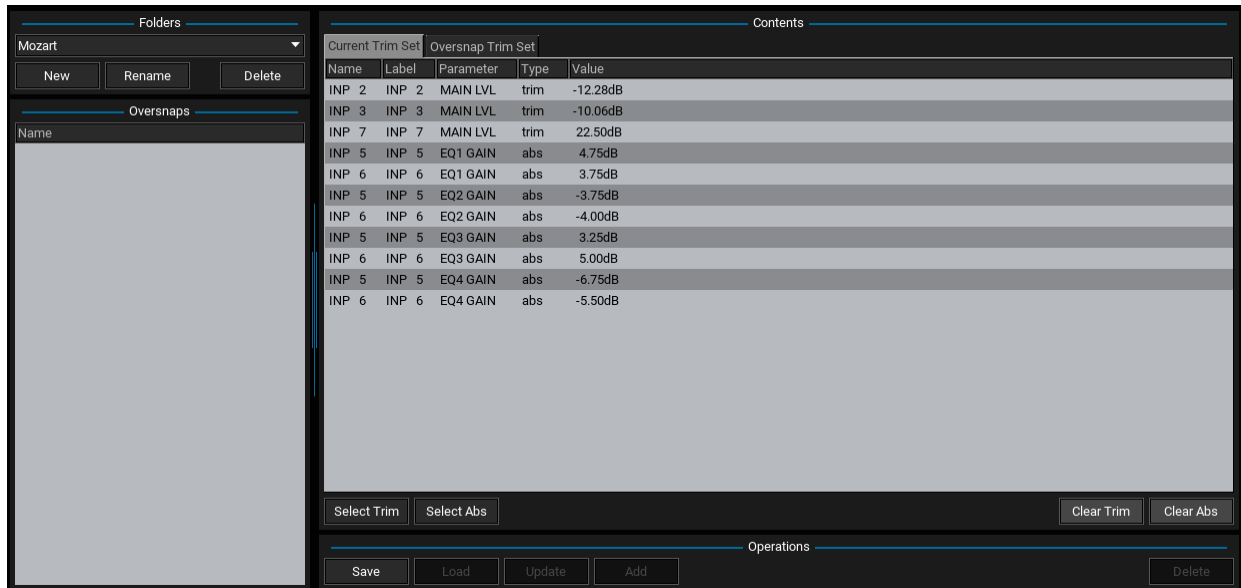
Note that the trim offset is the difference in level between the current fader position and the level stored in the last loaded snapshot – for example, if the snapshot loads a main fader level of -6dB, and you have moved the fader to +4dB, then the trim offset is +10dB.

13. When you have finished selecting offset parameters, turn off the WRITE **ABS** and **TRIM** buttons (equivalent to **Select Abs** and **Select Trim** on the **Snapshot Offsets** display).

Note that the **Current Trim Set** is a temporary buffer and its contents are not saved other than in the system's warm start data. To save your offsets so that they can be recalled at a later date, you should [save](#) an oversnap.

### 16.6.3 Recalling Snapshots with Offsets

As soon as you have added offset parameters to the **Current Trim Set**, these offsets are active. This means that *any* snapshot loaded from this point on, either from a cuelist or from a snapshot load, will have the **Current Trim Set** offsets applied:



The screenshot shows the console interface with the 'Current Trim Set' tab selected. The 'Contents' panel displays a table of offset parameters:

Name	Label	Parameter	Type	Value
INP 2	INP 2	MAIN LVL	trim	-12.28dB
INP 3	INP 3	MAIN LVL	trim	-10.06dB
INP 7	INP 7	MAIN LVL	trim	22.50dB
INP 5	INP 5	EQ1 GAIN	abs	4.75dB
INP 6	INP 6	EQ1 GAIN	abs	3.75dB
INP 5	INP 5	EQ2 GAIN	abs	-3.75dB
INP 6	INP 6	EQ2 GAIN	abs	-4.00dB
INP 5	INP 5	EQ3 GAIN	abs	3.25dB
INP 6	INP 6	EQ3 GAIN	abs	5.00dB
INP 5	INP 5	EQ4 GAIN	abs	-6.75dB
INP 6	INP 6	EQ4 GAIN	abs	-5.50dB

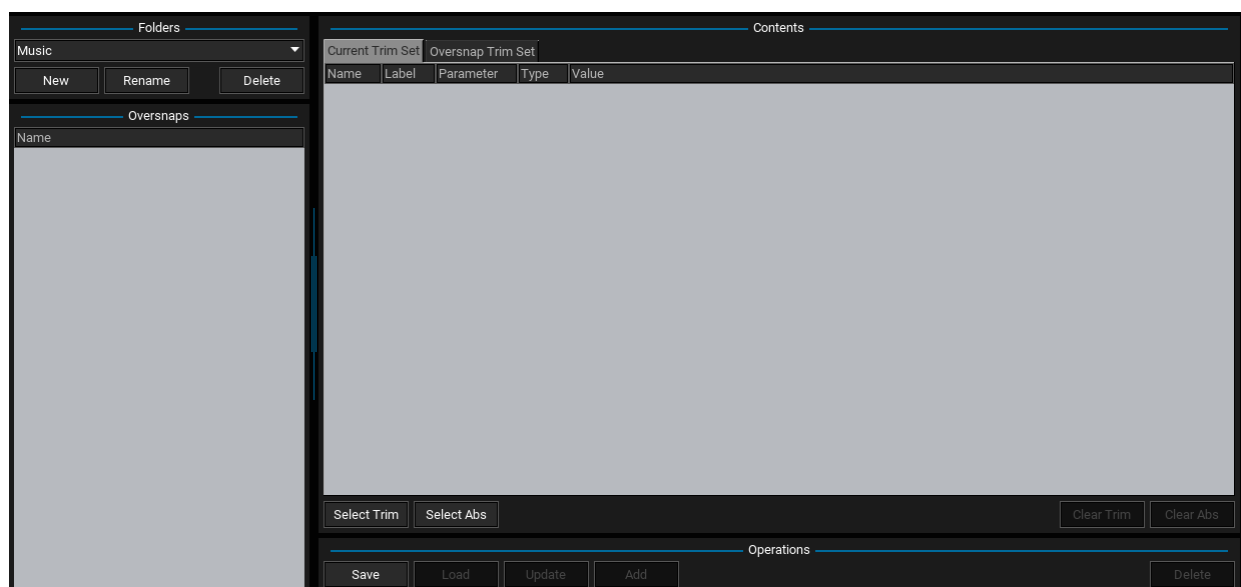
Below the table are buttons for 'Select Trim', 'Select Abs', 'Clear Trim', and 'Clear Abs'. At the bottom, there are buttons for 'Save', 'Load', 'Update', 'Add', and 'Delete'.

See [Running a Cuelist](#) and [Loading a Snapshot](#) for details.

### 16.6.4 Clearing Snapshot Offsets

To disable snapshot offsets, you must clear the **Current Trim Set**.

1. Click on the **clear abs** button to clear all absolute snapshot offsets.
2. And click on **clear trim** to clear all trim offsets:



The screenshot shows the console interface with the 'Current Trim Set' tab selected. The 'Contents' panel is now empty, indicating that all offsets have been cleared. The buttons 'Select Trim', 'Select Abs', 'Clear Trim', and 'Clear Abs' are still visible at the bottom of the panel. At the bottom of the console, there are buttons for 'Save', 'Load', 'Update', 'Add', and 'Delete'.

Once the **Current Trim Set** list is empty, snapshots will be loaded with their original values.

You can [update](#) the snapshot offsets in order to clear or modify a single offset parameter.



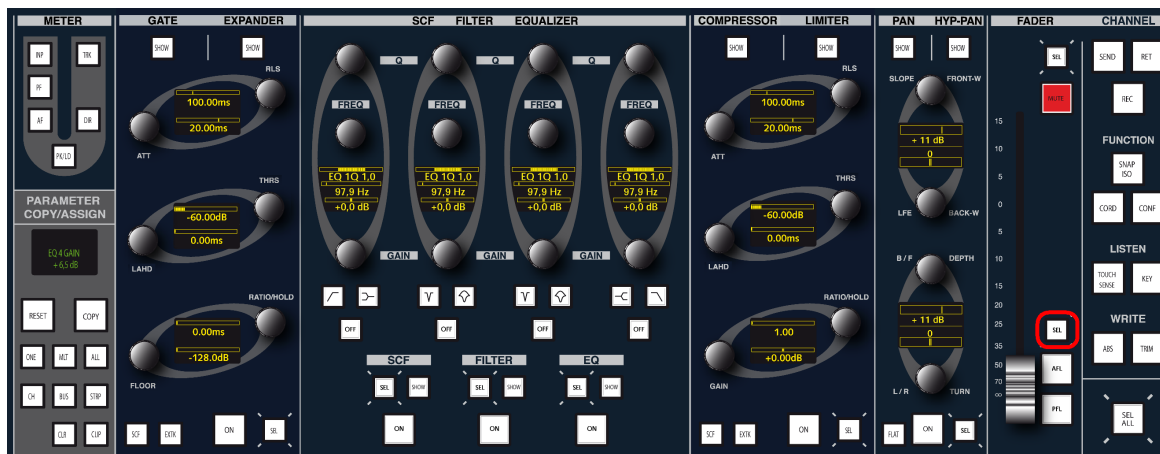
## 16. Console Reset

### 16.6.5 Updating Snapshot Offsets

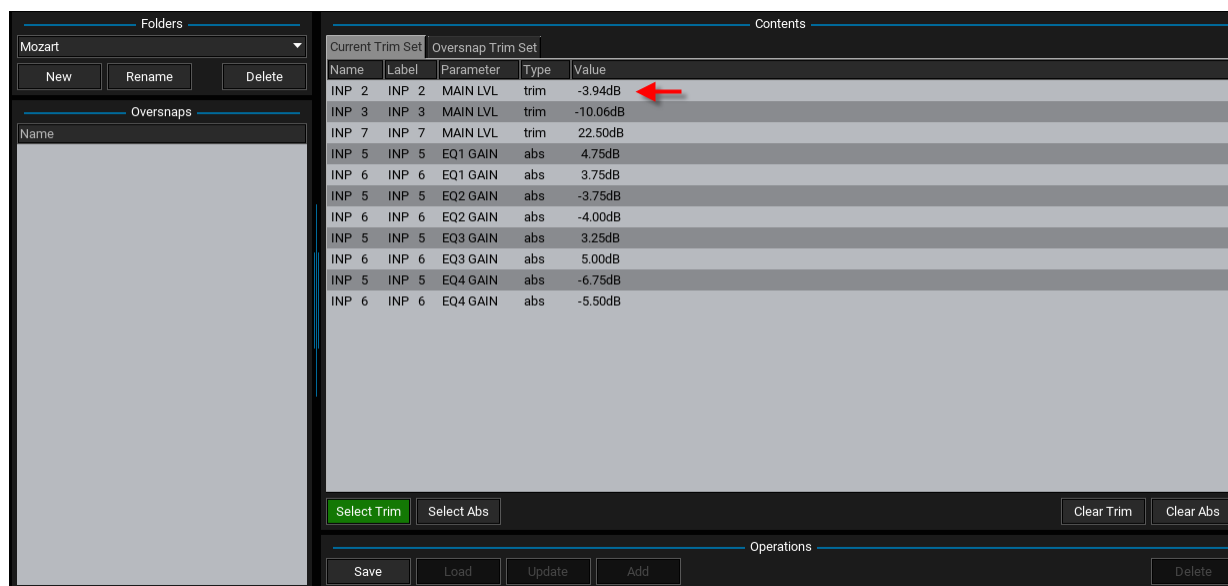
To update a snapshot offset - for example, if Soloist B sings louder than in rehearsal:

1. Press **TRIM** (under [CHANNEL](#) in the Central Control Section), or on-screen **Select Trim**.
2. Assign the Soloist B channel to the [Central Control Section](#) by pressing its fader **SEL** button.

The fader **SEL** button will be red as this parameter already has an active offset:



3. Adjust the fader level to the new setting - the parameter **SEL** button turns orange.
4. Press the orange parameter **SEL** button to confirm the new setting - the **SEL** button turns red and the trim offset updates within the **Current Trim Set**



5. Alternatively, to remove the trim offset altogether, press the red parameter **SEL** button - the **SEL** button returns to green and the Main LVL offset is removed from the **Current Trim Set**.
6. Remember to deselect the **ABS** and **TRIM** buttons (or on-screen **Select Abs** and **Select Trim**) when you have finished updating offsets. If you don't, and adjust a parameter with an active offset, then you will update the offset!

### 16.6.6 Oversnaps

At any time, you can save the contents of the [Current Trim Set](#) into a memory called an **Oversnap**. This allows you to recall offset parameters at a later date.

Each oversnap can store any number of offset parameters. And, different combinations of oversnaps can be loaded back to the **Current Trim Set**. This allows you to make a combination of offsets active – for example, to combine the offsets for soloist A with those for trombonist B.

Oversnaps are stored in the current snapshot folder within the active production.

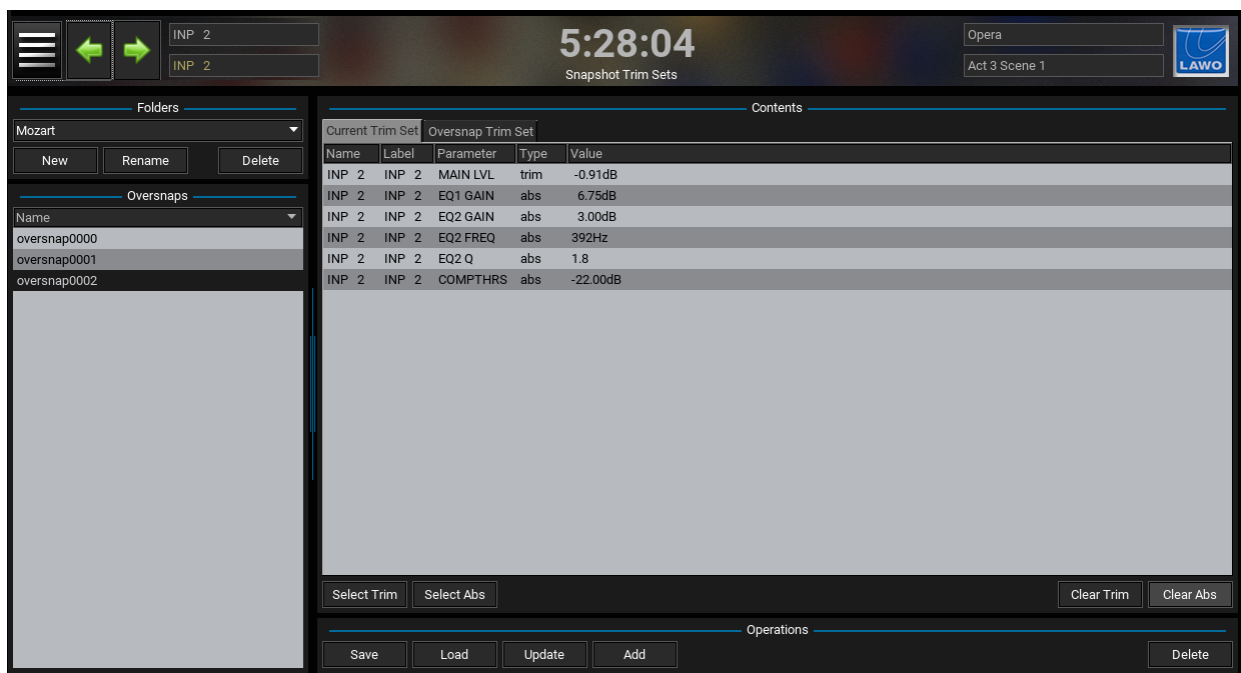
Note that you must use oversnaps to store and recall snapshot offset parameters. (The **Current Trim Set** is a temporary buffer which is saved in the system's warm start data to protect you from a system restart. However, if you clear the **Current Trim Set**, or change production, then any active snapshot offsets will be lost.)

### Oversnap Operations

➤ To save the contents of the **Current Trim Set** into an oversnap:

1. Click on the **Save** button in the **Operations** area (at the bottom of the display).

A new oversnap is saved into the current snapshot folder (e.g. **Mozart**) and appears at the bottom of the list with a default name (e.g. **oversnap0002**):



➤ To rename an oversnap:

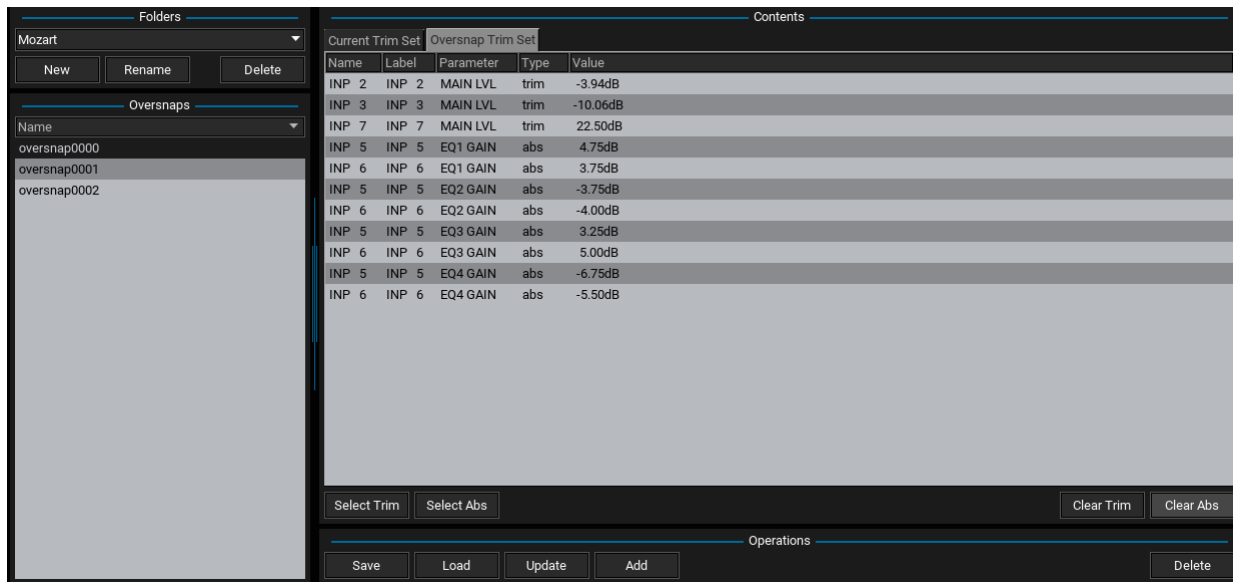
1. Click on the oversnap name field.

Click once to select all the text, or twice to modify an existing name (you will see a flashing cursor).

2. Enter a new name from the keyboard.
3. Press ENTER to confirm the new name. Or, to exit without making a change, press ESCAPE.

➤ **To check the contents of an oversnap:**

1. Select the oversnap you wish to interrogate.
2. Click on the **Oversnap Trim Set** heading in the lower half of the display - the trim set updates to show the contents of the selected oversnap:

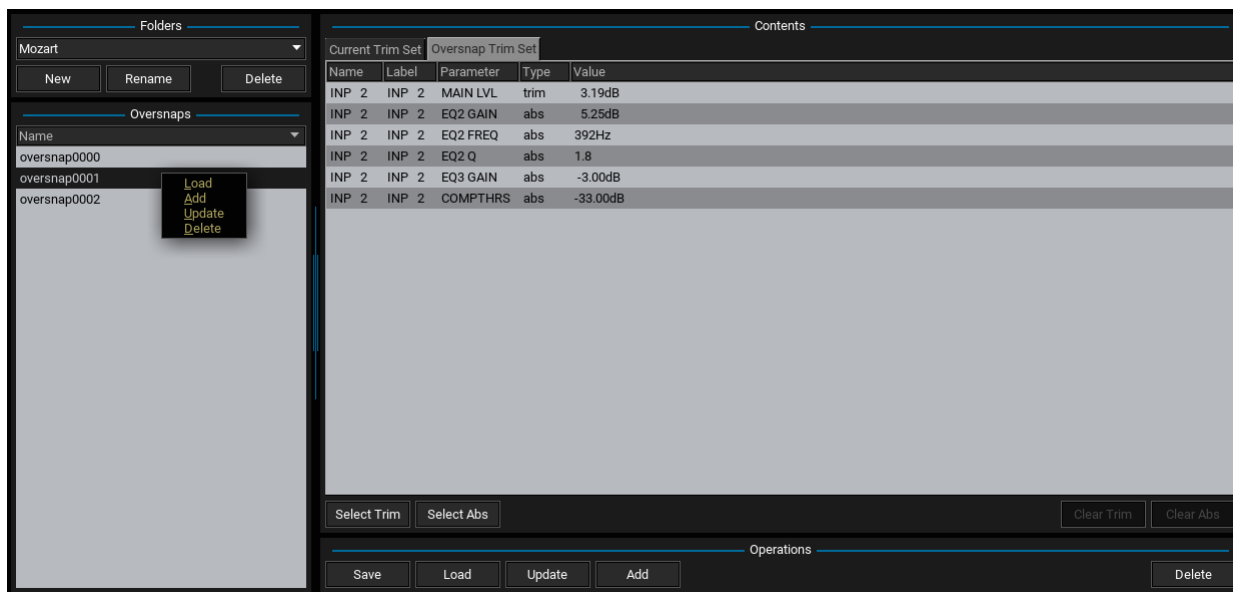


3. When you have finished interrogating stored oversnaps, it is a good idea to switch back to the **Current Trim Set**. This way you can be sure that you are viewing the active offset parameters which will be applied to your next snapshot load.

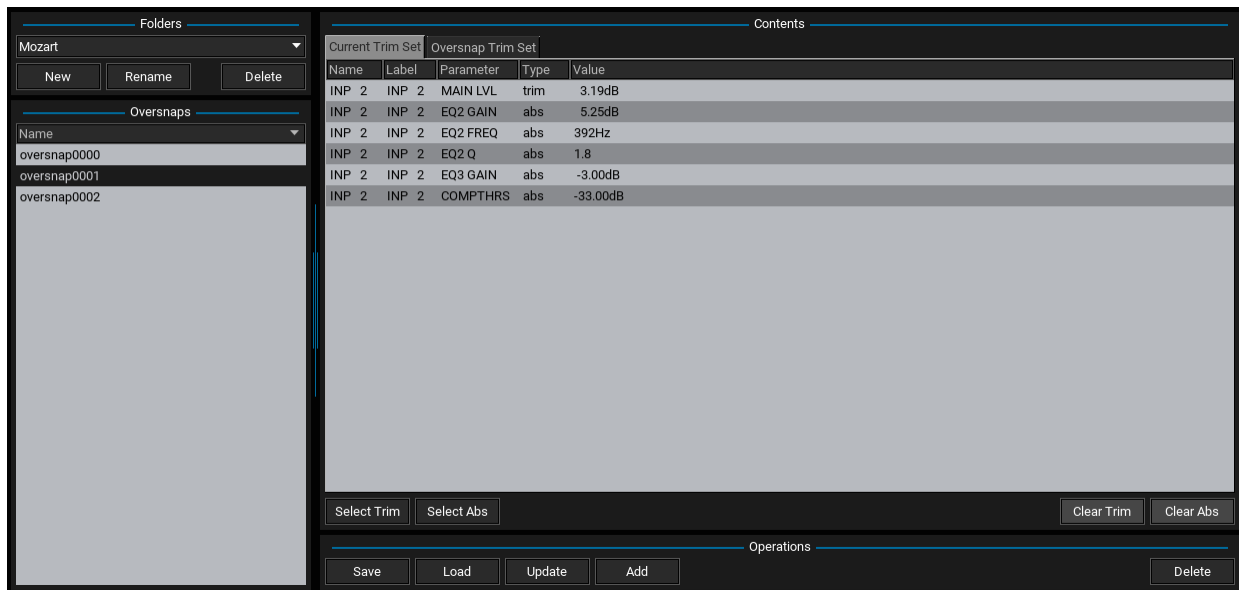
➤ **Recalling an oversnap:**

When recalling snapshot offsets, you can choose to either load or add an oversnap to the **Current Trim Set**. Any offsets listed within the **Current Trim Set** will then be applied to subsequent snapshot loads.

1. From either the **Operations** area, or a right-click, select **Load** or **Add**:
  - **Load** – replaces the contents of the **Current Trim Set** with the stored offsets.
  - **Add** – adds the stored offsets to the existing parameters within the **Current Trim Set**. For example, to combine the snapshot offset parameters saved for different artists.



The contents of the **Current Trim Set** update accordingly:



Name	Label	Parameter	Type	Value
INP 2	INP 2	MAIN LVL	trim	3.19dB
INP 2	INP 2	EQ2 GAIN	abs	5.25dB
INP 2	INP 2	EQ2 FREQ	abs	392Hz
INP 2	INP 2	EQ2 Q	abs	1.8
INP 2	INP 2	EQ3 GAIN	abs	-3.00dB
INP 2	INP 2	COMPTHRS	abs	-33.00dB

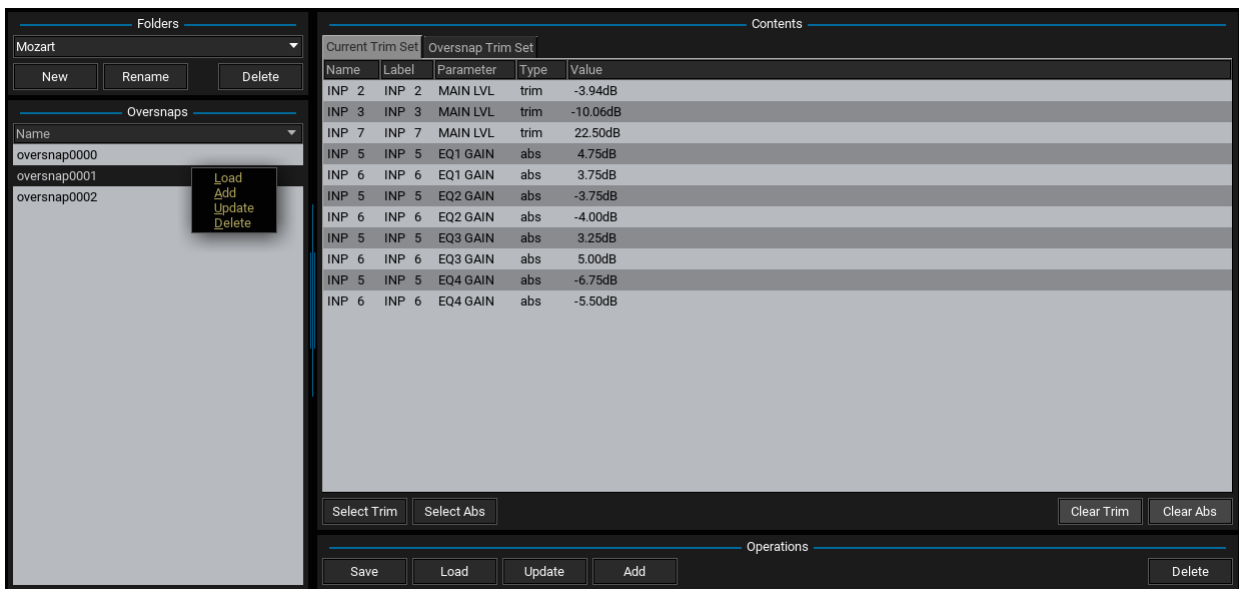
If an added oversnap contains parameters for an identical audio module to that in the existing **Current Trim Set**, then the added parameter replaces the existing one.

➤ **To update an oversnap with the contents of the Current Trim Set:**

1. [Add](#) the offset parameters you wish to store to the **Current Trim Set**.

To edit the contents of an existing oversnap: load the oversnap first; then [adjust](#) the snapshot offsets.

2. Then from either the **Operations** area, or a right-click, select **Update** - the oversnap is overwritten with the contents of the **Current Trim Set**:



Name	Label	Parameter	Type	Value
INP 2	INP 2	MAIN LVL	trim	-3.94dB
INP 3	INP 3	MAIN LVL	trim	-10.06dB
INP 7	INP 7	MAIN LVL	trim	22.50dB
INP 5	INP 5	EQ1 GAIN	abs	4.75dB
INP 6	INP 6	EQ1 GAIN	abs	3.75dB
INP 5	INP 5	EQ2 GAIN	abs	-3.75dB
INP 6	INP 6	EQ2 GAIN	abs	-4.00dB
INP 5	INP 5	EQ3 GAIN	abs	3.25dB
INP 6	INP 6	EQ3 GAIN	abs	5.00dB
INP 5	INP 5	EQ4 GAIN	abs	-6.75dB
INP 6	INP 6	EQ4 GAIN	abs	-5.50dB

➤ **To delete an oversnap:**

1. From either the **Operations** area, or a right-click, select **Delete**.
2. Select **OK** to delete the oversnap from the snapshot folder.

### Importing and Exporting Oversnaps

Oversnaps cannot be accessed individually from the **File** display, but they can be imported and exported by copying the snapshot folder:

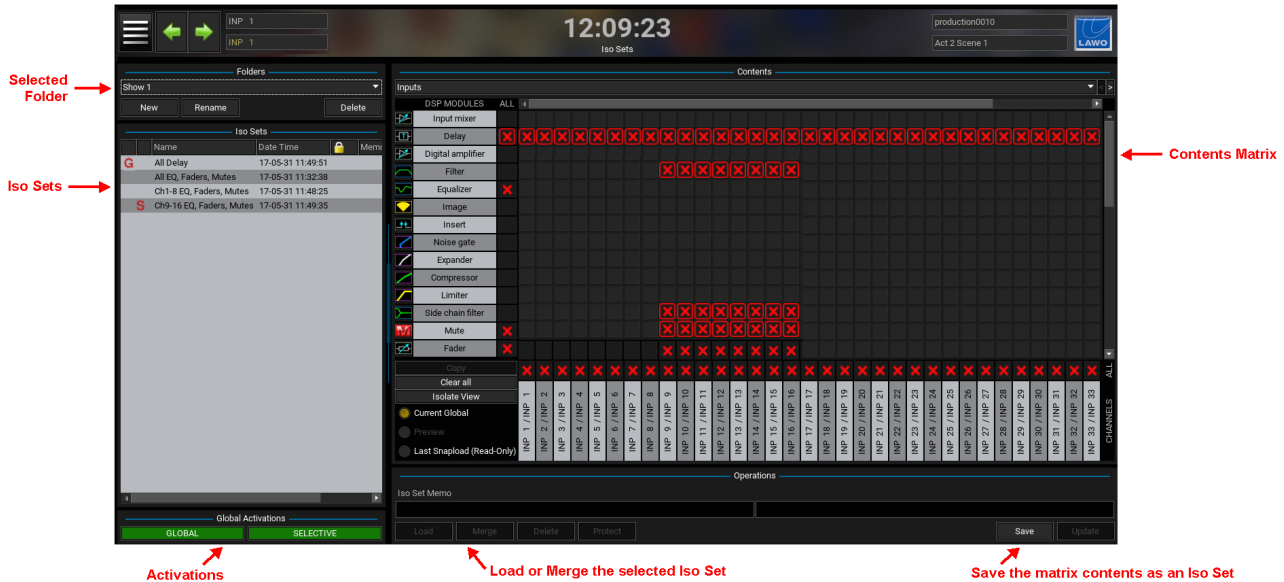
1. Copy the snapshot folder containing your oversnaps to a USB interface or network drive using the [File Export](#) function from the **File** display.
2. Connect your USB interface or network drive to the destination console.
3. And import the snapshot folder into the current production using [File Import](#) from the **File** display.

If you now go to the **Snapshot Trim Sets** display and select the imported folder, you will see your oversnaps.

## 16.7 Module ISO

Whenever a snapshot is recalled, from either the **Snapshot List** or **Cuelist** display, any active module ISOs are applied. This can be used to isolate individual channel DSP modules, on a per channel basis, so that particular DSP modules are *not* reset by a snapshot load.

1. [Open](#) the **Iso Sets** display on the Central GUI.



The display is divided into five areas:

- **Folders** – manages the [folders](#) stored in the current production.
- **Contents** - defines what will be isolated from the next snapshot load.
- **Iso Sets** - lists any Iso Sets stored in the selected folder.
- **Global Activations** - determine what is currently active.
- **Operations** - buttons for managing Iso Sets such as **Load**, **Merge**, **Delete**, etc.

The **Contents** matrix can operate in either **Isolate View** (shown above) or **Load View** (where green ticks indicate the modules to be loaded). **Clear all** can be used in either view to clear all current matrix selections.

You can save the **Current Global** status of the matrix as an **Iso Set**, by using the **Save** button (bottom right). This allows you to **Load** (or **Merge**) different **Iso Sets** later, or link an **Iso Set** to a specific snapshot.

The **Activations** (bottom left) determine what is currently active:

- **GLOBAL** (on) = the **Current Global** status of the matrix will be applied to the next snapshot load.
- **SELECTIVE** (on) = any **Iso Sets** which have been linked to snapshots will be applied when the corresponding snapshot is loaded.

Note that either or both activations can be enabled, allowing you to combine the **Current Global** matrix with the contents of an **Iso Set** linked to a specific snapshot - the **G** and **S** flags (in the **Iso Sets** area) indicate:

- **G** = the last global **Iso Set** to be loaded.
- **S** = the last selective **Iso Set** to be loaded (from a linked snapshot).

The radio buttons, on the lower left of the **Contents** matrix, can be used as follows:

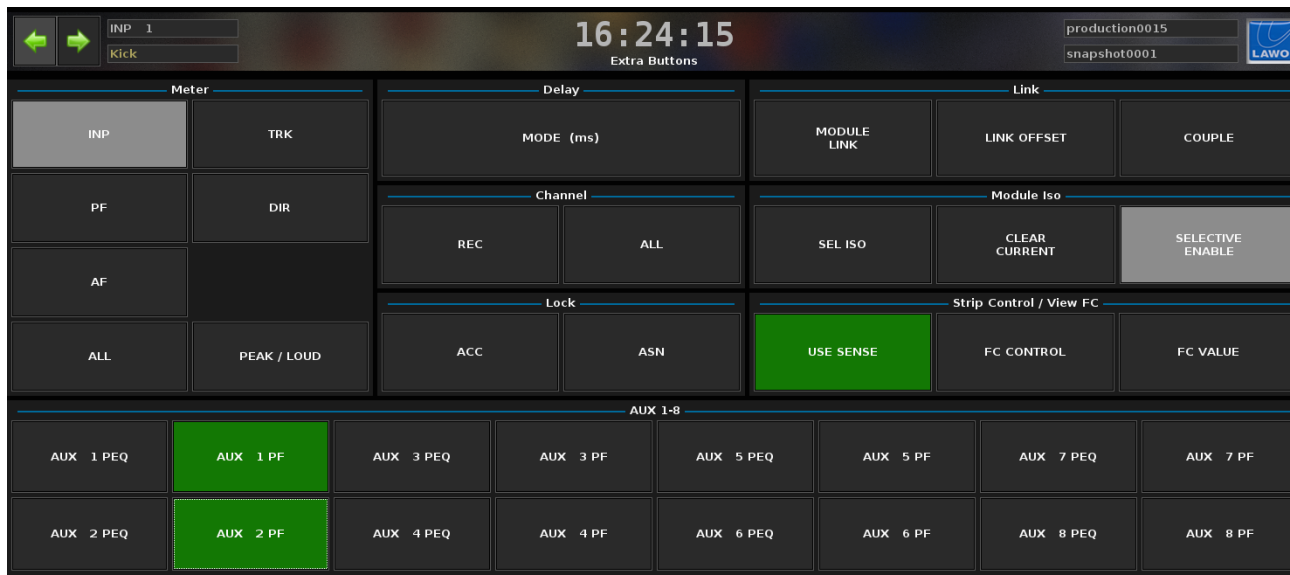
- **Current Global** - shows what will be applied to *all* snapshot loads.
- **Preview** - shows the contents of the selected **Iso Set**.
- **Last Snapshot (Read Only)** - shows the isolations applied by the last snapshot load. For example, if both the **GLOBAL** and **SELECTIVE** activation buttons are enabled, you will see the combined effect of both the **Current Global** matrix and an **Iso Set** loaded from a linked snapshot.

## 16.7.1 First Steps

1. Locate the **Module Iso** buttons on the [Extra Buttons](#) display.

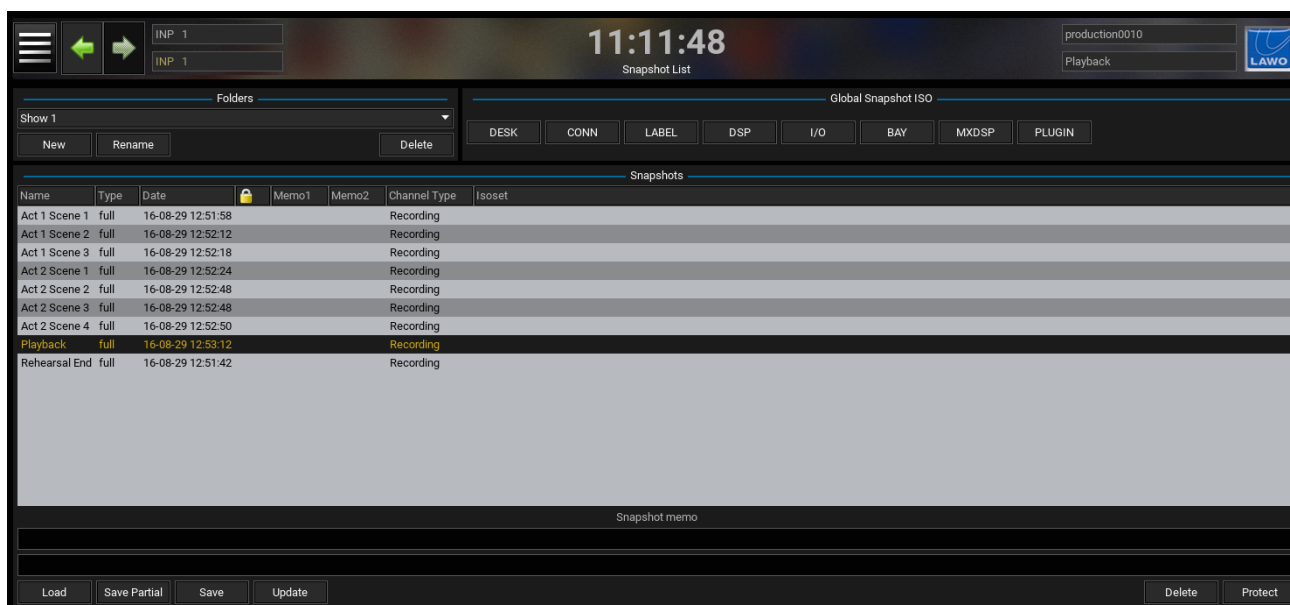
These functions can also be assigned to Central User Buttons (from the [Custom Functions](#) display).

*Extra Buttons display*



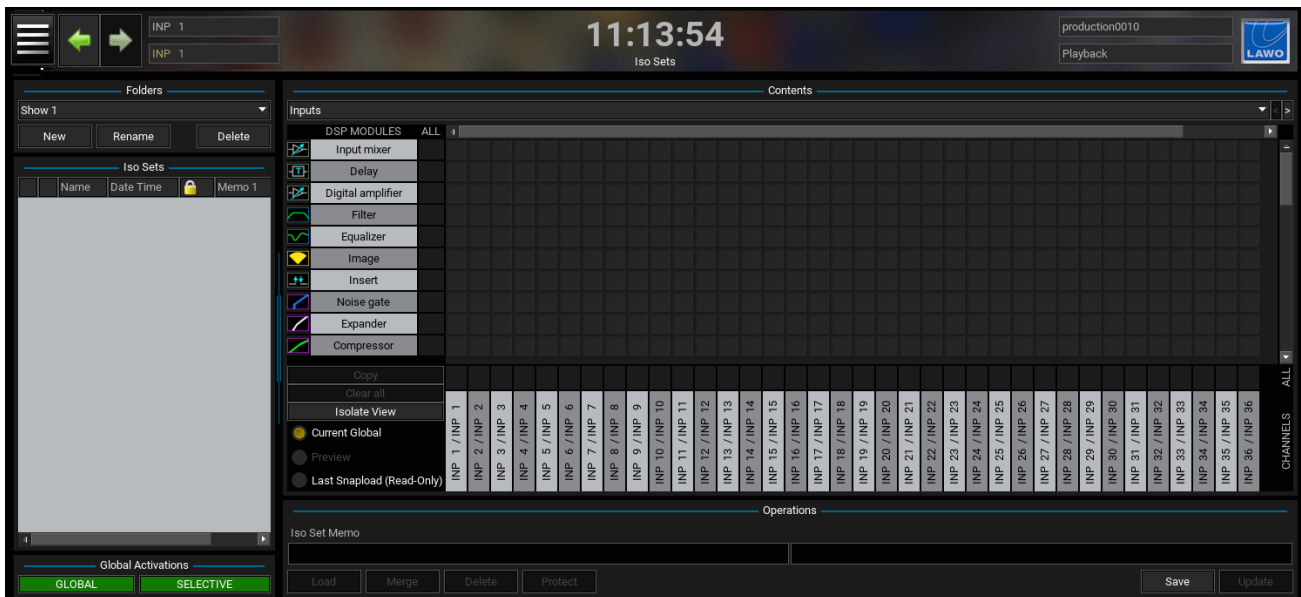
2. Check the **Folder** location of your snapshots from the [Snapshot List](#) display - note that the **IsoSet** field can be used to link an Iso Set to each snapshot [later](#).

*Snapshot List display*



3. Select the **Iso Sets** display and choose a folder from the **Folders** area (top left):

*Iso Sets display*

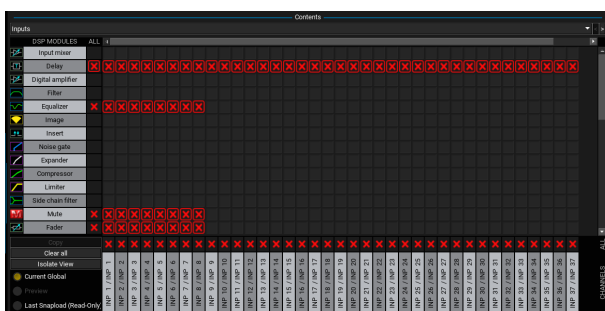


Any Iso Sets which you save will be stored in this folder within the active production.

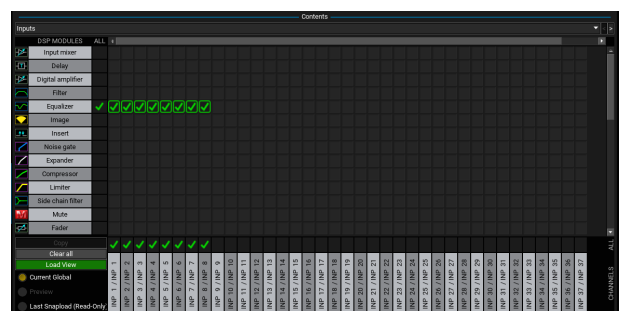
If you wish to link an **Iso Set** to a snapshot [later](#), then both the Iso Sets and Snapshots must be stored in the same folder - e.g. in **Show 1**.

4. Select the view you wish to use by clicking on either **Isolate View** (to change to **Load View**), or vice versa - the matrix updates accordingly:
  - In **Isolate View**, the red crosses within the **Contents** matrix indicate which DSP modules will be isolated - for example, all Delay modules across all Input channels, plus the EQ, Fader and Mute on Input channels 1 to 8.
  - In **Load View**, the green ticks indicate which DSP modules will be loaded - for example, only the EQ on Input channels 1 to 8.

*Isolate View*



*Load View*





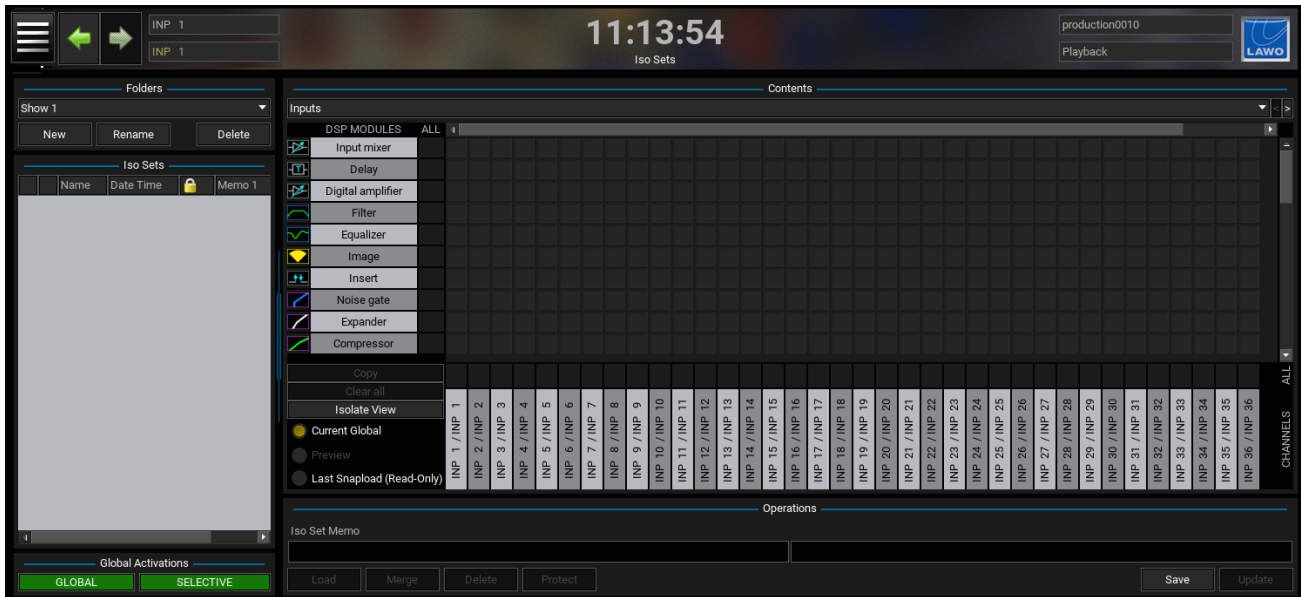
## 16.7.2 Defining the Current Global ISOs

When switched to **Current Global**, any isolations which appear in **Contents** the matrix will be applied to *all* subsequent snapshot loads, providing the **GLOBAL** activation button is enabled (green).

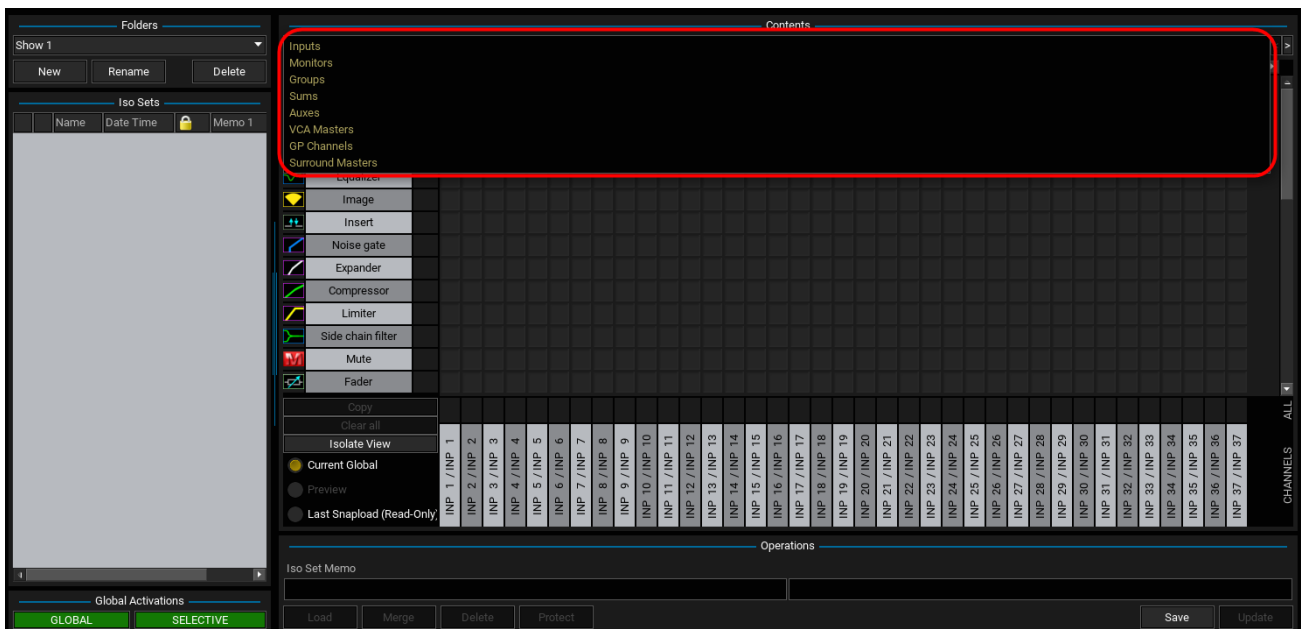
Note that you can [save](#) the **Current Global** matrix as an Iso Set if you wish to store and recall settings. You can also combine the **Current Global** isolations with selective Iso Sets which have been [linked](#) to snapshots. Both operations will be described later.

### ➤ To define the Current Global isolations:

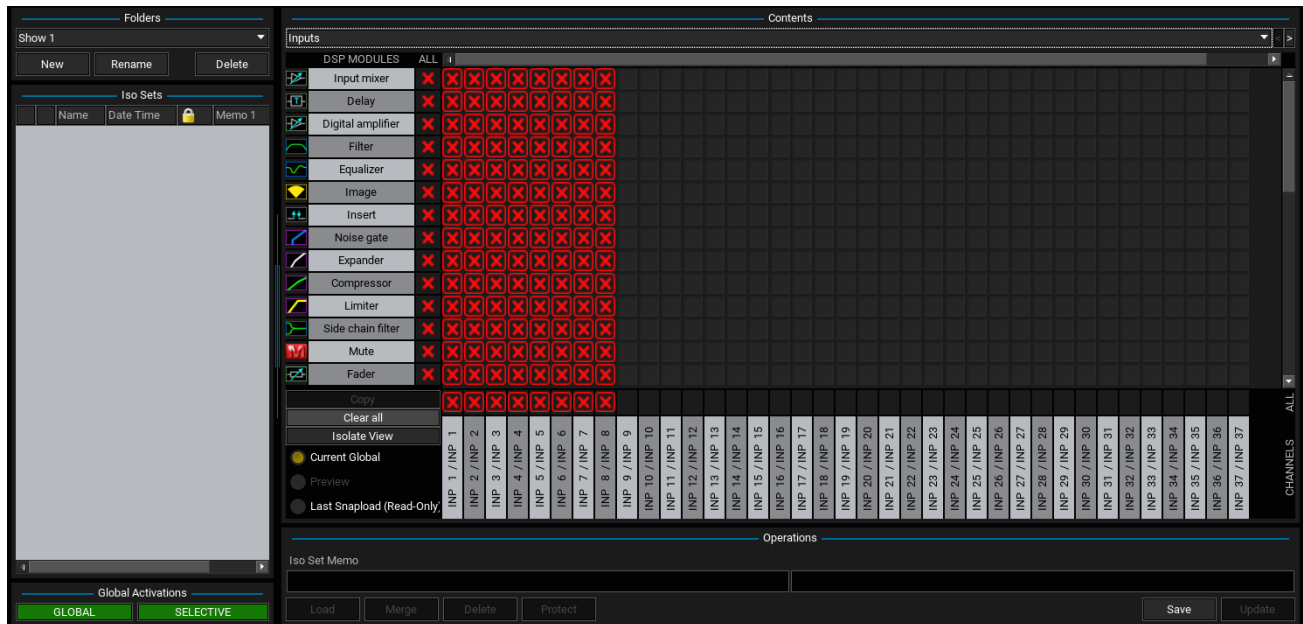
1. Select the **Current Global** radio button (on the lower left of the **Contents** matrix):



2. At the top of the **Contents** matrix, use the drop-down menu to choose the type of channels you wish to isolate - for example, **Inputs** for input channels:



3. Then use the on-screen matrix, or **SEL ISO** (described later), to add isolations to the matrix - in **Isolate View**, the red crosses indicate which DSP modules will be isolated:



When using the on-screen matrix, you can:

- click on an individual crosspoint to select a single DSP module on a single channel.
- click on the **ALL** crosspoint fields (beside each row of DSP modules) to select a single DSP module across all channels.
- click on the **ALL** crosspoint fields (above each channel) to select all DSP modules on a single channel.

Note that the **ALL** fields indicate:

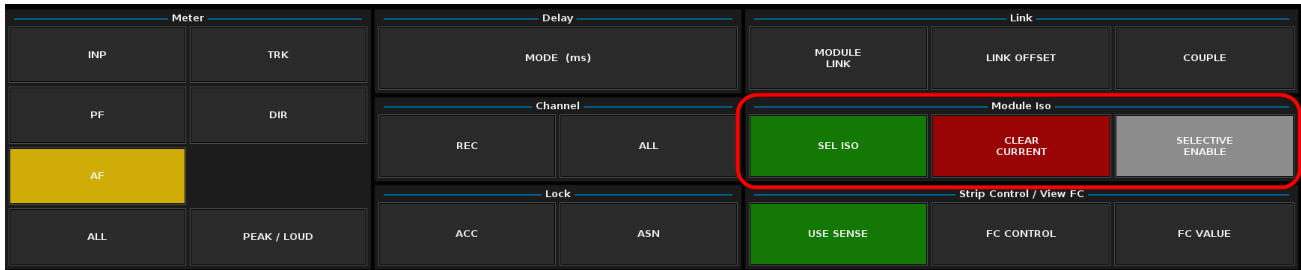
- blank = nothing is selected.
- red **X** with no outline = something is selected.
- red **X** with an outline = everything is selected.

Use the scroll bars at the top and on the right of the matrix to access all channels and all DSP MODULES.

## Using SEL ISO

Rather than using the on-screen matrix, you can use the Module **SEL ISO** button to make selections:

1. Press the **SEL ISO** button (on the [Extra Buttons](#) display) - it flashes (green) when active:

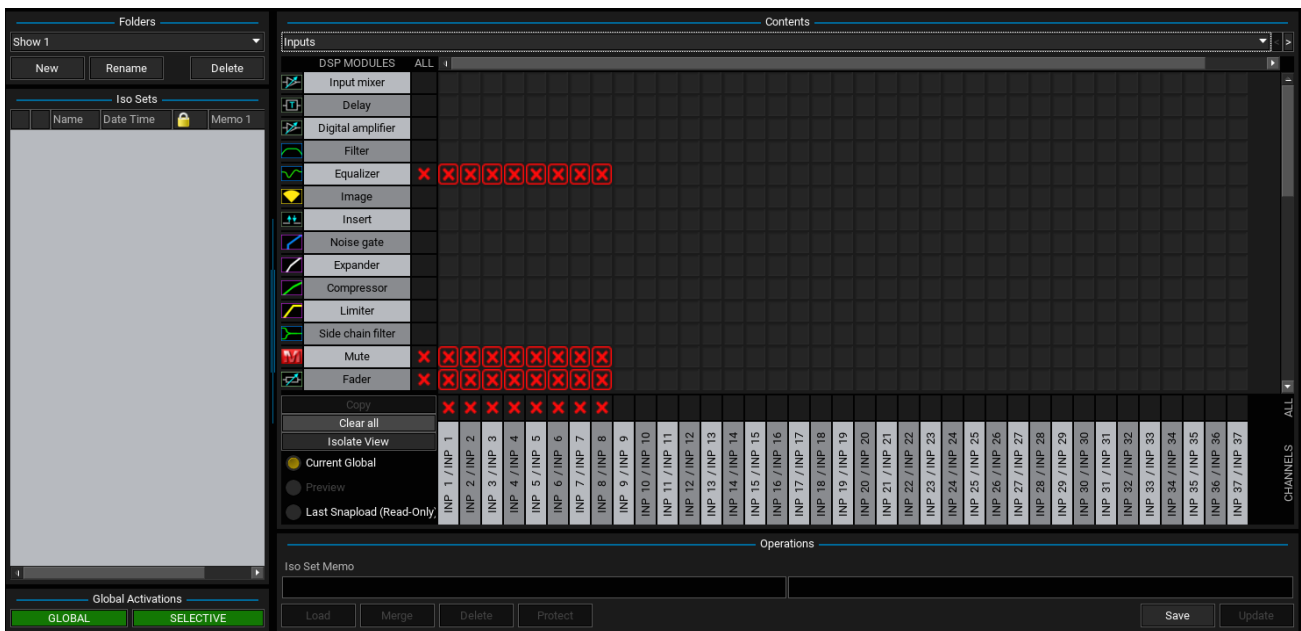


2. Select the DSP module(s) you wish to isolate, by enabling the **SEL** buttons on the Central Control Section, see [Selecting Channel Parameters](#).

For example, to select the fader and mute, press **SEL** beside the fader, and mute sections.

3. Then press the fader strip **SEL** buttons to apply your chosen selections across multiple channels.

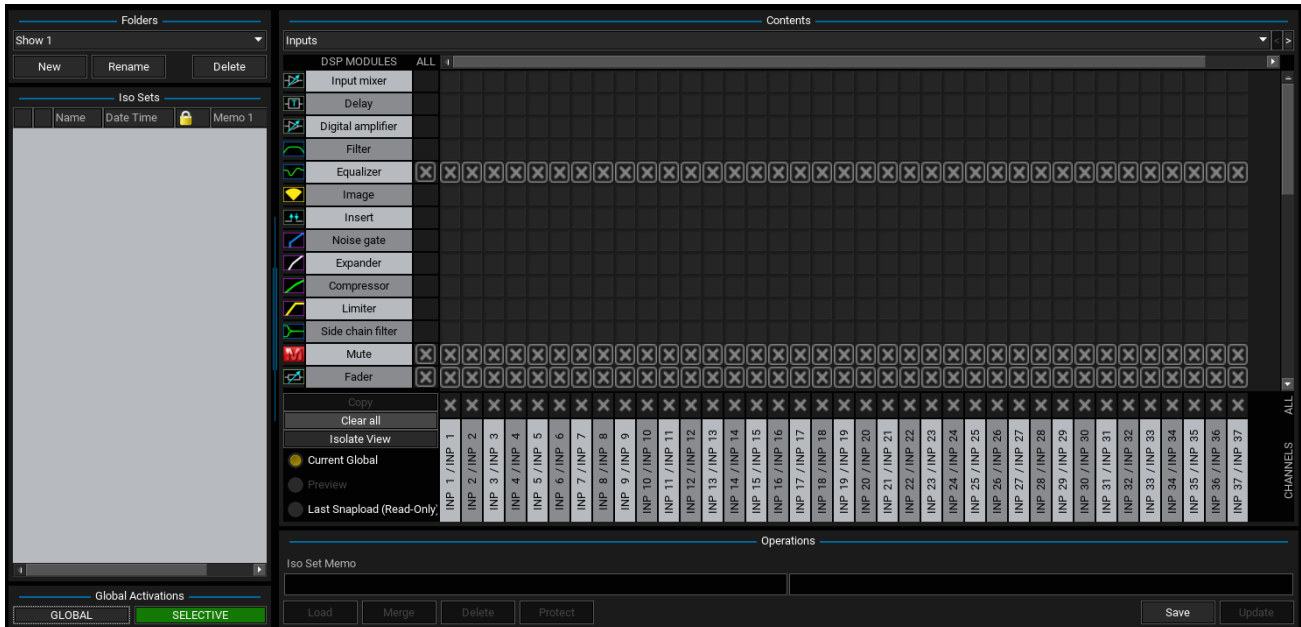
In each case, your selections are added to the **Contents** matrix:



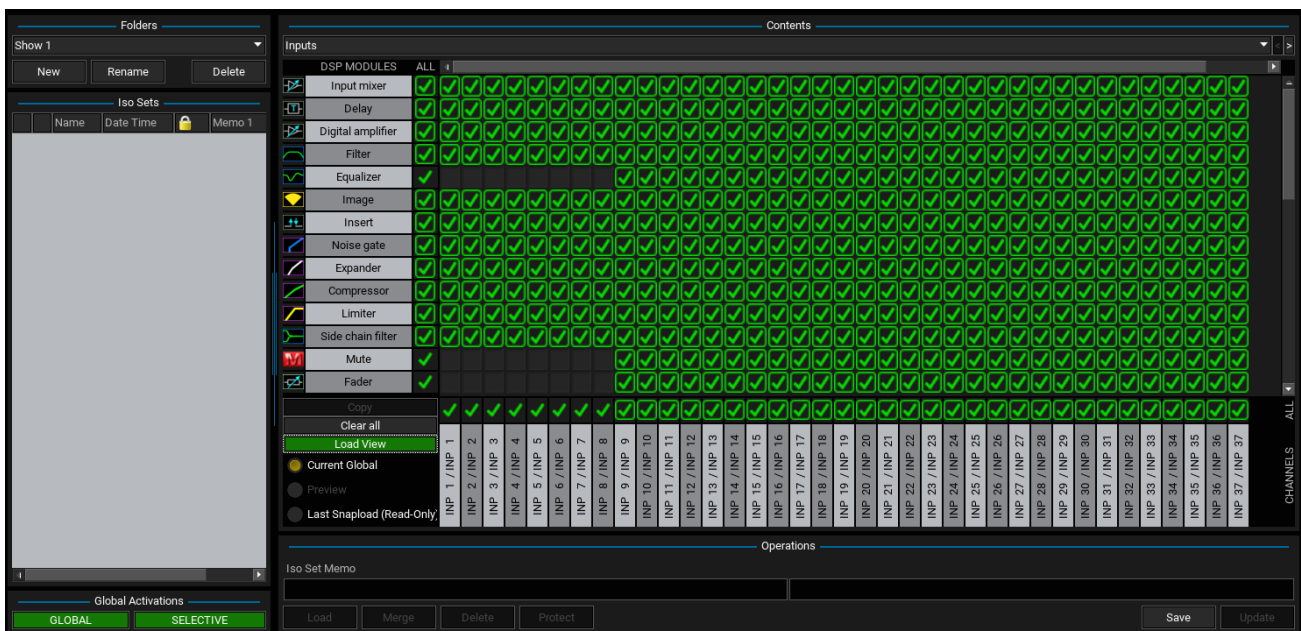
Click on **Clear all**, or select the **CLEAR CURRENT** button (on the [Extra Buttons](#) display), to clear all current selections.

4. When you have finished making selections, remember to turn off **SEL ISO**.
5. To apply your selections to the next snapshot load, check that the **GLOBAL** activation button (bottom left) is enabled (green).

Note that if you turn off the **GLOBAL** activation button, then no isolations will be applied to the next snapshot load - this is indicated by the "greyed out" crosspoints in the **Current Global** matrix:



In **Load View**, the selection process is identical, only this time you will need to use the green tick boxes to select the channels and DSP modules you wish to load (rather than isolate):



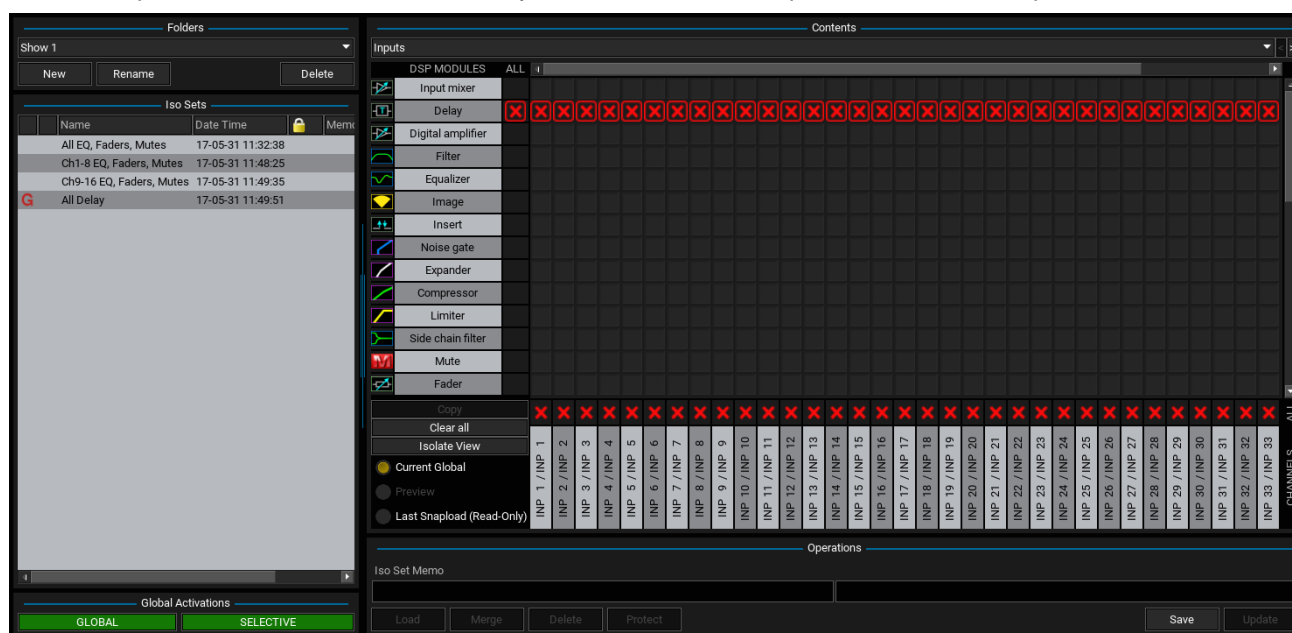
### 16.7.3 Working with Iso Sets

If you wish to store and recall the status of the **Current Global** matrix, or link a specific setup to a snapshot load, then you will need to use Iso Sets as follows.

## 16. Console Reset

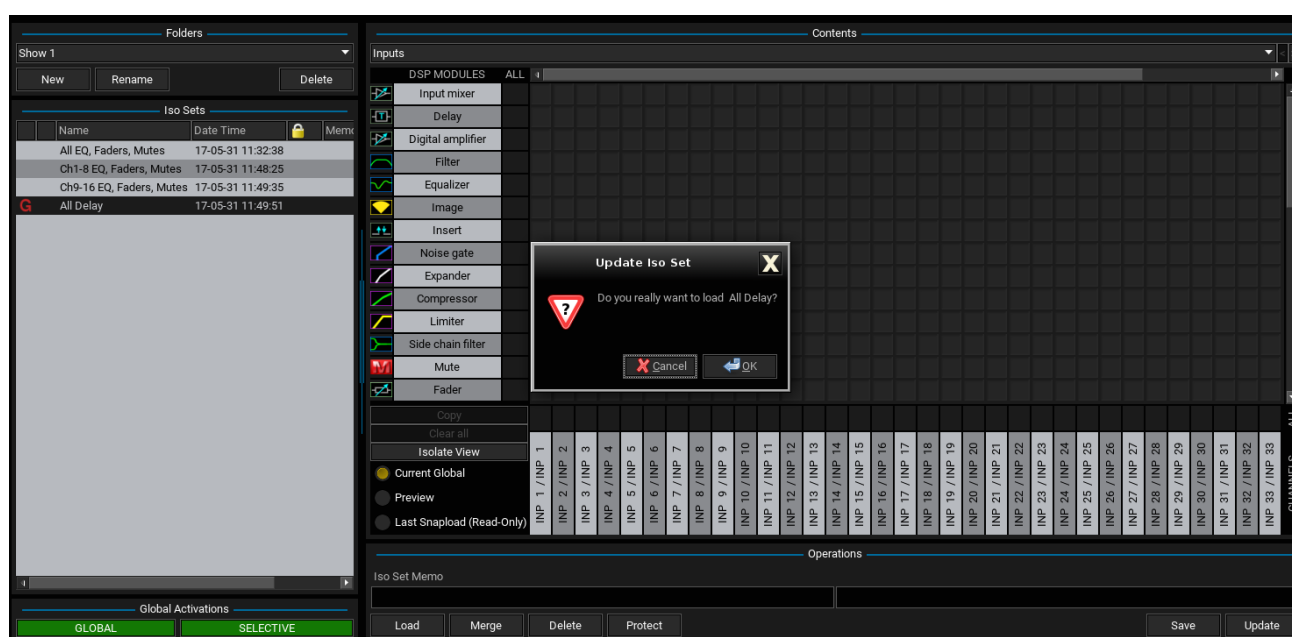
### Saving & Renaming an Iso Set

1. Define the **Current Global** ISOs as explained [earlier](#).
2. From the **Operations** area (bottom of display), select **Save** - the status of the **Current Global** matrix is saved as an **Iso Set** into the selected Folder (e.g. **Show 1**). The Iso Set is given an automatic Date and Time stamp, and a default name.
3. From the **Iso Sets** list, click on the name field to enter a new name from the keyboard.
4. If you wish, you can also enter two sets of text into the **Memo** fields.
5. Repeat to save all the Iso Sets that you wish to use for the production - for example:



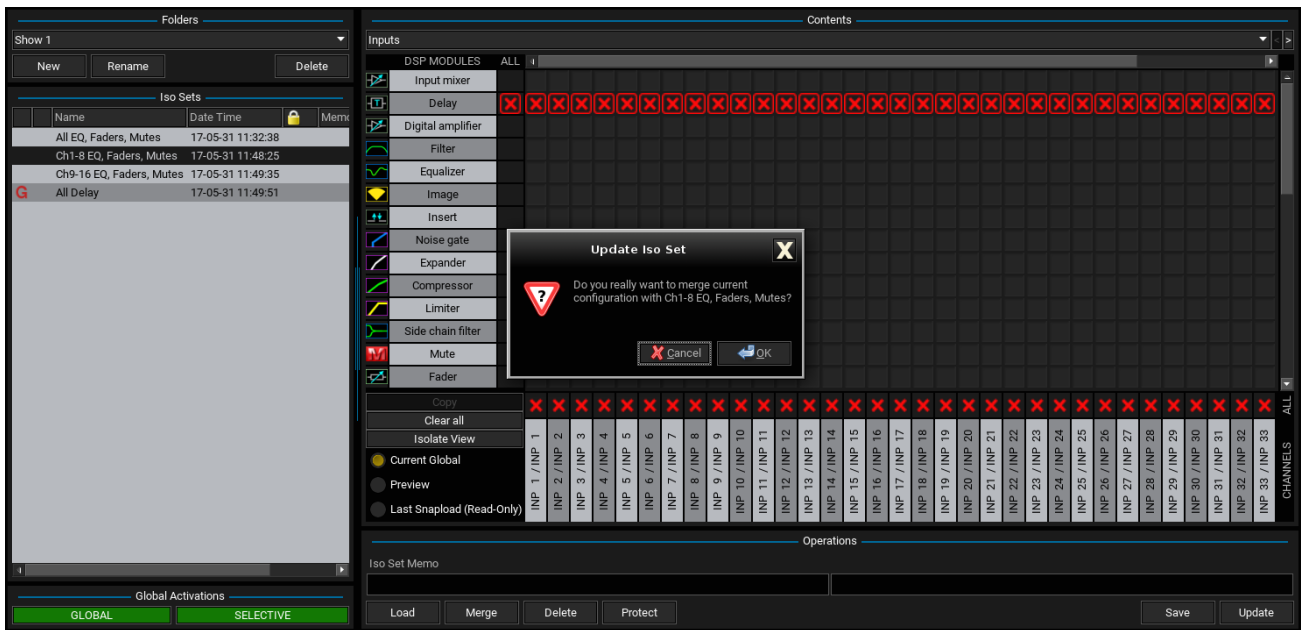
### Loading & Merging Iso Sets

1. Select an entry from the **Iso Sets** list, and select **Load** (from the **Operations** area). Then click on **OK** to confirm:

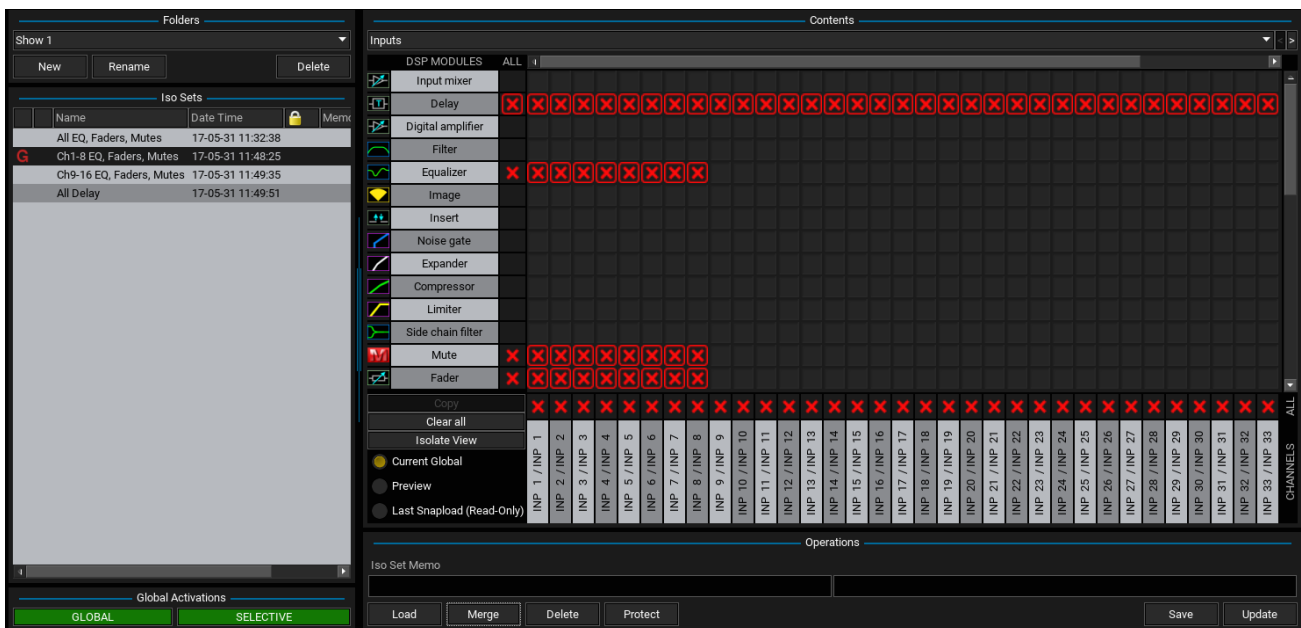


When an Iso Set is loaded, its contents will overwrite the **Current Global** matrix.

2. Now select a different **Iso Set**, and click on **Merge** and **OK** to confirm:



This time the contents are merged with the existing **Current Global** matrix:



Note that whenever a global Iso Set is loaded or merged, you will see a **G** beside its name in the **Iso Sets** list.

## Updating an Iso Set (& Preview)

To edit the contents of an Iso Set, either:

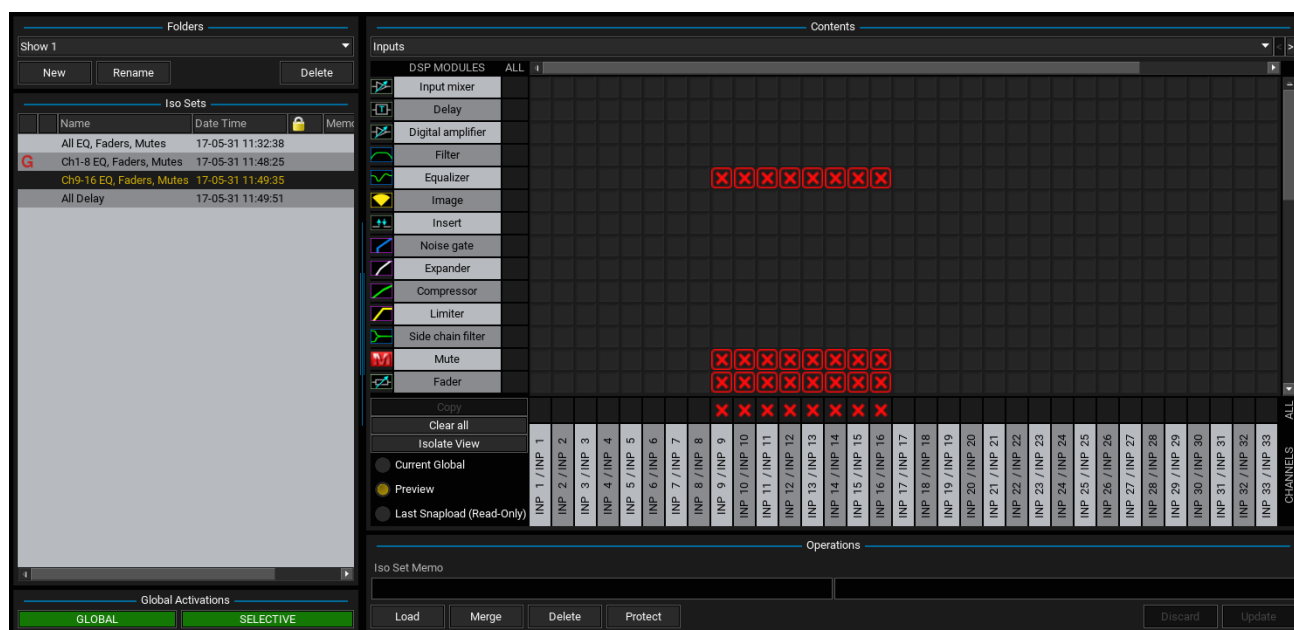
1. Load the Iso Set.
2. Make your changes.
3. Select the **Update** button (from the **Operations** area).

Or:

1. Select the **Preview** radio button (on the lower left of the **Contents** matrix).

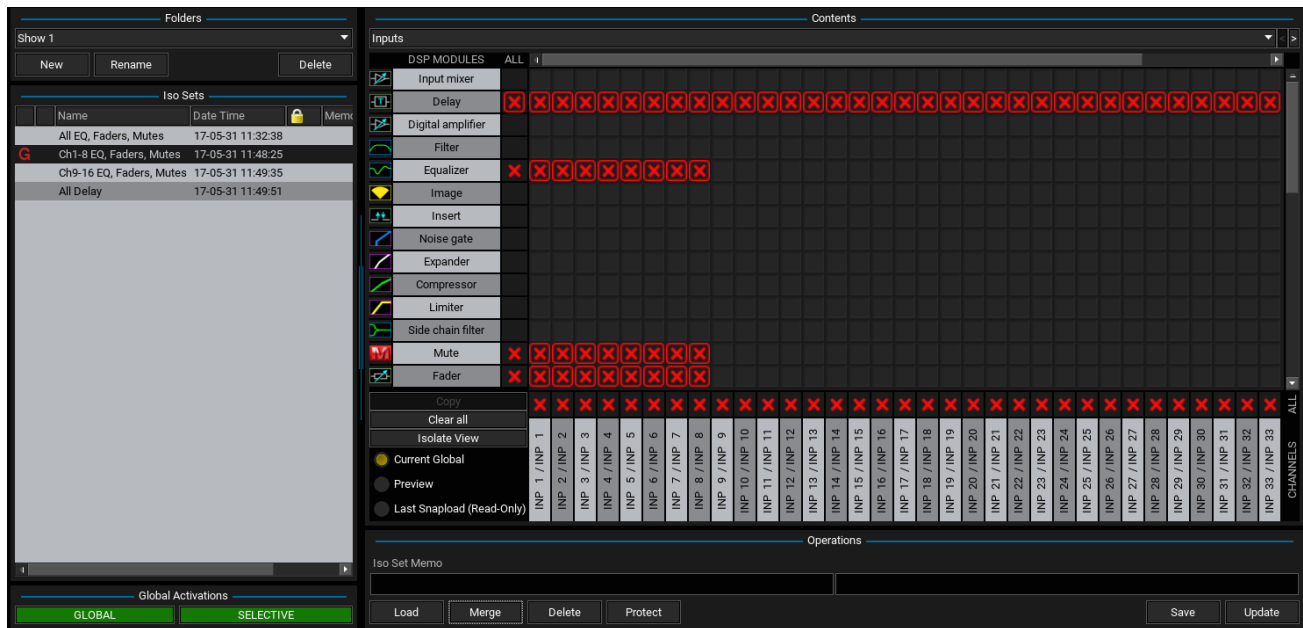
The matrix updates to show the contents of the selected Iso Set, but without changing the **Current Global** status (which is now hidden from view).

In our example, this has allowed us to preview the third Iso Set in the list:



2. Make your changes.
3. Select the **Update** button (from the **Operations** area).
4. Select the **Current Global** radio button to return the **Contents** matrix to its usual mode of operation.

## Other Operations



- **Delete** - deletes the selected **Iso Set** from the snapshots folder.
- **Protect** - protects the selected **Iso Set**. Once protected, the **Iso Set** cannot be updated or deleted.

### Importing and Exporting Iso Sets

Iso Sets cannot be accessed individually from the **File** display, but they can be imported and exported by copying the snapshot folder:

1. Copy the snapshot folder containing your iso sets to a USB interface or network drive using the [File Export](#) function from the **File** display.
2. Connect your USB interface or network drive to the destination console.
3. And import the snapshot folder into the current production using [File Import](#) from the **File** display.

If you now open the **Iso Sets** display and select the imported folder, you will see your iso sets.

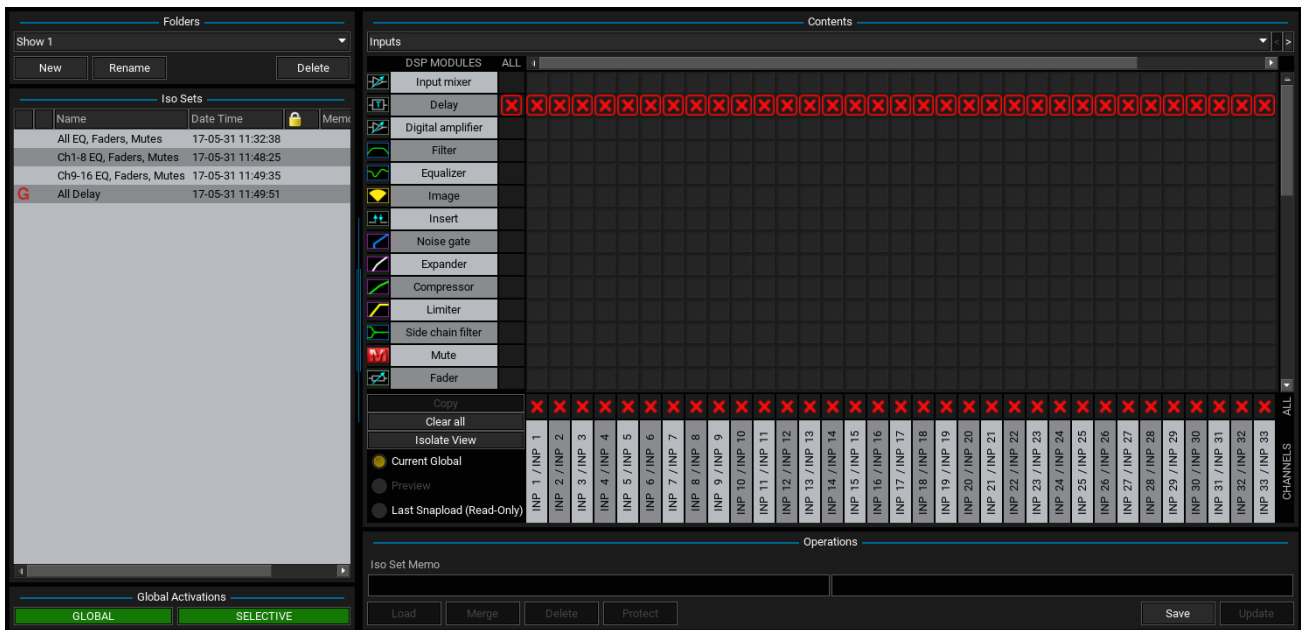
### 16.7.4 Snapshot Specific Iso Sets

Any **Iso Set** can be linked to a specific snapshot in order to apply different isolations to each snapshot load.

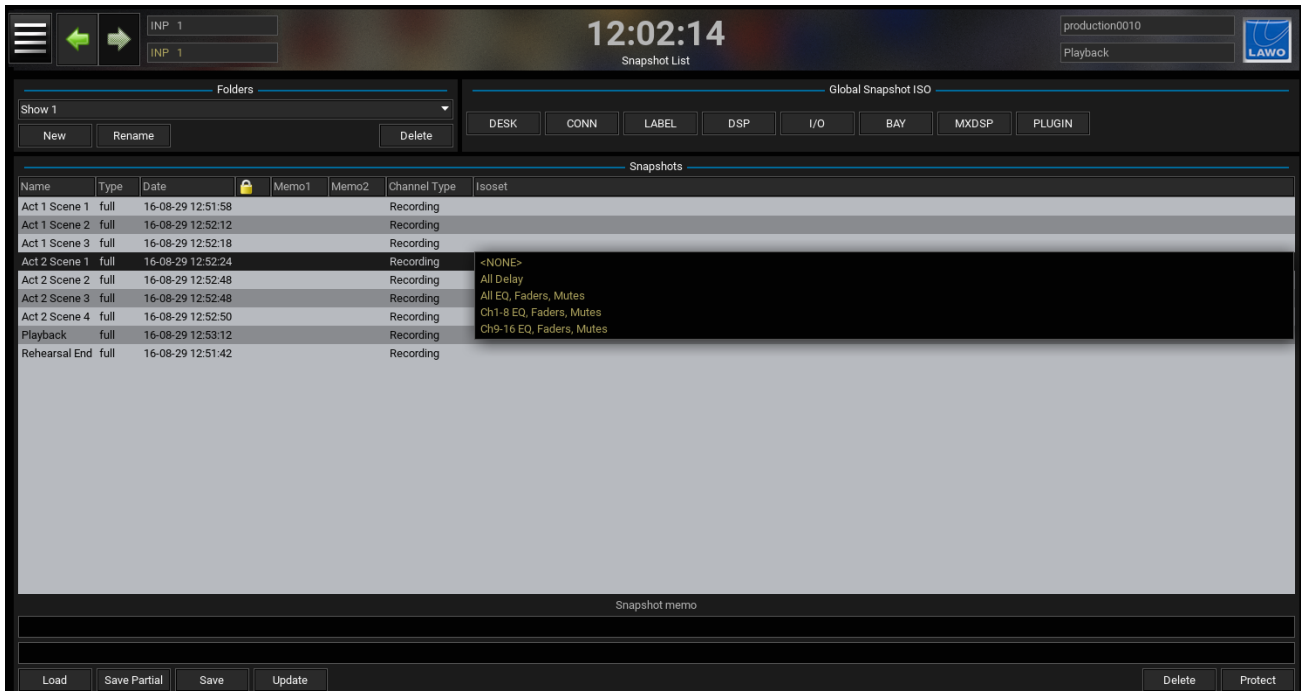


## Linking an Iso Set to a Snapshot

1. Save each of the Iso Sets you wish to link, as described [earlier](#) - you should have at least one entry in the **Iso Sets** area:

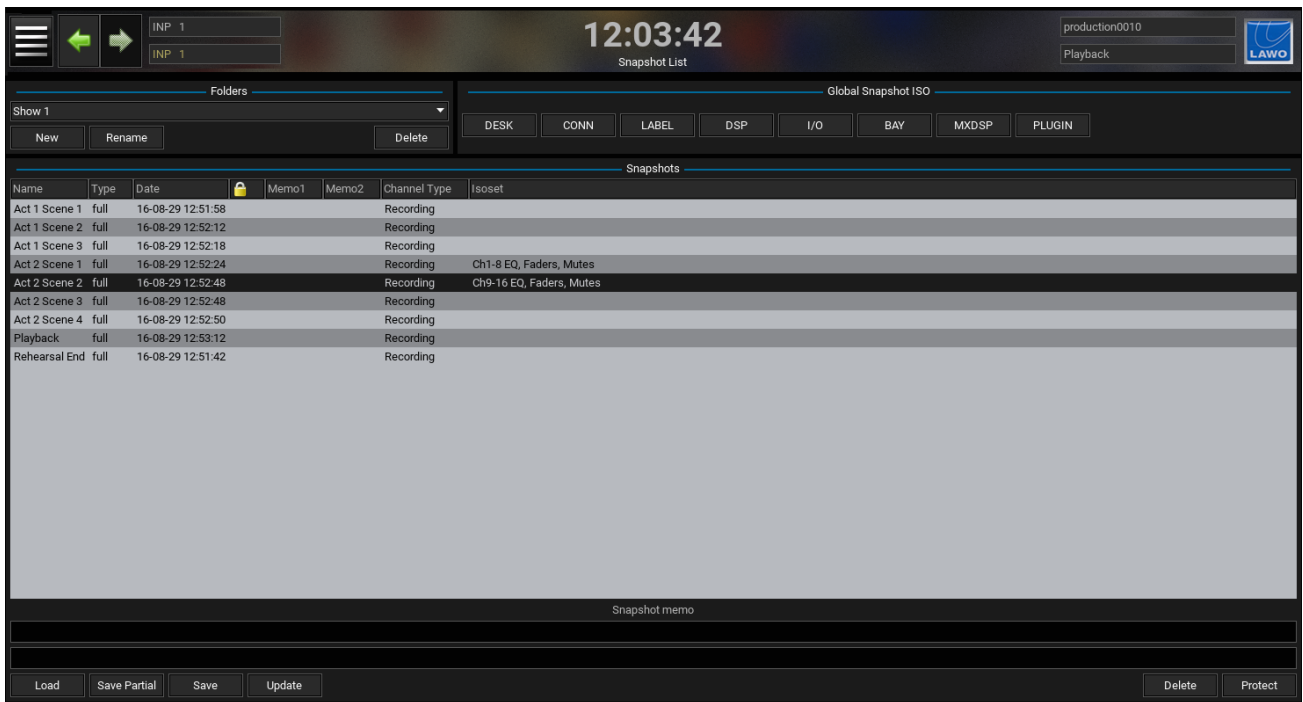


2. Then open the **Snapshots List** display.
3. Select one of the snapshots and left-click on the **Iso Set** field - select the **Iso Set** you wish to link from the drop-down menu:



You must **LEFT-click** (and not right-click) on the **Iso Set** field to access the drop-down assignment menu. The menu will include all the Iso Sets which you saved [earlier](#) from the **Iso Sets** display.

In our example, we have assigned two Iso Sets to two of our snapshots:



Name	Type	Date	Memo1	Memo2	Channel Type	Iso set
Act 1 Scene 1	full	16-08-29 12:51:58			Recording	
Act 1 Scene 2	full	16-08-29 12:52:12			Recording	
Act 1 Scene 3	full	16-08-29 12:52:18			Recording	
Act 2 Scene 1	full	16-08-29 12:52:24			Recording	Ch1-8 EQ, Faders, Mutes
Act 2 Scene 2	full	16-08-29 12:52:48			Recording	Ch9-16 EQ, Faders, Mutes
Act 2 Scene 3	full	16-08-29 12:52:48			Recording	
Act 2 Scene 4	full	16-08-29 12:52:50			Recording	
Playback	full	16-08-29 12:53:12			Recording	
Rehearsal End	full	16-08-29 12:51:42			Recording	

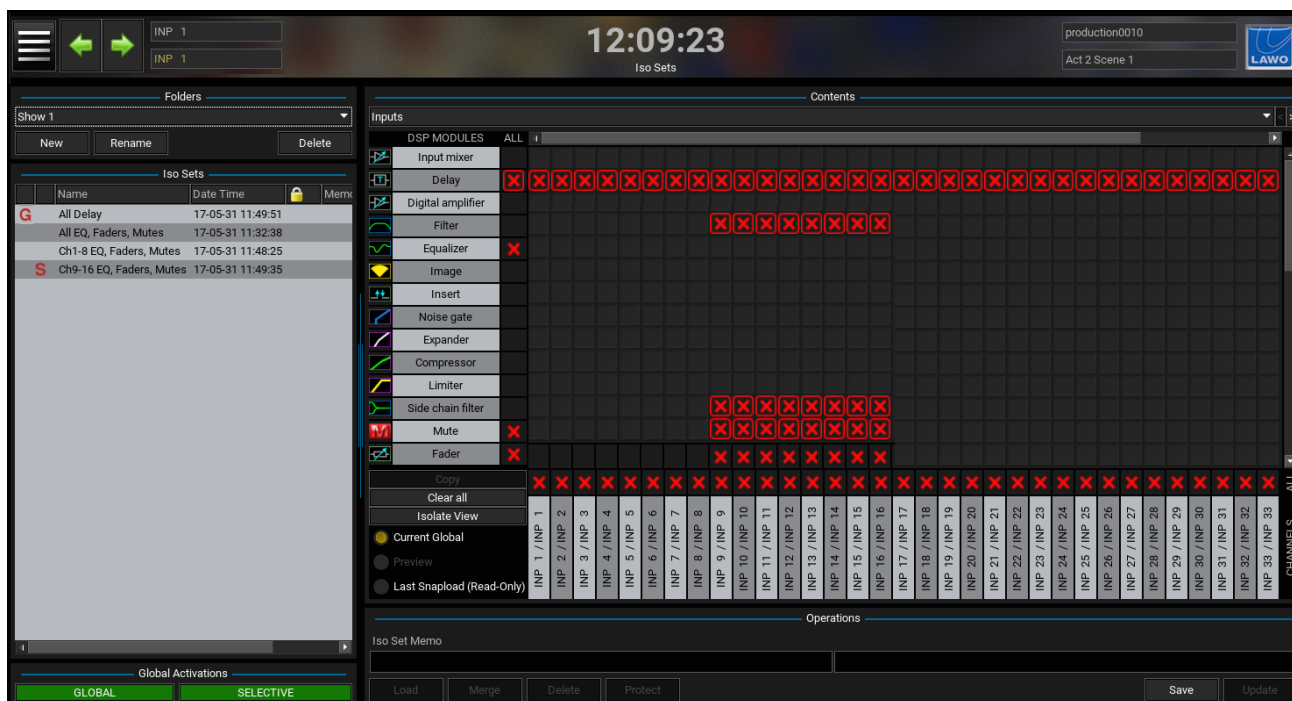
## Loading Snapshots (with Linked Iso Sets)

1. Return to the **Iso Sets** display and check that the **SELECTIVE** (Activations button) is enabled (green). Or, use the **SELECTIVE ENABLE** button (on the [Extra Buttons](#) display).
2. Then, from the **Snapshots List** display, **Load** one of the linked snapshots:

Name	Type	Date	🔒	Memo1	Memo2	Channel Type	IsoSet
Act 1 Scene 1	full	16-08-29 12:51:58				Recording	
Act 1 Scene 2	full	16-08-29 12:52:12				Recording	
Act 1 Scene 3	full	16-08-29 12:52:18				Recording	
Act 2 Scene 1	full	16-08-29 12:52:24				Recording	Ch1-8 EQ, Faders, Mutes
Act 2 Scene 2	full	16-08-29 12:52:48				Recording	Ch9-16 EQ, Faders, Mutes
Act 2 Scene 3	full	16-08-29 12:52:48				Recording	
Act 2 Scene 4	full	16-08-29 12:52:50				Recording	
Playback	full	16-08-29 12:53:12				Recording	
Rehearsal End	full	16-08-29 12:51:42				Recording	

The linked **Iso Set** is applied to the snapshot load, providing the **SELECTIVE** activation button is enabled (green).

You can check what has been applied by returning to the **Iso Sets** display, and selecting the **Last Snapload (Read-only)** radio button - in our example, the matrix shows the combined effect of the last loaded Global Iso Set marked with a **G**, and the linked loaded snapshot Iso Set marked with an **S**:



## 16.8 File Import/Export

The file import/export functions can be used for a number of applications:

- To archive or transfer user data between systems.
- To archive or transfer system logfiles for servicing purposes.
- To copy user data elements - for example, to copy a snapshot to a different production.

[User data](#) includes complete productions or elements of a production (such as a folder, snapshot or automation mix), plus other data stored "outside" of productions such as presets.

From the central GUI, the [File display](#) is used to transfer data to and from a USB interface or network drive.

Note that you can also transfer data to an external computer using [mxGUI](#), via the [File Transfer](#) display.

User data is fully compatible with any mc<sup>2</sup> or Nova, regardless of the hardware configuration. This enables the transfer of user data to and from any system (including any other mc<sup>2</sup>), in order to recall settings in a different studio.

You will need to take care when moving productions to a system with fewer DSP boards, and be aware that the channel DSP settings saved in snapshots from Recording channels cannot be loaded to Broadcast channels. See [Transferring User Data](#) for more details.

### 16.8.1 The File Display

The **File** display transfers user data to/from a USB interface or network drive.

1. [Open](#) the **File** display on the Central GUI.



The display is divided into two halves:

- **Production Files** - on the left you are always viewing files or folders on the console's internal data card.
- **File Browser** - on the right you can view files or folders on one of the following storage devices:
  - **Internal** - the internal data card.
  - **USB** - a mounted USB device.
  - **Net** - a network drive (pre-configured using AdminHD).

At the bottom of the display you will see the amount of free space (in MB) on your selected device.

For each file, you can see its name, type, the date and time when the file was last updated and the file size in Kb.

Open or close folders by double-clicking on the folder name (or click on the arrow beside the name).

Right-click on a file or folder and select:

- **EXPORT** - to transfer from left to right (internal to internal, USB or network drive).
- **IMPORT** - to transfer from right to left (internal, USB or network drive to the internal data card).

## The Production Files List

1. Double-click, or use the arrows, to close the folders in the **Production files** list until you reach the top level of the internal data card.

You should see three folders – **Productions**, **Presets** and **System logfiles**:

Production Files			
Name	Type	Date (m/d/y)	
Productions			
Presets			
System logfiles			

You can open the **System logfiles** if you need to access message files or the alarm logfile - these are diagnostics files which you can need to copy to USB and email to your service engineer should you encounter a system problem:

Production Files			
Name	Type	Date (m/d/y)	
Productions			
Presets			
System logfiles			
alarm.log	Log	06/08/10 06:41:32	
alarm.log.0	Log	06/02/10 15:04:25	
messages	Log	06/08/10 07:13:57	53
messages.0	Log	06/08/10 05:25:54	40

More commonly, you will be dealing with the **Productions** folder in order to copy or export a production, folder or snapshot.

2. Open **Productions** and the display will update to show all the [productions](#) stored on your system.

At this level, the productions you see are zipped. They can only be selected as a complete file, and cannot be opened to view or individual elements. The only entry which can be opened further is the **Active production** as this is not zipped.

3. Open the **Active production** to reveal two further directories: **Snapshot folders** and **Automation**:

Production Files			
Name	Type	Date (m/d/y)	
Productions			
Active production			
Snapshot folders			
Automation			
000-Bregenz X-Fade	Prod	07/29/09 09:03:03	
000a Basic Setups	Prod	06/08/10 06:07:26	
000a Bob Slide	Prod	06/08/10 06:09:15	
000a Football	Prod	06/08/10 06:07:55	
000a Formula One	Prod	06/08/10 06:08:09	

4. Open **Snapshot folders** to access any [Folders](#) stored within the **Active production**:

Production Files		
Name	Type	Date (m/d/y)
Productions		
Active production		
Snapshot folders		
1_Production Test	SnapF	
BACKUP	SnapF	
Basic Setups	SnapF	
Football	SnapF	
Formula One	SnapF	
Johannesburg	SnapF	
Music	SnapF	
Automation		
000-Bregenz X-Fade	Prod	07/29/09 09:03:03
000a Basic Setups	Prod	06/08/10 06:07:26
000a Bob Slide	Prod	06/08/10 06:09:15
000a Football	Prod	06/08/10 06:07:55
000a Formula One	Prod	06/08/10 06:08:09

5. And open a Folder to access the individual [snapshot](#) files.
6. Remember that at any time, you can go back one level by closing the folder – double-click on the folder name, or click on the arrow beside the name.

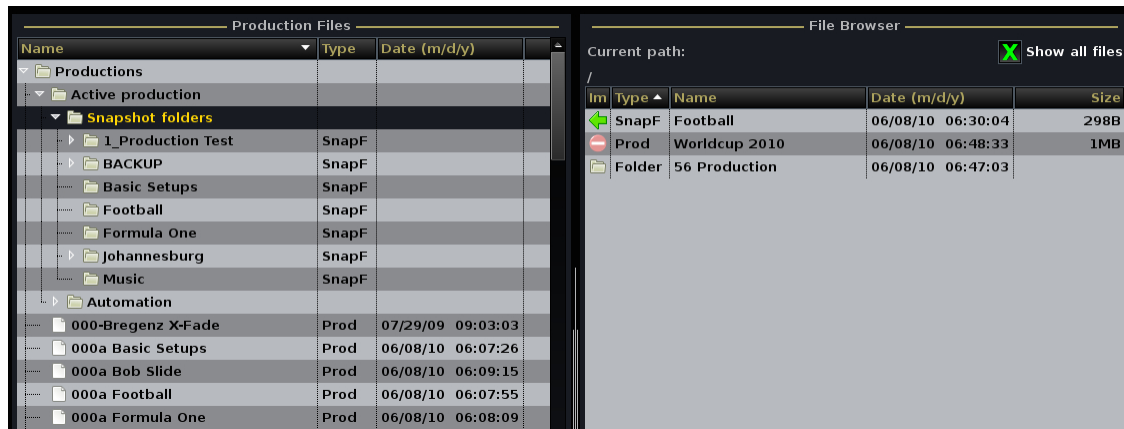
## The File Browser

Selecting and navigating within the **File Browser** varies slightly from the **Productions list**. This is because the files you see within the **File Browser** are dependent on the directory level of the **Productions list**. For example, if you are viewing zipped productions within the **Productions list**, then you will only see zipped productions in the **File Browser**. This prevents you from copying files to 'illegal' locations:

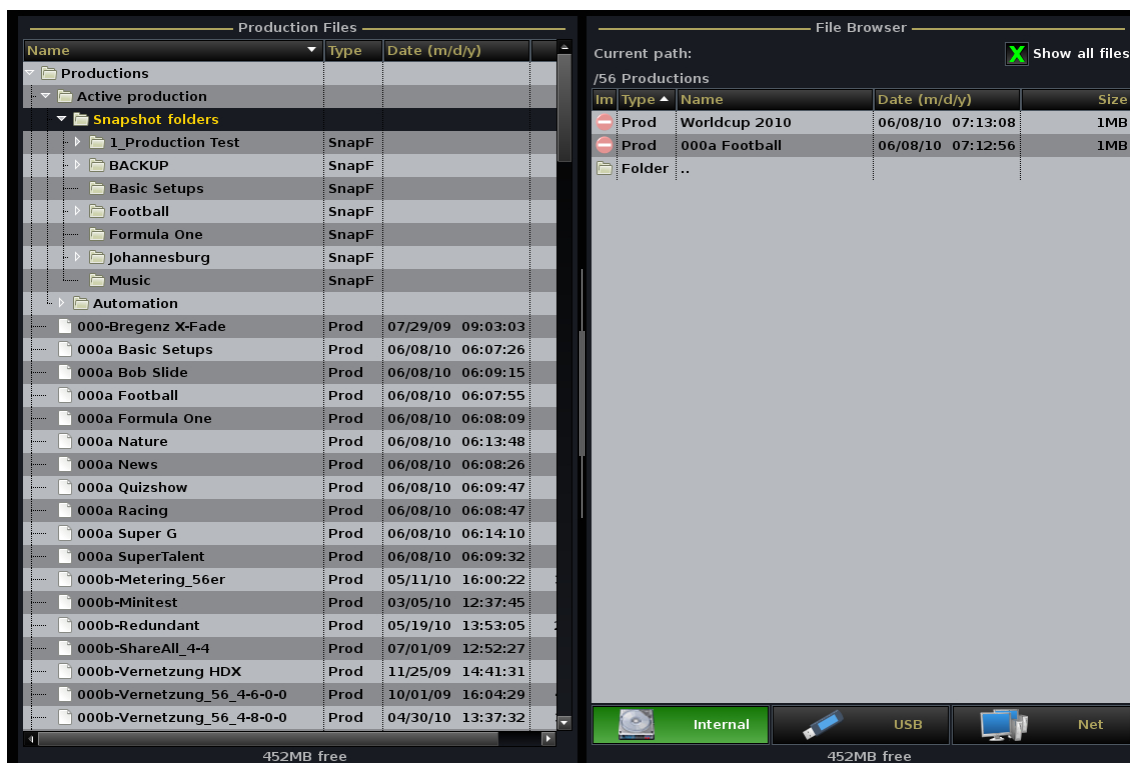
Production Files			File Browser		
Name	Type	Date (m/d/y)	Current path: /		
Productions			Im	Type	Name
Active production					Date (m/d/y)
000-Bregenz X-Fade	Prod	07/29/09 09:03:03			Size
000a Basic Setups	Prod	06/08/10 06:07:26	Prod	Worldcup 2010	06/08/10 06:48:33 1MB
000a Bob Slide	Prod	06/08/10 06:09:15	Prod	000a Bob Slide	06/08/10 06:50:45 1MB
000a Football	Prod	06/08/10 06:07:55			
000a Formula One	Prod	06/08/10 06:08:09			
000a Nature	Prod	06/08/10 06:13:48			
000a News	Prod	06/08/10 06:08:26			
000a Quizshow	Prod	06/08/10 06:09:47			
000a Racing	Prod	06/08/10 06:08:47			
000a Super G	Prod	06/08/10 06:14:10			
000a SuperTalent	Prod	06/08/10 06:09:32			
000b-Metering_56er	Prod	05/11/10 16:00:22			
000b-Minitest	Prod	03/05/10 12:37:45			
000b-Redundant	Prod	05/19/10 13:53:05			
000b-ShareAll_4-4	Prod	07/01/09 12:52:27			
000b-Vernetzung HDX	Prod	11/25/09 14:41:31			
000b-Vernetzung_56_4-6-0-0	Prod	10/01/09 16:04:29			
000b-Vernetzung_56_4-8-0-0	Prod	04/30/10 13:37:32			
1-christmastest_56	Prod	07/09/09 14:38:23			
4.7.0.0	Prod	10/22/09 06:25:42			
4.8.0.2_new	Prod	03/10/10 14:47:54			
56 Input Loop (neu)	Prod	12/17/09 11:16:44			
56 Input Loop 1	Prod	12/17/09 11:16:41			
96kHz_Lawo_GS_2006_08_17	Prod	03/09/10 09:37:19			
ACR_1_Build_2	Prod	01/11/10 17:55:41			
ADAT-mit Eingangs-SRC	Prod	05/17/10 12:33:19			
ADAT-ohne SRC	Prod	05/17/10 12:31:40			

1. To see all files from the **File Browser** regardless of their compatibility, select the **show all files** option - the **File Browser** updates to list all files on the selected device; the **Type** column shows whether they are compatible for import.

In our example, the Snapshot folder called **Football** is compatible for import:



2. If your selected storage device contains folders, then you can open a folder by double-clicking on the folder name - the file path is shown at the top of the **File Browser** – in our example, **/56 productions**:

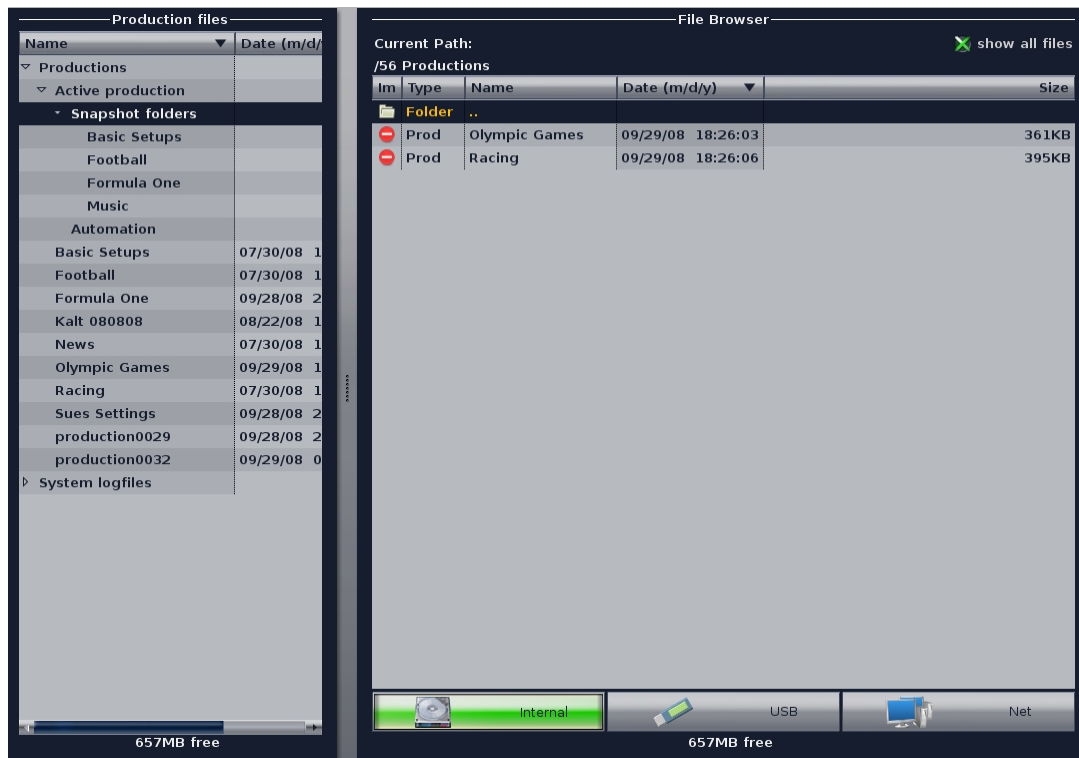


3. To close the folder and move back to the top level directory, double-click on **Folder...**



## Resizing and Sorting

1. You can resize the **Production files** and **File Browser** areas by [clicking and dragging](#) on the separator bar:



2. You can sort files by name, date, size, type, etc. by clicking on the column headers, or pressing the **SORT NAME** or **SORT TIME** [soft keys](#).

The **SELECT** soft key provides another method for opening or closing a folder.

## 16.8.2 File Types & Extensions

The **File** display can be used to export any the following files from the internal data card:

- The **Active Production**. The active production can be exported in full, or opened in order to select individual elements such as a folder, snapshot or automation mix.
- **Prod** – zipped production files. These are zipped files which cannot be opened. They can be exported as a file to the external storage device, imported on another console, and then unzipped within that console to access their individual elements.
- **SnapF** – an individual Folder within the Active production. By selecting a Folder, you can easily export all the snapshots for a particular show.
- **Snap** – an individual Snapshot within the Active production.
- **Mix** – an individual Automation Mix within the Active production.
- **Presets** – an individual channel or processing module preset.
- **Log** – a message file (system log file).

Note that you can also export these files to an external computer running [mxGUI](#), see the [File Transfer](#) display.

### Warning

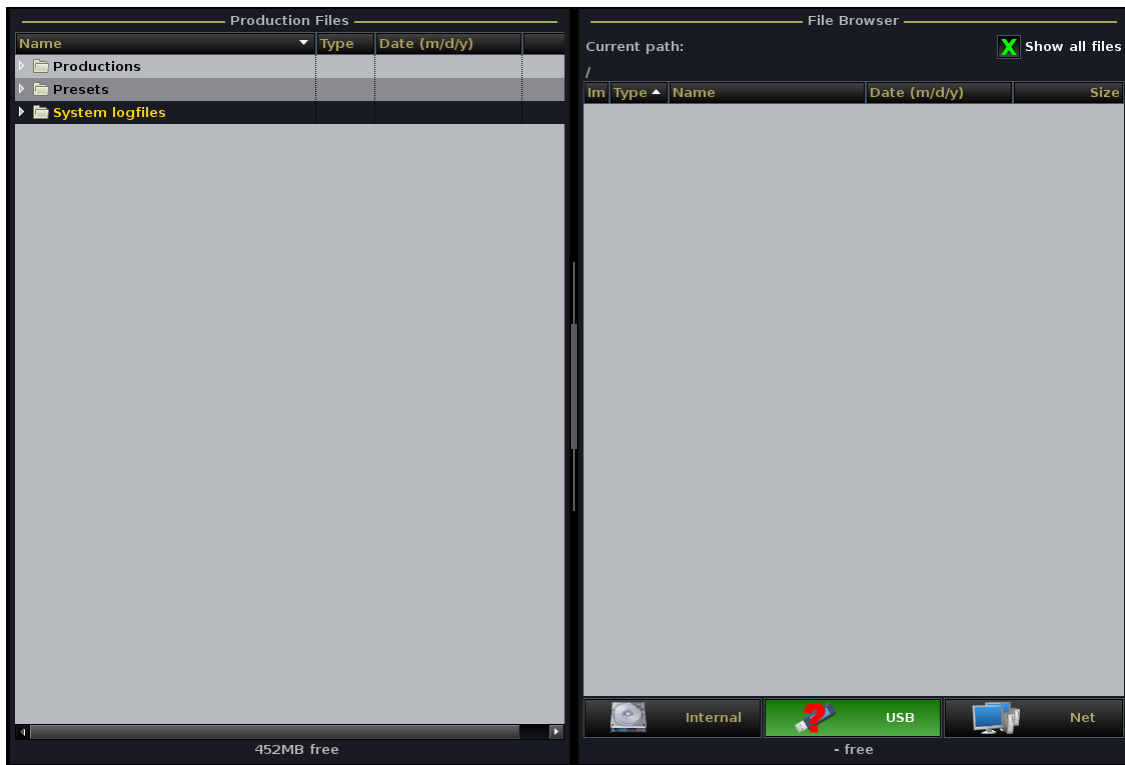
You can view and rename user data files on an external computer. However, if you edit the contents, or modify the file extension, you can corrupt the file and lose data!

The following extensions must be intact to permit a valid file import:

- **.lsn** – a snapshot
- **.lpn** – production
- **.lau** – automation mix
- **.pch** – channel preset
- **.peq**, etc. – EQ preset, Compressor preset, etc.
- **.lcf** – complete configuration (mxGUI only)
- **.lco** – core configuration: config.tcl (mxGUI only)
- **.lsl** – signal list: gui\_config.tcl (mxGUI only)

### 16.8.3 Exporting to USB

1. First, connect your USB interface to one of the console's USB ports.
2. Click on the **USB** interface icon at the bottom right of the display, or press the **EXTERNAL** [soft key](#):
  - If the USB interface is mounted, then its icon will turn green and the [File Browser](#) will show any files or folders already stored on the device.
  - If the USB interface is not mounted, then you will see the following:



3. Try refreshing the **USB** selection - select **Internal** and then back to **USB**.

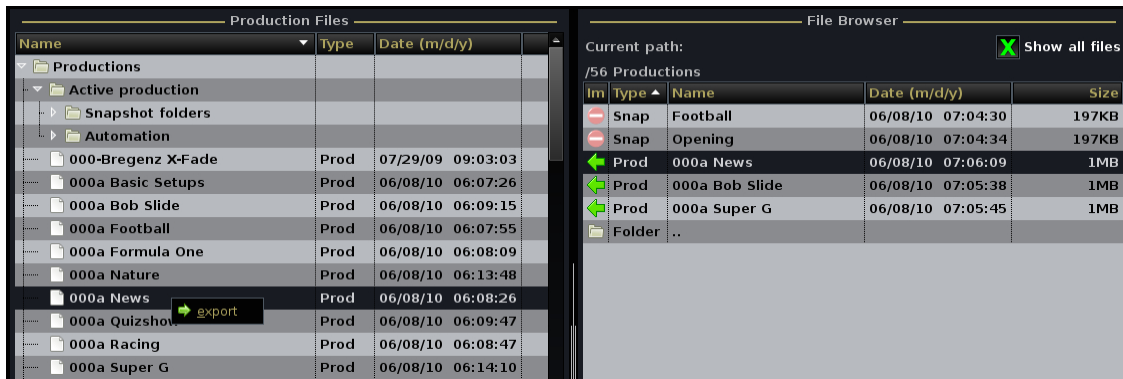
The device should now show as ready. If not, check your connection or try a different USB device.

Lawo cannot guarantee compatibility with all available USB interfaces. Therefore, please check the compatibility of your USB interface on your system.

4. Select the destination folder on your USB from the [File Browser](#). (You can [create folders](#) to help organise files.)

5. Then right-click on the file you wish to export from the [Production files](#) list and select **Export**, or press the **EXPORT** soft key.

The file is copied from the internal data card onto your USB storage device - in our example, we have exported the production named **000a News**:



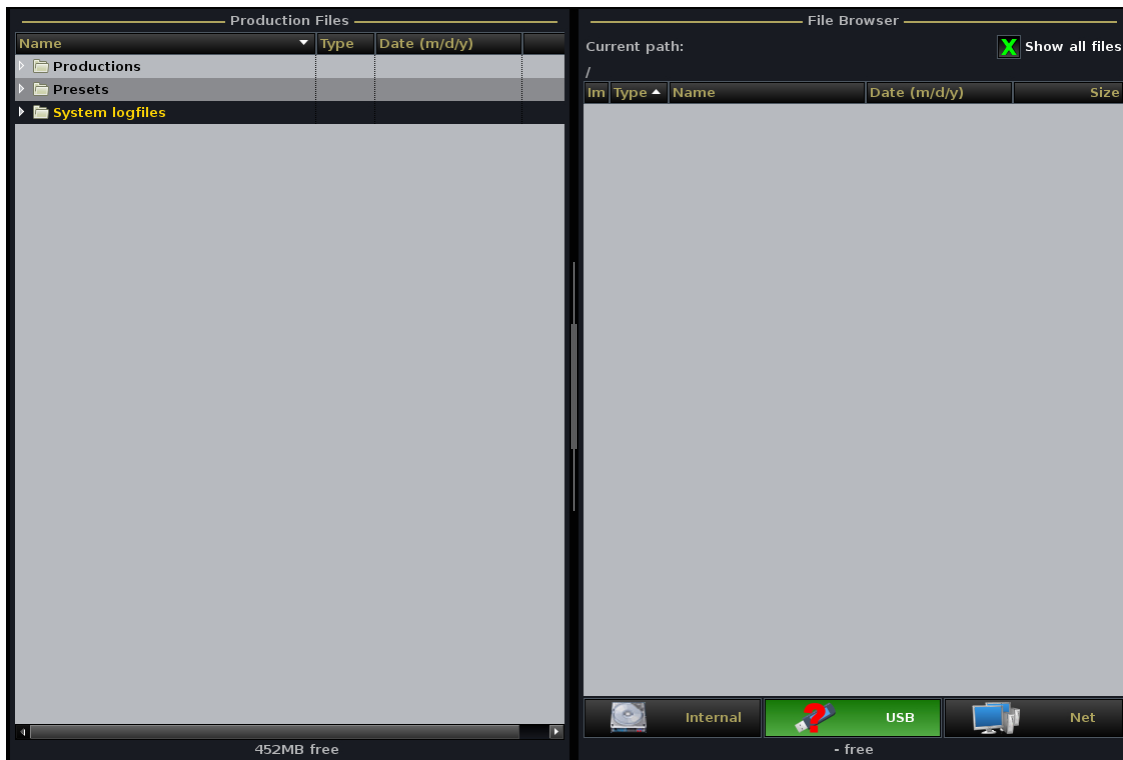
6. Once the data has finished transferring, you can unplug the USB device.

Note that there is no need to dismount the USB interface before you remove it. However, DO NOT unplug the USB interface while data is transferring as this may result in loss of data.

## 16.8.4 Exporting to a Network Drive

Follow the [same steps](#) to export a file or directory to a network drive. Note that the drive must be configured by your system administrator using the AdminHD configuration software for it be available.

1. Once configured, you can mount the drive by selecting the **Net** icon or pressing the **NETSHARE** [soft key](#):



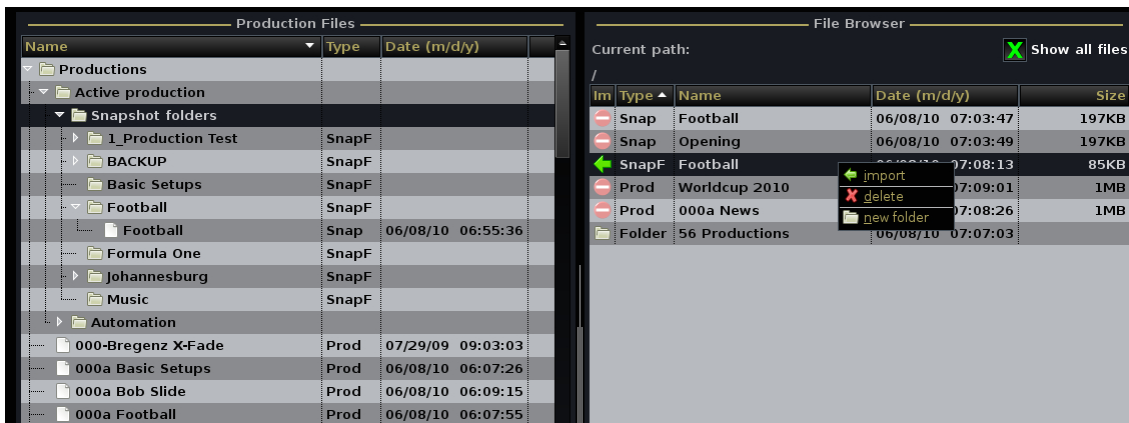
Note that the contents of the **File Browser** will not automatically update if changes are made from another console or computer. So, to see any changes, refresh the **Net** selection - select **Internal** and then back to **Net**.

### 16.8.5 Importing a File

You can import files from a USB interface or networked drive in a very similar manner to [File Export](#), but this time:

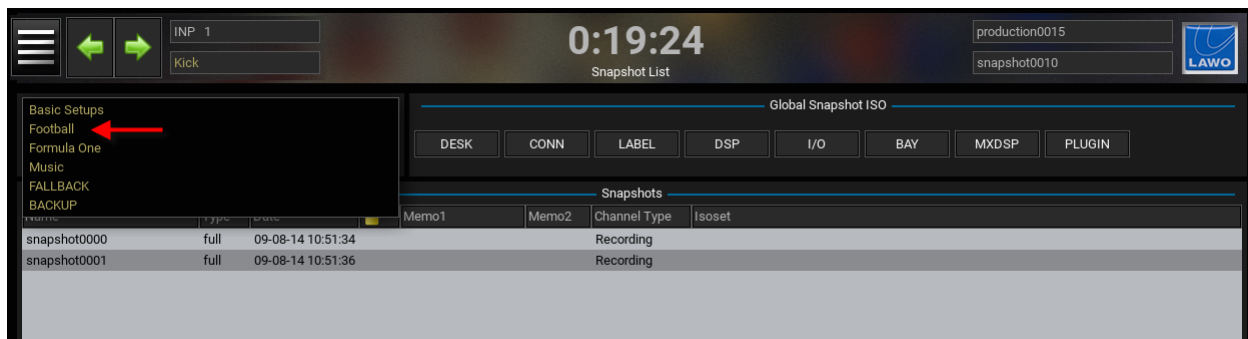
1. Select the file you wish to import from the [File Browser](#).
2. Select the correct destination level from the [Production Files](#) list.
3. Then right-click on the File Browser file and select **Import**, or press the **IMPORT** [soft key](#).

In our example, we have imported the snapshot folder called **Football** into the **Snapshot folders** of the Active Production:



Note that if a file or folder of the same name already exists, then the file will be copied with an appended name – for example, **Football (0001)**.

4. If you now select the **Snapshots List** display, you will find the imported Folder in the **Folders** drop-down menu at the top left of the display:



## 16.8.6 Copying Files Internally within the System

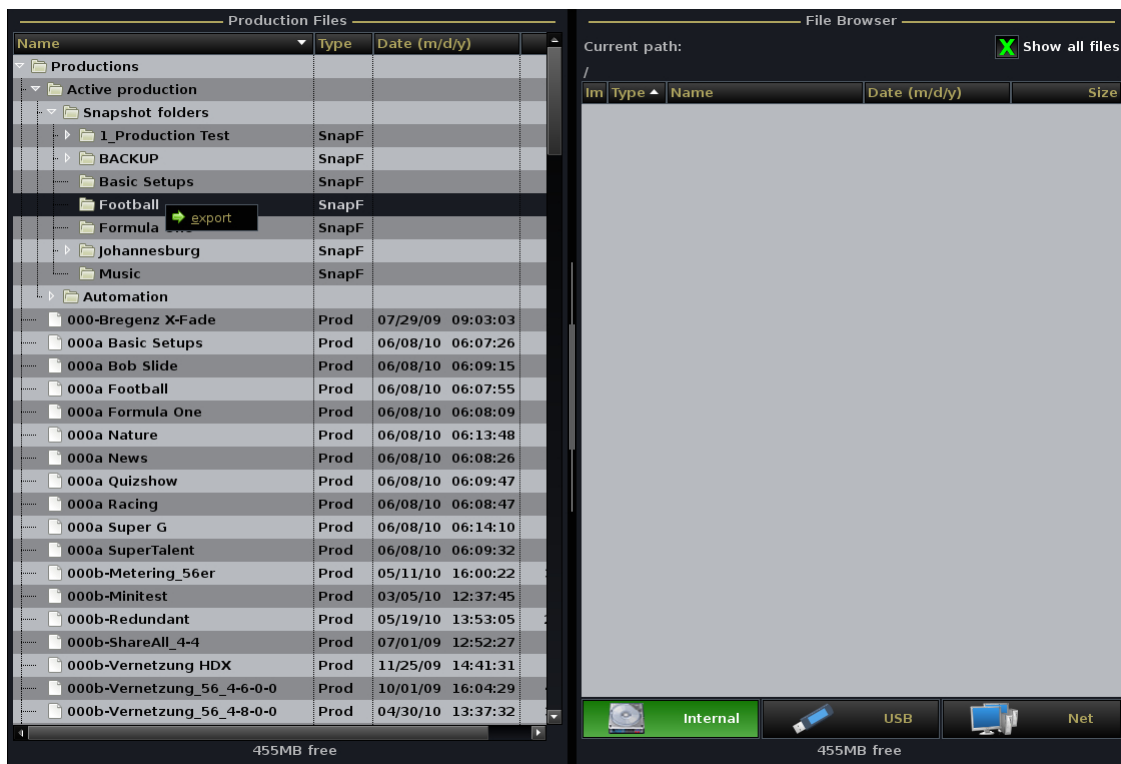
The **File** display can also be used to copy files internally within the system. For example to copy a snapshot or folder from one production to another.

As you cannot open up a zipped production to select individual elements, you will need to perform this operation in several stages:

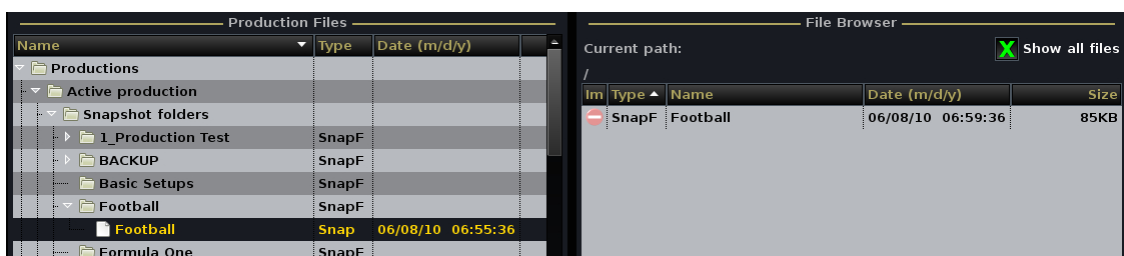
1. First, [load](#) the production which contains the snapshot you wish to copy from the **Productions** display.
2. Now, go to the **File** display and within the [File Browser](#), click the **Internal** drive icon.

You will see the contents of a temporary directory within the internal drive as your destination. This directory may be empty, or it may contain previously copied files.

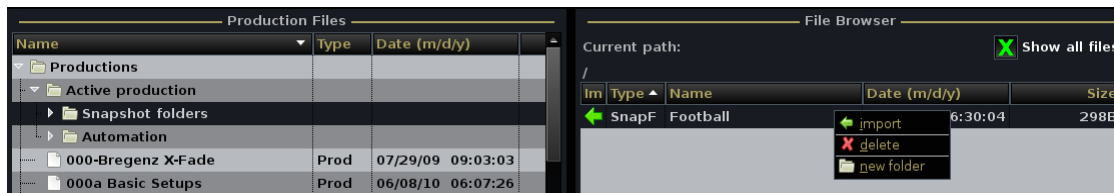
3. Now, from the [Production files](#) list, open up the **Active production**, the **Snapshot folders** directory and select the folder to copy – in our example, **Football**:



4. Select **EXPORT** to export the folder to the temporary directory:



5. Next, return to the **Productions** display and [load the production](#) you wish to copy into - this now becomes the Active Production.
6. Select the **File** display.
7. From the **Production files** list open up the **Active production** and select the **Snapshot folders** directory.
8. And, on the right hand side, select the folder you copied earlier – **Football**:



9. Select **IMPORT** to import the snapshot to the Active Production Folder.
10. If you now select the **Snapshots List** display, you will find the imported Folder.

If you are using this operation to copy a lot of files, then it is a good idea to [delete files](#) from the temporary directory.

Remember the [File Browser](#) can only show files which can be imported to your selected destination. For example, if you have selected a snapshot folder, you will only see snapshots; if you have selected the **Productions** directory, then you will see productions. To see all files, turn on the **show all files** option.

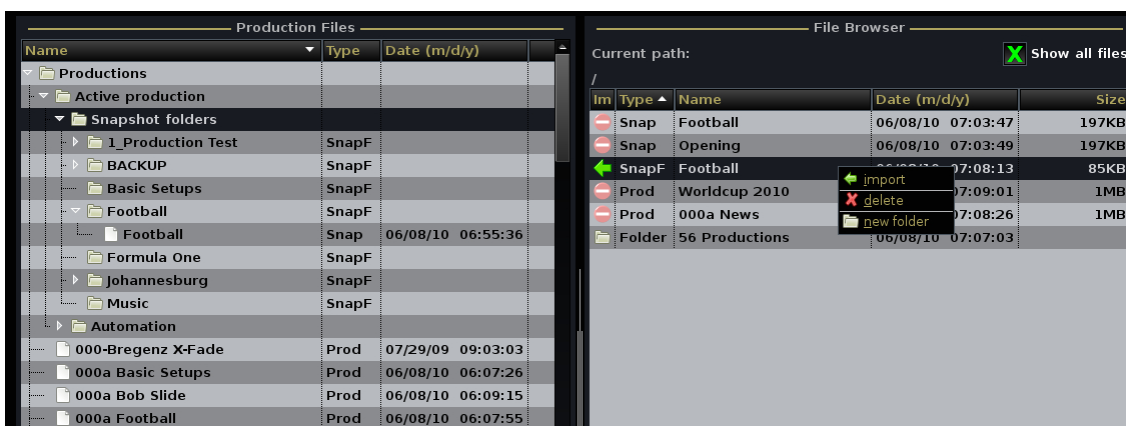
### 16.8.7 File Management

To help manage your data on your external USB interface or networked drive, the **File** display enables you to create a new folder or delete a file or folder in the [File Browser](#) (on the right of the display).

These functions are designed to give you the basic tools to manage your exported data. However, to reorganise the data structure on your storage device, connect it to your PC!

#### ➤ To Create a New Folder

1. Select **Internal**, **USB** or **Net** to select your interface.
2. Right-click on the **File Browser** and select **New Folder**, or press the **NEW FLDER** [soft key](#).

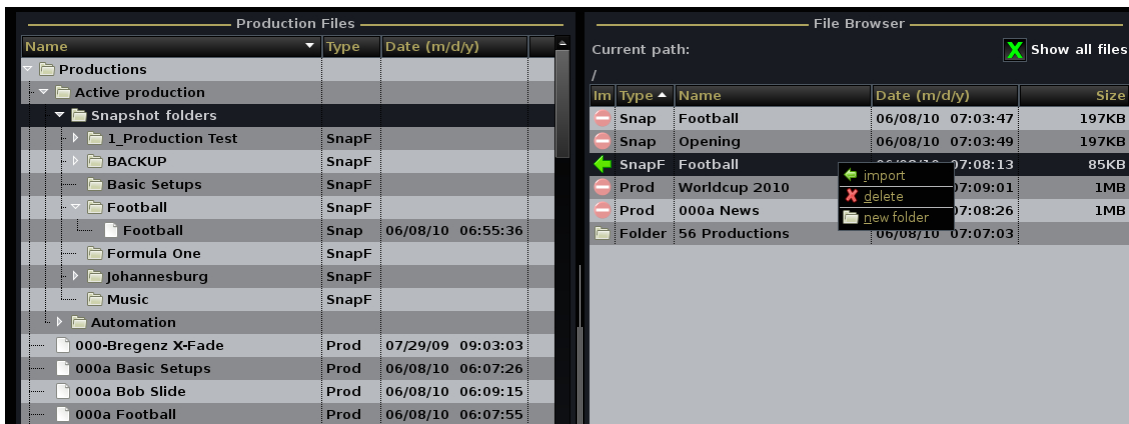


A new folder is created with a default name.

3. You can rename the folder by clicking on the folder name and editing the text in the [usual](#) manner.

### ➤ To Delete Files or Folders

1. Select **Internal**, **USB** or **Net** to select your interface.
2. Right-click on the file or folder from the **File Browser** and select **delete**, or press the **DELETE** [soft key](#).



You can delete files or folders within the temporary folder on the internal drive, or on your external USB interface or network drive.

Note that you cannot delete files or folders from the **Production files** list. (To perform these data management functions, go to the [Snapshots](#), [Mixes](#) or [Productions](#) displays.)

## 16.8.8 Transferring User Data

All user data is fully compatible with any mc<sup>2</sup> system. However, you should note the following if you are transferring data between systems:

### Productions

The [DSP configuration](#) is saved and loaded as part of the [production](#). Normally, you only need to save or update the production to ensure all settings are recalled when you later load the production back.

However, if you move a production to a console with fewer DSP boards, then the DSP configuration will not load (as it is looking for more physical cards). And, if the current channel type is not compatible with the production snapshot, your DSP settings will not load either.

To overcome this, save a snapshot on the original console in addition to saving the production. When you move the production to the new console, load the production, then manually load a DSP configuration with a compatible channel type. Now load the snapshot. Your settings will be recalled to all available DSP channels.



## Snapshots

[Snapshots](#) do *NOT* store the DSP configuration (to avoid an interruption to audio from a snapshot load). And, you cannot load a Broadcast snapshot to a console running Recording channels, or vice versa. To help manage this, the **Snapshots List** includes a channel type column:

1. [Open](#) the **Snapshots List** display.
2. The **Channel Type** column shows which channel type was active when the snapshot was saved: either **Recording** or **Broadcast**:

Snapshots							
Name	Type	Date		Memo1	Memo2	Channel Type	Isoset
Act 1 Scene 1	full	09-08-12 14:18:34				Recording	
Act 1 Scene 2	full	09-08-12 14:20:02		Soloist A		Recording	
Act 1 Scene 3	full	09-08-12 14:20:36				Recording	
Act 2 Scene 1	full	17-05-29 15:52:17		Update for Soloist B		Recording	
snapshot0000	full	09-08-12 14:18:26				Recording	
snapshot0001	full	09-08-12 14:18:28				Recording	
snapshot0002	full	09-08-12 14:18:32				Recording	
snapshot0010	full	09-08-12 14:18:38				Recording	

Snapshot memo

To keep things simple, always choose a DSP configuration which matches the snapshots for the production. When this is the case, settings load as normal, and you can load snapshots from one console to another, even if the number of DSP boards or DSP configuration varies. For example, if a snapshot saved with settings for 192 Broadcast input channels, is loaded onto a console running 96 Broadcast input channels, then settings are recalled to the matching available input channels (1 to 96).

If you do try and load a Recording snapshot to a console running Broadcast channels, then the following will happen:

- Incompatible channel DSP settings (e.g. EQ, Dynamics, Fader levels, VCA grouping, etc.) cannot be loaded. The only exception to this is bus assignments.
- All other parameters – signal routing, IO settings, desk configuration, etc. – are loaded as normal.

If you really need to transport a snapshot from one channel type to another, then this can be achieved using the dynamic automation (see [Mixes](#)).

## Presets

Unlike snapshots, it is possible to load a [preset](#) saved on a Broadcast channel to a Recording channel, or vice versa. If you do so, all matching parameter values are recalled. However, as not all parameters are included, the result may not sound the same.

For example, if you attempt to load a 3rd order filter setting from a Recording channel preset to a Broadcast channel, then a 2nd order filter (the maximum) is applied.

## Mixes

You can also load a [mix](#) created with Broadcast channels, to a DSP configuration running Recording channels, or vice versa.

Any matching parameter values, such as fader levels, are recalled. However, as not all parameters are included, the result may not sound the same.

This is a way of transporting snapshots from one channel type to another:

- Enable dynamic automation and recall the snapshot you wish to transfer.
- Turn off the automation.
- Then change the DSP configuration channel type (all channel DSP settings reset.)
- Turn on the automation to recall the compatible parameter values.
- Now save a new snapshot which matches the DSP configuration channel type.

## 17. Timecode Automation

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This chapter covers the timecode automation system.

Topics include:

- [Prerequisites](#)
- [Automation: Overview](#)
- [Before You Mix](#)
- [Writing Automation: First Steps](#)
- [Saving & Loading Automation Data](#)
- [Updating Fader Moves](#)
- [Writing Automation on Controls and Switches](#)
- [Automation Modes](#)
- [Command Functions](#)
- [Protecting Automation Data](#)
- [Recalling a Snapshot](#)
- [The Mixes Display](#)
- [The Passes Display](#)
- [Mix Pass Editing](#)
- [Machine Control](#)
- [Machine Locators](#)

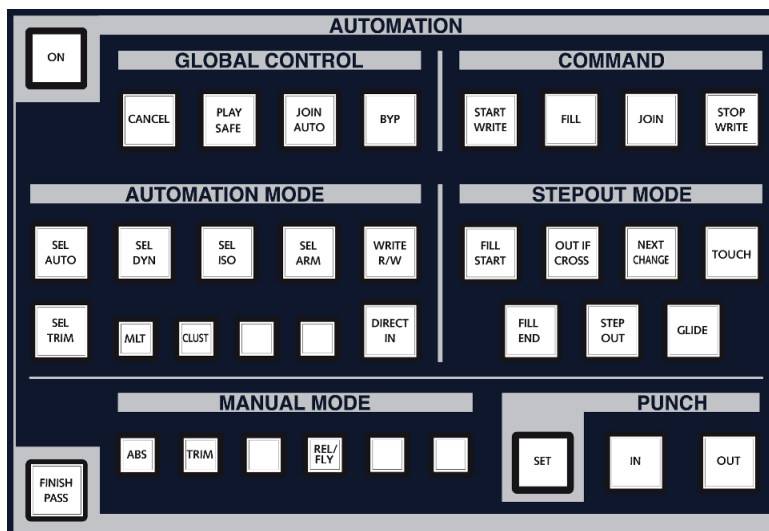
## 17.1 Prerequisites

The system must be specified with the Recording Com Kit (958/80) to provide LTC or MTC to the external playback device.

The control surface must include the optional AUTOMATION user panel.

## 17.2 Automation: Overview

The automation system automates console settings referenced to timecode, and is controlled from the optional AUTOMATION user panel within the centre section:



Any channel type can be automated (inputs, groups, sums, auxes, VCA masters, surround VCA masters and GPCs). And automation can be enabled for any audio module (fader, mute, aux sends, EQ, bus routing, channel signal flow, etc.)

Automation data can be written with timecode rolling forwards, backwards and at any speed, providing fast and efficient mixing. The way in which data is written is governed by a number of [modes](#), allowing you to write dynamic or static automation; step in or step out of write to make updates; trim existing moves; protect channels to prevent overwriting existing moves; and isolate channels to remove them from the automation system completely.

Each stream of automation data is recorded as a 'Pass', and multiple passes are stored within a 'Mix'. The ['Pass Tree'](#) allows you to view the history and A/B between different passes within each mix. You can also edit mix passes in order to delete, copy, shift, insert or paste sections from different passes.

Multiple [mixes](#) can be created within each [production](#); mixes are stored permanently on the system when you update or save a production.

Control of the playback machine can be programmed onto user buttons from the [Custom Functions](#) display, or handled from the optional [Machine Control panel](#).

You can also use the [Machine Locator](#) display to store and recall cue points, and/or switch one of your console displays to a [remote desktop](#) in order to view and control a DAW.

## 17.3 Before You Mix

Let's assume that you have created a new production and have a basic setup with levels, panning, EQ, etc.

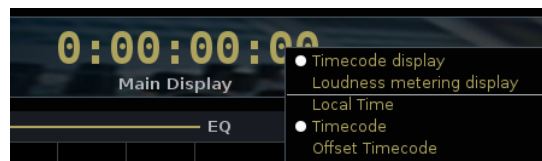
Before enabling the automation system, there are a few basic checks to perform:

1. Select the timecode reference for the automation system using the [Timecode/Frame Rate](#) options in the **System Settings** display.

Control of the playback machine can be programmed onto user buttons from the [Custom Functions](#) display, or handled from the optional Machine Control [panel](#).

You can use the [Machine Locator](#) display to store and recall timecode positions.

2. Change the Central GUI headline to display timecode rather than local time or loudness by clicking in the [headline](#) at the top of the title bar:



3. Press **PLAY** on your machine and check that the timecode follows.

You can choose **Offset Timecode** from the headline options, and set a [timecode\\_offset](#) from the **Passes** display, if your mix starts at an odd timecode value.

4. If necessary, set a pre-roll tolerance for your playback machine.

This option is set by the [Pre-roll window](#) option in the **Passes** display.

5. Check the **Mixes** display and create a new mix to store automation (described [next](#)).
6. Select the channels/modules you want to automate (described [shortly](#)).

If you wish, you can enable [Solo-in-Place](#) from the **System Settings** display.

### 17.3.1 Checking the Active Mix

When you enable automation, data from the **Active Mix** is loaded to the console. Therefore, to make sure you don't lose your current settings, you should check the **Mixes** display.

1. [Open](#) the **Mixes** display on the Central GUI - the list shows all the mixes in the current memory:



The name of the **Active Mix** is shown at the top of the display. It is the passes from this mix which appear in the [Pass Tree](#), and its Play pass which loads when you [enable automation](#).

The columns beside each mix name show the date and time stamp, the number of passes within the [Pass Tree](#), whether the mix is [protected](#) (padlock icon) and the size of the mix. You can drag and drop columns to change their order.

At the bottom of the display, the **Mix Memo** box can be used to [add notes](#) to a particular mix.

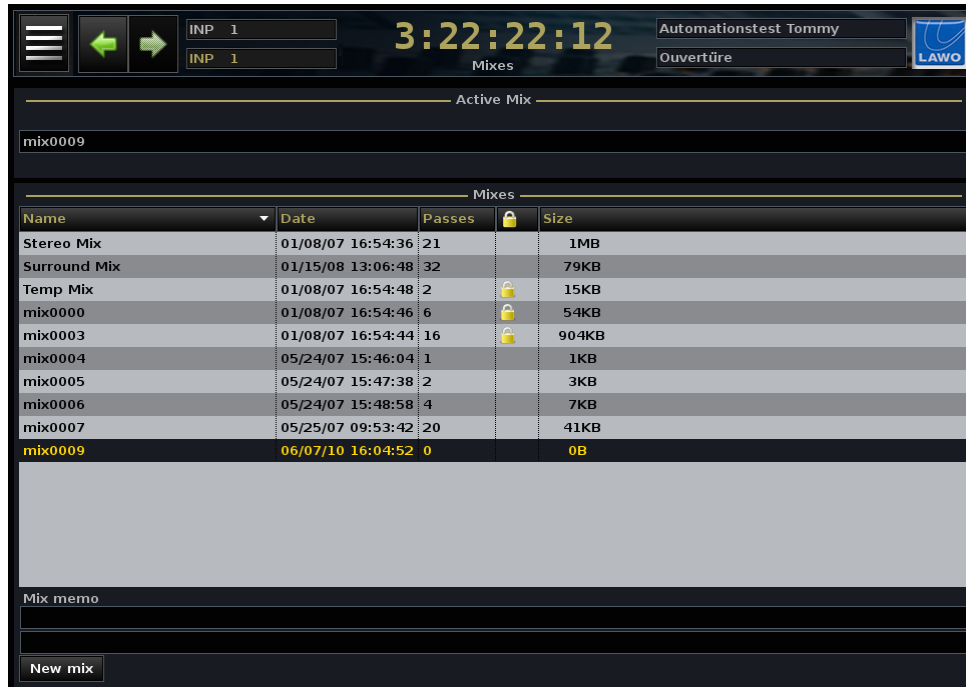
The on-screen buttons and SCREEN CONTROL soft keys provide access to [Load](#), [New](#), [Protect](#) and [Delete](#) operations. These functions are also available if you select a mix and right-click.

- If the **Active Mix** box is empty, you can skip straight onto [selecting the channels and modules](#) you want to automate. The first time you enable the automation, a new mix and Record pass are created automatically.
- However, if an **Active Mix** already exists (loaded from the production), you should [create a new mix](#) before proceeding. Otherwise, when you press the **AUTO ON** button, the system will load the Play pass from the **Active Mix**, thereby resetting your existing settings.

### 17.3.2 Creating a New Mix

1. Press the **NEW** soft key, or on-screen **New mix** button, to create a new mix.

An empty mix appears at the bottom of the **Mixes** list and automatically becomes the **Active Mix**. It is given a default name (e.g. **mix0009**), and is date and time stamped:

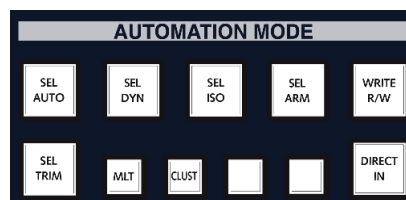


### 17.3.3 Selecting Channels/Modules for Automation

The **SEL AUTO** function selects which modules within each channel are enabled (or disabled) for automation.

The first time you enable a module for automation, it defaults to [dynamic](#) automation mode and is [armed](#) (ready to read and write automation) in [absolute](#).

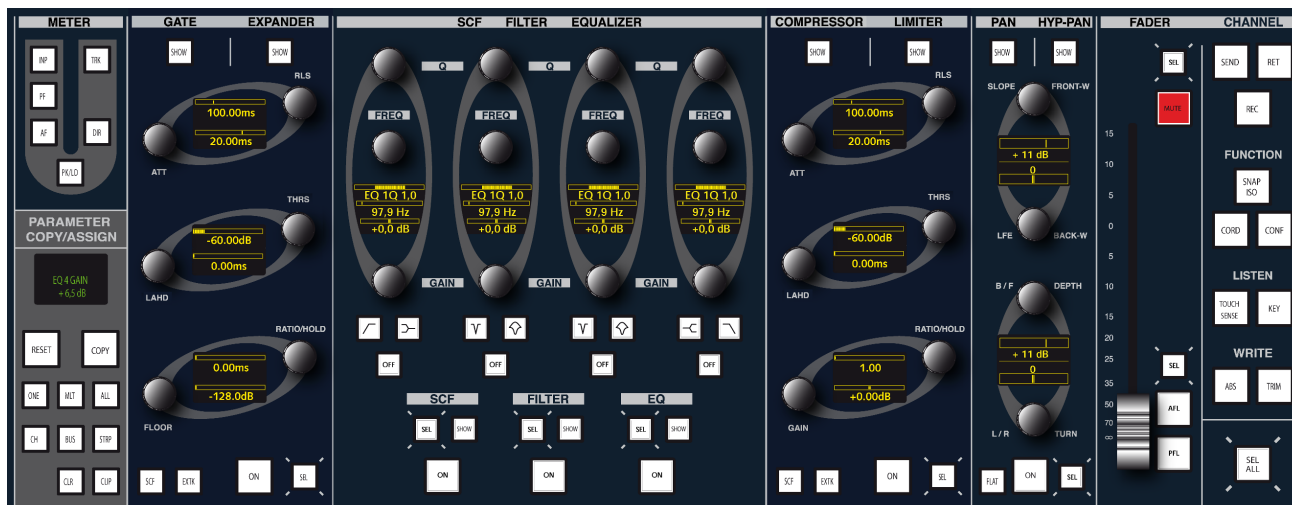
1. Assign one of the channels you want to automate to the [Central Control Section](#), either by pressing its fader **SEL** button or using the [ACCESS/ASSIGN](#) panel.
2. Press **SEL AUTO** - the button flashes to show it is active:





On the Central Control Section, the current status of each module is shown by the select buttons:

- **SEL** button lit (orange) = automation enabled.
- **SEL** button off = automation disabled.

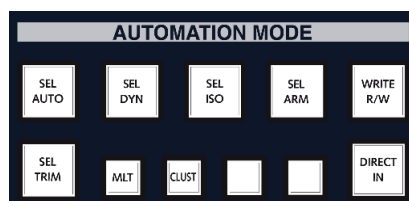


3. Press the Central Control Section **SEL** buttons to enable, or disable automation, for each audio module.

You can select any audio module(s), plus the channel signal processing (**CH**), bus routing (**BUS**), fader strip assignment (**STRIP**) and channel color coding. See [Selecting Channel Parameters](#).

For our example, toggle **SEL ALL** to deselect all channel parameters, and then press the **SEL** beside the fader control so that it lights. This enables fader automation on the channel in access.

4. Next press **MLT** to apply this setting across more than one channel:



The fader **SEL** buttons across the console flash, in green.

5. Use the fader **SELs** to select the channels you wish to automate - the buttons turn red when selected:



You have now enabled automation for the fader modules on the selected channels. The **AUT** indicator on the fader strips illuminates to reflect the status.

6. Deselect **SEL AUTO**, or press **ESC** on the ACCESS/ASSIGN [panel](#), to exit the **SEL AUTO** mode.

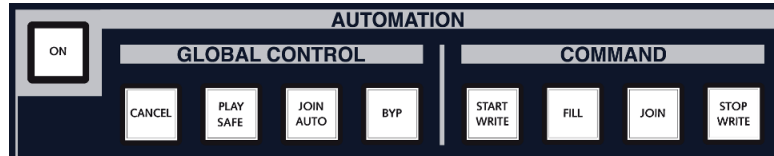
To change what is automated at a later date:

- Repeat steps 1 to 3 to enable, or disable, automation on the channel in access.
- Repeat steps 4 and 5 to apply the new module selections to multiple channels - note that you will need to refresh the fader **SEL** buttons in step 5 (turn them off and back on) to update existing selections.

## 17.4 Writing Automation: First Steps

Having [prepared](#) the console, you are now ready to turn on the automation and write your first pass.

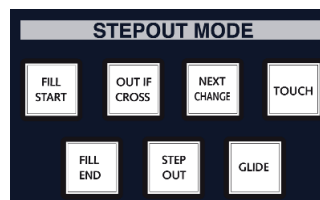
1. Rewind your playback machine to the start of the mix, and turn on automation by enabling the **ON** button:



The fader **R/W** buttons turn green. If they don't, then the fader is NOT [selected](#) for automation or it is [disarmed](#).



2. Check that **FILL END** is selected as the 'Stepout Mode':



The **FILL END** 'Stepout mode' is great for writing early passes where you are working through the song or production chronologically. Each time you stop and finish a pass, any values in write are written through to the end of the mix. This means that you don't have to play through the whole song just to write a fader level to the end of the mix. See [Step Out Modes](#) for more details.

3. Press the **AUTO** button, located on the [SCREEN CONTROL](#) panel, to view the **Mixes** display.

The **Active Mix** is shown at the top of the display - in our example, **mix0009**:



The screenshot shows the 'Mixes' display. At the top, there's a header bar with navigation buttons (left arrow, right arrow, menu), input fields for 'INP 1', a large timecode display showing '3:22:22:12', and user information 'Automationstest Tommy' and 'Ouverture'. Below the header, the 'Active Mix' section shows 'mix0009'. The main area is a table titled 'Mixes' with columns: Name, Date, Passes, a lock icon, and Size. The table lists several mixes, with 'mix0009' highlighted in yellow. Below the table is a 'Mix memo' section and a 'New mix' button.

Name	Date	Passes	Lock	Size
Stereo Mix	01/08/07 16:54:36	21		1MB
Surround Mix	01/15/08 13:06:48	32		79KB
Temp Mix	01/08/07 16:54:48	2		15KB
mix0000	01/08/07 16:54:46	6		54KB
mix0003	01/08/07 16:54:44	16		904KB
mix0004	05/24/07 15:46:04	1		1KB
mix0005	05/24/07 15:47:38	2		3KB
mix0006	05/24/07 15:48:58	4		7KB
mix0007	05/25/07 09:53:42	20		41KB
<b>mix0009</b>	<b>06/07/10 16:04:52</b>	<b>0</b>		<b>0B</b>

4. Press the **AUTO** button again to page to the **Passes** display.

The **Pass tree** should be empty as we have not yet written any data:



The screenshot shows the 'Passes' display. The header bar is similar to the previous screen, but the timecode display shows '3:54:34:20'. Below the header, there are settings for 'Play pass', 'Record pass', and 'Selected pass', each with a 'Locate' button. To the right, there are settings for 'Punch in', 'Punch out', 'Glide-in time', 'Glide-out time', 'Pre-roll window', and 'Midnight'. Below these settings is a 'Pass Tree' section with columns for 'Status', 'Name', and 'Date'. The tree is currently empty. At the bottom left, there is an 'Expand all' button.

5. Now press play and write some dynamic fader moves as the timecode rolls forwards.

As soon as you touch a fader, its **R/W** button changes from green to red to indicate that you are writing new data.

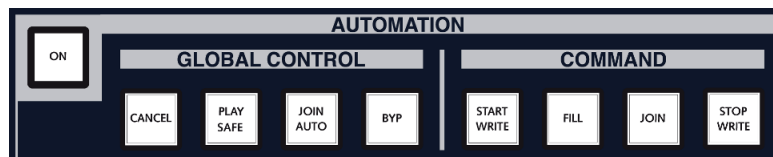
You will see that a **Record pass** is created – as this is the first pass, it is named **pass0000**:



You cannot create a new **Record pass** if the mix is [protected](#).

You will not be able to write dynamic automation if the fader has been [disarmed](#) or is running in [static automation mode](#).

6. When you are ready, finish the pass in one of two ways:
  - Press rewind or locate backwards; the change of timecode direction causes the pass to finish automatically.
  - Press **FINISH PASS** to finish the pass manually:



The automation data is recorded in **pass0000** which moves to the **Play pass** box in the **Passes** display:



In addition, all fader **R/W** buttons return to green indicating that they are back in read mode.

7. Locate back to the beginning of the mix and press play.

Watch your recorded moves play back against timecode!

A normal automation day starts at 00:00:00:00 and ends at 23:59:59:xx, meaning that the maximum mix pass length is 24 hours!

If your audio starts or crosses 00:00:00:00, then you should offset the timecode from the playback device to avoid the 23:59:59:xx/00:00:00:00 change of day.

### 17.4.1 Updating a Pass

To update the moves in **pass0000**:

1. Press play and touch the faders you want to update:

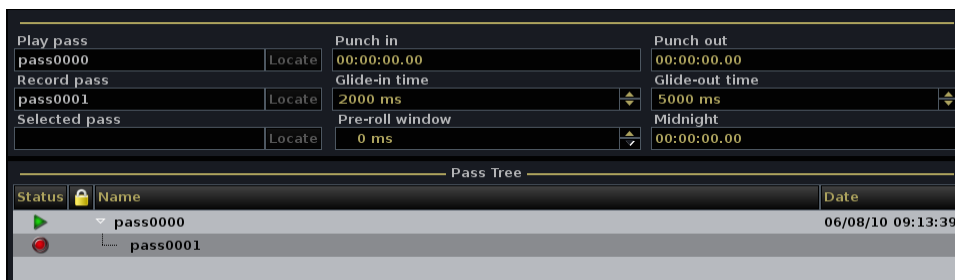


The fader **R/W** buttons turn red to show that they are back in write.

The **R/W** buttons on untouched faders remain green and play back the moves from **pass0000**.

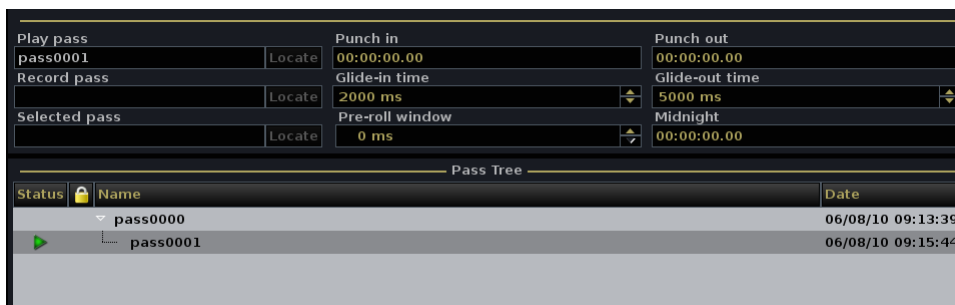
Note that the up/down arrows on the fader strip indicate the direction of the level stored within the Play pass. This is particularly useful when working in modes such as [OUT IF CROSS](#).

Having written some moves, a new **Record pass** – **pass0001** – is created:



2. Finish the pass, either by pressing **FINISH PASS** or locating backwards.

**Pass0001** now becomes the current **Play pass** ready for further updates:



If **FILL END** is still selected as the 'Stepout mode', any levels in write when you finish the pass are written to the end of the mix. For alternatives, see [Step Out Automation Modes](#).

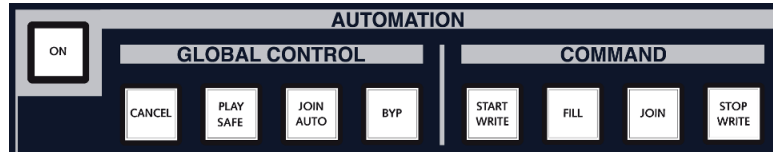
3. Continue updating the mix.

Each time you update the current **Play pass**, a new **Record pass** is created with a new unique reference number – **pass0002**, **pass0003**, etc.

The passes are kept within the **Pass Tree** showing the history of each update.

## 17.4.2 Cancelling a Pass

1. If you start a new **Record pass** and make a mistake, press **CANCEL** to throw away the data before finishing the pass:



The next time you begin a **Record pass**, it takes the next unique pass number. For example, if you cancel **pass0001**, then the next **Record pass** is named **pass0002**.

## 17.4.3 Reverting to an Earlier Pass

If you make a mistake and finish the pass, then you can go back to an earlier **Play pass** using the **Pass tree**:

1. Select the pass to revert to, for example **pass0002**.

The name of the pass is shown in the **Selected pass** box.

2. Press the **PLAY** soft key, or right-click and select **Play** from the drop-down menu options.

**Pass0002** becomes the current **Play pass** and the console settings update to reflect the new replay data.

3. Now go into play and write some fader updates.
4. Finish the pass, either by pressing **FINISH PASS** or locating backwards.

The newly created pass takes the next unique pass reference number, in our example **pass0007**, and appears as a new branch in the **Pass tree**:

Play pass	pass0007	Locate	Punch in	00:00:00.00	Punch out	00:00:00.00
Record pass		Locate	Glide-in time	2000 ms	Glide-out time	5000 ms
Selected pass	pass0002	Locate	Pre-roll window	0 ms	Midnight	00:00:00.00

Status	Name	Date
▼	pass0000	06/08/10 09:13:39
▼	pass0001	06/08/10 09:15:44
▼	pass0002	06/08/10 09:16:37
▼	pass0003	06/08/10 09:16:40
▼	pass0004	06/08/10 09:16:43
▼	pass0005	06/08/10 09:16:46
▼	pass0006	06/08/10 09:16:52
▶	pass0007	06/08/10 09:17:51

The **Pass tree** provides a history for every pass created within the active mix. You can use the **Pass tree** to A/B between different mixes or to write different versions of automation for a chorus or scene. Passes can be loaded, renamed, deleted and edited.

For more details, see the [Passes](#) display.

## 17.5 Saving & Loading Automation Data

Every time you [finish](#) a pass, you create a new pass which is stored within the [active mix](#) memory. At any time, you can create a [new mix](#) and store any number of passes within it.

Note that *all* this data remains in temporary memory, until you either [update](#) (or [save](#)) a production. The system then stores all the mixes in memory, and the passes within them, into the production on the user data flash card. See [What's Stored in a Production](#).

In addition, the system stores which mix is active, and which pass is the Play pass for each mix. This means that when you load back a production, you will always get back to the last mix and pass you were working on. So:

- to save your automation data, either [update](#) or [save](#) a production.
- to load a mix stored within the same production, simply [load a mix](#) and [turn on Automation](#).
- to load a mix from a different production, [load the production](#).

You can use a single production to store multiple mixes for, say, all the songs on an album.

Within each mix (song), create different passes to manage your mix variations - for example, vocals higher, rhythm section lower, etc.

Individual mixes or productions can be imported and exported to a USB interface, mxGUI computer or network drive. This allows you to archive or transfer automation data between systems. See [File Import/Export](#) for details.

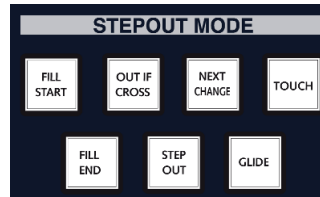
## 17.6 Updating Fader Moves

So far we have been working in **FILL END** which means that whenever you rewind and write an new update, any moves which follow are overwritten. In order to fine tune the mix, you should change to **STEP OUT** mode, use the fader **R/W** buttons to step out on the fly, and/or enable **TOUCH**.

### 17.6.1 Step Out

In **STEP OUT** mode, any parameter in write reverts to the play pass once you step out of write. This allows you to update a move, step out of write and keep all the moves which follow from the previous Play pass.

1. Select **STEP OUT** mode to change from 'fill to end' to 'step out' automation:



2. Press Play and touch the faders you want to update.

The **R/W** buttons on the updated faders turn red to show that they are in write.

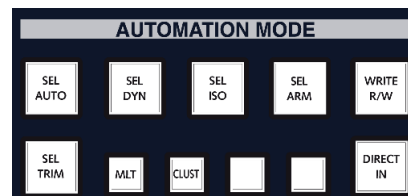
3. Finish the pass, either by pressing **FINISH PASS** or locating backwards.

Now play back the automatio and you should see your new fader moves followed by moves from the previous Play pass.

### 17.6.2 Using the Fader R/W Buttons

To make mixing more efficient you can use the fader **R/W** buttons to step in and out of write while in play. This allows you to step in and out of write several times during a single pass.

1. First select **WRITE R/W**:



2. To step in to write, you can now either touch the fader or press its **R/W** button.

The **R/W** button turns red to show that the fader is in write.

Note that when **WRITE R/W** is not enabled, the **R/W** button [disarms](#) the fader.

3. To step out of write, press the fader **R/W** button again.

The fader jumps back to the Play pass position, and its **R/W** button turns green to indicate that the fader is now reading the Play pass.

4. Continue stepping in and out of write on as many faders as you wish, and throughout the pass.
5. Finish the pass, either by pressing **FINISH PASS** or locating backwards.

All the updates you have made are recorded in the new Play pass.

You can combine **STEP OUT** and **WRITE R/W** with other modes such as [OUT IF CROSS](#) or [NEXT CHANGE](#). Or use [GLIDE](#) to glide back to the Play Pass when you step out of write.

You can also step in and out of write globally (for all automated parameters) using the [START/STOP WRITE](#) buttons. Or, for a cluster of channels, using the [CLUST](#) button.



### 17.6.3 Touch

If you would like the faders to step out of write when you release them, then turn on **TOUCH** (on the [STEPOUT MODE](#) panel):

1. Step into write by touching the fader.

The fader **R/W** button turns red to show that the fader is in write.

2. Keep touching the fader and when you wish to step out of write, release the fader.

The fader jumps back to its previous pass position and its **R/W** button turns green to indicate that the fader is now reading back the Play pass.

You can combine **TOUCH** with [GLIDE](#) if you wish the faders to glide back to the Play pass on release.

**TOUCH** applies to any variable control so you can use it on touch sensitive rotary controls such as panning, aux sends, etc.

To offset existing fader moves, use [TRIM automation](#).

## 17.7 Writing Automation on Controls and Switches

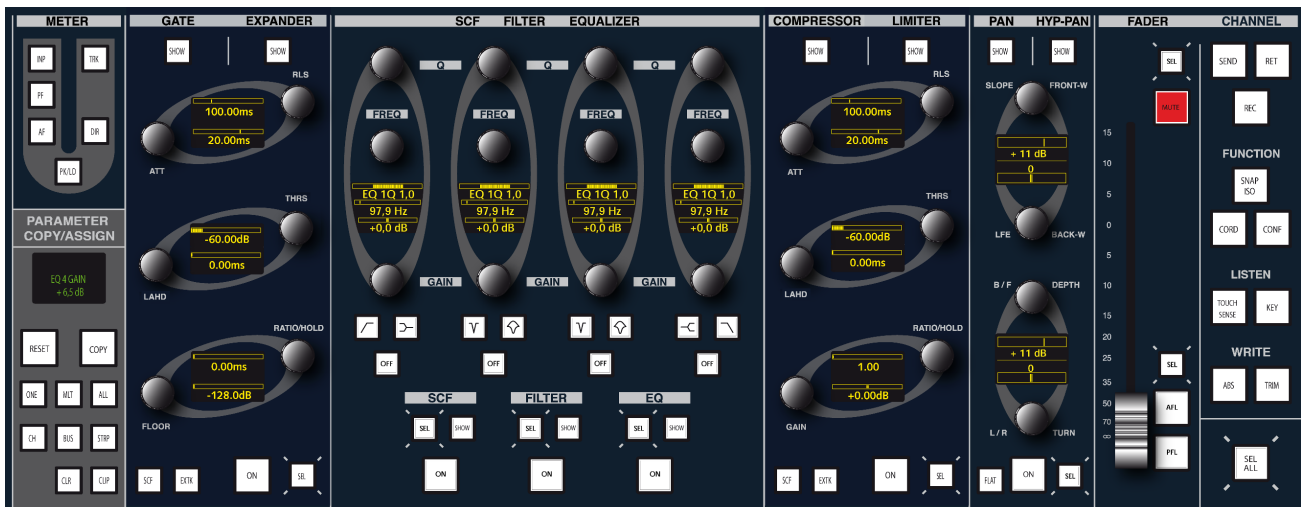
In addition to faders, you can write automation for any other channel control - for example, mutes, panning, EQ, even functions such as signal processing order and bus routing.

Return to the [SEL AUTO](#) mode, but this time enable automation for say the fader, mute and pan.

Faders and rotary controls are touch sensitive which allows them to step into write whenever you touch a fader or control. Switches step into write whenever you change the state of the switch or force a step in using the [WRITE R/W](#) mode.

You can check which parameters are in read or write on an individual channel, by assigning the channel to the [Central Control Section](#) and pressing **SEL ARM** (on the [AUTOMATION MODE](#) panel).

The **SEL** button on each audio module now lights as follows:



- **SEL** button lit (green) = the complete audio module is in read.
- **SEL** button lit (orange) = at least one parameter within a module is in write. For example, the EQ1 Gain.
- **SEL** button lit (red) = the complete audio module is in write. For example, the 4-band EQ section.
- **SEL** button off = the complete audio module is [disarmed](#) (read only).

The topics which follow describe two examples: an automated mute and dynamic pan move.

### 17.7.1 Writing Switch Automation

Switches step into write whenever you change the state of the switch or force a step in using the [WRITE R/W](#) mode. Assuming that you have [enabled automation](#) for the desired module (e.g. MUTE), you should be ready to go.

You will not be able to write dynamic automation if the switch has been [disarmed](#) or is running in [static mode](#).

1. With automation enabled, go into play and press the **MUTE** button either on the fader strip or Central Control Section to write your changes.
2. To check that you are writing automation, assign the channel to the [Central Control Section](#), and press **SEL ARM** (on the [AUTOMATION MODE](#) panel):

The mute **SEL** button turns orange when in write:



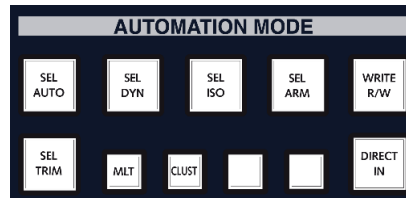
3. Finish the pass, either by pressing **FINISH PASS** or locating backwards, and play back the automation.

The mute **SEL** button turns green when in replay.

## 17.7.2 Updating Switch Automation

You can update switch automation by rewinding and overwriting the switch change. However, to remove a switch change you will need to step in and out of write while in play.

1. Assign the channel you want to update to the [Central Control Section](#).
2. Select **WRITE R/W** and **SEL ARM**:



The **SEL** buttons beside each Central Control Section module now allow you to step in and step out of write for that module. (i.e. they behave like the fader **R/W** buttons described [earlier](#)).

3. Rewind before the switch change you want to remove.
4. Step in to write by pressing the **SEL** button beside the switch on the Central Control Section - for example:



The switch goes into write in its current state – i.e. mute off. The **SEL** button turns red to show that the complete **MUTE** section is in write.

5. Locate or play past the end of the unwanted mute.
6. To step out of write, press the **SEL** button again.

The **SEL** button turns green to indicate it is now in replay and the mute button reverts to the data from the Play pass.

7. Finish the pass, either by pressing **FINISH PASS** or locating backwards.

The updates you have made are recorded in the new Play pass.

Another great way to update switch automation is to combine **STEP OUT** with [NEXT CHANGE](#).

### 17.7.3 Writing Rotary Control Automation

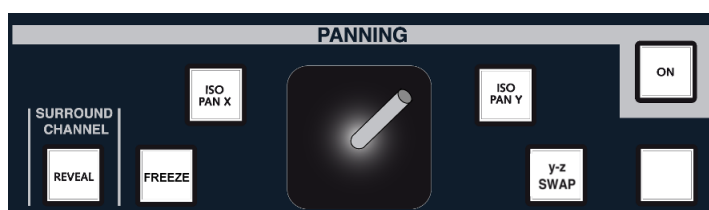
Rotary controls, like faders, are touch sensitive and go into write when you touch them or force a step in using the [WRITE R/W](#) mode. Assuming that you have [enabled automation](#) for the desired module (e.g. PANNING), you should be ready to go.

You will not be able to write dynamic automation if the control has been [disarmed](#) or is running in [static mode](#).

1. With automation on, go into play and move the left/right pan control either from a free control or the Central Control Section to write your changes.
2. To check that you are writing automation, assign the channel to the [Central Control Section](#), and press **SEL ARM** (on the [AUTOMATION MODE](#) panel).

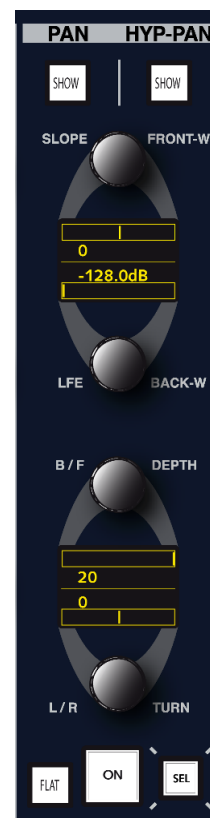
The panning **SEL** button turns orange when an individual control is in write:

*Central Control Section*



3. Finish the pass, either by pressing **FINISH PASS** or locating backwards, and play back the automation.

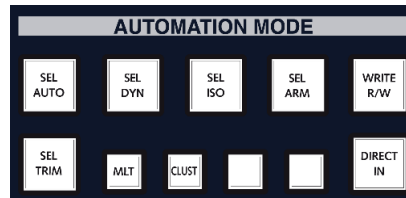
The panning **SEL** button turns green when the module is in replay.



### 17.7.4 Updating Rotary Control Automation

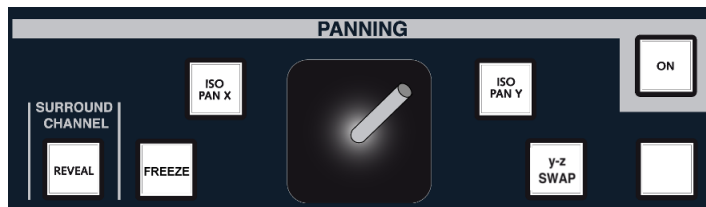
You can update the pan move by rewinding and overwriting the move. However, if the move starts too early you will need to step in and out of write while in play.

1. Assign the channel you want to update to the [Central Control Section](#).
2. Select **WRITE R/W** and **SEL ARM**:



The **SEL** buttons beside each Central Control Section module now allow you to step in and step out of write for the complete module.

3. Rewind before the start of the pan move you want to update.
4. Step in to write by pressing the **SEL** button beside the pan module on the Central Control Section:



The pan module goes into write in its current state – i.e. left/right pan at its starting position. The **SEL** button turns red to show that the complete module is in write.

5. Now go into play and move the left/right pan control to rewrite your move at the correct timecode.
6. To step out of write, press the **SEL** button again.

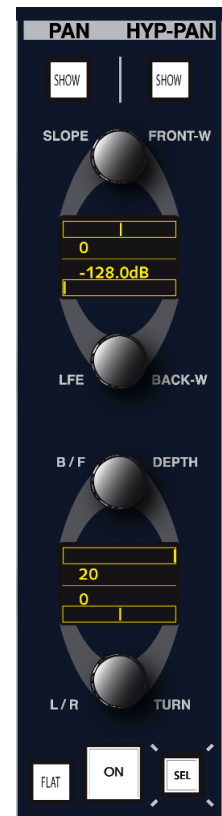
The **SEL** button turns green to indicate that the pan module is now in replay and the left/right pan control reverts to the data from the Play pass.

7. Finish the pass, either by pressing **FINISH PASS** or locating backwards.

The updates you have made are recorded in the new Play pass.

Another great way to update rotary control automation is to combine **STEP OUT** with [OUT IF CROSS](#).

Or, if you would like the controls to step out of write when you release them, then turn on [TOUCH](#).



### 17.7.5 Updating Automation on Individual Controls

When using **WRITE R/W** and **SEL ARM**, you have the option to step in either on the complete audio module, or on an individual control as follows:

1. Select **WRITE R/W** and **SEL ARM**.
2. Assign the channel to the Central Control Section.
3. With automation on, go into play.
4. Do one of the following:
  - Move the EQ1 Gain rotary control to step in to write on the one control - the EQ **SEL** button turns orange indicating that only a part of the module is in write.
  - Press the EQ **SEL** button to force the complete module into write in its current state - the EQ **SEL** button turns red indicating that *ALL* controls and switches within the EQ module are in write.
5. Make your changes and step out either by pressing the EQ **SEL** button or finishing the pass in the usual manner.

## 17.8 Automation Modes

The way in which automation is written is governed by three primary modes:

- Dynamic or Static automation
- The STEP OUT mode
- Absolute or Trim

### 17.8.1 Dynamic or Static Automation

The **SEL DYN** function selects which modules within each channel write dynamic or static automation.

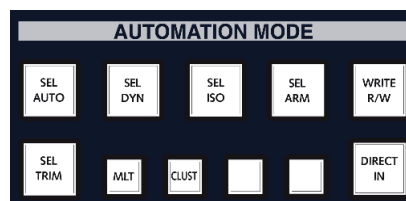
For example, you can emulate an analog console's automation system by writing dynamic fader and mute changes, while keeping all EQ, Compression, etc. at one static setting for the entire mix.

To reduce the amount of automation data being processed, it is best to only select dynamic automation for parameters you wish to automate against timecode. However, you might wish to use static automation mode for parameters which vary statically between different passes, as this will mean that they reset when you recall the alternate pass.

You can select dynamic or static automation for any number of parameters on any number of channels. The first time modules are [selected for automation](#), they default to dynamic automation.

➤ **To change the mode:**

1. Press **SEL DYN**:



2. Make your selections in a similar manner to **SEL AUTO**, see [Selecting Channels/Modules for Automation](#).

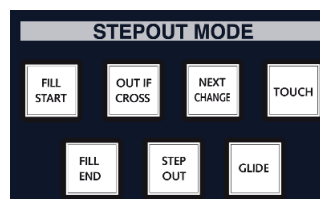
Note that the Central Control Section select buttons light as follows:

- **SEL** button lit = static automation mode.
- **SEL** button off = dynamic automation mode.

Remember to use **MLT**, to apply selections to multiple channels, and refresh the fader **SEL** buttons if you are updating existing selections.

### 17.8.2 Step Out Mode

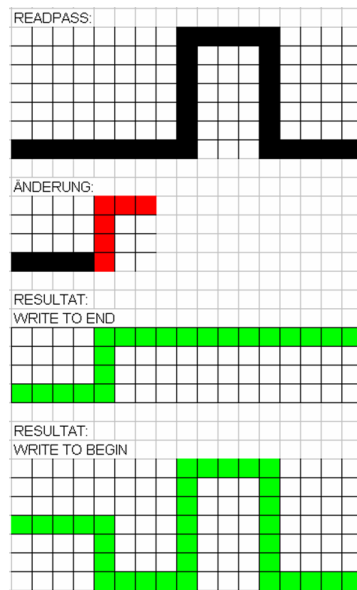
This mode affects what happens when you step out of write. There is a choice of several modes, some of which can be combined to achieve different results.



It is the mode selected when you [finish the pass](#) which is applied. For example, if you are in **STEP OUT** while playing through the chorus but then decide you would like to write the new values to the beginning of the mix, you can change to **FILL START** and then press **FINISH PASS** to fill to the start.



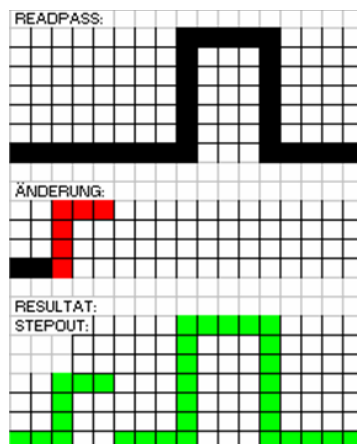
## FILL START and FILL END



- **FILL END** = any values in write are written to the end of the mix when you FINISH the pass. (Recommended when writing the first pass, or working through a mix chronologically.)
- **FILL START** = any values in write and written back to the start of the mix.
- **FILL END + FILL START** = any values in write are written as a static value for the whole mix.

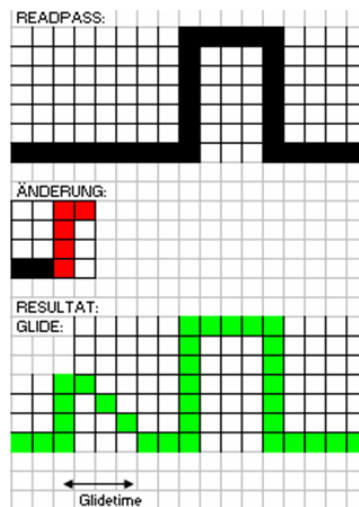
You can also write static values between specific timecode points, by using [COMMAND FILL](#).

## STEP OUT



**STEP OUT** = any values in write revert back to the Play pass when you step out of write. (Recommended for updating an existing mix.)

## GLIDE



When **GLIDE** is enabled, any variable parameters in write will glide back to the Play pass when you step out of write.

The glide time is set by the [Glide-out time](#) at the top of the **Passes** display.

**GLIDE** can be combined with **TOUCH** so that controls will step out of write on release and glide back to the Play pass.

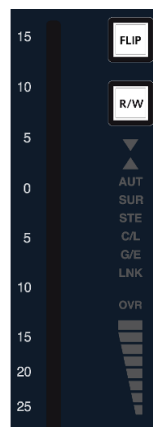
## OUT IF CROSS

When **OUT IF CROSS** is enabled, any variable parameters in write will automatically step out when they cross the Play pass.

The mode be combined with **STEP OUT**, **FILL END** or **FILL START** and is recommended for updating variable parameters such as fader levels.

For example, to update a fader level before an existing move: rewind and write the new fader level and leave the fader in write; as soon as the Play pass crosses the current level, the fader automatically steps out of write and starts playing back the Play pass.

Note that the up/down arrows beside the fader indicate the direction of the Play pass. This shows which way to move the fader to reach the automatic step out point.



### NEXT CHANGE

When **NEXT CHANGE** is enabled, any switched parameters in write will automatically step out when a parameter change occurs in the Play pass.

This mode can be combined with **STEP OUT**, **FILL END** or **FILL START** and is recommended for updating switched parameters such as mutes.

For example, if you have written some mute automation and now wish to update a earlier section of the mix: rewind and write the new mute changes and leave the mute in write; as soon as the next mute change occurs in the Play pass, the control automatically steps out of write and starts playing back the Play pass.

### TOUCH

When **TOUCH** is enabled, any controls in write will step out of write on release.

**TOUCH** applies to any variable control so you can use it on touch sensitive rotary controls such as panning and aux sends as well as faders!

**TOUCH** can be combined with [GLIDE](#) if you wish the values to glide back to the Play pass on release.

### 17.8.3 Absolute and Trim

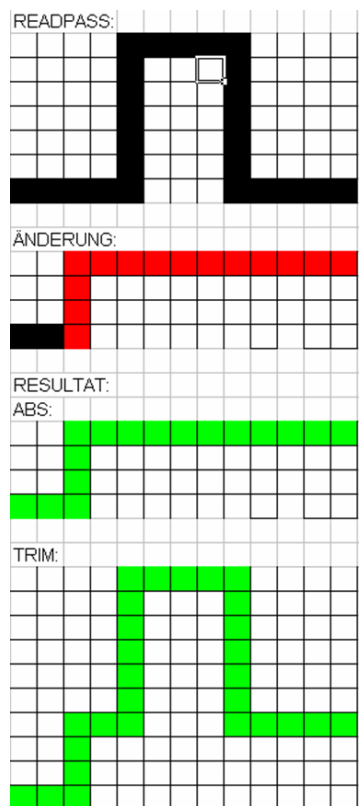
The **ABS** and **TRIM** buttons determine how automation data is written:



So far all our automation data has been written as Absolute data. In other words, when you put a control into write you are overwriting its absolute value.

Trim mode can be used to offset existing values. For example, you may have written some good fader moves for the chorus, and now you'd like to trim the moves up or down in level as you mix.

Trim works by offsetting the absolute data by a trim value. When you finish the pass, either by rolling back in time or pressing **FINISH PASS**, the trim data is automatically combined with the original Play pass to create a new absolute Play pass. The diagrams below show the affect of an update (ÄNDERUNG) to the Play pass (READPASS) when written in absolute, and when written in trim:



Note that Trim can be used to offset dB parameters such as fader level and EQ gain, or ranges such as Pan L/R. Other parameters, such as EQ frequency, cannot be trimmed and will always update in absolute.

Also note that Trim can be selected either [globally](#) across the console or [selectively](#) for specific controls or channels.

## Global Trim

The simplest way to use Trim is to activate **Trim** as a global automation mode.

This selection is made from the 'Manual Mode' buttons:



1. Select **TRIM** to activate trim.
2. Select **ABS** to return to absolute.

Note that if both buttons are off (unlit), then some controls are selected for trim while others remain in absolute. See [Selective Trim](#) for details.

Note also that certain parameters, such as frequency, cannot be trimmed, and will always update in absolute regardless of the **ABS/TRIM** mode

## Trim Modes

Once **TRIM** is enabled, you have the choice of two different Trim modes: [Trim On the Fly](#) or [Trim Relative](#). Both modes can be used for any trimmable parameter, but to explain the modes, let's trim a fader.

Note that, in each case, trim is applied according to the [Step Out Mode](#), so check the status of these buttons before performing your update:



For example:

- To trim a control to the end of the mix, select **FILL END**.
- To trim a section of the mix, you could use **STEP OUT** (steps out of write when you finish the pass), or **TOUCH** (steps out of write when you let go of the control).

## >> Trim On the Fly

**Trim On the Fly** is great if you wish to keep a sense of the underlying Play pass from the physical fader positions, as the faders replay the Play pass, and only stop moving when you touch them.

1. Select **TRIM** and **REL/FLY** (lit):



2. Select the [Step Out Mode](#), for example, **TOUCH**.
3. While automation is playing back, touch the fader to update its position.

The fader stops moving allowing you to change its position.

Any level changes are written as a trim offset; the amount of trim is shown in the Fader Label Display, temporarily replacing the Play pass level.

4. Let go of the fader to step out of write.

As soon as you let go, the fader returns to replay. Fader moves from the current Play pass are replayed and the Fader Label Display returns to the Play pass value.

By enabling **GLIDE** you can have your fader automatically glide back to the Play pass when you let go.

As an alternative to **TOUCH** you could use **STEP OUT** with **WRITE R/W**. Move the fader to step into write and apply your trim offset. Let go of the fader and moves replay from the Play pass. The fader remains in write until you finish the pass. This method of working means that you don't have to keep touching the fader for the duration of the trim update.

## >> Trim Relative

**Trim Relative** is great if you wish to use the physical position of the fader to show the amount of trim offset.

1. Select **TRIM** and deselect **REL/FLY** (unlit).

As soon as you enter Trim Relative mode, all faders selected for trim move to a default position (0dB).

2. Select the [Ste Out Mode](#), for example, **STEP OUT**.
3. Press **PLAY** to replay the Play Pass.

In Trim Relative, the faders do not move so use the Fader Label Displays to view any changes in level applied by the Play pass.

4. Touch the fader to step into write.

Any level changes are written as a trim offset; the amount of trim is shown in the Fader Label Display, temporarily replacing the Play pass level.

5. Because you selected the **STEP OUT** mode, you can let go of the fader and it remains in write (trim).

Note that as soon as you let go, the Fader Label Display returns to the automation values from the Play pass. The fader position represents the trim offset (from 0dB).

6. When you want to step out of write, finish the pass.

The fader returns to replay.

## Selective Trim

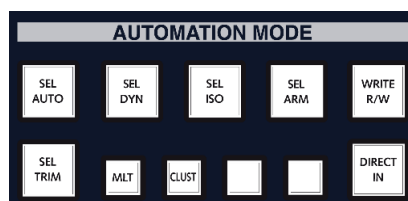
To update some controls or channels in Trim and others in Absolute, then:

- Define a channel [User Button](#) to select Trim or Absolute on a channel-by-channel basis. (This function must be programmed from the **Custom Functions** display, see [Fader User Buttons, Channel Functions](#).)
- Use **SEL TRIM** as described below.

Note that automation must be enabled (**AUTO ON** lit), and any selections you make are temporary. So, if you turn automation off and back on, all parameters are reset to **ABS**.

➤ **To select which parameters will write in trim:**

1. Press **SEL TRIM**:



2. Make your selections in a similar manner to **SEL AUTO**, see [Selecting Channels/Modules for Automation](#).

Note that not all controls can be trimmed. The Central Control Section select buttons light as follows:

- **SEL** button lit = trim.
- **SEL** button off = absolute.

Remember to use **MLT**, to apply selections to multiple channels, and refresh the fader **SEL** buttons if you are updating existing selections.

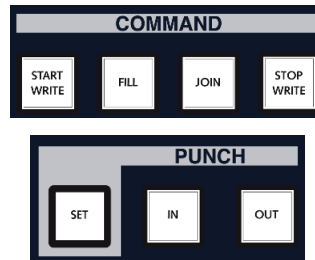
You can also use the [Cluster](#) function to select trim for a cluster of channels.

If you have selected a mixture of Abs and Trim statuses, then this is indicated on the 'Manual Mode' panel where you will see both **ABS** and **TRIM** buttons are off (unlit):



To reset the selective trim states, press either the global **ABS** or **TRIM** button.

## 17.9 Command Functions



The 'Command' functions can be used to step in or out of write across multiple channels, or to set an automatic step in/step out between two timecodes (Punch In/Punch Out).

Note that the 'Command' functions only affect which elements of the console step in or out of write. The way in which automation data is written is still governed by the automation mode. For example, if **FILL END** is the step out mode then the **START WRITE** command can be used as follows:

1. Press Play on your machine so that timecode is rolling.
2. Press **START WRITE** and all parameters enabled for automation step into write at their current positions.
3. Then do one of the following:
  - Locate backwards to finish the pass - the **FILL END** step out mode is applied. In other words, the values in write will be written to the end of the mix.
  - Alternatively, instead of finishing the pass, press **STOP WRITE** - all your parameters will step out back into replay. In other words, you have achieved a step in and step out, without having to change automation mode!
  - If you combine the above with **GLIDE**, then rather than an instant step out, variable parameters will glide back to their replay positions.

### 17.9.1 Global Step In/Step Out

1. Select **START WRITE** to step into write across the console.

All parameters and modules which have been [selected for automation](#) step into write.

2. Press **STOP WRITE** to step out of write across the console.

Any parameters in write step out back to the Play pass.

Use **STOP WRITE** to step out on all parameters at a section change such as the end of a chorus.  
Combine **STOP WRITE** with **GLIDE** to glide back to the Play pass values.

### 17.9.2 Cluster Step In/Step Out

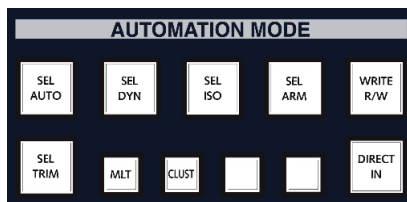
You can use the cluster function to step in or out of write across multiple channels.

The cluster works like a group but just for automation parameters. First define which channels you wish to cluster. Then when you step into write on say the EQ on one channel, all EQ sections within the cluster also step into write.



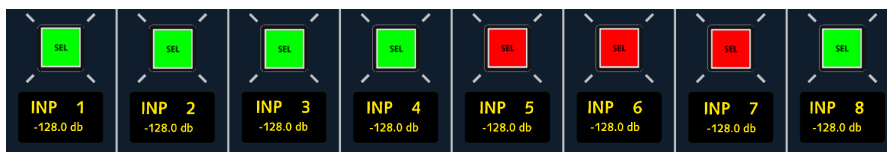
➤ To define the cluster:

1. Select **CLUST**:



The button flashes, and all the fader **SEL** buttons across the console flash, in green.

2. Add channels to the cluster by pressing their fader **SEL** buttons - the fader **SEL** buttons turn red:

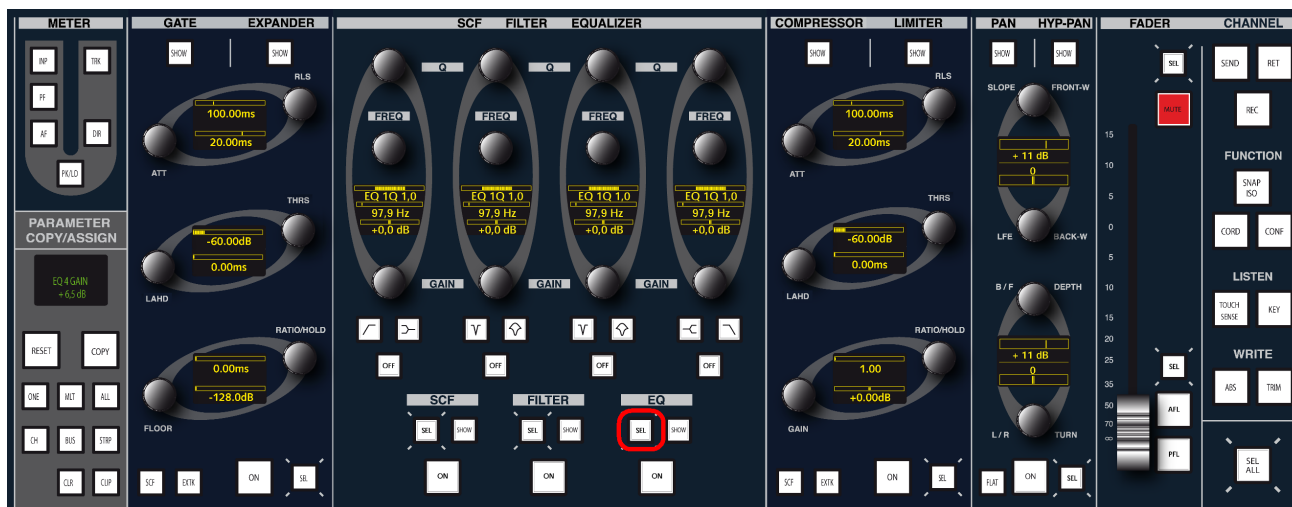


3. Deselect the **CLUST** button to complete this part of the operation - the cluster is now defined.

Note that the cluster remains active until you repeat the steps above and remove all channels from the cluster.

➤ To step in and out of write using the Cluster

1. Assign any channel within the cluster to the [Central Control Section](#), by pressing its fader **SEL** button.
2. Step into write on the EQ module using the **SEL** button:



All EQ modules within the cluster step into write at their current values.

Note that parameters will only step into write if they have been [selected](#) for automation and are [armed](#).

➤ Using the Cluster for other Functions

The cluster can also be used to [arm or disarm](#) modules, or select [Trim](#) automation, across the clustered channels.

Define the channel cluster. Then with one of the clustered channels 'in access', use either **SEL ARM** or **SEL TRIM** and make your module selections - the selections are applied to all channels within the cluster.

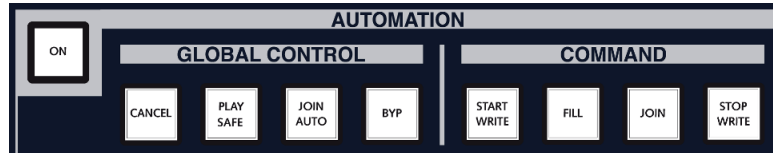
### 17.9.3 Join

The **JOIN** and **JOIN AUTO** buttons also allow you to step into write across a selection of parameters. However, the parameters which are 'joined' are automatically defined for you and are the parameters which were in write when you finished your last pass.

These functions are especially useful when working on a section of the mix, such as the Chorus of a song, where you are constantly rewinding to make updates.

#### Auto Join

1. Select **JOIN AUTO**:



2. Locate to the beginning of the Chorus and press Play.
3. During the Chorus write some fader and control moves.

You will now have a selection of parameters in write as indicated by the red **SEL** buttons on the Central Control Section (if the channel is in access).

4. Locate back to the beginning of the Chorus and press play to play back the pass.

Your moves replay and at the timecode where you located backwards (or finished your last pass), all the parameters which were in write in step 3 automatically step into write at their current value (this is called an auto join).

So, by working in **JOIN AUTO**, you can be constantly rewinding to make updates without having to pay attention to the step out point or to which parameters you updated.

#### Command Join

This function is similar to Auto Join but allows you to join controls manually. This can be useful for overwriting a move you didn't like. For example:

1. Locate to the beginning of the Chorus and press Play.
2. During the Chorus write some fader and control moves.

You will now have a selection of parameters in write. However, let's say that you liked the first series of moves but not the latter.

3. Locate back to the beginning of the Chorus and press play.
4. Watch your moves replay and at the point where you wish to step back into write, press **JOIN**:



All the parameters which were in write in step 2 now step into write (join) at their current value. If you keep playing you will now overwrite your unwanted moves.

### 17.9.4 Punch In/Punch Out Automation

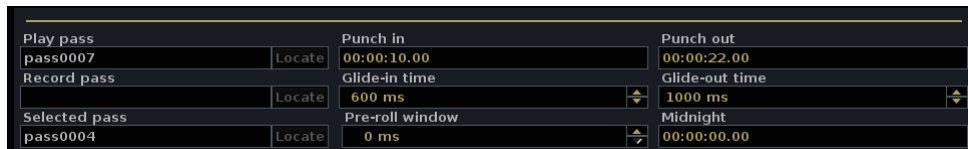
The **Punch In** and **Punch Out** times can be used for two different applications:

- To automatically **punch** in and out of write, so that you do not accidentally update automation outside of a specified timecode window.
- To apply parameter values to a **region** of the mix. For example, to write values for the whole of a Chorus or scene.

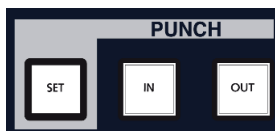
In either case, first you need to set the punch in and out times as follows:

1. **Open** the **Passes** display on the Central GUI.

The **Punch In** and **Punch Out** times are shown at the top of the display:



2. Play or locate your timecode to the required punch in time.
3. And, press **SET** (it will flash) followed by **IN**:



The current timecode position is entered in the **Punch in** time box on the **Passes** display.

4. Now play or locate your machine to the required punch out time, and press **SET** followed by **OUT**.

The current timecode position is entered in the **Punch out** time box on the **Passes** display.

6. Deselect the flashing **SET** button to complete this part of the operation.

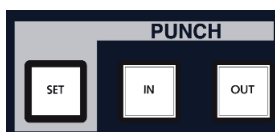
Use **SET** and **IN/OUT** while in play to enter Punch In and Punch Out times 'on the fly'.

Click in **Punch In** or **Punch Out** time boxes to enter a timecode manually from the console keyboard.

### Automatic Punch In and Out

To use the punch in and out times to automatically step in and out of write.

1. Make sure that the **SET** button is off:



2. Turn on both the **IN** and **OUT** buttons to make the punch in and punch out times active. (Or, select the **IN** and **OUT** buttons independently if you wish to only step in or only step out.)

The buttons turn blue when active.

3. Now rewind before the punch in timecode and press Play.

At the **Punch in** time, all parameters and modules which have been selected for automation step into write at their current values.

4. You can now write new moves into the automation.

When you pass through the **Punch out** time, all parameters and modules step out of write back to the Play pass.

5. When you have finished mixing that section, remember to deselect the **IN** and **OUT** buttons to deactivate the automatic punch in/punch out mode.

## Fill Region

To apply parameter values to a region of the mix. For example, to write values for the whole of a Chorus or scene:

1. Set the **Punch In** and **Punch Out** times, as described [earlier](#), to define the start and end of the region.
2. Now play through the section of the mix and adjust any parameters to the values you wish to write for the region.

You will now have a selection of parameters in write.

3. Before you rewind or finish the pass, press the **FILL** button:



Any parameters in write are written at their current value between the **Punch In** and the **Punch Out** times:

Play pass		Punch in	Punch out
pass0007	Locate	00:00:10.00	00:00:22.00
Record pass		Glide-in time	Glide-out time
	Locate	600 ms	1000 ms
Selected pass		Pre-roll window	Midnight
pass0004	Locate	0 ms	00:00:00.00

## 17.10 Protecting Automation Data

Having written automation, you may wish to play back your mix data but protect it from being overwritten. There are a number of options available:

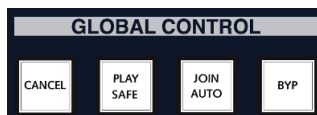
- **PLAY SAFE** – all channels read automation data from the Play pass but cannot write new data. If you adjust a parameter you will *NOT* hear any change in audio.
- **BYPASS** – identical to 'Play Safe', except that if you adjust a parameter you *WILL* hear the change in audio. If you like the new parameter value, you can step the control into write using the [DIRECT IN](#) button.
- **SEL ARM** – can be used to protect individual parameters. Armed controls are armed for reading and writing automation data. Disarmed controls will read automation but cannot write new data.

### 17.10.1 Play Safe

In this mode, all channels read automation data from the Play pass but cannot write new data.

In addition, if you adjust a parameter, you will *NOT* hear any change in the audio. 'Play Safe' applies globally to all channels and parameters, and is a great mode to use when laying back your mix.

1. Select **PLAY SAFE**:



Once selected, all channels enabled for automation will read data from the Play pass but not write new data if touched or changed.

2. If you adjust a parameter, you will *NOT* hear any change in the audio. When you let go of the control, the parameter reverts to its Play pass position

### 17.10.2 Bypass

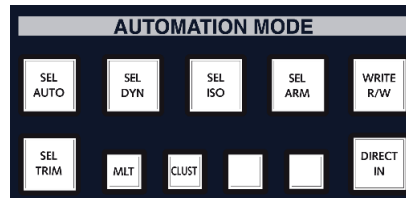
This mode is identical to 'Play Safe', except that if you adjust a parameter you *WILL* hear the change in audio. 'Bypass' applies globally to all channels and parameters, and is a great mode to use when auditioning your mix.

1. Select **BYP**:



Once selected, all channels enabled for automation will read data from the Play pass but not write new data.

2. If you adjust a parameter, you will hear the change. You then have two options:
  - If you Stop, Rewind and press Play, the parameter will revert to its Play pass position.
  - If you like the new parameter value, you can step into write at the new value using the **DIRECT IN** button:
3. Press the **DIRECT IN** button:



Any parameters which have been altered from the Play pass position step into write at the current value. If you now [finish](#) the pass, automation is written according to your choice of [Step Out mode](#).

The **DIRECT IN** button is *only* active when running in Bypass mode.

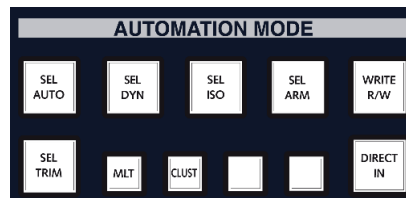
### 17.10.3 Arm and Disarm

The **SEL ARM** function allows you to protect automation data on individual modules within each channel. Armed modules are armed for reading and writing automation data. Disarmed modules will read automation but cannot write new data.

You can arm or disarm any number of parameters on any number of channels. The first time modules are [selected](#) for automation, they default to armed.

➤ **To change the arm/disarm status:**

1. Press **SEL ARM**:



2. Make your selections in a similar manner to **SEL AUTO**, see [Selecting Channels/Modules for Automation](#).

The Central Control Section select buttons light as follows:

- **SEL** button lit (green) = module is armed (read and write).
- **SEL** button off = module is disarmed (read only).

Remember to use **MLT**, to apply selections to multiple channels, and refresh the fader **SEL** buttons if you are updating existing selections.

You can also use the [Cluster](#) function to arm or disarm modules for a cluster of channels.

## 17.11 Recalling a Snapshot

You can recall [snapshots](#) while running the automation system.

The system behaves as if every control was touched and therefore allows you to step in and out of write as if you had manually updated the controls.

The snapshot recall will respond to [Snapshot Isolate](#) in the usual way.

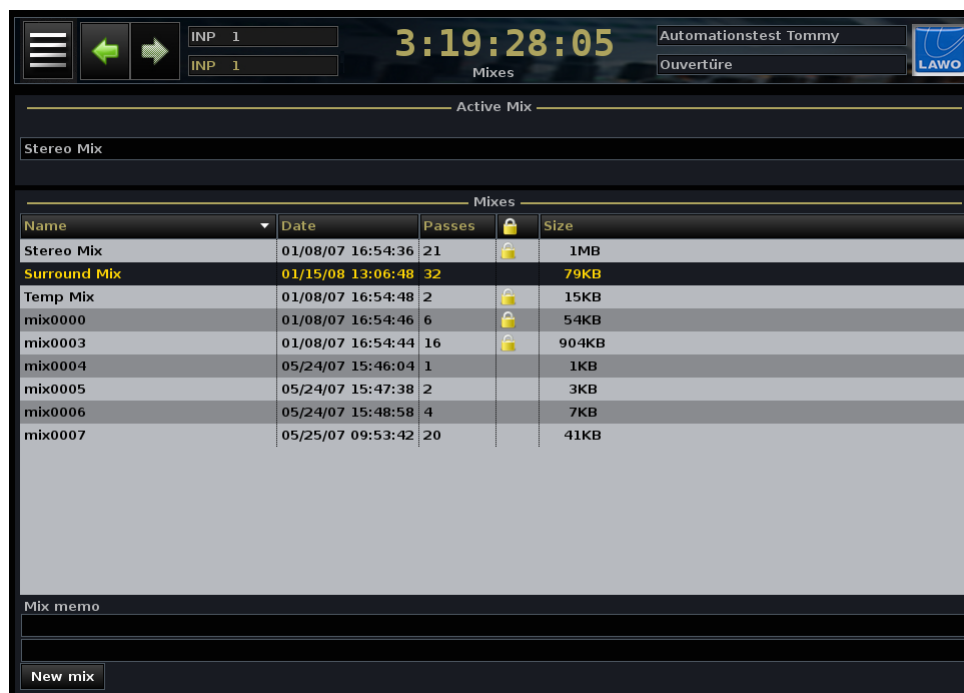
Depending on the size of the mix, and the number of changes actioned by the snapshot, there may be a slight delay when recalling the snapshot.



## 17.12 The Mixes Display

Mixes are managed from the **Mixes** display.

1. [Open](#) the **Mixes** display on the Central GUI - the list shows all the mixes in the current memory:



The name of the **Active Mix** is shown at the top of the display. It is the passes from this mix which appear in the [Pass Tree](#), and its Play pass which loads when you [enable automation](#).

The columns beside each mix name show the date and time stamp, the number of passes within the [Pass Tree](#), whether the mix is [protected](#) (padlock icon) and the size of the mix. You can drag and drop columns to change their order.

At the bottom of the display, the **Mix Memo** box can be used to [add notes](#) to a particular mix.

The on-screen buttons and SCREEN CONTROL soft keys provide access to [Load](#), [New](#), [Protect](#) and [Delete](#) operations. These functions are also available if you select a mix and right-click.

### 17.12.1 Loading a Mix

Loading a mix recalls all the passes stored within the mix to the [Pass Tree](#), including the Play pass. Therefore, if automation is [enabled](#), you will see your automated parameters reset. This provides quick access to any mix stored in the **Mixes** list.

Note that when you load a mix, any passes created within the previous mix are held in temporary memory. This allows you to quickly change between mixes (and passes) without losing data.

However, note that if you load a *different* production, the memory is cleared and a new set of mixes is loaded into the **Mixes** list.

Therefore, always [update](#) (or [save](#)) a production, before loading a different production, to safeguard your automation data.

➤ **To load a mix:**

1. Select a mix from the **Mixes** list.
2. Right-click and select **Load**, or press the **LOAD** soft key, to complete the operation.

The loaded mix becomes the **Active Mix** shown at the top of the display.

If automation is enabled, then you will see your automated parameters immediately reset (to the values stored in the Play pass).

3. Alternatively, enable automation, using the AUTOMATION **ON** button.
4. You can now play back and update your mix.

Note that the system stores the current Play pass for each mix. This means that when you load a different mix, you will always get back to the last pass you were working on.

### 17.12.2 Renaming a Mix

1. Click on the mix name.

Click once to select all the text, or twice to modify an existing name (you will see a flashing cursor).

Mixes				
Name	Date	Passes		Size
Stereo Mix	01/08/07 16:54:36	21		1MB
Surround Mix	01/15/08 13:06:48	32		79KB
Temp Mix	01/08/07 16:54:48	2		15KB
mix0000	01/08/07 16:54:46	6		54KB
mix0003	01/08/07 16:54:44	16		904KB
mix0004	05/24/07 15:46:04	1		1KB
mix0005	05/24/07 15:47:38	2		3KB
mix0006	05/24/07 15:48:58	4		7KB
mix0007	05/25/07 09:53:42	20		41KB

2. Enter a new name using the keyboard.
3. To confirm, press ENTER. Or, to exit without making a change, press ESCAPE.

### 17.12.3 Adding a Memo

You can use the two **Mix memo** lines to add memo information. For example, you may wish to remind yourself about the details of the mix.

1. Select the mix and then select a line in the **Mix memo** field - a black cursor appears.
2. You can now type to enter your information from the console keyboard:

Mixes				
Name	Date	Passes		Size
mix0006	05/24/07 15:48:58	4		7KB
mix0005	05/24/07 15:47:38	2		3KB
mix0004	05/24/07 15:46:04	1		1KB
mix0003	01/08/07 16:54:44	16		904KB
mix0000	01/08/07 16:54:46	6		54KB
Temp Mix	01/08/07 16:54:48	2		15KB
Surround Mix	01/15/08 13:06:48	32		79KB
Stereo Mix	01/08/07 16:54:36	21		1MB
Lunchtime Mix	05/25/07 09:53:42	20		41KB
<div>Mix memo</div> <div>Band is complete.</div> <div>Work on vocals next.</div> <div>New mix</div>				

You can enter as many characters as you wish in each line; the list will automatically resize to fit.

If you cannot enter any memo text, check that the mix is not [protected](#).

Right-click on a mix memo to **Copy** and **Paste** the text to another snapshot.

You can also [drag and drop](#) the **Memo** columns to change their position on the display.

### 17.12.4 Protect & Delete

#### Protect

A protected mix cannot be deleted. And you *cannot* create a new Record pass within a protected mix. You can use this safeguard any important mixes which you do not want to accidentally overwrite or delete.

1. Select a mix from the **Mixes** list.
2. Right-click and select **Protect**, or press the **PROTECT** soft key.

The padlock icon indicates that the mix is now protected:

Mixes				
Name	Date	Passes		Size
mix0006	05/24/07 15:48:58	4		7KB
mix0005	05/24/07 15:47:38	2		3KB
mix0004	05/24/07 15:46:04	1		1KB
mix0003	01/08/07 16:54:44	16		904KB
mix0000	01/08/07 16:54:46	6		54KB
Temp Mix	01/08/07 16:54:48	2		15KB
Surround Mix	01/15/08 13:06:48	32		79KB
Stereo Mix	01/08/07 16:54:36	21		1MB
Lunchtime Mix	05/25/07 09:53:42	20		41KB

#### Delete

Delete removes the mix from the internal memory.

1. Select a mix from the **Mixes** list.
2. Right-click and select **Delete**, or press the **DELETE** soft key, to complete the operation.

Note that you cannot delete a protected mix.

## 17.13 The Passes Display

Passes are managed from the **Passes** display.

1. Open the **Passes** display on the Central GUI:



At the top of the display are various fields for:

- **Play, Record and Selected pass** - display the current Play and Record passes (for writing new automation) and Selected pass (for editing automation). The **Locate** buttons automatically reveal the pass, in the **Pass Tree**, if it has been hidden by closing a branch.
- **Punch-in** and **Punch-out** times - define the [punch-in/out](#) timecode window.
- **Glide-in** and **Glide-out** times - define the [glide times](#).
- **Pre-roll window** - defines the [pre-roll tolerance](#) for machines which pre-roll when going into Play.
- **Midnight** - defines the [timecode offset](#).

The **Pass Tree** displays all the finished passes in memory.

Each time you [revert](#) to an earlier pass and then make updates, you start a new branch within the tree. Click on the arrows beside each branch to open or close. Or, click on **Expand all** at the bottom of the display to open up all branches of the **Pass tree**.

To avoid mixes become too large, a maximum of 10 passes are stored within each branch of the **Pass tree**; after the tenth pass, the first pass is deleted to make space for new data, and so on. To keep a specific pass indefinitely you should [protect](#) it; it will then be retained as one of the 10 passes with the branch.

The columns beside each pass name show its date and time stamp and whether the pass is [protected](#) (padlock icon). You can also [rename](#) or [delete](#) a pass; the **Status** field marks the current Play and Record pass with icons.

All passes are stored inside the **Active Mix** when you update or save a production. Or, if you load a different mix or production, then the **Pass Tree** updates accordingly.

You can use the **Pass Tree** to change the Play pass at a any time. For example, to A/B between two different versions of automation for a chorus or scene. See [Reverting to an Earlier Pass](#).

You can also [edit](#) mix passes in order to combine, delete, copy, shift, insert or paste sections of automation data.

### 17.13.1 Renaming a Pass

1. Click on the pass name.

Click once to select all the text, or twice to modify an existing name (you will see a flashing cursor).

Status	Name	Date
▼	pass0000	06/08/10 09:13:39
▼	pass0001	06/08/10 09:15:44
▼	pass0002	06/08/10 09:16:37
▼	pass0003	06/08/10 09:16:40
▼	pass0004	06/08/10 09:16:43
▼	pass0005	06/08/10 09:16:46
▼	pass0006	06/08/10 09:16:52
▶	pass0008	06/08/10 09:29:45
▶	pass0009	06/08/10 09:29:47
▶	pass0011	06/08/10 09:30:25
▶	pass0012	06/08/10 09:30:49
▶	pass0007	06/08/10 09:17:51
▶	pass0013	06/08/10 09:31:01
▶	pass0015	06/08/10 09:31:13

2. Enter a new name using the keyboard.
3. To confirm, press ENTER. Or, to exit without making a change, press ESCAPE.

### 17.13.2 Protect & Delete

#### Protect

A protected pass cannot be deleted manually, or automatically by the system (when it reaches the [10 pass per branch](#) limit).

1. Select a pass from the **Pass Tree**.
2. Right-click and select **Protect**, or press the **PROTECT** soft key.

A padlock icon indicates that the pass is now protected.

#### Delete

Delete removes the pass from the internal memory.

1. Select a pass from the **Pass tree**.
2. Right-click and select **Delete**, or press the **DELETE** soft key, to complete the operation.

Note that you cannot delete a protected pass or the current **Play pass**.

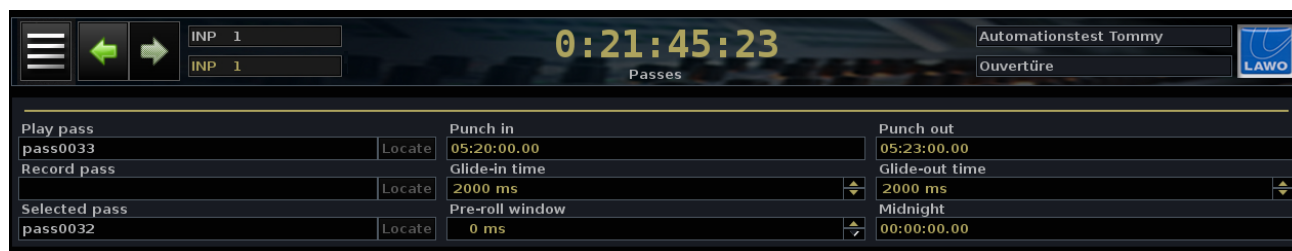
### 17.13.3 Setting an Offset Timecode

The **Midnight** field at the top of the **Passes** display is used to offset the internal timecode of the automation system. For example, if your mix starts at an odd timecode value and you wish to view it as starting at 00:00:00:00.

1. First, set the [Central GUI headline](#) to show **Timecode display** and **Offset Timecode** by clicking on the headline:



2. Now click in the **Midnight** field, at the top of the **Passes** display, to enter the offset timecode:



3. Use the console keyboard to enter the timecode which you wish to correspond to midnight (00:00:00:00).

For example, you could locate to the beginning of your mix (e.g. **21:00:20:15**) and enter this value as midnight.

4. Press Enter and you will see the start of your mix as 00:00:00:00 in the Central GUI time display.
5. To clear an offset, click in the **Midnight** field and enter **00:00:00:00**.

### 17.13.4 Setting Pre-roll

Any small rewind in timecode causes the automation system to finish the pass. Often this is undesirable, as it prevents you from putting controls into write while in Stop, and then writing these values forwards on entering Play.

To avoid this problem:

1. Use the console keyboard to enter a value in ms into the **Pre-roll window** – for example, 50ms.

The automation system now requires a rewind of more than 50ms to finish a pass, and therefore tolerates an external machine's pre-roll when entering Play.

2. Test your entry by putting some controls into write while in Stop and pressing Play.

The controls should remain in write when you go into Play. If not, adjust the **Pre-roll window** to a longer time accordingly.

Note that the **Pre-roll window** affects how a pass can be finished; you must rewind by more than the **Pre-roll window** time in order to finish a pass.

### 17.13.5 Glide Time

The **Glide-in time** and **Glide-out time** fields are used in conjunction with a number of functions:

- **Glide-in time** - used when performing [mix pass edits](#).
- **Glide-out time** - used when performing [mix pass edits](#), and when stepping out of automation using [GLIDE](#).

To adjust the glide times:

1. Either click within the **Glide-in/out time** box and type in a value from the console keyboard.
2. Or use the up/down arrows to adjust the time in 100 ms steps.

Both values can be adjusted from 0 to 60000ms (60 seconds).



## 17.14 Mix Pass Editing

The **Passes** display provides a number of functions for mix pass editing including combine, delete, copy, shift, insert and paste.

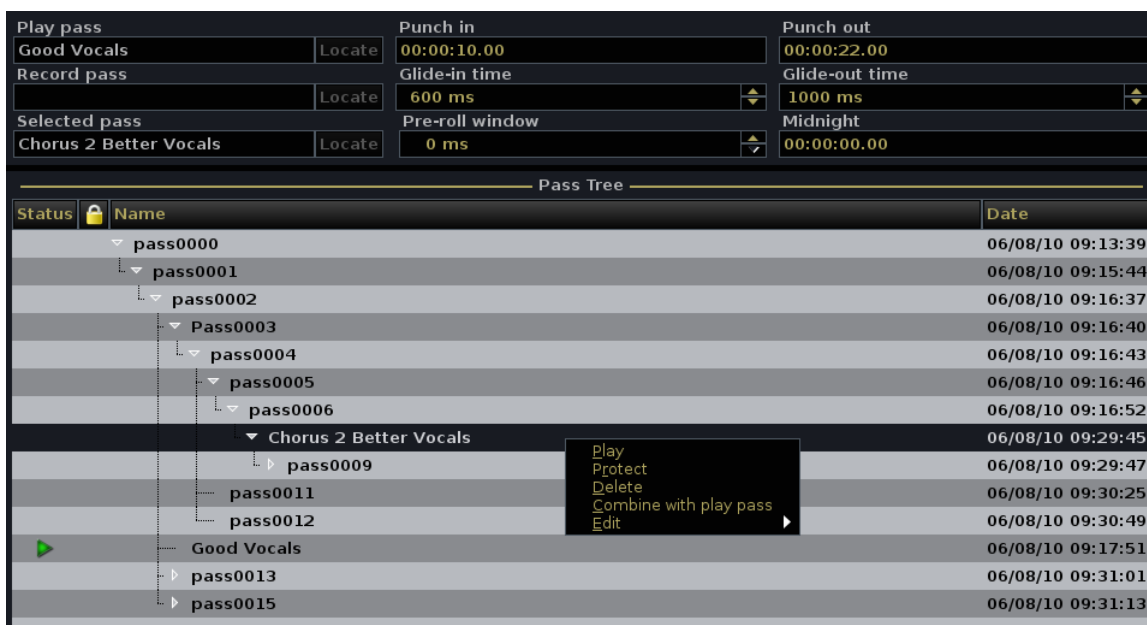
The **Combine** function combines the automation data from the **Selected pass** into the **Play pass**, while all the other **Edit** operations are applied to the current **Play pass**.

### 17.14.1 Combine

Combines the automation data from the **Selected pass** into the **Play pass**, between the **Punch in** and **Punch out** times.

1. First set the punch **in/out** times.
2. Make the pass you wish to add data into the current **Play pass** - select it and press the **PLAY** soft key, or right-click and select **Play**.
3. Then select the pass you wish to combine from.

In our example, we are combining from **Chorus 2 Better Vocals** into **Good Vocals**:



The screenshot shows the LAWO interface with the following settings:

- Play pass:** Good Vocals
- Record pass:** (empty)
- Selected pass:** Chorus 2 Better Vocals
- Punch in:** 00:00:10.00
- Punch out:** 00:00:22.00
- Glide-in time:** 600 ms
- Glide-out time:** 1000 ms
- Pre-roll window:** 0 ms
- Midnight:** 00:00:00.00

The **Pass Tree** shows a hierarchy of passes:

- pass0000
  - pass0001
    - pass0002
      - Pass0003
        - pass0004
          - pass0005
            - pass0006
              - Chorus 2 Better Vocals (Selected)
              - pass0009
              - pass0011
              - pass0012
              - Good Vocals (Play Pass)
              - pass0013
              - pass0015

A context menu is open over the **Chorus 2 Better Vocals** pass, showing options: **Play**, **Protect**, **Delete**, **Combine with play pass** (highlighted), and **Edit**.

4. Press the **COMBINE** soft key, or right-click and select **Combine with Play pass**.

A new pass is created as shown below:

	Punch In time	Punch Out time
Sel Pass		
Play Pass		
Result (New Play Pass)	Play Pass	Sel Pass

### 17.14.2 Edit Operations

All other edits are applied to the current **Play Pass** and are performed as follows:

1. Make the pass you wish to edit the current **Play pass** - select it and press the **PLAY** soft key, or right-click and select **Play**.
2. Then, right-click on the **Play Pass** and select either **Edit -> Pass** or **Edit -> Access**:
  - **Edit -> Pass** – edits the complete mix pass (all channels).
  - **Edit -> Access** – edits only the channel in access. This option will leave automation data on other channels intact.

A range of sub operations are revealed (the same options are available for **Edit -> Pass** and **Edit -> Access**):



If any of the options are greyed out, then check the following:

- To perform an edit, timecode automation must be [enabled](#) so make sure **AUTO ON** is selected.
  - If a **Record Pass** is active, then you cannot perform an edit. [Finish the pass](#) and then select the edit.
  - Most edits require a valid timecode “window” which is defined by the **Punch in** and **Punch out** times at the top of the **Passes** display. The “window” must be greater than zero for **Delete**, **Cut**, **Copy**, **Clear** and **Shift**. See [Punch in and out](#) times.
3. Select an operation from the drop-down menu – for example, **Delete**.

The edit is performed and a new **Play Pass** is created.

4. To undo the edit, [revert](#) to the previous Play Pass.

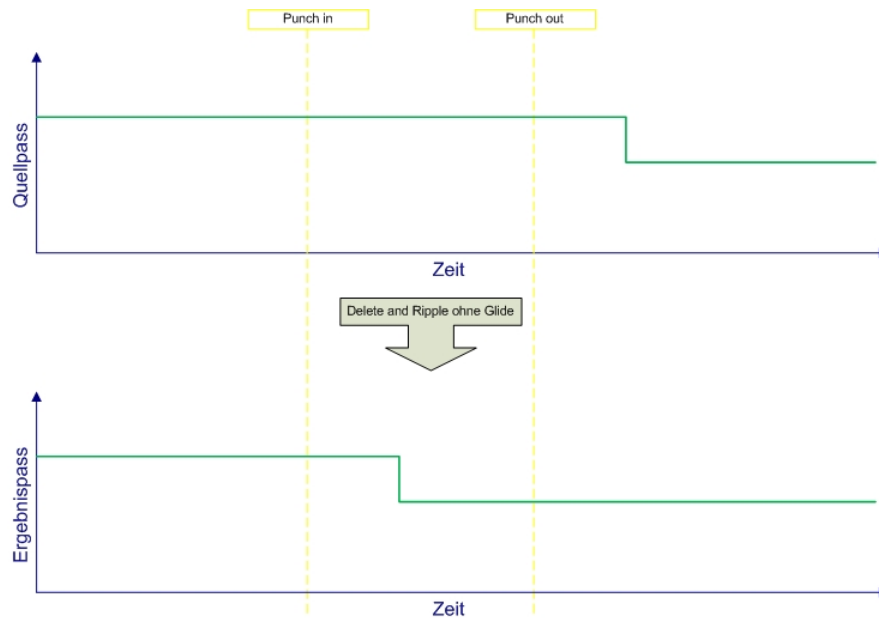
You can apply glide times to each edit by entering a value in the [Glide-in and Glide-out time](#) fields; the result is specific to each edit. But take care to avoid glide times longer than the **Punch in** to **Punch out** timecode window, otherwise you may experience some strange results!

Note that it is possible to copy data from a complete mix pass (via **Edit -> Pass**) and insert or paste it into the channel in access (via **Edit -> Access**). However, the reverse is not possible.

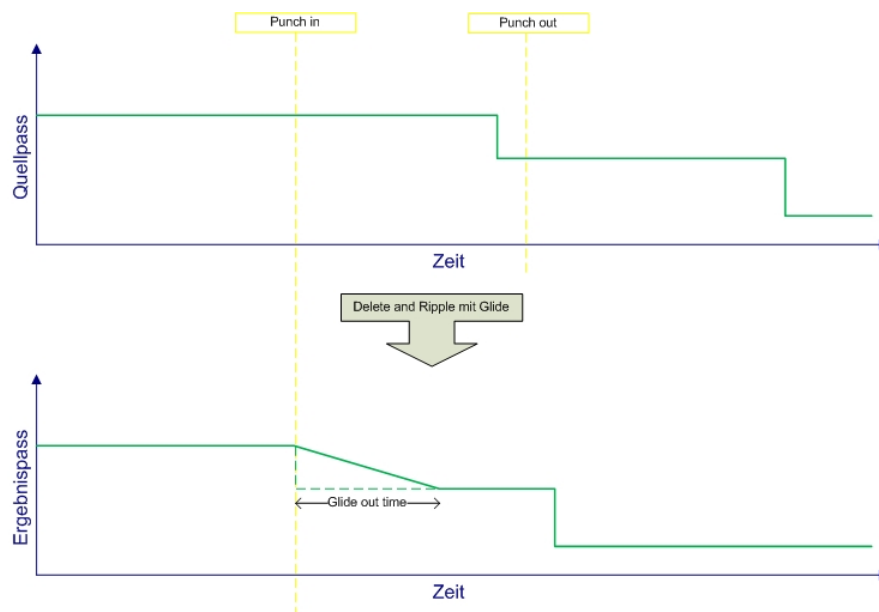
### 17.14.3 Delete

This edit performs a “delete and ripple”. You might use it to remove the automation for a section of the mix. For example, if a chorus has been deleted from the song.

Automation between the **Punch in** and **Punch out** timecode values is deleted, and all data after the **Punch out** time ripples up to the **Punch in** time:



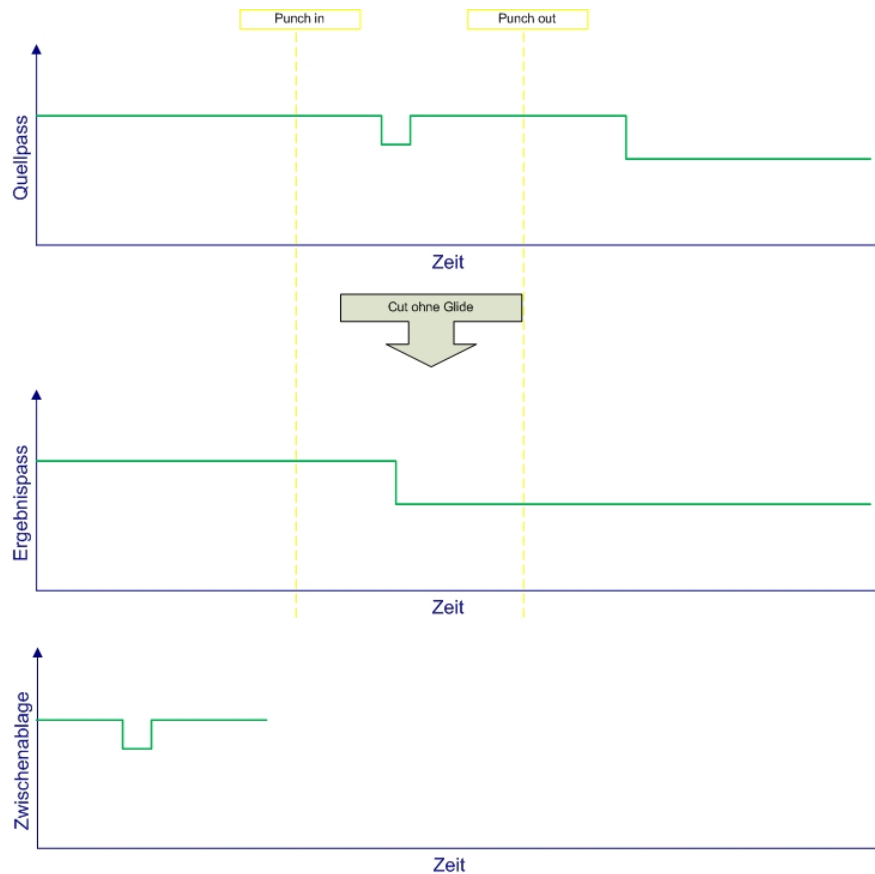
The **Glide-out time** is applied at the Punch in point; **Glide-in time** has no effect on this edit:



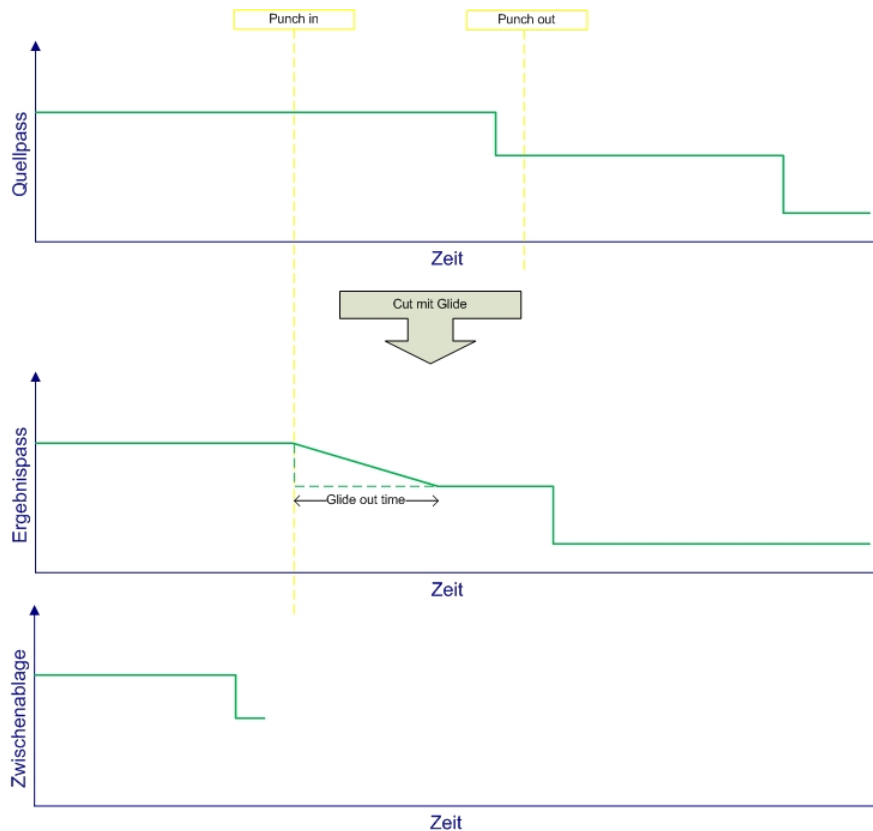
### 17.14.4 Cut

This edit cuts out a section of the pass and copies it to the clipboard. Its affect on the current **Play Pass** is identical to a [Delete](#). However, you would use this edit if you wish to paste or insert the clipboard data to another location. For example, to move the position of a chorus in the song.

Automation between the **Punch in** and **Punch out** timecode values is deleted and copied to the clipboard (Zwischenablage); all data after the **Punch out** time ripples up to the **Punch in** time:



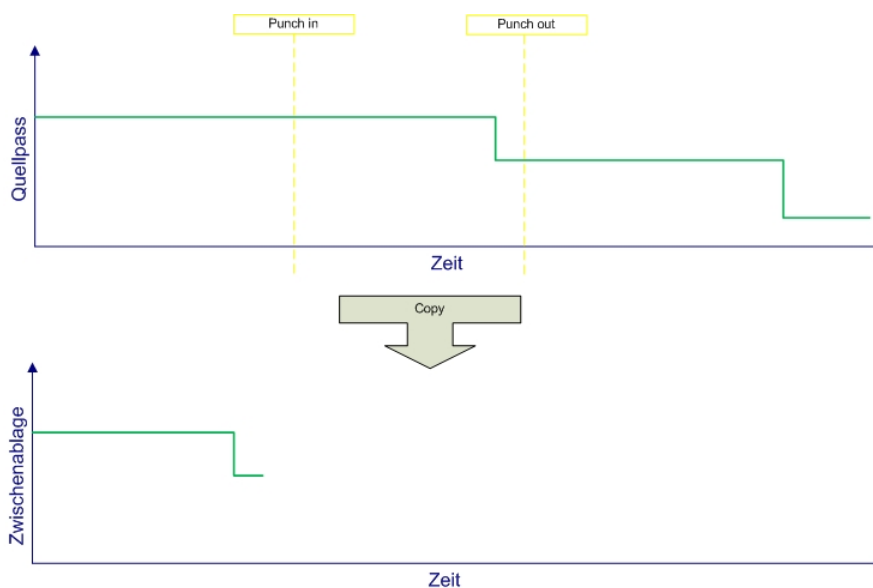
The affect of **Glide-in** and **Glide-out** times is identical to a [Delete](#).



### 17.14.5 Copy

This is a non-destructive edit which copies a section of the mix to the clipboard. It has no affect on the **Play Pass**. You would use this edit if you wish to paste or insert the clipboard data to another location. For example, to copy a chorus to another location.

Automation between the **Punch in** and **Punch out** timecode values is copied to the clipboard (Zwischenablage):

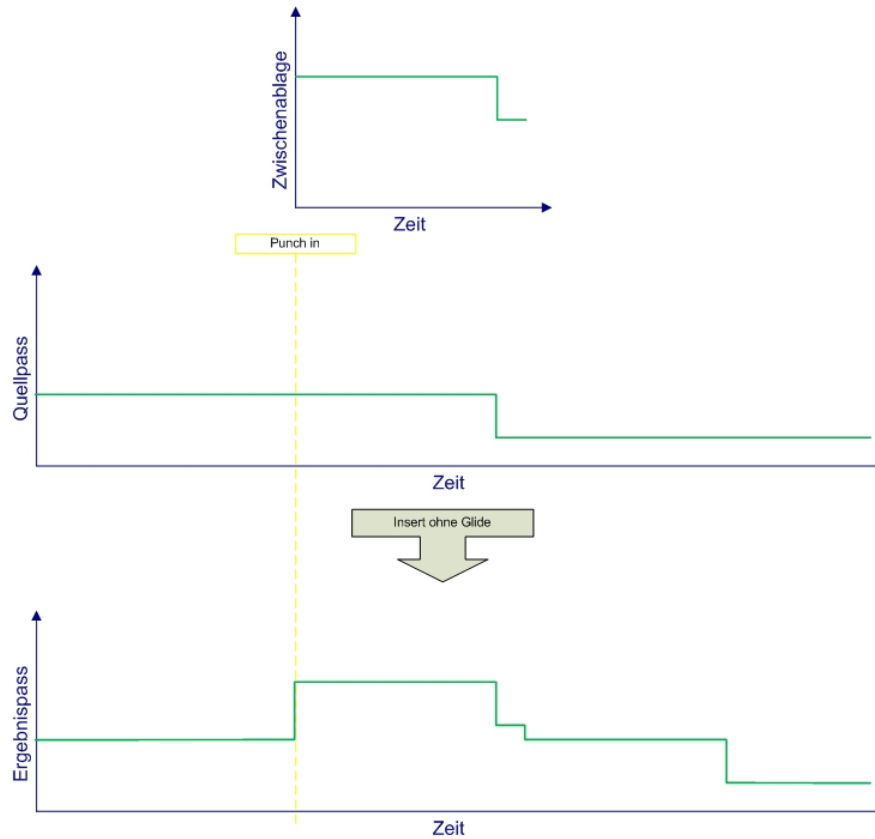


The **Glide-in** and **Glide-out times** have no affect on this edit.

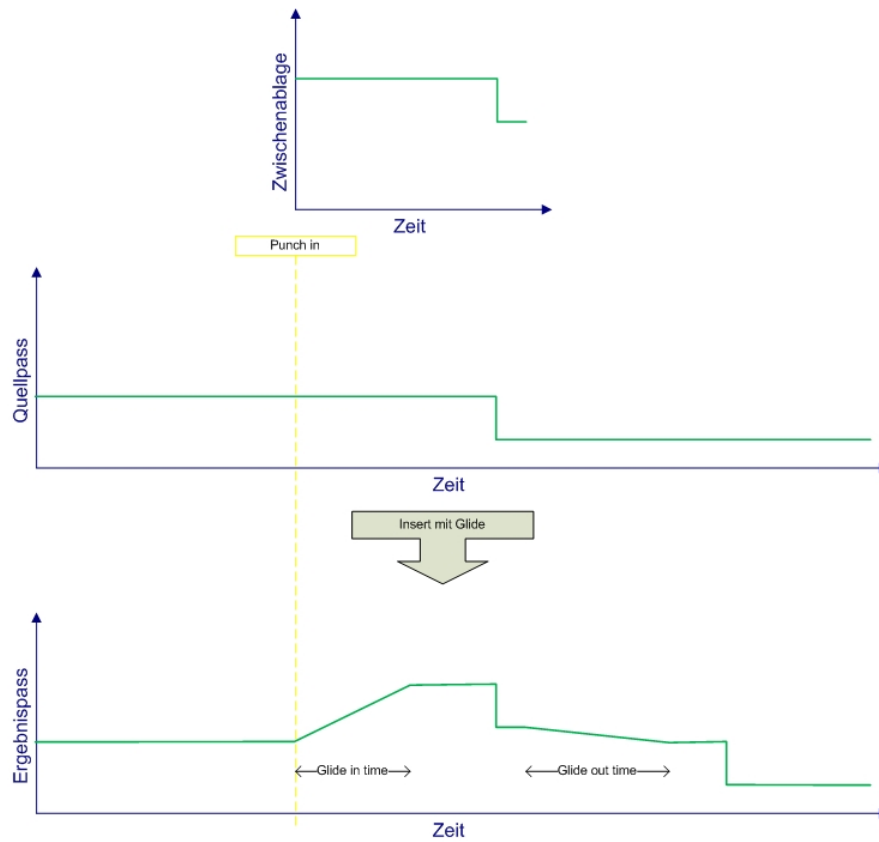
### 17.14.6 Insert

Having [cut](#) or [copied](#) data to the automation clipboard, it can be inserted into the **Play Pass**. You might use this edit to insert automation for a Chorus when you wish to keep the existing structure of the song intact. In other words, the song gets longer by one Chorus!

This edit inserts the clipboard data at the **Punch in** time. It is different to a [Paste](#) in that the existing **Play Pass** automation ripples down and is tagged onto the end of the insert. Note that the **Punch out** time has no affect on this edit.



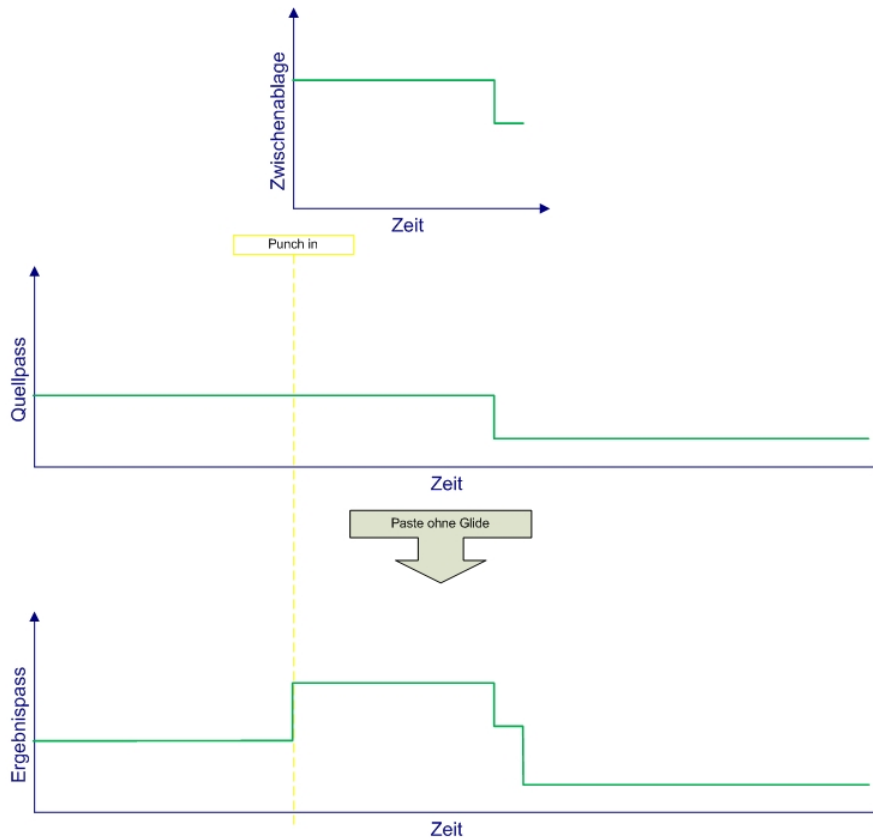
The **Glide-in time** is applied at the **Punch in** point; the **Glide-out time** is applied at the end of inserted clipboard:



### 17.14.7 Paste

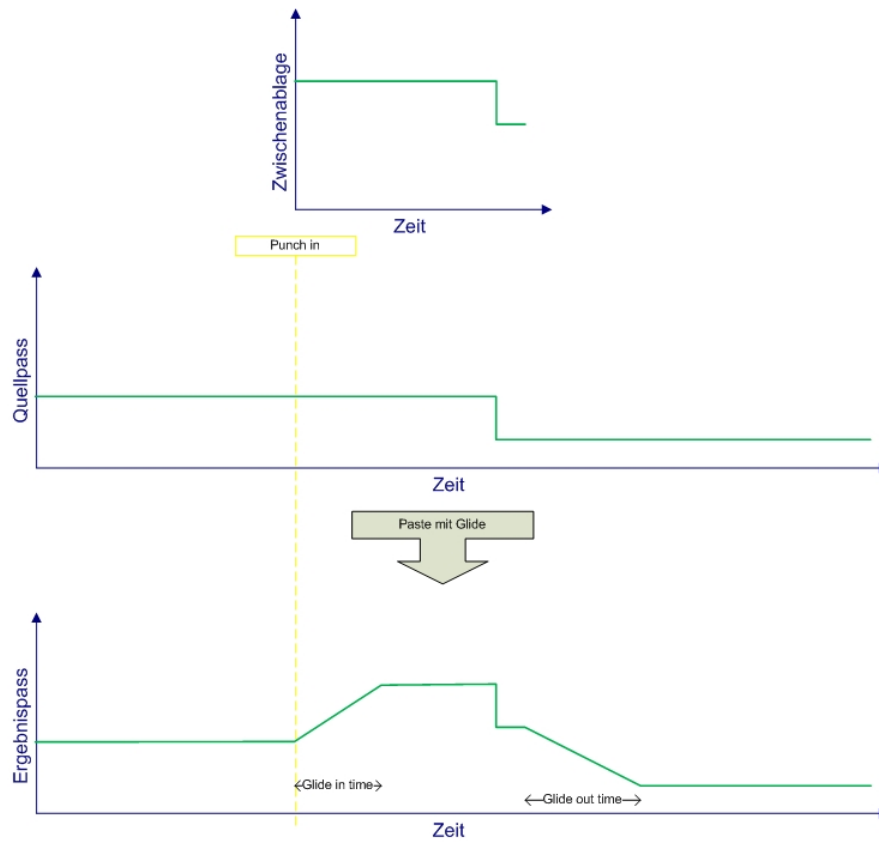
Having [cut](#) or [copied](#) data to the automation clipboard, it can be pasted into the **Play Pass**. You might use this edit to replace the automation for a Chorus with a newer pass. In other words, the clipboard replaces the existing Play Pass.

This edit pastes the clipboard data at the **Punch in** time. It is different to an [Insert](#) in that the existing **Play Pass** automation is replaced. Note that the **Punch out** time has no effect on this edit.





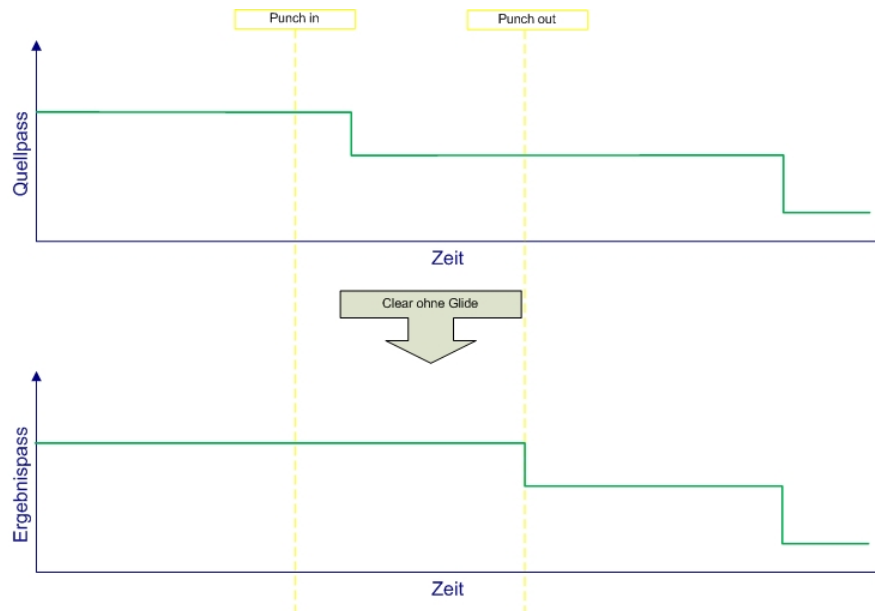
The **Glide-in time** is applied at the **Punch in** point; the **Glide-out time** is applied at the end of pasted clipboard:



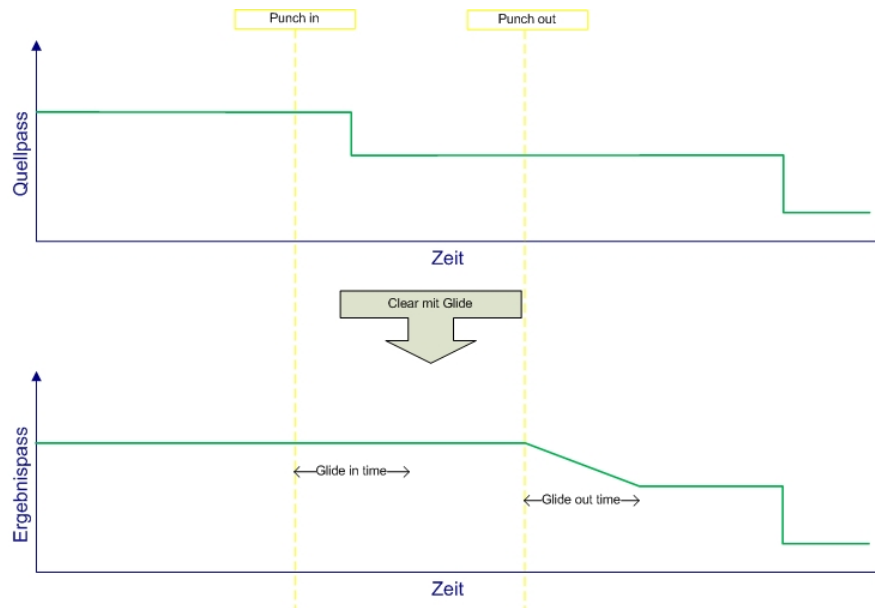
### 17.14.8 Clear

This edit clears a section of the mix. You might use it if the order of a song changes and you want to write new automation data in the cleared section. It is different to a [Shift](#) in that the existing **Play Pass** automation is replaced.

Automation data between the **Punch in** and **Punch out** times is cleared by extending the values from the **Punch in** time through to the **Punch out** time. The overall length of the mix remains intact:



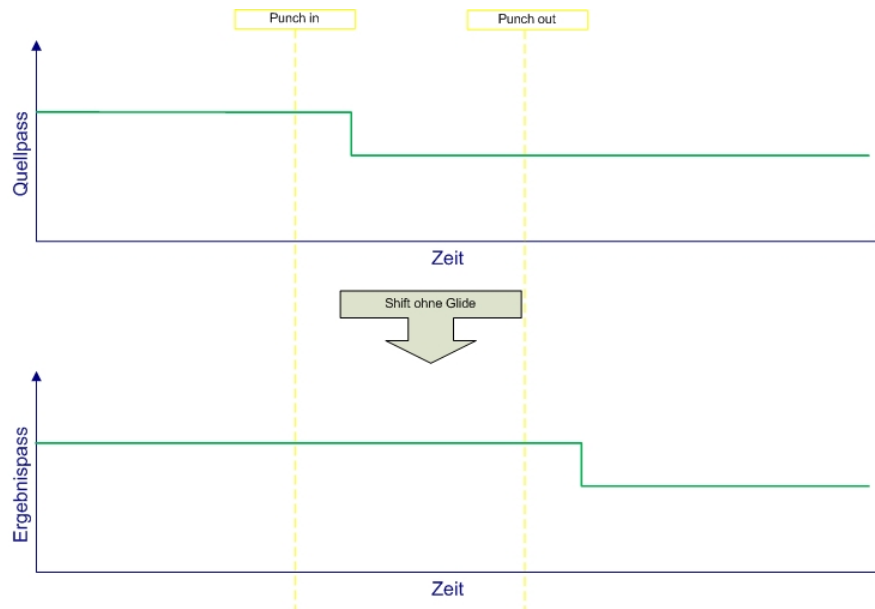
The **Glide-in time** is applied at the **Punch in** point; the **Glide-out time** is applied at the **Punch in** point:



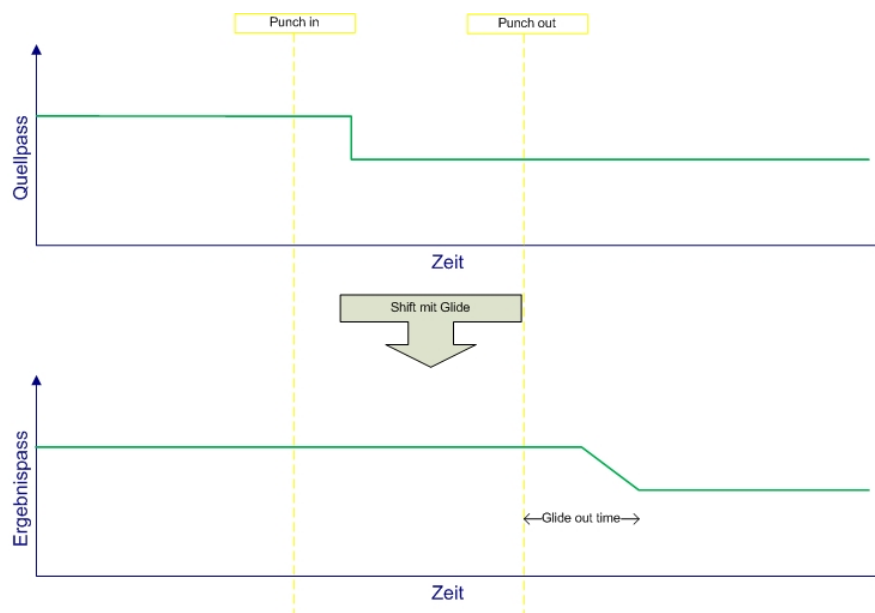
### 17.14.9 Shift

This edit shifts or moves a section of the mix. You might use it if you want to keep all your existing automation but write new data for an Instrumental which has been added to the song.

Automation data between the **Punch in** and **Punch out** times is shifted to the **Punch Out** time. Values at the **Punch in** time are then extended to the **Punch out** time to fill in the cleared section:



The **Glide-out time** is applied at the Punch in point; **Glide-in time** has no affect on this edit:



### 17.14.1 Advanced Editing

#### 0

When performing mix pass edits, *only* the controls selected and armed for automation are copied, pasted, inserted, etc. This allows you to copy data for all channels and controls, and then selectively insert, paste, etc.

For example, to copy and paste just the automation data for the vocal channels during a Chorus:

1. [Copy](#) the Chorus data from the **Play Pass**.

Automation data for all channels and controls in replay is copied to the clipboard.

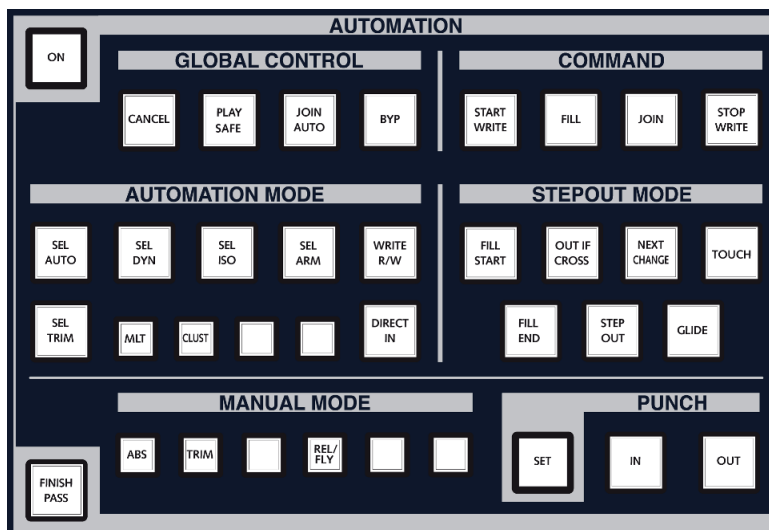
2. *BEFORE* performing the **Paste**, deselect any channels or controls which you do not want to include in the paste by [disarming](#) them – in our example, disarm all channels except the main and backing vocals.
3. Now perform the [Paste](#).

The **Paste** is applied only to the armed channels.

4. Then re-enable arm for all channels (back to replay).
5. Press Play to play back your edited mix pass!

## 17.15 Front Panel Control Summary

The AUTOMATION panel provides access to the following functions:



- [ON](#) – turns the automation on or off. Automation replays from the **Play pass** in the **Active Mix**.
- [FINISH PASS](#) – finishes the pass without having to stop and rewind.

### GLOBAL CONTROL

- [CANCEL](#) – cancels the Record pass. Use this button to discard moves you have just written.
- [PLAY SAFE](#) – parameters read automation data from the **Play pass** but cannot write new data. In addition, if you adjust a parameter value, you will *NOT* hear any change in the audio.
- [JOIN AUTO](#) – use this button if you are going to review and update a section of the mix.
- [BYP](#) – identical to 'Play Safe'; parameters read automation data from the **Play pass** but cannot write new data. However, if you adjust a parameter, you *WILL* hear the change in the audio.

### COMMAND

- [START WRITE](#) – press this button to step all parameters into write.
- [FILL \(Fill Region\)](#) – use this button to write a value between the **Punch In** and **Punch out** times.
- [JOIN](#) – use this button if you are going to be reviewing and updating a section of the mix.
- [STOP WRITE](#) – press this button to step all parameters out of write.

### AUTOMATION MODE

- [SEL AUTO](#) – selects modules to be enabled or disabled for automation, using the Central Control Section **SEL** buttons.
- [SEL DYN](#) – selects modules to write in dynamic or static automation mode, using the Central Control Section **SEL** buttons.
- **SEL ISO** – reserved for future implementation.
- [SEL ARM](#) – selects modules to be armed (read & write) or disarmed (read only), using the Central Control Section **SEL** buttons.
- [WRITE R/W](#) – turns the fader **R/W** buttons and Central Control Section **SEL** buttons into step in and step out of write controls.
- [SEL TRIM](#) – selects modules to write in absolute or trim mode, using the Central Control Section **SEL** buttons. Selections are cleared by pressing either the **ABS** or **TRIM** 'Manual Mode' button.
- [MLT](#) – used with **SEL AUTO**, **SEL DYN** and **SEL TRIM** to apply selections across multiple channels.
- [CLUST](#) – steps in and out of write on a cluster of channels.
- [DIRECT IN](#) – allows you to step a control into write when running in Bypass.

## STEPOUT MODE

These modes define what happens when you step out of write:

- [FILL START](#) – selects the fill to start automation mode.
- [OUT IF CROSS](#) – selects the out if cross automation mode.
- [NEXT CHANGE](#) – selects the next change automation mode.
- [TOUCH](#) – when enabled, faders and variable controls will automatically step out of write on release.
- [FILL END](#) – selects the fill to end automation mode.
- [STEP OUT](#) – selects the step out automation mode.
- [GLIDE](#) – when enabled, variable parameters will glide back to the **Play pass**. The glide time can be set from 0 to 60,000 ms.

## MANUAL MODE

- [ABS](#) – selects Absolute automation mode.
- [TRIM](#) – selects Trim automation mode..
- [REL/FLY](#) – selects Trim relative (unlit) or Trim on the fly (lit).

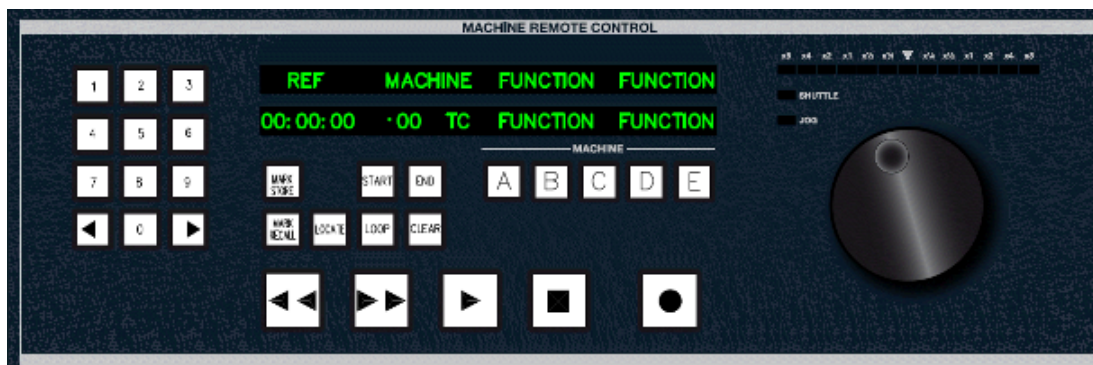
## PUNCH

Used to set the [punch in and out times](#), or activate [automatic punch in/out](#).

- **SET** – press to set the punch in or out times.
- **IN** – press to enable automatic step into write at the punch in time. (If **SET** is active, press to set the punch in time.)
- **OUT** – press to enable automatic step out of write at the punch out time. (If **SET** is active, press to set the punch out time.)

## 17.16 Machine Control

Control of the playback machine can be programmed onto user buttons from the [Custom Functions](#) display, or handled from the optional MACHINE REMOTE CONTROL user panel.



The panel provides remote control of one of three external machines. Sony 9pin (A) and Midi Machine Control (C) ports are supported; one port can be active at a time. When active, the console's automation system slaves to timecode from the active port.

Your system must be specified with the Recording Com Kit (958/80) to provide Sony 9pin, LTC and/or MIDI connections to an external playback device. Please consult your system specification for details.

### 17.16.1 Transport Control

1. To control one of the three machines, select a port enable button – **A**, **B** or **C** – and use the RW, PLAY, FW and STOP transport controls.

The first line of the display shows the active port (**A** to **C**) and the type of machine (e.g. **DA-88**). The second line shows the current timecode position of the machine (on the left), and timecode entered in the temporary buffer (on the right).

The temporary buffer is used when [storing and recalling marks](#) or [setting up a loop](#).

If there is no connection between the console and the machine, then the display shows **NO MACHINE**. If there is no tape in the machine, then the display shows **NO TAPE**.

2. To change the jog wheel between jog and shuttle modes, press down on the jog wheel.
3. To punch in and out of record while a machine is in play:
  - Press RECORD to punch in (while in play).
  - Press PLAY to punch out (while in record).

### 17.16.2 Locating

You can locate the machine to a particular timecode either by manually typing in a timecode position, or [recalling a stored mark](#).

To manually locate to a timecode:

1. Type the timecode position using the **0** to **9** buttons. The timecode should be entered in the following format:

**HH:MM:SS:FF**

You *must* enter *all* fields, including frames, for the timecode value to be accepted.

The timecode appears in the temporary buffer on the right of the display.

You can use the left and right arrow buttons to navigate through the timecode characters. If you make a mistake, use the **CLEAR** button as follows:

- A short press (for less than 3 seconds) will delete one character.
- A long press (for more than 3 seconds) will delete the entire timecode value.

2. Now press **LOCATE** - the machine locates to the temporary buffer timecode position; once the locate point has been reached, the machine goes into Play.

If you make a mistake and want to stop the machine locating, press **CLEAR**.



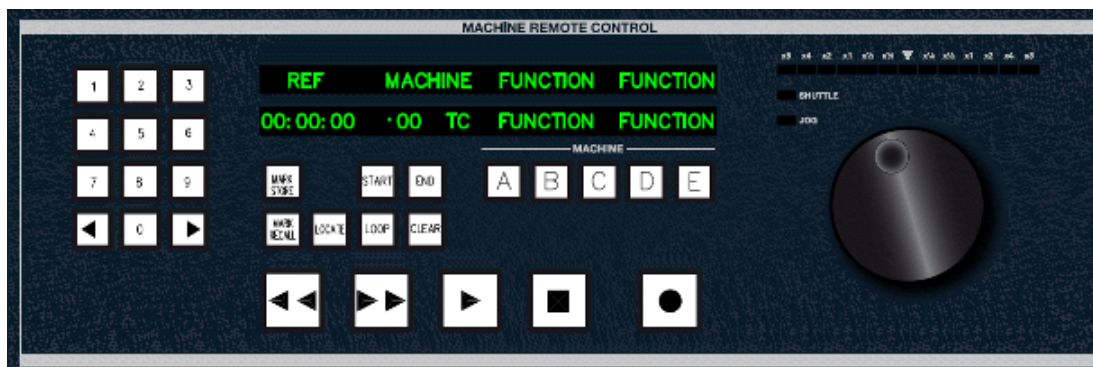
### 17.16.3 Storing and Recalling Marks

Marks can be used to store and recall up to 10 timecode positions so that you can use them as locate points.

The 10 mark buttons can also be assigned to locators from the [Machine Locators](#) display; this display provides an unlimited number of locators and a memo field to name each locate point.

➤ **To store a mark:**

1. Press **STORE**:



The current timecode position is stored into the temporary buffer and the buttons – **0** to **9** – start to flash in green.

Note that any buttons which are not flashing and are red already have a timecode stored.

2. Press one of the **0** to **9** buttons to select a location - the timecode from the temporary buffer is stored into the selected location.

Alternatively, to store a particular timecode, for example, 01:00:00:

1. Press the **STORE** button.
2. Type in the timecode position using the **0** to **9** buttons - the timecode in the temporary buffer updates.
3. Then press one of the **0** to **9** buttons to select a location.

➤ **To recall a mark:**

1. Press **MARK RECALL** - any of the **0** to **9** buttons which contain a mark start to flash.
2. Press the mark you wish to recall - **0** to **9**.

The stored timecode is recalled into the temporary buffer. It can now be used with the [LOCATE](#) or [START/END](#) functions.

➤ **To clear a mark so that the memory becomes inactive:**

1. Press **CLEAR** - any of the **0** to **9** buttons which contain a mark start to flash.
2. Press the mark or marks you wish to clear - **0** to **9**.

#### 17.16.4 Setting Up a Loop (Cycle)

You can set up a loop so that the machine will cycle between a start and end timecode.

1. First, enter the timecode you wish to use as the start point into the temporary buffer.

You can do this by [typing in a timecode position](#), [recalling a mark](#) or by pressing the **STORE** button to enter the current timecode position.

2. Press **START** to store temporary buffer timecode as the start point for the loop.
3. Repeat steps 1 and 2 but this time press **END** to store the loop end point.
4. Press **LOOP** to activate the loop.

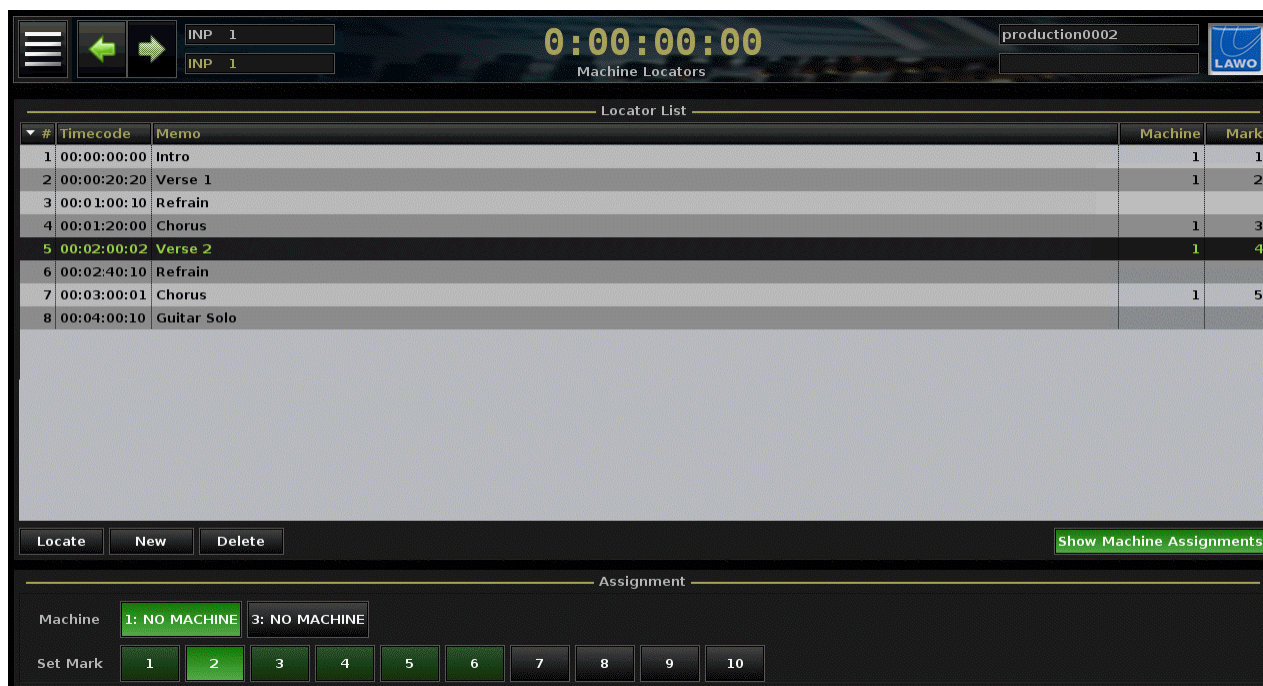
The machine will rewind to the **START** timecode, go into Play and when it reaches the **END** timecode repeat the loop.

5. Turn off **LOOP** to stop the cycle.

## 17.17 Machine Locators

The **Machine Locators** display provides a way of storing and recalling timecode positions.

1. [Open](#) the **Machine Locators** display on the Central GUI:



You can store an unlimited number of locators, each with its own **Timecode** stamp and **Memo** field.

If your console is fitted with the optional [Machine Control](#) user panel, then the 10 [mark](#) buttons on this panel can be assigned to locators - the assignment is indicated in the **Machine** (machine number) and **Mark** (button number) fields, and in the **Show Machine Assignments** area at the bottom of the display. See [Assigning Locators to the MRC panel](#).

### 17.17.1 Storing and Naming Locators

1. Select the on-screen **New** button, or press the **Create New Locator** user button (programmed from the [Custom Functions](#) display). You can store locators while timecode is running at any speed: in Stop, Play, Fast forward, etc.

The current timecode position is saved into the next available locator ID - in our example, ID 1.

2. Type into the **Memo** field (up to 256 characters) to name the locator and press Enter.

Note that the **Memo** field is automatically active after selecting **New**. This allows you to immediately type your text entry:

Locator List				
#	Timecode	Memo	Machine	Mark
1	00:00:00:00	Intro		

3. Repeat these steps to store more locators - for example:

Locator List				
#	Timecode	Memo	Machine	Mark
1	00:00:00:00	Intro		
2	00:00:20:20	Verse 1		
3	00:01:00:10	Refrain		
4	00:01:20:00	Chorus		
5	00:02:00:02	Verse 2		
6	00:02:40:10	Refrain		
7	00:03:00:01	Chorus		
8	00:04:00:10	Guitar Solo		

The first 10 locators (IDs 1 to 10) can be recalled from the **Goto Locator** user buttons programmed from the [Custom Functions](#) display.

### 17.17.2 Recalling a Locator

1. Double-click on an entry from the list, or select an entry and then click the on-screen **Locate** button.

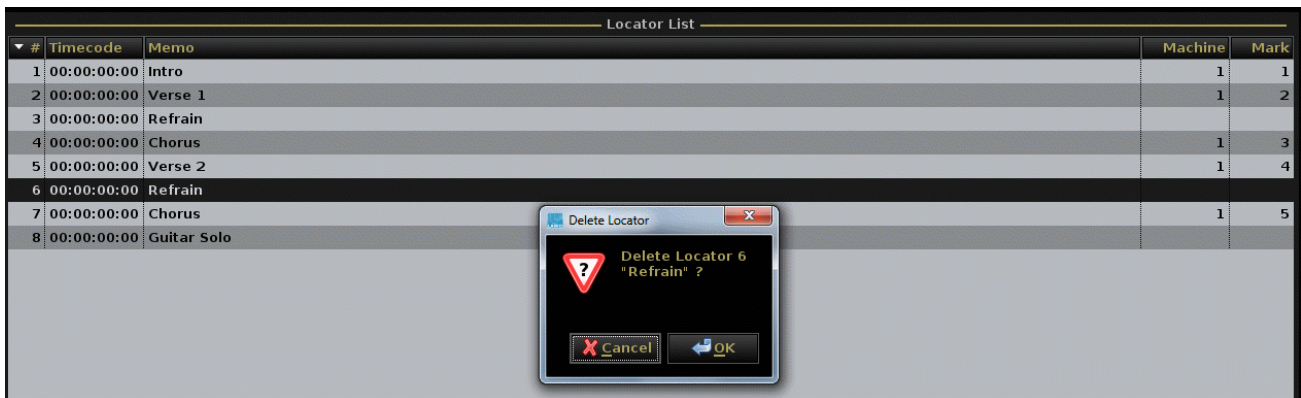
The stored timecode position is recalled - e.g. **Verse 2**:

Locator List				
#	Timecode	Memo	Machine	Mark
1	00:00:00:00	Intro		
2	00:00:20:20	Verse 1		
3	00:01:00:10	Refrain		
4	00:01:20:00	Chorus		
5	00:02:00:02	Verse 2		
6	00:02:40:10	Refrain		
7	00:03:00:01	Chorus		
8	00:04:00:10	Guitar Solo		

You can program up to 10 **Goto Locator** user buttons from the [Custom Functions](#) display to recall locators from a single button press.

### 17.17.3 Deleting a Locator

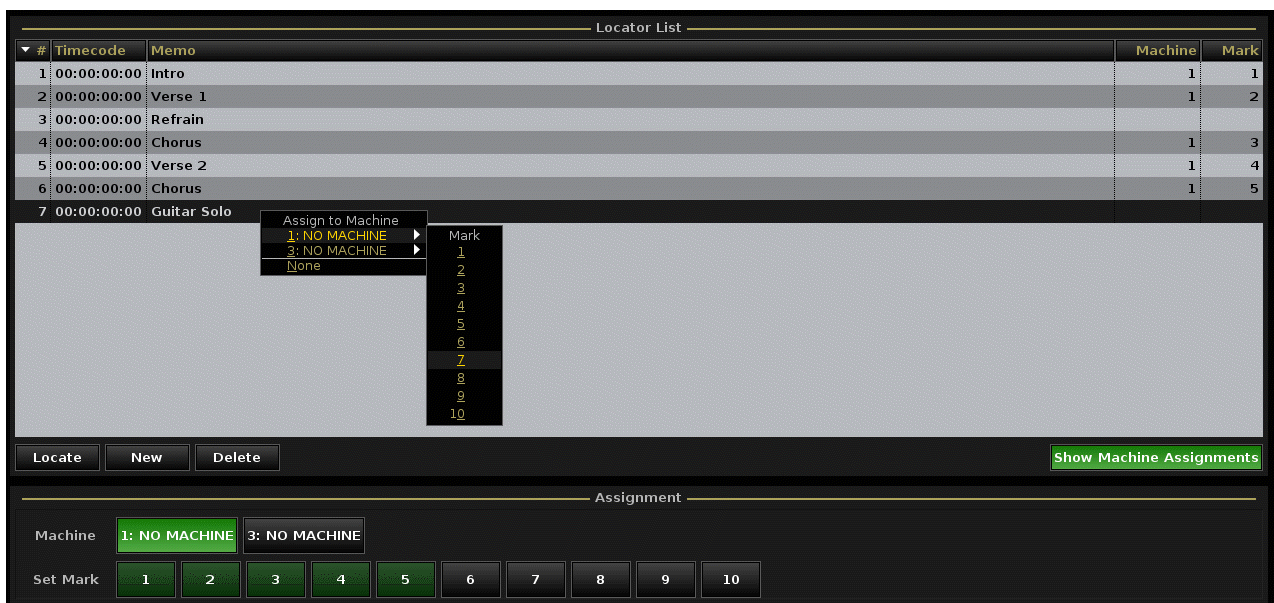
1. Select an entry and then click the on-screen **Delete** button.
2. Confirm the delete by selecting **OK**:



### 17.17.4 Assigning Locators to the MRC Panel

If your console is fitted with the optional [Machine Control](#) user panel, then the 10 [mark](#) buttons on this panel can be assigned to any locator entry in the list.

1. To make an assignment, right-click on the locator and select one of the drop-down options - first select the machine (in our example, 1 or 3), followed by the physical Mark button (from 1 to 10):



Once you have made your selection, the **Machine** and **Mark** fields, on the right of the display, update.

2. For an overview of assignments, select the on-screen **Show Machine Assignments** button, and select a machine (e.g. Machine 1) - green buttons are assigned; grey buttons are available.

3. To remove an assignment, right-click on the locator and select **None**:

Locator List				
#	Timecode	Memo	Machine	Mark
1	00:00:00:00	Intro	1	1
2	00:00:00:00	Verse 1	1	2
3	00:00:00:00	Refrain		
4	00:00:00:00	Chorus	1	3
5	00:00:00:00	Verse 2	1	4
6	00:00:00:00	Chorus	1	5
7	00:00:00:00	Guitar Solo	1	7

Assign to Machine  
1: NO MACHINE  
3: NO MACHINE  
None

# 18. Signal Routing & Settings

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This chapter covers signal routing and settings.

Topics include:

- [Signal Routing: Overview](#)
- [The Signal List Display](#)
- [The mx Routing Display](#)
- [The Signal Settings Display](#)

## 18.1 Signal Routing: Overview

The **mc<sup>2</sup>66 MKII** includes an integrated digital routing matrix. Any source can be routed to any input or monitor channel, and any output bus or channel send routed to any destination. In addition, you can route sources directly to destinations, for example to feed a Mic/Line input to an AES output.

Multiple systems can also be networked in order to share IO resources. For example, to share the same microphone input between two consoles.

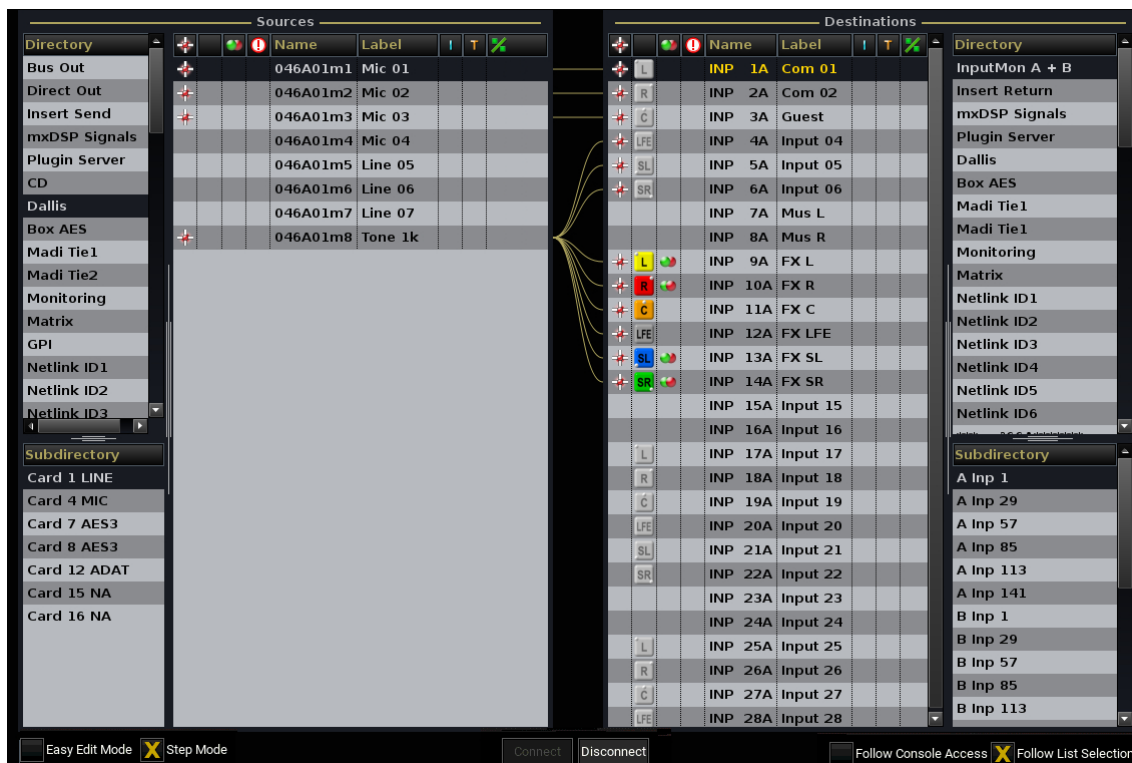
All routes are stored and recalled in productions and snapshots, reducing the amount of manual patching within the installation and saving hours of set up time!

Signal routing can be performed from either the [Signal List](#) or [mx Routing](#) displays. The **Signal List** presents lists of Sources and Destinations, whereas the **mx Routing** display provides a crosspoint overview. In addition, the **Signal List** is used to edit labels and define channel formats (mono, stereo, surround); the **mx Routing** display is used to create partial snapshots for recalling selective routes.



## 18.2 The Signal List Display

1. [Open](#) the **Signal List** display in the usual manner:



The display shows connections from **Sources** (on the left) to **Destinations** (on the right). In order to keep the list manageable, sources and destinations are divided into Directories and Subdirectories.

Open a **Directory** or **Subdirectory** by double-clicking on the directory name, or using the arrows beside the name. You can use the SCREEN CONTROL navigation buttons and rotary control to focus on different areas of the display and scroll up/down the **Directory**, **Subdirectory** and **Sources** or **Destinations** lists. Each area can be [resized](#) to improve its visibility.

If a source or destination is connected, then you will see a red and white cross in the "connection" column. In addition, if the source and destination are both in view, then a line appears to show the connection. In our example, we can see that the first three input channels (**INP 1** to **INP 3**) are routed from microphones (**Mic 01** to **Mic 03**), while other input channels are routed from **Tone 1k**.

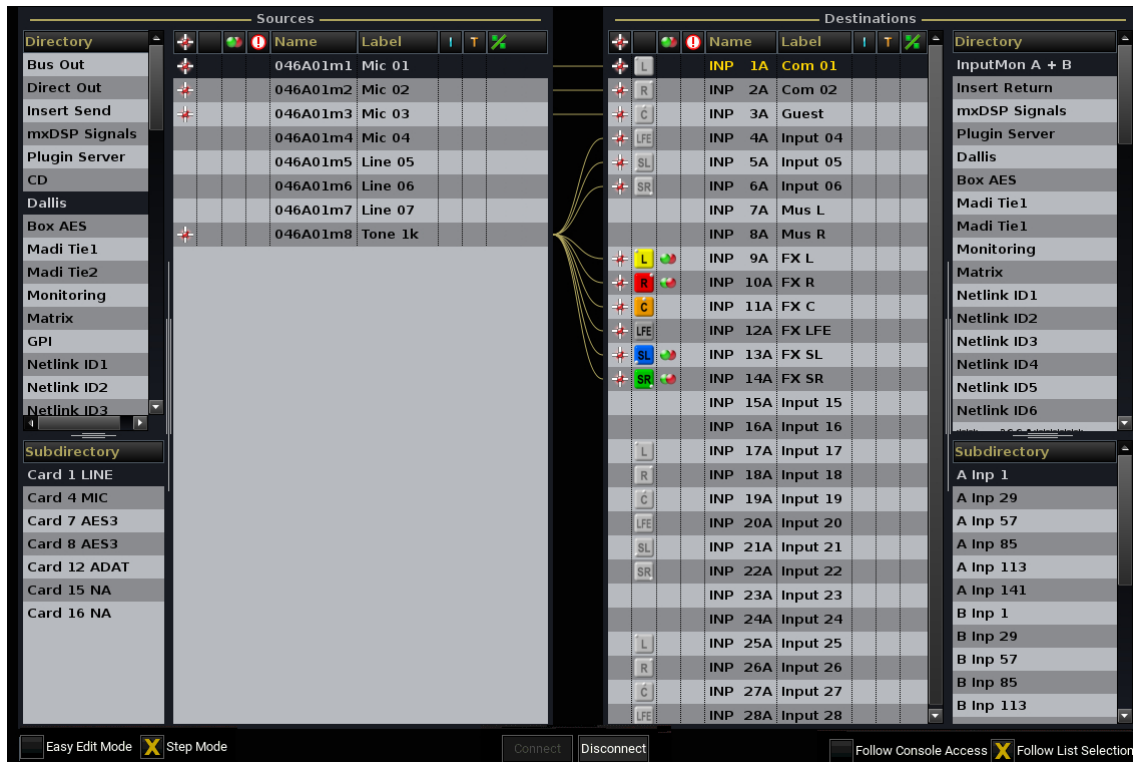
The **Connect** and **Disconnect** buttons or soft keys are used to make and unmake routes between the selected source and destination. If you enable **Step mode**, then you can quickly step down the list to quickly make a series of connections.

The **Label** column is used to edit the user label for sources or destinations. **Easy edit mode** will carry text forwards when editing a range of signals.

A number of other functions are available by right-clicking on a source or destination or using the SCREEN CONTROL soft keys. They include defining the channel format (mono, stereo or surround); reverse interrogation of routing; isolating or protecting individual signals; and placing the selected DSP channel in access.

When running [mxGUI](#) offline, all signals appear as "not available".

## 18.2.1 Signal List Columns

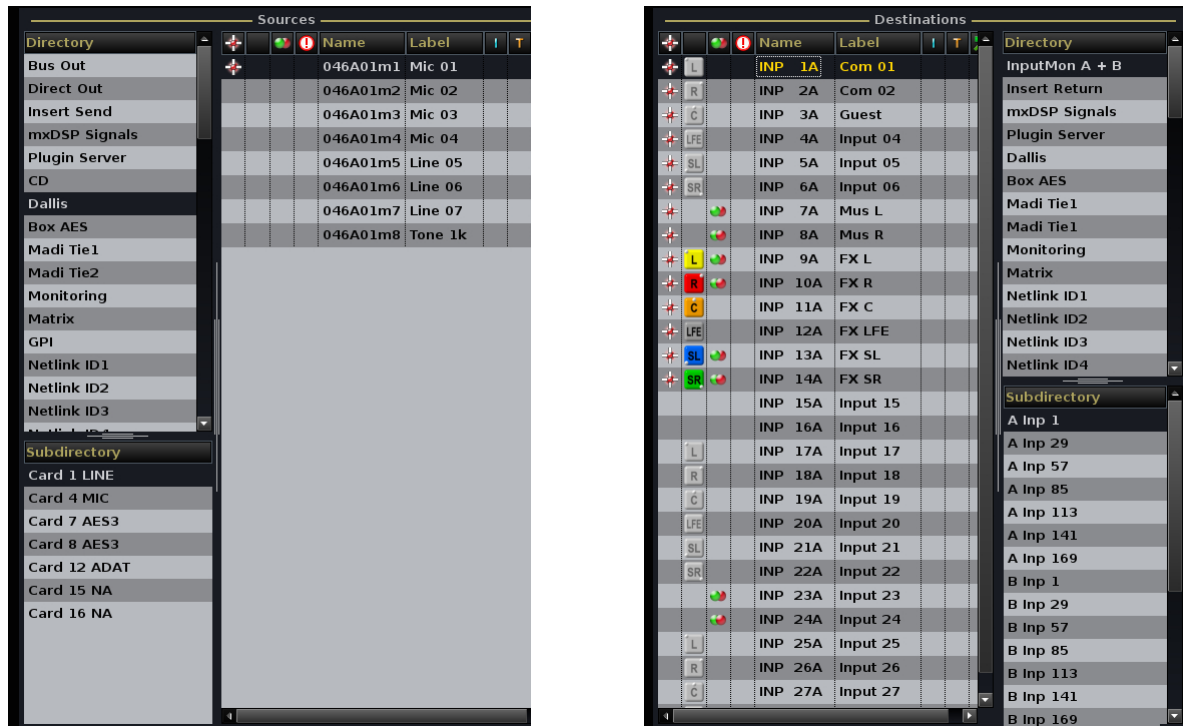


The screenshot displays the Signal List Columns interface, which is divided into two main sections: Sources and Destinations. Each section contains a table with columns for Name, Label, I, T, and %. The Sources table lists various input sources like Bus Out, Direct Out, Insert Send, mxDSP Signals, Plugin Server, CD, Dallis, Box AES, Madi Tie1, Madi Tie2, Monitoring, Matrix, GPI, Netlink ID1, Netlink ID2, and Netlink ID3. The Destinations table lists various output destinations like InputMon A + B, Insert Return, mxDSP Signals, Plugin Server, Dallis, Box AES, Madi Tie1, Madi Tie2, Monitoring, Matrix, Netlink ID1, Netlink ID2, Netlink ID3, Netlink ID4, Netlink ID5, and Netlink ID6. The interface also includes a Directory sidebar on the left and a Subdirectory sidebar on the right. At the bottom, there are buttons for Easy Edit Mode, Step Mode, Connect, Disconnect, Follow Console Access, and Follow List Selection.

The columns beside each signal provide the following information:

- **Connection** – a red and white cross appears when a source or destination is connected. If a destination is [protected](#), then you will also see a padlock icon.
- **Surround** – you will see color coded channel definitions if a source or destination is [surround](#). (The greyed out definitions show which blocks of channels can be configured for surround).
- **Stereo** – interlocking red and green circles appear when a source or destination is [stereo](#).
- **Unavailable** – a warning symbol appears beside signals which are [not available](#).
- **Name** – this is the system name for the signal (defined by the AdminHD configuration).
- **Label** – this is the user label for the signal. You can [rename](#) signal labels from this column.
- **I** – indicates if a signal is [Isolated](#) from snapshot recall.
- **T** - indicates a [Tiny \(reduced processing\)](#) channel.
- **%** - indicates 'Shared' or 'Imported' sources within a [networked installation](#).

## 18.2.2 Directories & Subdirectories



The left screenshot shows the 'Sources' panel with a list of directories and subdirectories. The right screenshot shows the 'Destinations' panel with a list of destinations and subdirectories.

Directory	Name	Label
Bus Out	046A01m1	Mic 01
Direct Out	046A01m2	Mic 02
Insert Send	046A01m3	Mic 03
mxDSP Signals	046A01m4	Mic 04
Plugin Server	046A01m5	Line 05
CD	046A01m6	Line 06
Dallis	046A01m7	Line 07
Box AES	046A01m8	Tone 1k

Name	Label
INP 1A	Com 01
INP 2A	Com 02
INP 3A	Guest
INP 4A	Input 04
INP 5A	Input 05
INP 6A	Input 06
INP 7A	Mus L
INP 8A	Mus R
INP 9A	FX L
INP 10A	FX R
INP 11A	FX C
INP 12A	FX LFE
INP 13A	FX SL
INP 14A	FX SR
INP 15A	Input 15
INP 16A	Input 16
INP 17A	Input 17
INP 18A	Input 18
INP 19A	Input 19
INP 20A	Input 20
INP 21A	Input 21
INP 22A	Input 22
INP 23A	Input 23
INP 24A	Input 24
INP 25A	Input 25
INP 26A	Input 26
INP 27A	Input 27

Every mc<sup>2</sup>/Nova supports a number of common **Directories** which are supported by all systems. Note that these **Directories** cannot be renamed or reorganised by AdminHD, and *always* appear at the top of each list.

External signals such as mic/line, AES, MADI, etc. vary depending on the input and output cards and type fitted to your system. Therefore, AdminHD is used to place these signals within custom-named **Directories** and **Subdirectories**, and give them a system **Name** and default user **Label**. For more details on editing the AdminHD configuration, please refer to your Technical Manual.

From the Central GUI, you *cannot* change the **Directory**, **Subdirectory** or signal **Name**. You *can* edit [user Labels](#), and save and recall them using snapshots or productions.

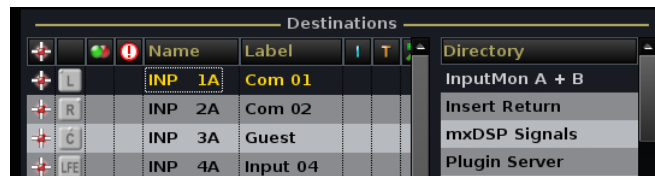
## Common Source Directories



The source **Directories**, supported by all systems, are as follows. Note that the number of sums, groups, etc. depends on your choice of [DSP configuration](#):

- **Bus Out**
  - **DOUT Sum** - sum bus outputs.
  - **DOUT Grp** - group bus outputs.
  - **DOUT Aux** - aux bus outputs.
  - **AFL/PFL** - AFL and PFL bus outputs.
- **Direct Out**
  - **DOUT Inp** - input channel direct outputs.
  - **DOUT Mon** - monitor channel direct outputs.
- **Insert Send**
  - **Send Inp** - input channel insert sends.
  - **Send Mon** - monitor channel insert sends.
  - **Send Sum** - sum insert sends.
  - **Send Grp** - group insert sends.
  - **Send Aux** - aux insert sends.
- **Generator** - outputs from the built-in [tone generator](#) (two sine wave, one pink noise and one white noise).
- **Downmix** (optional) - this directory appears if a [Downmix matrix](#) has been configured by AdminHD. It provides access to the downmix matrix source signals.
- **Summing** (optional) - this directory appears if any summing matrices have been configured by AdminHD. This resource can be used for Downmixing (see above), Monitoring (see below) or other customer-specific functions.
- **mxDSP Signals** (optional) - this directory appears if a DSP module has been configured for [mxDSP](#) (by AdminHD and the module's firmware). It provides access to the mxDSP source signals.
- **Monitoring** - outputs from the monitor matrices. Usually, these signals are factory-configured to interact with the console's [monitoring](#), and therefore should not be adjusted under normal circumstances.
- **Loopbacks** - outputs from the virtual [loopbacks](#).

## Common Destination Directories



The destination **Directories**, supported by all systems, are as follows. Note that the number of inputs, monitors, etc. depends on your choice of [DSP configuration](#):

- **InputMon A + B**
  - **A Inp** - input channels (A inputs).
  - **B Inp** - input channels (B inputs).
  - **A Mon** - monitor channels (A inputs).
  - **B Mon** - monitor channels (B inputs).
  - **Command 1-8** - the 8 talkback bus sources (used by [talkback user buttons](#) configured from the [Custom Functions](#) display.)
  - **DynKey 1-8** - the 8 dynamics key inputs (used by the dynamics processing, if you enable the [External Key](#).)
- **Insert Return**
  - **Ret Inp** - input channel insert returns.
  - **Ret Mon** - monitor channel insert returns.
  - **Ret Sum** - sum insert returns.
  - **Ret Grp** - group insert returns.
  - **Ret Aux** - aux insert returns.
- **Downmix** (optional) - this directory appears if a [Downmix matrix](#) has been configured by AdminHD. It provides access to the downmix matrix destination signals.
- **Summing** (optional) - this directory appears if any summing matrices have been configured by AdminHD. This resource can be used for Downmixing (see above), Monitoring (see below) or other customer-specific functions.
- **mx DSP Signals** (optional) - this directory appears if a DSP module has been configured for [mxDSP](#) (by AdminHD and the module's firmware). It provides access to the mxDSP destination signals.
- **Monitoring** - sources to the monitor matrices. Usually, these signals are factory-configured to interact with the console's [monitoring](#), and therefore should not be adjusted under normal circumstances.
- **Loopbacks** - inputs to the virtual [loopbacks](#).

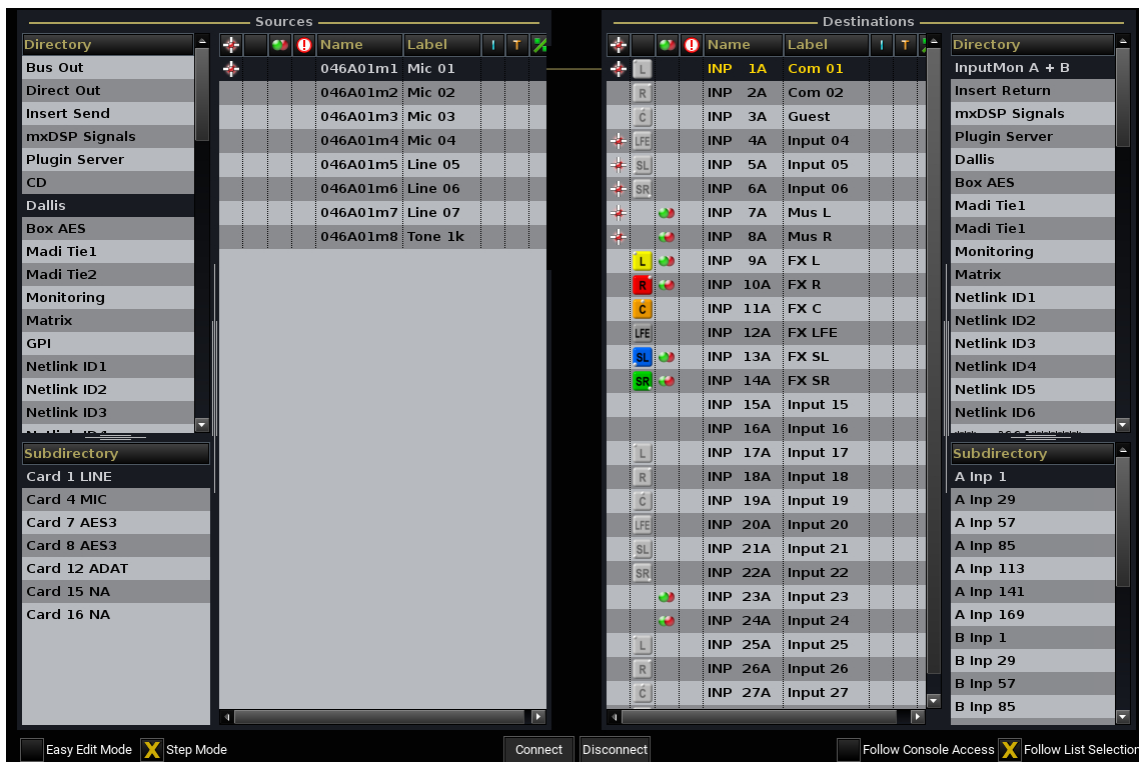
### 18.2.3 Routing a Source to a Destination

To make a route - for example, to route a microphone source to an input channel:

1. Select the source – for example, the source directory called **DALLIS**; subdirectory called **CARD 1 LINE**; and the source named **Mic 01**.
2. Select the destination – for example, the destination directory called **Input/Mon A + B**; subdirectory called **A Inp 1-28**; and destination called **INP 1A**.

Note that input and monitor channels support an [A/B input switch](#). By selecting **INP 1A** as the destination, you will route to the A input of input channel 1.

3. Then press the on-screen **CONNECT** button, or SCREEN CONTROL [soft key](#), to make the connection - the **Signal List** updates with a line between the source and destination:



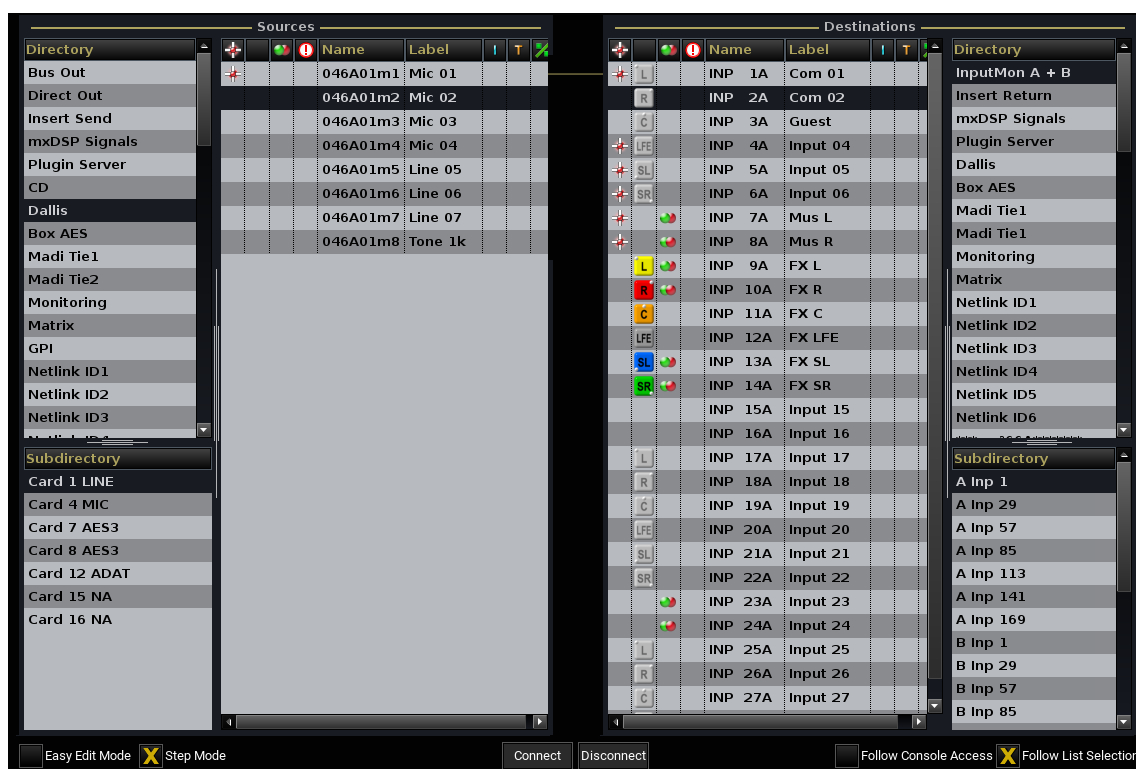
If the input channel is already [assigned](#) to a fader strip, and **INHERIT SOURCE** is selected (from the centre section [LABEL buttons](#)), then you will see the source label in the fader strip's label display.

## 18. Signal Routing & Settings

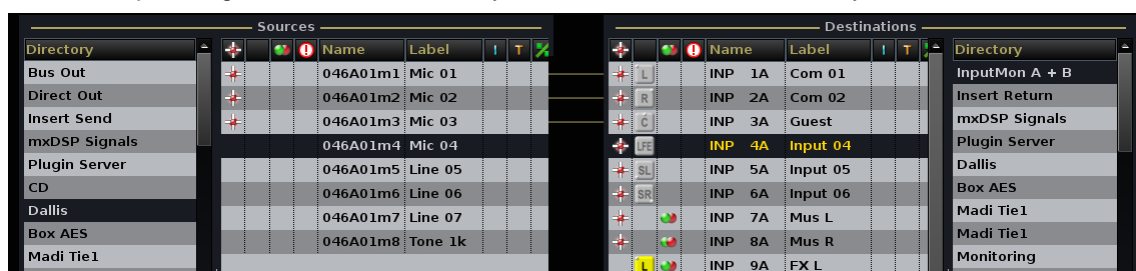
### 18.2.4 Routing Consecutive Sources to Destinations (Step Mode)

To route consecutive sources to consecutive destinations, turn on **Step mode** to speed up the connection process.

1. Select the first source – for example, **Mic 01** – and the first destination – for example, **INP 1A**. Your selected source and destination are highlighted in black.
2. *BEFORE* you press **CONNECT**, enable the on-screen **Step mode**, or select the **STEP** soft key.
3. Now press **CONNECT**. The first route is made and the source and destination selections automatically step down to the next entries in the list:



4. Continue pressing **CONNECT** until all of your sources are connected to your destinations:



If the list of sources is shorter than the list of destinations, then when you reach the last source in the list, **Step mode** automatically scrolls back up to the first source in the list. This allows you to continue making routes from the sources to the remaining destinations, for example, to route microphones 1-16 to input channels 1-16, 17-32, etc.

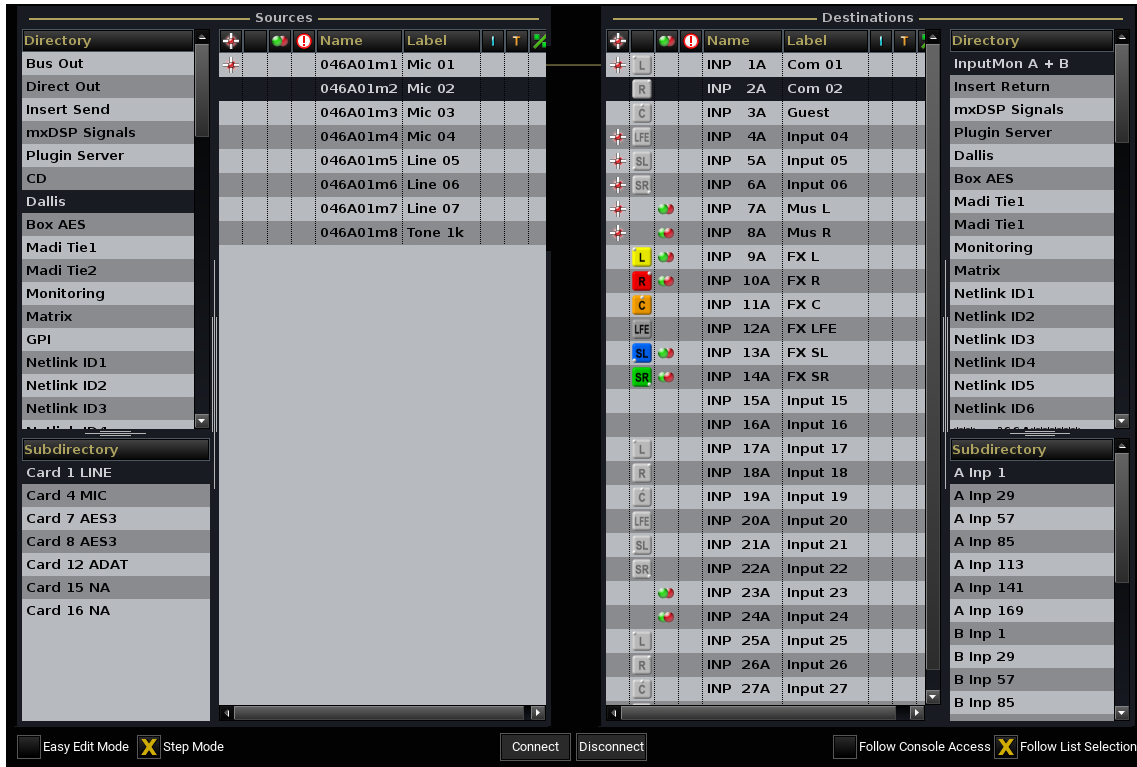
**Step mode** can also be used with an offset between the starting source and destination: for example, to route Microphones 1-16 to Input Channels 17-32, repeat the above operation but set your first destination channel to be **INP 17** rather than **INP 1**.

### 18.2.5 Disconnect

To remove a route:

1. Select the destination (e.g. **INP 2A**).
2. And press the on-screen **DISCONNECT** button, or SCREEN CONTROL soft key.

The line between the source and destination disappears:



Turn on [Step mode](#), select the first destination, and then keep pressing **DISCONNECT** to disconnect a range of destinations quickly and easily.

Note that if you route a source to a connected destination, then the previous source assignment is replaced; you don't have to disconnect the destination to assign a new source.



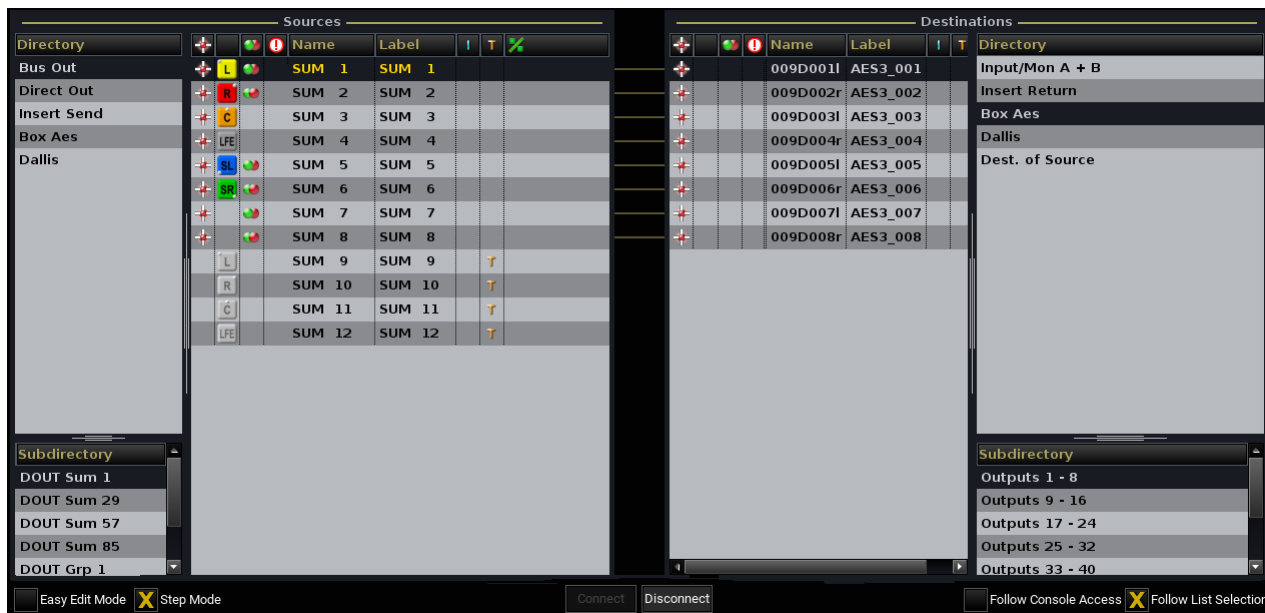
## 18. Signal Routing & Settings

### 18.2.6 More Signal Routing Examples

The same steps can be used to connect any source to any destination. For example:

➤ **To route a Sum bus to an output:**

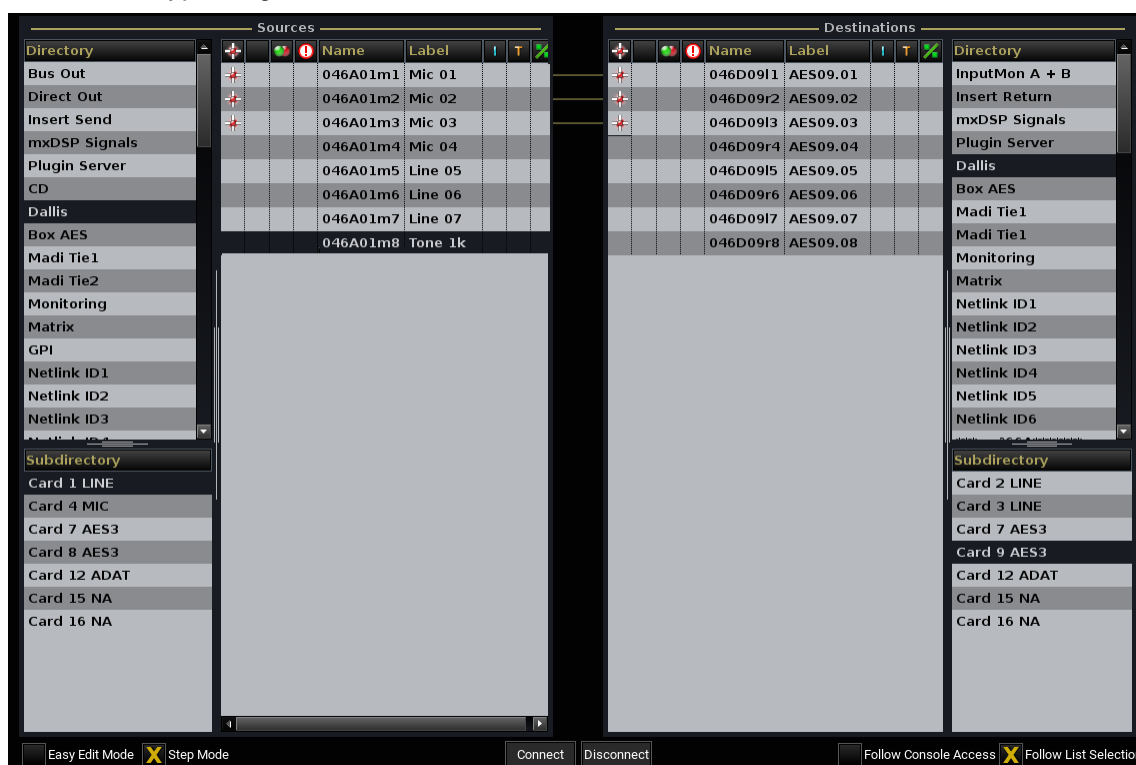
Select **Bus Out** -> **DOUT Sum 1** -> **Sum 1** as the source, and your external output as the destination:



The screenshot shows the LAWO routing console interface. On the left, the 'Sources' panel is open, showing a list of sources including 'Bus Out', 'Direct Out', 'Insert Send', 'Box Aes', 'Dallis', and 'Subdirectory'. The 'Subdirectory' panel is also open, showing 'DOUT Sum 1', 'DOUT Sum 29', 'DOUT Sum 57', 'DOUT Sum 85', and 'DOUT Grp 1'. In the center, the 'Sources' table is visible, showing a list of sources with columns for 'Name', 'Label', and 'T'. The 'Destinations' panel on the right is also open, showing a list of destinations including 'Input/Mon A + B', 'Insert Return', 'Box Aes', 'Dallis', and 'Dest. of Source'. The 'Subdirectory' panel on the right is also open, showing 'Outputs 1 - 8', 'Outputs 9 - 16', 'Outputs 17 - 24', 'Outputs 25 - 32', and 'Outputs 33 - 40'. At the bottom, there are buttons for 'Easy Edit Mode', 'Step Mode', 'Connect', 'Disconnect', 'Follow Console Access', and 'Follow List Selection'.

➤ **To route a microphone signal directly to an AES output:**

Select the mic/line input as the source, and your AES output as the destination. This makes a direct route through the matrix, bypassing the console's channel DSP.



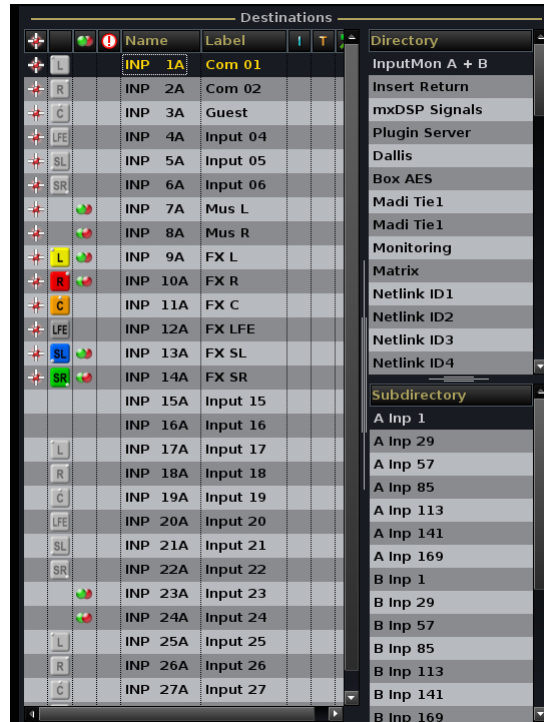
The screenshot shows the LAWO routing console interface. On the left, the 'Sources' panel is open, showing a list of sources including 'Bus Out', 'Direct Out', 'Insert Send', 'mxDSP Signals', 'Plugin Server', 'CD', 'Dallis', 'Box AES', 'Madi Tie1', 'Madi Tie2', 'Monitoring', 'Matrix', 'GPI', 'Netlink ID1', 'Netlink ID2', 'Netlink ID3', and 'Subdirectory'. The 'Subdirectory' panel is also open, showing 'Card 1 LINE', 'Card 4 MIC', 'Card 7 AES3', 'Card 8 AES3', 'Card 12 ADAT', 'Card 15 NA', and 'Card 16 NA'. In the center, the 'Sources' table is visible, showing a list of sources with columns for 'Name', 'Label', and 'T'. The 'Destinations' panel on the right is also open, showing a list of destinations including 'Input/Mon A + B', 'Insert Return', 'mxDSP Signals', 'Plugin Server', 'Dallis', 'Box AES', 'Madi Tie1', 'Madi Tie1', 'Monitoring', 'Matrix', 'Netlink ID1', 'Netlink ID2', 'Netlink ID3', 'Netlink ID4', 'Netlink ID5', 'Netlink ID6', and 'Subdirectory'. The 'Subdirectory' panel on the right is also open, showing 'Card 2 LINE', 'Card 3 LINE', 'Card 7 AES3', 'Card 9 AES3', 'Card 12 ADAT', 'Card 15 NA', and 'Card 16 NA'. At the bottom, there are buttons for 'Easy Edit Mode', 'Step Mode', 'Connect', 'Disconnect', 'Follow Console Access', and 'Follow List Selection'.

### 18.2.7 A/B Input Sources

For any input or monitor DSP channel, you can assign two sources (A and B) to provide a main and backup source for the channel.

A/B input switching is available from the fader strip, or the [Input Control](#) section. Note that the **Channel A/B Input Switch Enable** option in the [System Settings](#) must be turned on to support this feature.

The A and B input sources are assigned from the **Signal List** display:



- Select **A Inp** or **A Mon** to assign a source to the A input of a channel.
- Select **B Inp** or **B Mon** to assign a source to the B input of a channel.

## 18.2.8 Loopbacks

Version 5.4 software introduces 1016 internal loopbacks. These are virtual loopbacks which require no external physical connection.


They can be used for a variety of applications - for example, if the same source must feed multiple destinations. In our example below, the stereo program output (SUM 1 & 2) must be routed to four stereo AES destinations. Instead of routing the SUMs directly to each pair of outputs, the SUMs feed Loopbacks 1 & 2, which then in turn feed the four AES outputs. This makes it easy to alter the source at a later date, as only the routing to Loopbacks 1 & 2 needs any alteration:

*Step 1 - Assign Source to Loopbacks:*



The screenshot shows the LAWO Signal List interface. At the top, there is a clock displaying 11:48:51 and a 'Signal List' label. Below the clock, there are two main panels: 'Sources' and 'Destinations'. The 'Sources' panel has a directory on the left with options like 'Direct Out', 'Insert Send', 'Local IO', 'Generator', 'Downmix', 'Summing', 'Monitoring', and 'Loopbacks'. The 'Destinations' panel has a directory on the right with options like 'InputMon A + B', 'Insert Return', 'Local IO', 'Downmix', 'Summing', 'Monitoring', 'Loopbacks', and 'Dest. of Source'. The 'Sources' table lists SUM 1 through SUM 18. The 'Destinations' table lists LB 00:00 through LB 00:21. The 'Sources' table is selected, and the 'Destinations' table is also visible. The 'Destinations' table is currently empty.

*Step 2 - Assign Loopbacks to Destinations:*



The screenshot shows the LAWO Signal List interface. At the top, there is a clock displaying 11:50:38 and a 'Signal List' label. Below the clock, there are two main panels: 'Sources' and 'Destinations'. The 'Sources' panel has a directory on the left with options like 'Bus Out', 'Direct Out', 'Insert Send', 'Local IO', 'Generator', 'Downmix', 'Summing', 'Monitoring', and 'Loopbacks'. The 'Destinations' panel has a directory on the right with options like 'InputMon A + B', 'Insert Return', 'Local IO', 'Downmix', 'Summing', 'Monitoring', 'Loopbacks', and 'Dest. of Source'. The 'Sources' table lists LB 00:00 through LB 00:21. The 'Destinations' table lists AES3 01 through AES3 16. The 'Sources' table is selected, and the 'Destinations' table is also visible. The 'Destinations' table is currently empty.

### 18.2.9 Reverse Interrogation of Signal Routing

Reverse interrogation provides a quick way of viewing all the sources feeding a particular destination, or all destinations routed from a particular source.

➤ To view all the destinations fed from a source:

1. Select the source you wish to interrogate on the left of the display – e.g. **Tone1**.
2. Then right-click and select **Show Destinations of source**, or press the **DoS** (Destinations of Source) soft key:



A list of all current destinations for the selected source appears in the **Destinations** list:



Note that if the source is routed to an input or monitor channel, then for each channel assignment you will see three routes: Source to Input; Source to Input A; Source to Input B.

➤ To find the source which feeds a destination, reverse the procedure:

1. Select the destination you wish to interrogate on the right of the display.
2. Then right-click and select **Show Source of destination**, or press the **SoD** (Source of Destination) [soft key](#):



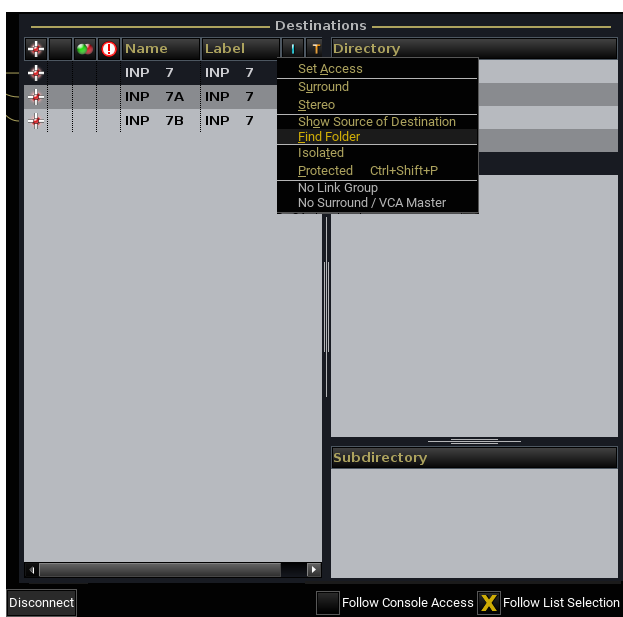
The source assigned to the selected destination appears in the **Sources** list.

### Find Folder

If you are unsure which directory or subdirectory this source (or destination) belongs to, then:

1. Right-click on the destination (or source), and select **Find folder**.

The **Directory** and **Subdirectory** update to reveal the correct folder for the selected destination:



### 18.2.10 Creating Stereo or Surround Channels/Busses

While making routes from the **Signal List** display, you can also configure whether your channels and busses are mono, stereo or surround.

➤ **To create a stereo input channel:**

1. Select an odd numbered input channel from the **Destinations** list (e.g. **INP 7**).
2. Press the **STEREO** soft key, or right-click and select the **Stereo** option:

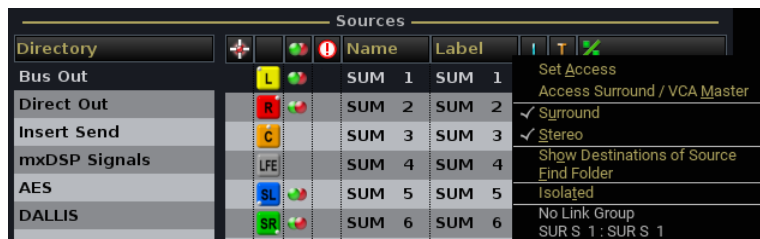


This links the selected channel to its adjacent DSP path. For example, INP 7 and INP 8.

You can link any odd/even pair of input or monitor channels using this method. Alternatively, select a **Bus Out** from the **Sources** list to create a stereo bus master.

➤ **To create a surround sum:**

1. Select the first sum for the surround output from the **Sources** list (e.g. **SUM 1**).
2. Press the **SURROUND** soft key, or right-click and select the **Surround** option:



This links consecutive sums, according to the [global surround format](#), and automatically assigns a [Surround VCA](#) - in our example, **SUR S 1**.

You can configure surround sums, groups or auxes using this method. Alternatively, select **InputMon** from the **Sources** list to configure surround input or monitor channels.

For surround inputs, panning is automatically reset so that INP 9 feeds SUM 1, INP 10 feeds SUM 2, etc. The best way to position a surround channel within the surround field is using [Hyper Pan](#).

Surround channels can only be created in 8-channel blocks, so you must select Sum 1, 9, 17, etc. You cannot select **Surround** if you right-click on an invalid channel number.

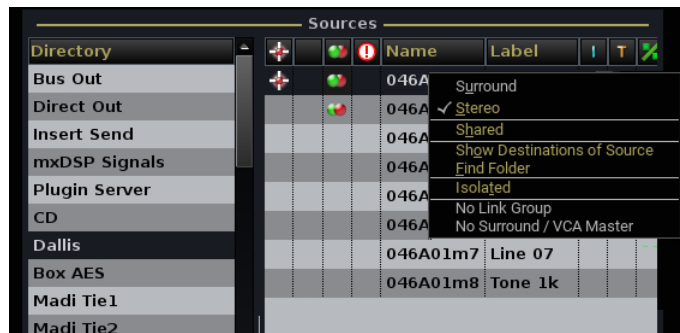
Note that the front and rear left/right pairs of a surround channel are automatically linked for stereo. This is for convenience when [revealing](#) the component channels. The stereo linking is only a default state; you can deselect the stereo link at any time.

### 18.2.11 Stereo Signals

You can link external signals as **Stereo**. This affects the behaviour of the signal's [IO DSP](#), but signal routing is still handled independently.

For example, if you link two microphone signals, they can be routed to destinations independently, but their IO DSP operates in stereo.

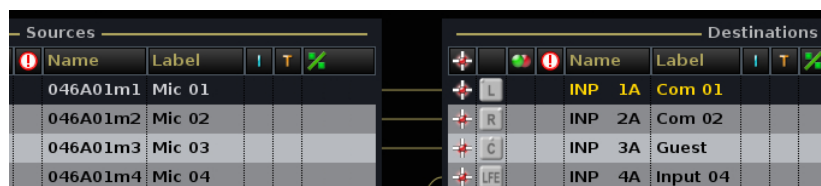
1. Select the odd numbered source you wish to link.
2. Then right-click and select **Stereo**:



The red and green circles in the Stereo column reflect the status .

### 18.2.12 Editing User Labels

The user **Label** for each source and destination can be edited from the **Signal List** display. It is stored and recalled by both snapshots and productions:



The source and destination **Name** is defined by the AdminHD configuration, and cannot be edited from the Central GUI. This provides a fixed **Name**, relevant to the installation, which remains consistent for all users.

For input (and monitor return) channels, you can use the Source **Label** field to edit the INHERIT SOURCE labels, and the Destination **Label** field to edit the CHANNEL USER labels. You can also label Sums, Groups and Auxes in a similar manner.

#### ➤ To edit a label:

1. Click on the label field - either once to overwrite (the text highlights), or twice to modify the existing name (a flashing cursor will appear).
2. Enter a new name using the console keyboard.
3. Press **ENTER** to confirm the new name. Or, if you make a mistake or want to exit without making any changes, press **ESC**.



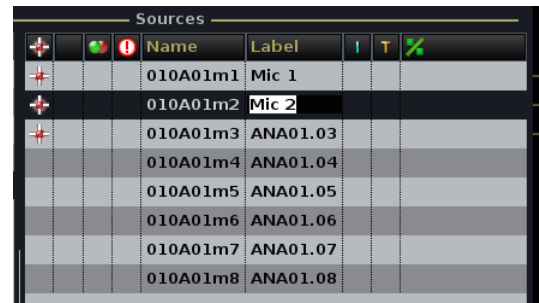
### Easy Edit Mode

You can use **Easy Edit** mode to speed up the labeling process. This mode carries forward your text, so that you can quickly enter the same label for multiple signals. Or, if the label ends with a number, then the number will increment.

1. *BEFORE* editing your first source or destination label, turn on **Easy Edit** at the bottom of the **Signal List** display.
2. Then select and edit your first source or destination label in the usual manner - e.g. **Mic 1**.
3. Press **ENTER** to confirm the new name - the system now steps down to the next signal in the list, and automatically carries forward the text label.

If the text ends with a number, then the number increments.

If the label does not end with a number, then the same text is carried into the next label field.



Sources			
	Name	Label	I T X
+	010A01m1	Mic 1	
+	010A01m2	Mic 2	
+	010A01m3	ANA01.03	
+	010A01m4	ANA01.04	
+	010A01m5	ANA01.05	
+	010A01m6	ANA01.06	
+	010A01m7	ANA01.07	
+	010A01m8	ANA01.08	

4. When you have entered the last label, press **ESC** to exit the labelling mode.

You can temporarily enable **Easy Edit** using the console keyboard **SHIFT** button as follows:

- Select the first signal label and enter a new label in the usual manner.
- Press and hold **SHIFT** and then press **ENTER** - the system steps down to the next signal in the list, and automatically carries forward the text label.
- Keep holding **SHIFT** and pressing **ENTER** until you have labeled all the required fields.
- Press **ESC** to exit the labeling mode.



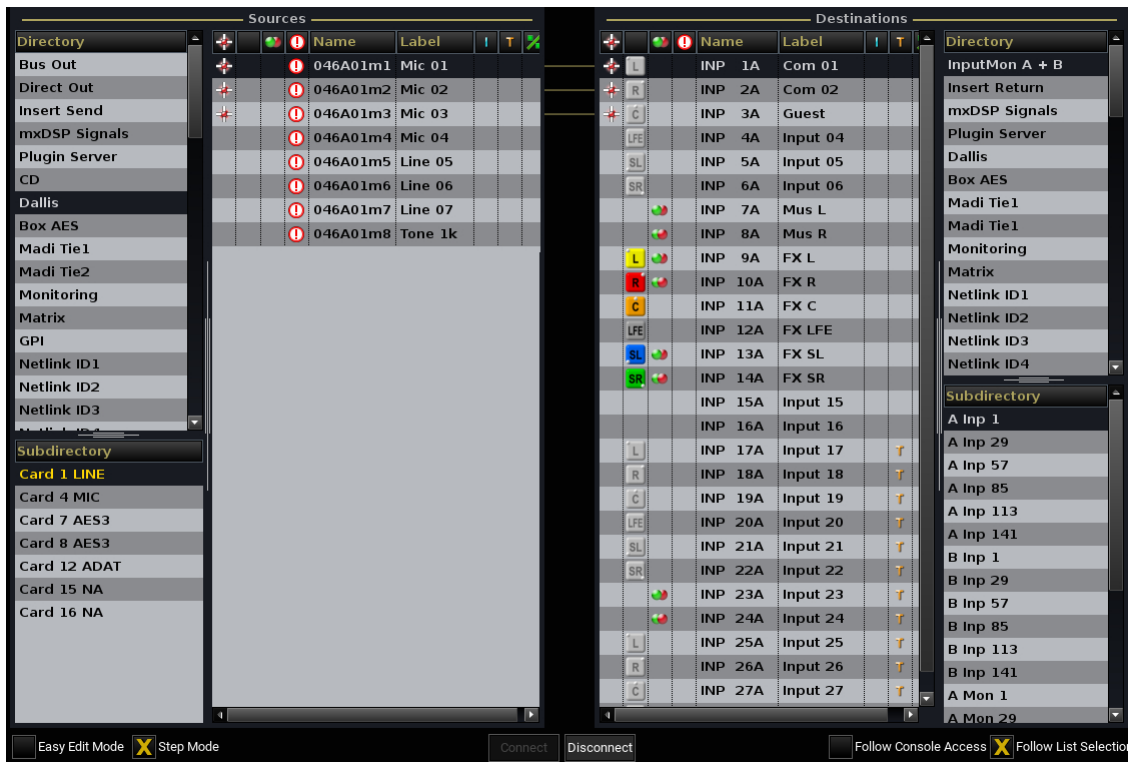
### 18.2.13 Not Available Signals

If a warning flag is present within the unavailable column, then a signal is currently unavailable.

When running [mxGUI](#) offline, all signals appear as unavailable.

The warning flags can be useful for fault finding and reassurance. For example, in an outside broadcast vehicle, you can have a number of remote DALLIS or Compact IO stageboxes. During the setup for the broadcast, you can make routes from microphone sources which connect to these stageboxes, even if the stagebox is not yet connected.

The warning flag indicates that the signal is currently unavailable. However, you can continue to label the signal and make routes to/from it as normal:



The screenshot displays the mxGUI interface for signal routing. It features three main panels: 'Sources', 'Destinations', and 'Subdirectory'.

**Sources Table:**

Name	Label	I	T	%
046A01m1	Mic 01			
046A01m2	Mic 02			
046A01m3	Mic 03			
046A01m4	Mic 04			
046A01m5	Line 05			
046A01m6	Line 06			
046A01m7	Line 07			
046A01m8	Tone 1k			

**Destinations Table:**

Name	Label	I	T	%
INP 1A	Com 01			
INP 2A	Com 02			
INP 3A	Guest			
INP 4A	Input 04			
INP 5A	Input 05			
INP 6A	Input 06			
INP 7A	Mus L			
INP 8A	Mus R			
INP 9A	FX L			
INP 10A	FX R			
INP 11A	FX C			
INP 12A	FX LFE			
INP 13A	FX SL			
INP 14A	FX SR			
INP 15A	Input 15			
INP 16A	Input 16			
INP 17A	Input 17			
INP 18A	Input 18			
INP 19A	Input 19			
INP 20A	Input 20			
INP 21A	Input 21			
INP 22A	Input 22			
INP 23A	Input 23			
INP 24A	Input 24			
INP 25A	Input 25			
INP 26A	Input 26			
INP 27A	Input 27			

**Subdirectory:**

- InputMon A + B
- Insert Return
- mxDSP Signals
- Plugin Server
- Dallis
- Box AES
- Madi Tie1
- Madi Tie2
- Monitoring
- Matrix
- GPI
- Netlink ID1
- Netlink ID2
- Netlink ID3
- Netlink ID4
- Subdirectory
  - A Inp 1
  - A Inp 29
  - A Inp 57
  - A Inp 85
  - A Inp 113
  - A Inp 141
  - B Inp 1
  - B Inp 29
  - B Inp 57
  - B Inp 85
  - B Inp 113
  - B Inp 141
  - A Mon 1
  - A Mon 29

At the bottom, there are checkboxes for 'Easy Edit Mode', 'Step Mode', 'Connect', 'Disconnect', 'Follow Console Access', and 'Follow List Selection'.

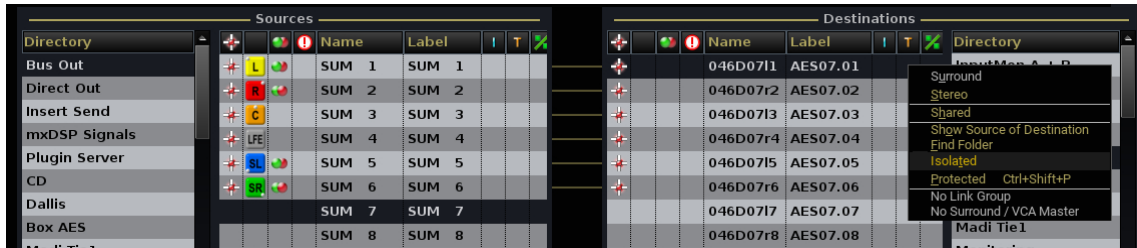
When the Stagebox is connected to the system the column updates accordingly and the warning flag disappears.

### 18.2.14 Isolated Signals

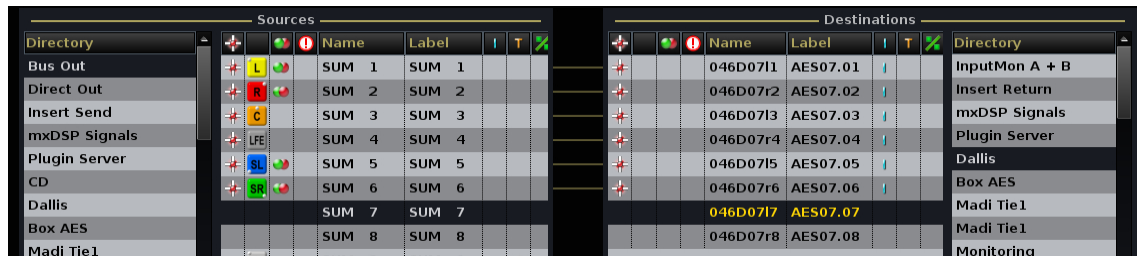
The **I** column indicates if a signal is isolated from a snapshot recall. For example, you may wish to protect important signals, such as main sum distribution or monitor feeds, from accidental reset.

On sources, only the source parameters are isolated. On destinations, the destination parameters and any routes made to the destination are isolated. Therefore, to isolate matrix crosspoints, select the destination.

1. Right-click on the source or destination and select the **Isolated** option:



The **I** column updates to identify all isolated signals:



Note that the isolate function does not prevent routes from being stored when a snapshot is saved or updated; Isolate only applies when settings are loaded back from a snapshot.

Snapshot isolates are stored and recalled by productions.

Individual signals can be isolated or protected, at a lower level, using a Custom Function - see [Snap Iso List](#). Or by the factory configuration (using a [.tcl](#) file).

### 18.2.15 Protected Signals

To apply more comprehensive protection to a matrix destination, then it can be protected so that nothing can alter its connection.

Once protected, nothing can alter the connection to the destination – not the **Signal List** or **mx Routing** displays, not snapshots, productions, mxGUI or remote MNOPL. This is ideal for critical signals, such as mains distribution.

Note that only destinations can be protected.

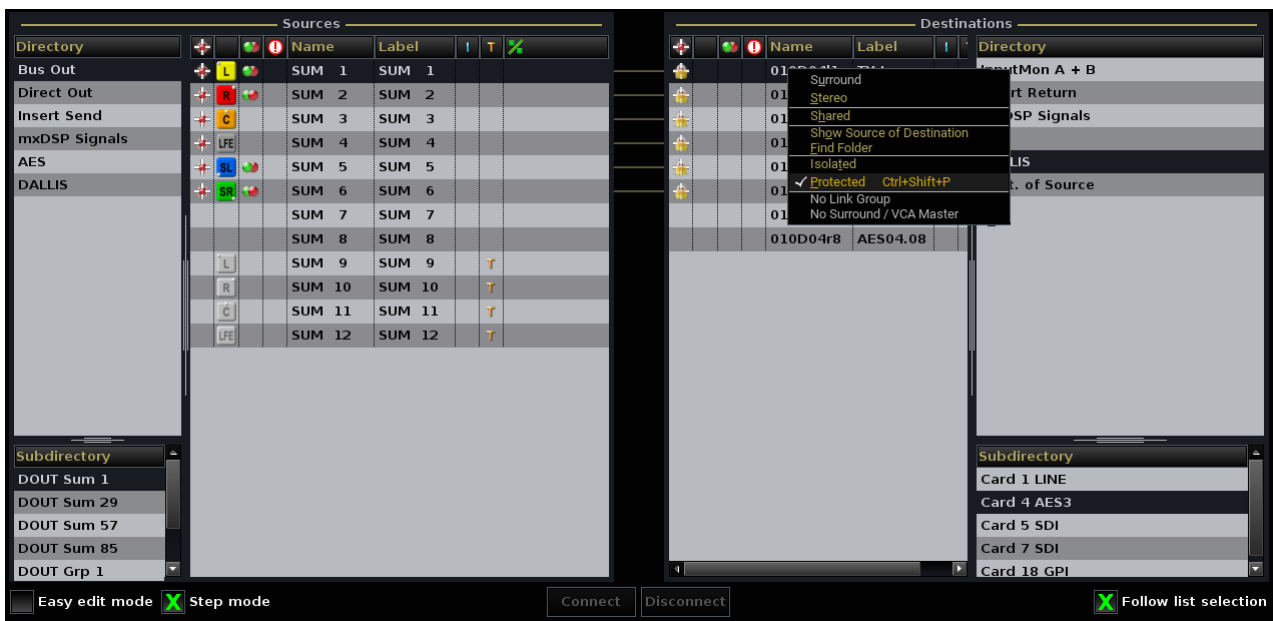
The state of protected signals is not saved or loaded by productions, snapshots or automation. Therefore, any changes are permanent, and affect all users, unless you deselect the **Protected** option.

Individual signals can be isolated or protected, at a lower level, using a Custom Function - see [Snap Iso List](#). Or by the factory configuration (using a [.tcl](#) file).

#### ➤ To protect a destination signal:

1. Select the destination you wish to protect.
2. Right-click and select the **Protected** option.

*Protected destinations are displayed with a padlock icon in the connection column:*

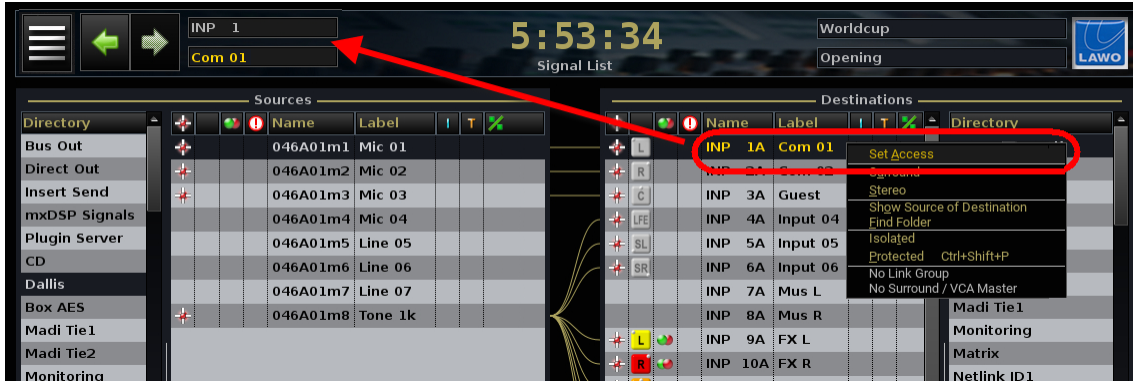


3. To change the route to a protected destination, you must first turn off the **Protected** option.

### 18.2.16 Set Access & Access Surround/VCA Master

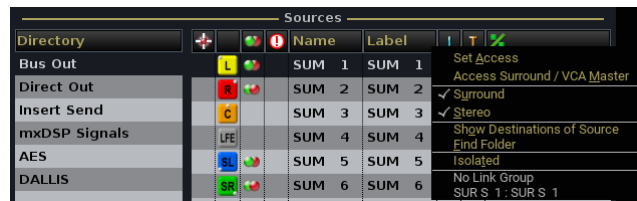
The following method can be used to quickly place the selected channel [in access](#):

1. Right-click on the (source or) destination channel and choose **Set Access** - the channel in access updates:



Note that for surround channels, you can select either the component channel or its Surround VCA Master:

- **Set Access** - selects the component channel (e.g. SUM 1).
- **Access Surround / VCA Master** - selects the surround VCA Master (e.g. SUR S 1).



The **Set Access** option *only* appears if you right-click on a DSP channel; you cannot place an input or output signal into access.

The **Access Surround / VCA Master** option *only* appears if you right-click on a component of a surround DSP channel; if the channel is not part of a surround group, then you will not see this option.

## 18. Signal Routing & Settings

### 18.2.17 Follow Console Access

This option forces the **Signal List** to follow the "channel in access". For example:

1. Make sure that the **Follow console access** option is enabled.
2. Then press a fader **SEL** button on a fader strip controlling an input channel. The **Destinations** side of the display automatically updates to show the selected channel - in our example, INP 11:



The screenshot shows the LAWO Signal List interface. At the top, the time is 7:12:24. The 'Signal List' title is centered. On the left, the 'Sources' list is visible, showing various input channels like LINE 1 through LINE 16. On the right, the 'Destinations' list is visible, showing input channels INP 1A through INP 24A. The 'INP 11' channel is highlighted in the 'Destinations' list. At the bottom, the 'Follow Console Access' option is checked, indicated by a yellow 'X' in a box.

3. Similarly, if you press a fader **SEL** button on a fader strip controlling an output (e.g. AUX 25) - the **Sources** side of the list automatically reveals the Aux bus master:

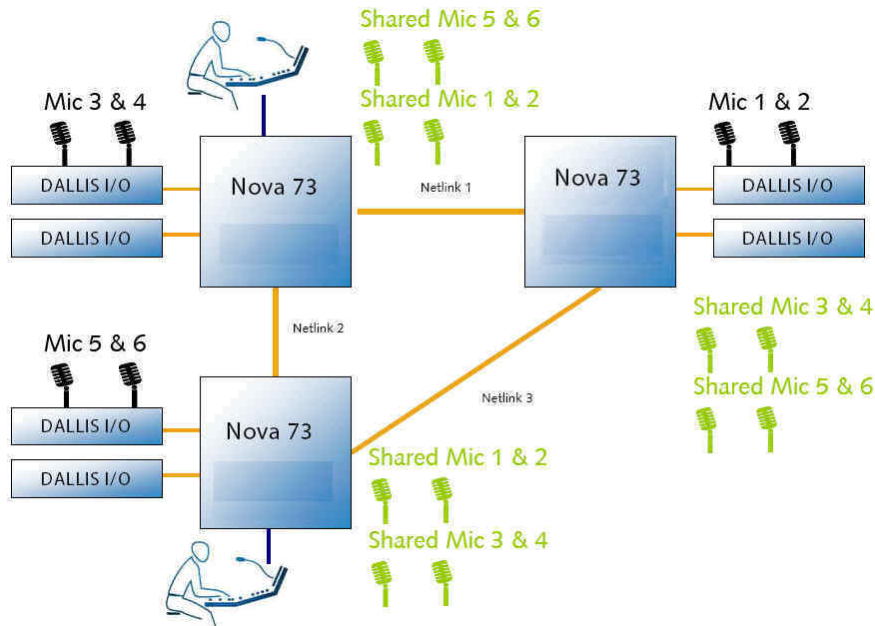


The screenshot shows the LAWO Signal List interface. At the top, the time is 7:17:49. The 'Signal List' title is centered. On the left, the 'Sources' list is visible, showing various auxiliary channels like AUX 1 through AUX 24. The 'AUX 8' channel is highlighted in the 'Sources' list. On the right, the 'Destinations' list is visible, showing auxiliary channels Aes01L through Aes12R. At the bottom, the 'Follow Console Access' option is checked, indicated by a yellow 'X' in a box.

4. To interrogate the routing assignments further, right-click and select "Destinations of Source" (or "Source of Destination"). See [Reverse Interrogation](#).

## 18.2.18 Networking I/O Resources

The mc<sup>2</sup>66 MKII is just one member of the mc<sup>2</sup>/Nova family of products which share the same hardware and software. The Nova73 and DALLIS system is available in its own right as a stand alone routing matrix. Multiple systems can 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 can be MADI, RAVENNA, AES or analog audio, and signals are dynamically allocated as each operator makes routes from the **Signal List** display.

Any number of sources can 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.

All Lawo products use a consistent software release numbering system to indicate compatibility. In each case, the first three digits of the software versions *must* match.

So, for example, a mc<sup>2</sup>66 console running version **5.10.0.2** can be networked to another mc<sup>2</sup>/Nova system running **5.10.0.x**. You can check the software version of your mc<sup>2</sup> system from the [Global Options](#) in the **System Settings** display.

Note that a warning icon will appear in the [Status Bar](#) if the networked connection fails.


## 18. Signal Routing & Settings

### Sharing Sources

On the system which is distributing the signals – in our example, console A - you can select which sources are shared from the **Signal List** display.

1. Select the source you wish to share (e.g. **Mic1**).
2. Right-click and select the **Shared** option, or press the **SHARE** soft key:




An  icon appears in the % column to indicate that the source is now shared.

3. Press **SHARE** again to unshare the source.

You *cannot* unshare a source if it has been routed as an imported source within another console. For example, if console B has made a route using the Mic 1 signal, then console A cannot unshare the Mic 1 source until console B's route is removed. This protects one console from removing routes which are in use by another within the network.

If you wish to share a number of sources, then enable [Step mode](#) to step through and **SHARE** a number of sources.

Once the source has been shared from console A, then other consoles within the network can access this source from their **Signal List** display. An  icon appears in the % column to indicate that the source is imported.

Console B will *only* be able to access the source if its AdminHD configuration has been programmed to do so – i.e. a location for the imported source must have been created within **Directory** and **Subdirectory**. Please consult your technical department for further details.

Once console B can 'see' the imported source, then making a route or changing parameters is done in exactly the same way as if the source were local to the console.

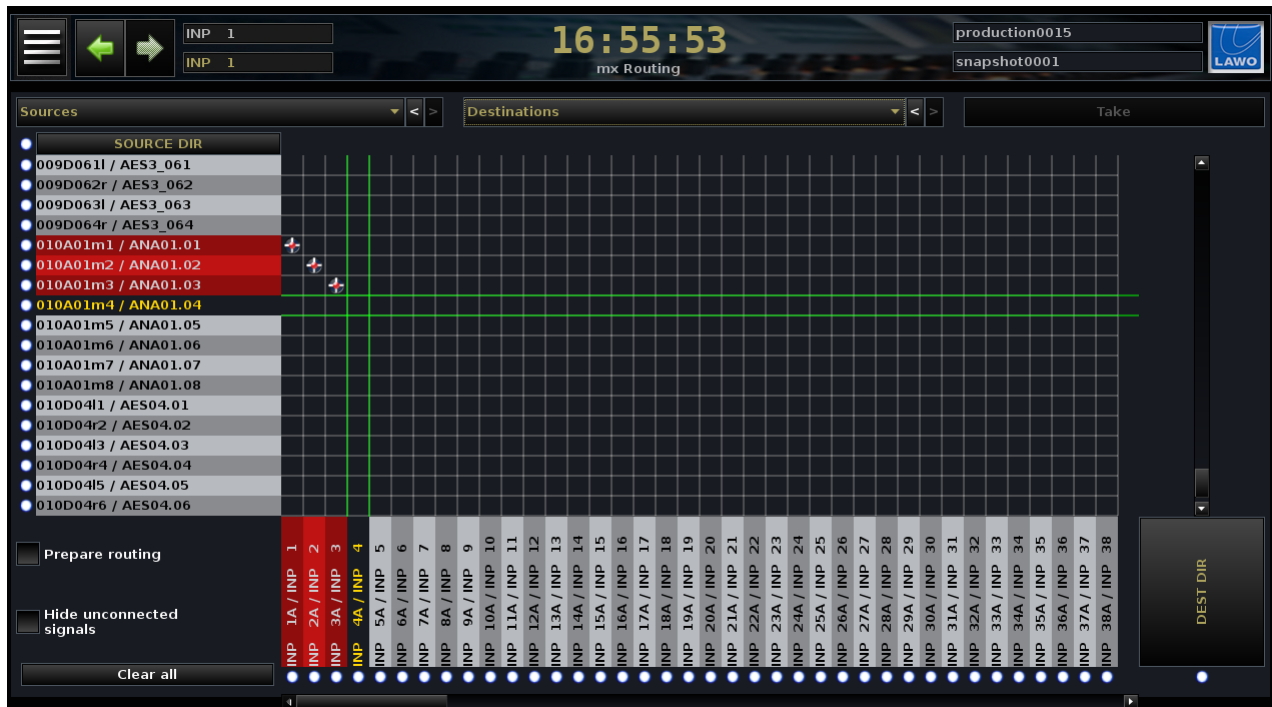
All consoles within the network have access to the source parameters, and the last console to make a change wins. In our example, consoles A and B both have access to mic pre-amp control for mics 1 and 2. Similarly for a shared digital destination, both consoles can change parameters like SRC, etc.

This philosophy extends to snapshots. So if both console A and B are using the Mic 1 signal, parameter settings like mic gain, etc. can be reset from snapshots from either console. To control which console resets the mic parameters, use the **IO** [Global Snapshot Isolate](#) option to prevent recall of IO settings. Alternatively, you can employ a third party system, such as VSM, to manage control priorities.

## 18.3 The mx Routing Display

This display provides an alternative view of the signal routing.

1. [Open](#) the **mx Routing** display in the usual manner:



This display provides a crosspoint overview of signal routing, with sources running down the left hand side, and destinations running across the bottom. The names of the source and destination directories are shown at the top of the display – in our example, all **Sources** and all **Destinations**.

If a source or destination is connected, then it is highlighted in red. If the source and destination are both in view, you will see a red and white cross on the grid to show the crosspoint connection. If a destination is protected, you will see a padlock icon.

The **mx Routing** display can view or change signal routing, and access many of the same options as the [Signal List](#). Any changes are reflected in the **Signal List** display, and vice versa.

This section concentrates on operations which *cannot* be performed from other displays. They are:

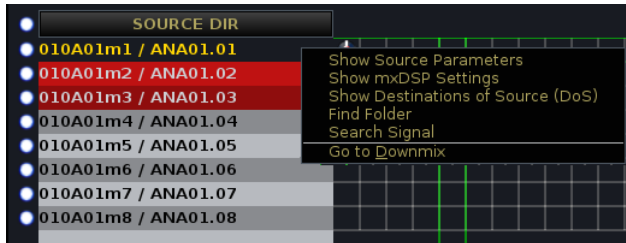
- [Signal routing](#) - via the crosspoint matrix.
- [Search signal](#) - to locate a signal by name or label.
- [Preparing signal routing](#) - to prepare a set of connections and then action them simultaneously.
- [Partial snapshots](#) - to store and recall selected routing crosspoints.



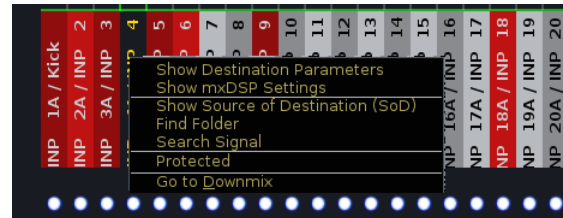
## Right-click Functions

If you right-click on a signal, then the following functions become available. Note that most of these are "duplicate" functions, so please follow the links below for more details:

*Right-click on Source signal*



*Right-click on Destination signal*

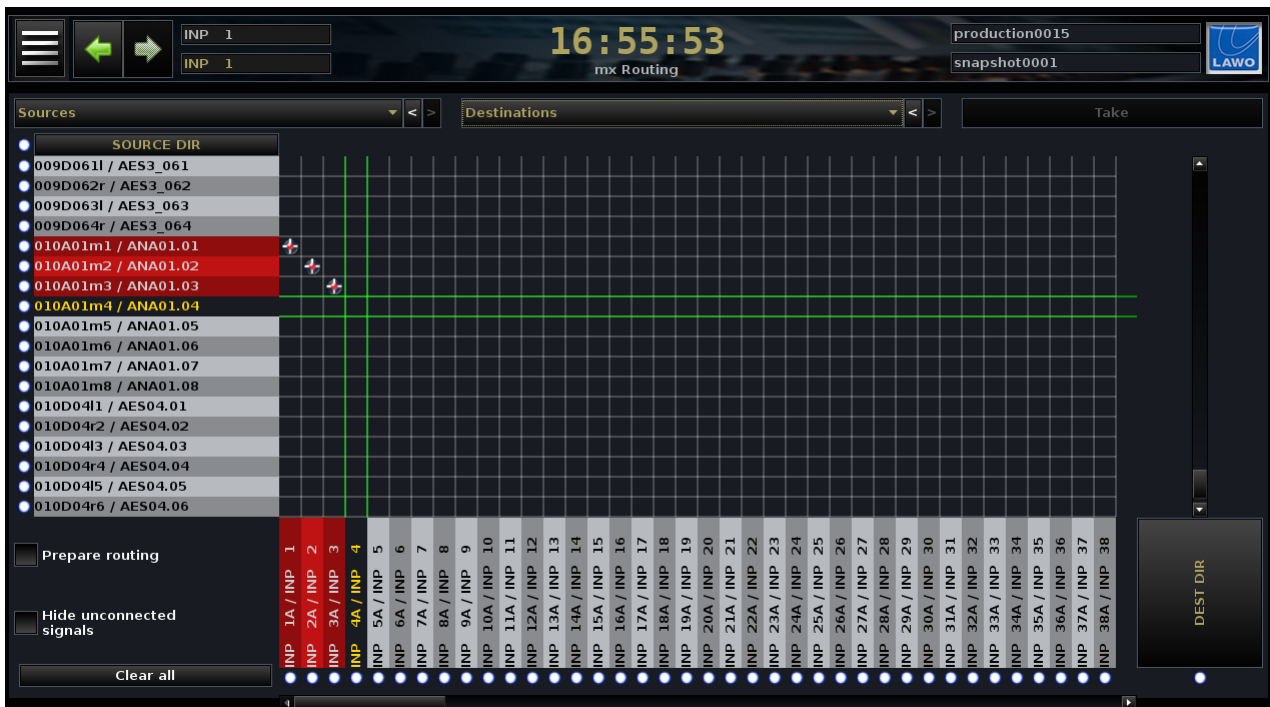


- **Show Source/Destination Parameters** - opens a pop-up window where you can adjust parameters for the selected signal. These options are identical to those found on the [Signal Settings](#) display.
- **Show mxDSP Settings** - opens a pop-up window where you can adjust mxDSP parameters. These options are identical to those found on the [mxDSP Settings](#) display.
- **Show Dest of Source/Source of Dest** - provides reverse interrogation of signal routing, and works in a similar manner to the [Signal List](#) display.
- **Find Folder** - reveals the signal's folder, and works in a similar manner to the [Signal List](#) display.
- **Search Signal** - covered [later](#) in this section. Note that this operation is *only* available from the **mx Routing** display.
- **Protected** - protects the selected destination, and works in a similar manner to the [Signal List](#) display.
- **Go to Downmix** - if the selected signal is an input or output to a downmix matrix, then this option automatically opens the [Downmix](#) display.

### 18.3.1 Signal Routing from the mx Routing Display

To make a route from the **mx Routing** display:

1. Position the cursor to select a source and a destination - the crosspoint is highlighted in green:

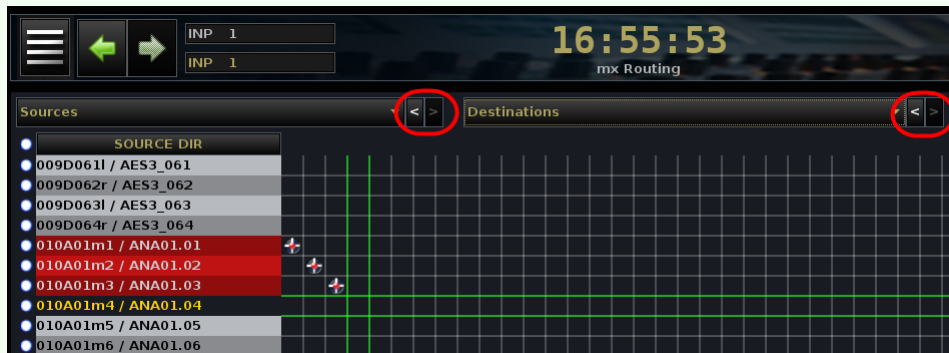


2. And press the left mouse key to make (or unmake) the connection - the route is made as indicated by a red and white cross.
3. You can choose to display *only* connected signals by selecting the **Hide Unconnected Signals** checkbox.

4. You can choose to view a particular source or destination **Directory**, by clicking on the drop-down **Sources** (or **Destinations**) list - the available Directories and Subdirectories are identical to those found in the [Signal List](#):



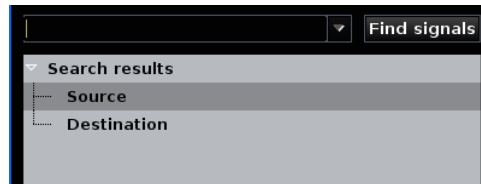
Use the on-screen next and previous directory buttons to quickly navigate to recent directory selections:



## 18.3.2 Search Signal

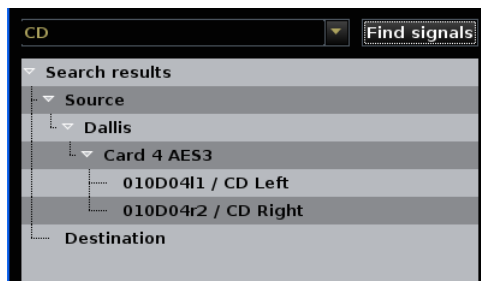
This function is *only* available from the **mx Routing** display (it is not available from the **Signal List**) and allows you to search for a signal by name or label. For example, you may suspect that a CD player is connected to the system but do not know its directory:

1. Right-click anywhere within the matrix grid, and select **Search Signal** to open the **Signal find** pop-up window:

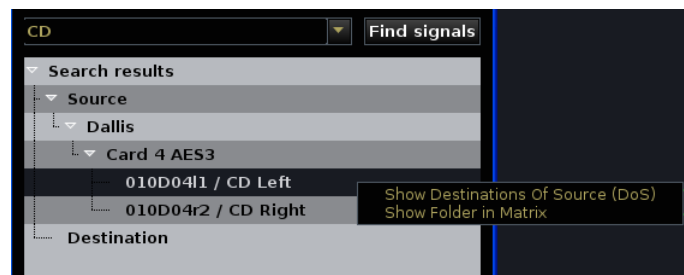


2. Type in the name or user label of the source (or destination) you wish to locate – in our example, **CD**.
3. Then select **find signals**.

The system searches the system name and user label for all matching text strings – in our example two sources named CD Left and CD Right have been found:



4. Now select one of the results and right-click:
  - Use **Show Destinations of Source (DoS)** to view all connections made from the source.
  - Or, **Show Folder in Matrix** to open the source directory.



## 18.3.3 Preparing Signal Routing (the Take Button)

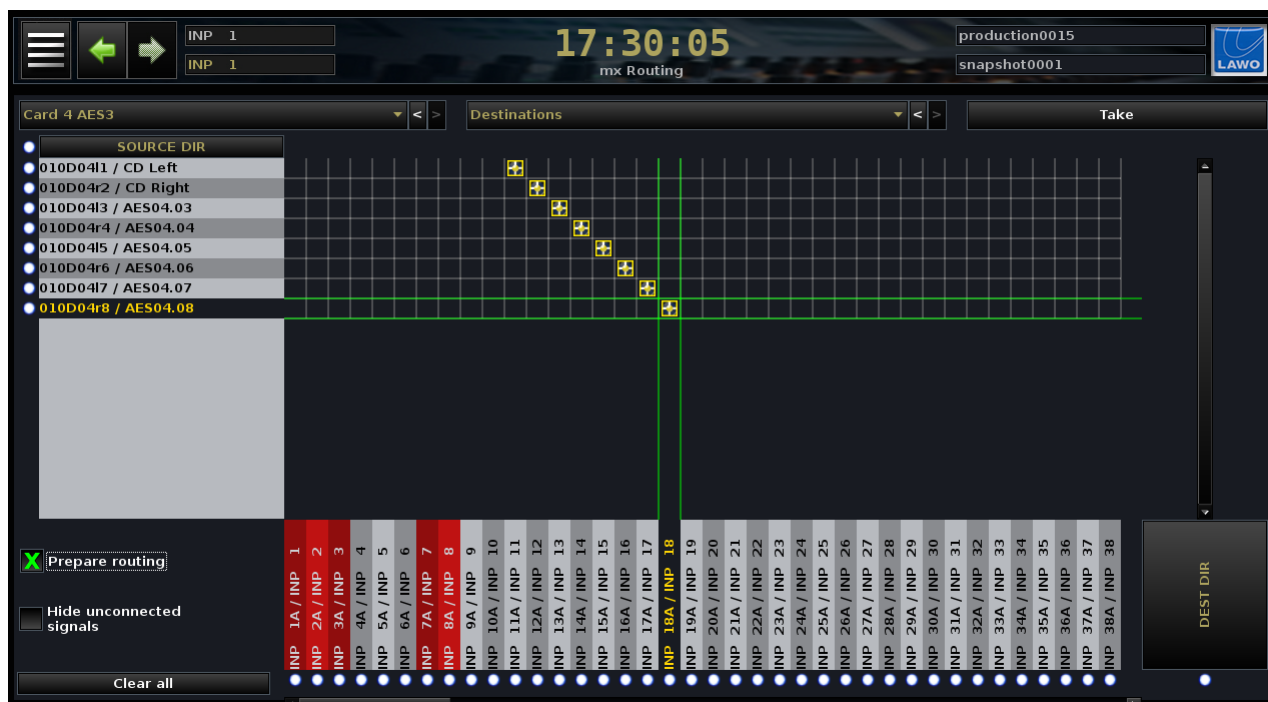
The **mx Routing** display allows you to prepare a set of connections and then action them simultaneously – for example, to route 8 returns from a digital effects unit to 8 channels all from one button press.

1. *BEFORE* you make or unmake any connections, select the **Prepare Routing** checkbox on the left of the display.

This puts the display into 'prepare' mode.

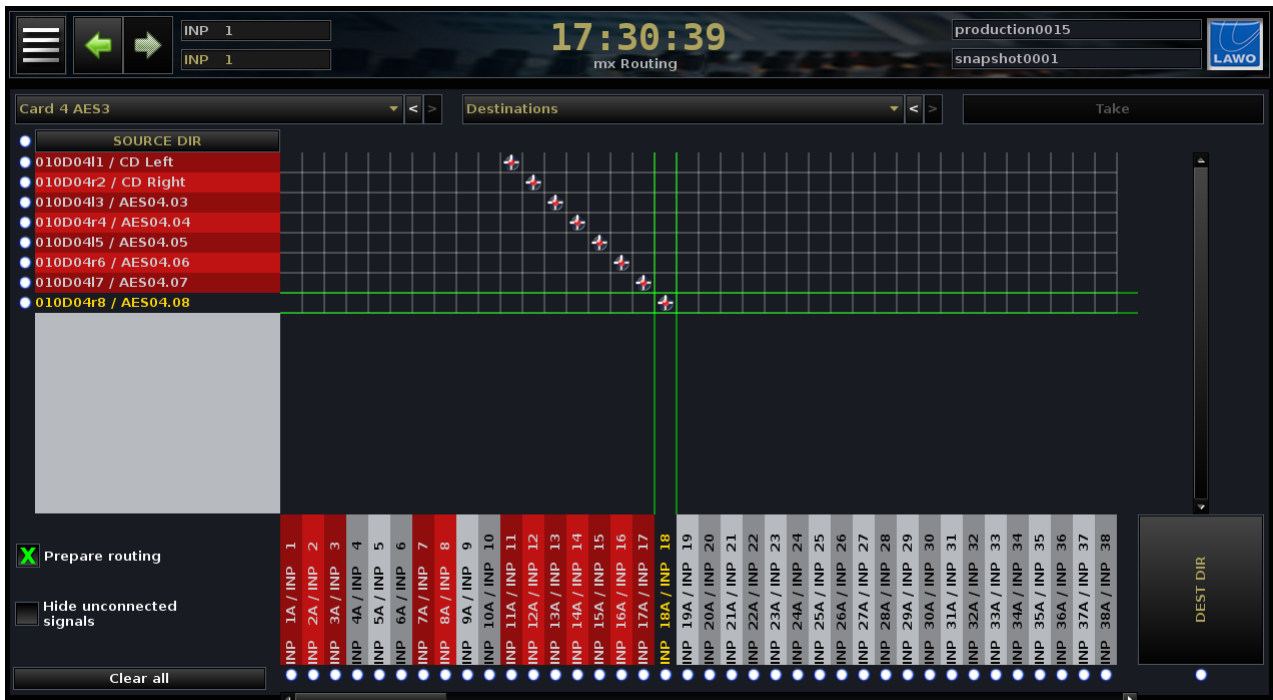
2. Now make (or unmake) the connections – in our example, AES returns to INP channels 11 to 18.

At this stage, the connections have only been prepared and are not yet active; therefore they are displayed with a different icon:



3. When you have completed the prepared routes, select the **Take** button at the top right of the display.

All prepared connections (and disconnections) are actioned, and the icons change state to reflect the routes made:



4. You can now prepare another set of connections and action them from the **Take** button.
5. When you are finished, remember to deselect the **Prepare Routing** checkbox to return the display to its normal mode of operation.

### 18.3.4 Partial Snapshots

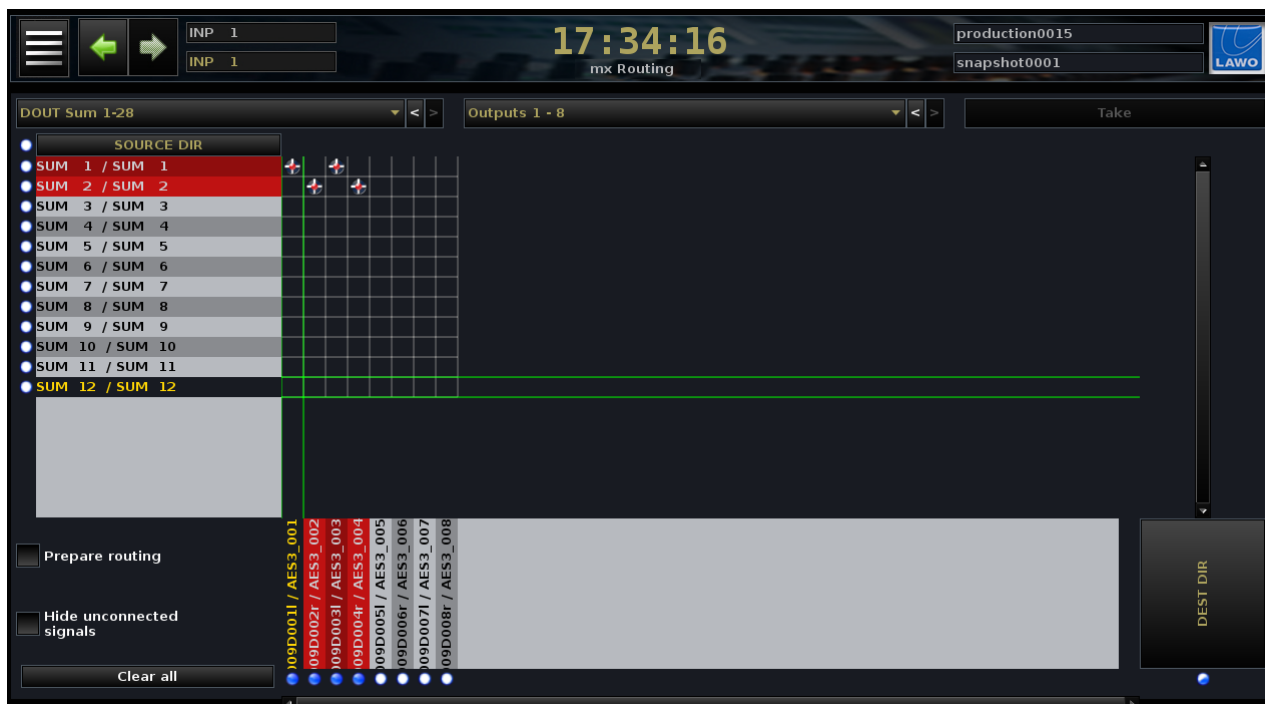
A partial snapshot is designed to store selected routing crosspoints. For example, you could use a partial snapshot to route tone to all transmission feeds for a line check without affecting other aspects of the mix.

A partial snapshot also stores and recalls signal parameters such as mic pre-amp gain and SRC on/off for the selected sources and destinations.

Partial snapshots are prepared from the **mx Routing** display, and then saved and loaded from the **Snapshot List** display.

1. Open the [mx Routing](#) display.
2. Use the circles beside each source and destination to select which will be stored within the partial snapshot - when a source or destination is selected, its circle turns blue.
  - If you select a destination, the partial snapshot stores the route made to the destination and the destination's IO parameters.
  - If you select a source, the partial snapshot stores only the source IO parameters.

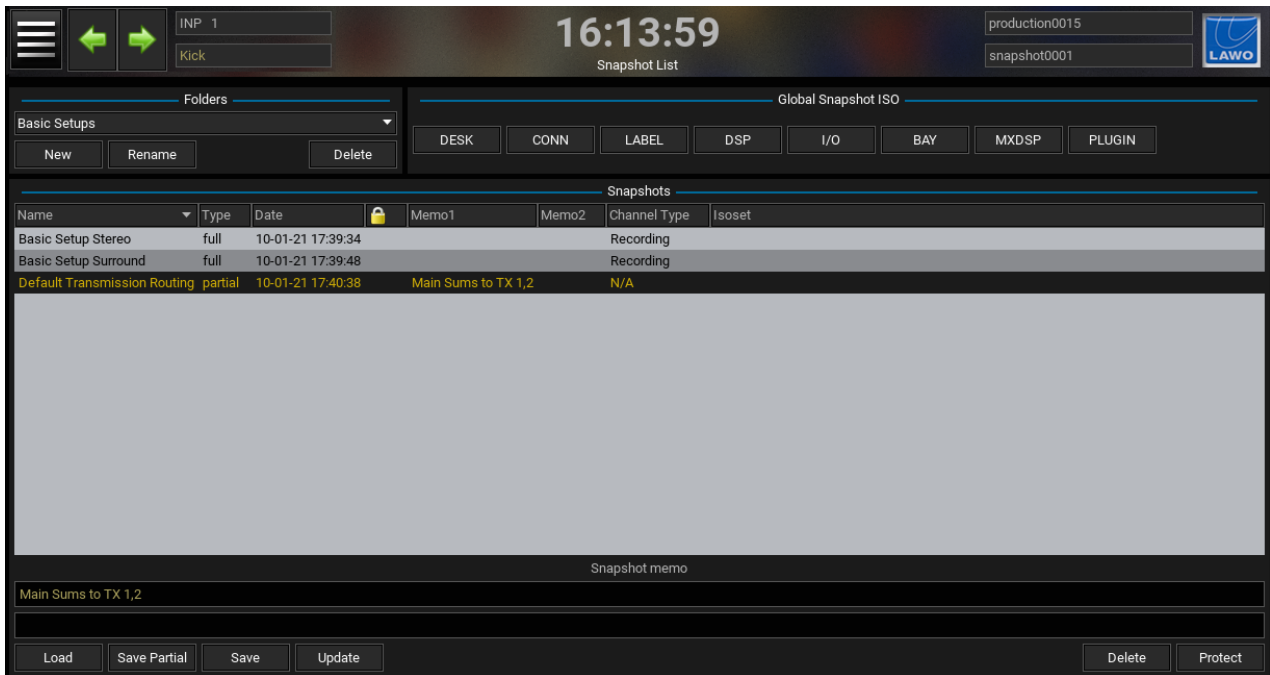
Therefore, to store crosspoints in a partial snapshot, *a/ways* select the destinations. In our example, we have selected four AES destinations:



Note that the half blue circle beside **DEST DIR** indicates that some signals within the current directory are selected. To select all sources or all destinations within a directory, click on this circle to turn it fully blue.

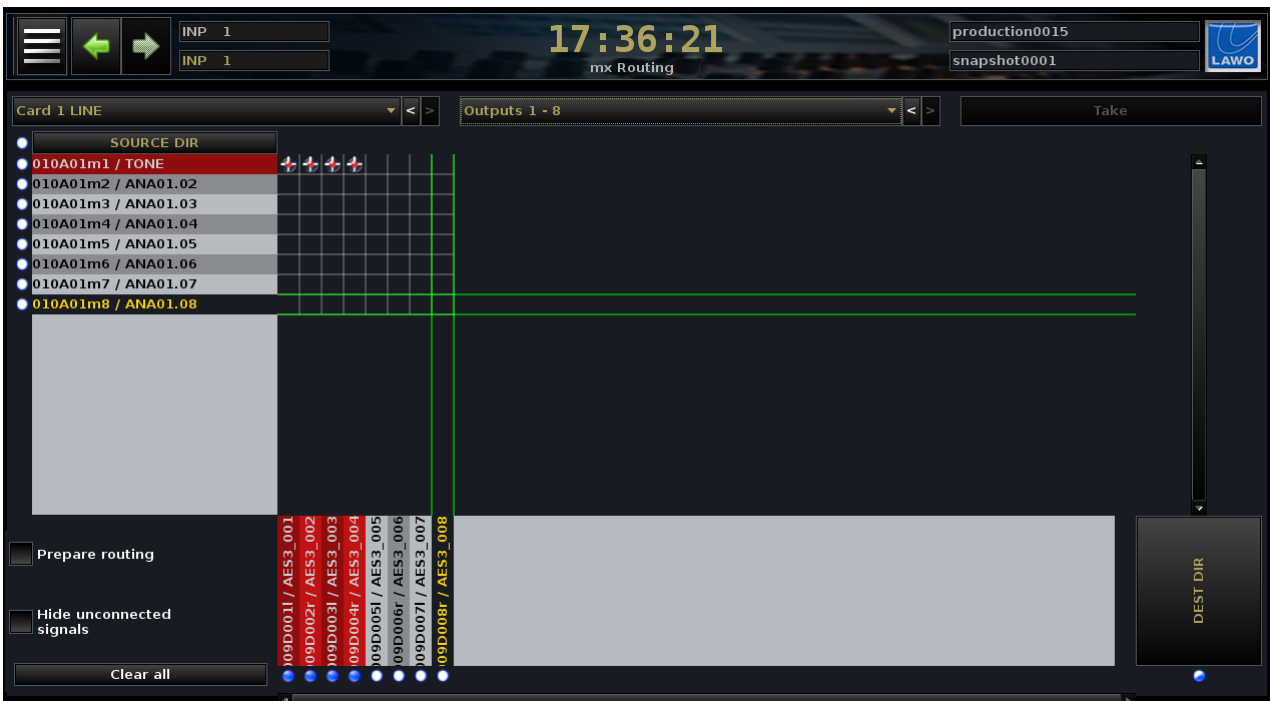
Alternatively, select **Clear All** to clear all partial snapshot selections made throughout the entire routing matrix. Use this when you wish to clear down any active selections in preparation for a new partial snapshot.

- Now open the [Snapshot List](#) display and select **Save Partial** at the bottom of the display - the system saves the routes made to the selected destinations in a new partial snapshot:



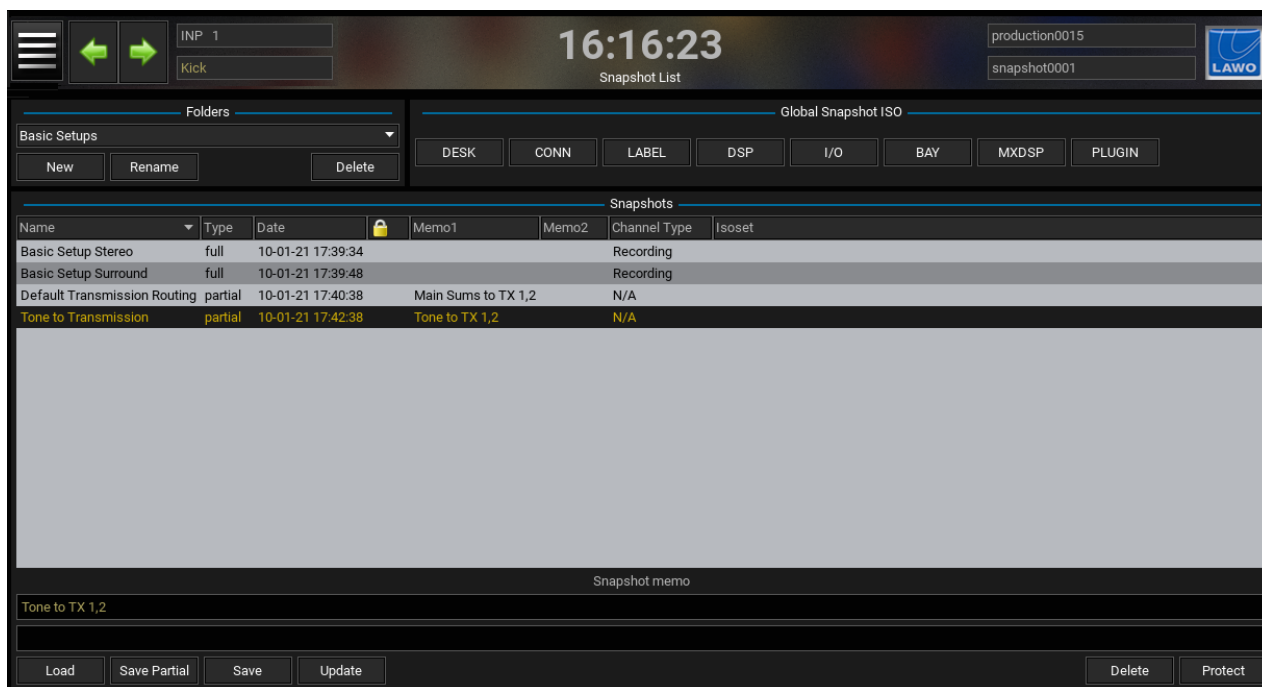
Note that the type of snapshot is marked in the **Type** column to distinguish **partial** snapshots from **full** snapshots.

- Return to the [mx Routing](#) display and make the new routes to your selected destinations – in our example, Tone to the transmission feeds:





5. And save another partial snapshot from the [Snapshot List](#) display:



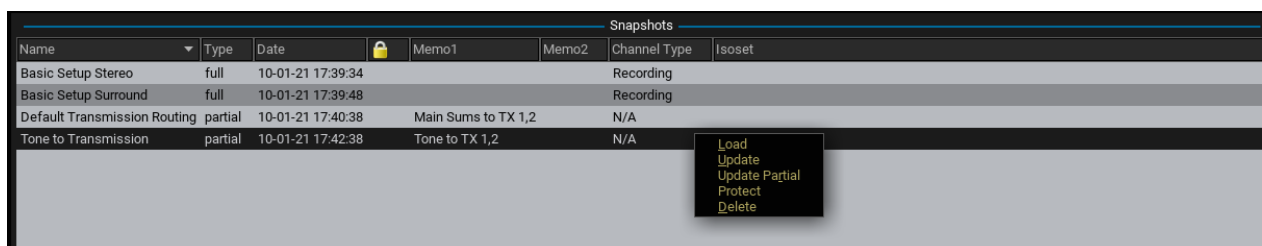
6. At any time you can now load the partial snapshots to recall routes made only to the transmission feed destinations.

Note that it is the blue circle selections when the partial snapshot is saved which defines which routes and IO settings are stored. This allows you to save partial snapshots for different subsets of signals.

Note that you can use signal **Isolate** or **SNAP ISO** to [isolate](#) a source or destination from the partial snapshot recall.

Partial snapshots are treated in exactly the same way as full snapshots, so you can load, update, protect or delete them from the [Snapshot List](#) display.

7. To update an existing partial snapshot, be sure to select **Update Partial**:



8. Remember to [save](#) or [update](#) the production in order to save snapshots permanently to the user data flashcard.

## 18.4 The Signal Settings Display

The **Signal Settings** display has two functions: to monitor the status of system hardware, and to set parameters for individual input and output signals.

1. [Open](#) the **Signal Settings** display in the usual manner:



The two “trees” on the left of the display show the location of a signal within the **Signal List** (top) and its physical location in the **System** (bottom). Whenever a signal is selected at the top, the **System** tree follows, and vice versa.

You can open or close branches of the **Signal List** or **System** tree by clicking on the arrows or double-clicking on a directory/component name.

You can resize the different areas by clicking and dragging on the separator bars - for example, during normal operation you might hide the **System** tree until it is needed. If information within an area is hidden, then left/right or up/down scroll bars will automatically appear.

As you select signals, a graphical representation appears in the middle of the display – in our example, we can see the DALLIS where our mic signal is connected.

If all is well with the system hardware, then the components are colored grey. However, if there is a problem, the component will be highlighted in red, and you will see a red/white cross next to the component name in the system tree.

When running [mxGUI](#) offline, all components appear as if they are in [error](#).

When you select an individual signal, a number of parameter tabs appear at the bottom of the display – in our example, **General**, **Conference**, **Mic/Line**, **Input DSP** and **Device**:



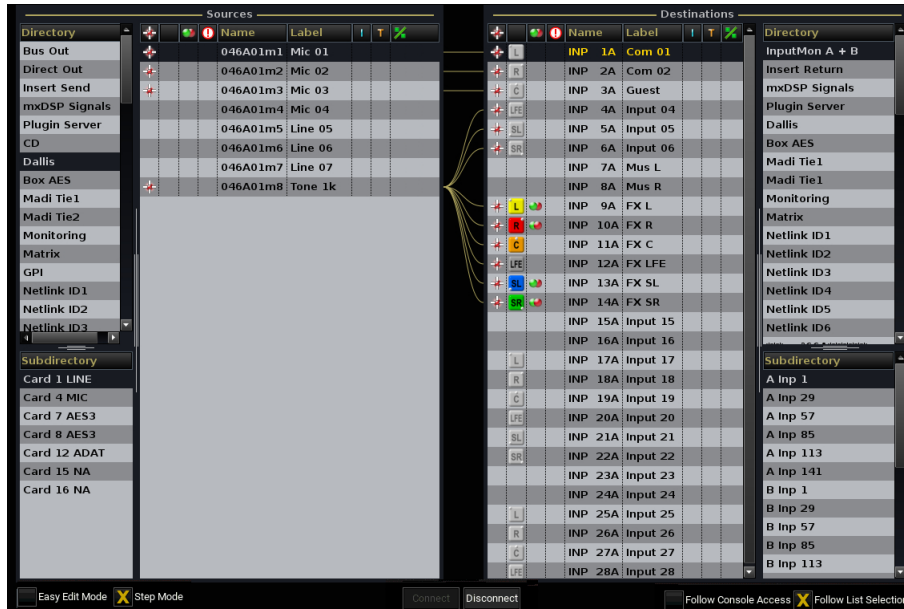
Note that the parameter tabs depend on the type of signal selected.

2. Select a tab to access IO parameters for the selected signal.
3. Press the **COLLAPSE** soft key to collapse **System** tree in order to get a quick overview of system components.

### 18.4.1 Follow list selection

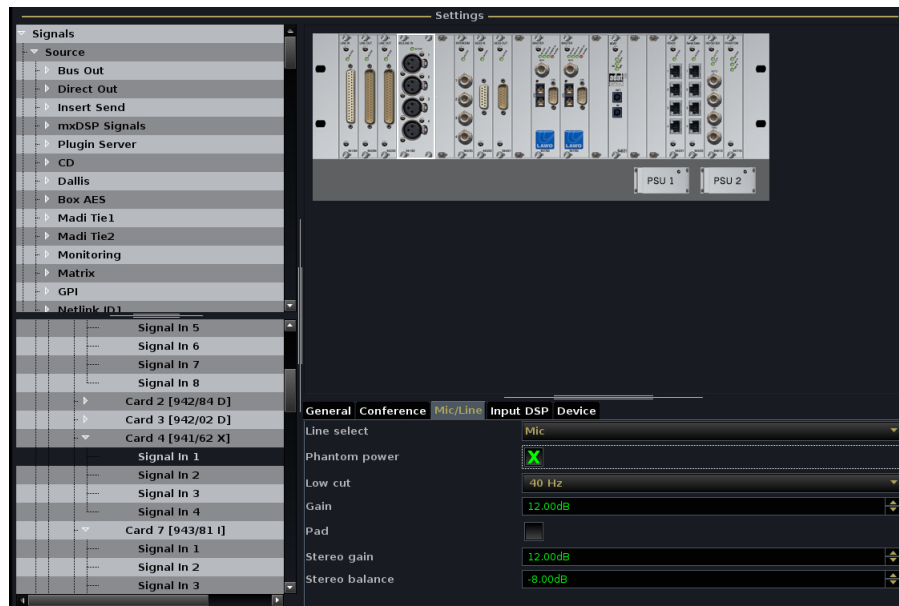
You can link the [Signal List](#) and [Signal Settings](#) displays so that when you select a signal from the **Signal List** display, and switch to **System Settings**, the selected signal follows.

1. Open the **Signal List** display and select a source – e.g. **Mic 01**:



2. Make sure that the **Follow list selection** option is checked at the bottom of the display.
3. Then switch back to the **Signal Settings** display.

The **System** tree should have automatically opened to reveal your selected source:



### 18.4.2 Diagnosing System Errors

In the event of a component failure, a hazard warning flag appears in the title bar of the Central GUI. Hover over the warning triangle to view the last ten alarm messages. Messages in red indicate active alarms; messages in yellow are resolved.

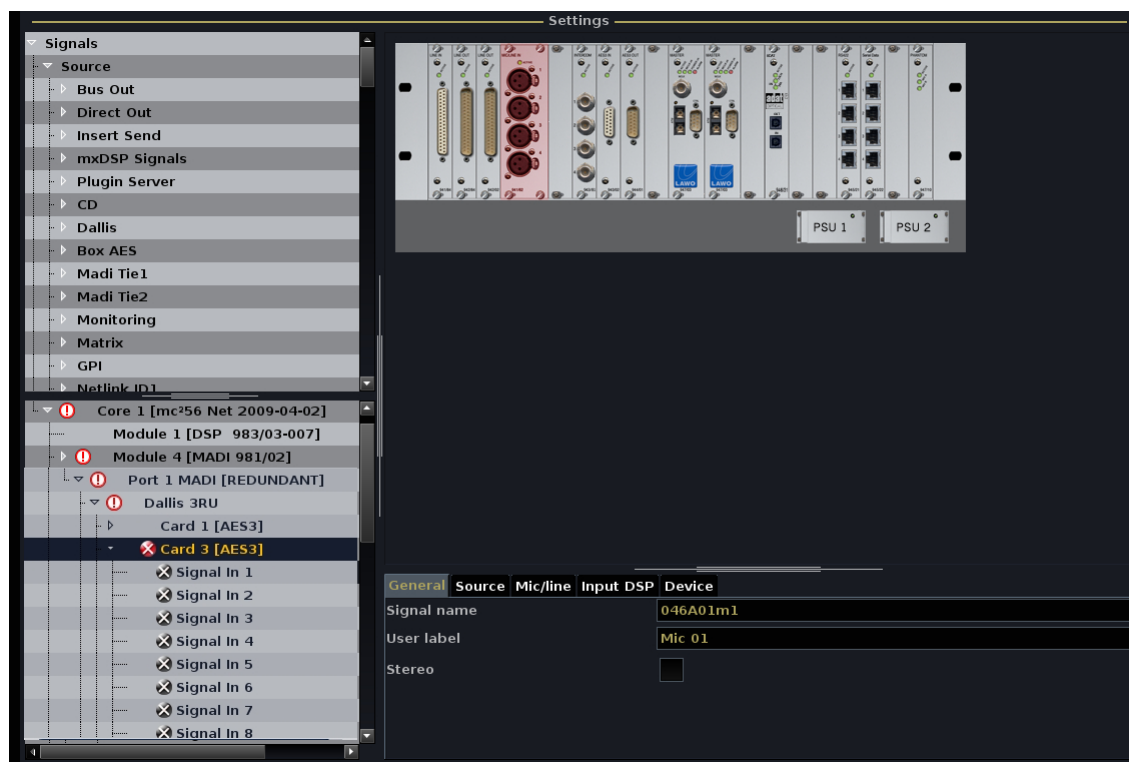


To interrogate further:

1. Open the **Signal Settings** display.

This display monitors all of the components defined in the AdminHD configuration. In the event of a problem, a red/white cross appears in the **System** tree.

2. 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.

### 18.4.3 System Tree Structure

The **System** tree is structured as follows:

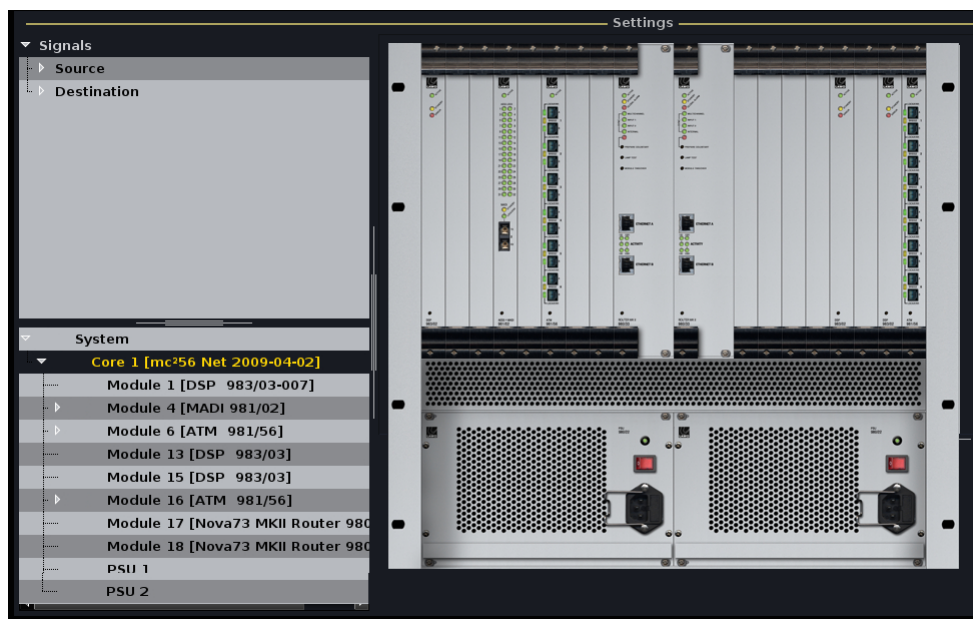
1. At the top level - **System** - you can view general information about the system. Many of these fields are duplicates of [System Settings](#) options.

The **IP address primary** field displays the IP address of the main control system.

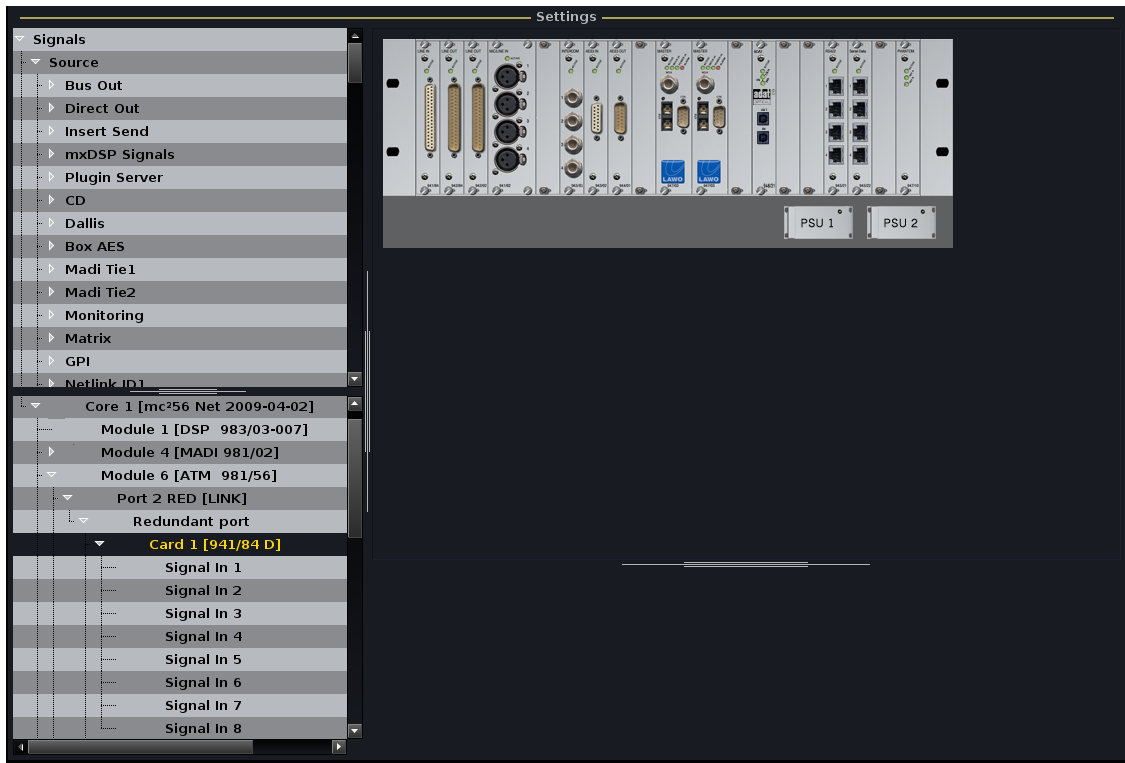
The **IP address secondary** field displays the IP address of the redundant control system (if fitted).



2. Open the **System** to see all the **Cores** contained within your system network – e.g. **Core 1**.
3. Open **Core 1** to see all the **Modules** fitted to the core, and its power supplies – **PSU 1** and **PSU 2**:



4. And open a **Module** to view its ports and then any DALLIS or Compact IO units connected to those ports:



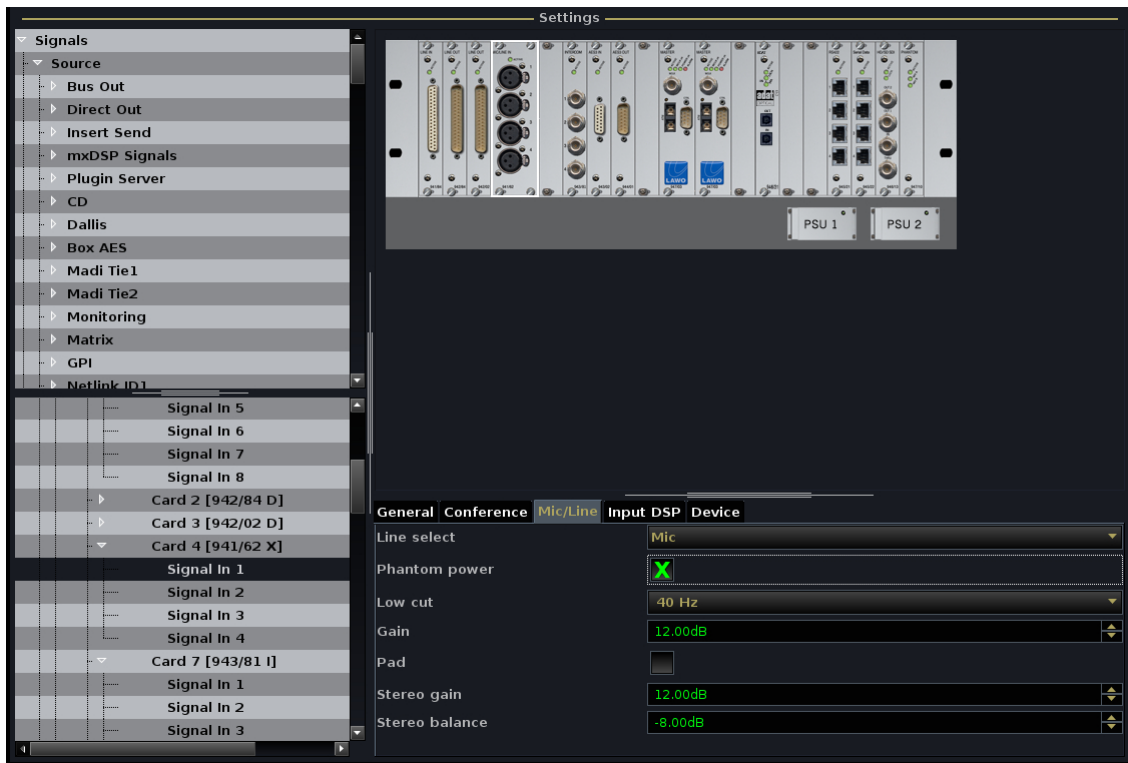
## 18.4.4 IO Parameters

Each time you select an individual signal within the **Signal Settings** display, you can adjust its IO parameters from the bottom of the display.

1. Open up the system tree until you find the signal you wish to adjust – in our example, **Mic 01**.

A number of parameter tabs appear at the bottom of the display.

2. Select a tab to access the IO parameters for the selected signal:



The parameters vary depending on the type of signal and whether you have selected an input or output.

You can find details for all parameters by referring to the IO card data sheets.

Here we will cover the most common parameters.



## General Parameters

These parameters appear for most signals:



- **Signal name** - the system name defined by AdminHD. This is identical to the [Name](#) field in the **Signal List** display.
- **User label** - the user label defined by the [Label](#) field in the **Signal List** display.
- **Signal Stereo** - links odd/even signals as stereo. This is identical to the [Stereo](#) option in the **Signal List** display.
- **Signal Isolate** - isolates a signal from snapshot recall. This is identical to the [Isolate](#) option in the **Signal List** display.
- **Inherited Label** (output signals only) - if the selected output is routed from a source, then this field displays the inherited user label, as defined by the [Label](#) field in the **Signal List** display.

## Conference Parameters (Input Signals Only)

These parameters appear when an input signal is selected:

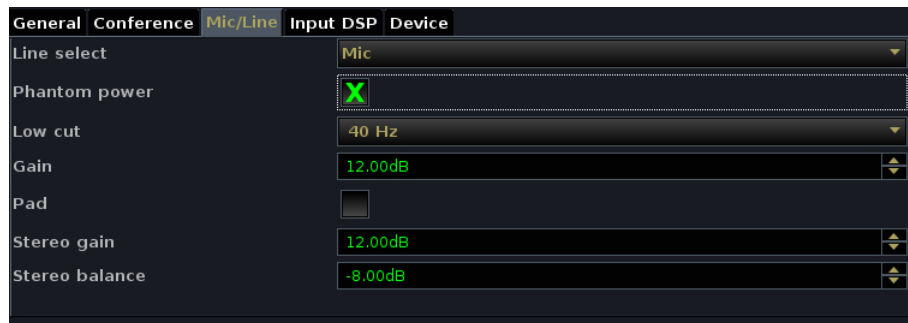


They define options for the source's [mix minus \(N-1\)](#):

- **Mix minus Self Monitoring** - as a default, this parameter is disabled (unchecked). Enable this parameter if you wish to add the selected signal back onto the mix minus feed. For example, if the Talent wants to hear their own microphone.
- **Mix Minus Bus** - use this field to assign an auxiliary send or track bus as the mix minus send for the selected input signal. You can assign any aux (1 to 32) or any track bus (1 to 96).

## Mic/Line Parameters

These parameters appear when an input signal from a mic/line card is selected:



They duplicate the mic/line parameters available from the [INPUT Control section](#):

- **Line select** - selects mic or line level.
- **Phantom power** - enables 48V phantom power.
- **Low cut** - enables the high pass filter.
- **Gain** - adjusts the mic/line input gain.
- **Pad** - enables the 20dB pad.
- **Stereo gain & Stereo balance** - if a signal is designated as a [stereo source](#), then you can use these fields to adjust the gain and balance of both left and right signals.

To enter a gain value (in dB), either click on the existing entry and type in a value from the keyboard, or click on the up/down arrows beside the field to increment or decrement the value in 1dB steps.

## AES/EBU Inputs

These parameters appear when a digital input signal is selected:



- **Sample Rate Converter On** - enables sample rate conversion.

Note that not all digital inputs support sample rate conversion so this option may not be available for all signals.

To make a digital path suitable for Dolby E operation, you should turn off the [IO DSP](#) for both the input and output, and disable any [sample rate conversion](#).

## AES/EBU Outputs

These parameters appear when a digital output signal is selected:



For an AES/EBU output signal you can adjust the [Sample Rate](#) and [Wordlength](#).

Note that both options affect the status of the **Sample Rate Converter**, and therefore this option is for display purposes only.

To disable sample rate conversion, to make the output path suitable for Dolby E operation, set the **Sample Rate** and **Wordlength** according to the [Digital Output Settings](#) Appendix.

### >> Sample Rate & Use System Sample Rate

The default state is that digital outputs are referenced to the console's system clock – in other words, the **Use System Sample Rate** option is checked, and the **Sample Rate** field is set accordingly.

The system's internal sample rate is set by the [Sample Rate](#) option in the **System Settings** display.

On digital outputs with sample rate conversion (SRC), you can alter the clock selection. For example, to send a 44.1kHz feed to a CDR. Note that not all digital outputs support sample rate conversion so this option is not available for all signals.

#### ➤ To change the sample rate of the selected output:

1. Select **Sample Rate** and choose a drop-down menu option:
  - **follow** – sets the output sample rate to follow the input sample rate from which it is routed.
  - **44.1** – 44.1kHz.
  - **48** – 48kHz.

On systems running at higher sample rates, you can also select:

- **88.2** – 88.2kHz.
- **96** – 96kHz.

Selecting a different sample rate automatically unchecks the **Use System Sample Rate** option, and checks the **SRC** status flag:



2. To reset the digital output, so that it is referenced to system clock, reselect **Use System Sample Rate**.

### >> Word Length

The word length for each digital output defaults to 24-bit unless you select otherwise.

Note that dither is automatically applied to signals reduced to 20- or 16-bits. In addition, your wordlength selection can change the status of output sample rate conversion. See the [Digital Output Settings](#) Appendix for details.

#### ➤ To change the wordlength of the selected output:

1. Select **Wordlength** and choose a drop-down menu option:
  - **24 bit**
  - **20 bit**
  - **16 bit**

## I/O DSP

These parameters are available for all types of input and output signal, and control a small amount of DSP which exists on the IO card:



To make a digital path suitable for Dolby E operation, you should turn off the [IO DSP](#) for both the input and output, and disable any [sample rate conversion](#).

- **IO DSP** - enables or disables the IO DSP. This option must be turned on (checked) for **Volume** and **Phase** to be active. Note that, for fixed gain analog and digital inputs, IO DSP is enabled/disabled from the **LINE/ON** button on the [INPUT Control section](#).
- **Volume** - this field allows you to set an offset level for the selected input or output signal. It is particularly useful if you are routing a bus to multiple destinations that require slightly different line up levels, as you can use the **Volume** to adjust each individual output level.

Click to enter a value from the keyboard, or click on the up/down arrows to increment or decrement the level in 0.5dB steps.

The **Volume** can be adjusted from -128dB to +15dB.

Note that, for fixed gain analog and digital inputs, **Volume** is adjusted from the **GAIN** control on the [INPUT Control section](#).

- **Phase** - check this option to reverse the phase of the signal. Note that, for fixed gain analog and digital inputs, **Phase** is adjusted from the **Ø** button on the [INPUT Control section](#).

## Device Parameters



- **HLSD** - this field displays the Lawo system address which is used to identify the signal within the system. It is a unique address which cannot be modified by the user.

You may need to copy and paste the HLSD when programming a [Custom Function](#) involving signals, see [Entering a HLSD Address](#).

## Tone Generator Control (Internal Tone only)

All mc<sup>2</sup>/Nova systems fitted with a Router Module MKII support four internal generator sources: two sine wave, one pink noise and one white noise.

This feature is supported from V4.12 software onwards. If you have updated your software to V4.12, then you must update the **gui\_config.tcl** file using AdminHD and cold start the system to add the generator sources to a directory within the **Signal List** display. You can then make routes from each of the four generator sources in the usual manner.

The first internal generator source (sine 1) can be switched to any Input or Monitor channel using the INPUT panel's [TONE button](#).

When an internal generator signal is selected, the **Signal Generator** tab appears in the IO parameter area of the **Signal Settings** display:



- **Type** - select the type of test signal. Options include sine wave, pink noise and white noise.
- **Frequency** - for the two sine wave generator sources, you can adjust the frequency.

Click on the up/down arrows to step through the following predefined options: **20, 49.9, 100, 200, 400, 440, 1000, 2000, 2998, 3999, 4987, 6997** Hz and **10.0, 15.0, 20.0** kHz.

Alternatively, you can type in any frequency within the parameter area.

- **Level** - this field adjusts the level of the generator signal.

You can either click on the existing entry and type in a value from the keyboard, or click on the up/down arrows beside the field to increment or decrement the value in 1dB steps.

The level can be adjusted from 0dB to -128 dB.

## SDI Parameters

SDI parameters vary depending on the card type (3G or non 3G). Please refer to the following Appendices for further details:

- [SDI Parameters \(3G SDI Card\)](#)
- [SDI Parameters \(non 3G SDI Cards\)](#)

## 19. mxDSP

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This chapter describes the operation of mxDSP.

Topics include:

- [mxDSP: Overview](#)
- [Routing Signals to/from the mxDSP Module](#)
- [The mxDSP Settings Display](#)

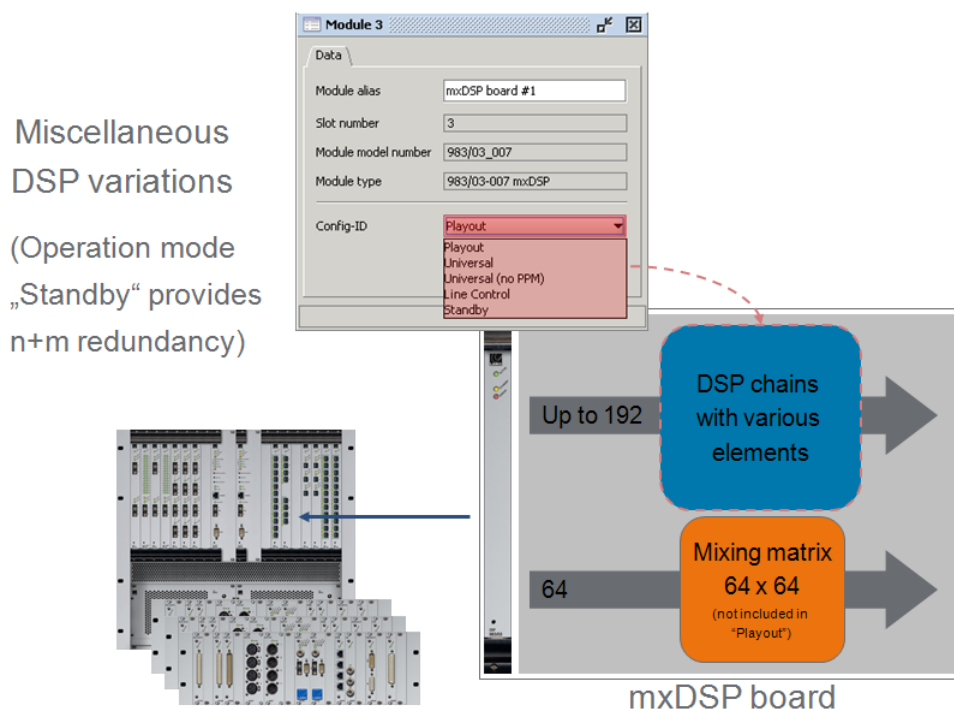
## 19.1 mxDSP: Overview

mxDSP provides a pool of DSP resource which can be applied to signal paths within the routing matrix (instead of DSP channels within the mixing console). It can be used for a variety of applications - for example, to apply fixed DSP settings to line arrays.

Note that this feature is optional. At least one mxDSP module must be configured, using AdminHD, and new software loaded to the board, before the mxDSP features become available. For details, please refer to your Technical Manual.

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:



The **Config-ID**, which determines the mxDSP mode, can be changed using AdminHD while running online.

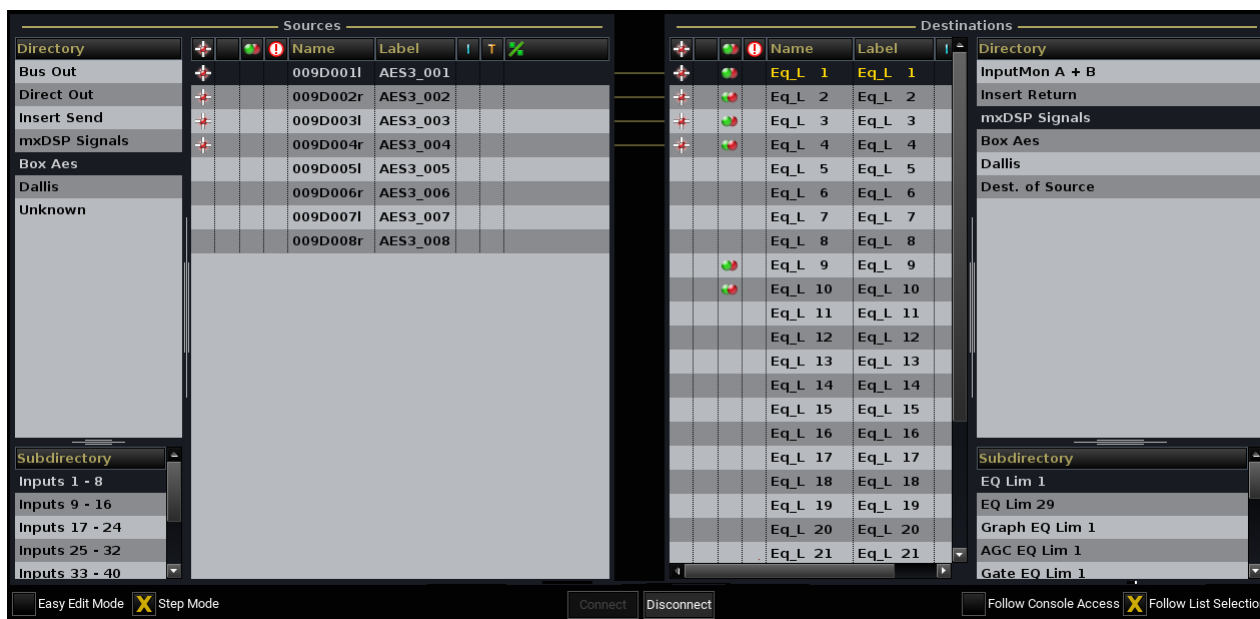


## 19.2 Routing Signals to/from the mxDSP Module

Each [DSP Chain](#) or [Summing Matrix](#) in/out can be routed from any source, and to one or more destinations using either the [Signal List](#) or [mx Routing](#) displays.

The **mxDSP Signals** appear within their own Directory. So, to route a source to an mxDSP destination (using the **Signal List** display):

1. Select your source in the usual manner.
2. Then select the destination:
  - Select **mxDSP Signals** from the **Directory** list.
  - Select the DSP Chain type from the Subdirectories – e.g. **EQ Lim 1**.
  - Select the DSP Chain from the Destinations list – e.g. **EQ\_L 1**.
3. Press **CONNECT** to make the route:



4. Then select [mxDSP Settings](#) display, and you will see the **Label** of the assigned source beside the DSP Chain.

## 19.3 The mxDSP Settings Display

This display provides screen-based control of mxDSP parameters. Note that if there are no mxDSP modules configured within the system, then the display will appear empty.

1. [Open](#) the **mxDSP Settings** display in the usual manner:

*mxDSP Settings display (example)*



On the left of the display you will see the:

- **DSP Chain Type** – this lists all the DSP chain types offered by the card. The types are predefined by the card configuration (defined by AdminHD). Types in grey are not supported by the current configuration.
- **DSP Chain** – this lists the individual DSP chains. Here you can name and label each chain and view its source and mono/stereo configuration.

Note that you cannot change the **Stereo** configuration of a DSP Chain from the **mxDSP Settings** display. This operation must be performed from the [Signal List](#) display.

To control routing to and from the DSP chains, use either the **Signal List** or **mx Routing** displays, see [Routing mxDSP Signals](#).

### 19.3.1 Controlling DSP Parameters

1. Select a DSP Chain from the list to view its signal flow.
2. Then click on one of the signal flow blocks – e.g. **Par-EQ** – to display the current parameters:



3. Adjust parameter values using any of the [usual](#) methods.

You can adjust parameter values for any DSP block within any DSP chain.

### 19.3.2 The 64x64 Summing Matrix

Depending on the AdminHD configuration, each mxDSP module can support a 64 x 64 summing matrix.

1. Scroll through the entries in the **DSP Chain Type** list and select **Sum Matrix**.

The display updates to show settings for the selected summing matrix – in our example, **Matrix 1**:



For each of the 64 summing matrix inputs and outputs, you can adjust the following settings:

- **Input level, phase and mute.**
- **Output level, phase and mute.**
- **Crosspoint level and on/off status.**

Note that the summing matrix defaults to all levels at 0dB, all phase, mutes and crosspoints off.

On the left of the display, the **Sum Matrices** area lists all matrices configured within the system. For example, if you have several mxDSP modules, configured with a summing matrix, then you will see Matrix 1, Matrix 2, etc.

The [Views](#) list can be used to filter the number of signals in view.

### 19.3.3 Controlling the Matrix Settings

The main area of the display shows the crosspoint on/off status and levels for the signals in view:



In our example, inputs 1 to 64 run down the left hand side, and outputs 1 to 64 across the bottom.

1. Use the scroll bars to access all 64 signals.
2. Select **Inherit Label** (bottom left) to view the source and destination labels, from the [Signal List](#), rather than the default labels shown above.

In the main grid, each box shows the matrix crosspoint level in dB. If a crosspoint is active, then its box has a heavy green outline.

The yellow outlines provide a reference to show which input, output and crosspoint will be affected by the DSP buttons on the left of the display (**Input Phase**, **Input Mute**, etc.)

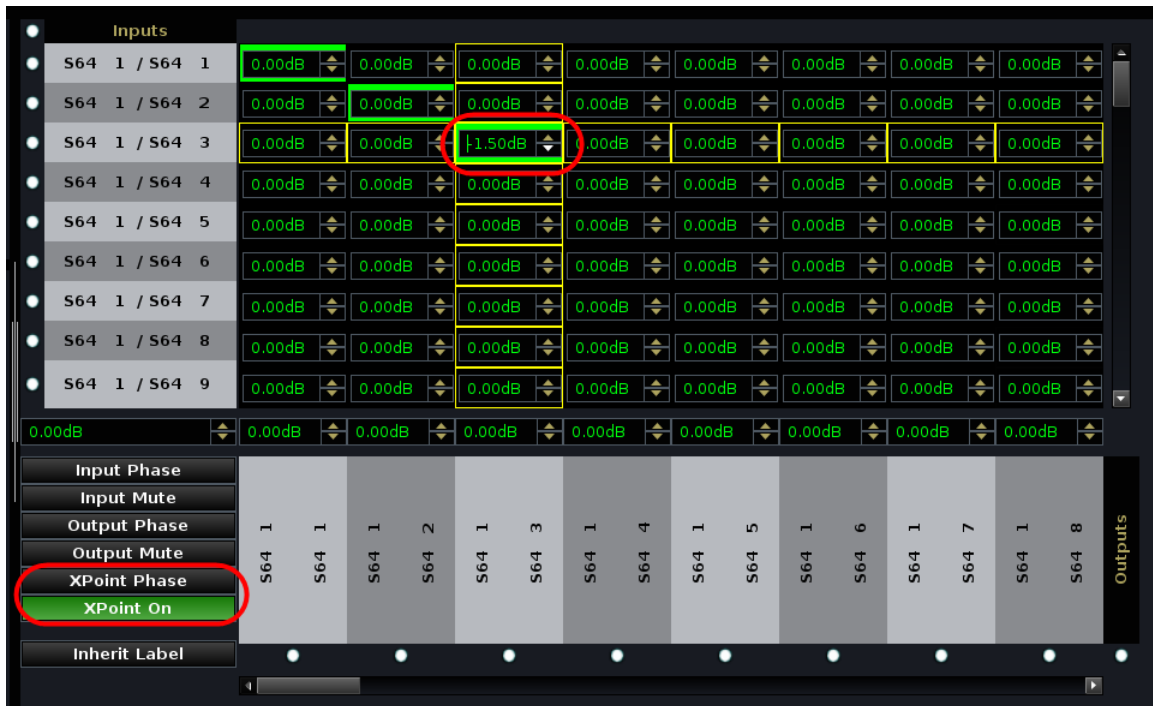
The circles beside each input and output signal are used to create [views](#).

## To Adjust a Matrix Crosspoint

1. Click on the crosspoint you wish to adjust - the yellow outline updates.
2. Adjust the level using any of the [usual](#) methods. For example, turn the rotary control on the SCREEN CONTROL [panel](#) or click on the up and down arrows.

The crosspoint level can be adjusted from -128dB to +15dB.

3. Select **XPoint On** to turn the crosspoint on or off. When active, the crosspoint box has a heavy green outline.
4. Select **XPoint Phase** to reverse the phase of the crosspoint. When active, the button turns blue.



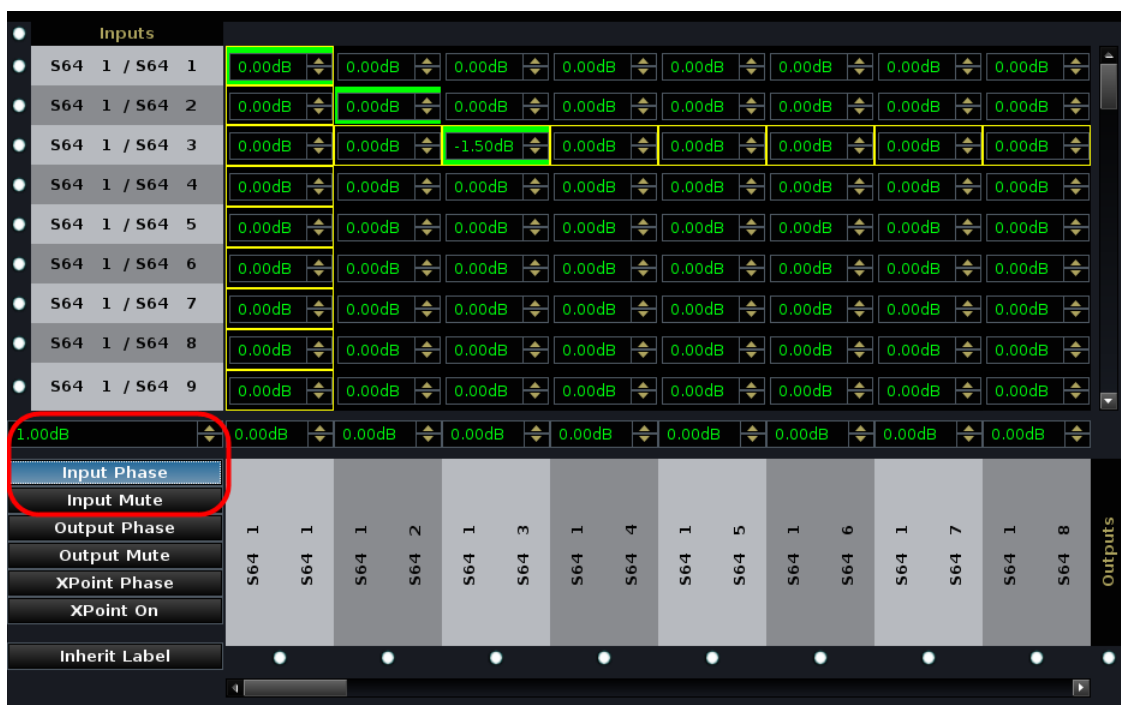
### To Adjust a Matrix Input

1. Click on any crosspoint within the input row you wish to adjust – for example, input 3.
2. Use the level box below the **Inputs** list to adjust the input level.

The input level can be adjusted from -128dB to +15dB.

3. Select **Input Phase** to reverse the phase of the summing matrix input.
4. Select **Input Mute** to mute the input.

The input level box turns red if the input is muted.



## To Adjust a Matrix Output

1. Click on any crosspoint within the output column you wish to adjust – for example, output 5.
2. Use the level box at the bottom of the column to adjust the output level.

Output level can be adjusted from -128dB to +15dB.

3. Select **Output Phase** to reverse the phase of the summing matrix output.
4. Select **Output Mute** to mute the output.

The output level box turns red if the output is muted.





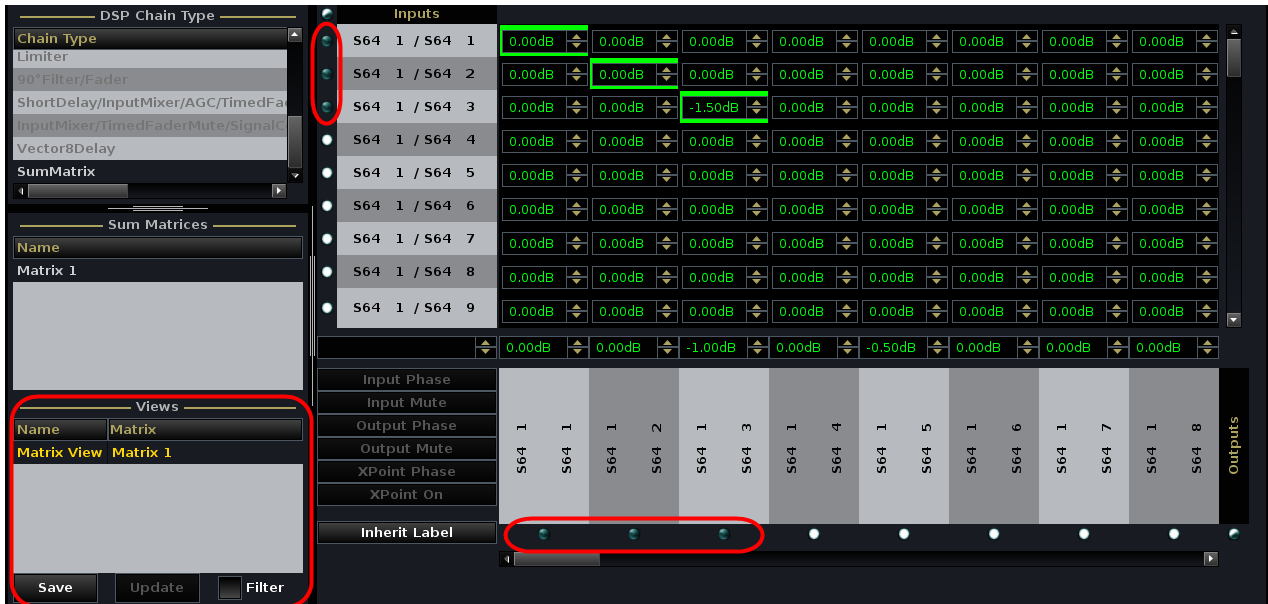
## Views

To reduce the number of signals in view to a more manageable number you can use **Views**.

1. Select the circles beside each input and output signal you wish to include within the matrix View.

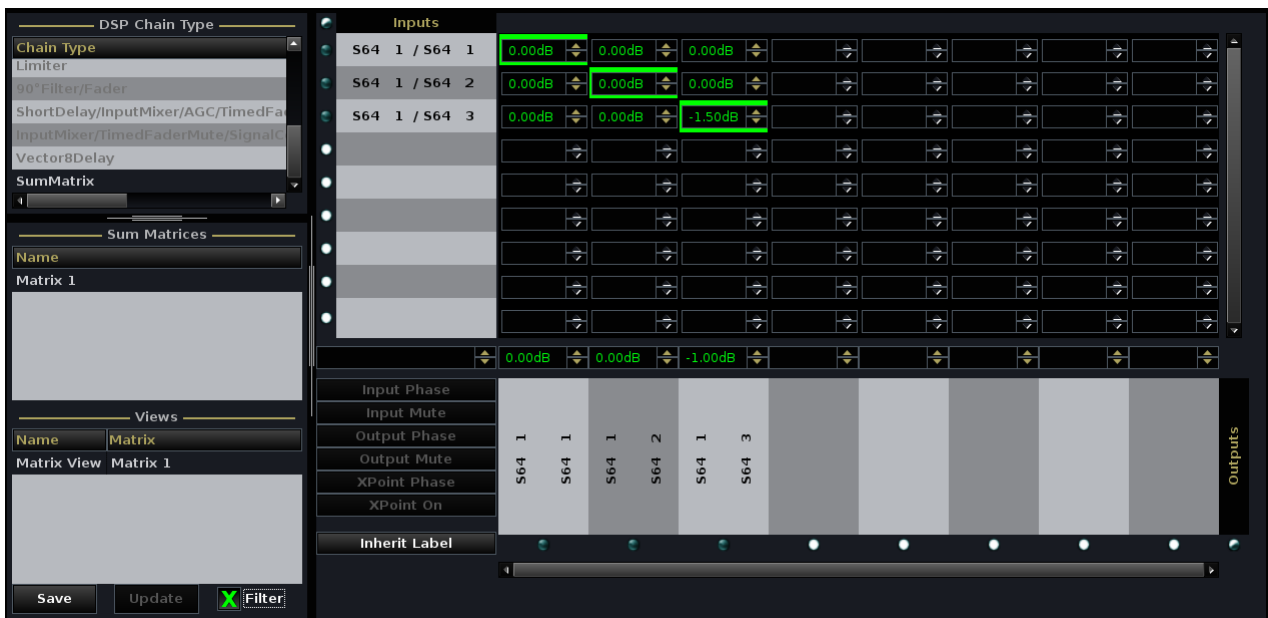
When a signal is selected, its circle turns blue.

2. Now select **Save** at the bottom of the **Views** area - the **Views** list updates accordingly:



3. To apply the View, select the checkbox beside **Filter**.

When the **Filter** checkbox is active, the crosspoint grid only shows signals stored within the selected **View**:



4. To return to all signals, deselect the **Filter** checkbox.

The screenshot shows a 'Views' window with a table. The table has two columns: 'Name' and 'Matrix'. The first row contains 'Matrix View' and 'Matrix 1'. A right-click context menu is open over the 'Matrix 1' cell, displaying the following options: 'Update', 'Delete', 'Rename', and 'Reload'. Below the table, there are three buttons: 'Save', 'Update', and a green 'X' icon followed by the text 'Filter'.

- Note that the half blue circle beside **Inputs** and **Outputs** indicates that some but not all signals are selected:

- [illegible]

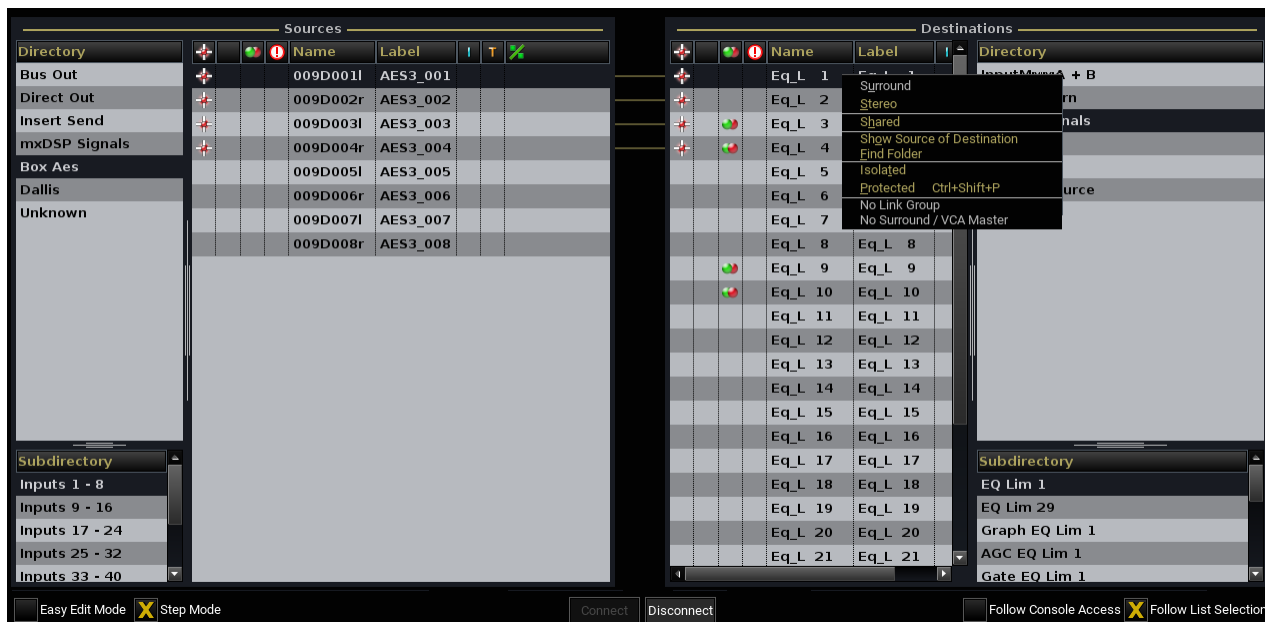
### 19.3.4 Stereo Configuration

An odd/even pair of DSP Chains can be configured for stereo operation.

Note that surround configuration is not supported.

This operation is performed from the [Signal List](#) display:

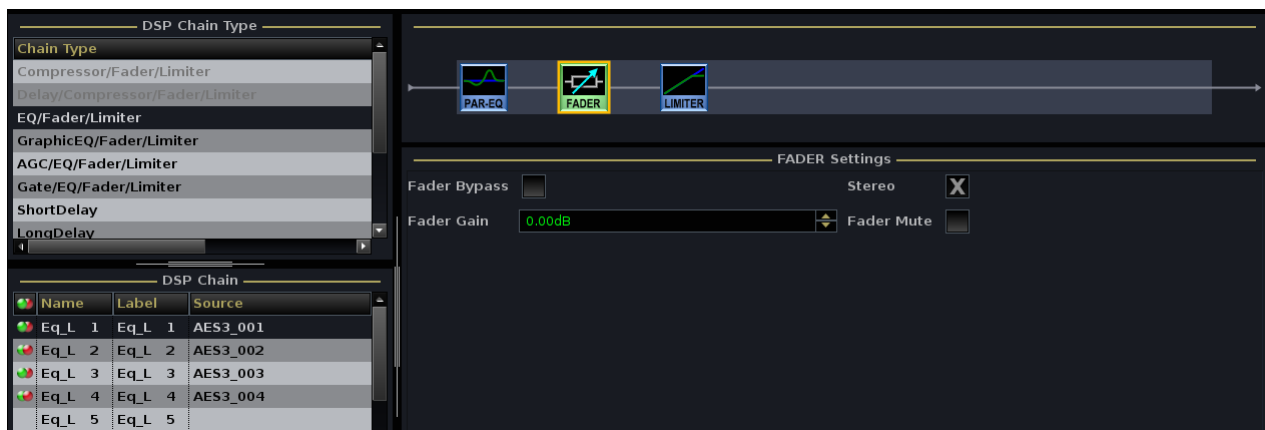
1. Select the DSP chain you wish to make stereo and right-click:



2. Select the **Stereo** option.

Green/red circles appear beside the DSP chains to indicate that they are now linked for stereo.

3. Return to the **mxDSP Settings** display and you will see the stereo status indicated beside the DSP Chain and within the main **Settings** area:



### 19.3.5 Saving and Loading mxDSP Settings

The settings for each mxDSP module are stored within snapshots and productions, so remember to [save](#) or [update](#) a production to save any changes.

You can isolate all mxDSP signals so that they will not be affected by a snapshot load using the **mxDSP Global Snapshot Isolate** option.

## 20. System Configuration

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This chapter deals with the system configuration displays.

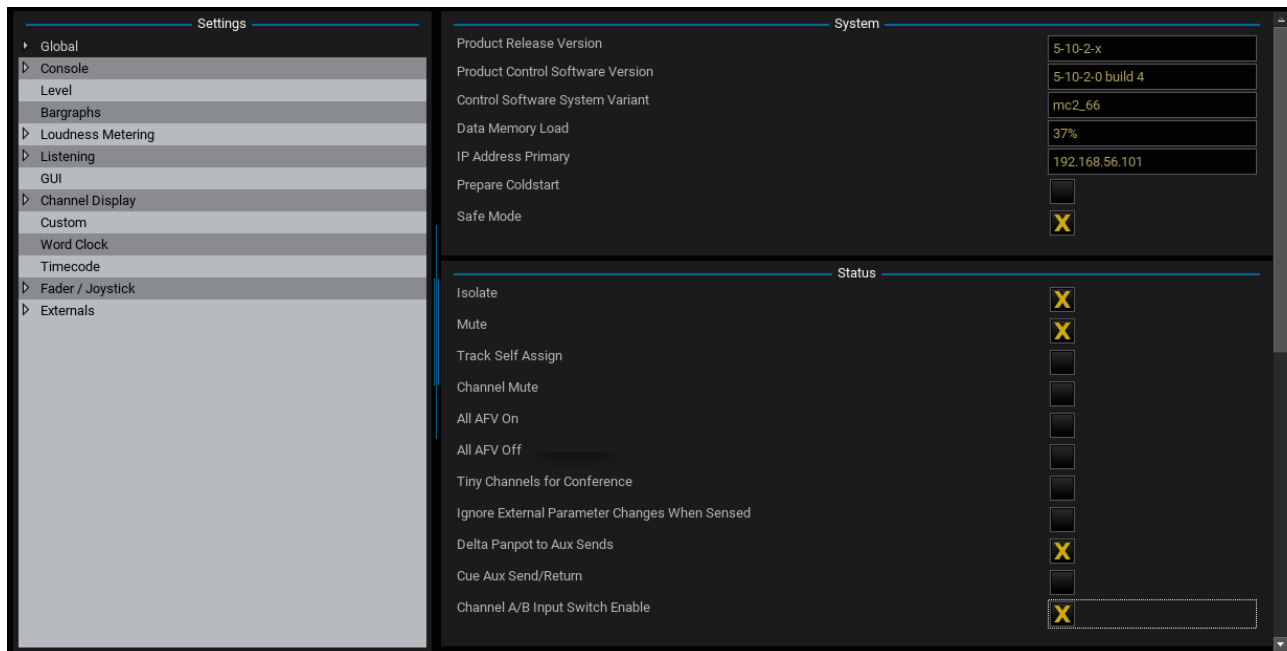
Topics include:

- [System Settings](#)
- [Custom Functions](#)
- [The Custom Functions List](#)
- [Command Triggers](#)
- [The Extra Buttons Display](#)

## 20.1 System Settings

The **System Settings** display configures all the system options which can be modified by the user. These options are stored and recalled with productions, but not snapshots.

1. [Open](#) the **System Settings** display in the usual manner:



On the left you will see a list of topics.

2. Using the trackball or navigation controls select a topic – for example, **Global**.

The right hand side of the display updates to show a list of options within the selected topic.

3. Depending on the option it can be modified as follows:

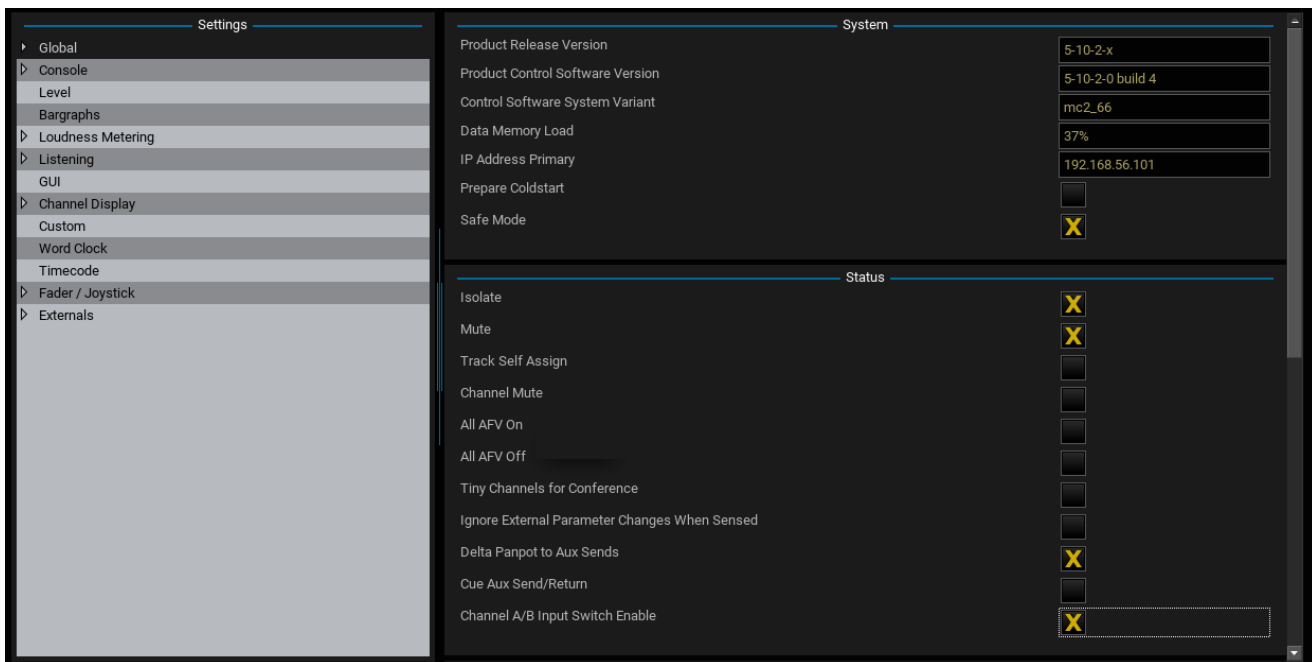
- **Checkbox on/off** (e.g. **Isolate**) - use the trackball to select the checkbox beside the option.

A cross appears when the option is enabled – for example, **Isolate** is **ON**.

- **Drop-down selections** (e.g. **Surround format**) – using the trackball select an option from the drop-down list.
- **Numeric Entries** (e.g. **Backup Snapshot Maximum**) – some options require a number to be entered. You can click on the existing entry and type in a value from the keyboard; or click on the up/down arrows beside the number to increment or decrement its value; or select the option, press the **SET** [soft key](#) and then use the SCREEN CONTROL panel rotary control to increment or decrement the value.

If you hover the cursor above each option name, you will see a 'Tool Tip'. This provides a helpful description of each option.

## 20.1.1 Global -> System



The screenshot shows the 'System' configuration page. On the left is a 'Settings' sidebar with a tree view containing: Global, Console, Level, Bargraphs, Loudness Metering, Listening, GUI, Channel Display, Custom, Word Clock, Timecode, Fader / Joystick, and Externals. The main area is divided into two sections: 'System' and 'Status'.

**System Section:**

Product Release Version	5-10-2-x
Product Control Software Version	5-10-2-0 build 4
Control Software System Variant	mc2_66
Data Memory Load	37%
IP Address Primary	192.168.56.101
Prepare Coldstart	<input type="checkbox"/>
Safe Mode	<input checked="" type="checkbox"/>

**Status Section:**

Isolate	<input checked="" type="checkbox"/>
Mute	<input checked="" type="checkbox"/>
Track Self Assign	<input type="checkbox"/>
Channel Mute	<input type="checkbox"/>
All AFV On	<input type="checkbox"/>
All AFV Off	<input type="checkbox"/>
Tiny Channels for Conference	<input type="checkbox"/>
Ignore External Parameter Changes When Sensed	<input type="checkbox"/>
Delta Panpot to Aux Sends	<input checked="" type="checkbox"/>
Cue Aux Send/Return	<input type="checkbox"/>
Channel A/B Input Switch Enable	<input checked="" type="checkbox"/>

### Product Release and Control Software Versions

These fields are for display purposes only, and tell you the software versions running on your system. Note that there are two different releases, both important when reporting software versions to a service engineer:

- **Product Release Version** – this is the release version of your product software.
- **Product Control Software Version** – this is the release version of the control system software.
- **Control Software System Variant** – this is the system variant applied to the mc<sup>2</sup> release. (From Version 5.4 onwards, a single update file is used to update software on all mc<sup>2</sup> consoles; the system variant ensures that the correct features are applied to your console!)

### Data Memory Load

This field is for display purposes only, and indicates the amount of used data storage space (%).

### IP Address Primary

This field is for display purposes only, and indicates the IP address of the main control system.

### Prepare Cold Start

This option sets whether the system will [cold or warm start](#) on the next power-on:

- **Prepare Coldstart** (on) - the system will cold start. This means that no user data is loaded. Use this option if you wish to clear all user settings from the system.
- **Prepare Coldstart** (off) - the system will warm start. This means that the console is restored with same settings as before the power off.

Note that following a restart this option is always reset to off. This ensures that by default, warm start data is loaded at the end of every power-on or restart.

### Safe Mode

This option enables or disables control from the [Lawo Remote App](#):

- **Safe Mode** (on) – access from the Lawo Remote App is denied. Use this mode to prevent unauthorised control of the console.
- **Safe Mode** (off) – the console can be controlled by the Lawo Remote App.

## 20. System Configuration

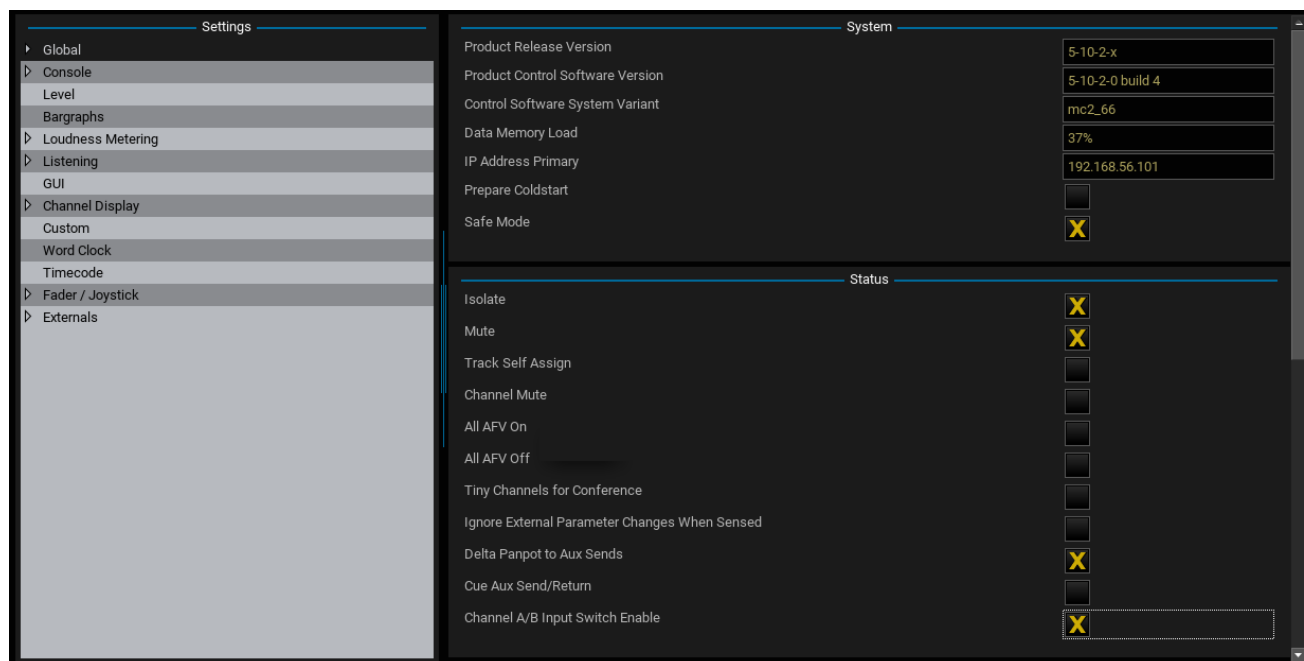
### Keyboard Layout

Use the drop-down menu to choose the [console keyboard](#) layout: **English** or **German**. Note that this option only appears when the **System Settings** display is opened on the console GUI. The option is hidden when running mxGUI, as you cannot change the mxGUI host's keyboard layout.

### Redundancy Takeover

Use this option to force a manual [takeover](#) to the redundant Router Module if one is fitted.

### 20.1.2 Global -> Status



### Isolate

This option enables or disables the [SNAP ISO](#) (Snapshot Isolate) buttons across the console:

- **Isolate (on)** – you can select **SNAP ISO** (Snapshot Isolate) buttons to isolate channels from a snapshot or automation load.
- **Isolate (off)** – prohibits selection of **SNAP ISO** buttons across the console; any existing **SNAP ISO** selections will be cleared. Use this mode to ensure that all stored parameters are recalled to all channels from any snapshot or automation load.

### Mute

This option enables or disables the fader strip MUTE buttons across the console:

- **Mute (on)** – you can select **MUTE** buttons to mute/cut a channel.
- **Mute (off)** – prohibits selection of **MUTE** buttons across the console; any existing **MUTE** selections will be cleared. Use this mode to prevent accidental muting of channels during a live production.

### Track Self Assign

This option determines whether a [monitor channel](#) can be assigned to its associated track bus. For example, whether monitor channel 8 can be assigned to track bus 8:

- **Track Self Assign (on)** – allows monitor channel x to be assigned to track bus x. This mode is designed for non-multitrack applications where you wish to route to track busses from any channel.
- **Track Self Assign (off)** – prohibits the assignment of monitor channel x to track bus x; any existing assignments to associated track busses will be cleared. Use this mode when working with a multitrack machine to prevent monitor channel x routing to track bus x and generating feedback.

### Channel Mute

This option determines where in the signal flow a channel is muted when the MUTE button is selected:

- **Channel Mute (on)** - the **MUTE** button mutes the channel after the input mixer. In this mode all channel outputs including pre-fader sends are muted. Note that PFL is NOT muted to enable pre-fader listen.
- **Channel Mute (off)** - the **MUTE** button mutes the channel after the fader. In this mode only post fader outputs are muted, pre fader sends remain active.

### All AFV On/Off

This option sets [AFV](#) (Audio Follow Video) to either on or off across all channels:

- **All AFV on (on)** – AFV is switched on across all channels.
- **All AFV off (on)** – AFV is switched off across all channels.

### Tiny Channels for Conference

From V4.24 software onwards, this option determines whether [tiny](#) input channels can feed onto [mix minus \(N-1\)](#) sends:

- **Tiny Channels for Conference (on)** – tiny input channels can feed mix minus sends.
- **Tiny Channels for Conference (off)** – tiny input channels cannot feed mix minus sends.

When using a [Recording Channel](#) DSP configuration, and creating a mix minus from [tiny](#) channels, you *MUST* use auxiliary busses for mix minus sends (as track bus conference facilities are not supported from tiny DSP channels).

### Ignore External Parameter Changes When Sensed

Enable this option if you wish to prevent parameter changes while a console front panel control is being sensed. For example, to prevent an external override from a remote device (via Remote MNOPL, Ember+, etc.)

### Delta Panpot to Aux Sends

This option determines whether [aux send panning](#) follows channel fader panning, across the console, for stereo aux sends:

- **Delta Panpot to Aux Sends (on)** – aux panning follows channel fader panning.
- **Delta Panpot to Aux Sends (off)** – aux panning can be set independently from channel fader panning.

### Cue Aux Send/Return

This option determines the behaviour of auxiliary sends 17 to 32 when assigned from [monitor channels](#).

- **Cue Aux Send/Return (on)** – aux sends 17 to 32 can be switched between send and return. This mode is ideal for cue feeds when overdubbing.
- **Cue Aux Send/Return (off)** – aux sends 17 to 32 return to normal aux send operation and can be switched post fader, pre fader or pre EQ.

### Channel A/B Input Switch Enable

From Version 5.10.0, this option enables (or disables) the [A/B input switching](#) globally across the console:

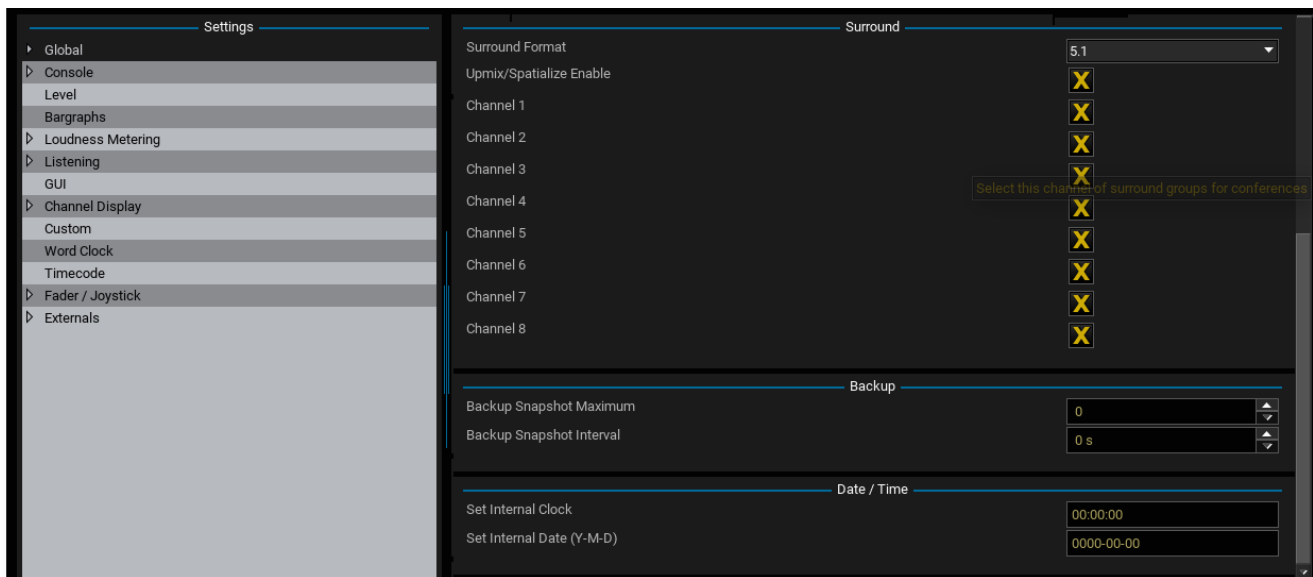
- **Channel A/B Input Switch Enable (on)** – A/B input switching is enabled across all channels.
- **Channel A/B Input Switch Enable (off)** – A/B input switching is disabled across all channels. You can use this to prevent users switching to unconnected inputs by accident. When you turn the option off, all inputs are switched automatically to their A input.

Note that this option is disabled following a cold start.

For backwards compatibility, the option is switched on automatically if a production created prior to V5.10.0 is loaded.



### 20.1.3 Global -> Surround



#### Surround Format

This option defines the global surround format used for surround channels, panning laws and monitoring.

Use the drop-down menu to select an option:

- **4.0** – L, R, C, S for Dolby ProLogic.
- **5.1** – L, R, C, LFE, Ls, Rs for Dolby Digital and DTS.
- **6.1** – L, R, C, LFE, Ls, Rs, Cs for Dolby Digital EX and DTS ES.
- **SDDS 7.1** – L, R, Lc, Rc, C, LFE, Ls, Rs for SDDS 7.1.
- **DTS-HD** – L, R, C, LFE, Lm, Rm, Ls, Rs for DTS-HD 7.1.

#### Upmix/Spatialize Enable

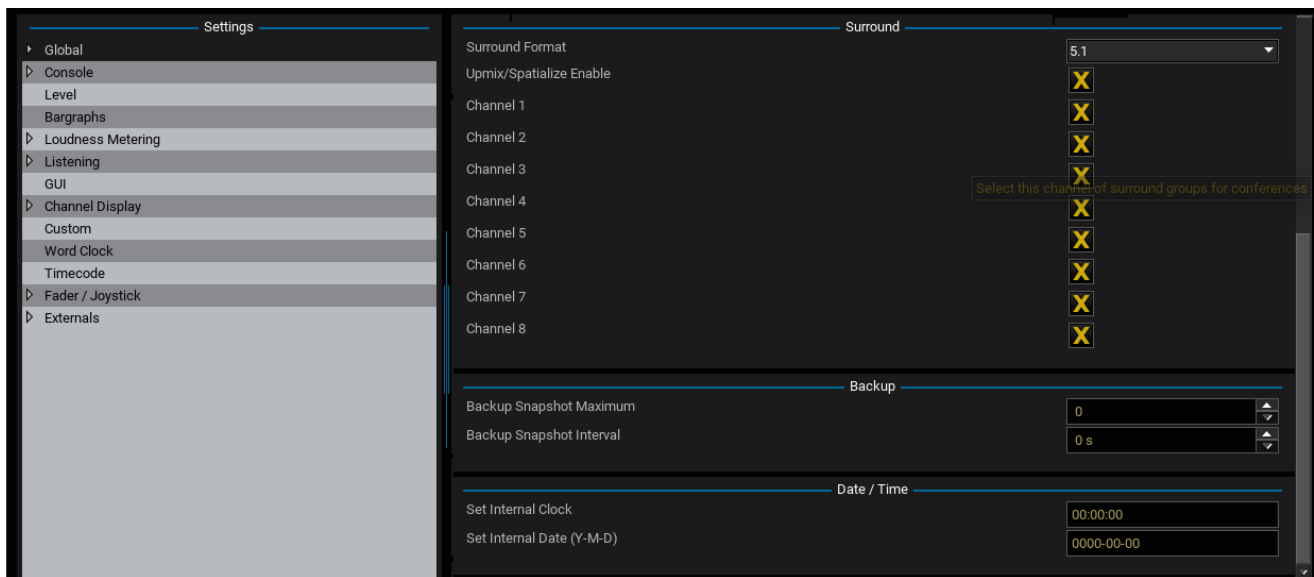
Use this option to enable or disable the [AMBIT](#) upmix and spatialize module for 5.1 surround channels.

#### Channel 1 to 8

These options determine which components of a surround channel feed the [mix minus](#) bus when configured. Select the channels if you wish them to feed the mix minus bus. For example, you might select only Channel 1 (left) and Channel 3 (centre).

The default configuration is all flags selected (as above).

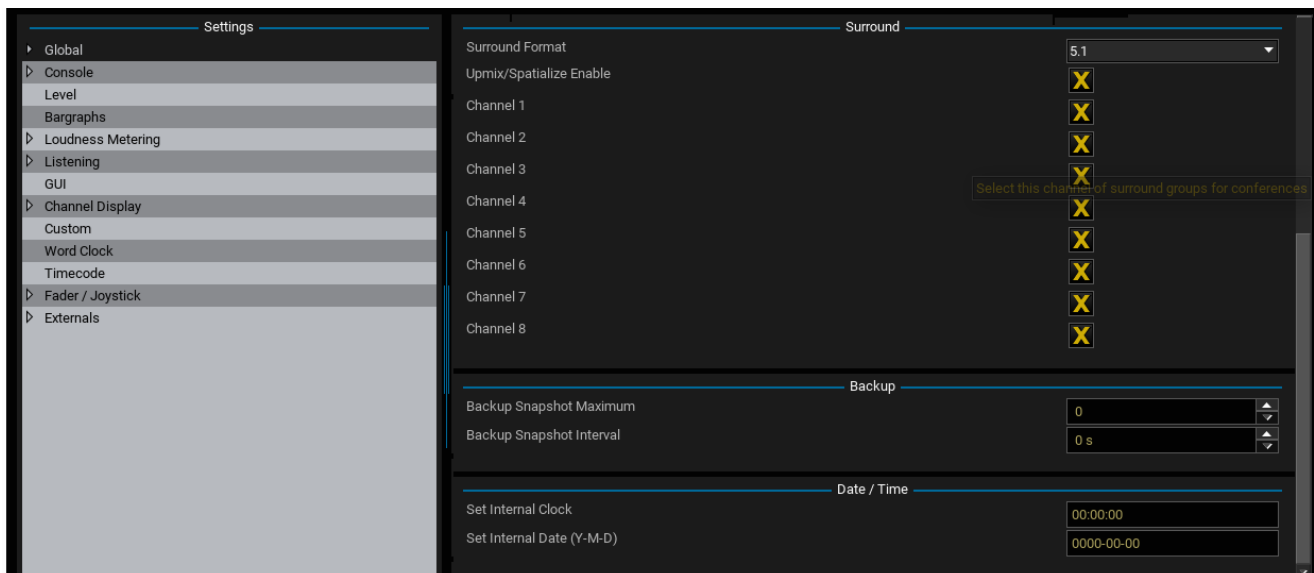
## 20.1.4 Global -> Backup



These options define the system's [backup snapshots](#)

- **Backup Snapshot Maximum** – sets the number of backup snapshots which will be automatically stored before the first backup snapshot is overwritten. The number can be adjusted from 0 to 1000. Enter 0 to turn off the backup snapshots function.
- **Backup Snapshot Interval** – sets the time interval between backup snapshots, and can be adjusted from 60 seconds to 24 hours (86400s).

## 20.1.5 Global -> Date/Time



### Set Internal Clock

Using this option you can set the internal clock.

1. Type in the time you wish to set and then press Enter - a confirmation pop-up appears.
2. Select **OK** to confirm - the new time is set.

The time can be displayed on the Central GUI by adjusting the [headline](#) in the title bar.

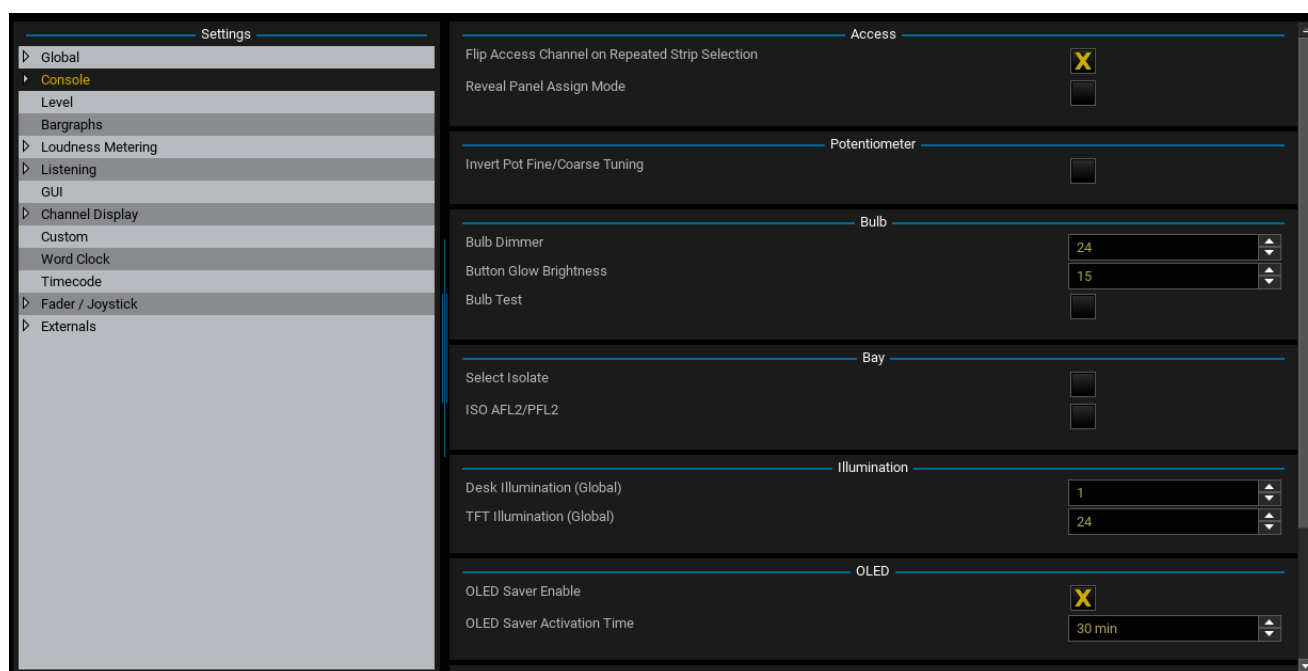
Your system can be configured for NTP synchronization, so that the internal clock is synchronized to an external NTP server (connected to the Lawo network). In this instance, the NTP server time takes priority. From Version 5.4 onwards, NTP synchronization has been improved with support for different time zones and daylight saving. Note that this option must be factory-configured within the [TCL files](#).

### Set Internal Date

Using this option you can set the internal date.

1. Type in the date in the format: Month/Day/Year (e.g. 25/01/2010) and then press Enter - a confirmation pop-up appears.
2. Select **OK** to confirm and the date is set. The date stamp is used when saving user data such as [Productions](#) and [Snapshots](#).

## 20.1.6 Console -> Access



### Flip Access Channel on Repeated Strip Selection

This option affects what happens when you press a fader **SEL** button twice in quick succession (a double-press). For example, if INP 1 is in access and you double-press the fader **SEL** button on INP 5:

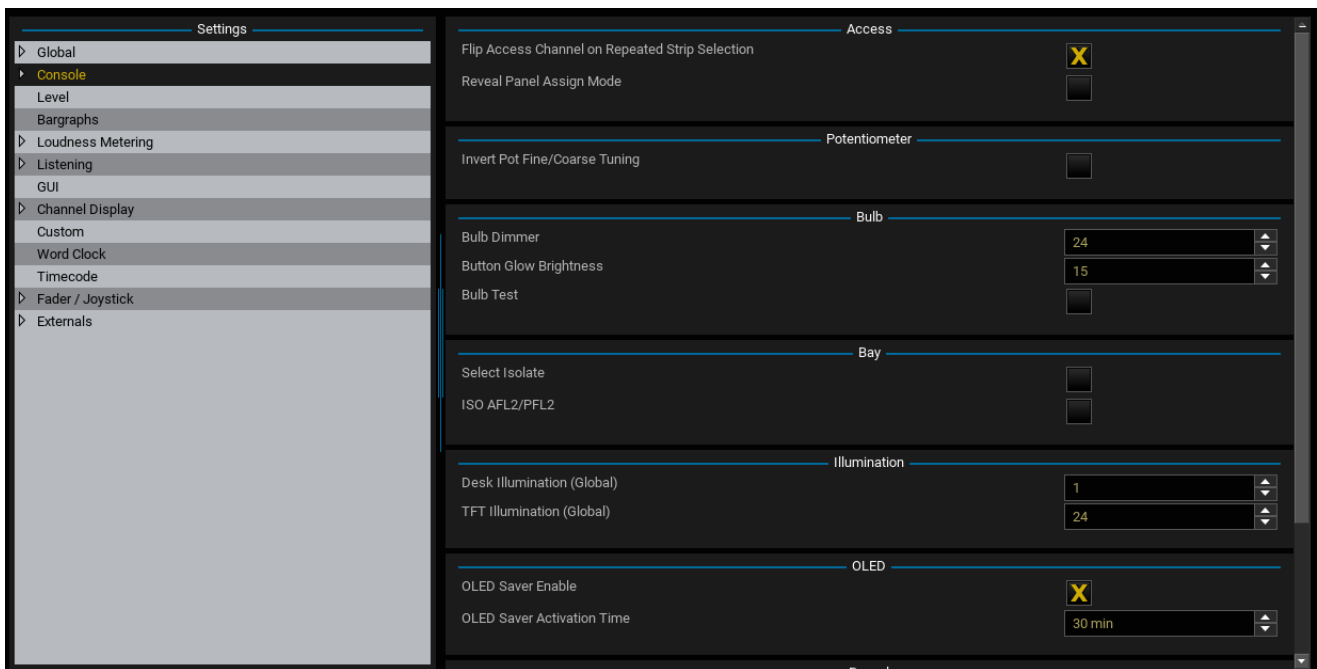
- **Flip Access Channel on Repeated Strip Selection** (on) – the system registers both presses and so selects INP 5 and then unselects INP 5 returning to the previously selected channel - INP 1. This is the default behaviour.
- **Flip Access Channel on Repeated Strip Selection** (off) – the system ignores the double-press and so does NOT revert to the previously selected channel. In our example, the channel in access becomes INP 5.

### Reveal Panel Assign Mode

This option determines the behaviour of the [Reveal Panel](#).

- **Reveal Panel Assign Mode** (on) - the reveal panel is cleared and performs no function unless the channel in access is a surround VCA.
- **Reveal Panel Assign Mode** (off) - the last selected surround VCA remains assigned to the reveal faders even if you select a different channel type.

## 20.1.7 Console -> Potentiometer

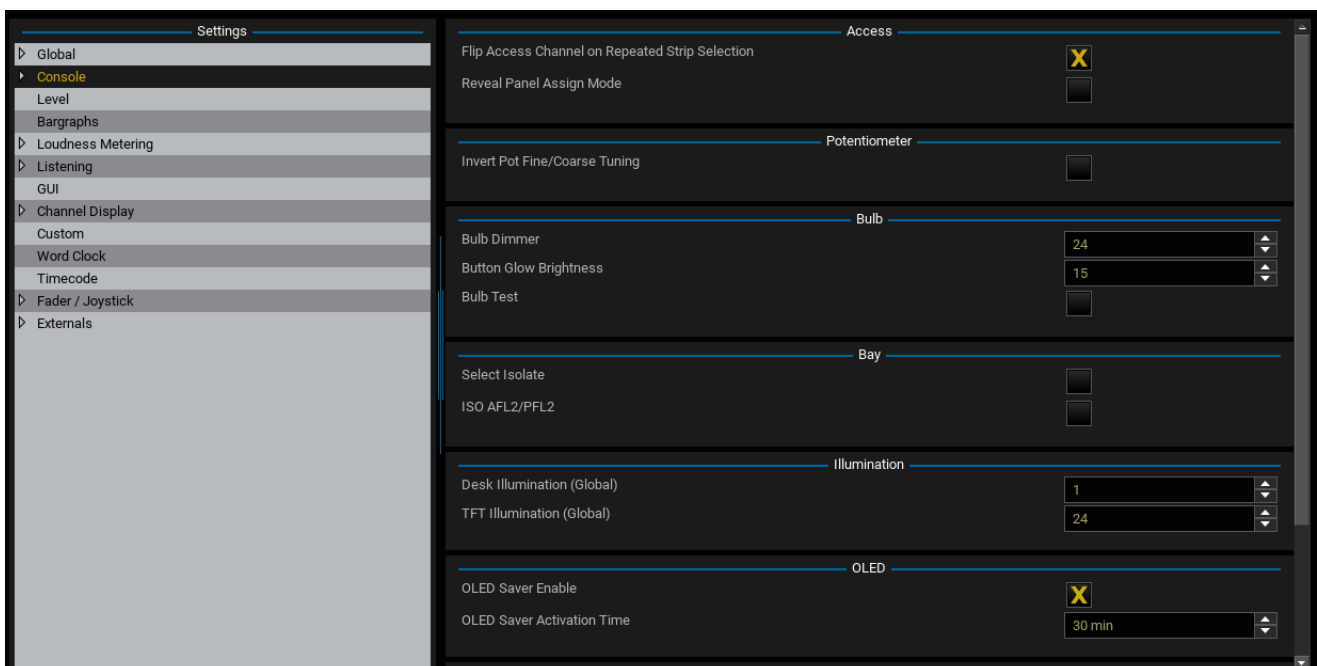


### Invert Pot Fine/Coarse Tuning

This option inverts the behaviour of all rotary controls on the console surface:

- **Invert Pot Fine/Coarse Tuning (on)** – turn a control for coarse adjustments; push down and turn for fine tuning.
- **Invert Pot Fine/Coarse Tuning (off)** – turn a control for fine tuning; push down and turn for coarse adjustments.

## 20.1.8 Console -> Bulb



### Bulb Dimmer

This option sets the brightness of all LEDs, bulbs and text displays across the console surface. The brightness can be set from 0 = low to 31 = high. Note that there is a fixed relationship between the **Bulb Dimmer** value and **Button Glow Brightness**.

### Button Glow Brightness

This option applies to the mc<sup>2</sup>56 MKII only. On other consoles, the option can be adjusted, but performs no action.

When enabled, some fader strip buttons (in their off state) are dimly lit according to the [channel color code](#). This makes it easy to identify which channels are assigned to fader strips, especially useful in low-light conditions. The fader strip buttons affected are A/B input switching, Free Control on/off buttons, the four channel user buttons, AFL and PFL.

To enable button-glow, set the **Button Glow Brightness** to any value > 0. We recommend 20 as a good starting number.

Note that there is a fixed relationship between the **Button Glow Brightness** and **Bulb Dimmer** value. Therefore, if you adjust the **Bulb Dimmer** setting it will affect **Button Glow Brightness**.

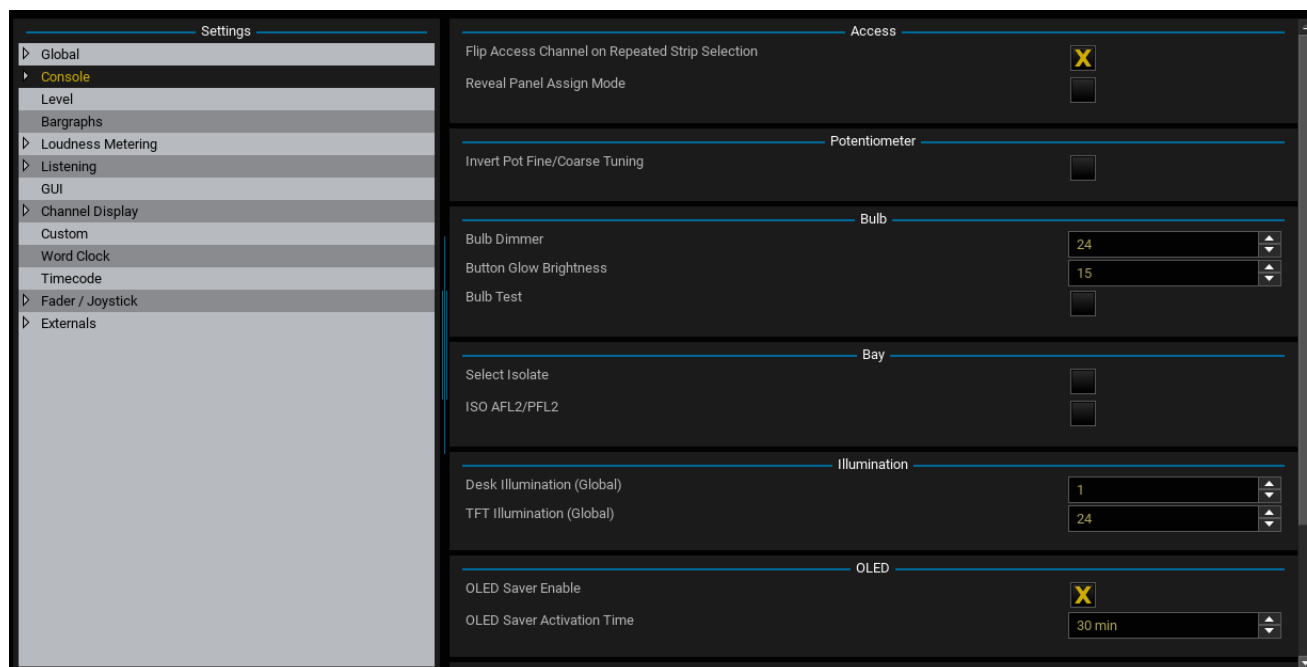
To disable button-glow, set the **Button Glow Brightness** to 0.

### Bulb Test

This option lights all LEDs, bulbs and text displays across the console surface in order to check for defects:

- **Bulb Test** (on) - enters the test mode. All LEDs, bulbs and displays will illuminate across the console. Note that all dual colored bulbs should be orange. If not, then this indicates that either the red or green bulb is faulty.
- **Bulb Test** (off) - exits the test mode.

## 20.1.9 Console -> Bay



### Select Isolate

This option determines whether fader select (**SEL**) buttons within [isolated](#) fader bays update the channel in access:

- **Select Isolate** (on) – the **SEL** buttons within isolated bays do NOT update the channel in access. Use this mode when you want isolated bays to work independently from the rest of the console. For example, when one engineer is working on an isolated fader bay and another with the rest of the console.

- **Select Isolate** (off) – the **SEL** buttons within isolated fader bays do update the channel in access. This mode is ideal for single operator use where you wish the channel in access to follow selections within isolated fader bays.

### ISO AFL2/PFL2

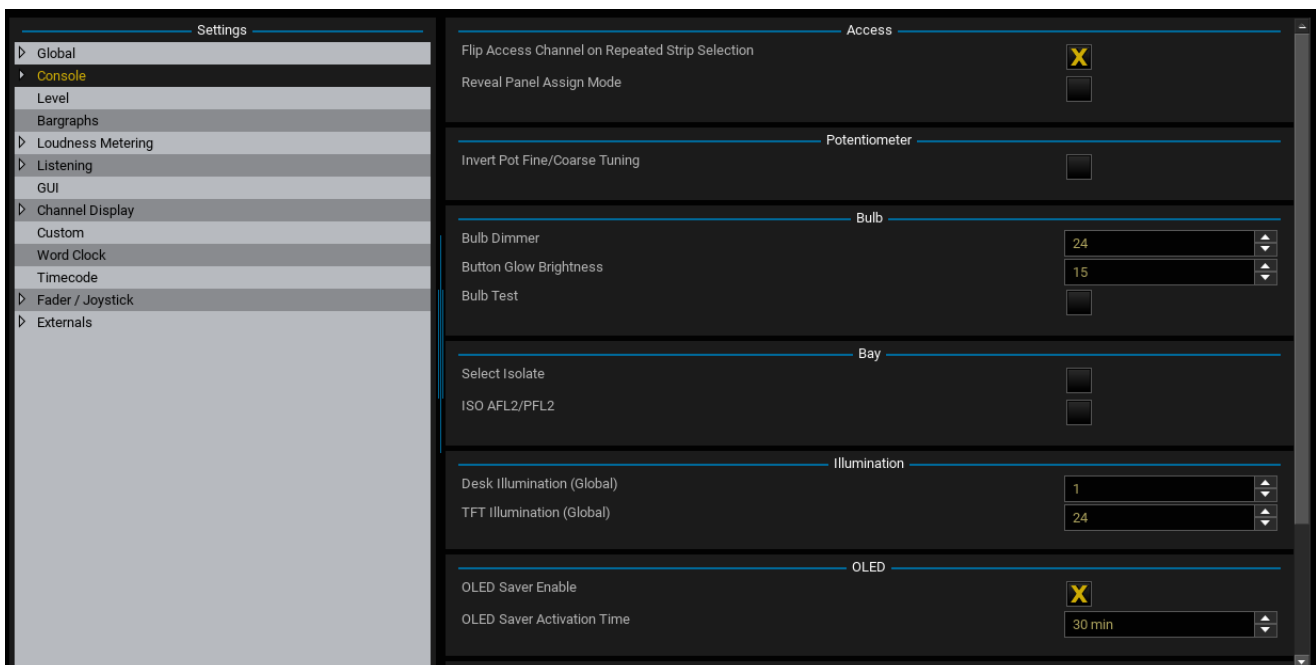
This option is used to route AFL and PFL selections made within [isolated fader bays](#) onto a second AFL and PFL bus:

- **ISO AFL2/PFL2** (on) – enables the second AFL/PFL output; any AFL and PFL selections made from an isolated fader bay route to the AFL2 and PFL2 outputs. AFL and PFL selections from the rest of the console route to AFL1 and PFL1.
- **ISO AFL2/PFL2** (off) – disables the second AFL/PFL output; all AFL and PFL selections, including those within isolated fader bays, route to AFL1 and PFL1.

You can find the **AFL2** and **PFL2** bus outputs in the [Signal List display](#), under the **Bus Out**.

In the default monitoring configuration, you should have options to switch **AFL2** and **PFL2** to the control room monitors or headphones. See [AFL & PFL](#).

### 20.1.10 Console -> Illumination



#### Desk Illumination

This option sets the brightness for the console desk light. The brightness can be set from 0 = off to 15 = high.

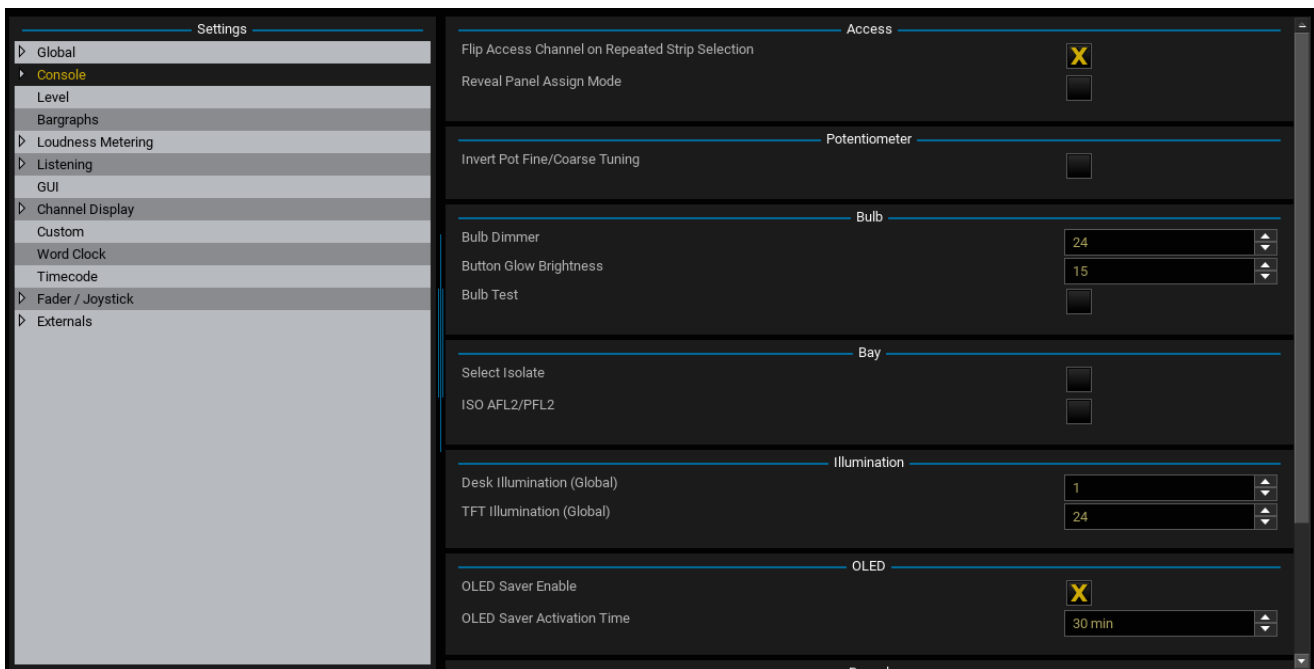
#### TFT Illumination

This option sets the brightness for the TFTs. The brightness can be set from 0 to 32 = high.

#### Floor Light Red, Green, Blue, White

This option applies to the mc<sup>2</sup>96 only and sets the color and brightness of the "floor" lighting (i.e. the bulbs mounted in the underside of the control surface).

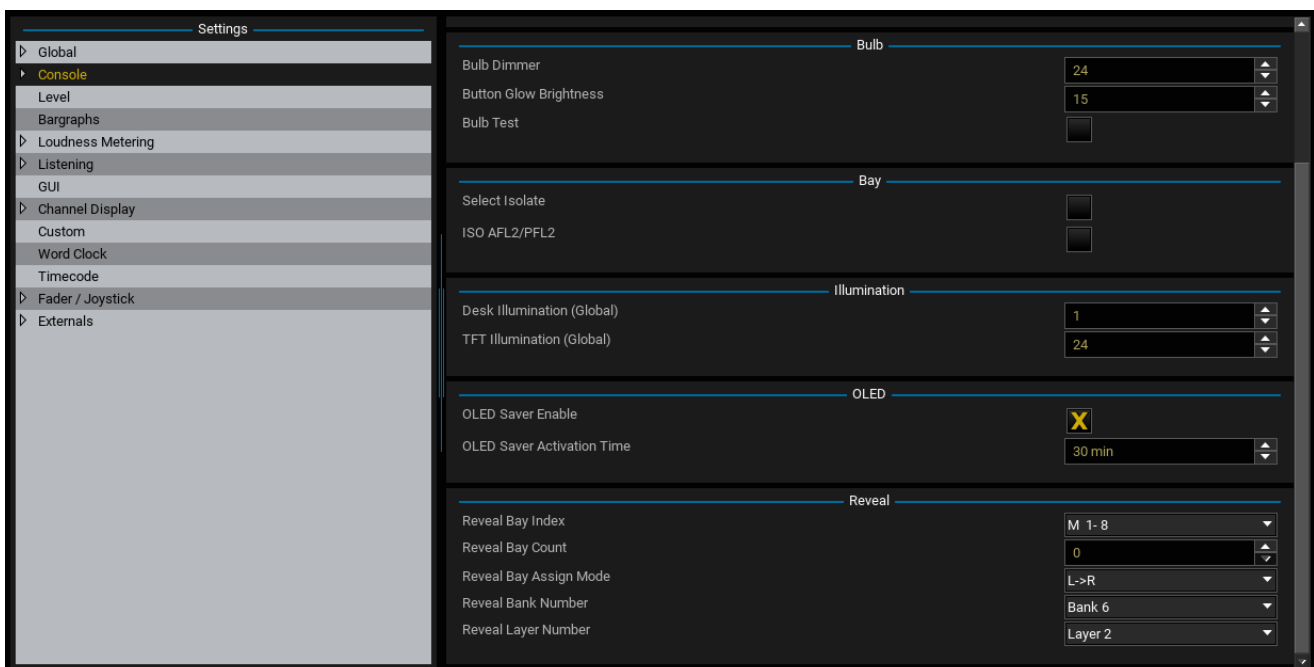
### 20.1.11 Console -> OLED



These options enable the OLED (text displays) screensaver and set the time in minutes before the screensaver is activated. The time can be set from 5 to 60 minutes. The screensaver will deactivate as soon as you touch any fader, rotary control or press a button.

Use this mode to prolong the lifetime of the OLED (text displays).

### 20.1.12 Console -> Reveal



These five options determine where the VCA slave faders appear when the [REVEAL function](#) is active.

The first three options determine the location and number of fader strips to be used, and whether faders are revealed from left to right or right to left:

- **Reveal bay index** – enter the first channel or main fader bay you wish to use.

- **Reveal bay count** – select the total number of fader bays you wish to use. For example, **1** will allocate 8 fader strips, **2** will allocate 16 fader strips, etc. If you enter **0**, then no fader bays are allocated, and the **REVEAL** button will perform no function.

Using more than 8 faders can be very useful if you are using **REVEAL** with normal [VCA grouping](#). For example, by setting the Reveal bay count to **2** you will be able to reveal 16 slaves.

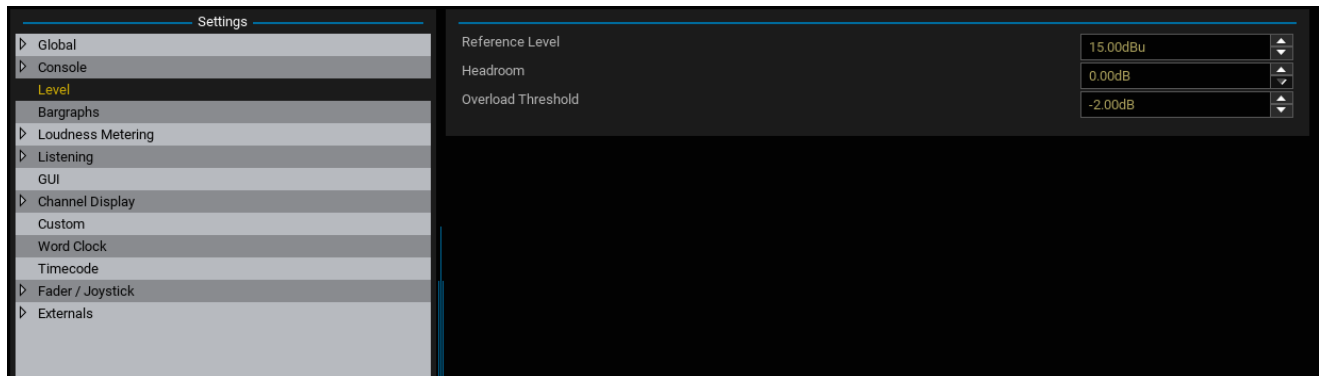
- **Reveal bay assign mode** – this option determines whether slaves appear from left to right (L->R) or right to left (R->L) across the defined fader bay(s).

The last two options determine which fader strip bank(s) and layer are used to implement the reveal function:

- **Reveal bank number** – selects the fader strip bank used to store revealed slaves.
- **Reveal layer number** - selects the fader strip layer used to store revealed slaves.

Whenever you put a surround VCA or normal VCA master into access, its slaves are automatically assigned to the designated "Reveal bank and layer"; the **REVEAL** button then simply flips these fader strips to the current surface. Therefore, select a bank and layer of fader strips which you do not need for your normal operation.

### 20.1.13 Level Options



This topic can be used to change the system's reference level, headroom or overload threshold. The levels affect the maximum analog level from your system according to the following equation:

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

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

**WARNING:** changing the **Reference Level** or **Headroom** will move the internal 0dB operating point for the system, and thereby change the behaviour of 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 analog IO cards:

- The **Headroom** and **Reference Level** cannot be altered independently. For example, with a +15dBu fixed analog IO card and +9dB **Headroom**, the **Reference Level** *must* be +6dBu.
- The [maximum analog 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 analog 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 analog interfaces in dBu. Reference level can 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 analog reference level and digital full scale (0dBFS). Headroom can be set from 0dB to +20dB depending on the **Reference level**.

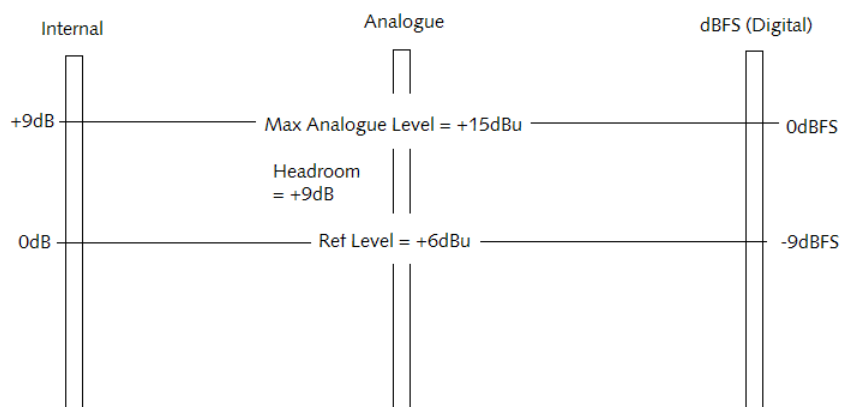
Note that the internal Headroom is more than 380dB which means, if you route from input to group to group to sum, you can overdrive the level more than 380dB before clipping!

### Overload Threshold

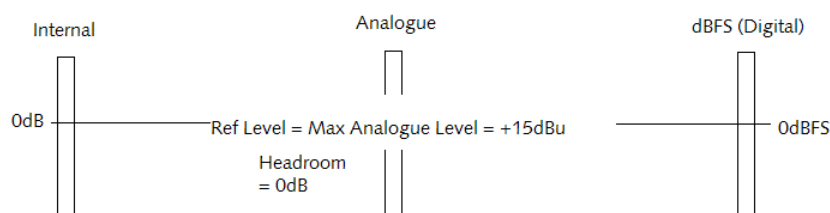
Sets the overload threshold of your system relative to digital full scale. It can be set from -6dBFS to -0.5dBFS or switched off.

Note that **OVR** is only indicated if you meter signals input to or output from the routing matrix. Internally, the system headroom exceeds 380dB!

The diagram below shows the normal operating levels for DIN scale operation in Germany:

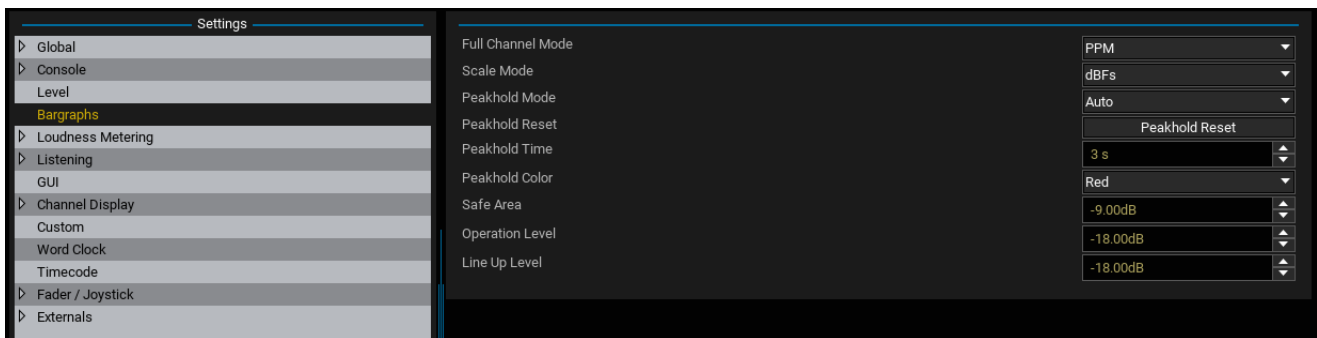


However, if you intend to work with the **dBFS** digital meter [scale option](#), or an external AES meter, then you should set the **Reference Level** equal to your maximum analog level (e.g. +15dBu) and **Headroom** to 0dB as shown below:



This ensures that the dBFS metering on the **Channel** display matches any external AES metering you may have. But be aware that the internal 0dB operating level now equals 0dBFS. This means that you are responsible for your own headroom. For example, if you still want a headroom of +9dB, then you will need to set your limiter threshold points to -9dB, etc.

### 20.1.14 Bargraph Options



This topic sets the peak metering options:

#### Full Channel Mode

This option defines the [peak meter](#) characteristics across the console. Choose from the following options:

- **PPM** – Peak metering; 10ms attack time and 1.5s release.
- **True Peak** – True peak metering with 2 x oversampling, 0ms attack time and 1.5s release.
- **fast** – fast response peak metering; 1ms attack time and 1.5s release.
- **VU** – RMS metering; 300ms attack and 300ms release.

For [ITU compliant operation](#), you should choose **True Peak**.

#### Scale Mode

This option defines the [peak meter](#) scale across the console. Choose from the following options:

- **DIN PPM** – conforming to IEC 268-10.
- **UK PPM** – conforming to IEC 268-10 IIA.
- **Nordic** – conforming to IEC 268-10 I.
- **dBFS** – dB Full Scale digital meter scale (shown opposite).

When using the **dBFS** meter scale, it is recommended that you return to the [Level options](#) and set the **Reference Level** equal to your maximum analog Level and the **Headroom** to 0dB. This ensures that the dBFS metering across the console matches any external AES metering that you may have.

#### Peakhold Options

These options defines the behaviour of the [peak hold](#) indicator which monitors and marks the peak level reached on each meter across the console:

- **Peakhold Mode** - can be set to:
  - **Auto** – peak hold automatically clears after the **Peakhold Time** value (see below).
  - **Manual** – peak hold remains set until you select **CLEAR**.
  - **Off** – the peak hold indicator is disabled.
- **Peakhold Reset** - clears the peak hold indicators and reset peak level monitoring.
- **Peakhold Time** - sets the peak hold time used in the **Auto** peak hold mode (see above). Set the value in seconds.
- **Peakhold color** - sets the color of the peak hold indicator.

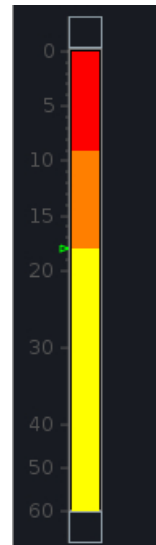
## 20. System Configuration

### Safe Area, Operation Level, Line Up Level

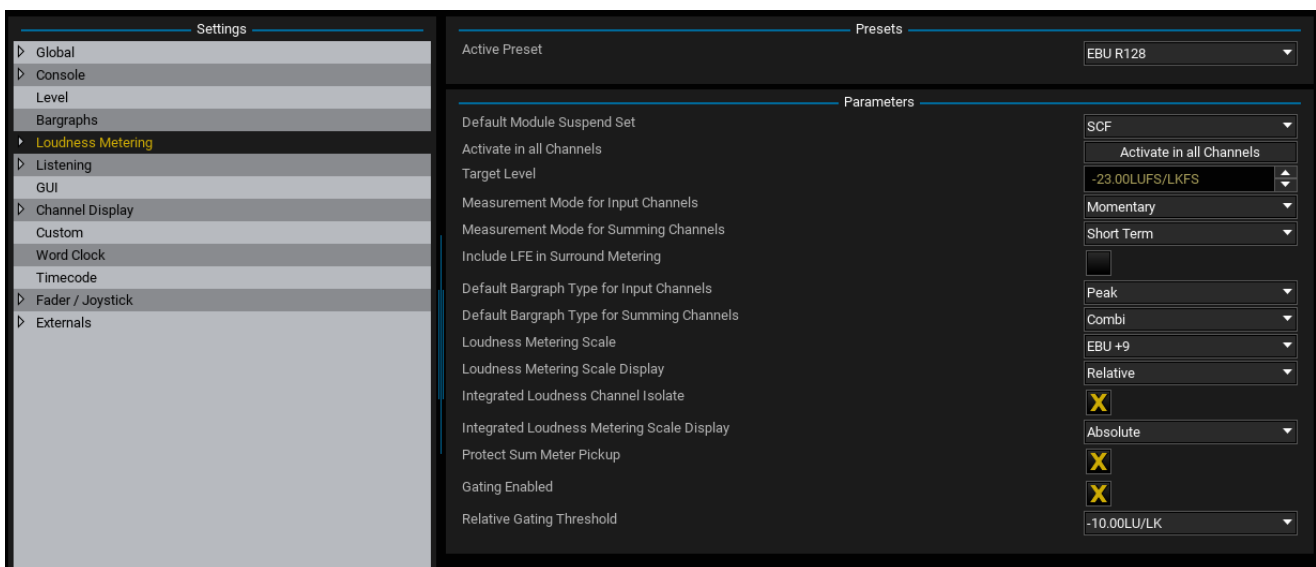
These options color code the [peak meter](#) bargraphs, and can be used to help manage your headroom:

- **Safe Area** - this option sets the point where the meters change from red to orange. For example, you could set this to -6dB to mark 6dB's of headroom.
- **Operation Level** - this option sets the point where the meters change from orange to yellow in the middle of the meter scale. For example, you might set this to -12.0dB so that when signals peak within the orange area (-12dB to -6dB) you know that they are at a good operating level for the type of programme material.
- **Line Up Level** - this option sets the position of the green 'Line up level' mark.

In each case, the levels are adjusted relative to the 0dB meter point.



### 20.1.15 Loudness -> Presets



The **Active Preset** automatically recalls the correct [loudness metering](#) settings to comply with either the **EBU R128** or **ATSC A/85 & ARIB** implementation standards.

The preset determines how loudness is displayed - in **LU/LUFS** for **EBU R128**, or **LK/LKFS** for **ATSC/ARIB** compliance. Note that LUFS is identical to LKFS defined by the ITU standard (BS 1770).

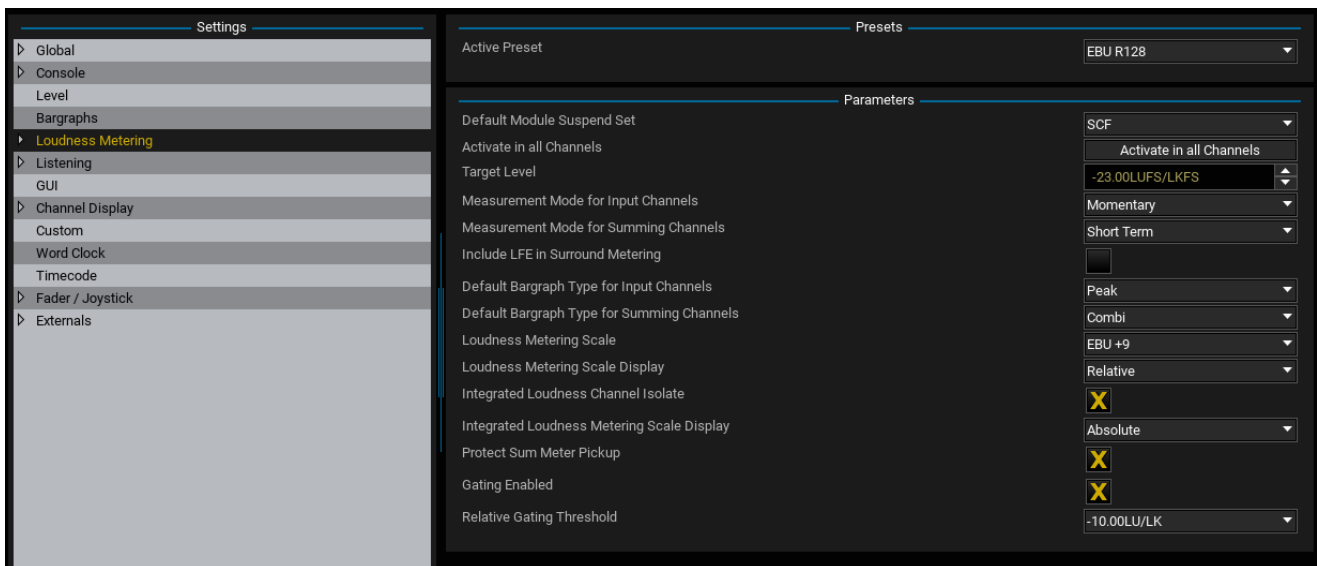
The preset also resets the following [Loudness Parameters](#):

- **Target Level**
- **Loudness Metering Scale**
- **Gating Enabled**
- **Relative Gating Threshold**

Note that if you change any of these options, then you are deviating from the EBU or ATSC/ARIB recommendations; to indicate this, the **Active Preset** changes to **Custom**.

Note that you can change the **Loudness Metering Scale** to the extended scale (e.g. from **EBU +9** to **EBU +18**) without affecting compliance.

### 20.1.16 Loudness -> Parameters



#### Default Module Suspend Set

This option defines the default DSP module, or modules, which will be disabled (suspended) when loudness metering is [activated](#). Use the drop-down menu to make a selection. The default selection can be modified on a channel by channel basis from the [Channel Config](#) display.

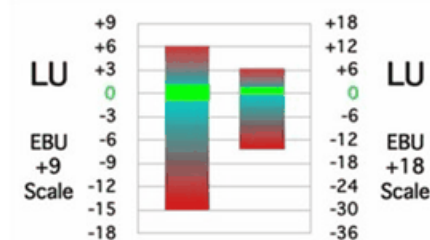
#### Activate in all Channels

Select this option to turn on loudness metering for all channels which support it. See [Activating Loudness Metering](#) for details.

#### Target Level

This option adjusts the target level for program loudness, and is recalled by the [Active Preset](#).

The EBU R128 recommends a target level of **-23 LUFS +/- 1 LU**. The target level is equivalent to 0 LU on the EBU loudness metering scale:



The ATSC A/85 & ARIB standards recommend a target level of **-24 LKFS +/- 2 LK**.

Note that LUFS is identical to LKFS defined by the ITU standard (BS 1770).

Note that the **Target Level** can be adjusted from -31 to -14 LUFS/LKFS. However, any changes will deviate from the EBU or ATSC/ARIB recommendations.

#### Measurement Mode for Input/Summing Channels

The next two options adjust the measurement mode for the [loudness meter](#) bargraphs. You can select:

- **Momentary (M)** – integration time operates over a 400ms sliding window.
- **Short Term (S)** – integration time operates over a 3 second sliding window.

The loudness bargraphs include either an **M** or **S** representing the integration time. You can adjust this option separately for input channels and summing channels.

## 20. System Configuration

### Include LFE in Surround Metering

Check this option if you wish to include the LFE channel in surround channel loudness measurements.

### Default Bargraph Type for Inp/Summing Channels

The next two options adjust the default [bargraph type](#) for input and summing channels:

- **Default Bargraph Type for Input Channels** sets the option for all input and monitor channels.
- **Default Bargraph Type for Summing Channels** sets the option for all summing channels (groups, sums and auxes).

In each case, you can choose from:

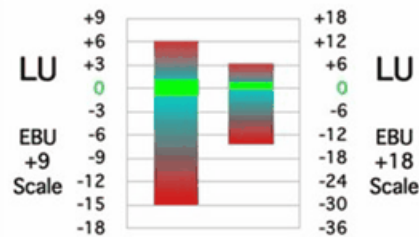
- **Combi** – peak and loudness metering side by side.
- **Peak** – peak metering only.
- **Loudness** – loudness metering only.

### Loudness Metering Scale

This option defines the scale for the [loudness meter](#) bargraphs. Note that a default scale is recalled by the [Active Preset](#).

The scale options comply either with the EBU R128 or ATSC A/85 / ARIB recommendations:

- **EBU +9** – the EBU standard scale.
- **EBU +18** – the EBU extended scale (covering twice the dynamic range).



- **ITU-R BS.1771** – the ITU standard scale (-21 LU to +9 LU).
- **Extended ITU-R BS.1771** – the extended ITU standard scale (-42 LU to +18 LU).

### Loudness Metering Scale Display

This option determines how the [loudness meter](#) bargraph scale values are displayed. You can select:

- **Absolute** – scale values are displayed as absolute values in LUFS/LKFS.
- **Relative** – scale values are displayed relative to the **Target Level**.

### Integrated Loudness Channel Isolate

This option affects channels using the [integrated loudness measurement](#).

Check the option to automatically isolate a channel once an integrated measurement is started. The option turns on **SNAP ISO** on the channel's fader strip so that any snapshot recalls will *not* affect the channel.

If this option is *not* checked, then a snapshot saved when the **LOUD** DSP module was turned off, will reset the channel's signal flow and therefore destroy any active integrated loudness measurement.

### Integrated Loudness Metering Scale Display

This option determines how the integrated loudness value is displayed. You can select:

- **Absolute** – value is displayed as an absolute value in LUFS/LKFS.
- **Relative** – value is displayed relative to the **Target Level**.

### Protect Sum Meter Pickup

When this option is checked, you cannot alter the position of the loudness meter pickup point (the **LOUD** DSP module) for summing channels (Groups, Auxes or Sums).

## Gating Enabled

When this option is checked, two-step gating is enabled for integrated loudness measurements.

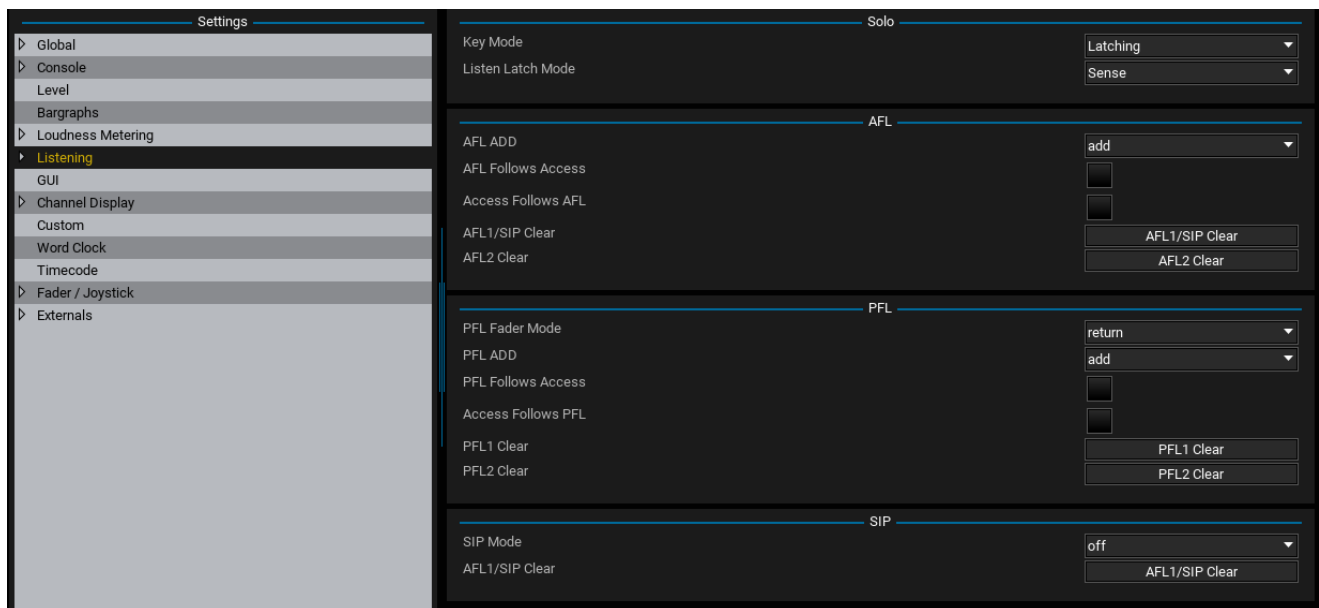
Note that this option is recalled by the [Active Preset](#). Any change will deviate from the EBU or ATSC recommendations.

## Relative Gating Threshold

This option sets the relative gating threshold to either -8 or -10 LU/LK. Gating is only applied if the **Gating Enabled** option above is checked.

Note that this option is recalled by the [Active Preset](#). Any change will deviate from the EBU or ATSC/ARIB recommendations.

## 20.1.17 Listening -> Solo



## Key Mode

Defines whether Listen buttons are latching or momentary; the option affects AFL (or Solo-in-Place) and PFL buttons:

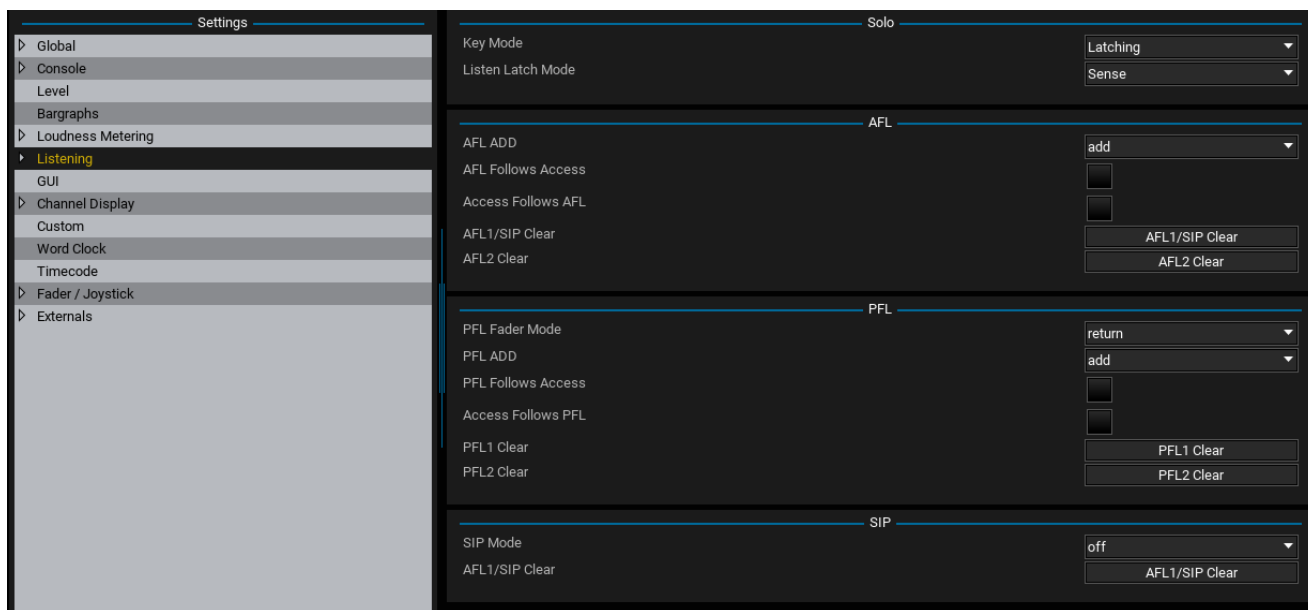
- **Key Mode (Latching)** – buttons latch on or off when pressed.
- **Key Mode (Momentary)** – buttons are only active while pressed.

## Listen Latch Mode

Defines whether AFL monitoring actioned from the [LISTEN](#) buttons is momentary (sensing) or latching:

- Select **Sense** for momentary AFL. The output of the LISTEN module feeds the AFL bus as long as you touch the control. Once the control is released, AFL is cancelled.
- Select **Latch** for latching AFL. AFL latches on and remains on even if you release the control. AFL is cancelled when you touch a control within another module or deselect the LISTEN button.

### 20.1.18 Listening -> AFL



#### AFL Add

Defines whether **AFL** selections are additive or exclusive:

- **EXCL** – only one AFL is active at any time; selecting a new AFL cancels the previous selection.
- **ADD** – allows multiple AFL buttons to be combined, thereby enabling a group of channels to be monitored in context.

#### AFL follows Access

Controls the behaviour of AFL when you update the [channel in access](#). It works best with exclusive AFL.

- **AFL follows access** (on) – AFL selections follow the channel in access.
- **AFL follows access** (off) – updating the channel in access does not automatically select AFL.

#### Access Follows AFL

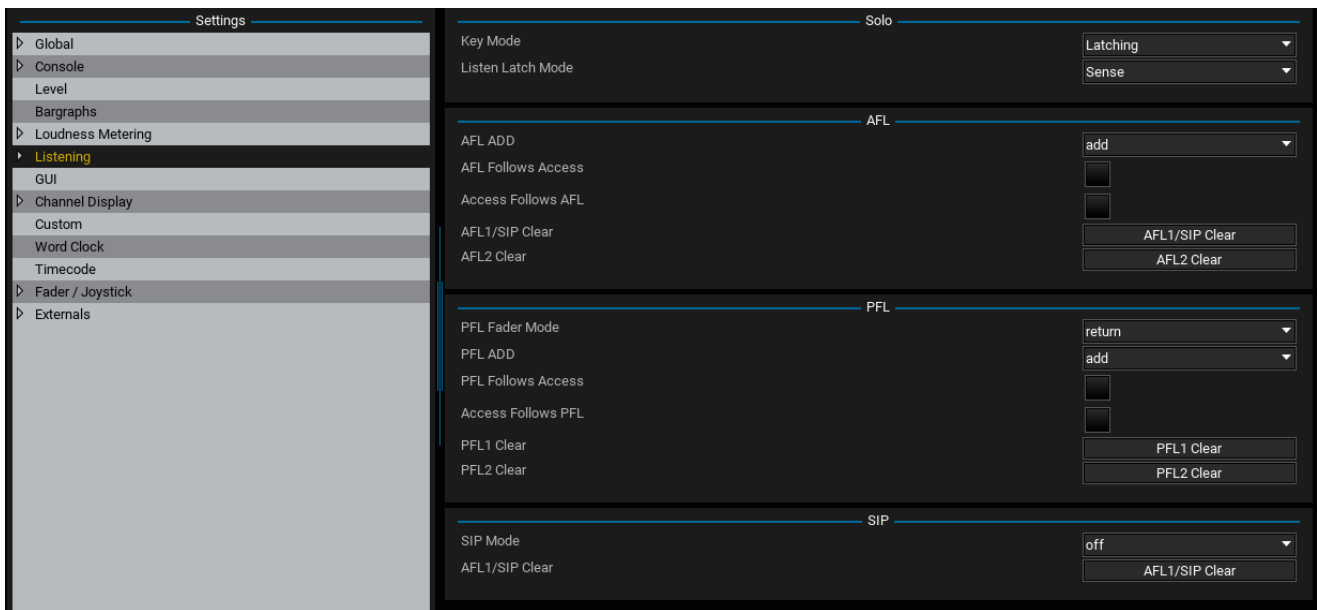
Determines whether the [channel in access](#) automatically follows AFL selections:

- **Access follows AFL** (on) – selecting a channel AFL automatically updates the channel in access.
- **Access follows AFL** (off) – the channel in access is not updated by AFL selections.

#### AFL/SIP Clear

Select these buttons to clear all active AFL1 or AFL2 selections. Note that Clear A/PFL may also be available from the console's [monitoring](#) section.

### 20.1.19 Listening -> PFL



#### PFL Fader Mode

Controls how PFL responds to fader open and fader closed:

- **off** – the fader position does not affect PFL selections.
- **on** – choose this option to cancel PFL when a fader opens.
- **return** – choose this option to activate PFL when a fader closes.

PFL can also be actioned from the fader backstop, see the [Fader Backstop](#) options.

#### PFL Add

Defines whether PFL selections are additive or exclusive:

- **EXCL** – only one PFL can be active at any time; selecting a new PFL cancels the previous selection.
- **ADD** – allows multiple PFL buttons to be combined, thereby enabling a group of channels to be monitored in context.

#### PFL follows Access

Controls the behaviour of PFL when you update the [channel in access](#). It works best with exclusive PFL:

- **PFL follows access (on)** – PFL selections follow the channel in access.
- **PFL follows access (off)** – updating the channel in access does not automatically select PFL.

#### Access follows PFL

Determines whether the [channel in access](#) automatically follows PFL selections:

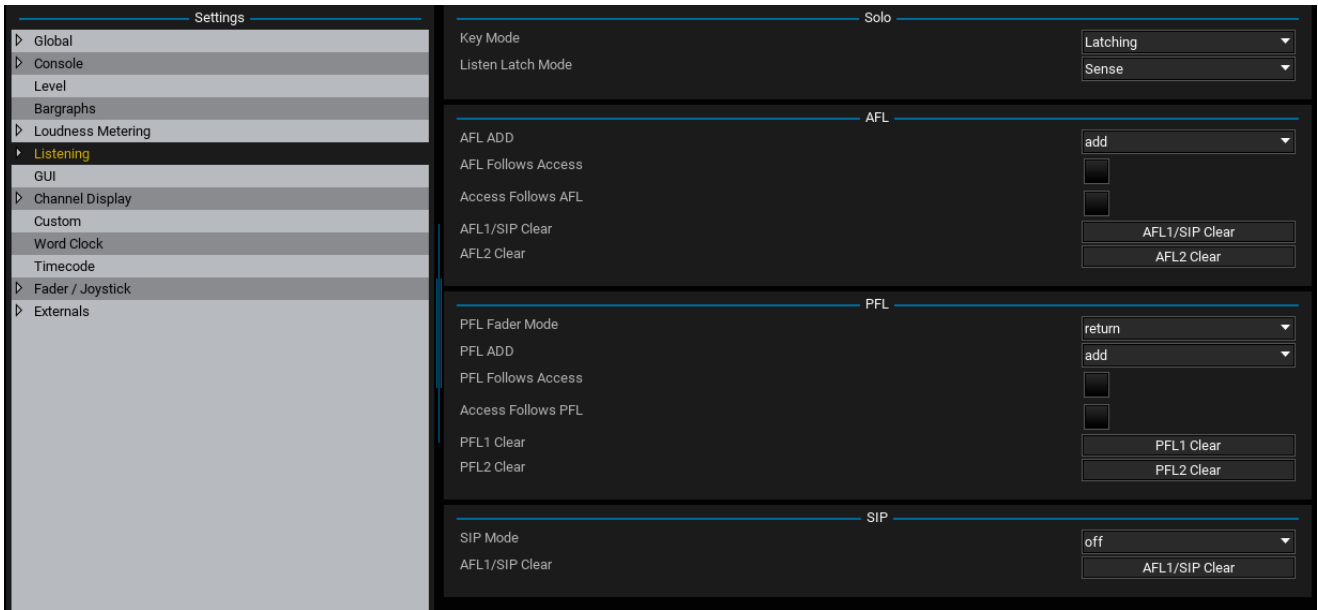
- **Access follows PFL (on)** – selecting a channel PFL automatically updates the channel 'in access'.
- **Access follows PFL (off)** – the channel in access is not updated by PFL selections.

#### PFL Clear

Select these buttons to clear all active PFL1 or PFL2 selections. Note that Clear A/PFL may also be available from the console's [monitoring](#) section.



## 20.1.20 Listening -> SIP (Solo-in-Place)



### SIP Mode

This option enables or disables destructive Solo-in-Place:

- **OFF** – all AFLs act as non-destructive AFL.
- **MON** – all AFLs act as non-destructive AFL except on [monitor channels](#) where the AFL button provides Solo-in-Place for multitrack returns.
- **INP+MON** – all AFLs act as destructive Solo-in-Place.

**WARNING:** Solo-in-Place works by muting any channels not in Solo, so that they no longer feed the bus outputs. This is very useful for post production. However, you should *NOT* use Solo-in-Place when working on a live broadcast, to avoid accidentally interrupting the main program mix.

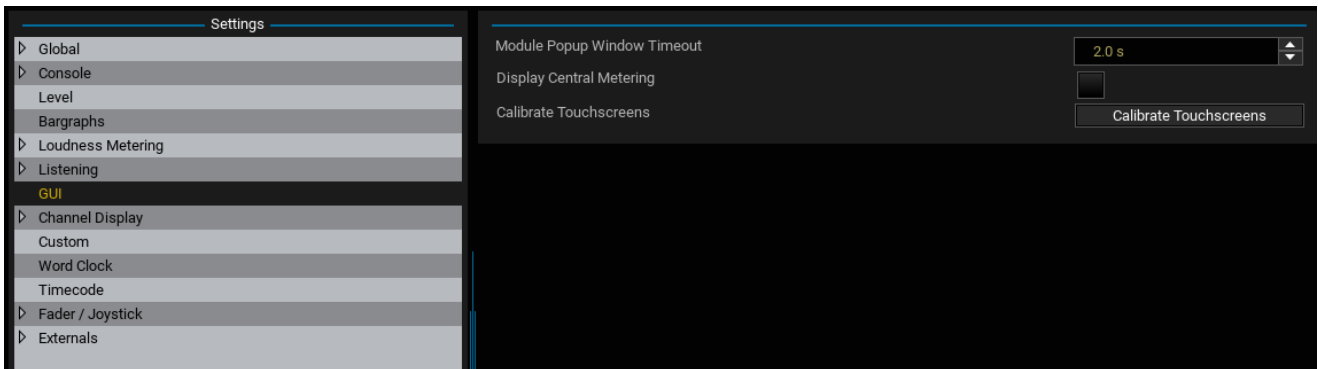
### AFL1/SIP Clear

Select this button to clear all active Solo-in-Place (or AFL) selections.

Note that Clear A/PFL may also be available from the console's [monitoring](#) section.

Use the [Solo Safe](#) option, in the **Channel Configuration** display, to prevent individual channels being muted when a Solo is active.

## 20.1.21 GUI Options



This topic sets Graphical User Interface options.

### Module Popup Window Timeout

This option sets the timeout for the pop-up parameter window (which appears on the Channel Display when you touch a Central Control Section control - e.g. EQ Gain, Compressor Threshold, etc).

### Left & Right Step Through Page Stack (mc<sup>2</sup>36 only)

This option changes the behaviour of the Left and Right navigation buttons on the SCREEN CONTROL [panel](#). When enabled, the buttons select the Next or Previous page on the Central GUI. When disabled, the buttons change which part of the current display is in focus.

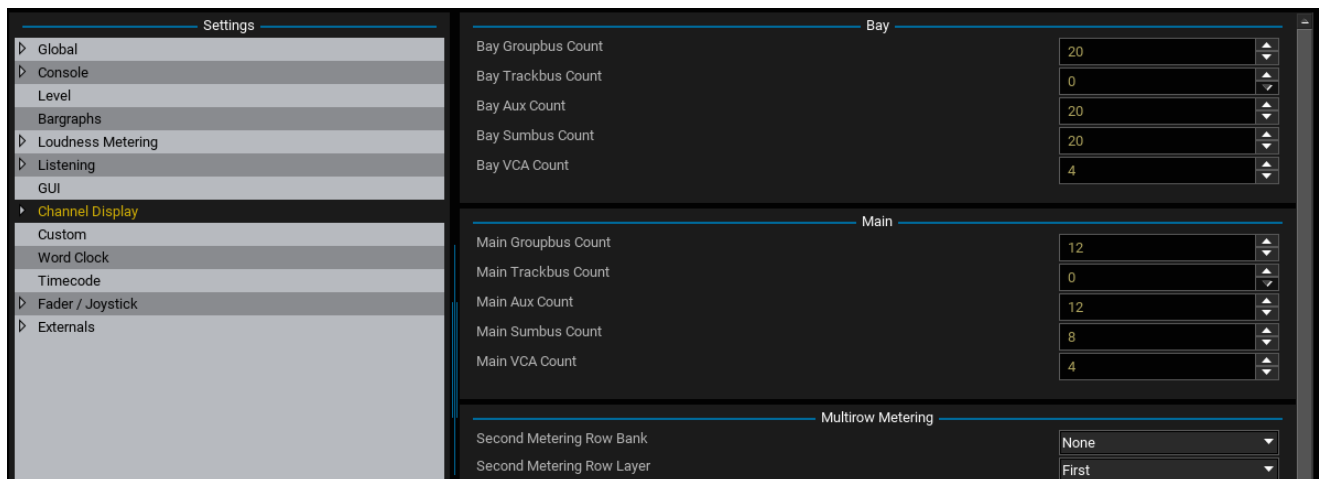
### Display Central Metering

This option activates the mini main fader metering display for the main fader strips. Note that this option is not supported by the mc<sup>2</sup>66.

### Calibrate Touchscreens

Select this button to start the touch-screen calibration; then follow the on-screen instructions. Note that this option is not supported by the mc<sup>2</sup>96 as user calibration of the touch-screens is not necessary.

## 20.1.22 Channel Display -> Bay



Section	Parameter	Value
Bay	Bay Groupbus Count	20
	Bay Trackbus Count	0
	Bay Aux Count	20
	Bay Sumbus Count	20
	Bay VCA Count	4
Main	Main Groupbus Count	12
	Main Trackbus Count	0
	Main Aux Count	12
	Main Sumbus Count	8
	Main VCA Count	4
Multirow Metering	Second Metering Row Bank	None
	Second Metering Row Layer	First

These options change the number of assignments shown on the [Channel display](#):

- **Bay Groupbus Count** - the number of **Group** busses displayed.
- **Bay Trackbus Count** - the number of **Track** busses displayed.
- **Bay Aux Count** - the number of **Aux** busses displayed.
- **Bay Sumbus Count** - the number of **Sum** busses displayed.
- **Bay VCA Count** - the number of "nested" **VCA** masters displayed.

For each entry, enter the number of busses; the Channel Display resizes accordingly:

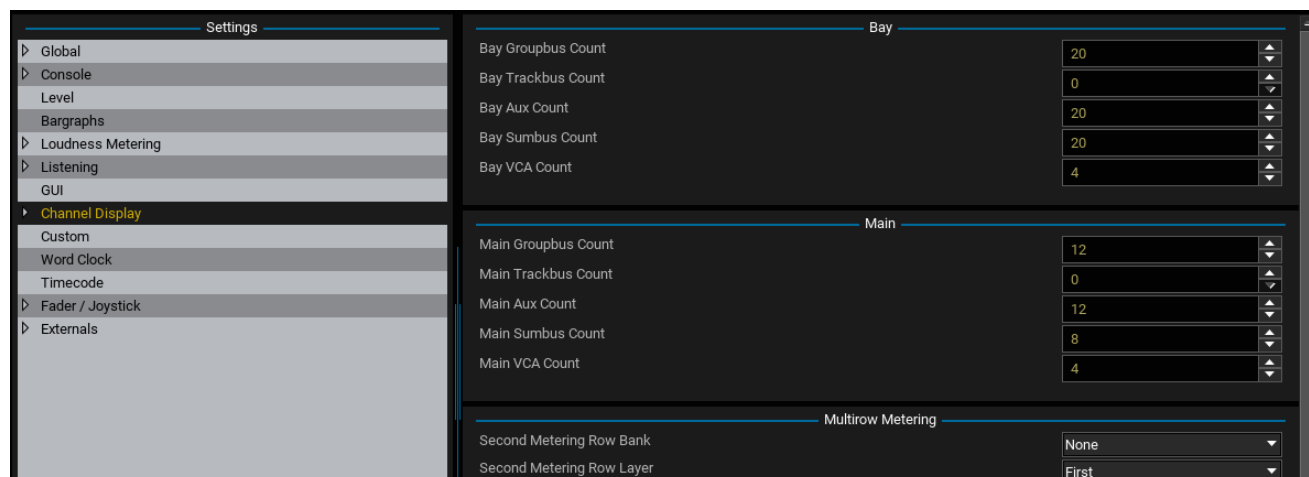
## 20. System Configuration



Note that if [multiple meter rows](#) are enabled, then the maximum number of assignments is limited by the physical size of the display.

Note that this option affects the number of assignments displayed, and not the total number of busses or VCAs available (bus numbers are defined by your DSP configuration).

### 20.1.23 Channel Display -> Main

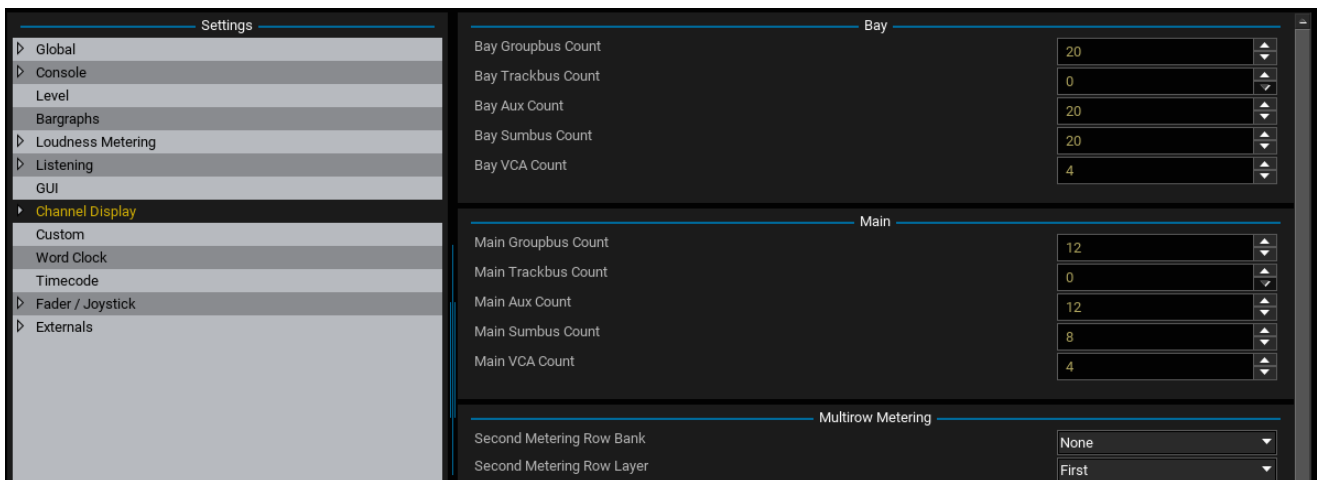


These options change the number of assignments shown on the [Main Faders](#) display:

- **Main Groupbus Count** - the number of **Group** busses displayed.
- **Main Trackbus Count** - the number of **Track** busses displayed.
- **Main Aux Count** - the number of **Aux** busses displayed.
- **Main Sumbus Count** - the number of **Sum** busses displayed.
- **Main VCA Count** - the number of "nested" **VCA** masters displayed.

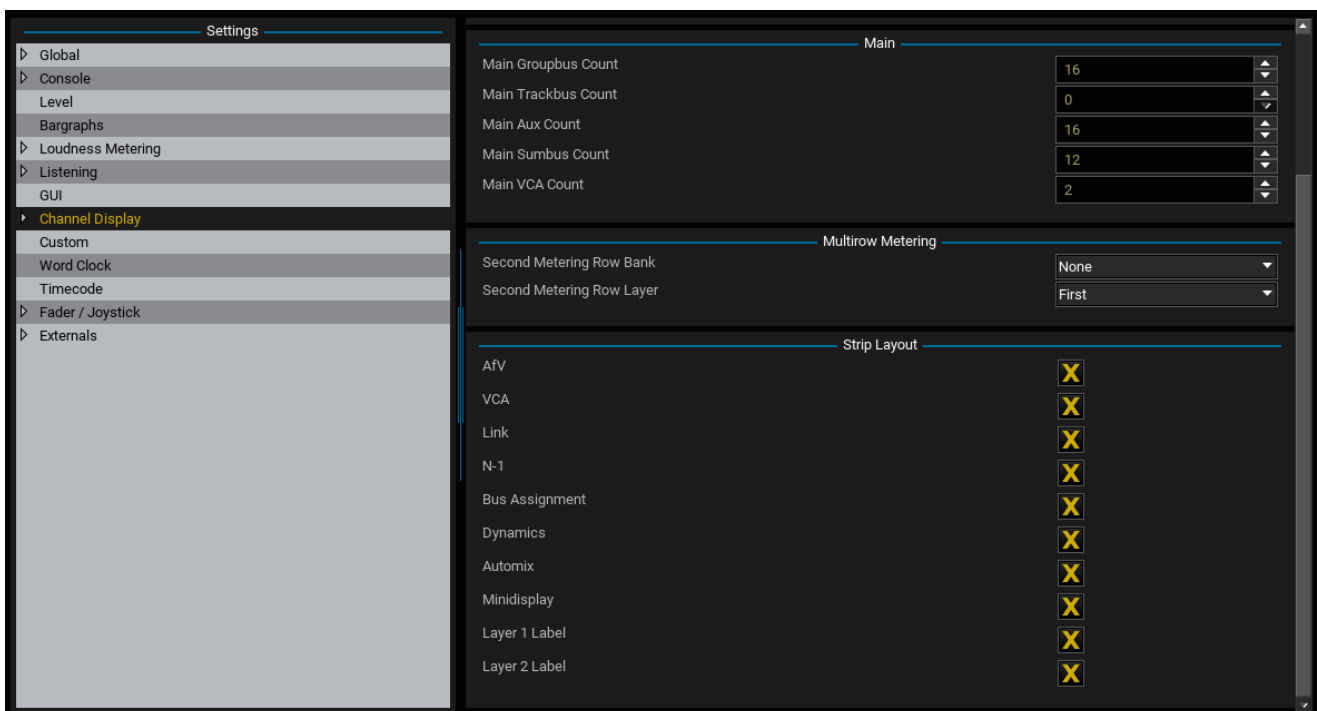
The options work in a similar manner to the [Bay bus count](#).

### 20.1.24 Channel Display -> Multirow Metering



The next set of options configure the additional metering rows on the [Channel display](#). See [Multi-row Metering Configuration](#) for details.

### 20.1.25 Channel Display -> Strip Layout



These options configure what appears on the Channel display. They allow you to remove elements if they are not needed, so that operators can focus on the most important functions.

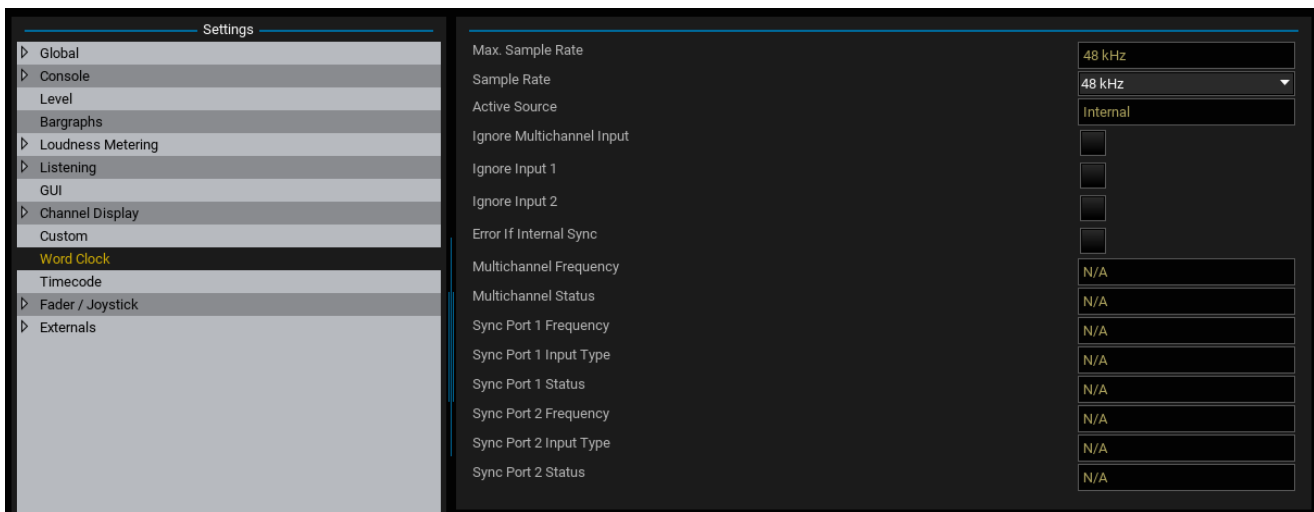
The factory default is that all elements are selected. Deselect a checkbox to hide an element (e.g. AFV).

For more details on each element, please see the [Channel display](#).

### 20.1.26 Custom Options

This topic is reserved for future implementation.

### 20.1.27 Wordclock Options



This topic defines the system's sample rate and sync reference.

#### Sample Rate

The **Max Sample Rate** field is for display purposes only, and shows the highest sample rate available. Note that the option to run at higher (96kHz or 88.2kHz) or lower (48kHz or 44.1kHz) sample rates is defined by the AdminHD configuration and cannot be modified from the console.

Higher sample rates use twice as much DSP resource and also reduce the router's summing capacity. Therefore, your system should only be running at higher sample rates if 96kHz or 88.2kHz operation is required.

The **Sample Rate** option will change the operating frequency of the system. Depending on the **Max Sample Rate** defined by AdminHD, you can choose:

- **48kHz** or **44.1kHz** - if the Max Sample Rate = 48kHz.
- **96kHz**, **88.2kHz**, **48kHz** or **44.1kHz** - if the Max Sample Rate = 96kHz.

**WARNING:** It is *NOT* recommended to change the sample rate unless you are using an external Wordclock sync reference. In this case, then the frequency of the sync source *MUST* match the internal **Sample Rate**.

You should mute your loudspeakers when changing the **Sample Rate**.

If your system includes RAVENNA Net devices, such as Lawo's **A\_\_line**, then the sample rate of these devices must be changed manually using the RAVENNA Web GUI.

#### Sync Source

The **Active Source** field is for display purposes only, and shows the active synchronization source: **Multichannel**, **Input 1**, **Input 2** or **Internal**.

Information about the **Frequency**, **Input Type** and **Status** of each external sync source is shown in the lower part of the display; if a signal is not present or invalid, then you will see **N/A**.

The active sync source is selected automatically as follows: **Multichannel** - **Input 1** - **Input 2** - **Internal**. In each case, the status of the sync source and the **Ignore ...** check boxes are taken into account.

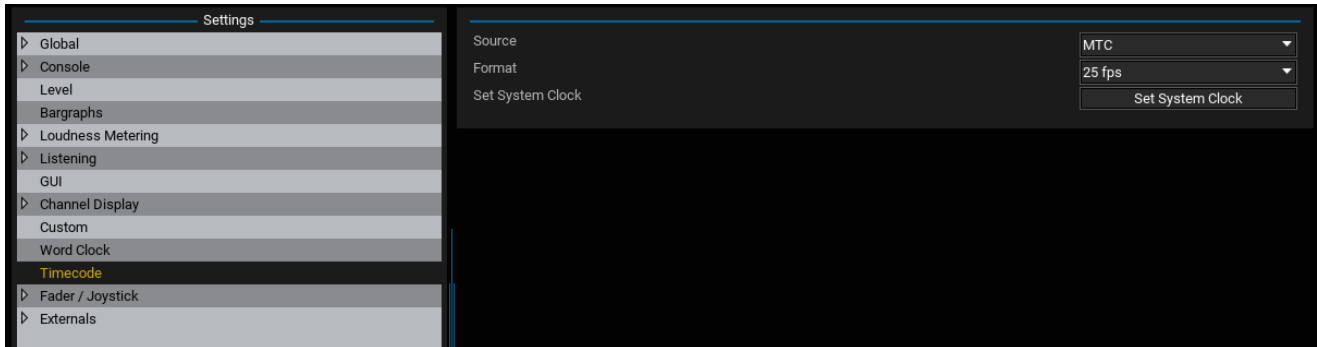
For example, with a valid sync signal connected to all inputs and no **Ignore ...** check boxes selected, the system will lock to the **Multichannel** sync source (pre-defined by AdminHD). If multichannel sync is lost or the signal is invalid, then the system automatically switches to **Input 1**. Similarly, if sync is lost on this port, then the system switches to **Input 2**. Finally, if sync is lost on all external ports, then the system switches to **Internal**. An automatic return mode means that the system will switch back to **Input 2**, **1** or **Multichannel** once a valid signal is detected.

To ignore an external sync source, enable its **Ignore ...** check box. For example, to skip the multichannel sync source in the sequence, enable the **Ignore Multichannel Input** check box.

If the **Error if Internal Sync** check box is enabled, then the global alarm will be triggered when the system switches to internal sync. Note that this option can also be configured using AdminHD (under Core -> Data).

For more details about the system's sync options, please refer to your Technical Manual.

### 20.1.28 Timecode Options



This topic selects the timecode source and frame rate when running [timecode automation](#):

#### Source

Sets the timecode source. You can choose from:

- **MTC** – the automation system will slave to the external Midi timecode (MTC) input.
- **Internal** – the automation system will slave to internal timecode.
- **LTC** – the automation system will slave to the external Linear timecode (LTC) input.
- **Machine** – the automation system will slave to the active Sony 9-pin machine.

#### Format

When running on internal timecode, this option sets the frame rate.

Note that the frame rate also sets the delay time for [channel delay](#) when adjusting delay in frames. For example, if you select 25 fps, then delay time for 1 frame will be 40ms (1/25s).

- **24 fps** - 24 frames per second - Film.
- **25 fps** - 25 frames per second - EBU (PAL or SECAM)
- **30d fps** - 30 drop frame timecode - NTSC color TV.
- **30 fps** - 30 frames per second – monochrome TV.

If you have selected an external timecode source, this field displays the incoming frame rate.

#### Set System Clock

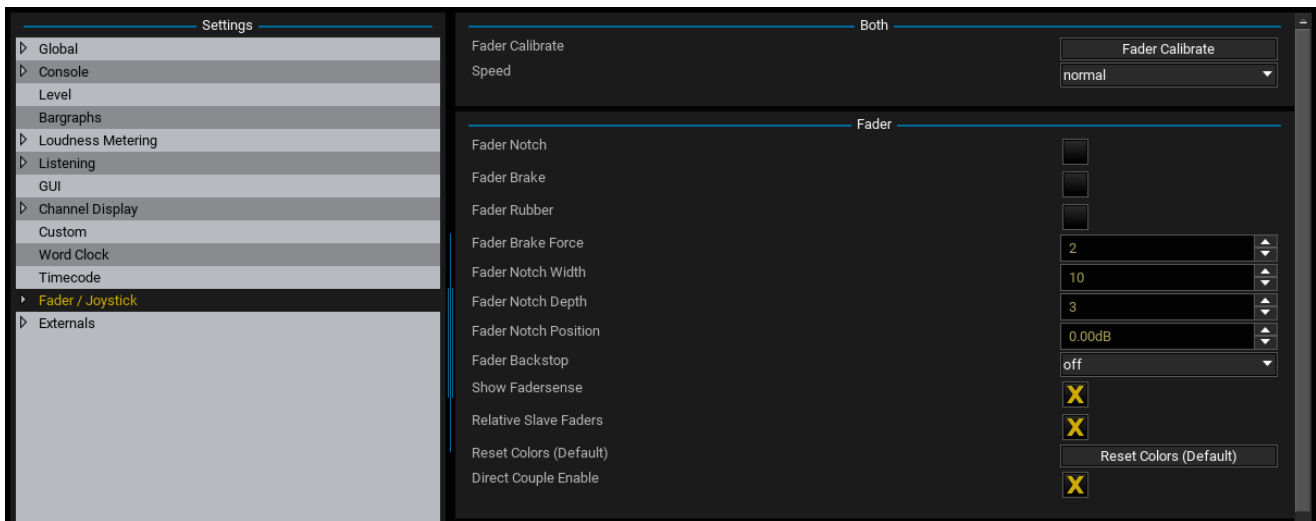
Select this button to set the timecode to the [local system time](#).

### 20.1.29 Fader/Joystick Options

This topic provides options to customise the feel of your faders and joystick. For example, you may wish to work with a 0dB level fader notch, increase or decrease the brake resistance of the faders and/or work with a PFL Overpress. You can also create notches and brake resistance for the surround joystick to allow you to feel specific room positions as you pan.

Note that these options apply globally to all console faders and/or joysticks.

## Fader/Joystick -> Both



### Fader Calibrate

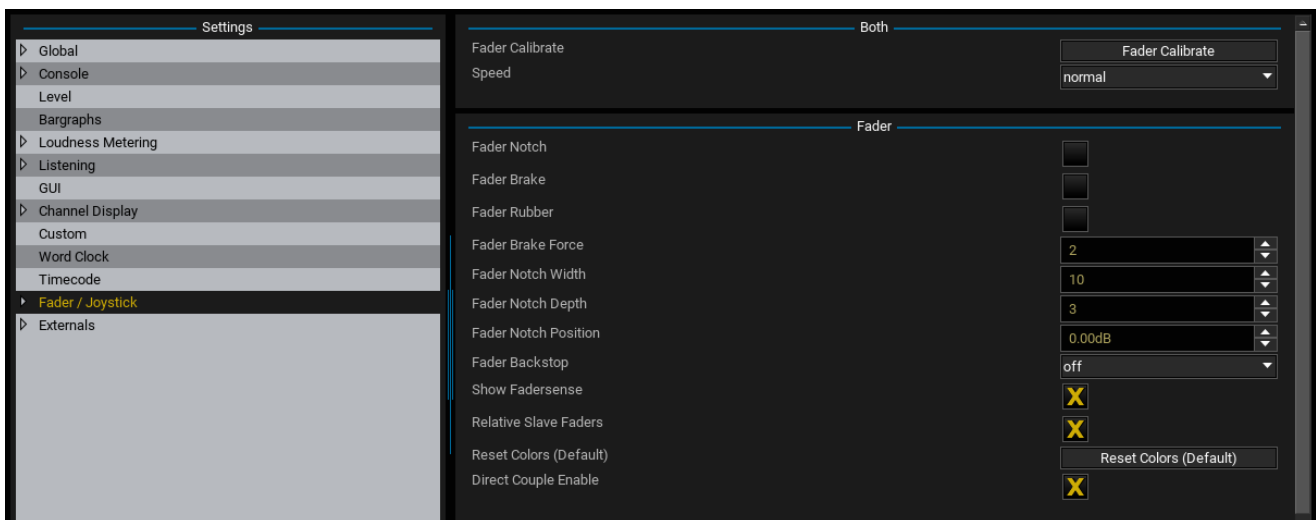
Select **Fader Calibrate** to calibrate all faders - each fader across the console opens and closes to calibrate.

### Speed

This option adjusts the speed of all console faders when they respond to automated control, for example snapshot reset or timecode automation. You can select:

- **fast** - fast fader speed.
- **normal** - normal fader speed.
- **slow** - slow fader speed.

## Fader/Joystick -> Fader



The following options set notches and brake resistance for the console's faders:

- **Fader Notch** (on) - activates a fader notch at a certain position (e.g. 0dB).
- **Fader Brake** (on) - activates fader brake resistance.
- **Fader Rubber** (on) - activates the fader brake force if the fader moves away from the notch position.
- **Fader Brake force** – sets the amount of resistance which will be applied when Fader brake is active. 1 = smooth; 3 = stiff.
- **Fader Notch Width** – sets the width of the notch when Fader notch is active. 1 = narrow; 20 = wide.

- **Fader Notch Depth** – sets the depth of the notch when Fader notch is active. 1 = flat; 5 = deep.
- **Fader Notch Position** – sets the position of the notch when Fader notch is active. The position can be set from -128dB (fader closed) to +15dB (fader open).

You can select multiple options, for example, to activate a fader notch and brake resistance.

### Fader Backstop

The fader backstop switch can be used to select PFL monitoring when a fader is pulled back against its endstop. Or, to trigger an external event such as a fader start:

- **Off** - disables the backstop switch.
- **On** - enables the backstop switch. Use this option if you wish to trigger a fader start, or other external event, by pulling back on a fader.
- **On + PFL** - enables PFL monitoring from the backstop, otherwise known as backstop PFL monitoring.

### Show Fadersense

This option enables or disables the show Fader/encoder sense mode on the [Channel display](#):

- **Show Fadersense** (on) – touch a fader or encoder and the channel highlights on the **Channel** display. The color of the outline matches the color coding for the channel type, selected from the [Channel Config](#) display.
- **Show Fadersense** (off) – nothing changes on the **Channel** display when you touch a fader or encoder.

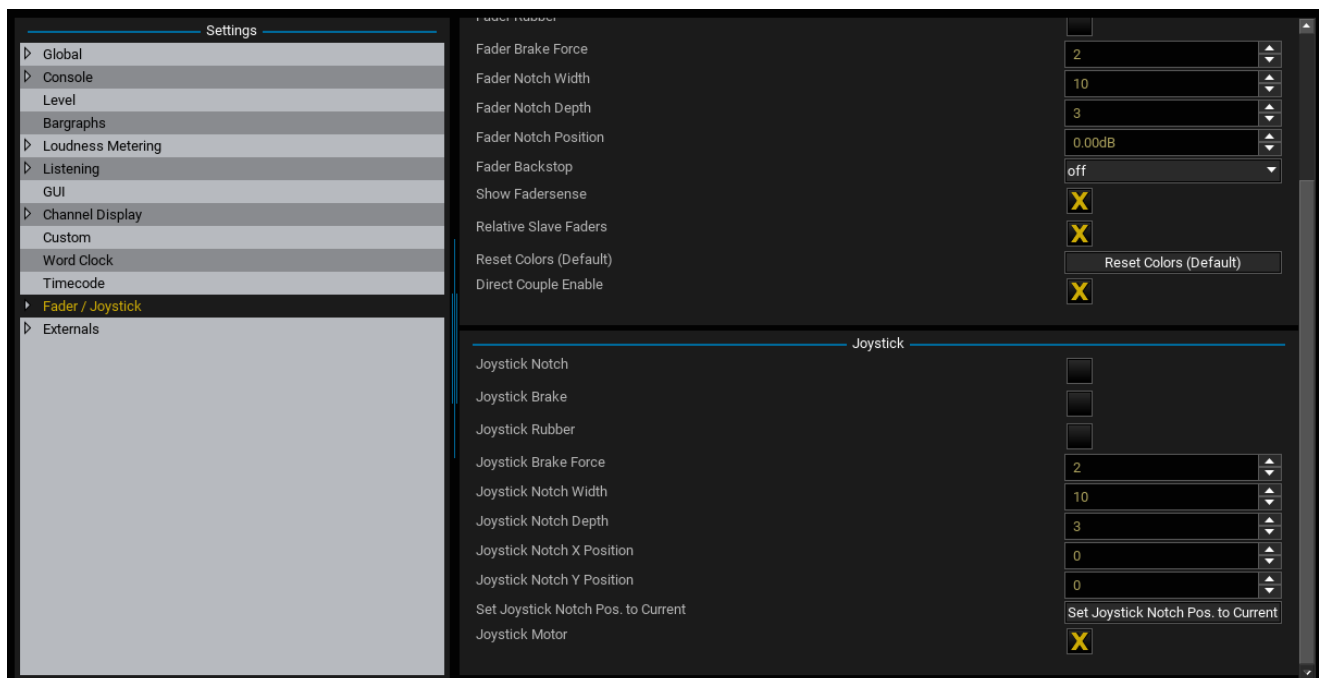
### Relative Slave Faders

When this option is enabled (default), the slave faders of a [VCA group](#) are non-moving, as in an analog VCA. This allows you to see and update slave positions even if the VCA master is closed. Uncheck the option to turn on the fader motors for VCA slaves; move a VCA master and the slaves will follow. Note that this option *only* affects VCA grouping. Surround VCAs, Links and the Couple group always use moving faders.

### Reset colors (default)

This option resets all DSP channels to their default color codes, see [Channel color Coding](#).

### Fader/Joystick -> Joystick



The following options set notches and brake resistance parameters for the console's [joystick](#):

- **Joystick Notch** (on) - activates a joystick notch at a certain position (e.g. Front Centre).



## 20. System Configuration

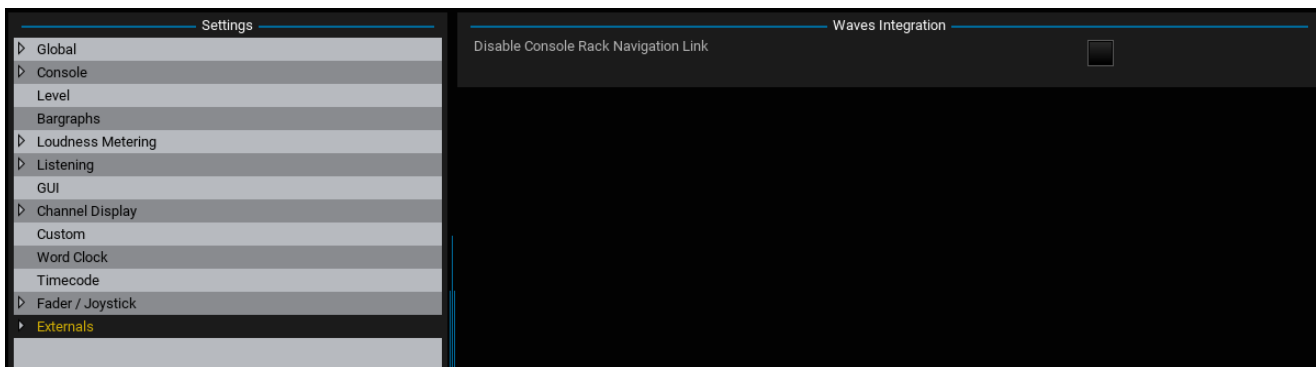
- **Joystick Brake** (on) - activates joystick brake resistance.
- **Joystick Rubber** (on) - activates the joystick brake force if the joystick moves away from the notch position.
- **Joystick Brake Force** – sets the amount of resistance which will be applied when Joystick brake is active. 1 = smooth; 3 = stiff.
- **Joystick Notch Width** – sets the width of the notch when Joystick notch is active. 1 = narrow; 20 = wide.
- **Joystick Notch Depth** – sets the depth of the notch when Joystick notch is active. 1 = flat; 5 = deep.
- **Joystick Notch X Position** – sets the x-axis position of the notch when Joystick notch is active. The position can be set from -20 (Left) to +20 (Right).
- **Joystick Notch Y Position** – sets the y-axis position of the notch when Joystick notch is active. The position can be set from -20 (Rear) to +20 (Front).
- **Set Joystick Notch Pos. To Current** – this option allows you to set the joystick notch position from the current position of the control. Place the joystick control at the desired position then select this button.

### Joystick Motor

This option can be used to enable or disable the motors on the console's [joystick](#).

- **Joystick Motor** (on) - enables the joystick motor.
- **Joystick Motor** (off) - disables the joystick motor.

### 20.1.30 Externals



This topic sets the following option for the Waves SoundGrid Plug-in Server.

#### Disable Console Rack Navigation Link

By default, the option is set to off. If a Waves Rack is connected to or from a channel (as an insert or FX Return), then when you press the channel's fader **SEL** button on the console, the associated Rack opens automatically in the Plug-in display window. This makes checking and adjusting plug-in parameters on different channels very fast.

Turn the option on to disable the automatic Rack navigation feature.

Please refer to the separate “Waves Plug-in Server for mc<sup>2</sup> User Guide” for full details.

## 20.2 Custom Functions

This display provides access to factory-configured custom functions, such as the mapping of user buttons, so that users can reconfigure the console without assistance from Lawo.

The functions configured from this display are stored as part of the system configuration, which means that any changes will affect all users. In addition, there are many powerful features. It is recommended that users have a good understanding of the system, are familiar with the programming of user buttons, and understand how to connect to the console via ftp or telnet. For information on these procedures, please refer to the "mc266 MKII Technical Manual".

Note that the **Custom Functions** display can be hidden from the console GUI to protect the current configuration. If this is the case, you can still access the display from an [mxGUI](#) computer. Please contact Lawo support for advice on how to show or hide the **Custom Functions** display on your console.

1. [Open](#) the **Custom Functions** display in the usual manner.

The **Functions** column on the left lists the different types of function which can be configured. A brief description appears when you hover over each title.

2. Select a function to interrogate any existing assignments.

Each time you select a different function, the **Assignments** column updates – in our example, we have two Machine Control user button assignments named **Play** and **Stop**.

3. Select an **Assignment** to interrogate its **Details**:

Functions	Assignments	Details	
Name	Name	Name	Value
Central User Button, Machine Control	Play	Userbutton Type	User Panel
Central User Button, Snap/Sequence	Stop	Panel Index	Panel 1
Central User Button, System Settings Page Functions		Userbutton Index (0=off)	2
Central User Button, GUI-Page Select		Userbutton Scribble	
Central User Button, Access Channel Functions		Machine Command	Stop
Central User Button, Automation Functions			

### 20.2.1 Operating Principles

#### Triggering a Custom Function

Most functions listed on the **Custom Functions** display are actioned from a user button. However, some functions are designed for other purposes. For example, [Snap Iso List](#) configures a list of sources or destinations which you do not wish to be reset by snapshots.

When looking at the **Functions** list, use the naming as a guide:

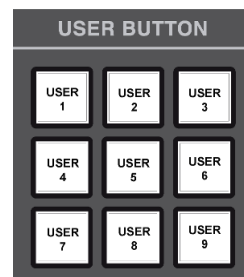
- "Central User Button, xxx" - master functions such as machine control Play, Stop.
- "Fader User Button, xxx" - channel-related functions such as Snapshot Isolate, Aux on/off.
- Anything else is a special case!

#### User Button Panel Types

Fader User Buttons



CENTRAL USER BUTTONS



When assigning **Fader User Button** functions, they can be mapped to any available user button on the [fader strip](#). The function then becomes available globally across the console (e.g. Fader User Button 3 = **SNAP ISO**).

When assigning **Central User Button** functions, you have a choice of several panel types including the CENTRAL USER BUTTONS shown above. See [Central User Button Numbering](#) for all available user button locations.

### Programming Custom Functions

All custom functions are programmed in a similar manner, so this section deals with how to [create](#), [edit](#) and [delete](#) an assignment. For a complete list of functions see [The Custom Functions list](#).

**WARNING:** Before changing the function of a user button, make sure that there is nothing assigned to it. Otherwise, the button *will* perform multiple functions!

In particular, take care with the Monitoring touch-screen panel. The pages cannot be accessed from a custom function, therefore the button location *MUST* be free across *ALL* pages.

Also be aware that factory-configured user functions do *NOT* appear in the **Custom Functions** display. If you wish to reprogram these, then you should contact Lawo to remove the factory configuration first. Otherwise, you may have buttons performing more than one function.

Note that as soon as you create or edit a custom function assignment, a Custom Template file (for the assignment) is stored in the system's configuration data. Custom functions are stored as part of the configuration, and not in productions, and therefore any changes will affect *all* users of the system.

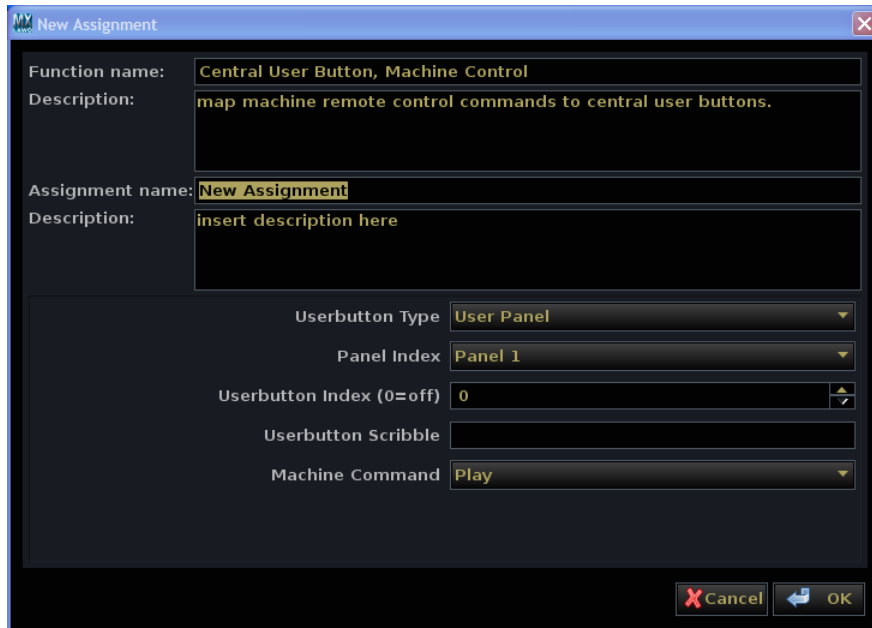
## 20.2.2 Creating a New Assignment

For example, to map a Central User Button to a machine control command such as Play:

1. Right-click on the function from the **Functions** list and select **New Assignment**:

Functions		Assignments		Details	
Name		Name		Name	Value
Central User Button, Machine Control		Play		Userbutton Type	User Panel
Central User Button, Snap/Sequence		New Assignment		Panel Index	Panel 1
Central User Button, System Settings Page Functions				Userbutton Index (0=off)	1
Central User Button, GUI-Page Select				Userbutton Scribble	
Central User Button, Access Channel Functions				Machine Command	Play
Central User Button, Automation Functions					

A pop-up window appears listing the assignment details:



The dialog box titled "New Assignment" contains the following fields:

- Function name:** Central User Button, Machine Control
- Description:** map machine remote control commands to central user buttons.
- Assignment name:** New Assignment
- Description:** insert description here
- Userbutton Type:** User Panel
- Panel Index:** Panel 1
- Userbutton Index (0=off):** 0
- Userbutton Scribble:** (empty field)
- Machine Command:** Play

Buttons at the bottom: Cancel, OK

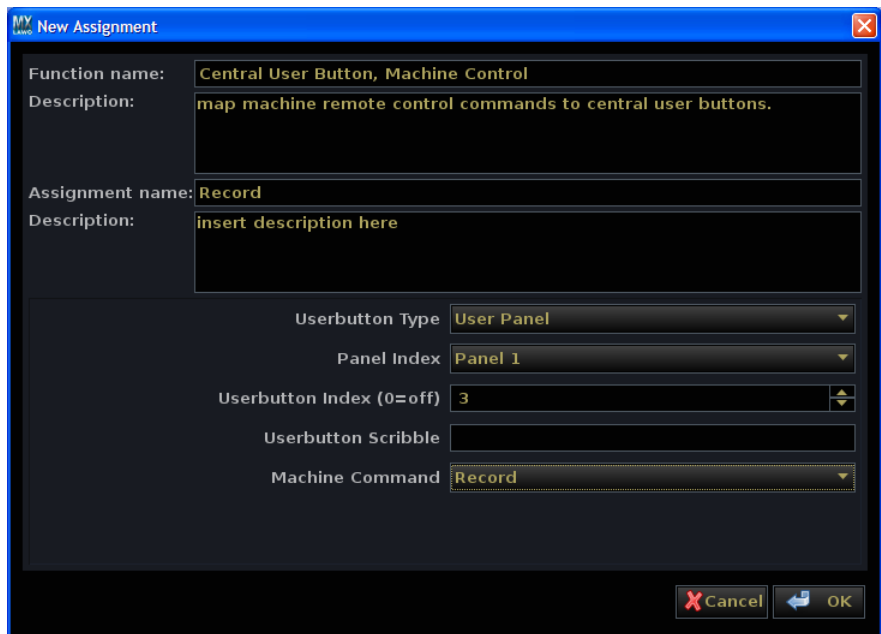
2. Edit each field as follows:
  - **Function Name** and **Description**: these fields are for information only and cannot be edited. They describe what the function does.
  - **Assignment Name**: enter a name for the assignment.

You *must* enter a unique name for each custom function you create.

- **Description**: enter a user description for your assignment (optional).
- **Userbutton Type**: select the panel location for the button assignment - e.g. **User Button Screen Control Panel**.
- **Panel Index**: select the panel number for the assignment, see [User Button Numbering](#).
- **Userbutton Index**: select the button number for the assignment, see [User Button Numbering](#).

## 20. System Configuration

In our example, we have selected button 3 on User Panel 1:



- **Userbutton Scribble:** if the selected user button has an accompanying scribble strip display, then you can enter the text to be displayed in this field. Up to 8 characters. Text is only displayed *IF* the button has a scribble strip - for example, on the Lawo Remote App.
- **Machine Command:** select the function to be assigned, for example - **Record**.

3. Once you are happy with everything select **OK**.

The assignment is made and you will see its name appear in the **Assignments** list:

Functions	Assignments	Details
Name	Name	Name
Central User Button, Machine Control	Play	Userbutton Type
Central User Button, Snap/Sequence	Record	Panel Index
Central User Button, System Settings Page Functions	Stop	Userbutton Index (0=off)
Central User Button, GUI-Page Select		Userbutton Scribble
Central User Button, Access Channel Functions		Machine Command
Central User Button, Automation Functions		
Central User Button, GPI Outputs		
Fader User Button, Channel Functions		
Fader User Button, Cord/Conf		
		Value
		User Panel
		Panel 1
		3
		Record

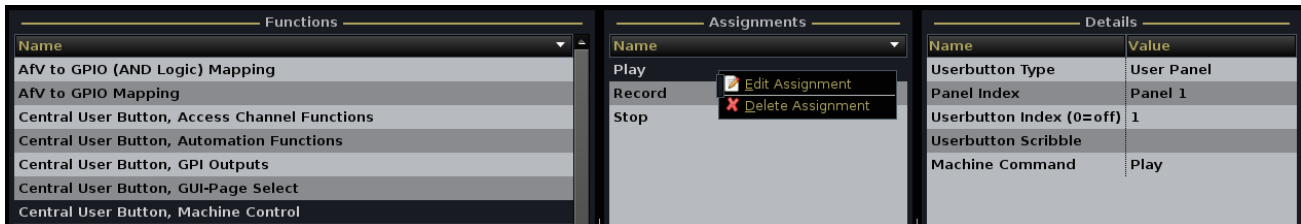
4. Repeat these steps to configure other custom functions.

### 20.2.3 Editing & Deleting Assignments

Note that as soon as you edit or delete an assignment, the changes update the Custom Template file (for the assignment). Custom functions are stored as part of the configuration, and not in productions, and therefore any changes will affect *all* users of the system.

➤ **To edit an existing assignment:**

1. Select the **Function** and **Assignment** you wish to edit,
2. Right-click and select **Edit Assignment**:



The **Edit Assignment** pop-up window appears showing the current details of the assignment.

3. Edit the fields [as before](#) and select **OK** to confirm the changes.

➤ **To delete an existing assignment:**

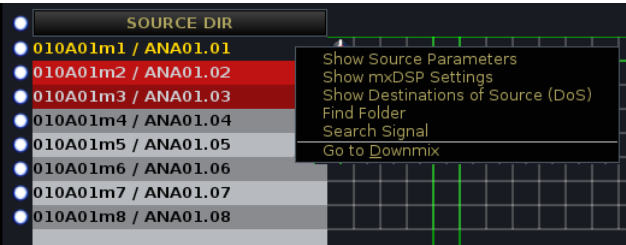
1. Select the **Function** and **Assignment** you wish to delete.
2. Right-click and select **Delete Assignment**.
3. Confirm by selecting **OK**.

The assignment is deleted.

## 20.2.4 Entering a HLSD Address

Some functions require you to enter the Lawo system address (HLSD address) for a signal. You can copy and paste this address from the [Signal Settings](#) display, or from the **mx Routing** display as follows:

1. Open the [mx Routing](#) display and locate the signal.
2. Right-click and select **Show Source Parameters** (or **Show Destination Parameters**):



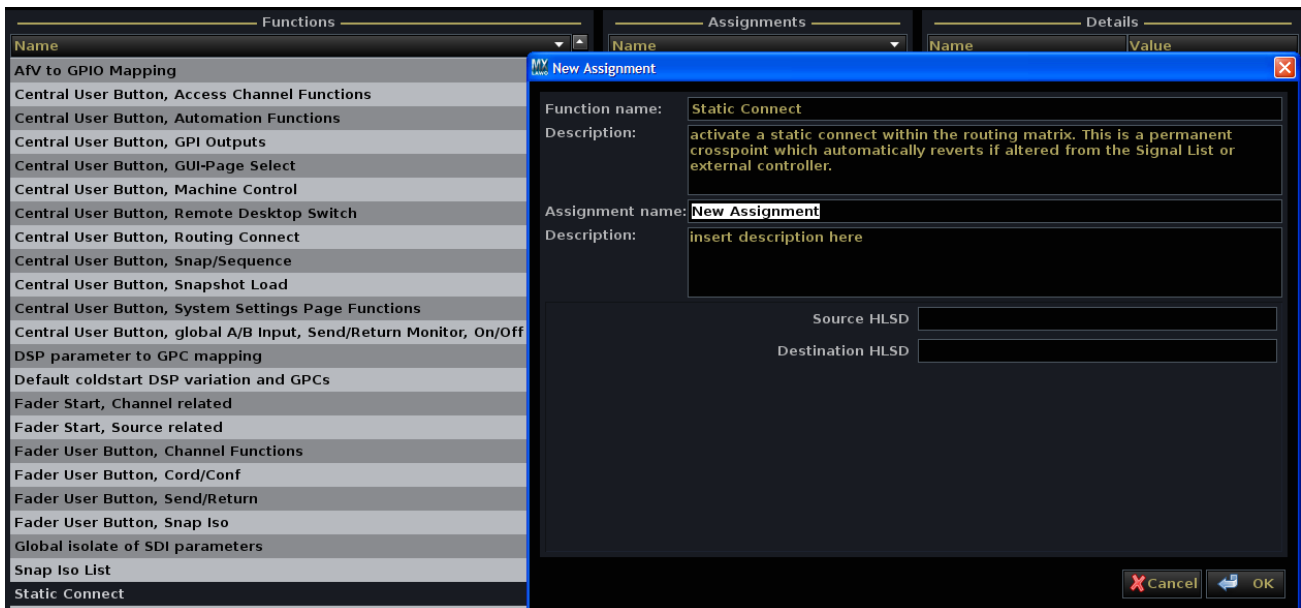
The Signal Parameters pop-up window appears:



3. Select the **Device** tab.
4. Select the **HLSD** address field, right-click and select **Copy** to copy the address:



5. Now return to the **Custom Functions** display.
6. Create a new function assignment, or edit an existing assignment – for example, a **Static Connect**:



7. Right-click on the **HLSD** field and select **Paste** to paste the copied address.

### 20.2.5 Importing and Exporting Custom Functions

When you create a custom function, the assignment is stored as a Custom Template file within the console's configuration data.

These files cannot be accessed from the console GUI. However, they can be transferred to an [mxGUI](#) computer via the [File Transfer](#) display. This provides a way of importing and exporting functions between systems, or creating a backup for your installation.

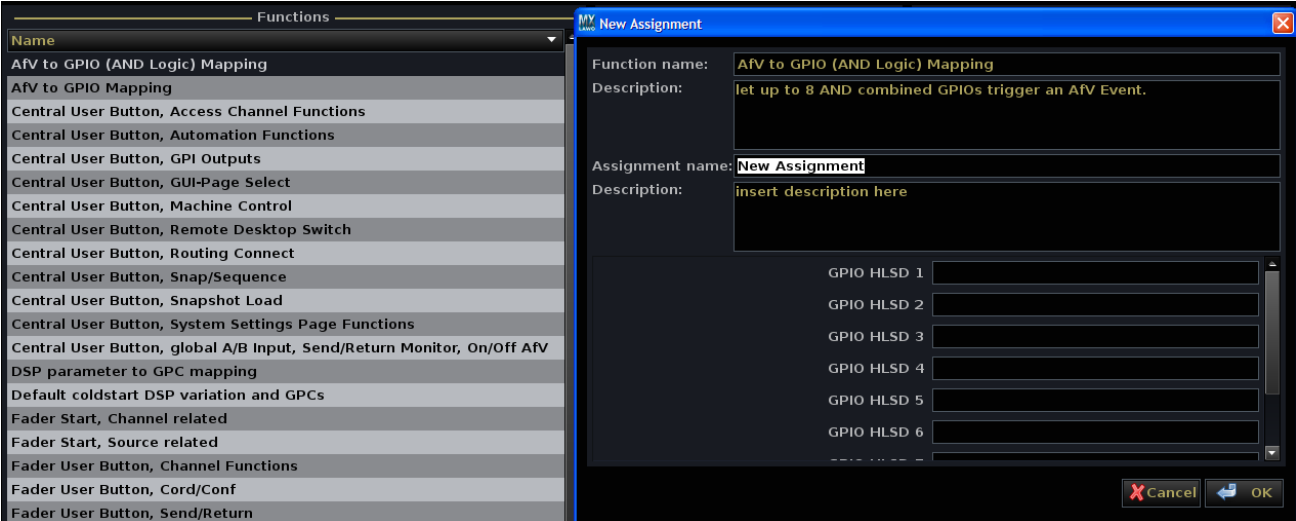


## 20.3 The Custom Functions List

The next series of topics describe each of the custom functions, in alphabetical order:

Click on **Name** at the top of the **Functions** list to sort by name order.

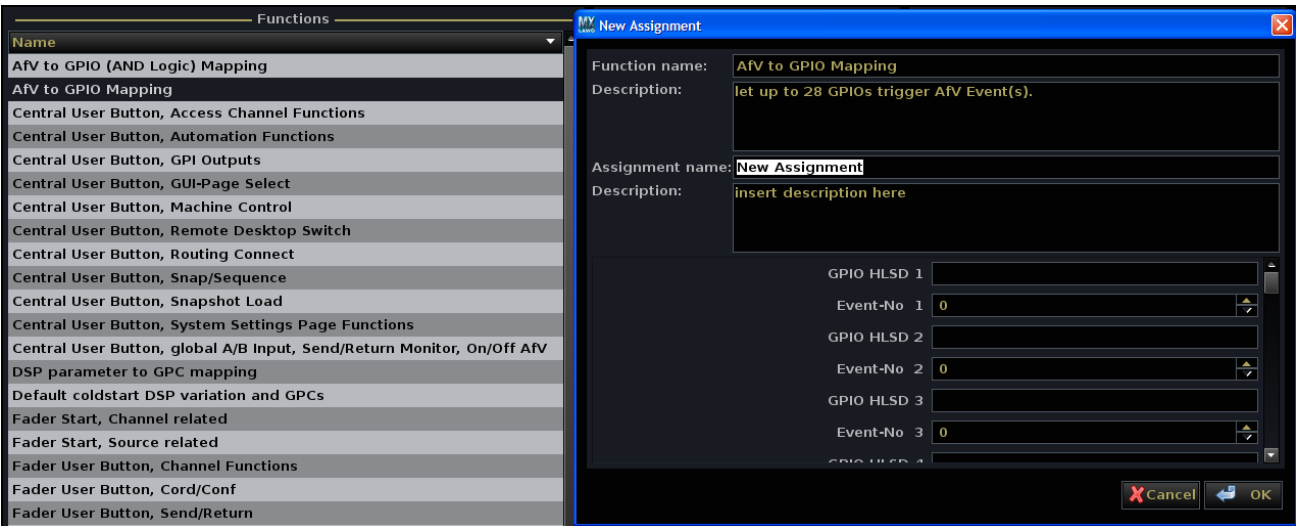
### 20.3.1 AFV to GPIO (and Logic) Mapping



This function triggers a single Audio Follow Video event from up to 8 AND combined GPIOs. The GPIO events can be In, Out, Relays or Optocoupler. Create multiple assignments if you wish to trigger several AFV events with AND combined GPIO logic.

You can create multiple instances of this template.

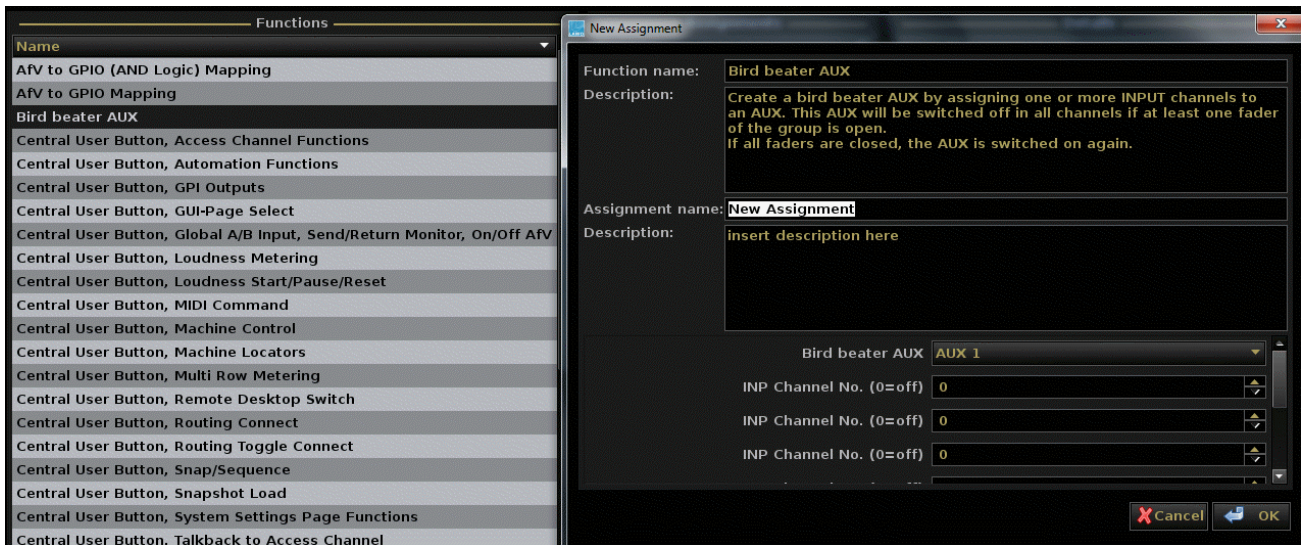
### 20.3.2 AFV to GPIO Mapping



This function triggers Audio Follow Video events from up to 28 GPIOs. You can create an OR combined GPIO by entering the same AFV event for all 28 GPIOs. Alternatively, you can mix OR combined GPIOs with a direct AFV Event assignment.

You can create multiple instances of this template.

### 20.3.3 Bird Beater Aux



This function allows you to create a "bird beater" aux - an aux send which automatically mutes when the channel fader opens and is "on air". This feature is similar to the [Direct-Out Mute by Fader](#) option, but affects an aux instead of the channel's direct output.

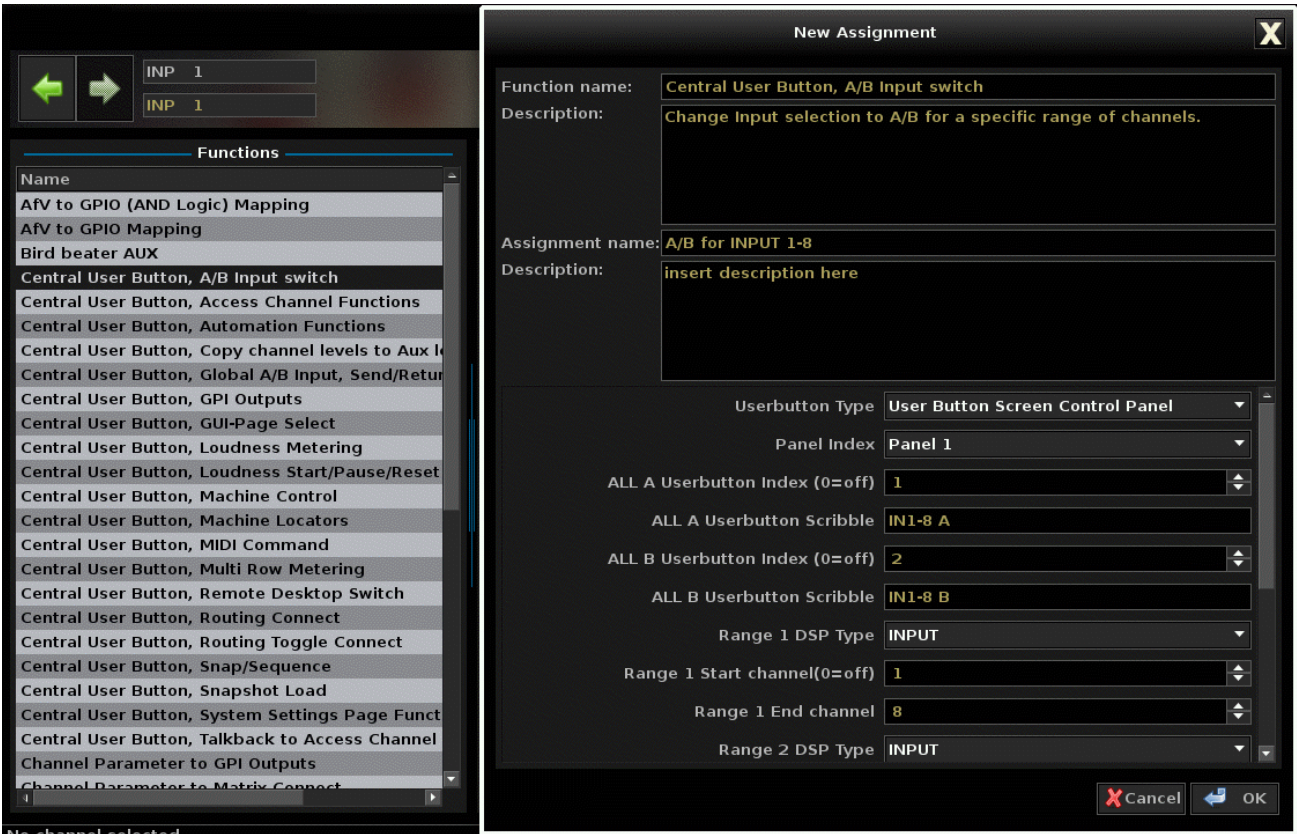
Note that you can OR the function so that the aux send mutes if at least one fader opens. Up to 8 input channels and 8 group channels can be included in the OR.

1. Use the **Bird beater AUX** field to select the aux bus you wish to use (from 1 to 32).
2. Use the **INP** or **GRP Channel No.** fields to define the input or group channel(s) which will trigger the "bird beater" aux - you should enter the mono DSP channel number. So, for example, if channels are stereo, enter the left channel number (1, 3, 5, 7, etc.).

Note that **GRP** channels are supported from Version 5.0 software onwards.

You can create multiple instances of this template.

## 20.3.4 Central User Button, A/B Input Switch



This function defines two [central user buttons](#) to switch selected input channels between their [A and B sources](#). You will need one button to switch the selected range to input A; another to switch to input B. Up to four channel ranges can be defined.

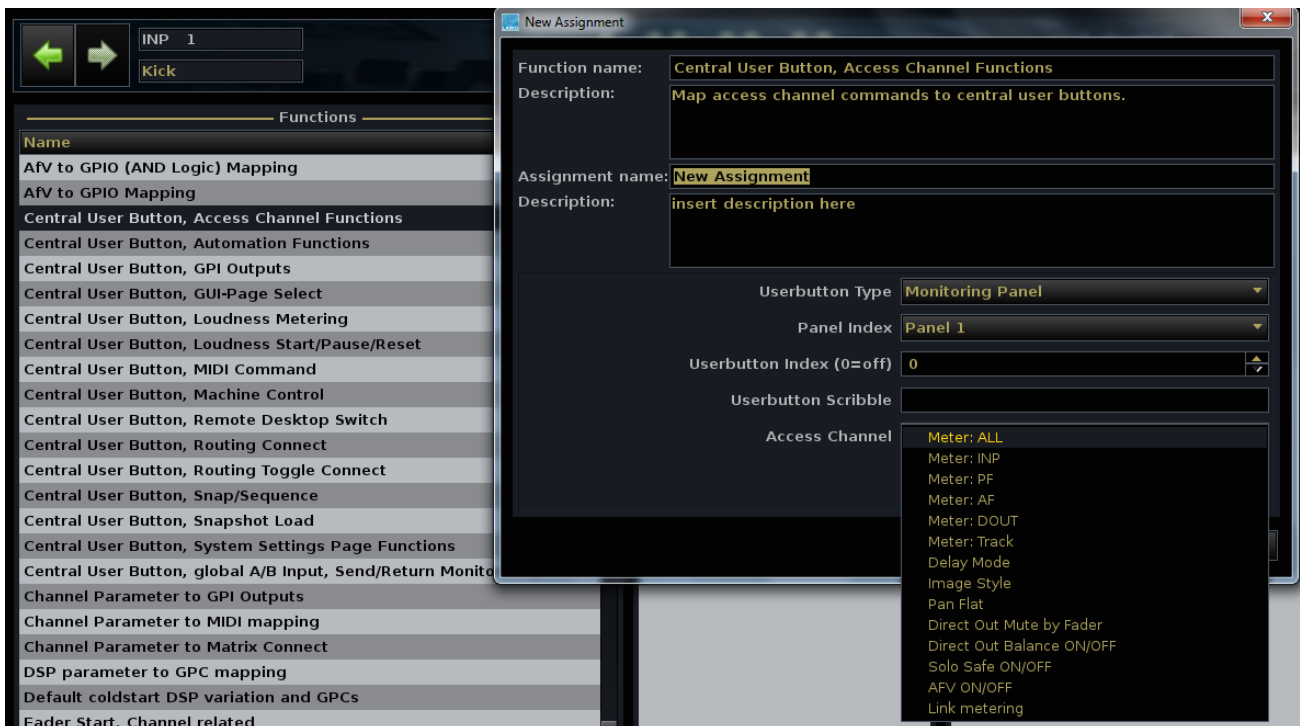
Note that if B Inputs are not assigned, then the status LED of the “All B” button will not light. The button will still switch to Input B on Inputs where a source is assigned.

You can create multiple instances of this template.

Note that the **Channel A/B Input Switch Enable** option in the [System Settings](#) must be turned on to support A/B input switching.

See also [Global A/B switching](#).

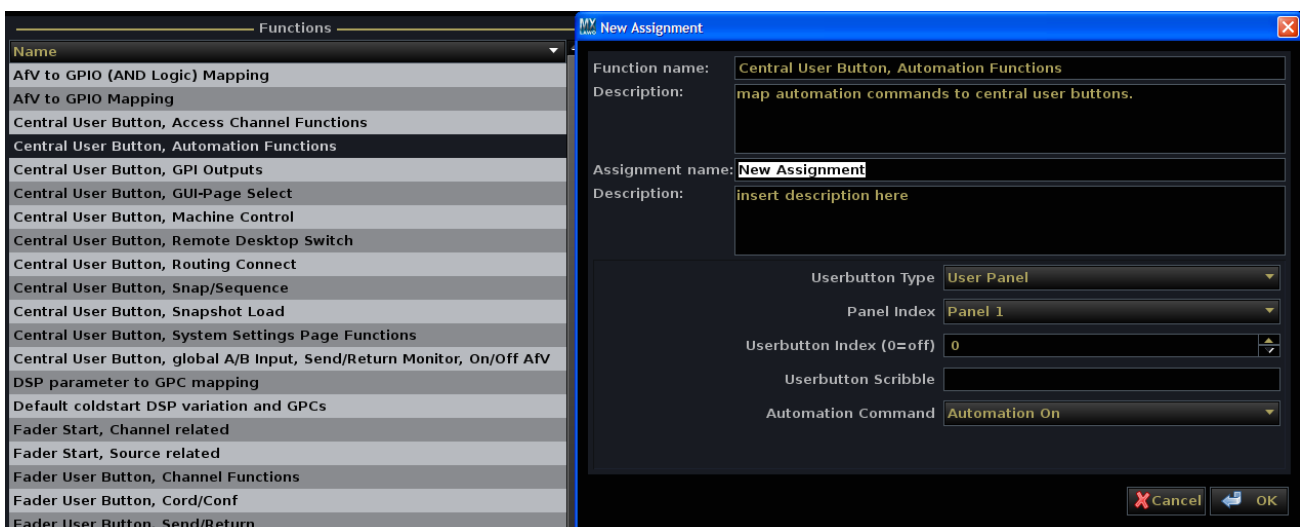
### 20.3.5 Central User Button, Access Channel Functions



Maps a [central user button](#) to functions which will act on the channel in access. Functions include:

- [Meter pickup point selection](#)
- [Delay mode](#), [Image style](#) and [Pan flat](#)
- [Direct Out options](#)
- [Solo Safe on/off](#)
- [AFV \(Audio Follow Video\) on/off](#)
- [Link metering on/off](#)

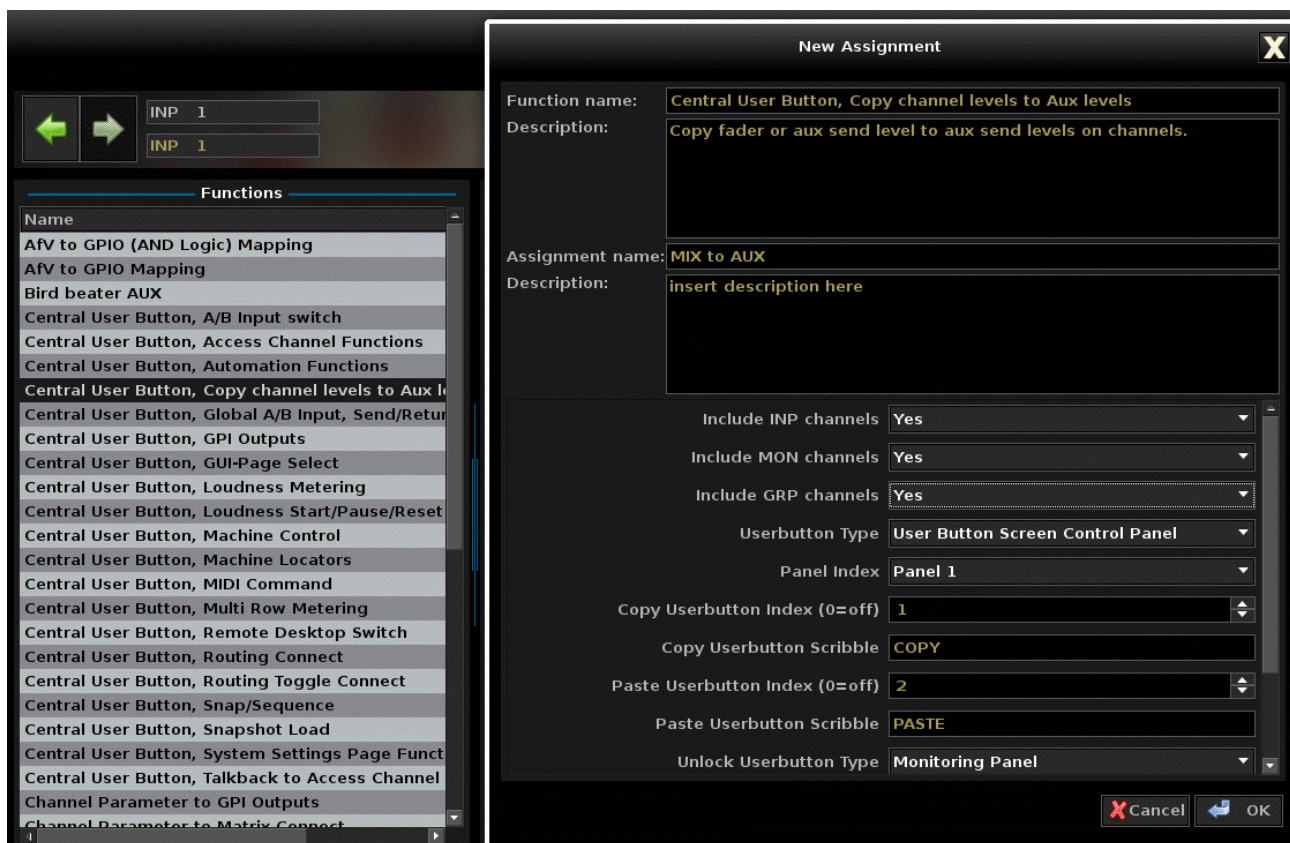
### 20.3.6 Central User Button, Automation Functions



Map a [central user button](#) to timecode automation functions.



### 20.3.7 Central User Button, Copy channel levels to Aux levels



This function defines two [central user buttons](#) which can be used to copy and paste mix levels. For example, to copy your channel levels to an aux, or copy one aux send mix to another.

#### Configuration

First, use the **Custom Functions** display to define the **COPY** and **PASTE** buttons. These can be any two [central user buttons](#). During the configuration stage, you can choose whether the copy will include Input, Monitor and/or Group channels. This will then be applied to all copy and paste operations.

#### Operation

Once the **COPY** and **PASTE** user buttons are defined:

1. Place the mix you wish to copy onto your faders. For example, to copy the main channel levels, do nothing. To copy an aux send mix, use the [FADER CONTROL](#) panel to assign an aux mix to the faders.
2. Press the **COPY** user button to copy the current fader levels - the button turns green to indicate that there are stored parameters.
3. Now select the aux you wish to copy to using the [FADER CONTROL](#) panel - the faders update to show the selected aux mix.
4. Press **PASTE** to paste the stored fader mix - the fader positions update.

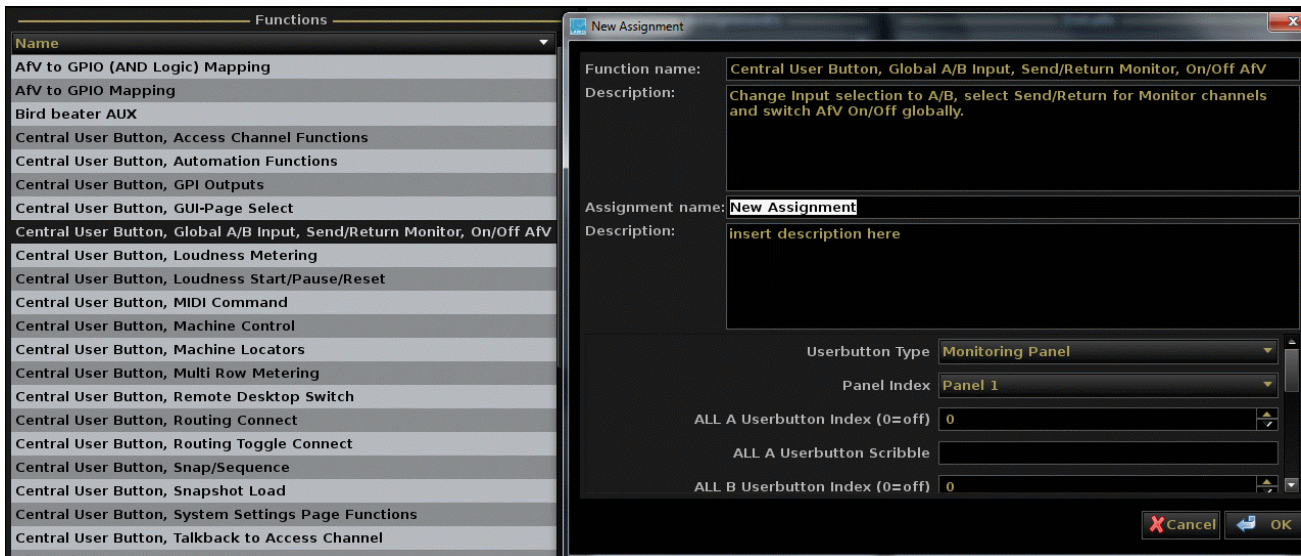


The copy and paste is now complete. You can paste the same mix to several auxes by repeating steps 3 and 4.

Note that the **COPY** button will remain green (to indicate that there is still a mix stored) unless you press **COPY** again (until its green LED goes out).

Once you have finished all copy and paste operations, remember to deselect the [FADER CONTROL](#) AUX button to return the faders to channel mix levels.

### 20.3.8 Central User Button, Global A/B Input, Send/Return Monitor, On/Off AFV



This function allows you to switch a number of operations globally from a [central user button](#). You can assign:

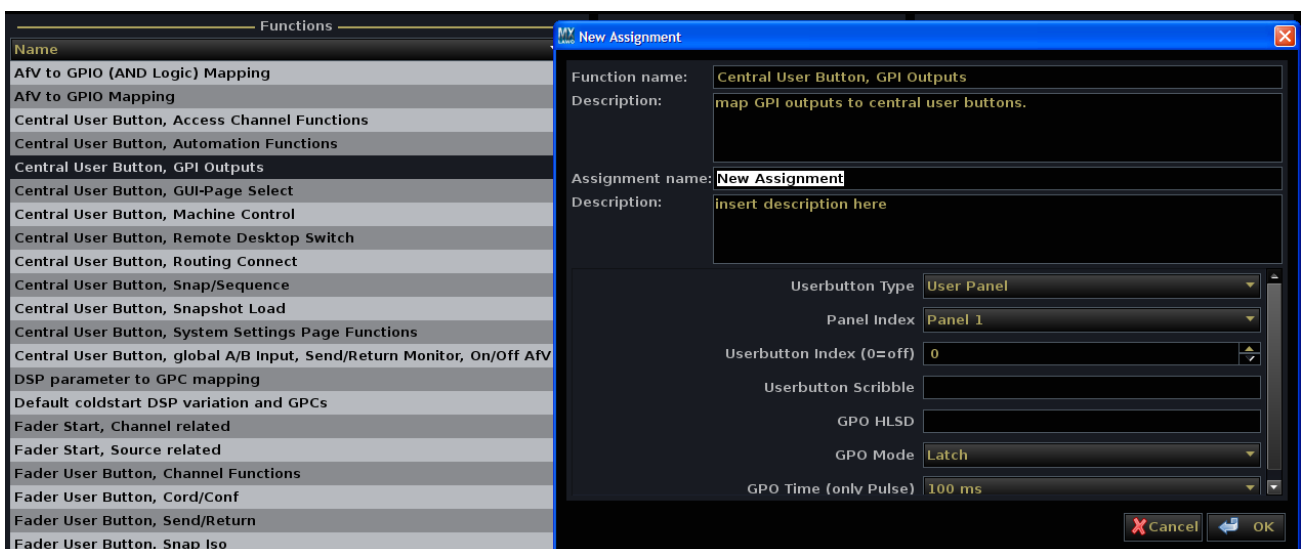
- Global [A/B Input Switching](#) – use this function to switch all input channels between A and B sources (if assigned).

Note that if B Inputs are not assigned, then the status LED of the “All B” button will not light. The button will still switch to Input B on Inputs where a source is assigned. See also [selective A/B switching](#).

- Global [Send/Return Switching](#) on monitor channels – handy for multitrack recording sessions.
- Global [AFV On/Off Switching](#) – handy if cameras are rehearsing (to switch AFV off).

You can create multiple instances of this template if you wish to have functions on different User Button Panels.

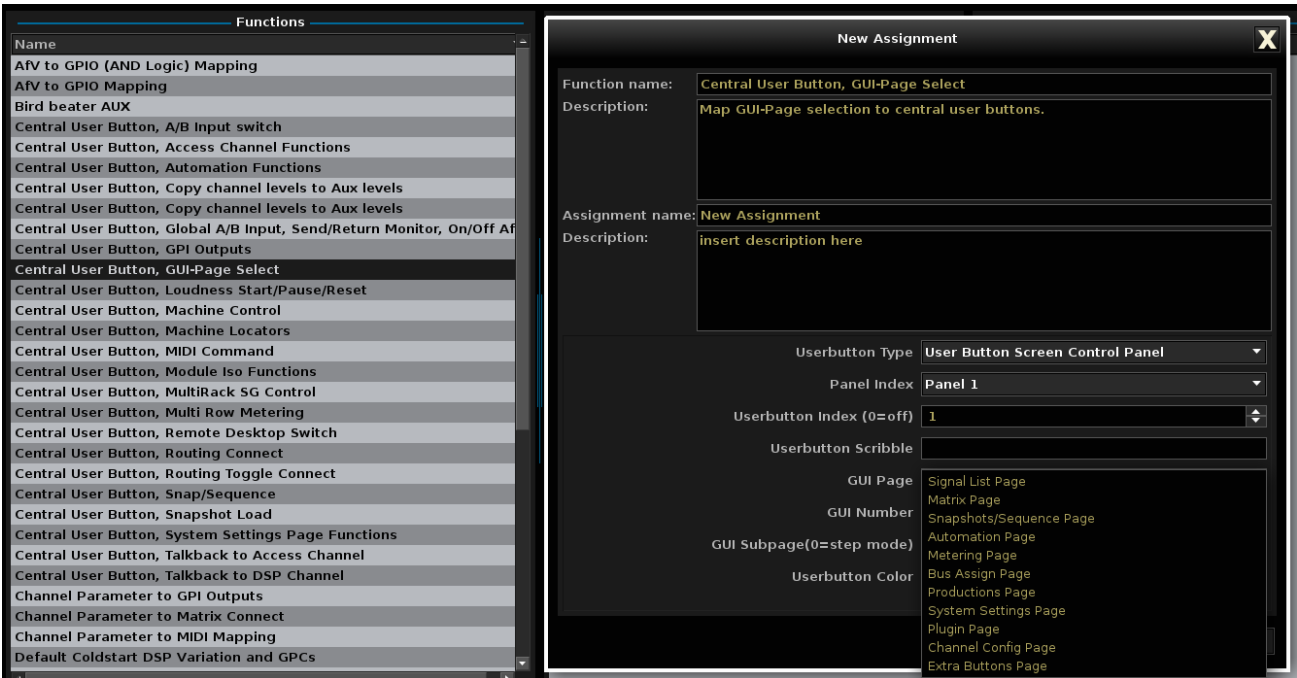
### 20.3.9 Central User Button, GPI Outputs



Maps a [central user button](#) to external relays (GPI Outputs). For each user button define the:

- **GPO HLSD** – this is the [Lawo system address](#) of the GPO which will be triggered.
- **GPO Mode** – latching, momentary, pulse, etc.
- **GPO Time** – for a pulsed relay.

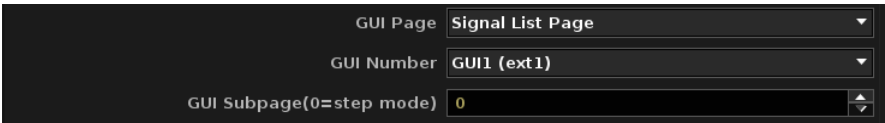
## 20.3.10 Central User Button, GUI-Page Select



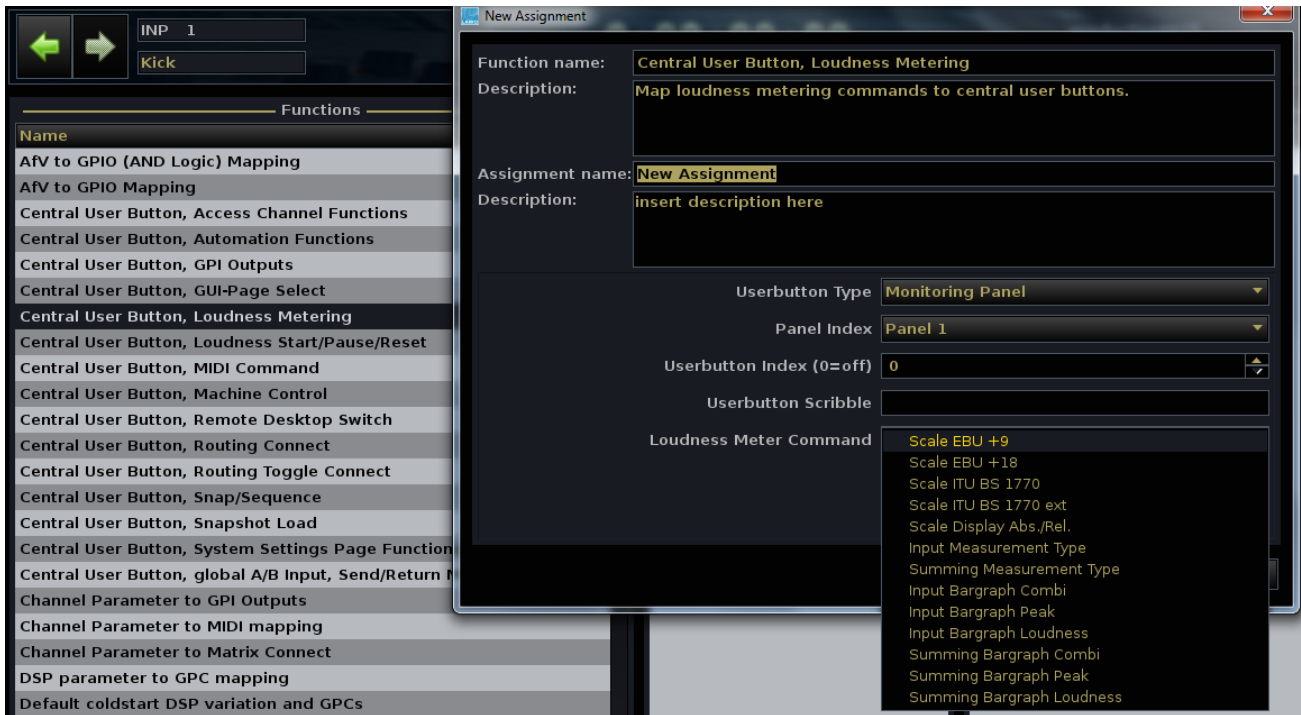
Maps a [central user button](#) to GUI page switching. Note that the page switching can apply to the console's Central GUI (GUI 0), or an external display (GUI 1 or GUI 2) if available.

1. Define the **Userbutton Index**, **Scribble** and **Color** in the usual manner.
2. Use the **GUI Page** drop-down menu to select the main page selection - e.g. **Signal List**.
3. Use the **GUI Number** to define the target display:
  - **GUI 0 (int)** = the console's Central GUI
  - **GUI 1 (ext 1)** = an external GUI (if available on your system).
  - **GUI 2 (ext 2)** = a second external GUI (if available on your system).
4. Use the **GUI Subpage** drop-down menu to select the sub page index - **0** = subpage 1; **1** = sub page 2; and so on.

In the example below, the **Signal List** display (which is the first Signal List subpage) will be switched to an external GUI (GUI 1):



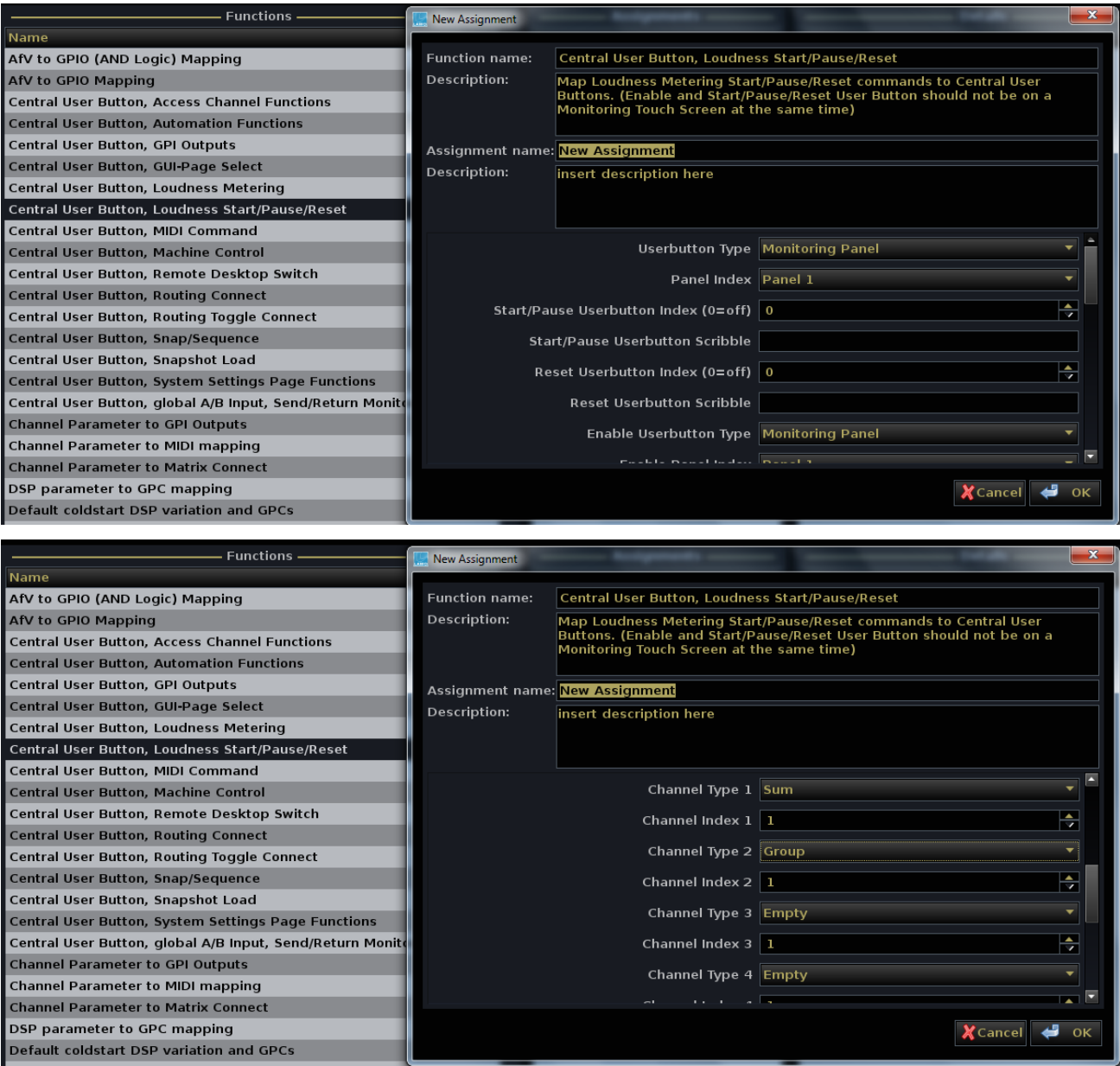
### 20.3.11 Central User Button, Loudness Metering



Maps a [central user button](#) to the [Loudness Metering options](#) available from the **System Settings** display.



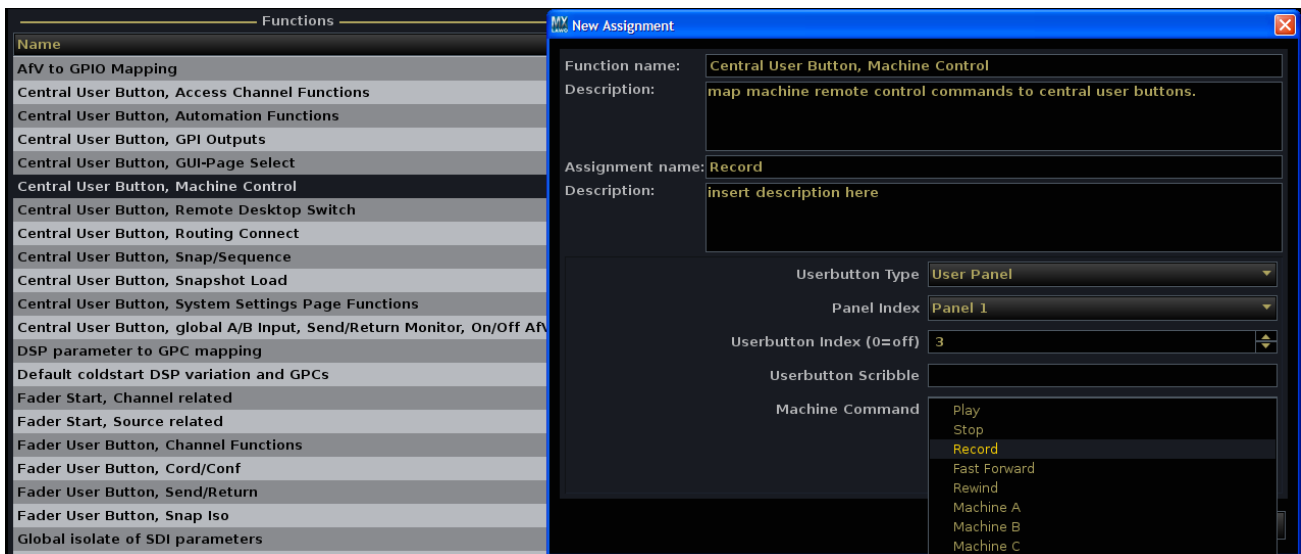
## 20.3.12 Central User Button, Loudness Start/Pause/Reset



Maps a [central user button](#) to start, or reset, the integrated loudness measurement on up to 8 specific summing channels, see [Integrated Loudness Measurement](#).

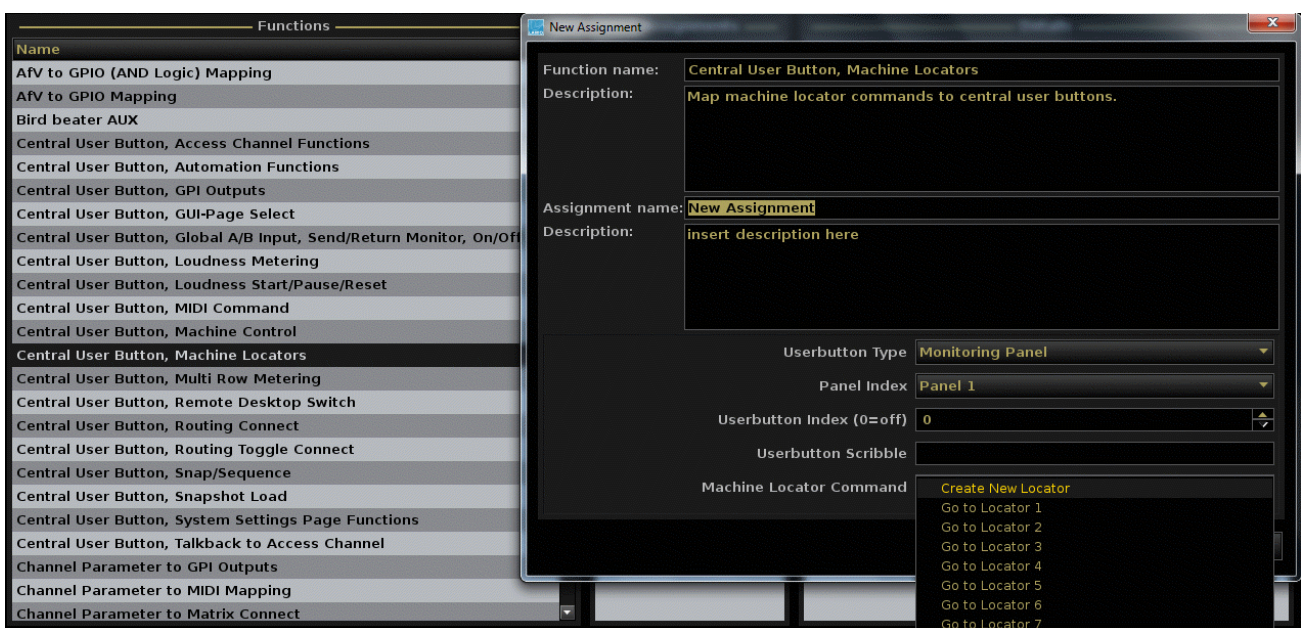
Note that you these functions can also be mapped to fader strip user buttons, using the [Fader User Button, Channel Functions](#) template.

### 20.3.13 Central User Button, Machine Control



Maps a [central user button](#) to [machine control](#) commands.

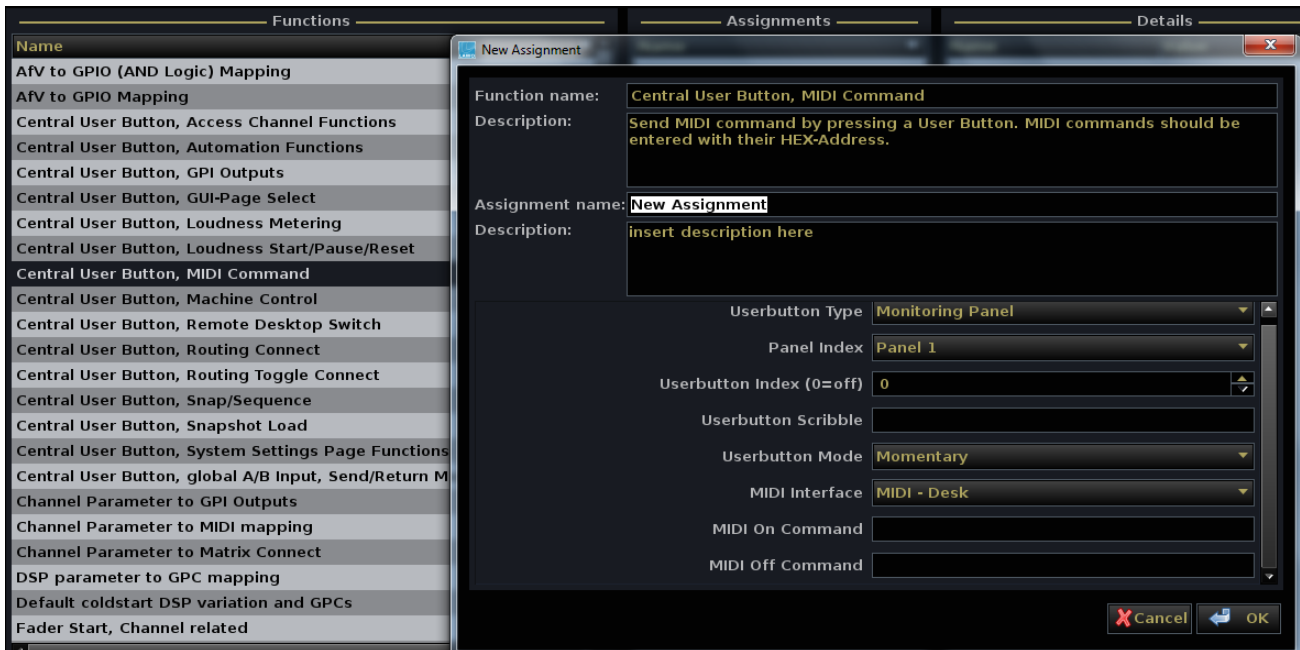
### 20.3.14 Central User Button, Machine Locators



Maps a [central user button](#) to [machine locator](#) commands (cue points). The drop-down options include:

- **Create New Locator** - stores the current timecode position into a new locator (identical to **New** on the **Machine Locators** display).
- **Go to Locator 1 to 10** - recalls a stored locator from ID 1 to 10.

### 20.3.15 Central User Button, MIDI Command

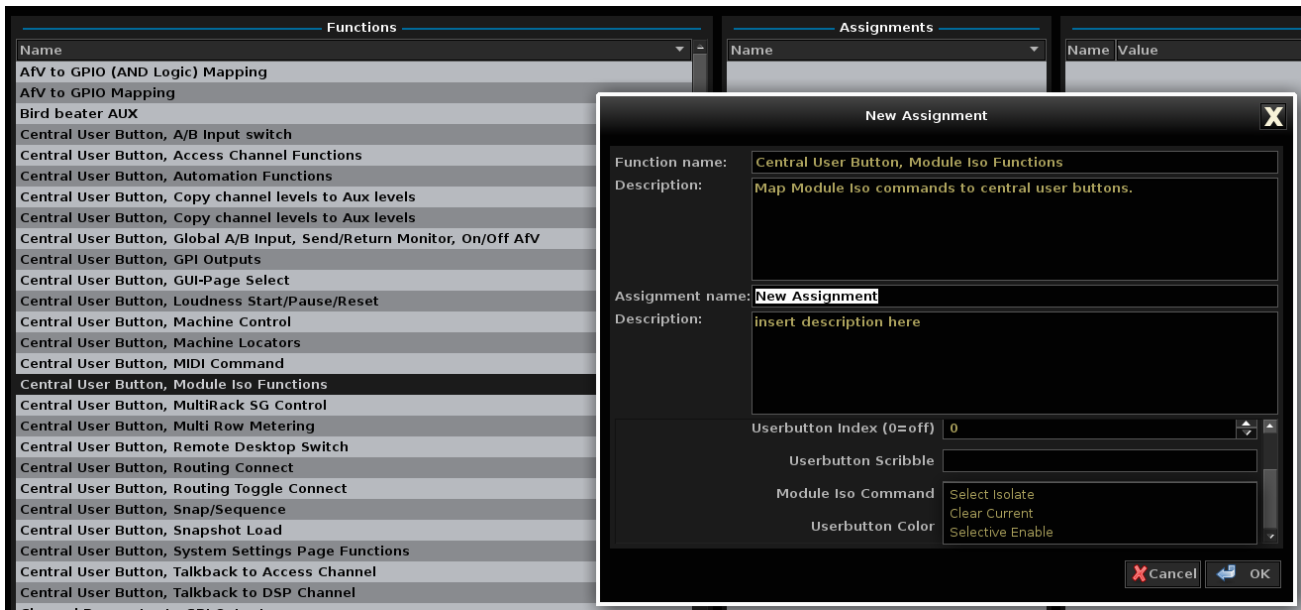


Maps a [central user button](#) to MIDI commands. For each user button define the:

- **MIDI Interface:**
  - **DESK** – MIDI is connected to the MIDI IN/OUT sockets on the rear of the console.
  - **LAN 1 to 16** – MIDI is transmitted via the Lawo network; select the network client from 1 to 16.
- **MIDI On/Off Commands** – enter the hexadecimal address for the MIDI Command. For example:
  - **0xc0 0x07** = Program Change to MIDI ch 1; Patch Number 8.
  - **0xc2 0x03** = Program Change to MIDI ch 3; Patch Number 4.

From Version 5.6.0, MIDI strings can be up to 64 characters long.

### 20.3.16 Central User Button, Module Iso Functions



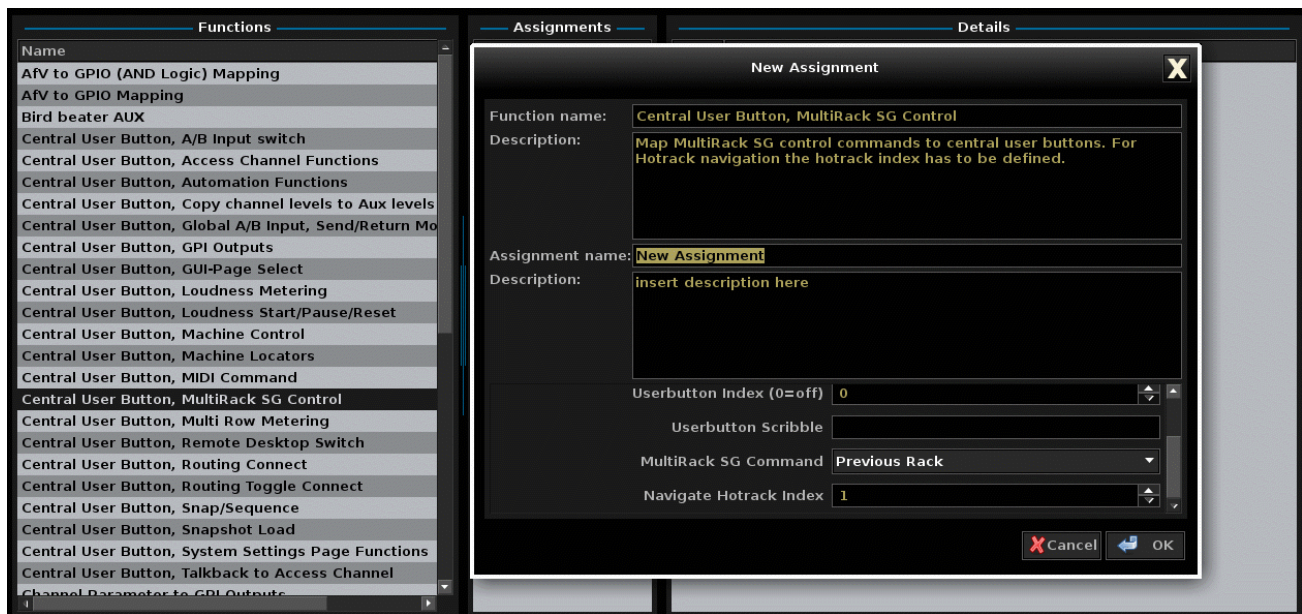
Maps a [central user button](#) to the following [Module ISO](#) functions:

- **Select Isolate** - press this button to the use the Central Control Section and fader **SEL** buttons to make selections within the **Contents** matrix.
- **Clear Current** - clears all current **Contents** matrix selections.
- **Selective Enable** - enables (or disables) the **SELECTIVE** Global Activation button.

The first two functions allow to quickly edit the **Current Global** selections within the **Contents** matrix.

**Selective Enable** makes it easy to enable and disable the activation of **Iso Sets** from linked snapshots.

### 20.3.17 Central User Button, MultiRack SG Control



From Version 5.6.0, these functions map [central user buttons](#) to commands within the Waves MultiRack SoundGrid Host (optional). The functions can be used to further integrate the operation of the external Waves plug-in server with the console.

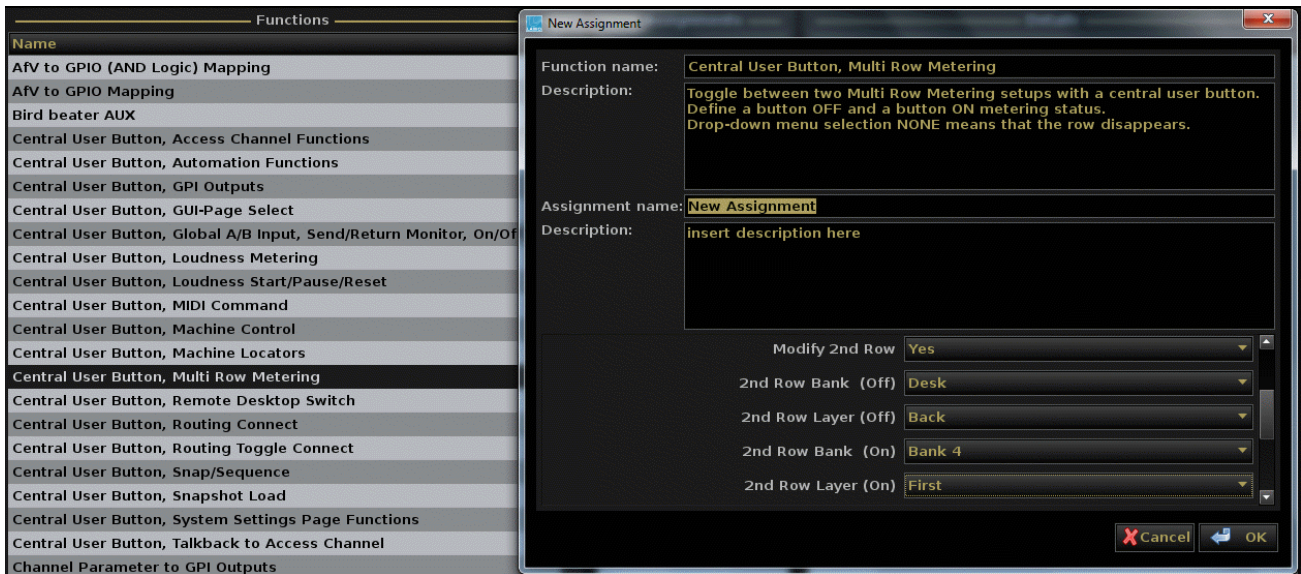
Six functions are supported:

- **Previous Rack & Next Rack** - scroll through the available Racks (in any view).
- **Previous Plugin & Next Plugin** - within the selected Rack, scroll left and right through the inserted Plug-ins (in any view).
- **Toggle View** - switches the MultiRack operating window between Main and Rack view. (Note that if MultiRack is in Overview, then on its first press the button switches to Main view.)
- **Hot Rack** - this function carries an index which can represent any Rack number. When the button is pressed, the corresponding Rack is opened, allowing you to view and adjust its plug-ins. Up to eight functions of this type can be created. For each one, assign the index number using the **Navigate Hotrack Index** field.

For more details, please refer to the "Waves Plug-in Server for mc<sup>2</sup> User Guide".



### 20.3.18 Central User Button, Multi Row Metering



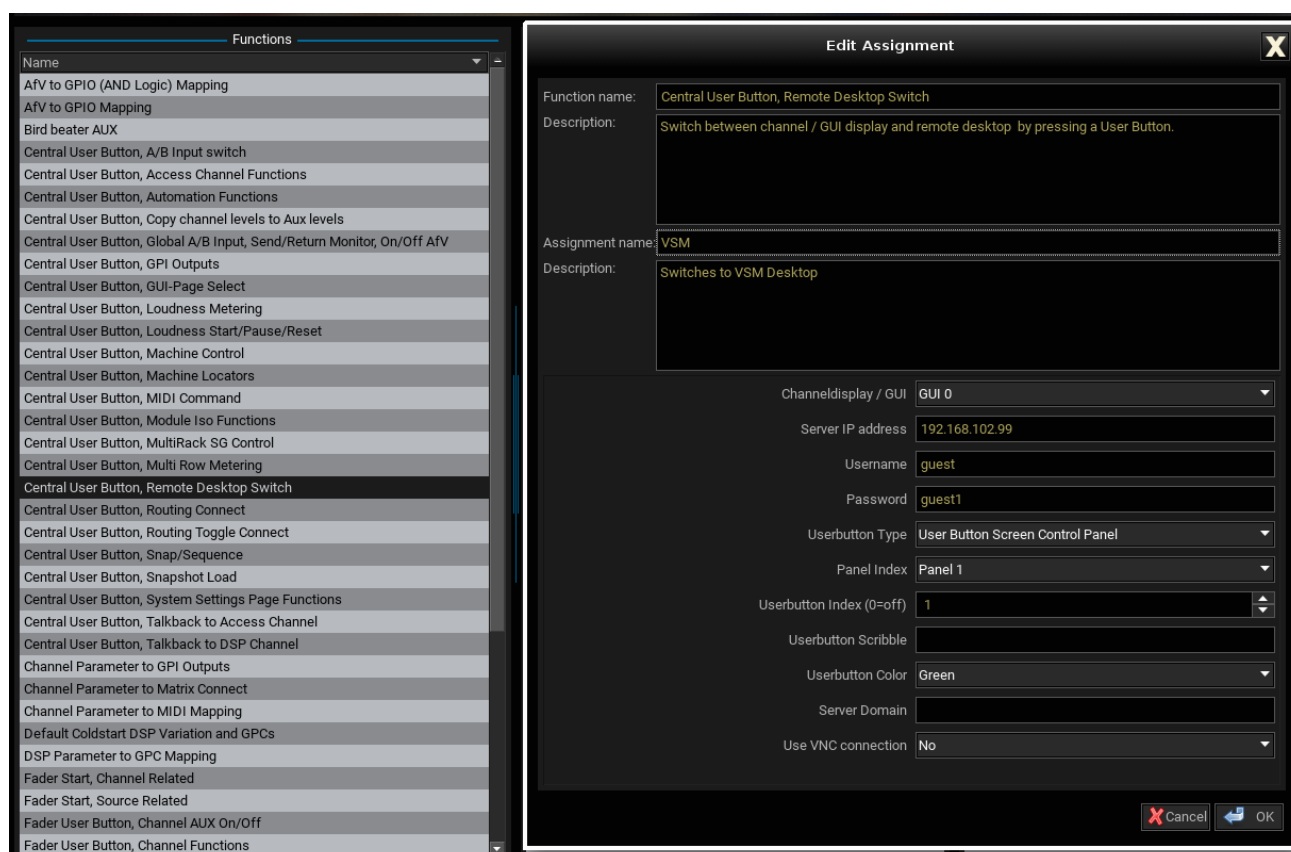
This function maps a [central user button](#) to switch the second **Metering Row** options available from the **System Settings** display, see [Multi-row Metering](#). This allows you to toggle between two metering setups.

To enable user button switching, set the **Modify 2nd Row** field to **Yes**. (If this field is set to **No**, then the metering row is always assigned to the options defined in the [System Settings](#) display.)

Each user button has an "On" and "Off" state - so, in our example, when the user button is "Off", the 2nd row *always* meter channels assigned to the alternate Layer of the active Bank (**Desk + Back**); when the user button is "On", the 2nd row switches to meter channels assigned to the Bank 4, Layer 1 (**Bank 4 + First**).

Select **None** from the **2nd Row Bank** options to disable the second metering row.

### 20.3.19 Central User Button, Remote Desktop Switch



This function allows any of the console's TFT displays to be switched to a remote desktop in order to view and control other applications – for example, a playback system or DAW. You can use any [central user button](#) to action the function.

From Version 5.10.0, the functionality has been expanded to support VNC Remote connections. To use this type of connection, set the "Use VNC connection" field to **Yes**. If the field is left as **No**, then the function supports the Windows RDP protocol.

#### ➤ On the Remote Server:

Connect the remote desktop server to the Lawo control system network.

The server should have a fixed IP address (fixed IP from DHCP server, or static IP address) within the same range as that of the control system, for example **192.168.102.xxx**. You can check the IP address of your control system from the **System Settings** display, see [IP Address Primary](#).

Create a new user and password for the remote desktop login. We advise creating a new user account, as the password is displayed and stored in clear text on the mc<sup>2</sup> mixing console. The user must be a member of the "Remote Desktop Users" Group.

#### ➤ On the Console:

For each remote desktop you wish to connect to, define the:

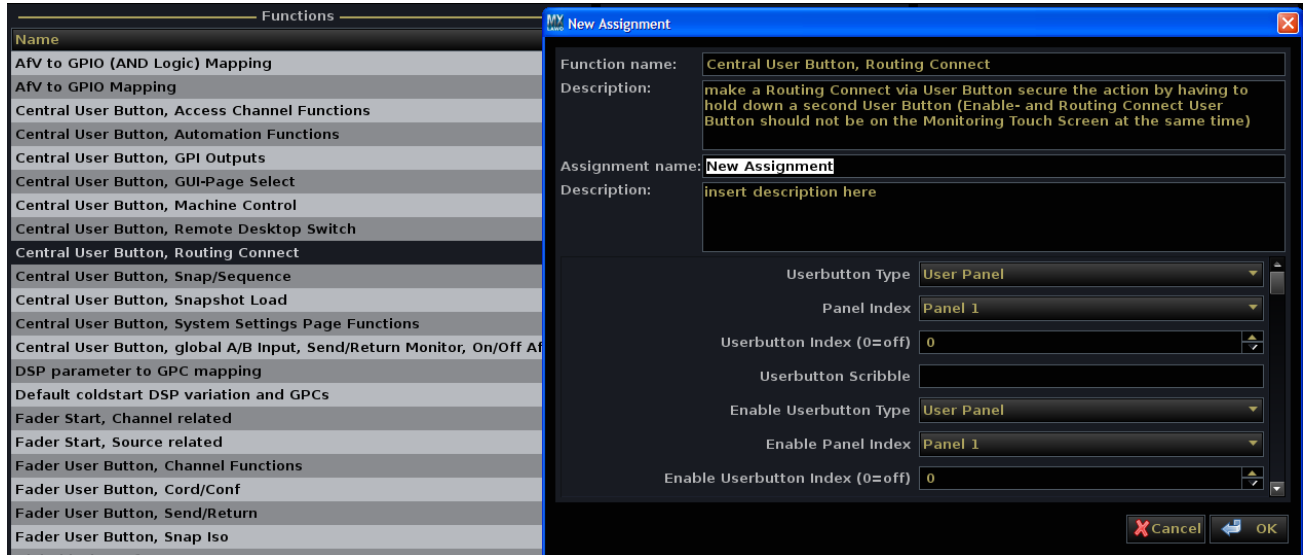
- **Channeldisplay / GUI** – select the console display which will display the remote desktop. You can choose any Channel display or Central GUI.
- **Server IP address** – enter the IP address of the server (as configured above).

Note that the control system must have an IP route to the remote server. If the server is not in the same subnet range, then an appropriate gateway must be configured. Please consult your network administrator for assistance. The default Subnet Mask is **255.255.255.0**.

- **Username** – enter the remote server's Username.

- **Password** – enter the remote server's Password.
- **Userbutton Type, Panel Index**, etc. – assign the [user button](#) which will switch to and from the remote desktop.

### 20.3.20 Central User Button, Routing Connect



The screenshot shows the 'New Assignment' dialog box in the MX software. The dialog is titled 'MX New Assignment'. It has a list of functions on the left, with 'Central User Button, Routing Connect' selected. The main area contains the following fields:

- Function name:** Central User Button, Routing Connect
- Description:** make a Routing Connect via User Button secure the action by having to hold down a second User Button (Enable- and Routing Connect User Button should not be on the Monitoring Touch Screen at the same time)
- Assignment name:** New Assignment
- Description:** insert description here
- Userbutton Type:** User Panel
- Panel Index:** Panel 1
- Userbutton Index (0=off):** 0
- Userbutton Scribble:** (empty field)
- Enable Userbutton Type:** User Panel
- Enable Panel Index:** Panel 1
- Enable Userbutton Index (0=off):** 0

At the bottom right, there are 'Cancel' and 'OK' buttons.

This function allows you to perform signal routing from a [central user button](#). Up to 28 connects/disconnects can be assigned to one button. Routes can be made to/from any source or destination including DSP channels.

You can create multiple instances of this template.

Copy the source and destination **HLSD** from the **mx Routing** display, see [Entering a HLSD Address](#).

To create a disconnect, type **DISCONNECT** into the field for the Source HLSD.

To secure the operation, define an **Enable Userbutton**. Once defined, you will need to hold down **Enable** while pressing the **Connect** user button in order to action the connects/disconnects.

Note that the **Enable** and **Routing Connect** user buttons are not multi-touch capable, therefore do not assign them to a touch-screen.

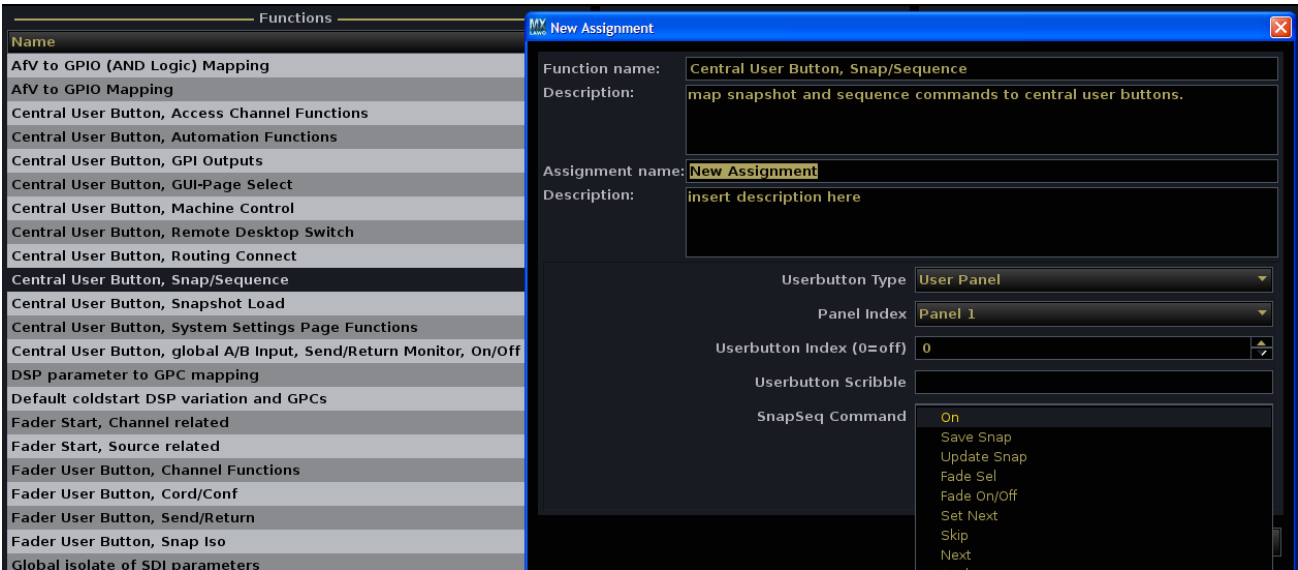
### 20.3.21 Central User Button, Routing Toggle Connect

This function is similar to the [Central User Button, Routing Connect](#) function. But it provides source on and source off states so that routes can toggle. Up to 16 connects/disconnects can be assigned to one user button.

You can create multiple instances of this template.

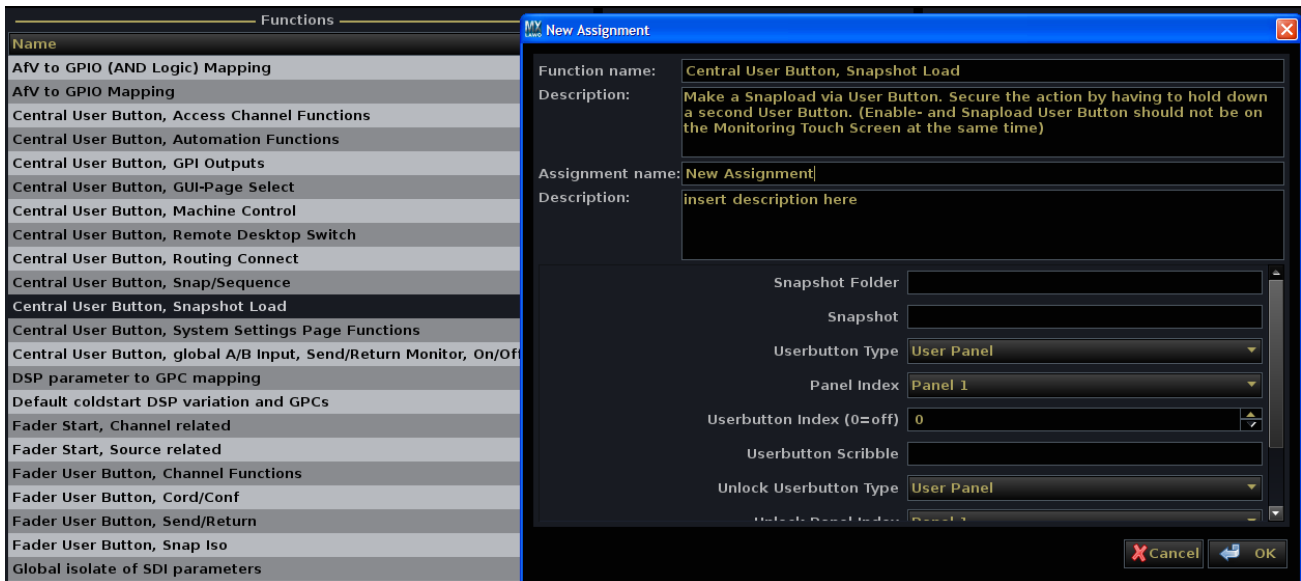


## 20.3.22 Central User Button, Snap/Sequence



Maps a [central user button](#) to [snapshot/cuelist](#) commands.

### 20.3.23 Central User Button, Snapshot Load



The screenshot shows the 'New Assignment' dialog box. The left pane lists various functions, with 'Central User Button, Snapshot Load' selected. The right pane contains the following fields:

- Function name: Central User Button, Snapshot Load
- Description: Make a Snapload via User Button. Secure the action by having to hold down a second User Button. (Enable- and Snapload User Button should not be on the Monitoring Touch Screen at the same time)
- Assignment name: New Assignment
- Description: insert description here
- Snapshot Folder: (empty)
- Snapshot: (empty)
- Userbutton Type: User Panel
- Panel Index: Panel 1
- Userbutton Index (0=off): 0
- Userbutton Scribble: (empty)
- Unlock Userbutton Type: User Panel
- Unlock Description: (empty)

Buttons at the bottom: Cancel, OK.

This function allows you to load a specific snapshot from a single user button press. The snapshot can come from any folder within the active production.

You can make the operation more secure by defining an **Unlock** user button. This means that the operator must press and hold the **Unlock** button while pressing the **Snapshot Load** in order to recall the snapshot. You can use any [central user button](#) to action the functions.

Note that the **Unlock** and **Snapshot Load** user buttons are not multi-touch capable, therefore do not assign them to a touch-screen.

For each function, define the:

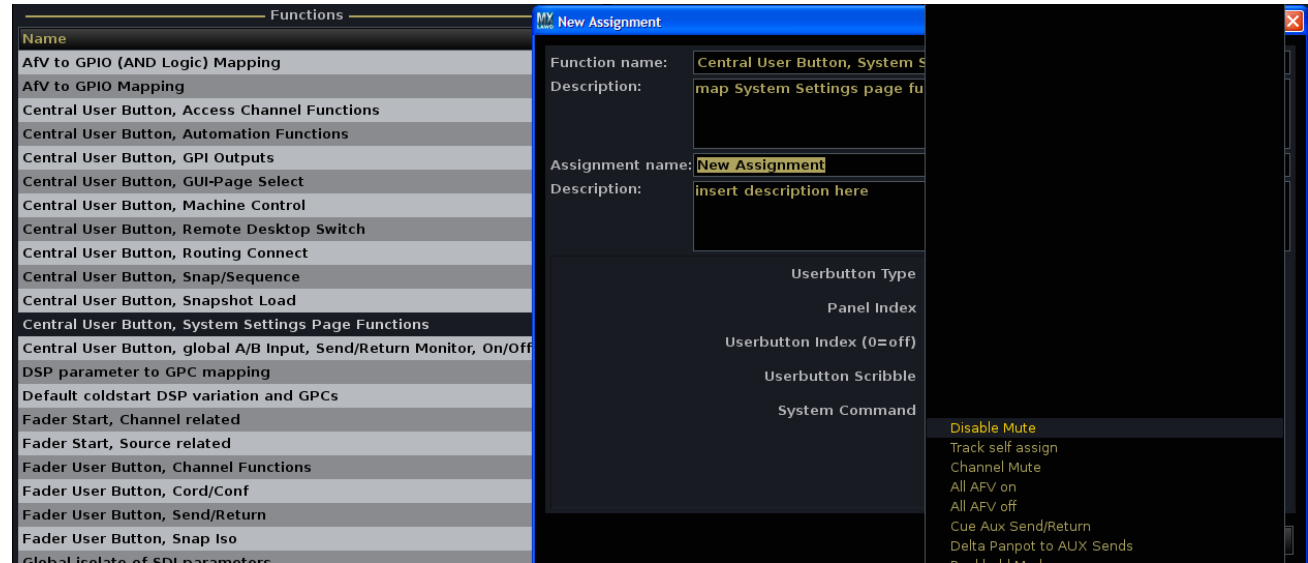
- **Snapshot Folder** – the name of the [Folder](#) where the snapshot is stored.
- **Snapshot** – the name of the [Snapshot](#) you wish to load.
- **Userbutton Type, Panel Index**, etc. – the [user button](#) which will action the Snapshot Load.
- **Unlock Userbutton Type, Panel Index**, etc. – the [user button](#) which will action the Unlock function.

If the **Unlock** user button is empty, then the **Snapshot Load** will action on a single press of the first user button.

## 20.3.24 Central User Button, System Settings Page Functions

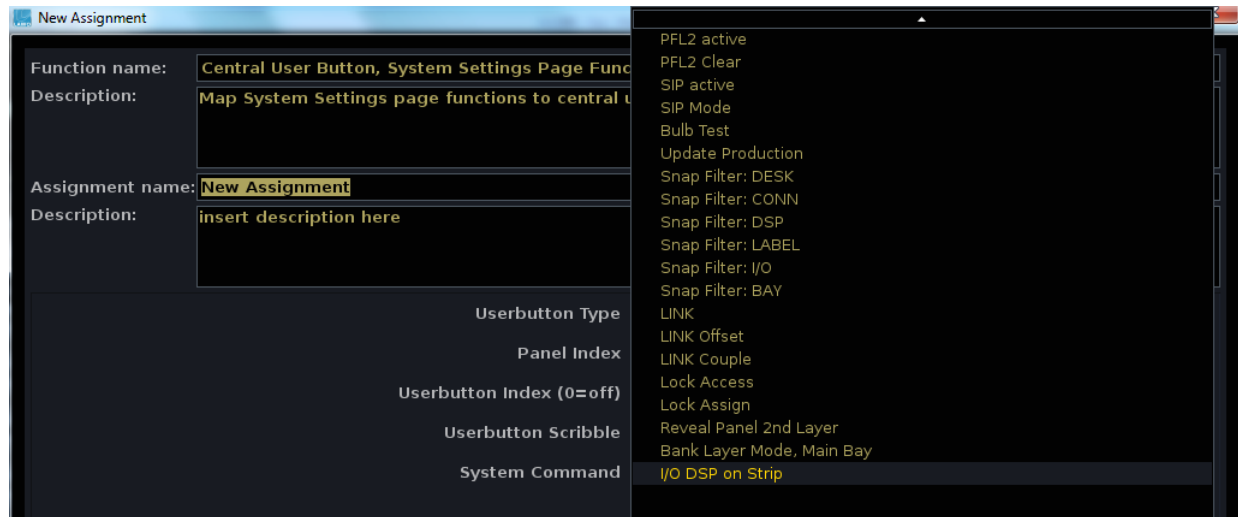
Maps a [central user button](#) to system options, allowing them to be changed 'on the fly'.

Most of the options in this list come from the [System Settings](#) display:

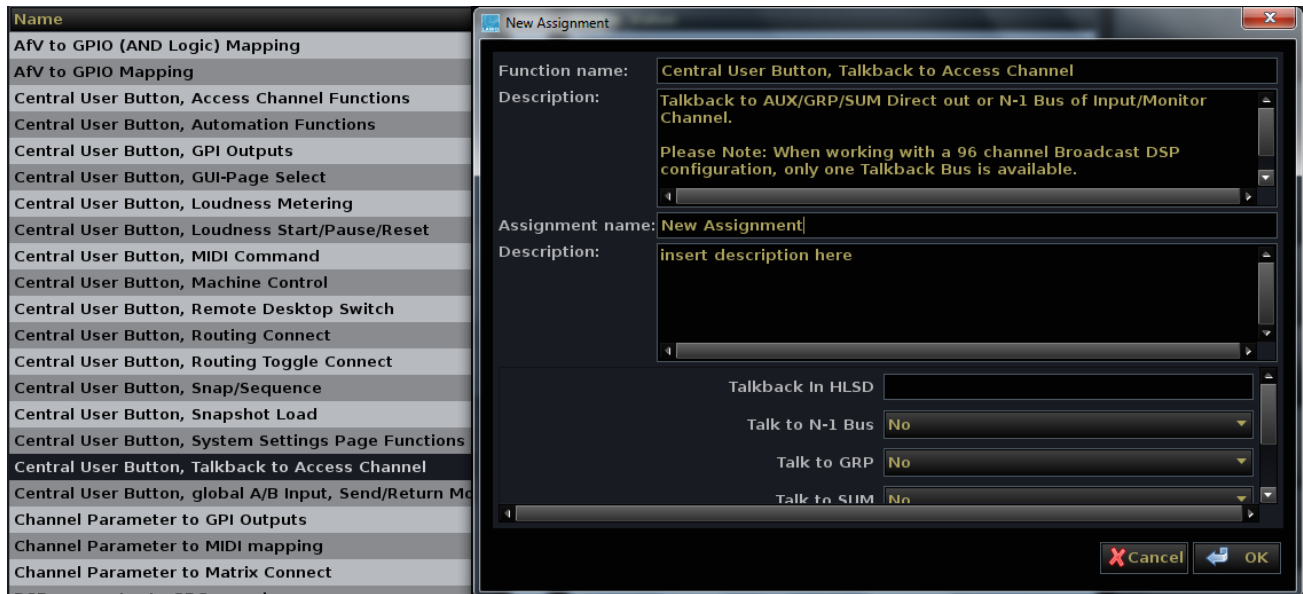


Those which do not are:

- **Snap Filter** – mimic the [Global Snapshot ISO](#) buttons.
- **LINK, Lock and Bank Layer Mode: Main Bay** – mimic the front panel buttons of the same name.
- **I/O DSP on Strip** – changes the [INPUT MIXER mode](#) from SOURCE to INMIX.



### 20.3.25 Central User Button, Talkback to Access Channel

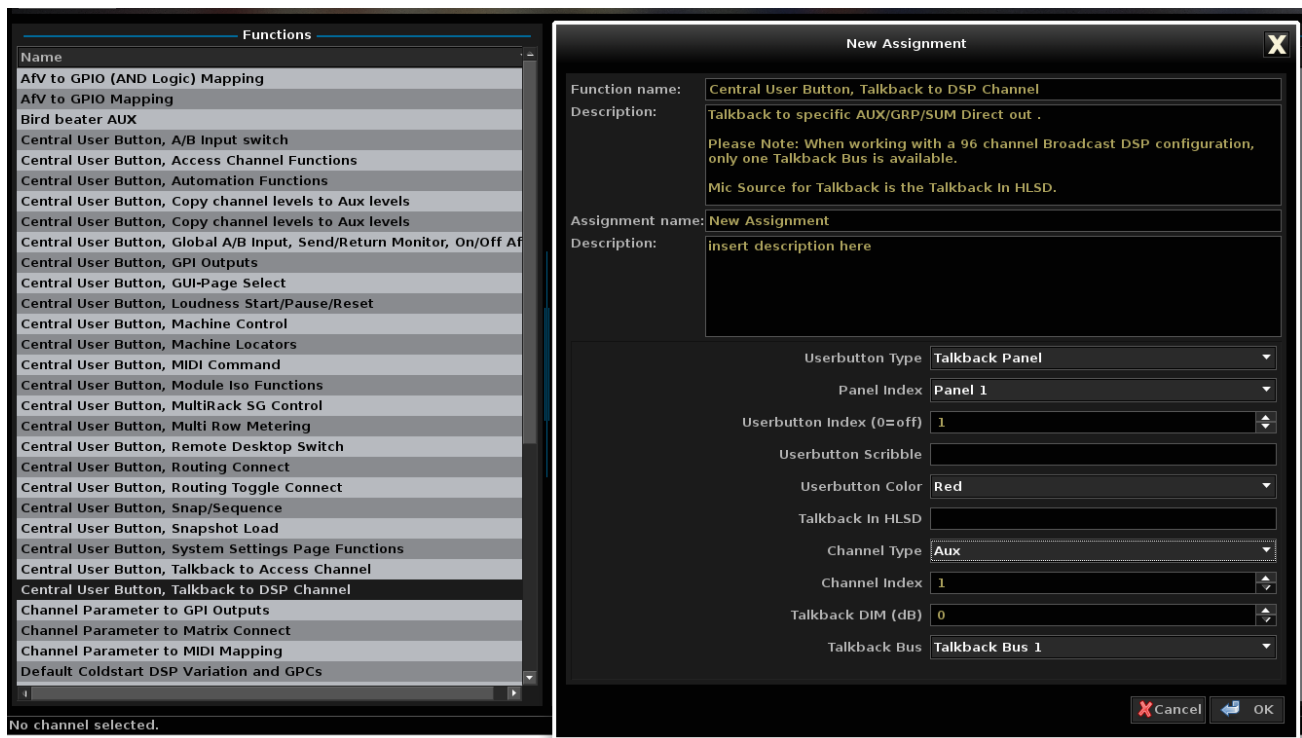


Maps a [central user button](#) to talkback switching.

This function is identical to the [Fader User Button, Talkback to Channel](#), except that talkback is applied to the channel in access.

Note that, from Version 5.8 onwards, you can also program a central user button to talk to a specific Aux, Sum or Group channel. See [Central User Button, Talkback to DSP Channel](#).

### 20.3.26 Central User Button, Talkback to DSP Channel



From Version 5.8 software, this function maps a [central user button](#) to talkback switching - for example, to talk to a specific Aux, Group or Sum channel.

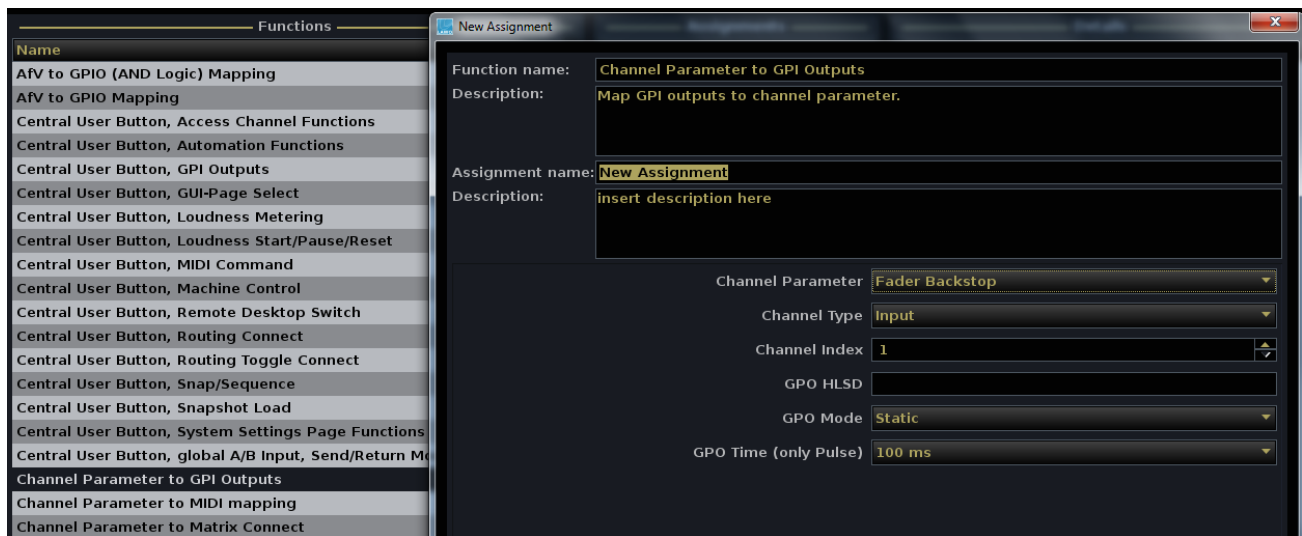
When active, talkback is routed from the talkback source onto one of 8 talkback busses. (These busses appear in the [Signal List](#) display under the **Input/Mon A + B -> Command Bus** Source Directory. Note that when using a 96 channel broadcast channel DSP configuration, only one talkback bus is available).

The talkback bus then feeds the specified DSP channel: any Aux, Group or Sum.

You can also decide whether to dim the console monitoring when the talkback user button is active.

1. Define the **Userbutton Index**, **Scribble** and **Color** in the usual manner.
2. Enter the HLSD address for the talkback source into the **Talkback In HLSD** field. The easiest way is to copy and paste the signal HLSD from the **mx Routing** display, see [Entering a HLSD Address](#).
3. Define the channel Type and Index where the talkback will be applied - this can be any Aux, Group or Sum.
4. Use the **Talkback DIM (dB)** field to enter the amount of dim applied to the console's monitoring when the user button is active.
5. Use **Talkback Bus** to select one of the 8 available talkback busses. This option is useful when programming multiple **TALK** buttons, as you can have each user button working with a different talkback bus.

### 20.3.27 Channel Parameter to GPI Outputs



Maps a channel parameter to a GPI output.

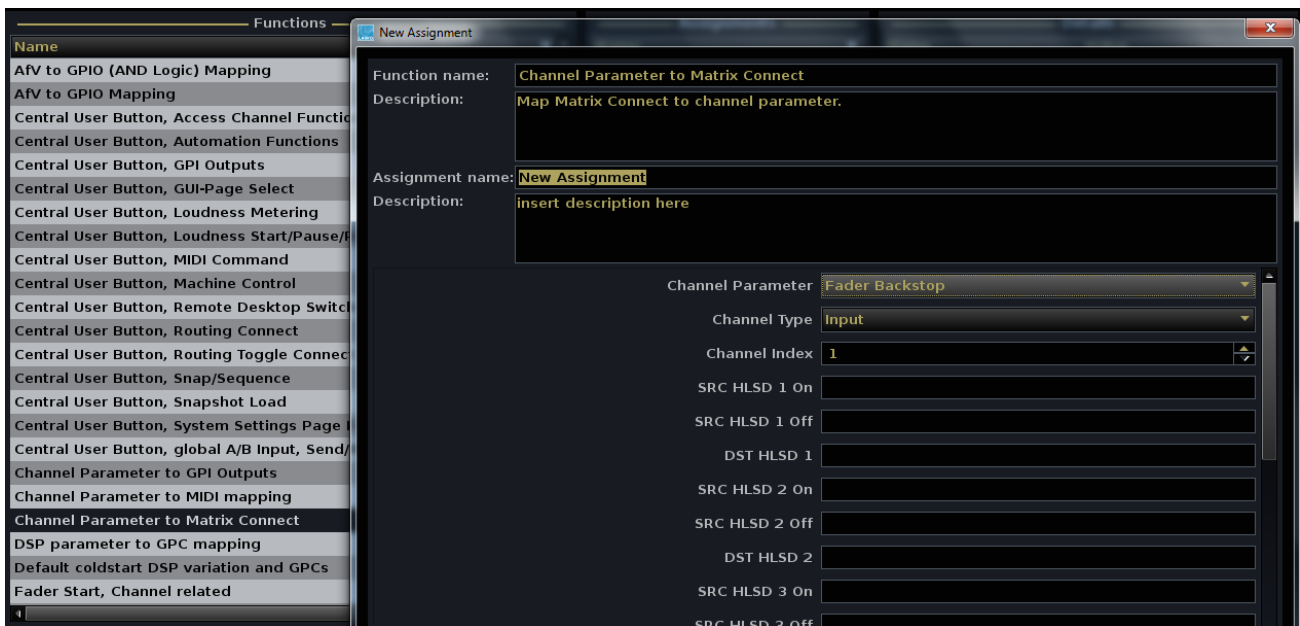
The custom function defines the channel parameter, type and number, and then the HLSD, Mode and Time for the GPI. Note that the GPI is triggered from the channel, and therefore will follow if the channel is assigned to a different fader strip.

Channel parameters include:

- **Fader Backstop** – active when you pull back on the fader. Note that [Fader Backstop](#) must be turned **On** in the **System Settings** display.
- **Fader start** – active whenever the fader is opened.
- **Userbuttons 1 to n** – active when the [fader strip user buttons](#) are turned on.

Note that fader start GPIs can also be programmed using the [Fader Start, Source related](#) or [Fader Start, Channel related](#) custom functions (allowing multiple channels or sources to be assigned to each relay).

### 20.3.28 Channel Parameter to Matrix Connect



Maps a channel parameter to signal routing. For example, you could choose to disconnect certain routes, such as a studio loudspeaker, when a channel fader is opened. Routes can be made to/from any source or destination including DSP channels.

Channel parameters include:

- **Fader Backstop** – active when you pull back on the fader. Note that [Fader Backstop](#) must be turned **On** in the **System Settings** display.
- **Fader start** – active whenever the fader is opened.
- **Userbuttons 1 to n** – active when the [fader strip user buttons](#) are turned on.
- **Aux 29 to 32 On/Off** – active when the channel [Aux on/off](#) button is turned on.

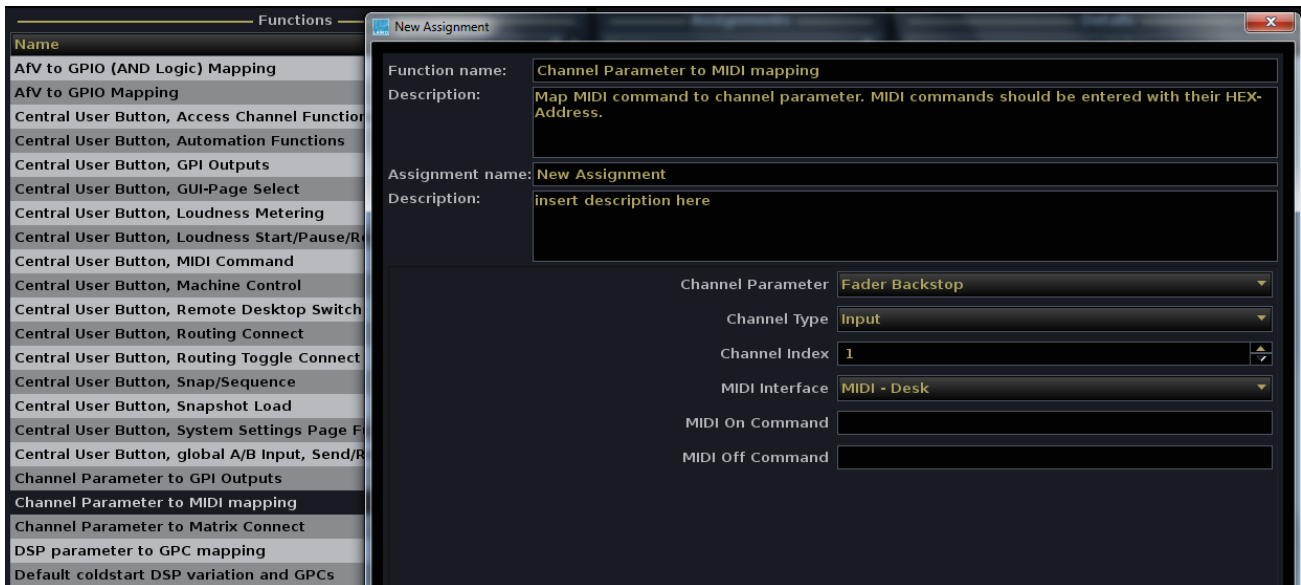
Copy the source and destination **HLSD** from the **mx Routing** display, see [Entering a HLSD Address](#).

To create a disconnect, type **DISCONNECT** into the field for the Source HLSD.

Up to 8 connects/disconnects can be assigned to one custom function.

You can create multiple instances of this template.

### 20.3.29 Channel Parameter to MIDI Mapping



Maps a channel parameter to a MIDI Command. The channel parameters are identical to those available for [Channel Parameter to GPI outputs](#) function.

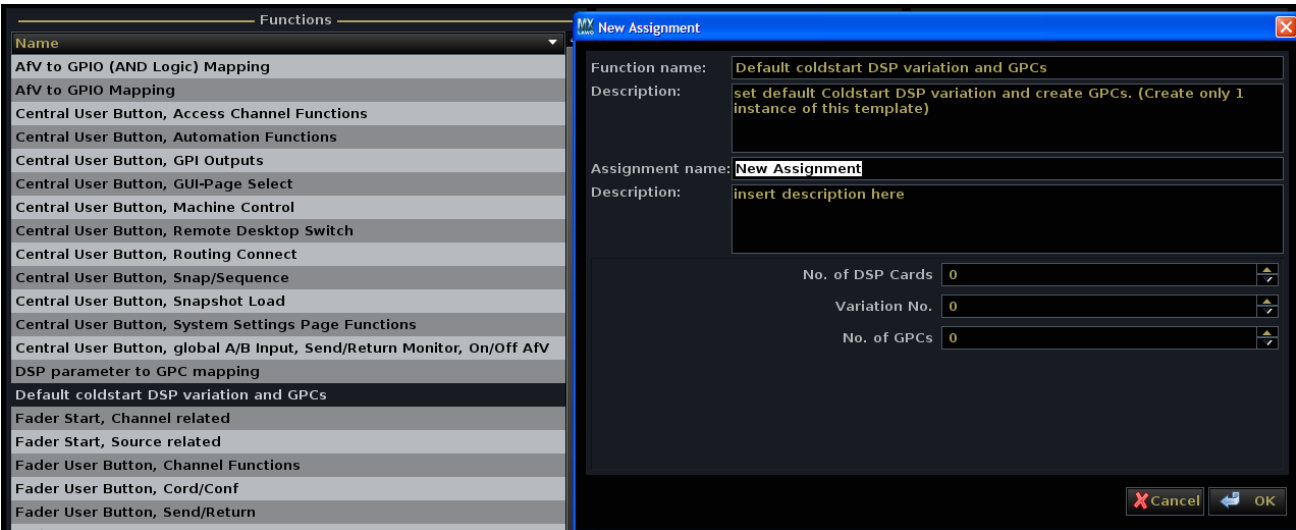
For the MIDI command, define the:

- **MIDI Interface:**
  - **DESK** – MIDI is connected to the MIDI IN/OUT sockets on the rear of the console.
  - **LAN 1 to 16** – MIDI is transmitted via the Lawo network; select the network client from 1 to 16.
- **MIDI On/Off Commands** – enter the hexadecimal address for the MIDI Command. For example:
  - **0xc0 0x07** = Program Change to MIDI ch 1; Patch Number 8.
  - **0xc2 0x03** = Program Change to MIDI ch 3; Patch Number 4.

From Version 5.6.0, MIDI strings can be up to 64 characters long.



## 20.3.30 Default coldstart DSP variation and GPCs



This function sets the [DSP Configuration](#) which will be loaded after a [cold start](#).

Enter the number of DSP boards fitted, and the **Variation No.** which you wish to load.

Note that the **Variation No.** is *NOT* the **Index** number displayed on the [DSP Configuration](#) display.

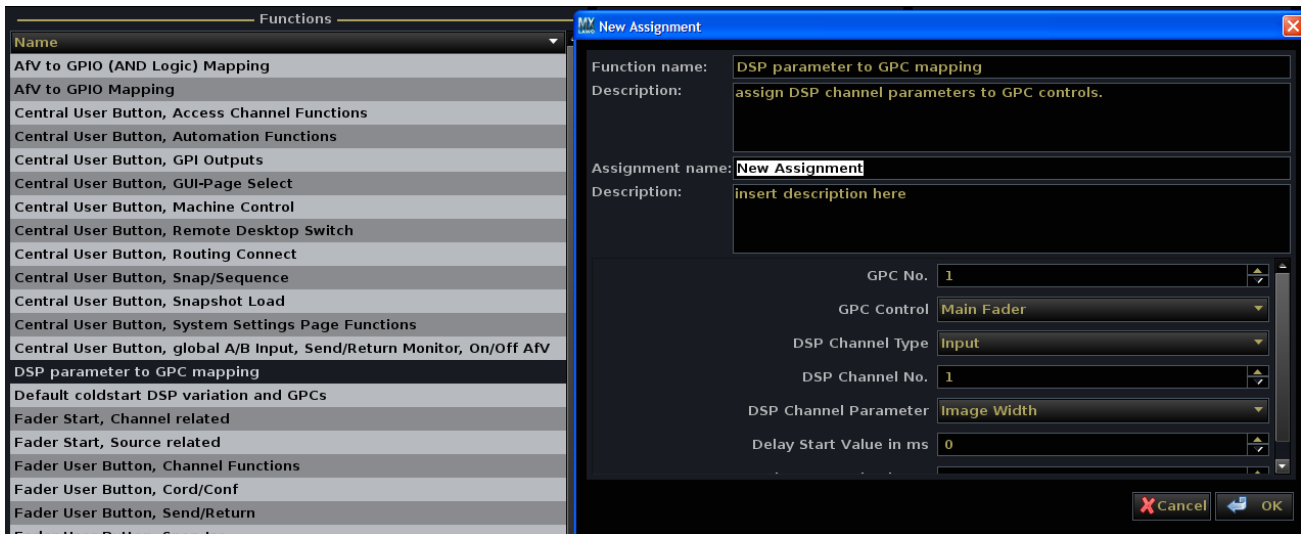
To calculate the **Variation No.**, open the **DSP Configuration** display, and sort the **Configuration Presets** list by the number of Inputs, in descending order. Now count down from the top of the list to find the Variation number.

Also note that there is no feedback from the system if the chosen variation is not available. If the DSP configuration preset cannot be loaded, then you see that there is no active DSP configuration preset once the system restarts.

The **No of GPCs** field has no function in the current release of software, and is reserved for future implementation.

Although you can create multiple instances of this template, it is not recommended - the last one initialised wins.

### 20.3.31 DSP Parameter to GPC Mapping



This function offers a new way to control and automate DSP parameters by assigning a DSP channel parameter to a [General Purpose Channel](#) (GPC) control.

The **GPC Control** can be the Main fader or one of the GPC Auxes.

The **DSP Channel Type** can be any Input, Monitor, Group, Sum, Aux or Surround VCA channel.

The **DSP Channel Parameter** can be: Image Width or Position; Panning Left-Right or Front-Back; Slope; Hyperpanning: Turn, Front and Back Width, Depth; EQ Gain for Bands 01, 02, 03, 04; Digiamp; Insert Send; Direct Out, Delay or any Aux send level.

Each GPC control is assigned to a single DSP parameter, so if you wish to control more than one parameter at a time, then do this by linking the GPCs. 256 GPCs are available.

By combining this function with the [AFV to GPIO](#) template, you can change DSP parameters from an Audio Follow Video event.

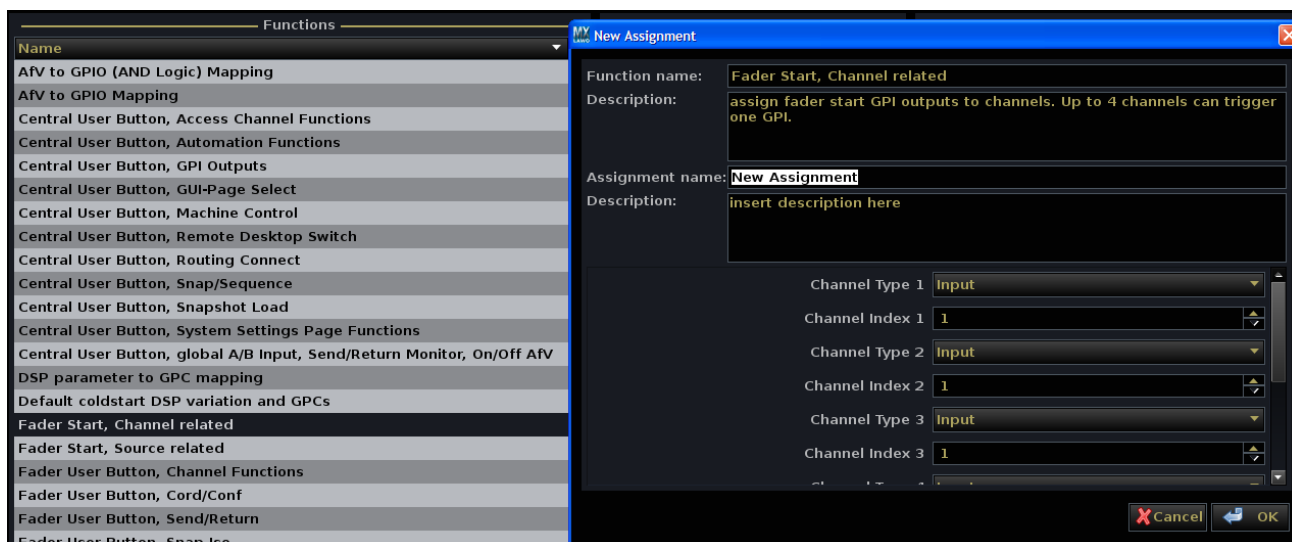
For example, to adjust delay for wireless cameras automatically:

1. Create an [AFV to GPIO](#) custom function where all GPIOs from the wireless cameras OR combine to trigger one AFV event.
2. Then use a **DSP Parameter to GPC Mapping** custom function to assign the Delay parameter of the audio Group (mixing the wireless cameras) to a GPC.
3. Assign the AFV event to the General Purpose Channel.

#### Warning

Do *NOT* link GPCs which control the same DSP parameter in a contradictory manner, as the system may react badly!

### 20.3.32 Fader Start, Channel related



Maps DSP channels to an external relay (GPI output) in order to create a fader start. Once the DSP channel is assigned to a physical fader, the fader triggers the start. Up to 4 DSP channels can be assigned to each relay.

For each of the 4 channels, define the:

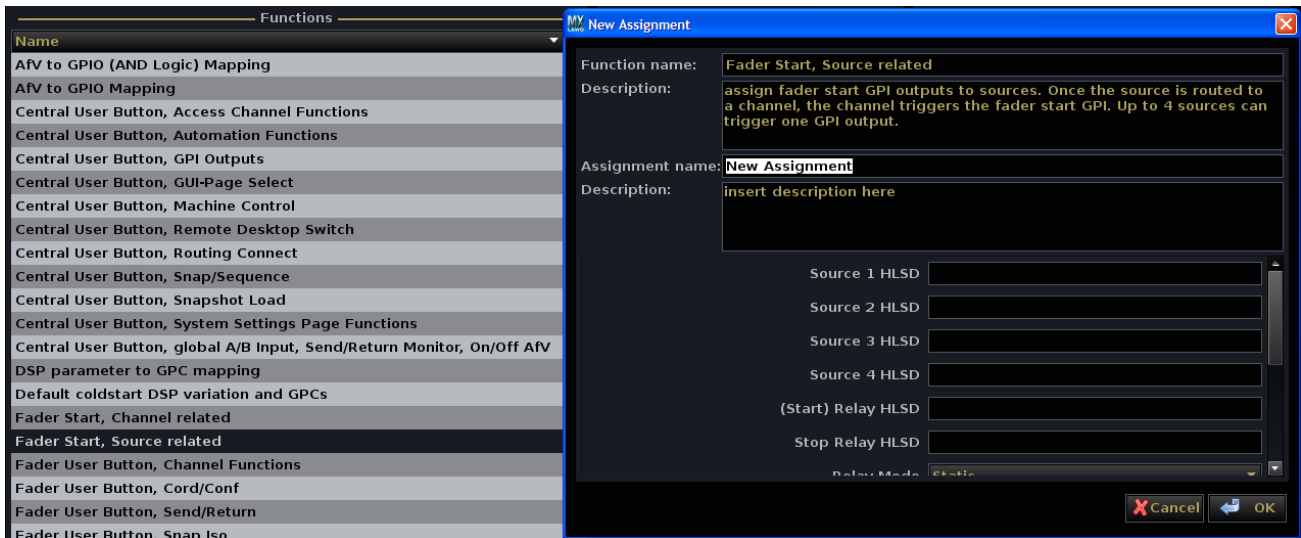
- **Channel Type** – input, monitor, group, sum, aux, surround VCA or GPC (General Purpose Channel).
- **Channel Index** – the channel number.

Scroll down the **New Assignment** window to define options for the relay output:

- **Relay HLSD** – this is the [Lawo system address](#) of the relay which will be triggered.
- **Relay mode** – static, pulse, etc.
- **Relay Time** – can be set for a pulsed relay.
- **Consider Cut** – has two states:
  - **Yes** – if the channel mute is active, then the fader start will not trigger when the fader is opened.
  - **No** – the fader start always triggers when the fader opens regardless of the channel mute status.

Note that the fader start is assigned to the DSP channel and not a physical fader. Therefore, if INP 1 is reassigned to a different fader strip, the fader start follows.

### 20.3.33 Fader Start, Source related



Maps source signals to an external relay (GPI output) in order to create a fader start. Once the source is routed to a DSP channel, and the channel assigned to a physical fader, the fader triggers the start.

Up to 4 sources can be assigned to each relay:

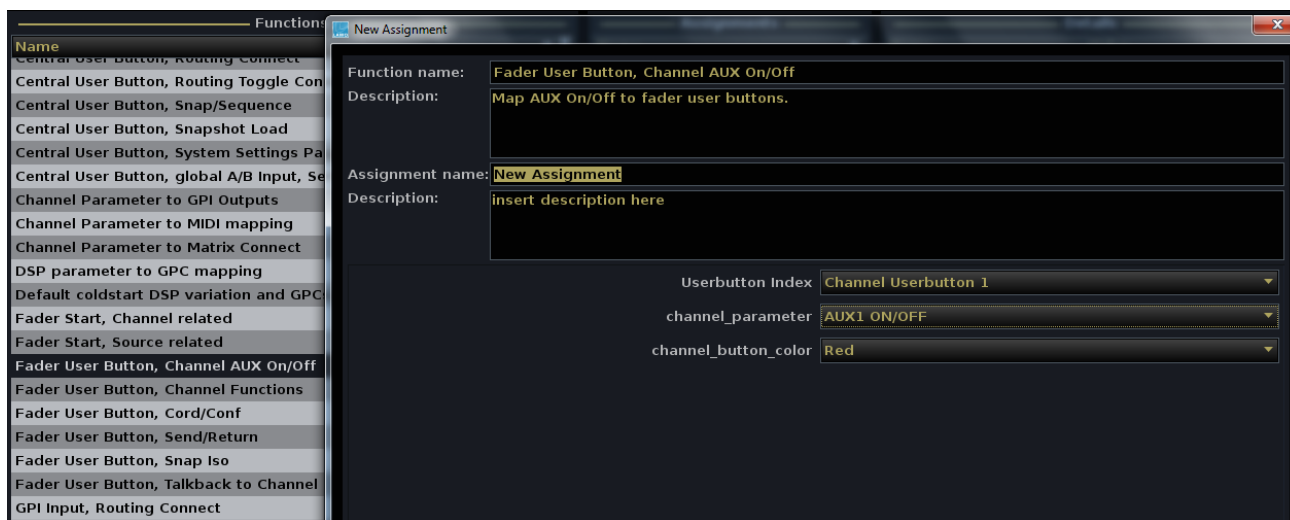
- **Source HLSD** – the [Lawo system address](#) of each source.
- **(Start) Relay HLSD** – the Lawo system address of the start relay which will be triggered.
- **Stop Relay HLSD** – the Lawo system address of the stop relay which will be triggered.
- **Relay mode** – static, pulse, etc.
- **Relay Time** – can be set for a pulsed relay.
- **Consider Cut** – has two states:
  - **Yes** – if the channel mute is active, then the fader start will not trigger when the fader is opened.
  - **No** – the fader start always triggers when the fader opens regardless of the channel mute status.

The last three options assign a user button which can be used to trigger the relays:

- **Enable Userbutton Type** – the panel type.
- **Enable Userbutton Index** – the panel number.
- **Enable Userbutton Scribble** – the text displayed if the user button has an accompanying scribble strip display.

Note that the fader start is assigned to the source. Therefore, if the source is reassigned to a different DSP channel, the fader start follows.

### 20.3.34 Fader User Button, Channel Aux On/Off

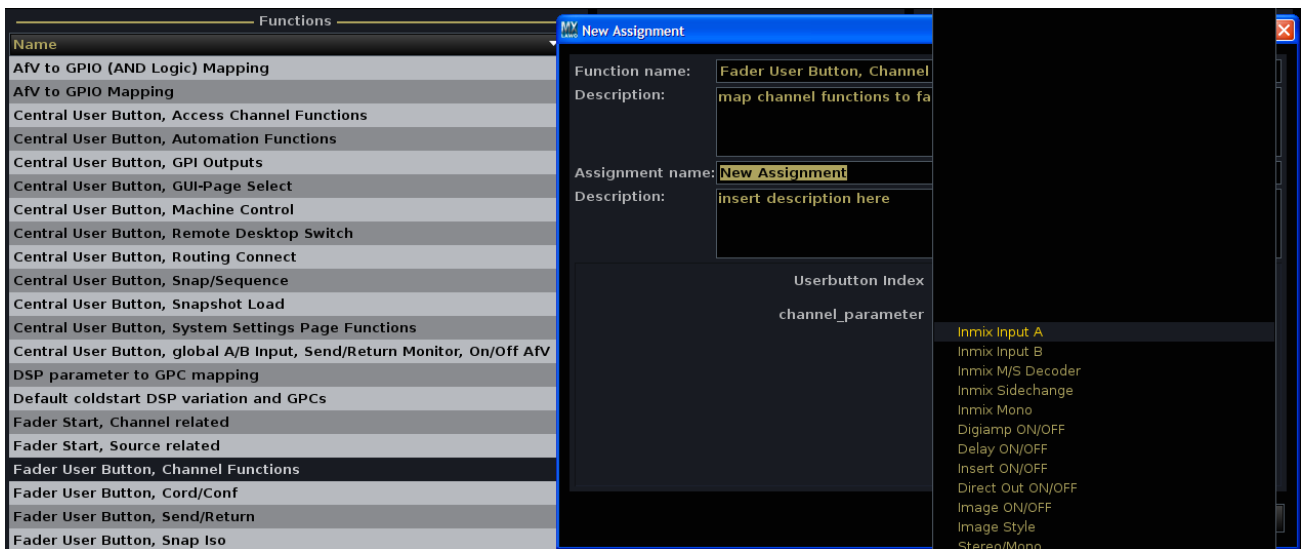


Maps a [fader strip user button](#) to the channel's [aux send on/off](#).

For each function, define the:

- **Userbutton Index** – the user button number (1 to 4).
- **Channel parameter** – e.g. Aux 1 ON/OFF.
- **Channel Button Color** – select the color for the user button on state: red, yellow or green.

### 20.3.35 Fader User Button, Channel Functions



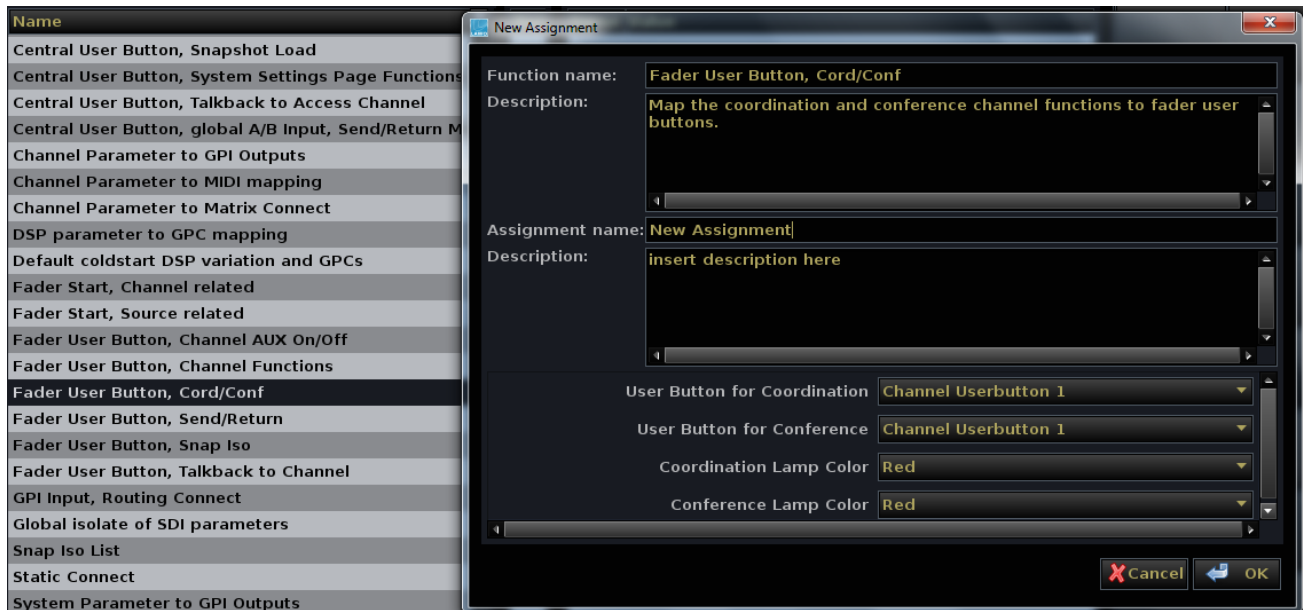
Maps a [fader strip user button](#) to a channel function such as:

- [A/B input switching](#)
- [MS Decode](#)
- [Delay on/off](#)
- [EQ on/off](#)
- [Fader R/W](#) (particularly useful for the mc<sup>2</sup>56 which has no dedicated **R/W** button.)
- [Trim/Absolute](#)
- etc.

For each function, define the:

- **Userbutton Index** – the user button number (1 to 4).
- **Channel parameter** – e.g. Delay ON/OFF.
- **Channel Button Color** – select the color for the user button on state: red, yellow or green.

### 20.3.36 Fader User Button, Cord/Conf

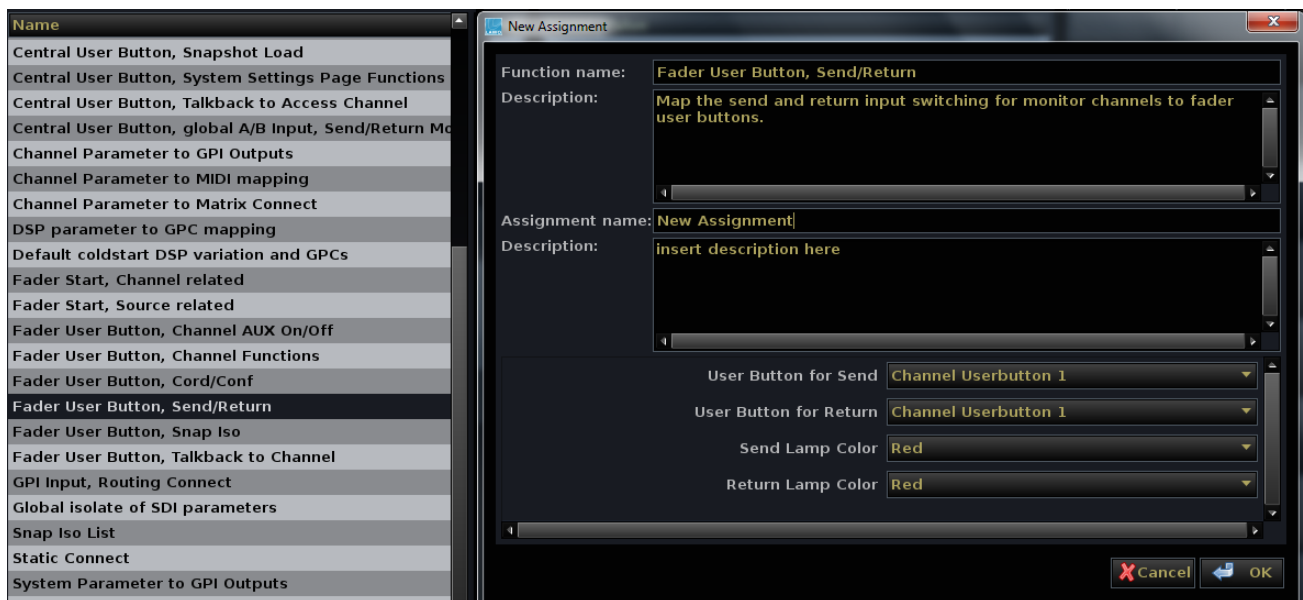


Maps [fader strip user buttons](#) to the **CONF** and **CORD mix minus** controls.

For each function, define the:

- **Userbutton Number** – 1 to 4.
- **Lamp Color** – select the color for the user button on state: red, yellow or green.

### 20.3.37 Fader User Button, Send/Return

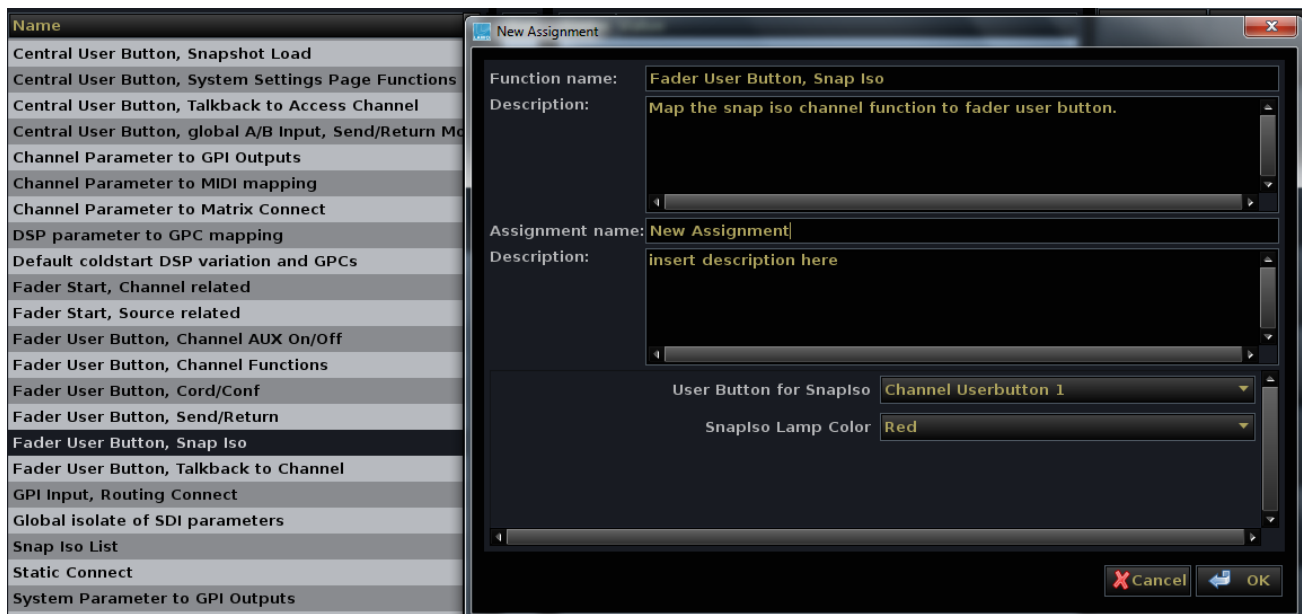


Maps [fader strip user buttons](#) to the multitrack **SEND** and **RETURN** switching for [monitor channels](#).

For each function, define the:

- **Userbutton Number** – 1 to 4.
- **Lamp Color** – select the color for the user button on state: red, yellow or green.

### 20.3.38 Fader User Button, Snap Iso



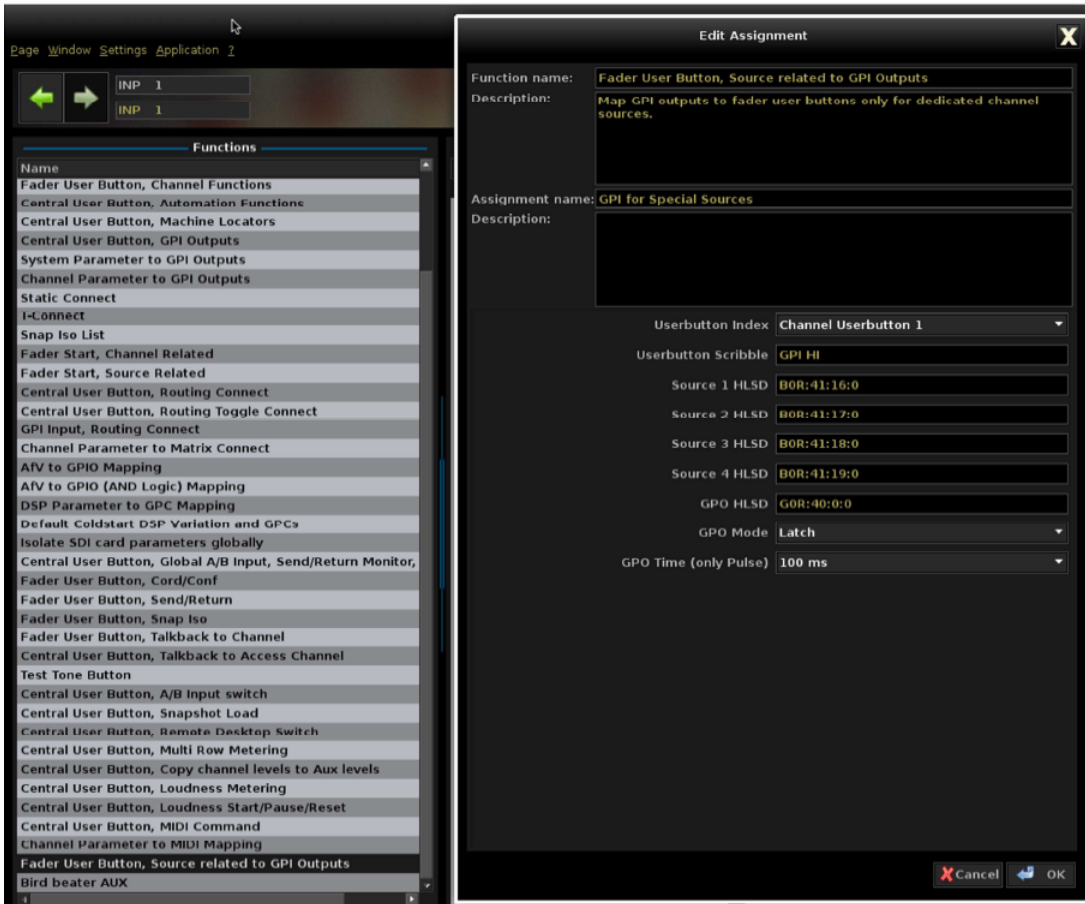
Maps a [fader strip user button](#) to the [snapshot isolate](#) function (**SNAP ISO**):

Define the:

- **Userbutton Number** – 1 to 4.
- **Lamp Color** – select the color for the user button on state: red, yellow or green.



## 20.3.39 Fader User Button, Source related to GPI Outputs

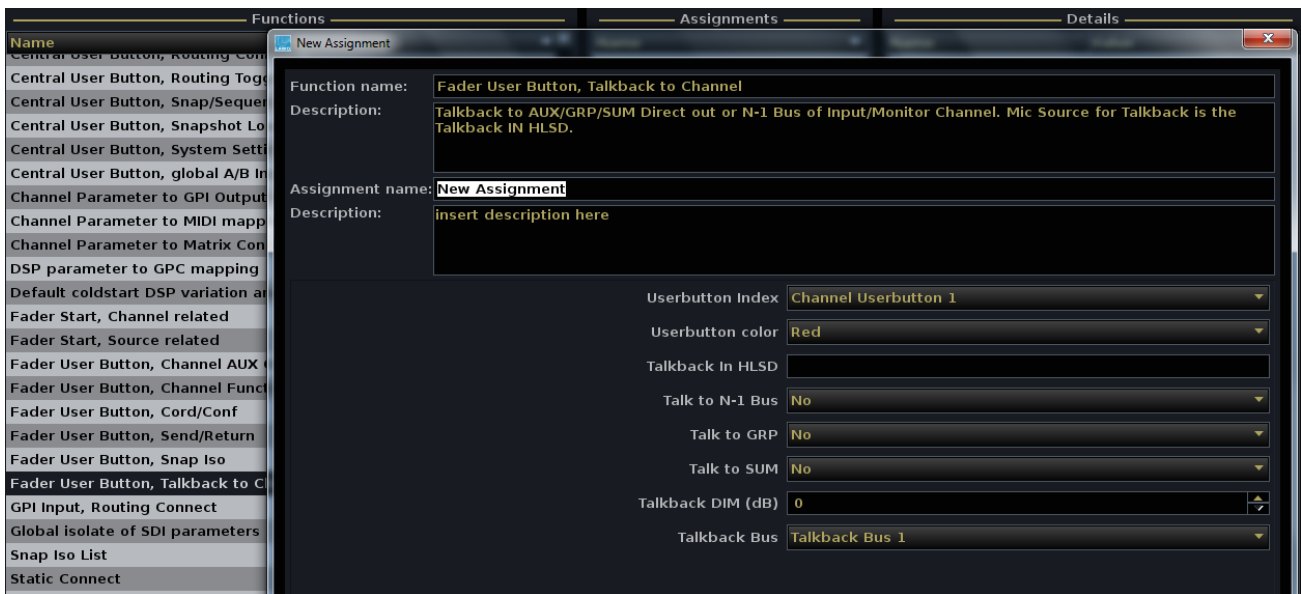


From Version 5.4 onwards, this function maps a [fader strip user button](#) on dedicated sources to a specific GPI output. When the source is assigned to a fader strip, the operator can then easily trigger the GPO.

Up to four sources can trigger a single GPO. In each case, enter the **HLSD** address for each source and the GPO. Then assign the **Mode** and **Time** for the GPO.

Copy the source and destination **HLSD** from the **mx Routing** display, see [Entering a HLSD Address](#).

### 20.3.40 Fader User Button, Talkback to Channel



Maps a [fader strip user button](#) to talkback switching.

When active, talkback is routed from the talkback source onto one of 8 talkback busses. (These busses appear in the [Signal List](#) display under the **Input/Mon A + B -> Command Bus** Source Directory. Note that when using a 96 channel broadcast channel DSP configuraton, only one talkback bus is available).

The talkback bus can then feed the channel's N-1 bus (on input or monitor channels), the Group direct output (on group channels) or the Sum direct output (on sum channels).

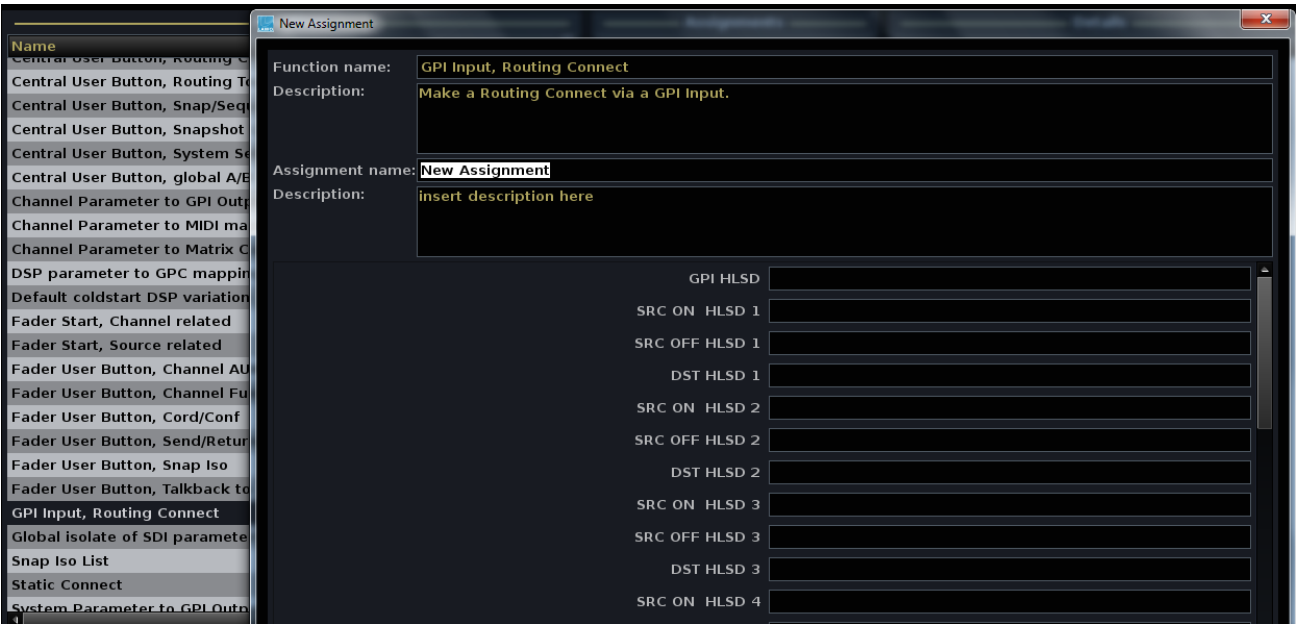
You can also decide whether to dim the console monitoring when the talkback user button is active.

1. Define the **Userbutton Index** and **Userbutton Color** in the usual manner.
2. Enter the HLSD address for the talkback source into the **Talkback In HLSD** field. The easiest way is to copy and paste the signal HLSD from the **mx Routing** display, see [Entering a HLSD Address](#).
3. Define whether the user button will activate talkback on input/monitor channels, group channels and/or sums:
  - **Talk to N-1 = Yes** – on an input or monitor channel, the user button routes talkback to the mix minus bus assigned to the channel's source. This can be any aux or track bus as defined by the [mix minus configuration](#).
  - **Talk to GRP = Yes** – on a group channel, the user button routes the talkback bus to the group's direct out.
  - **Talk to SUM = Yes** – on a sum channel, the user button routes the talkback bus to the sum's direct out.

For example, if you set **Talk to N-1 = Yes**, and **Talk to GRP/Talk to SUM = No**, then the user button will *only* activate talkback on fader strips assigned to input or monitor channels, and route talkback to the channel's N-1 bus.

4. Use the **Talkback DIM (dB)** field to enter the amount of dim applied to the console's monitoring when the user button is active.
5. Use **Talkback Bus** to select one of the 8 available talkback busses. This option is useful when programming multiple **TALK** buttons, as you can have each user button working with a different talkback bus.

## 20.3.41 GPI Input, Routing Connect



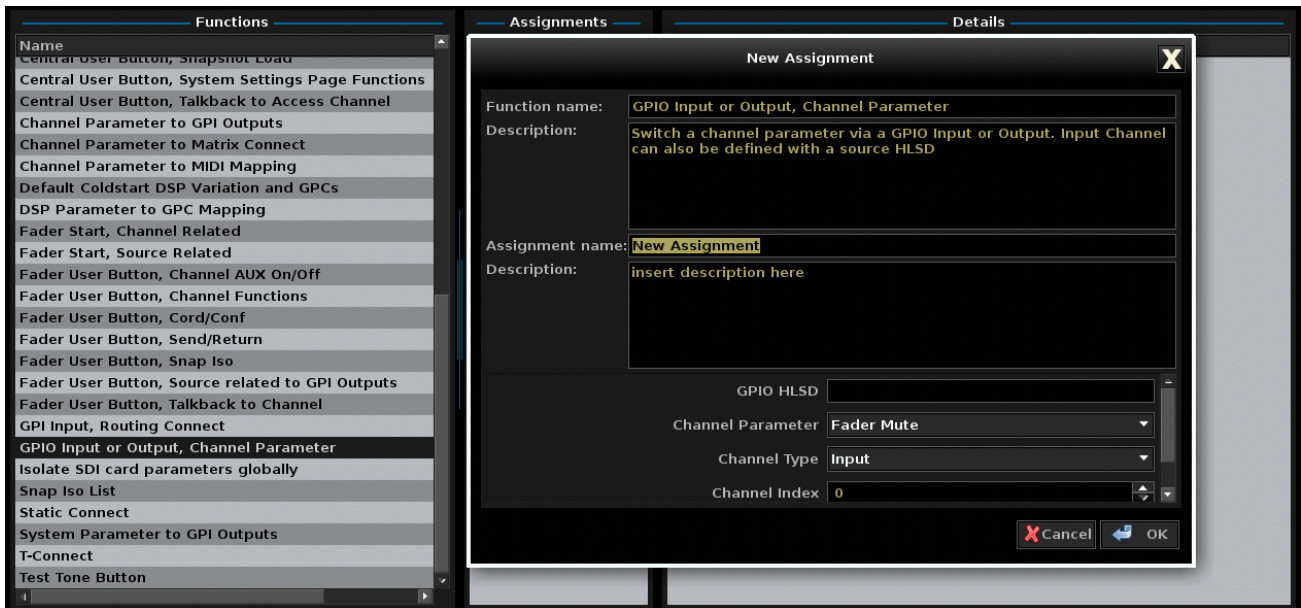
This function allows you to perform signal routing from a GPI Input. Up to 16 connects/disconnects can be assigned to one input.

You can create multiple instances of this template.

Copy the source and destination **HLSD** from the **mx Routing** display, see [Entering a HLSD Address](#).

To create a disconnect, type **DISCONNECT** into the field for the Source HLSD.

### 20.3.42 GPIO Input or Output, Channel Parameter



From Version 5.6.0, this function allows you to trigger channel parameters via GPIO.

Supported channel parameters are: **Fader Mute**, **Delay On/Off**, **PFL On/Off**, **AFL On/Off**, **PFL2 On/Off** and **AFL2 On/Off**.

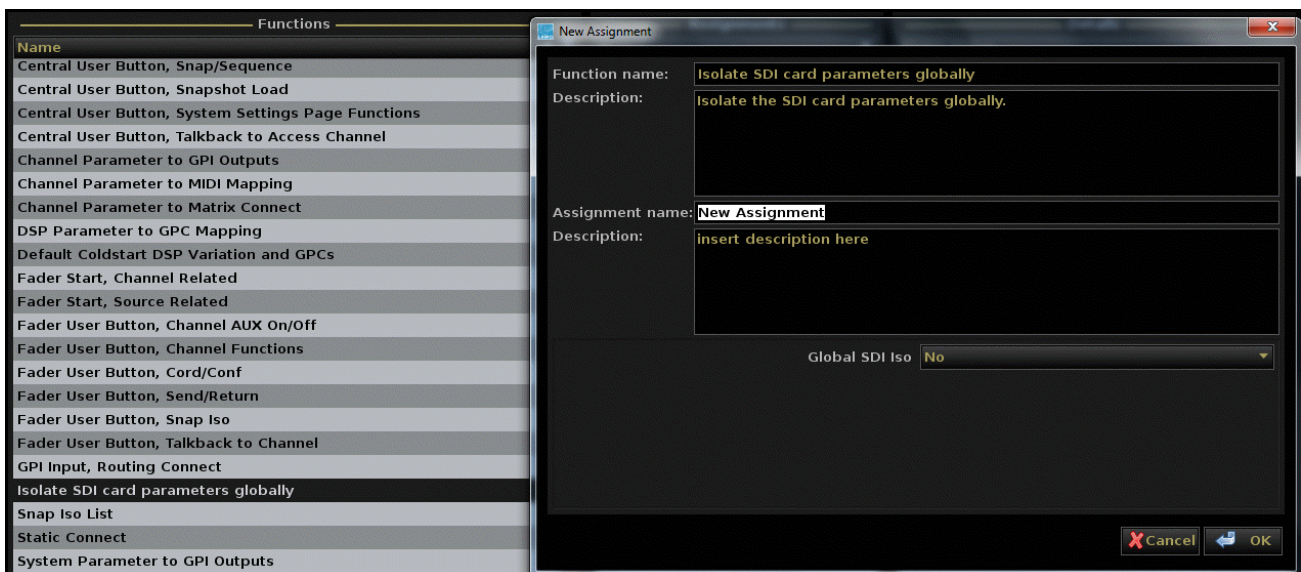
Select the **Channel Type** and **Index** you wish to trigger.

The **GPIO HLSD** field assigns the GPIO address.

Copy the source and destination **HLSD** from the **mx Routing** display, see [Entering a HLSD Address](#).

You can create multiple instances of this template.

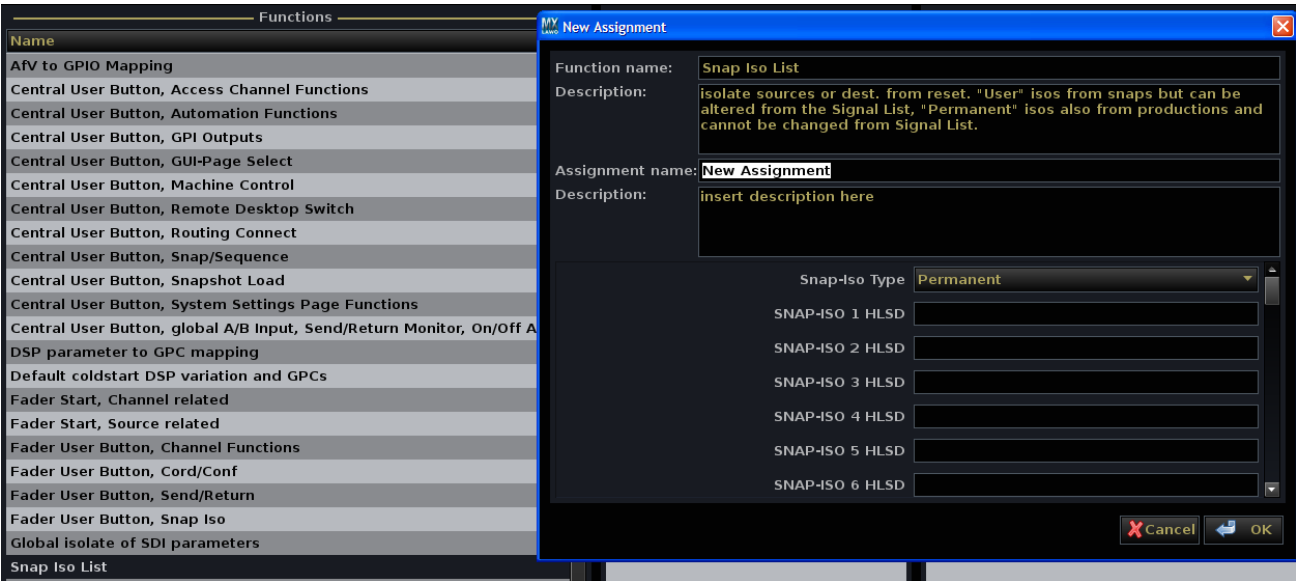
### 20.3.43 Isolate SDI card parameters globally



[SDI parameters](#) are never stored by snapshots, but they are stored and recalled by productions. This function can be used to isolate all SDI parameters so that settings are not affected by a production load.

This template should only be created once. If created several times, the last initialised one wins.

## 20.3.44 Snap Iso List



This function allows you to isolate sources or destinations to prevent them being reset by [snapshots](#), [productions](#) or the [Signal List](#) display.

Up to 48 signals can be defined within each **Snap Iso List** assignment; you can create multiple assignments to isolate lots of signals.

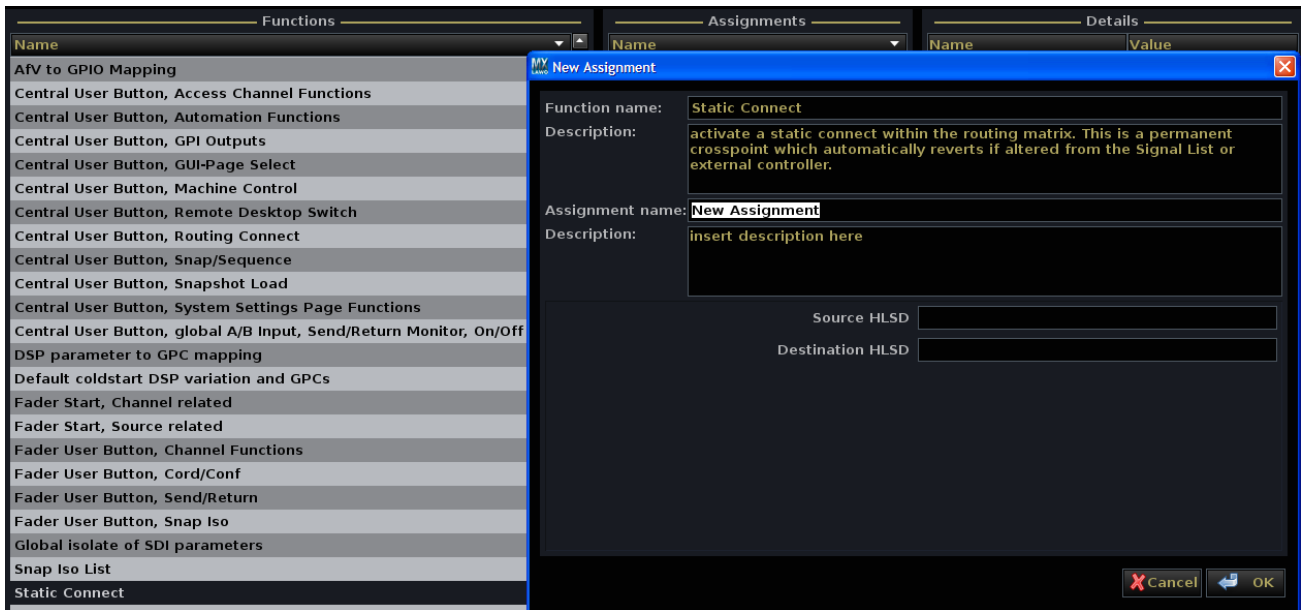
Within each assignment, the **Snap-iso Type** can be:

- **Permanent** – signals are not reset by snapshots or productions, and cannot be adjusted from the **Signal List** display.
- **User** – signals are not reset by snapshots, but will be reset by productions and can be adjusted manually from the **Signal List** display.

For each **Snap Iso List** assignment, enter the **HLSD** (Lawo system address) of the signals you wish to isolate.

Copy the source and destination **HLSD** from the **mx Routing** display, see [Entering a HLSD Address](#).

### 20.3.45 Static Connect



This function allows you to define a Static Connect by entering the **HLSD** ([Lawo system address](#)) for a Source and a Destination.

A Static Connect is a routing crosspoint which will *always* be active. If it is disconnected by any means, for example by the console operator or by an external controller, the crosspoint is automatically remade. You might use this function to prevent vital crosspoints from being accidentally reset.

Note that having defined a Static Connect, the only way to change or disconnect the crosspoint is to delete the Static Connect from the **Custom Functions** display.

Copy the source and destination **HLSD** from the **mx Routing** display, see [Entering a HLSD Address](#).



## 20.3.46 System Parameter to GPI Outputs



Name	Function
Central User Button, Snap/Sequence	
Central User Button, Snapshot Load	
Central User Button, System Settings Pa	
Central User Button, global A/B Input, S	
Channel Parameter to GPI Outputs	
Channel Parameter to MIDI mapping	
Channel Parameter to Matrix Connect	
DSP parameter to GPC mapping	
Default coldstart DSP variation and GPC	
Fader Start, Channel related	
Fader Start, Source related	
Fader User Button, Channel AUX On/Off	
Fader User Button, Channel Functions	
Fader User Button, Cord/Conf	
Fader User Button, Send/Return	
Fader User Button, Snap Iso	
Fader User Button, Talkback to Channel	
GPI Input, Routing Connect	
Global isolate of SDI parameters	
Snap Iso List	
Static Connect	
<b>System Parameter to GPI Outputs</b>	
T-Connect	

Function name: **System Parameter to GPI Outputs**

Description: **Map GPI outputs to system parameter.**

Assignment name: **New Assignment**

Description: **insert description here**

System Parameter: **PFL active**

GPO HLSD:

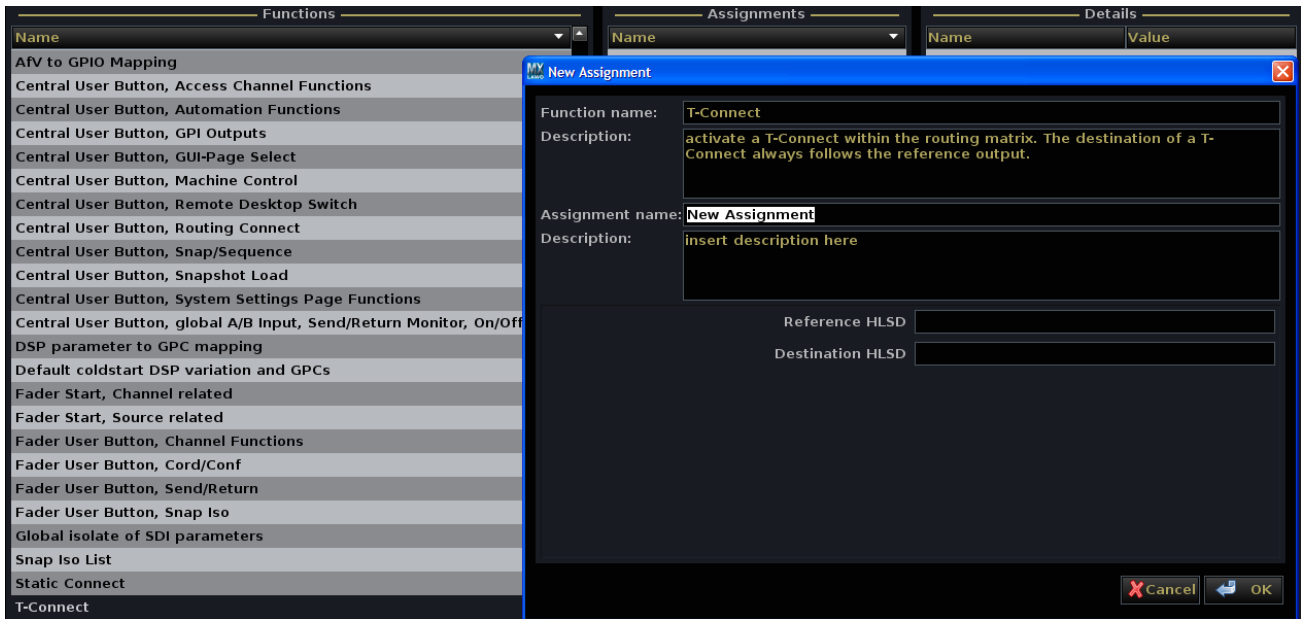
GPO Mode: **Static**

GPO Time (only Pulse): **100 ms**

Maps system parameters to GPI Outputs. Select the parameter – for example, **PFL active** – and then enter the **HLSD**, **Mode** and **Time** for the GPO.

Copy the source and destination **HLSD** from the **mx Routing** display, see [Entering a HLSD Address](#).

### 20.3.47 T-Connect



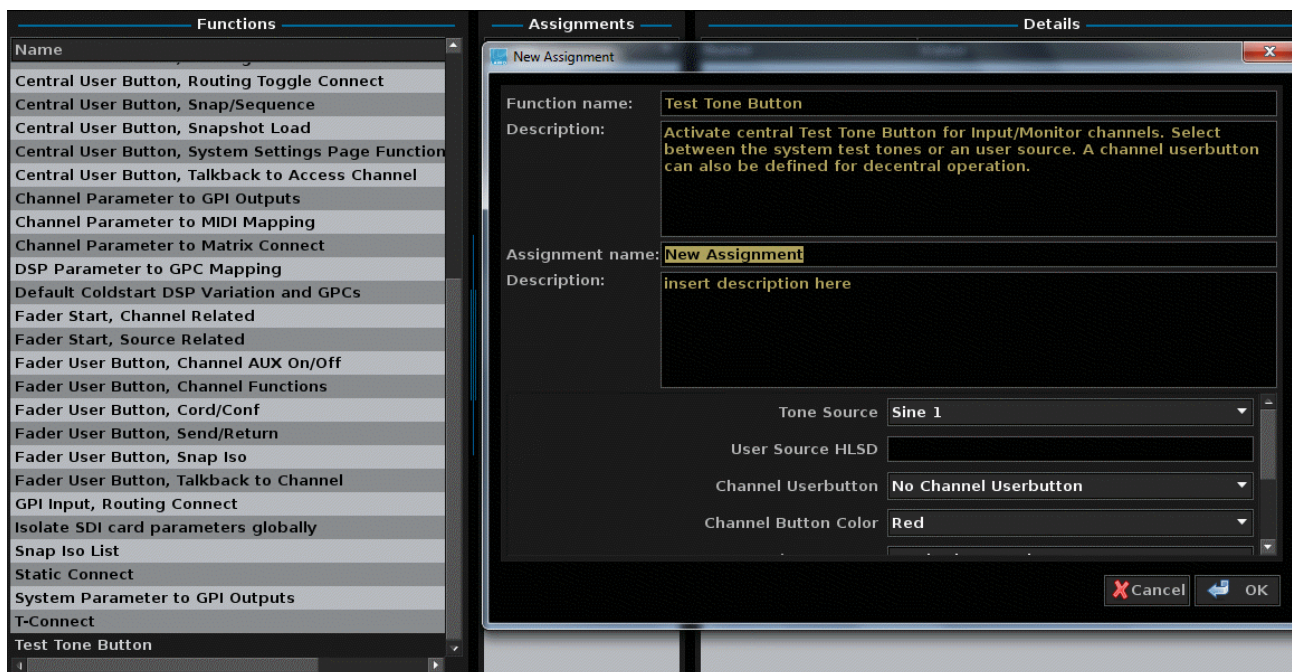
This function allows you to define a T-Connect by entering the **HLSD** (Lawo system address) for a Reference output and a Destination output.

The Destination output always follows the Reference output. So, for example, if the source to the reference output is Sum 3, the destination output source is also Sum 3. You might use this function if you have several transmission feeds all requiring identical routing changes.

Copy the source and destination **HLSD** from the **mx Routing** display, see [Entering a HLSD Address](#).



## 20.3.48 Test Tone Button



From V4.24 software onwards, this function activates and specifies the source used for [tone to channel](#) switching. Once programmed, test tone is always active:

- **Tone Source** - select one of the drop-down options to specify either an internal tone generator source (**Sine 1**, **Sine 2**, **White Noise**, **Pink Noise**), or **User Input**.
- **User Source HLSD** - if **User Input** is selected, enter the [HLSD address](#) for the source here.

The next two fields map a [fader strip user button](#) to the [tone to channel](#) button. This can be used to provide fast, direct access to tone switching across the console.

From V5.0 software onwards, the next four fields map a [central user button](#) to turn off all [tone to channel](#) selections. This allows you to switch off tone to all channels, globally, from a single button push.

## 20.4 Command Triggers

From Version 5.10.2, Command Triggers can be used to execute a command or series of commands from a trigger. Triggers and commands can include channel parameters, load events or remote events such as GPIOs and MIDI messages. For example, to open or close a channel level from a GPI input. Or, issue a MIDI Note On message from a specific channel level threshold.

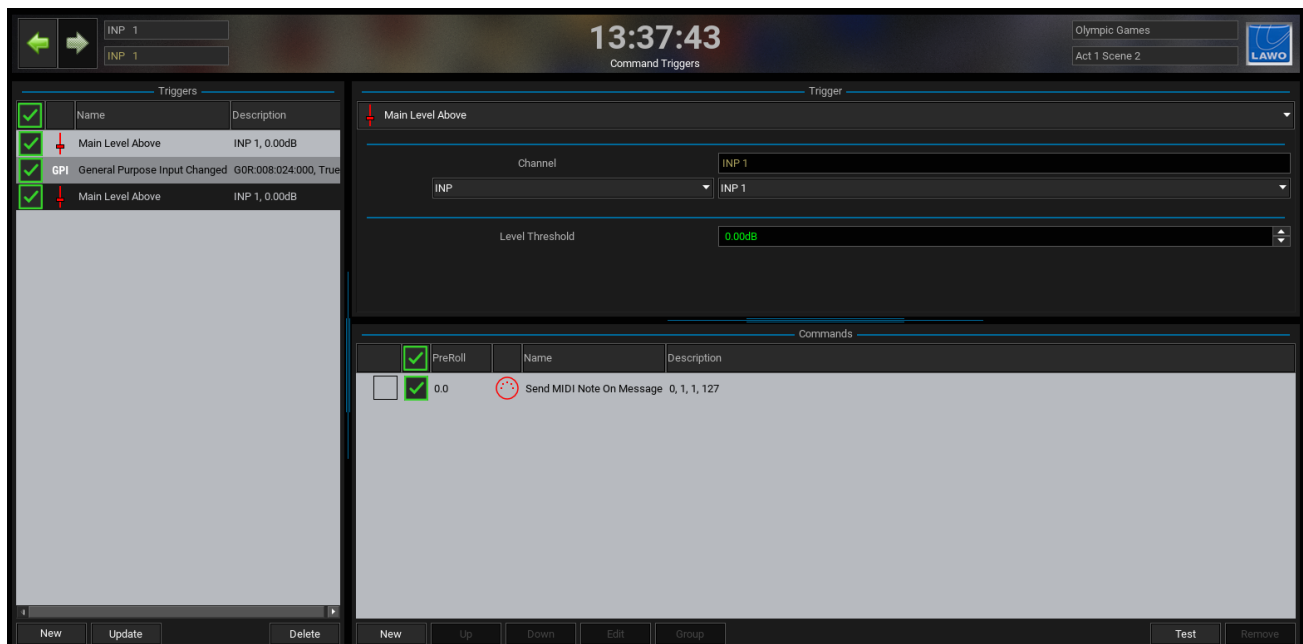
Multiple triggers can be stored in each production. Note that only one set of triggers are ever stored (there is no folder structure).

Command triggers are written onto the user data flash card when you [save](#) or [update](#) a production.

### 20.4.1 The Command Triggers Display

The **Command Triggers** display is used to program command triggers.

1. [Open](#) the display in the usual manner:



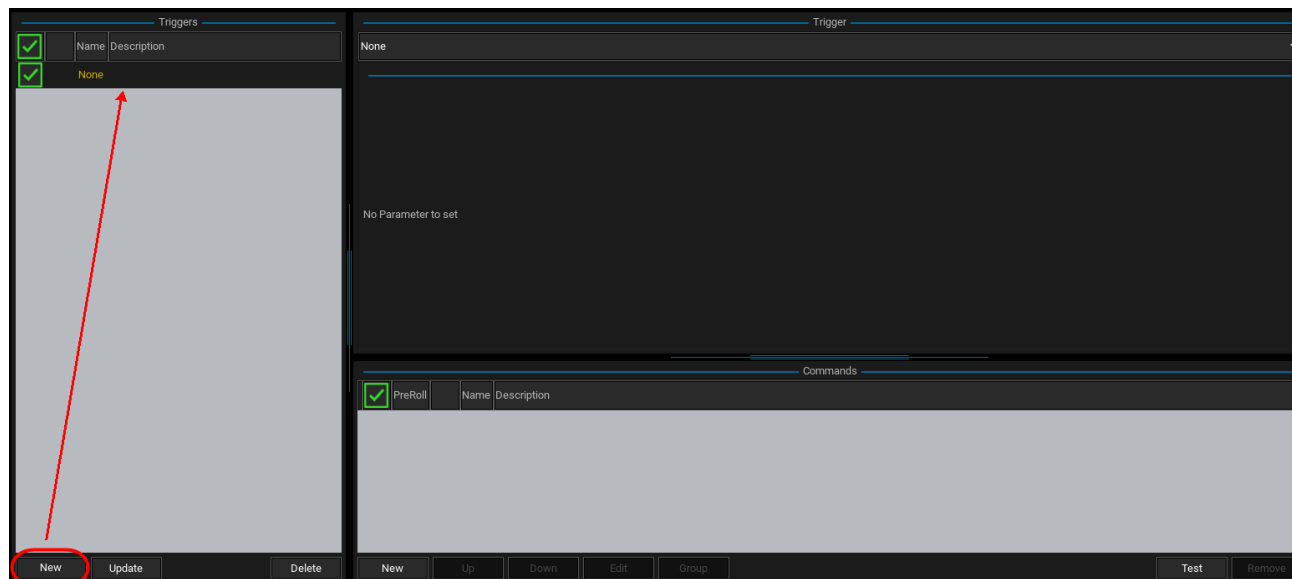
On the left you will see all the **Triggers** which have been defined. In our example, we have three triggers.

On the right you will see the details of the selected **Trigger** and its **Commands**. In our example, a **MIDI Note On Message** will be executed when the **Main Level** of **INP 1** rises above **0dB**.

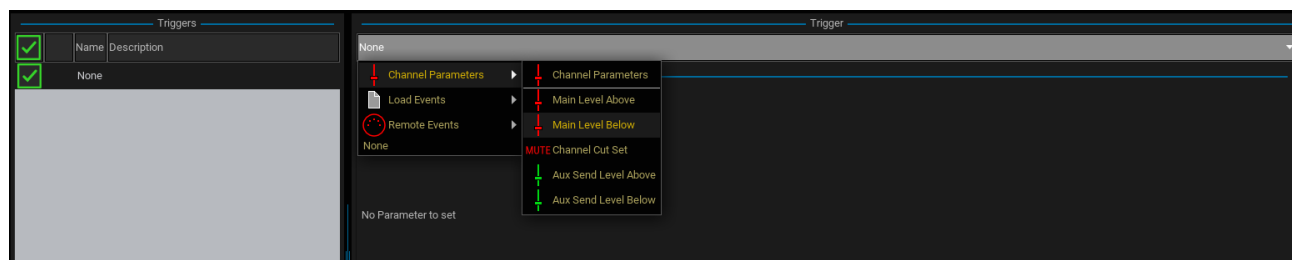
### 20.4.2 Programming a Trigger

To prepare a simple trigger:

1. Click on **New** to create a new "empty" trigger - an entry is added to the **Triggers** list (on the left of the display):



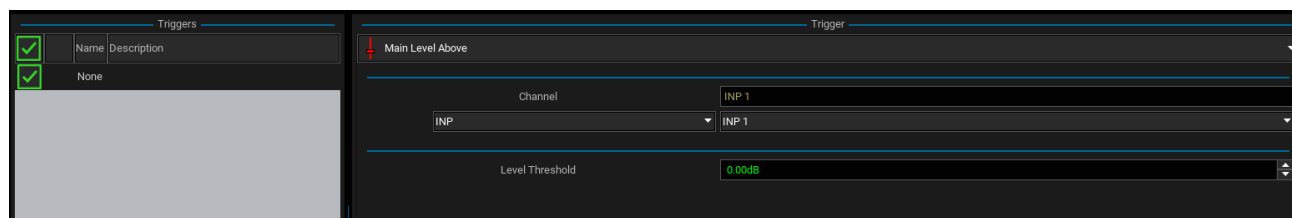
2. Click on the drop-down **Trigger** menu to assign the input trigger. The system supports a wide variety of input triggers, and so you will see the following categories:



- **Channel Parameters** - specific channel events (e.g. main fader level above/below, channel cut set, aux send level above/below).
- **Load Events** - such as a snapshot load.
- **Remote Events** - such as a GPI, incoming timecode position passed or MIDI message.

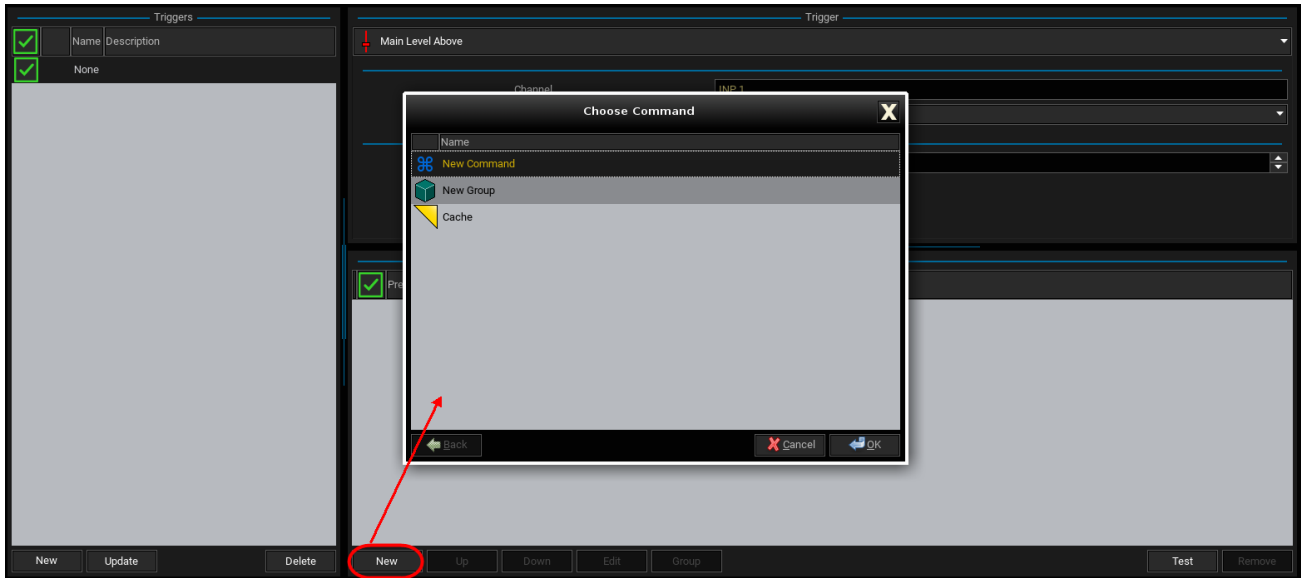
3. Select a category (e.g. **Channel Parameters**), an input trigger (e.g. **Main Level Above**) and then define its parameters.

For example, the trigger below will become active when the **Main Level** of **INP 1** rises above **0dB**:



Next define the **Commands** which will be executed when the trigger becomes active:

4. Click on **New** to open the "Choose Command" window:



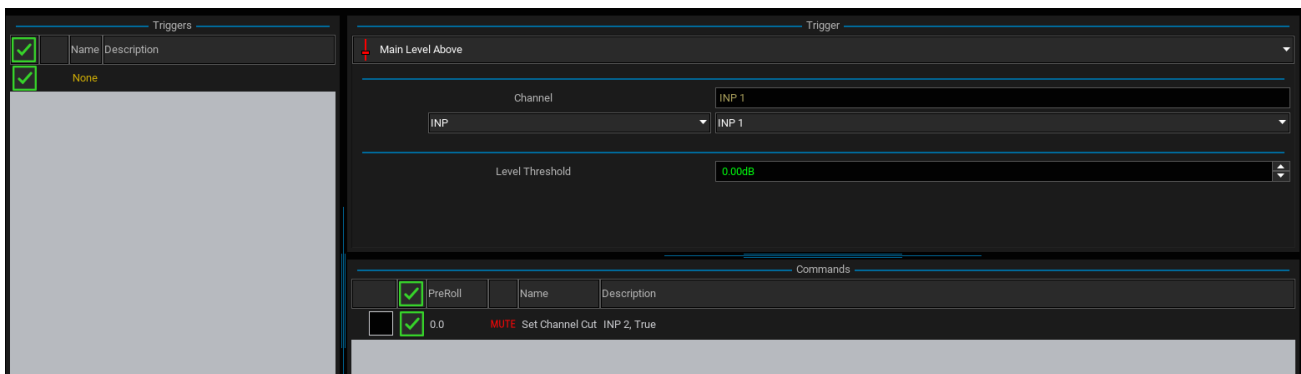
5. To assign a single command, select **New Command**. (Alternatively, you can use **New Group** to create a [group](#) of commands, or **Cache** to select commands previously stored to the [cache](#). Note that these functions operate in an identical manner to the Cuelist group and cache functions, and therefore are not explained separately here.)

When you select **New Command**, you will see the following categories:

- **Channel Parameters** - specific channel events (e.g. main fader level above/below, channel cut set, aux send level above/below).
- **Load Events** - such as a channel preset, snapshot, iso set, oversnap or fade snapshot.
- **Global Operations** - such as clearing all iso sets.
- **Remote Events** - such as a GPO or MIDI message.

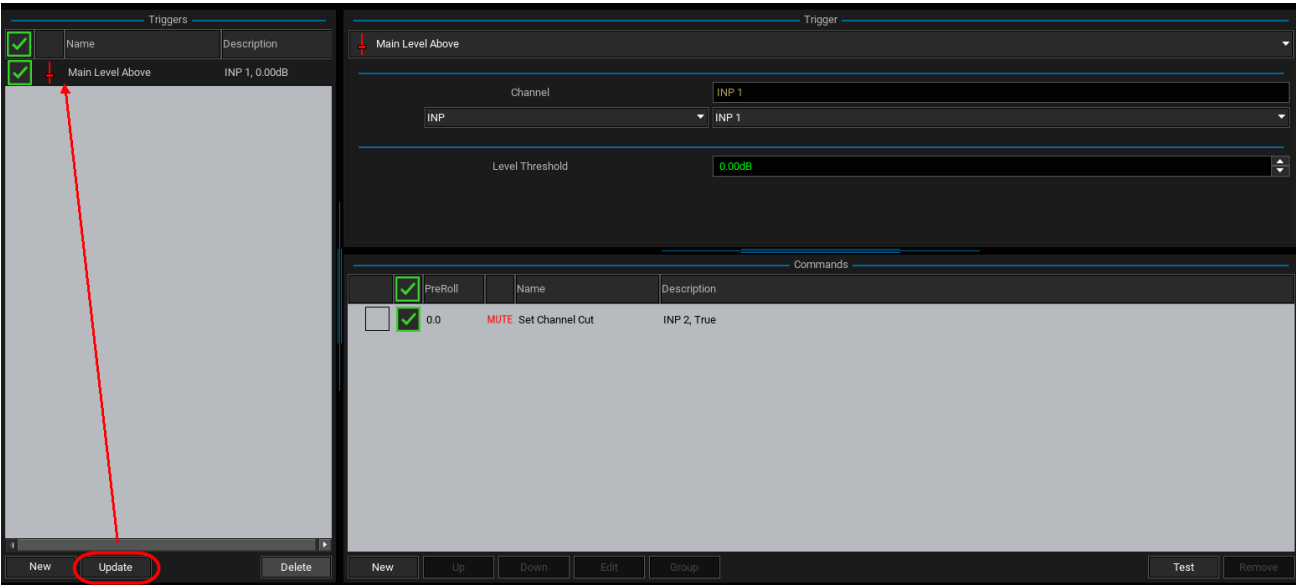
6. Select a category (e.g. **Channel Parameters**), a command (e.g. **Set Channel Cut**) and then define its parameters.

In our example below, the **Channel Cut** for **INP 2** will become active:



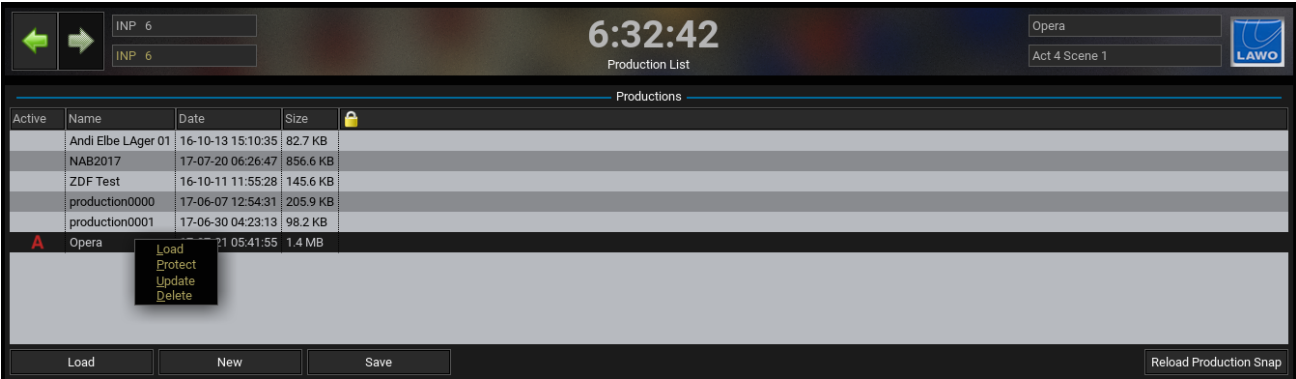
# 20. System Configuration

7. Repeat steps 5 and 6 if you wish to execute more commands.
8. Having prepared the input **Trigger** AND all your **Commands**, click on **Update** - this will write all the assignments into the selected Trigger (on the left of the display), and you will see its **Name** and **Description** update accordingly:



Note that you **MUST** perform this step to save your assignments.

9. Then either [update](#) (or [save](#)) the production:

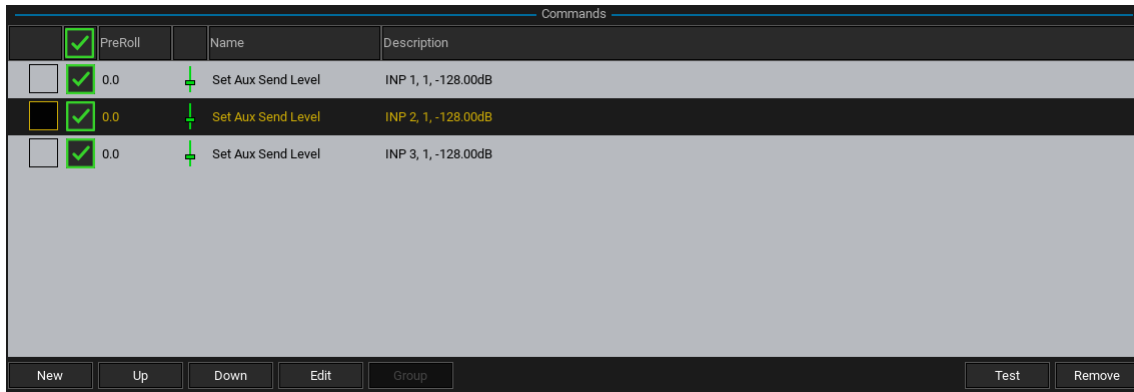


You can now repeat steps 1 to 8 to create more triggers as you wish.

Note that you **MUST** perform steps 8 and 9 in order to save any changes, as Command Triggers are only written onto the user data flashcard when you update (or save) a production.

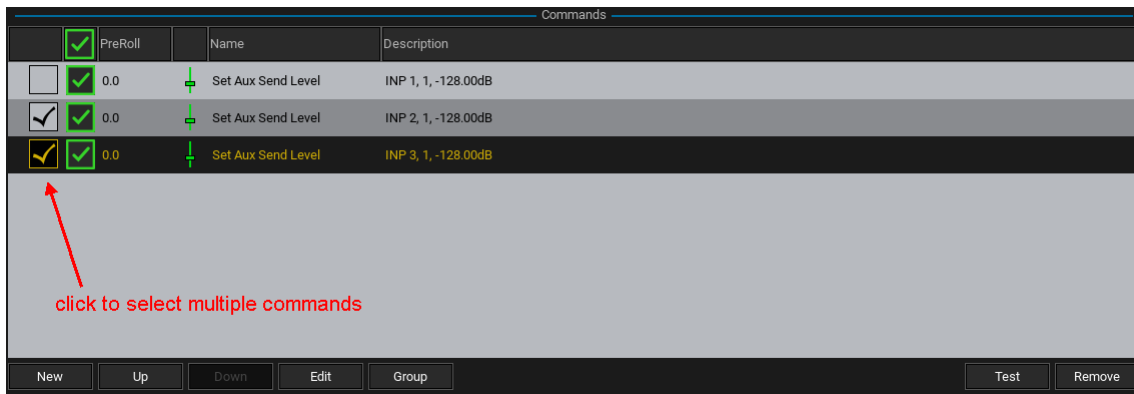
### 20.4.3 Managing Commands

If you have assigned several commands to a trigger, then they can be managed as follows:



1. To remove a command, select it (from the **Commands** list), and click on **Remove**.

Note that you can select multiple commands and remove them in one operation by using the select tick boxes. However, there is no level of confirmation, and so you should use this feature with caution!



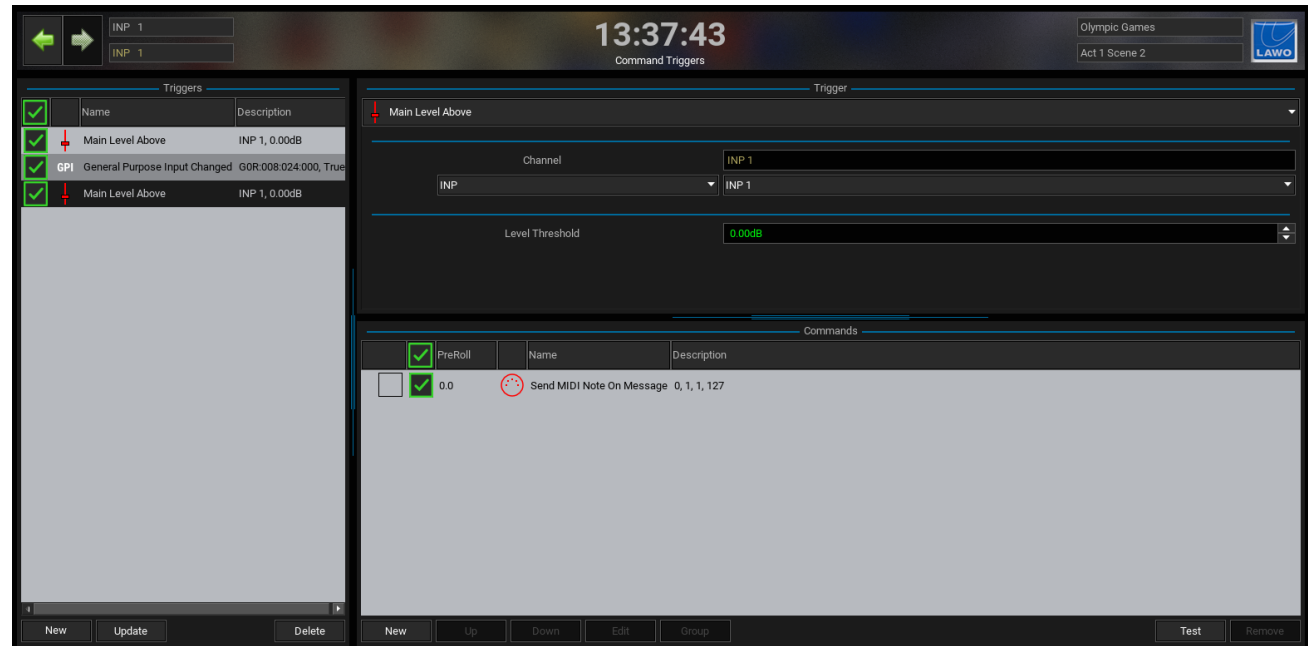
2. To test the function of a command, select it and click on **Test** - the command will be executed.
3. To change the function of a command, select it and click on **Edit** - the [Choose Command](#) window appears, allowing you to assign a different command.
4. To change the order of commands, select the entry you wish to move. Then click on either the **Up** or **Down** button to move the selected command up or down the list.

Note that, depending on the type of command, the order can be important. For example, if a specific channel parameter is placed after a load snapshot, then this may be reset by the values stored in the snapshot!

5. To delay the start of a command, enter a value into the **PreRoll** field (in seconds).
6. To create a group of commands, select multiple events using the select tickboxes (as shown above), and click on **Group**. Note that this function works in an identical manner to the Cuelist Output Event grouping. See [Using Groups](#) for details.

## 20.4.4 Managing Triggers

All the **Triggers** which have been created are listed on the left of the display:



Note that **Triggers** cannot be renamed, as the **Name** field show the system name (e.g. **Main Level Above**, **General Purpose Input Changed**, etc.).

Use the buttons at the bottom of this area to:

- **New** - adds a new "empty" trigger.
- **Update** - overwrites the selected trigger with the contents of the **Trigger** and **Commands** areas.
- **Delete** - deletes the selected trigger.

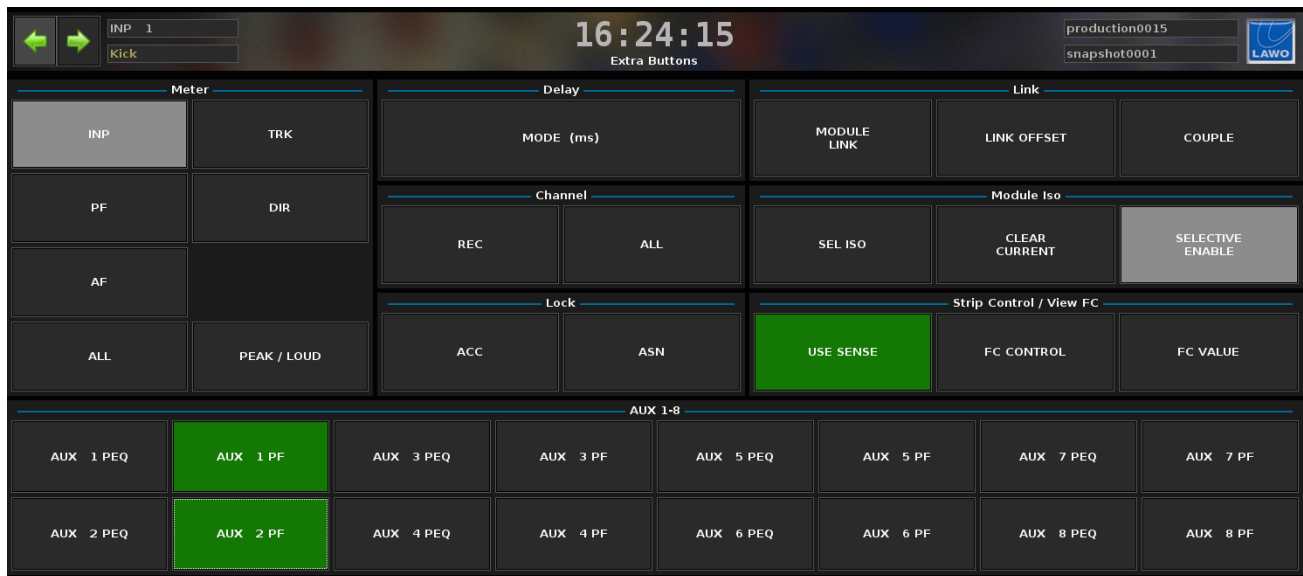
## 20.5 The Extra Buttons Display

The **Extra Buttons** display contains touch-screen functions which you can only need from time to time. Most functions are also duplicated on front panel buttons; they are included as screen buttons for compatibility with the mc<sup>2</sup>36 and 56.

There are several ways to access the display:

1. From the [Page menu](#) – select **Pages -> Extra Buttons**.
2. From the Central GUI - select **X-TRA BUTTONS** (above METERING) on the [Main display](#):
3. From a [CENTRAL USER BUTTON](#).

*Extra Buttons display*



Each function is described in detail elsewhere in this manual, so please follow the links for full details:

- **Meter** – selects the meter [pick-up point](#) for the channel in access.
- **Delay MODE** – cycles the [delay](#) mode for the channel in access between milliseconds, frames and meters.
- **Channel REC and ALL** – global send/return switching for [monitor channels](#).
- **Lock ACC** - protects the [channel in access](#).
- **Lock ASN** - locks the [STRIP ASSIGNMENT](#) and [BUS ASSIGNMENT](#) buttons.
- **Link** – used to create [link groups](#) and [coupling](#).
- **Module Iso** – these buttons allow you to [isolate](#) different channel modules from a snapshot recall.
- **Strip Control/View FC** – sets whether the Free Control displays on the fader strips show the control functions (e.g. Aux 5), values (e.g. +4dB) or follow the touch-sense (control/value).
- **Aux 1-8** – changes the aux send [pickup point](#). Eight aux sends are displayed at a time, and follow the front panel **AUX 1..8**, **AUX 9..16**, **AUX 17..24** and **AUX 25..32** buttons.

Note that, in Version 5.8 software, the **Image style**, **Pan Flat** and **EQ type** buttons have been removed from the **Extra Buttons** page (to simplify the display). These functions can be selected from the relevant areas of the [Main Display](#).



## 21. mxGUI

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This chapter describes how to install and operate mxGUI.

Topics include:

- [Introduction](#)
- [Prerequisites](#)
- [Installation Procedure](#)
- [Getting Started](#)
- [Online Operation](#)
- [Offline Setup](#)
- [The File Transfer Display](#)
- [The Strip Assign Display](#)
- [The Access/Assign Window](#)
- [mxUpdater](#)

## 21.1 Introduction

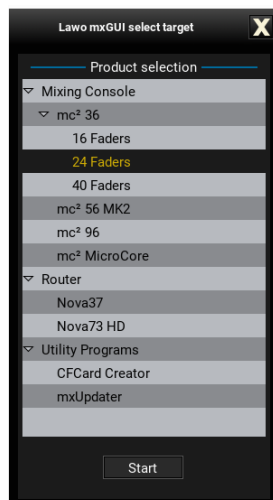
**mxGUI** (Matrix GUI) is a software program which runs on an external computer to provide offline setup or remote operation of any mc<sup>2</sup> or Nova system:

- **Offline Setup** - productions, snapshots, cuelists, mixes and presets can be prepared and stored on the mxGUI computer, and then transferred to the system at a later date; thus saving valuable setup time before a show.
- **Remote Operation** - mxGUI can run online by connecting the mxGUI computer to the mc<sup>2</sup>/Nova control system (via Ethernet). This provides additional screen displays or remote operation for a second engineer.

mxGUI works by running an emulation of the mc<sup>2</sup>/Nova control system on a virtual Linux machine inside your host operating system. This means that when you first start mxGUI, the computer first boots the virtual machine (provided by **VirtualBox**), and then launches mxGUI.

At the launch window, you can select any mc<sup>2</sup> or Nova emulation; the correct SCREEN CONTROL displays for your system will then open. This enables the creation of a complete production offline, including signal routing, labels, fader strip assignments, processing settings, snapshots, cuelists, etc. Note that if you are running in Nova73 or Nova37 mode, then only the relevant pages are accessible.

mxGUI Launch Window



mxGUI emulating a 24-fader mc<sup>2</sup>36



Note that the options available from the mxGUI launch window can be edited when you install the software, see [Editing the Product Options](#).

From the launch window you can also start Utility Programs such as **mxUpdater** or the **CFCard Creator**. [mxUpdater](#) is described later. For details on creating CF Cards, please refer to your Technical Manual.

## 21.2 Prerequisites

Please check the following before installing mxGUI:

### Compatibility

mxGUI can connect to any mc<sup>2</sup> or Nova system running Version 4.6 software or later.

It is mandatory that the system software version matches that of mxGUI to ensure proper functionality. All Lawo products use a consistent software release numbering system to indicate compatibility. In each case, the first three digits of the software versions *must* match.

So, for example, to connect to a system running **5.14.0.0**, you will need to run mxGUI **5.14.0.x**.

You can check your system's software version from the "[Global Options](#)" in the **System Settings** display, and the mxGUI version from the ? main menu.

### Host Computer System Requirements

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

#### Windows PC:

- **Hardware:** 1.5 GHz (required for VirtualBox).
- **Operating System:** Windows 7, 8, 8.1 or 10 (32-bit and 64-bit)
- **RAM:** 2GB.
- **Hard Disc:** minimum 200 MB free space.
- **Operation:** Keyboard and mouse.
- **Interface:** Ethernet 10/100Mbit.

#### MAC:

- **Hardware:** 1.5 GHz (required for VirtualBox).
- **Operating System:** MAC OS X 10.6 (Snow Leopard) or higher.
- **RAM:** 2GB.
- **Hard Disc:** minimum 200 MB free space.
- **Operation:** Keyboard and mouse.
- **Interface:** Ethernet 10/100Mbit.

## 21.3 Installation

To install mxGUI, you will need a pre-installed **VirtualBox** (version **4.3.18** or later) and the correct **mxGUI-X-X-X.ova** file.

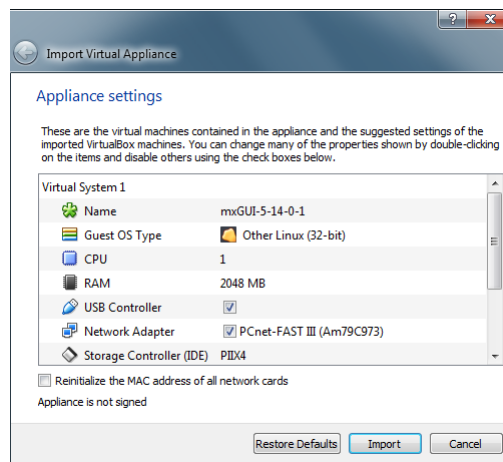
**VirtualBox** (from Oracle) is free to download from [www.virtualbox.org](http://www.virtualbox.org). Please download and run the correct installer for your Operating System. Then follow the on-screen instructions. During the installation process, you can choose to create a desktop icon for the **Oracle VM VirtualBox Manager** - this will make it easier to open the **VirtualBox Manager** later (required for configuration).

Lawo's **mxGUI** is freely available from the **Download-Center** at [www.lawo.com](http://www.lawo.com) (after **Login**). From release **5.2.0.x**, there is one mxGUI installation file (.ova) for all Operating Systems (Windows, Mac, etc.) The .ova file creates a virtual machine appliance which runs within **VirtualBox**. From release **5.2.0.x** onwards, you can install multiple versions of mxGUI without having to delete your older version.

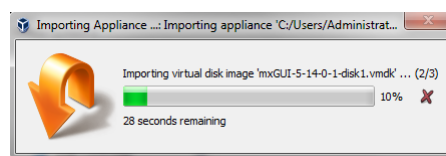
Note that for Version **5.14.0.x**, there is a separate mxGUI release for the mc<sup>2</sup>66 MKII. This should be installed separately using the dedicated **mxGUI-5-14-0-X\_mc66.ova** file. You can install both the generic and mc<sup>2</sup>66 appliances on the same computer. Then choose the correct appliance to [start](#) the software.

Once you have installed **VirtualBox**, proceed as follows:

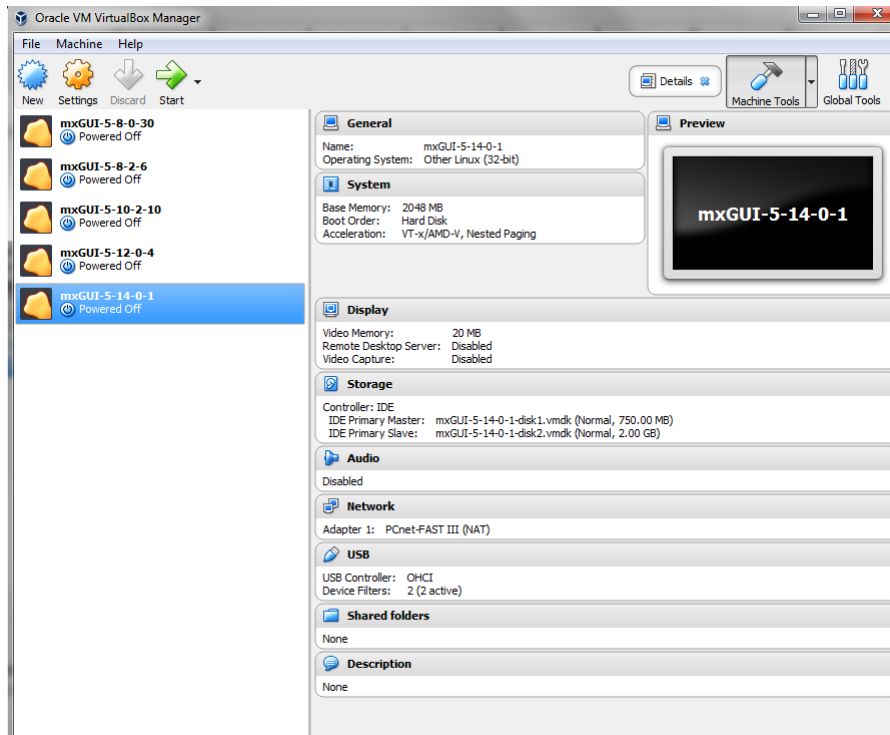
1. Double-click on the **mxGUI-x-x-x.ova** file - the **Oracle VM VirtualBox Manager** automatically opens along with the "Import Virtual Appliance" window and its suggested settings:



2. Select **Import** to import the new mxGUI appliance - the process can take a few seconds:



Once complete, **mxGUI-x-x-x-x** is added to the list of virtual machines (on the left of the display). Click on the machine to show the **Details** of its settings. If you have more than one **mxGUI** listed (due to an older installation), take care to select the correct version:

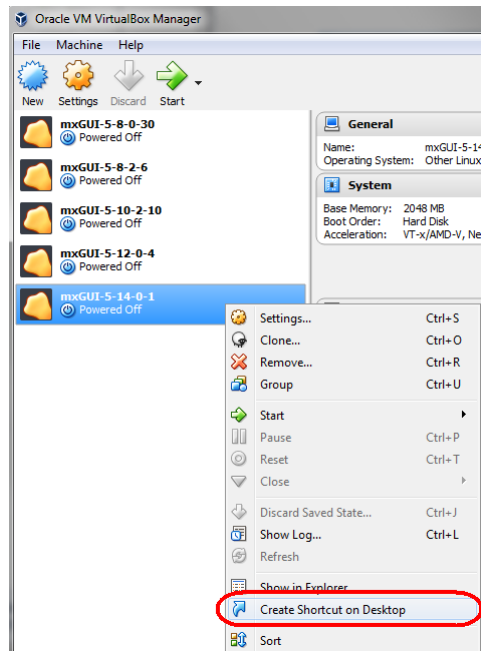


3. At this stage, it is a good idea to configure the [Shared Folders](#) and the [Host-only](#) Network Adaptor if required.

Note that if you have been running mxGUI V5.6 (or older), then you must create new [Shared Folders](#), otherwise the Virtual Machine will crash.

If not, you can continue as follows.

4. Right-click on the **mxGUI-x-x-x-x** virtual machine and select **Create Shortcut on Desktop** to add an alias to your desktop (to quickly start mxGUI):



5. Now close the **Oracle VM VirtualBox Manager**, and [start mxGUI x.x.x.x](#) from the desktop icon. If you need to re-open the **VirtualBox Manager**, then you will find it in your list of programs (or Applications).

## 21.3.1 Shared Folders

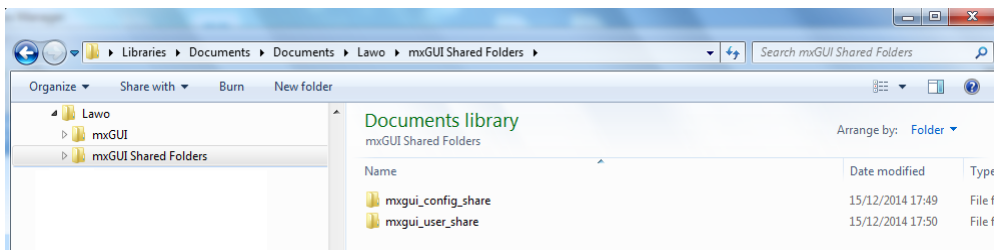
From release **5-2-0-0**, mxGUI supports two new Shared Folders: **mxgui\_user\_share** and **mxgui\_config\_share**.

The **mxgui\_user\_share** folder appears in both mxGUI and your host operating system. You will need this folder if you wish to copy settings from mxGUI to your computer (e.g. onto USB, email, etc.) or vice versa. The folder is identical to the "mxgui\_shares -> shared folder" in previous mxGUI releases.

The **mxgui\_config\_share** folder stores the complete "Local Control System" for the mxGUI computer including the system configuration (i.e. the hardware definition, Signal List, etc.) From release **5-2-0-0** onwards, you can use this folder to share the same configuration data between different mxGUI versions. The folder is identical to the "mxgui\_shares -> config" folder in previous mxGUI releases.

In order to access the folders from within mxGUI, you must define their file paths in the **Oracle VM VirtualBox Manager**.

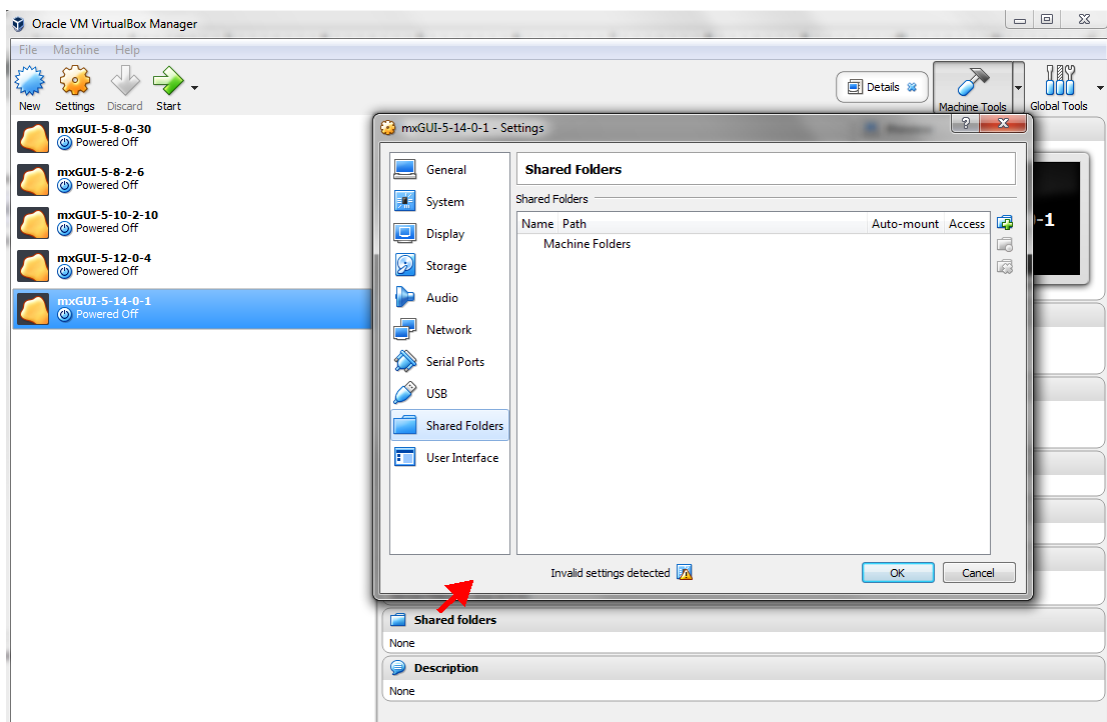
1. If this a new mxGUI installation, then first create two folders in your Operating System, named **mxgui\_config\_share** and **mxgui\_user\_share** - you can choose any location on your computer, but the file paths *must* define the actual folder locations and not a short cut. For example:



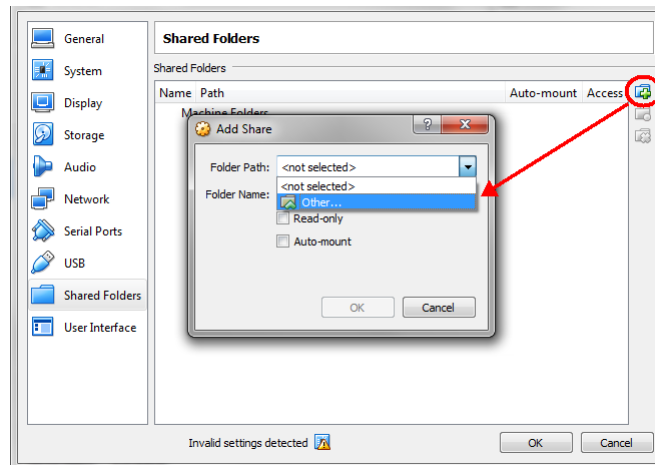
2. Now open the **Oracle VM VirtualBox Manager** and select the correct mxGUI virtual machine from the list on the left.

The mxGUI virtual machine must be powered off in order to create the folder links. If the machine is shown as "Powered On", then [close](#) mxGUI before continuing to the next step.

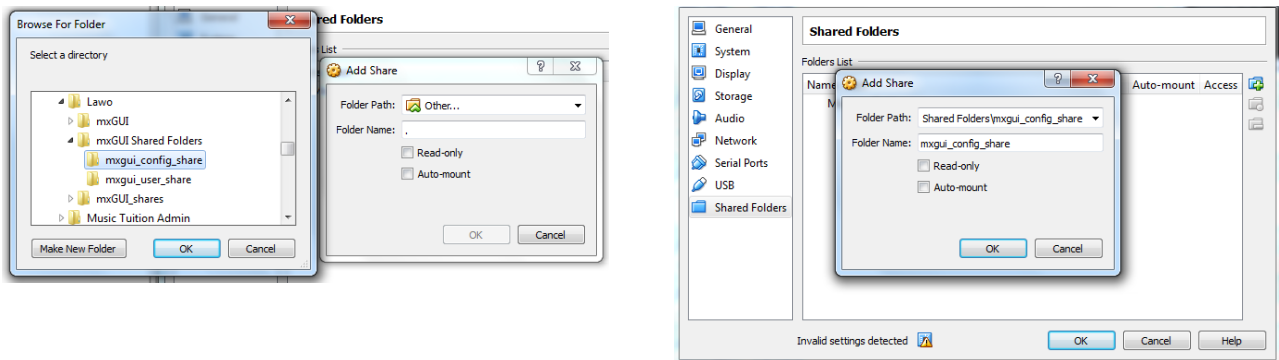
3. Click on **Shared folders** (in the **Details** area) to open the **Shared Folder Settings**:



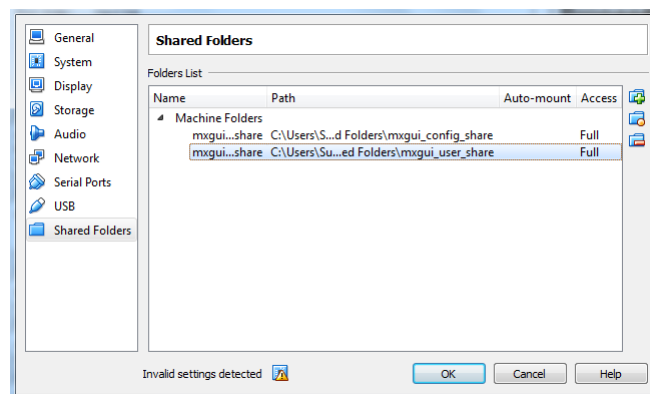
4. Select the **+** icon (add new shared folder) to define a new folder location - click in the **Folder Name** field, choose **Other**:



5. Then select the **mxgui\_config\_share** folder which you created in step 1, and click **OK** twice:



6. Repeat steps 4 and 5 to define the file path for the **mxgui\_user\_share** folder - when complete you should have two Shared Folder entries:



7. Select **OK** to confirm the changes.

If you now close the **Oracle VM VirtualBox Manager**, and [start mxGUI](#), you will be able to access the contents of the **mxgui\_user\_share** folder via the **Productions -> File Transfer** display.

In addition, all data stored by mxGUI on its "Local Control System" is saved into the **mxgui\_config\_share** folder.

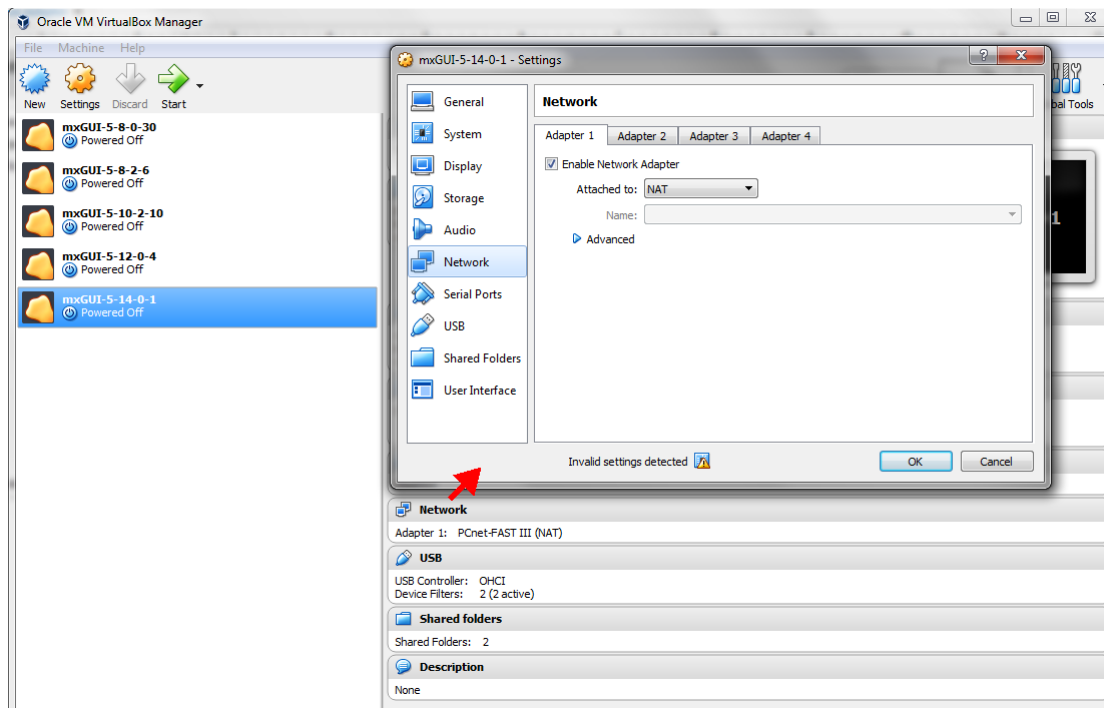
To share either folder with another version of mxGUI, repeat steps 2 to 7 to assign the same folder to the alternate mxGUI release.



### 21.3.2 Host-only Network Adaptor

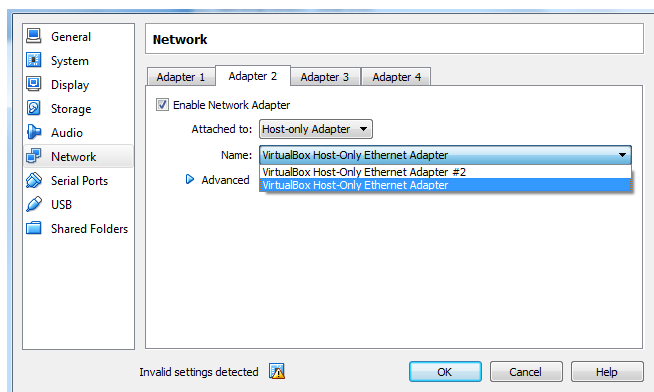
From release **5-2-0-0**, if you wish to make an external connection to mxGUI from another application (such as AdminHD or Telnet), then you will need to add a "host-only" network adaptor as follows:

1. Open the **Oracle VM VirtualBox Manager** and select the correct mxGUI virtual machine from the list on the left.
2. Click on **Network** (in the **Details** area) to open the **Network** Adaptor Settings:

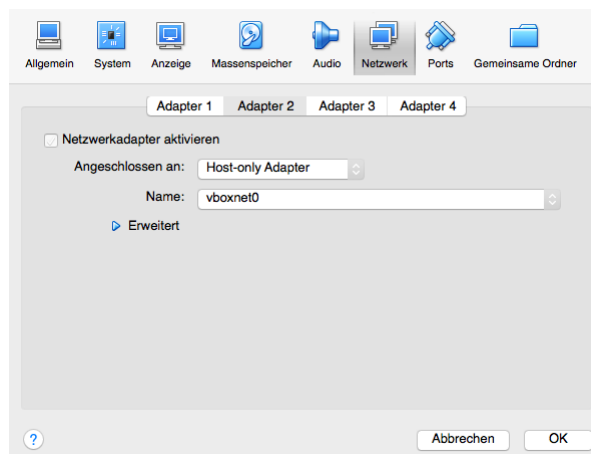


3. Leave the **Adaptor 1** settings untouched, and select the **Adaptor 2** tab - tick the Enable box, and then choose the following option from the drop-down menus. Note that the naming varies between Windows and OSX/Linux:

*Windows:*



*OSX or Linux:*



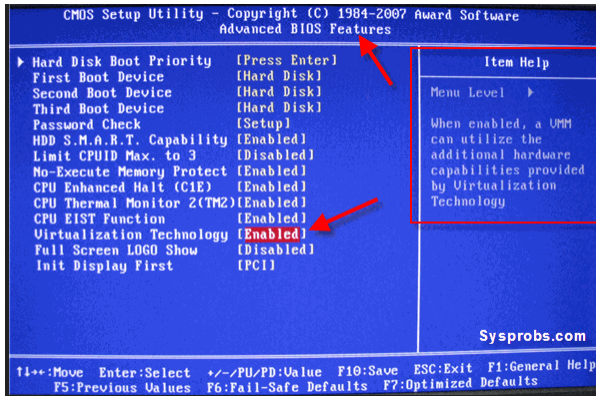
4. Select **OK** to confirm the changes.

If you now close the **Oracle VM VirtualBox Manager**, and [start mxGUI](#), you will be able to open a remote connection to mxGUI using its default IP address: 192.168.56.101

### 21.3.3 BIOS Setup (for Windows PC)

In order for mxGUI to [start](#) correctly (when running on a host PC), virtualization must be activated in the PC's BIOS system.

1. Consult your computer's documentation for details on how to enter the BIOS setup.
2. Then look for the Virtualization option and set it to **Enabled**. The screenshots below show two example systems:



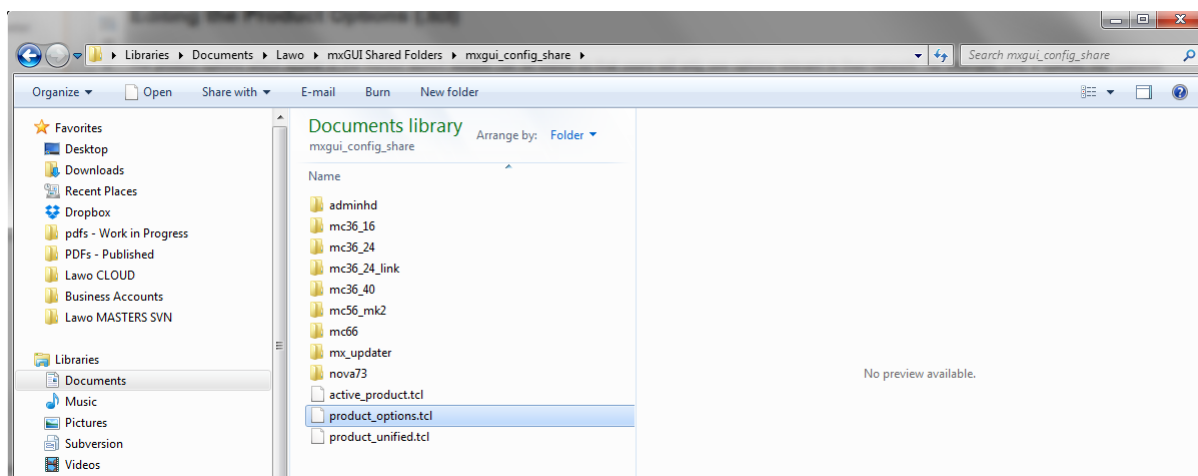
3. Remember to save any changes and then exit the BIOS.
4. Now restart the PC and then start mxGUI.

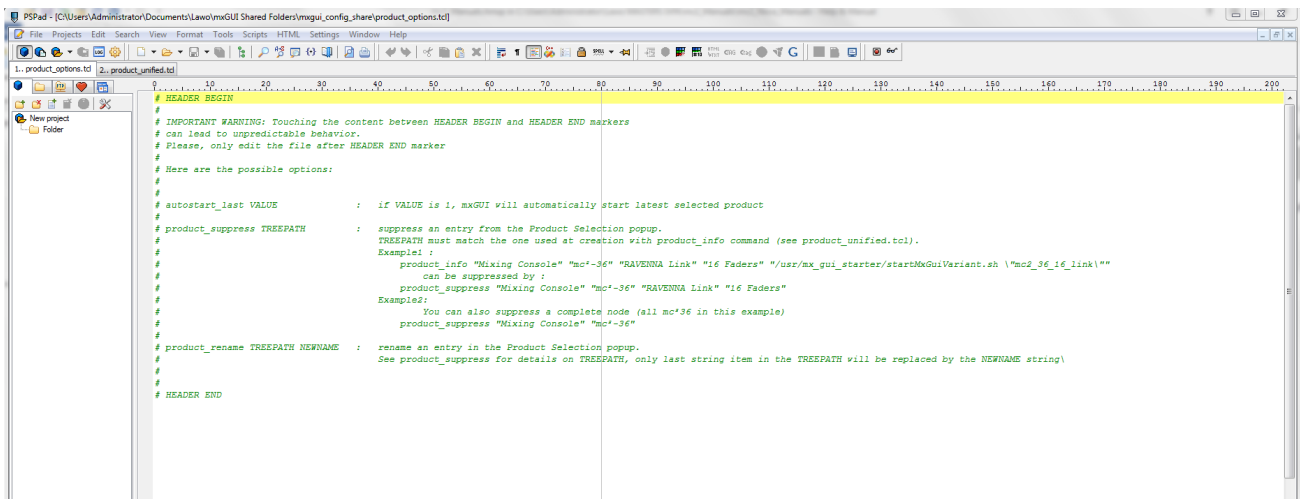
### 21.3.4 Editing the Product Options (.tcl)

The product options which appear in the mxGUI [launch window](#) can be edited so that users will only see options relevant to their network - for example, only a specific mc<sup>2</sup> console.

The options are read from the "product\_options.tcl" file located in the "mxGUI\_config\_share" folder. Therefore, to reduce the options from a standard install, edit and save the file (as shown below), and then restart mxGUI. You can use any suitable "tcl" file editor to edit the file.

*Default File Location*

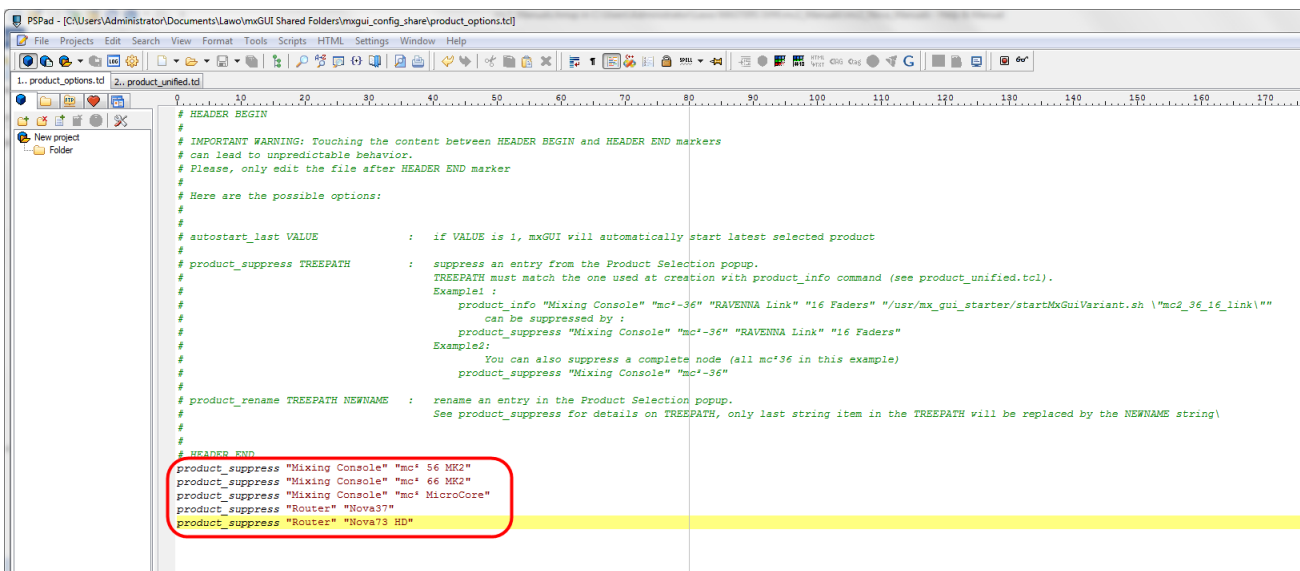


*"product\_options.tcl" after a standard install*


```

# PSPad - [C:\Users\Administrator\Documents\Lawo\mxGUI Shared Folders\mxgui_config_share\product_options.tcl]
#
# IMPORTANT WARNING: Touching the content between HEADER BEGIN and HEADER END markers
# can lead to unpredictable behavior.
# Please, only edit the file after HEADER END marker
#
# Here are the possible options:
#
# autostart_last VALUE      : if VALUE is 1, mxGUI will automatically start latest selected product
#
# product_suppress TREEPATH : suppress an entry from the Product Selection popup.
#                             TREEPATH must match the one used at creation with product_info command (see product_unified.tcl).
#                             Example1:
#                             product_info "Mixing Console" "mc²-36" "RAVENNA Link" "16 Faders" "/usr/mx_gui_starter/startMxGuiVariant.sh \"mc2_36_16_link\""
#                             can be suppressed by:
#                             product_suppress "Mixing Console" "mc²-36" "RAVENNA Link" "16 Faders"
#                             Example2:
#                             You can also suppress a complete node (all mc²36 in this example)
#                             product_suppress "Mixing Console" "mc²-36"
#
# product_rename TREEPATH NEWNAME : rename an entry in the Product Selection popup.
#                                   See product_suppress for details on TREEPATH, only last string item in the TREEPATH will be replaced by the NEWNAME string\
#
# HEADER END

```

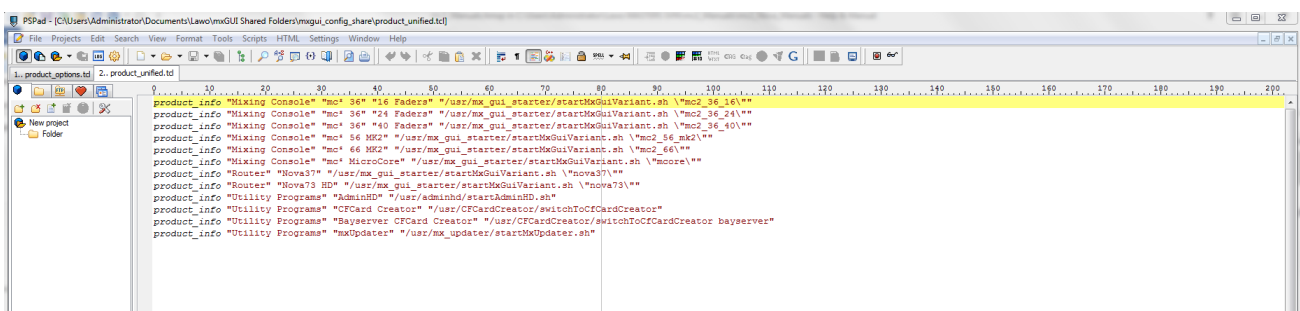
*"product\_options.tcl" - edited to remove all options except mc²36*


```

# PSPad - [C:\Users\Administrator\Documents\Lawo\mxGUI Shared Folders\mxgui_config_share\product_options.tcl]
#
# IMPORTANT WARNING: Touching the content between HEADER BEGIN and HEADER END markers
# can lead to unpredictable behavior.
# Please, only edit the file after HEADER END marker
#
# Here are the possible options:
#
# autostart_last VALUE      : if VALUE is 1, mxGUI will automatically start latest selected product
#
# product_suppress TREEPATH : suppress an entry from the Product Selection popup.
#                             TREEPATH must match the one used at creation with product_info command (see product_unified.tcl).
#                             Example1:
#                             product_info "Mixing Console" "mc²-36" "RAVENNA Link" "16 Faders" "/usr/mx_gui_starter/startMxGuiVariant.sh \"mc2_36_16_link\""
#                             can be suppressed by:
#                             product_suppress "Mixing Console" "mc²-36" "RAVENNA Link" "16 Faders"
#                             Example2:
#                             You can also suppress a complete node (all mc²36 in this example)
#                             product_suppress "Mixing Console" "mc²-36"
#
# product_rename TREEPATH NEWNAME : rename an entry in the Product Selection popup.
#                                   See product_suppress for details on TREEPATH, only last string item in the TREEPATH will be replaced by the NEWNAME string\
#
# HEADER END
product_suppress "Mixing Console" "mc² 56 MK2"
product_suppress "Mixing Console" "mc² 66 MK2"
product_suppress "Mixing Console" "mc² MicroCore"
product_suppress "Router" "Nova37"
product_suppress "Router" "Nova73 HD"

```

Make sure that you add the live entries after the # HEADER END. The correct syntax for each product can be found in the "product\_unified.tcl" file:



```

# PSPad - [C:\Users\Administrator\Documents\Lawo\mxGUI Shared Folders\mxgui_config_share\product_unified.tcl]
#
# IMPORTANT WARNING: Touching the content between HEADER BEGIN and HEADER END markers
# can lead to unpredictable behavior.
# Please, only edit the file after HEADER END marker
#
# Here are the possible options:
#
# autostart_last VALUE      : if VALUE is 1, mxGUI will automatically start latest selected product
#
# product_suppress TREEPATH : suppress an entry from the Product Selection popup.
#                             TREEPATH must match the one used at creation with product_info command (see product_unified.tcl).
#                             Example1:
#                             product_info "Mixing Console" "mc²-36" "RAVENNA Link" "16 Faders" "/usr/mx_gui_starter/startMxGuiVariant.sh \"mc2_36_16_link\""
#                             can be suppressed by:
#                             product_suppress "Mixing Console" "mc²-36" "RAVENNA Link" "16 Faders"
#                             Example2:
#                             You can also suppress a complete node (all mc²36 in this example)
#                             product_suppress "Mixing Console" "mc²-36"
#
# product_rename TREEPATH NEWNAME : rename an entry in the Product Selection popup.
#                                   See product_suppress for details on TREEPATH, only last string item in the TREEPATH will be replaced by the NEWNAME string\
#
# HEADER END
product_info "Mixing Console" "mc² 36" "16 Faders" "/usr/mx_gui_starter/startMxGuiVariant.sh \"mc2_36_16\""
product_info "Mixing Console" "mc² 36" "24 Faders" "/usr/mx_gui_starter/startMxGuiVariant.sh \"mc2_36_24\""
product_info "Mixing Console" "mc² 36" "40 Faders" "/usr/mx_gui_starter/startMxGuiVariant.sh \"mc2_36_40\""
product_info "Mixing Console" "mc² 56 MK2" "/usr/mx_gui_starter/startMxGuiVariant.sh \"mc2_56_mk2\""
product_info "Mixing Console" "mc² 66 MK2" "/usr/mx_gui_starter/startMxGuiVariant.sh \"mc2_66\""
product_info "Mixing Console" "mc² MicroCore" "/usr/mx_gui_starter/startMxGuiVariant.sh \"microcore\""
product_info "Router" "Nova37" "/usr/mx_gui_starter/startMxGuiVariant.sh \"nova37\""
product_info "Router" "Nova73 HD" "/usr/mx_gui_starter/startMxGuiVariant.sh \"nova73\""
product_info "Utility Programs" "AdminHD" "/usr/adminhd/startAdminHD.sh"
product_info "Utility Programs" "CFCard Creator" "/usr/CFCardCreator/switchToCFCardCreator"
product_info "Utility Programs" "Bayserver CFCard Creator" "/usr/CFCardCreator/switchToCFCardCreator bayserver"
product_info "Utility Programs" "mxUpdater" "/usr/mx_updater/startMxUpdater.sh"

```

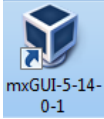
## 21.4 Getting Started

This section looks at opening and closing mxGUI, and its basic operating principles.

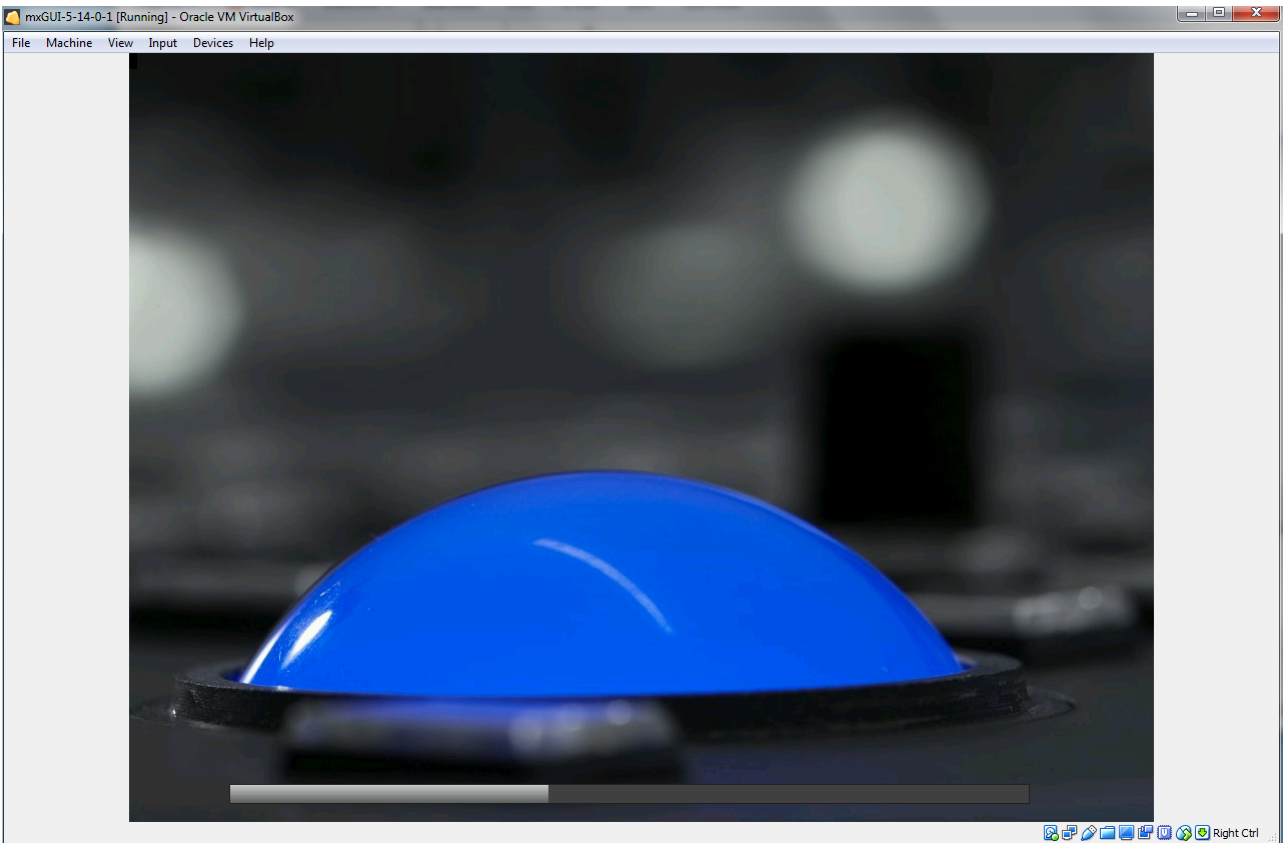
## 21.4.1 Starting mxGUI

mxGUI runs on a virtual Linux machine inside your host operating system. Therefore, when you first start mxGUI, the system boots the virtual machine (provided by **VirtualBox**) and then launches the application:

1. Click on the **mxGUI-VX-X-X.x** desktop icon to start the whole procedure:

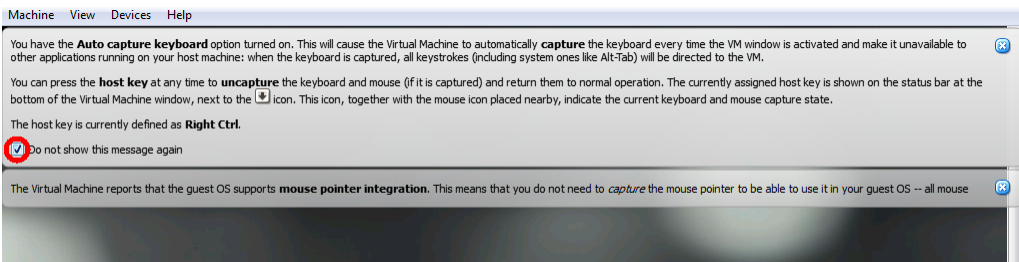


This automatically launches the **Oracle VM VirtualBox** and the virtual machine starts to boot. Note that the boot-up process can take some time - the progress is indicated in the horizontal bar at the bottom of the **VirtualBox** window:

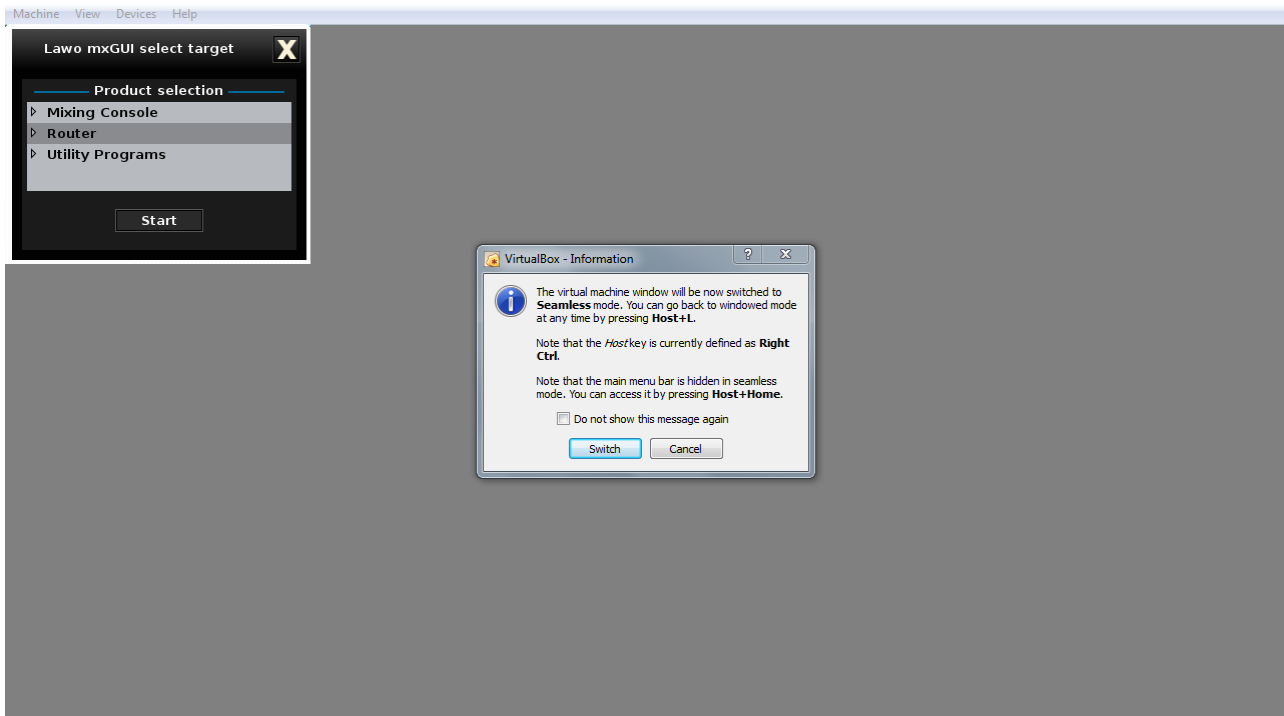


During the first boot-up, **VirtualBox** presents some messages and options. Note that these vary depending on your host OS, and will not appear if they have already been suppressed for future startups. The examples below are from a computer running Windows 7:

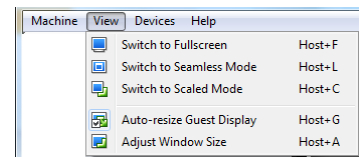
- If the following (or similar) messages appear, then please check the option to suppress each message on future startups, and click **X** to close each message. The messages are related to the interaction between your computer's KVM interface and **VirtualBox**.



- When the following pop-up appears, click **Do not show this message again** (to suppress the pop-up on future startups) and select **Switch** - mxGUI will now be viewed in **Seamless** mode (recommended):



Note that you can choose different **VirtualBox** viewing modes: Fullscreen, Seamless, Scaled or normal. To change the mode, press **Host + L** (as instructed above) and select an option from the **View** menu. Either **Fullscreen** or **Seamless** view are recommended as these will scale the mxGUI operating window to fit your display - **Fullscreen** uses the full screen available; **Seamless** view allows you to scale the mxGUI operating window to fit alongside other applications.



Once the virtual machine has booted, you will see the mxGUI product launch window:



Click on the arrows to open the **Mixing Console** or **Router** options, and select the system you wish to emulate (see next page).

Alternatively, you can start one of the following **Utility Programs**:

- CFCard Creator** - used to create backup CFCards for the mc<sup>2</sup>/Nova control system.
- mxUpdater** - used to update the system software version (available from Version 5.8.2 onwards).

When emulating a system, it is important to select the correct option for the system you wish to connect to, as this ensures that *only* the features relevant to your product are available in the mxGUI displays. In the current release, the options are:

### Mixing Consoles

- mc<sup>2</sup> 36 -> 16, 24 or 40 Faders
- mc<sup>2</sup> 56 MK2
- mc<sup>2</sup> 96
- mc<sup>2</sup> Micro Core

### Routers:

- Nova37
- Nova73 HD

Note that for Version 5.14.0.x, there is a separate mxGUI release for the mc<sup>2</sup>66. Therefore, to open an emulation for a **mc<sup>2</sup>66 MK2** console, you will need to install and then open this appliance as described [earlier](#).

2. Select a system and click **Start** - the program loads its warm start data (the settings saved when mxGUI was last shutdown), and is ready to use once you see the **mxGUI** operating window:



If mxGUI fails to start correctly on a host PC, then please check that virtualization is active. See [BIOS Setup \(for Windows PC\)](#).

## 21.4.2 Closing mxGUI

To close mxGUI:

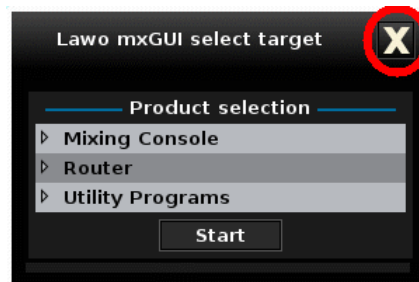
1. Either select **Application -> Quit** from the main menu bar, or click on the close icon at the top right of the display:



Either operation quits mxGUI and exits back to the [launch options](#). You can now re-launch mxGUI by selecting a product target.

When running offline, the latest settings are saved to the local control system's warm start data.

2. To close the virtual machine completely, click on the close icon at the top right of the "select target" window:



The **VirtualBox** window opens briefly while the virtual machine closes down. To re-start mxGUI (and the virtual machine), click on its desktop icon.



## 21.4.3 Online/Offline Status

The first time you start mxGUI, it opens in offline mode. (Once configured, you can use the [Reconnect](#) option to automatically start in online mode.) The online/offline status can be interrogated by hovering over the connection icon at the bottom right of the display:



### Offline

When offline, mxGUI is connected to the "local host". This means that data is being saved and loaded to/from the "Local Control System", i.e. on your computer.

If this is the first time you have started mxGUI, then your **Signal List**, **Productions**, **Snapshots**, etc. will bear no resemblance to the displays on your system. This is because your "Local Control System" is running from a default configuration.

The best solution is to transfer the complete configuration (and some productions) from your system to the mxgui computer.

If you don't have access to a system, and want to play around with the mxGUI interface, you can build a simple production using the default configuration installed by the mxGUI installer.

The default mxgui configuration is very basic, and provides limited tools for offline setup (as elements such as signals will not match those of your system).

### Online

When mxGUI operates online, the connection icon shows the IP address of the connected host - in our example, an mc<sup>2</sup>66 with an IP address = 192.168.102.65:



Any changes you make immediately affect the online system, and all data is saved and loaded to/from the host control system.

## 21.4.4 Operating Principles

The mxGUI operating window is virtually identical to the [Central GUI](#) on an mc<sup>2</sup> console, except for some additional menus, the name of the emulation and a "close" button (to close the current emulation).



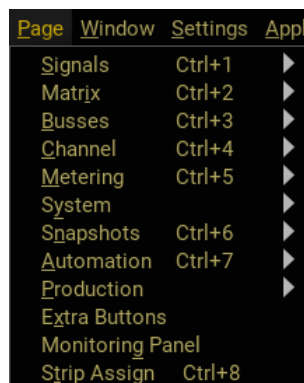
### mxGUI Menus

The main menus at the top of the window

- **Page** - opens the drop-down page menu (see Changing the GUI Display).
- **Window -> Access/Assign** - opens the 'Access/Assign' pop-up window. This mimics the console's ACCESS/ASSIGN control panel.
- **Settings -> Connection** - opens the 'Connection' pop-up window. This is used to connect to a real system in order to work online.
- **Application -> Quit** - closes the mxGUI application.
- **? -> Info** - shows the mxGUI release and system software versions, plus the Lawo support contact details.

### Changing the GUI Display

Click on the drop-down **Page** menu to access the same SCREEN CONTROL displays as on your mc<sup>2</sup> system: **Signal List**, **Signal Settings**, etc:



Or, press the "Hot Key" combination (e.g. Ctrl + 1) for faster access; each press will cycle through all the available pages.

You will find two displays which appear only within mxGUI (and not on the console):

## Adjusting Settings

Using the mouse and keyboard on your computer, you can:

- Left-click to enable a button or option.
- Right-click to reveal the context menu (if applicable).
- Left-click on a text field to [edit](#) a name.
- Click on the up/down arrows beside a parameter, or use the keyboard up/down arrow keys, to adjust the value.

You can use the mouse wheel (if you have one) to adjust a parameter value, or scroll up/down a list, once it is in focus.

## Keyboard Shortcuts

You can also use any of the [Keyboard Shortcuts](#) to speed up the page navigation and editing of parameters.

## 21.5 Online Operation

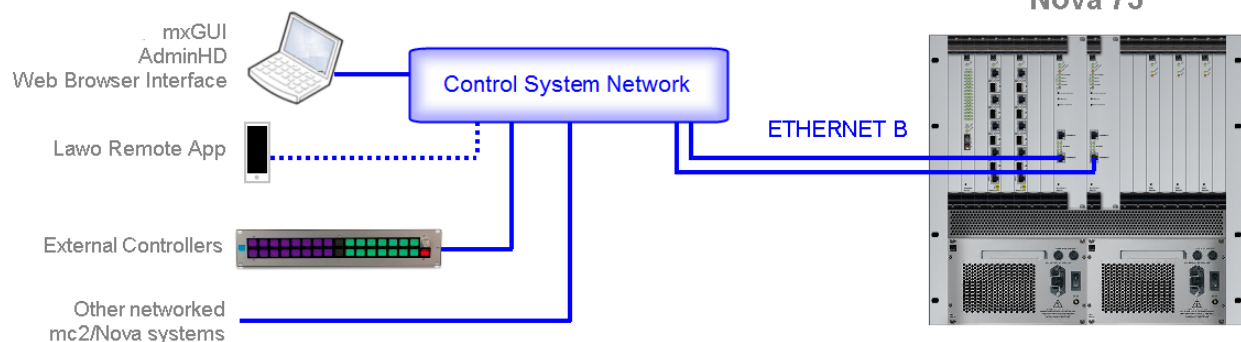
When operating online, the mxGUI computer talks to a real mc<sup>2</sup>/Nova system via its control system port. In this mode, mxGUI is simply acting as a remote control. You will see the same **Signal List**, **Productions** list, etc. as on the mc<sup>2</sup> system, and all data (productions, presets, configuration, etc.) is being saved and loaded to/from the host control system.

### 21.5.1 Network Connection

The mxGUI computer must connect to the mc<sup>2</sup>/Nova control system. Connections are made via TCP/IP Ethernet.

*Connection to Control System (via network switch)*

#### Remote Control Devices



In the example above, we are connecting to a mc<sup>2</sup>96 and, therefore, the **ETHERNET B** port on the Nova73 Router Module (MKII) should be used. To check the connector location when using other products, see [Control System Locations](#).

A single mxGUI computer can connect directly. However, it is more common to install a network switch. Depending on the number of network connections, one mc<sup>2</sup>/Nova system can support up to 16 clients.

**WARNING:** You must use a network switch and *NOT* a hub, and keep the Lawo network separate from other network traffic within the installation. The switch should support 1GB for best performance.

For more information on installing a suitable network switch, please contact your local Lawo representative or email [support@lawo.com](mailto:support@lawo.com).

#### Cable Specifications

- CAT 5 or better (CAT 5e/6/7); straight (1:1) or crossed Ethernet cable.
- Connector Type: RJ45.
- 1000, 100 and 10 Base-TX LAN speeds are supported; **1000 Base-TX** (Gigabit Ethernet) is recommended.
- Cable Length: up to 100m.

#### Connecting via a Network Switch (recommended)

1. Connect the mxGUI computer's network interface to the network switch.
2. If not already installed, connect the **ETHERNET B** port from the first Router Module (980/33) to the network switch.

If a redundant Router Module is installed, run a second **ETHERNET B** connection as shown above. This will ensure continued access to the control system should a [takeover](#) occur.

## Direct Connection

1. Connect the mxGUI computer's network interface directly to the **ETHERNET B** port on the active Router Module (980/33).

If the system switches to the alternate Router Module, then will need to re-connect your device manually.

### 21.5.2 TCP/IP Configuration

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

#### IP Address

The IP address must be unique, and lie within the same IP address range as that of the mc<sup>2</sup>/Nova control system (i.e. the first three fields must match).

For example, if the Lawo control system's IP address = **192.168.102.65**, then set your computer's IP address to **192.168.102.101**.

You can check the Lawo system IP address from the Central GUI: open the **System Settings** display and select **Global** - the **IP Address Primary** = the main control system IP address.

For a list of the default IP addresses for all products, see [Default TCP/IP Settings](#).

#### Subnet Mask

The Subnet Mask must match that of the mc<sup>2</sup>/Nova control system. In all Lawo systems, the default Subnet Mask = **255.255.255.0**.

#### Default Gateway

A Default Gateway setting is required if data packets are to be redirected. For example, if you are connecting via a network switch with Layer 3 routing capability. If redirection is not required, then the Default Gateway can be left blank.

If you are connecting via a wider network, please ask your network administrator for further assistance.

Check the IP settings carefully. If there is an IP conflict, then the network will not operate correctly.

## Testing the Connection

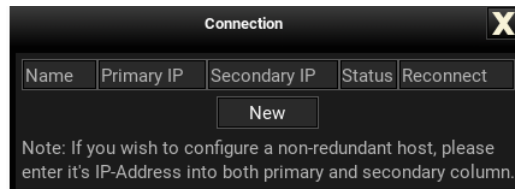
The simplest way to check the connection is to open the Web Browser Interface as follows: open your browser software and enter the IP address of the Lawo system into the URL field - the **System Overview** page should appear. If not, try the [trouble-shooting](#) tips.

### 21.5.3 Opening a Connection to a System

1. Start mxGUI, making sure that you open the correct emulation.
2. Select **Settings** -> **Connection** from the mxGUI main menus:

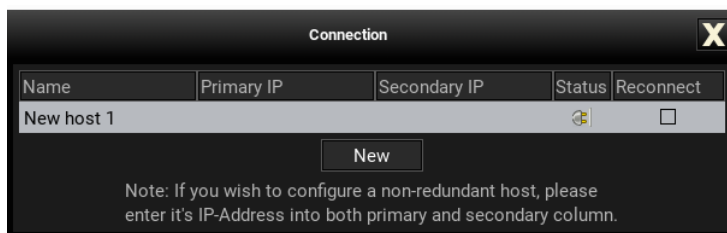


The 'Connection' pop-up window appears:



If this is the first time you have used the 'Connection' window, then it will be blank. (This window lists all the systems which mxGUI can connect to, each with a **Name**, **Primary IP** address (main control system), **Secondary IP** address (redundant control system) and connection **Status**).

- Click on **New** to create a new generic connection:



Name	Primary IP	Secondary IP	Status	Reconnect
New host 1				<input type="checkbox"/>

New

Note: If you wish to configure a non-redundant host, please enter it's IP-Address into both primary and secondary column.

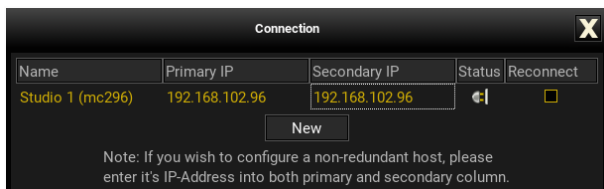
- Then click on the name - e.g. **New host 1** - to enter a name for this system. For example, we have chosen **Studio 1 (mc296)**.

- Enter the IP address of the control system into the **Primary IP** and **Secondary IP** fields. In each case, type in the address and then press ENTER to confirm.

If there is no redundant control system, then you should enter the same IP address into both fields.

If there is a redundant control system, then enter the main and redundant control systems IP addresses into the Primary and Secondary fields. Note that the IP address of a redundant control system is always one digit higher than that of the main control system.

*IP Addresses (for non-redundant system)*

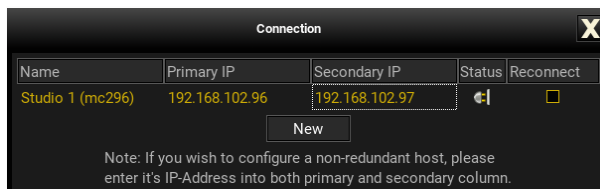


Name	Primary IP	Secondary IP	Status	Reconnect
Studio 1 (mc296)	192.168.102.96	192.168.102.96		<input type="checkbox"/>

New

Note: If you wish to configure a non-redundant host, please enter it's IP-Address into both primary and secondary column.

*IP Addresses (for redundant system)*



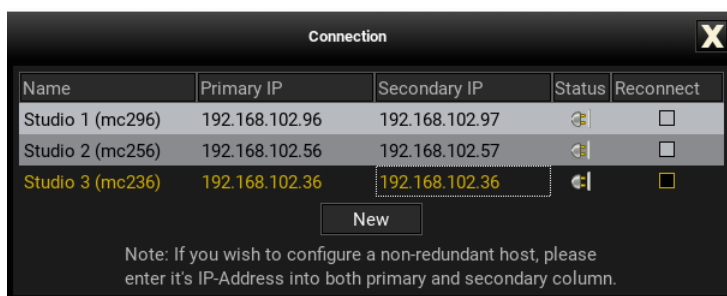
Name	Primary IP	Secondary IP	Status	Reconnect
Studio 1 (mc296)	192.168.102.96	192.168.102.97		<input type="checkbox"/>

New

Note: If you wish to configure a non-redundant host, please enter it's IP-Address into both primary and secondary column.

The connection is now prepared and you are ready to go online.

You can prepare several connections for different systems if you wish. Our example below shows three different mc<sup>2</sup> connections, all currently offline:

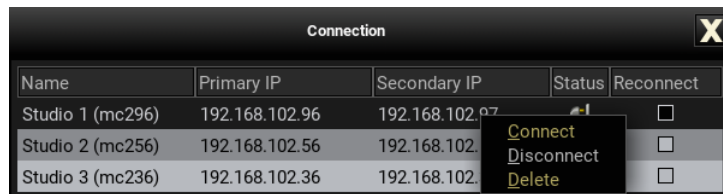


Name	Primary IP	Secondary IP	Status	Reconnect
Studio 1 (mc296)	192.168.102.96	192.168.102.97		<input type="checkbox"/>
Studio 2 (mc256)	192.168.102.56	192.168.102.57		<input type="checkbox"/>
Studio 3 (mc236)	192.168.102.36	192.168.102.36		<input type="checkbox"/>

New

Note: If you wish to configure a non-redundant host, please enter it's IP-Address into both primary and secondary column.

6. To connect to one of the systems in the list, right-click on its entry and select **Connect**:



The mxGUI computer will now attempt to connect to the selected system:

If the connection is successful, then the **Status** column updates to show the “plugged in” icon.

If the connection fails, then the **Status** remains as “unplugged”:

- Check the [network connection](#) and [TCP/IP settings](#) of your computer's network interface card.
- Check that mxGUI is compatible with the mc<sup>2</sup> or Nova system (the first three digits of the software versions must match.)
- See also the [trouble-shooting](#) tips to resolve the problem.

7. If you wish mxGUI to automatically reconnect if the system loses its online status, then tick **Reconnect**. mxGUI will also start up in online mode if a valid network connection is present.

8. Once you have a valid connection, you can minimise the **Connection** window.

Hover over the connection icon, at the bottom right of all mxGUI displays, to view the IP address of the connected host:



You can now use the mxGUI displays to view or change settings on the online system.

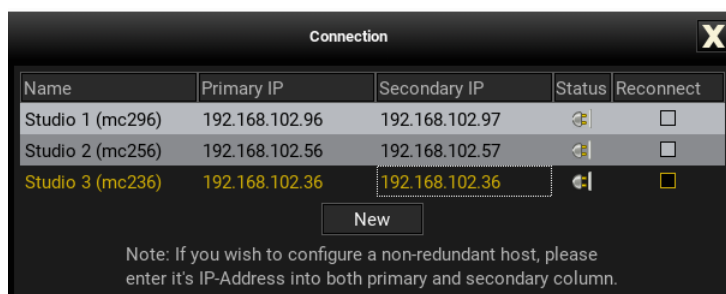
Any changes you make are actioned immediately, and all data is saved and loaded to/from the host control system. So, make sure any other operators are aware that you are online!

## 21.5.4 Disconnecting mxGUI

To disconnect mxGUI from the system:

1. Maximise or open the **Settings -> Connection** window.
2. Select the online system, right-click and choose **Disconnect**.

mxGUI disconnects and the **Status** of the Connection returns to is “unplugged” state:



mxGUI can connect to one system at a time. Therefore, if you connect to a different mc<sup>2</sup> or Nova system, any existing connection is automatically canceled.



## 21.6 Offline Setup

When running offline, mxGUI runs an emulation of the mc<sup>2</sup>/Nova control system. All data is saved and loaded to/from your computer (known as the “Local Control System”).

Settings are prepared offline by saving productions from the **Productions** display, presets from the **Main** display, etc. These files are then transferred back to the mc<sup>2</sup>/Nova either by copying to USB (via the [Shared Folder](#)), or going online and using the [File Transfer](#) display.

### 21.6.1 Files & Compatibility

#### What can be Prepared Offline?

Anything which can be saved on a real system can be saved offline onto the mxGUI local control system:

- **Productions, Snapshots, Cuelists and Mixes** - as saved from the [Productions](#), [Snapshots](#), [Cuelists](#) and [Mixes](#) displays.
- **Presets** – module or channel presets as saved from the [Main](#) display.
- **Custom Function Assignments** – the mapping of user buttons and other custom function assignments as defined in the [Custom Functions](#) display.

When mxGUI is started in one of the Nova modes, presets, cuelists and mixes are not accessible (as these features are not supported by a stand-alone routing matrix).

#### Compatibility

- **Productions** can be loaded on any mc<sup>2</sup> or Nova system. However, only transferable elements will load. For example, you can recall a snapshot created on one console to another providing you are using the same channel type. However, inputs and outputs are specific to the system, so signal routing will not load unless supported by an identical Core and Signal List Configuration.
- **Presets** can be loaded to any mc<sup>2</sup> console regardless of the configuration or mc<sup>2</sup> mode.
- **Custom Function Assignments** – these files are specific to the function. This means that you can transfer a custom assignment file created on mxGUI to any console or Nova router; if the receiving system does not support the same User Panel or HLSD, the custom assignment can be edited from the [Custom Functions](#) display.

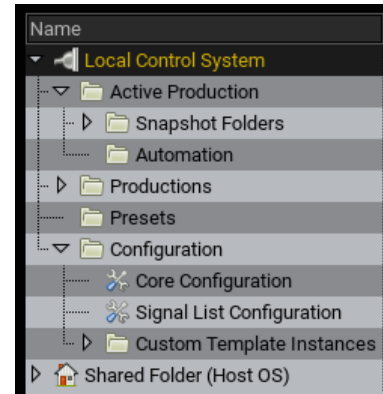
When preparing a production, it is important that the local control system configuration, on your mxGUI computer, matches that of your actual system. This ensures that any productions you create will load in full when they are transferred back to the mc<sup>2</sup> or Nova. See [Synchronising the Configuration](#).

See [Transferring User Data](#) for more information on exchanging data within a production (e.g. snapshots).

## Where are the Files Stored?

The [File Transfer](#) display provides access to user data stored on the **Local Control System**:

- **Active production** – this can be opened to access individual snapshot folders, snapshots and automation mixes (mc<sup>2</sup> consoles only).
- **Productions** – contains all zipped productions; these can be transferred as a complete file.
- **Presets** – contains all module and channel presets (mc<sup>2</sup> consoles only).
- **Configuration** – contains the configuration data (see below).



## Configuration Data

The complete configuration set contains four individual component files:

- **Core Configuration** – defines the Nova/IO system and its signal parameters (config.tcl).
- **Signal List Configuration** – defines the Directories, Subdirectories, Names and Labels of the [Signal List](#) display (gui\_config.tcl).
- **Custom Template Instances** – store the contents of the [Custom Functions](#) display.

The first two files cannot be edited by mxGUI and are included for service/AdminHD access.

For simplicity, the complete configuration can be zipped and transferred as a single file - called the **complete\_config**.

## 21.6.2 Organising Your Files

If you are going to prepare settings for a range of different systems, then it is a good idea to organise your files carefully before you start working with mxGUI.

1. Use the [File Transfer](#) display to create a separate folder, inside the **Shared Folder**, for each mc<sup>2</sup> or Nova system.
2. Then within each studio's folder, create a sub folder for productions, custom functions, etc:

Name	Type
Shared Folder (Host OS)	
folder0000	
Presets	
Studio 1 (66)	
66 Productions	
complete_config	Complete Configuration Set
Custom Function Assignments	
Studio 7 (56)	
56 Productions	
complete_config	Complete Configuration Set

This will allow you to keep all the relevant files together for each studio's configuration: **Productions**, **Custom Function Assignments** and configuration (**complete\_config**).

In the example above, a separate **Presets** folder has been created to store module or channel presets. Because presets can be recalled on any mc<sup>2</sup> console, this is a top level folder and is not system specific.

### 21.6.3 Synchronising the Configuration

In order to prepare a production offline, it is important that the local control system configuration, on your mxGUI computer, matches that of your mc²66 MKII. If not, some parts of the production, such as signal routing, will not load correctly, see [File Compatibility](#).

The best solution is to transfer the complete configuration from your mc²66 MKII to the mxGUI computer.

You only need to perform this operation once (providing there are no changes to your system configuration).

For a fail safe approach, it is best to perform this operation in two stages using the mxGUI [Shared Folder](#):

- [Step 1](#) - Go online, and transfer the **complete\_config** from the mc²66 MKII to the **Shared Folder**. This places a copy of the system configuration on your computer. (If you do not have online access, then request a copy of the "complete\_config" file from your system administrator, and copy this into the **Shared Folder** using your host operating system, see [Shared Folder](#).)
- [Step 2](#) - Disconnect (go offline) and transfer the copied **complete\_config** from the **Shared Folder** to the local control system. Then cold start mxGUI, and it will boot-up using the new configuration data.

**WARNING:** While it is possible to transfer the **complete\_config** from the Remote to the local control system in one step, this is *NOT* recommended. *IF* you transfer in the wrong direction, then you will overwrite the configuration data on your mc²66 MKII!

#### Step 1. Transfer the complete\_config to the Shared Folder

1. [Connect](#) your mxGUI computer to the remote system, and [configure](#) its TCP/IP settings.
2. Open an [online connection](#).
3. Open the [File Transfer](#) display.
4. Select a location within the **Shared Folder** (on the left) as your destination - in our example, the sub folder **Studio 1 (66)**.
5. Then right-click on the console's **Configuration** directory (on the right) and choose **Transfer**:

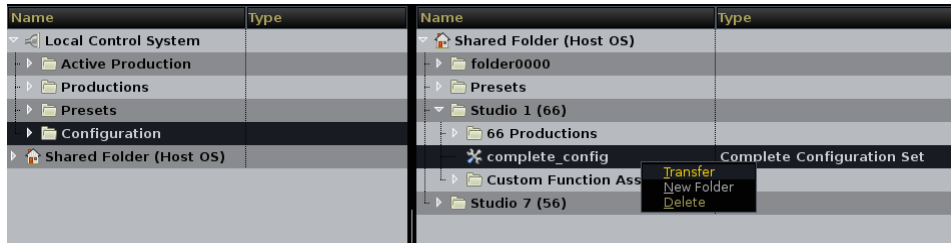


All the configuration files are zipped and transferred to the mxGUI **Shared Folder** as a single file - **complete\_config**.

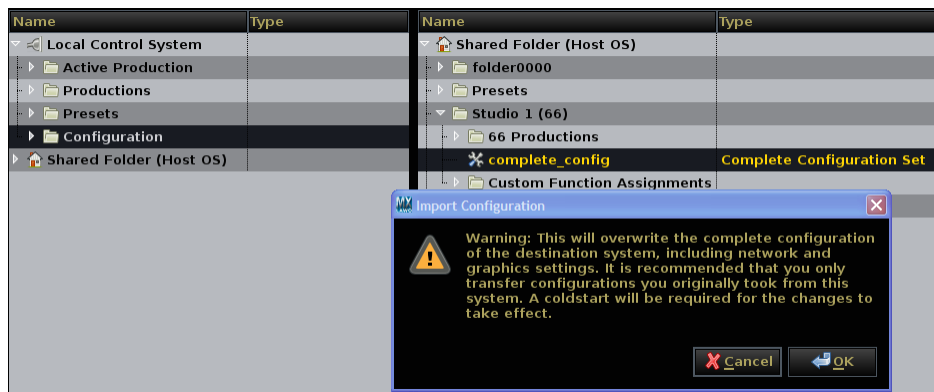
While online, it is a good idea to transfer some productions from the online system (on the right) to the mxGUI computer (on the left). You can then load a production later, rather than having to build your offline setup from scratch.

## Step 2. Change the mxGUI Configuration

1. [Disconnect](#) mxGUI from the online system.
2. From the [File Transfer](#) display, select the local control system's **Configuration** folder (on the left).
3. Locate the **complete\_config** file you transferred earlier (on the right), right-click and choose **Transfer**:



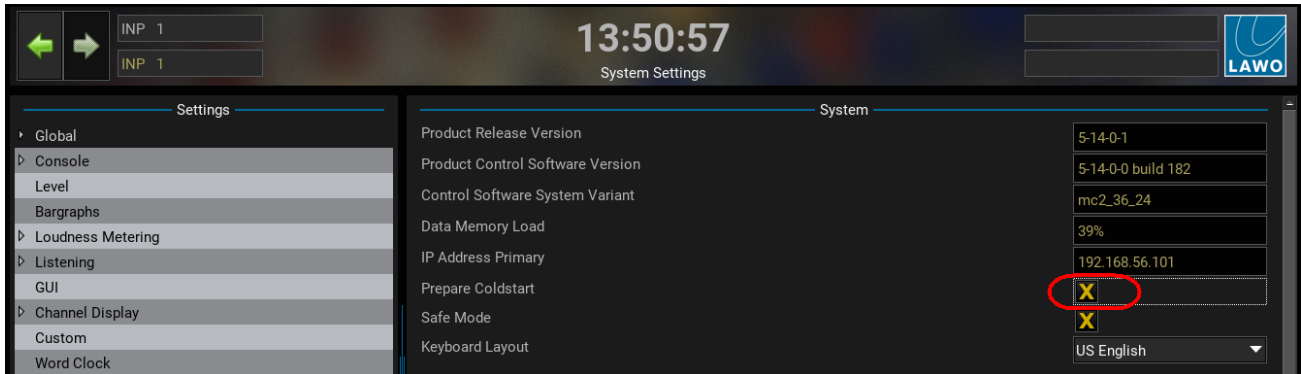
A pop-up appears warning you that **OK** will overwrite the configuration of the mxGUI local control system:



4. Select **OK** to continue - the configuration is transferred.

You now need to cold start mxGUI before the new configuration data takes effect. To do this:

1. Select the **System** -> **System Settings** display.
2. And select the **Global** topic.
3. Enable the **Prepare Coldstart** option:



This prepares mxGUI so that on the next restart it will perform a cold start rather than warm starting from the current configuration.

4. Close mxGUI, by selecting **Application** -> **Quit**.
5. Then restart the program from the launch options:



After the restart, you will be running the new configuration.

You can check this by looking at the Directories and Subdirectories within the [Signal List](#) and/or the Nova configuration in the [Signal Settings](#) display.

## 21.6.4 Preparing & Saving Settings

You can now begin your offline setup:

### Productions

1. If you transferred some productions from the online system, then copy these into the **Productions** folder of the local control system using the [File Transfer](#) display:

Name	Type	Name	Type
Local Control System		Shared Folder (Host OS)	
Active Production		complete_config_backup	Complete Configuration Set
Productions		Demo Room 66 Configuration	
Basic Setups	Production	Nova73	
Football	Production	OFO Default	Production
News	Production	Presets	
OFO Default	Production	Studio 1 (66)	
Olympic Games	Production	66 Productions	
Opera	Production	Basic S...	Production
production0000	Production	Footba	Production
production0001	Production	News	Production
production0004	Production	Olympic Games	Production
production0005	Production	Opera	Production
production0015	Production	production0000	Production
Racing	Production	production0015	Production
Training Production	Production	Racing	Production
Presets		complete_config	Complete Configuration Set
Configuration		Custom Function Assignments	
Shared Folder (Host OS)		Studio 5 (66)	

2. Load a production from the [Productions](#) display. This provides a great starting point for your offline setup.
3. Now make changes, and save your settings either by [saving](#) or [updating](#) the production.

You can use the [Strip Assign](#) display, and [Access/Assign](#) pop-up window to perform tasks which normally use the console front panel - for example, changing the channel in access, assigning channels to fader strips, etc.

### Presets

Module or channel presets are saved in the usual manner from the [Main](#) display.

To modify an existing preset, copy it into the **Presets** folder of the local control system.

### Custom Functions

Custom Functions can be programmed in the usual manner from the [Custom Functions](#) display.

To modify an existing function, copy it into the **Custom Template Instances** folder of the local control system.

### Other Data

You can also save snapshots and mixes from mxGUI, and access these individual files from the **Active Production** folder of the local control system.

Remember to save or update the production to save the snapshot or mix permanently onto the local control system. If not, your snapshots and mixes are only held in temporary memory.

### 21.6.5 Transferring Data Back to the System

Having prepared a file, it can be transferred back to the mc<sup>2</sup>66 MKII either by copying to USB (via the [Shared Folder](#)), or going online and using the [File Transfer](#) display.

For example, to transfer a production via the **File Transfer** display:

1. [Connect](#) your mxGUI computer to the remote system, and [configure](#) its TCP/IP settings.
2. Open an [online connection](#).
3. Open the [File Transfer](#) display.
4. Select the online system's **Productions** folder as the destination (on the right).
5. Then on the left, right-click on the production you wish to import and choose **Transfer** - the production is copied to the online control system.
6. Now go to the console and [load the production](#) - your setup is recalled!

You can transfer any type of file: productions, snapshots, automation, presets, and custom function assignments to the online control system.

A production created offline will only load completely if:

- The configuration running on mxGUI matches that of the online system.
- mxGUI is running the correct mc<sup>2</sup>/Nova emulation.

### Good Housekeeping

Having completed a transfer, it is a good idea to keep a copy of the production in the mxGUI **Shared Folder**. This ensures that you keep a backup of everything needed for this offline setup: the **complete\_config**, **production**, etc:

Name	Type
Shared Folder (Host OS)	
folder0000	
Presets	
Studio 1 (66)	
66 Productions	
complete_config	Complete Configuration Set
Custom Function Assignments	
Studio 7 (56)	
56 Productions	
complete_config	Complete Configuration Set

Note that when you [change](#) the mxGUI configuration, all other folders – **Active production**, **Productions** and **Presets** – remain intact. This means that you can end up with a mixture of productions from different systems on the same mxGUI local control system.

We recommend keeping a backup of all files within the Shared Folder. Create a sub folder for each mc<sup>2</sup> and Nova system so that you can store all configuration data and productions together. This way you will know which productions match which configuration in a few weeks time! See [Organising Your Files](#).

## 21.7 The File Transfer Display

The **File Transfer** display allows you to transfer Productions, Presets and Configuration files between the local control system (your mxGUI computer) and an online control system (mc<sup>2</sup> console, Micro Core or Nova router). You might use this display to:

- Transfer configuration data to mxGUI.
- Transfer productions, snapshots, presets, custom function files to/from an mc<sup>2</sup>/Nova system.
- Transfer files to/from the **Shared Folder** so that files can be accessed by your host operating system.

1. Select **Page -> Production -> File Transfer** to open the display:



The display is divided into two halves:

- **Local Control System** - on the left you are *a/ways* viewing files or directories on the mxGUI computer.
- **Online Control System** - on the right you can view files or directories on any online system plus the shared folder (host operating system shared folder).

Note that the **Shared Folder (Host OS)** is represented on both sides of the display so that it can accept files from the local control system (your offline mxGUI) or an online system.

In the example above we are connected to a mc<sup>2</sup>66 control system (online). Note that if mxGUI is offline, then the only folder on the right of the display is the **Shared Folder**.

The method of operation is very similar to the [File display](#) on an mc<sup>2</sup> console:

1. Open or close directories by double-clicking on the directory name (or click on the arrow beside the directory name).
2. Having selected a source and a valid destination, right-click on the source file to select **Transfer**:



Note that:

- Files can be transferred from left to right or right to left.
- Each file or folder is clearly marked with its **Type** – e.g. production, snapshot, channel preset, EQ preset, etc. This is important as files can only be transferred to a valid destination. For example, you cannot transfer a snapshot into the Automation directory!
- For safety reasons you cannot delete productions, snapshots, configuration files, etc. from the **File Transfer** display.



## 21.7.1 The Shared Folder

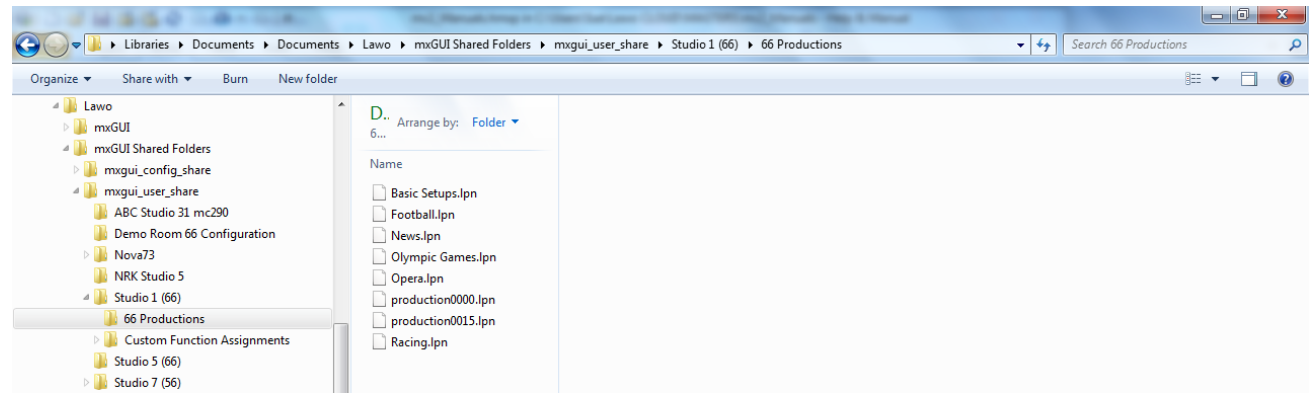
The contents of the **Shared Folder** can be accessed from the [File Transfer](#) display, and outside mxGUI by your host operating system. You can use the **Shared Folder** to organise files or transfer files externally (e.g. to USB or email).

Note that from **5-2-0-0**, the location of the **mxgui\_user\_share** folder must be defined within the **Oracle VM VirtualBox Manager** for each mxGUI release, see [Installation Procedure: Shared Folders](#).

*The Shared Folder (in mxGUI):*

Name	Type
Local Control System	
Shared Folder (Host OS)	
complete_config_backup	Complete C
Demo Room 66 Configuration	
Nova73	
OFO Default	Production
Presets	
Studio 1 (66)	
66 Productions	
Basic Setups	Production
Football	Production
News	Production
Olympic Games	Production
Opera	Production
production0000	Production
production0015	Production
Racing	Production
complete_config	Complete C
Custom Function Assignments	
Studio 5 (66)	

*The User Shared Folder (in Windows Explorer):*

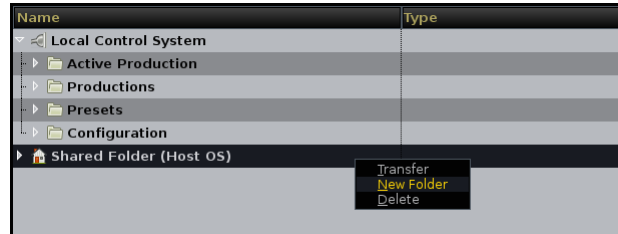


## Shared Folder Operations

### From mxGUI

Within mxGUI, you can perform some basic file management tasks:

1. Right-click on the **Shared Folder** and select **New Folder**:



A new folder is added with a generic name.

2. Type to rename the folder.

You can create folders within folders simply by right-clicking on the sub folder name.

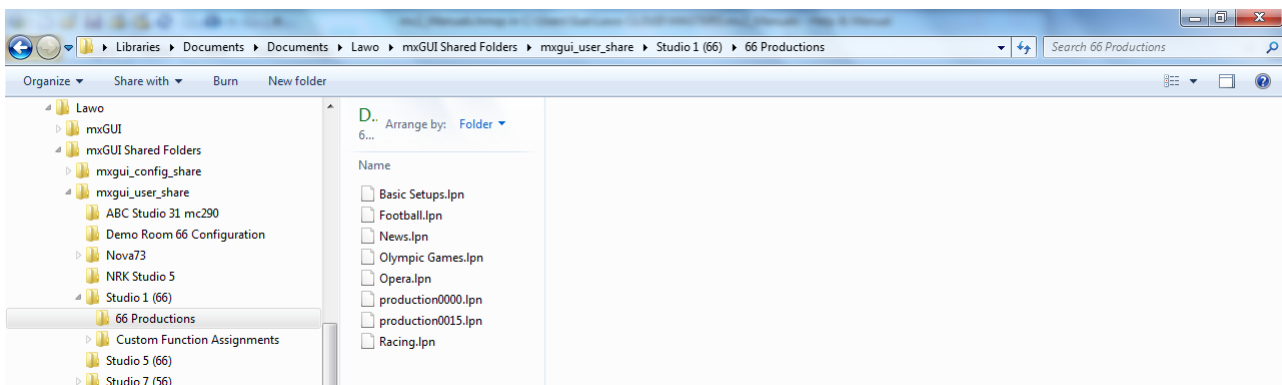
3. Right-click on the file or sub folder and select **Delete**. Then Select **OK** to confirm.

The file or folder is deleted from the Shared Folder.

### From your Host OS

You can use your host operating software to perform any of the usual file management tasks: create folder, move or delete files, etc.

For more details on locating the **Shared\_Folder**, see [Installation Procedure: Shared Folders](#). Our folder location is shown below:



Note that each file has a specific file extension which should not be modified, otherwise the file cannot be loaded by the Lawo system. For example, **.lpn** is the file extension for all zipped productions. See [File Types & Extensions](#).

## 21.8 The Strip Assign Display

This display provides an overview of channel and main fader strip assignments.

1. Select **Page** -> **Strip Assign** to open the **Strip Assign** display.

The display represents the two layers of physical fader strips on the console:



- **STRIP N** – identifies the fader strip. Note that main fader strips are marked as **MAIN N**.
  - **Layer 2 Controls (Upper row):**
    - **SEL** - the fader select (**SEL**) button.
    - **Mute** - the fader **MUTE** button.
    - **Level in dB** - the fader level, with **+** and **-** level adjust buttons.
    - **Channel Name/User Label/Source Label** - this label is switched by the **LABEL** buttons on the [ACCESS/ASSIGN](#) pop-up window.
  - **Layer 1 Controls (Lower row)** - as above, but level can be adjusted using the on-screen fader.
2. Click and drag on a fader (Layer 1), or use the **+** and **-** buttons (Layer 2) to adjust the channel level.

If you click in the level field, you can adjust the level using the mouse wheel (if you have one), or type in a value.

Open the [ACCESS/ASSIGN](#) pop-up window and use the [COUPLE](#) function to adjust level across a range of fader strips.

3. Press a **Mute** button to MUTE the channel.
4. Press a **SEL** button to select the fader strip - for example, Strip 1, Layer 1 - the channel in access updates accordingly.

If you open the [ACCESS/ASSIGN](#) pop-up window, you can use the **SEL** buttons to perform assignment operations such as fader strip assignments, bus assignments, copy/ reset audio parameters, etc.

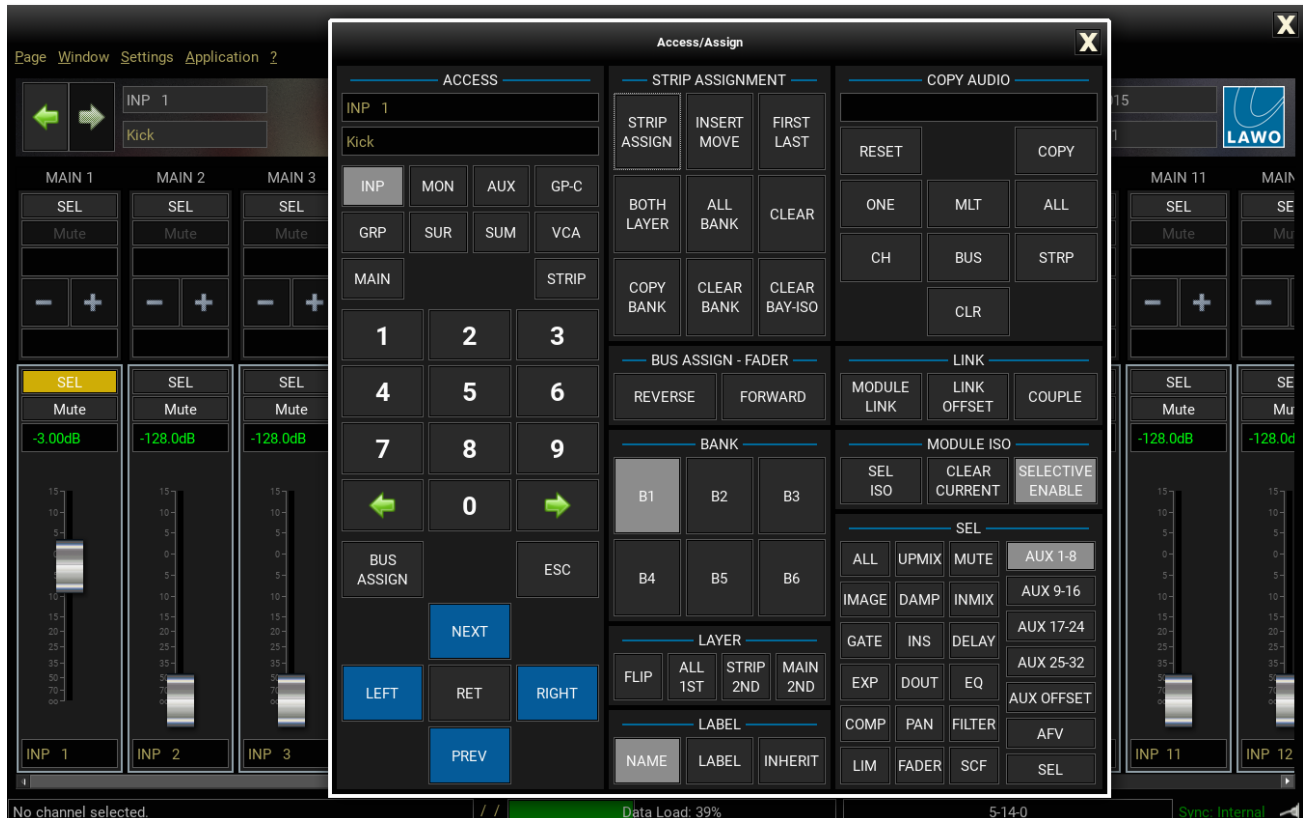
## 21.9 The Access/Assign Window

The Access/Assign window is a pop-up window that replicates *all* the access and assignment functions found on the front panel of a mc<sup>2</sup> console.

1. Select **Window -> Access/Assign**:



The window opens, and can be moved to any position above another display, or minimised until needed:



2. Use the on-screen controls in exactly the same way as the console front panel:
  - **ACCESS** – selects the channel in access, see [ACCESS CHANNEL/ASSIGN](#).
  - **STRIP ASSIGNMENT** - assigns channels to fader strips, see [Fader Strip Assignment](#).
  - **BUS ASSIGN - FADER** – makes bus/VCA assignments, see [Bus Assign](#).
  - **BANK** and **LAYER** - switches [Banks](#) and [Layers](#).
  - **LABEL** – switches the fader strip [Labels](#).
  - **COPY AUDIO** – used to copy or reset audio parameters, see [Copy & Reset](#).
  - **LINK** – used to create [link groups](#) or [couple](#) groups.
  - **MODULE ISO** – used to [isolate](#) DSP modules from snapshot loads.
  - **SEL** – replicates the SEL buttons for each audio module (EQ, Gate, Compressor, etc.) within the Central Control Section, see [Selecting Channel Parameters](#).

## 21.10 mxUpdater

From Version 5.8.2 software, the **mxUpdater** utility can be used to update the software of the mc<sup>2</sup>/Nova control system, or backup and restore user data.

### Software Updates

**mxUpdater** makes it easy to update your system, without needing FTP or Telnet tools, whenever you install a new version of mxGUI. Note that the utility contains only the software version which is concurrent with the mxGUI release. Therefore, it is *only* possible to update to this version.

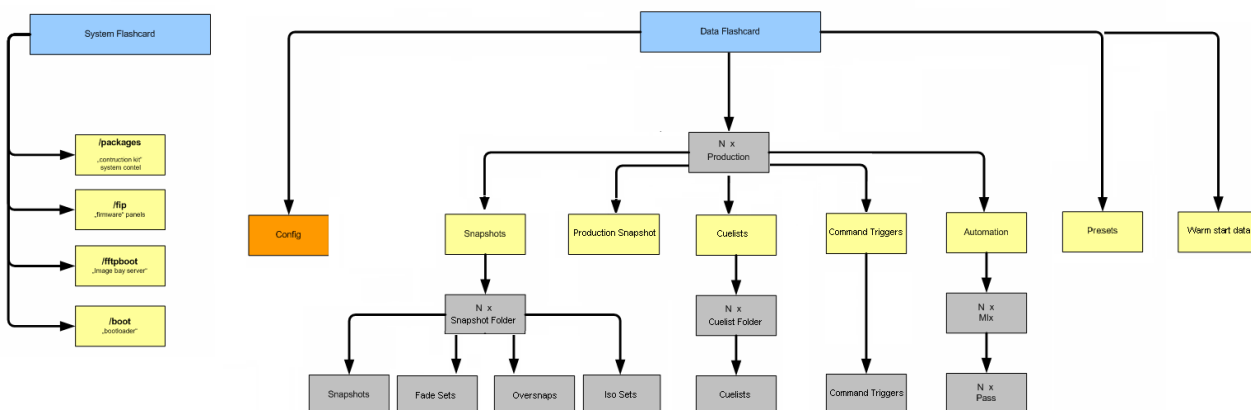
If you wish to update to a different version, or downgrade the system, then you will need to use the "new CF card" method described in your Technical Manual.

Note that a software update affects only the System Flashcard (below left), and will not alter any of your user data.

### Backup and Restore of User Data

Independently, **mxUpdater** can also be used to backup and restore all user data on the Data Flashcard. This allows you to restore all user data, including productions and the system configuration, to an earlier point in time.

Note that the backup and restore functionality affects only the Data Flashcard (below right), and will not alter the current software version running on the System Flashcard.

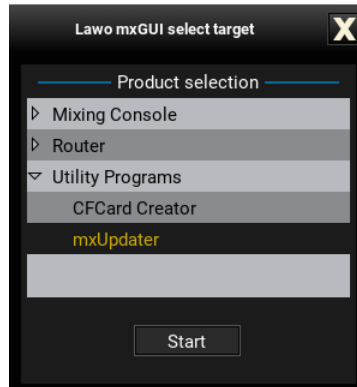


### Preparation

To use **mxUpdater** for either application, you will need to set up the two mxGUI [shared folders](#) and make an [online connection](#) to the mc<sup>2</sup>/Nova control system.

## 21.10.1 Starting the Utility & Connecting to the System

1. [Close](#) mxGUI to return to the product launch options.
2. Select **Utility Programs** -> **mxUpdater** and click on **Start**:

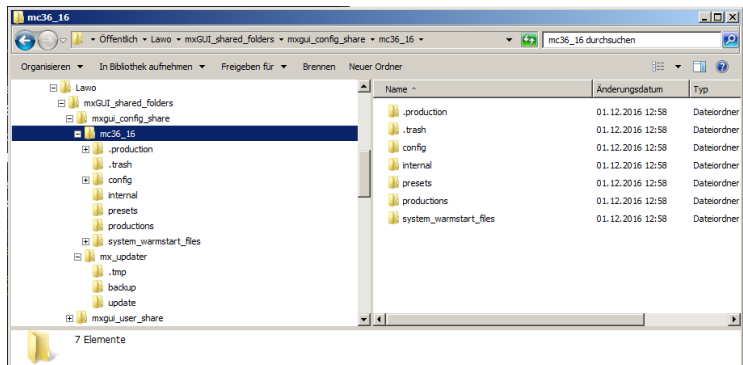
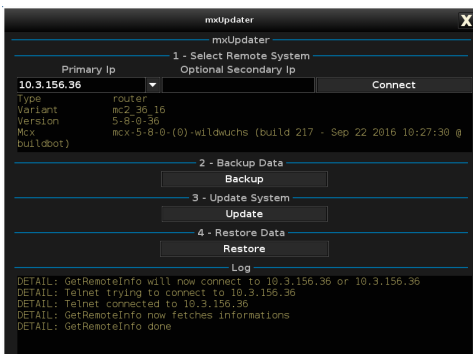


The program opens with an empty window.

3. Under "1 - Select Remote System", enter the IP address of the mc<sup>2</sup>/Nova control system and click on **Connect**.

If you have connected to a system previously, then its IP address can be selected from the drop-down list.

After a successful connection you will see some information about the system in the **mxUpdater** window and the following files in the **mxgui\_config\_share** folder:

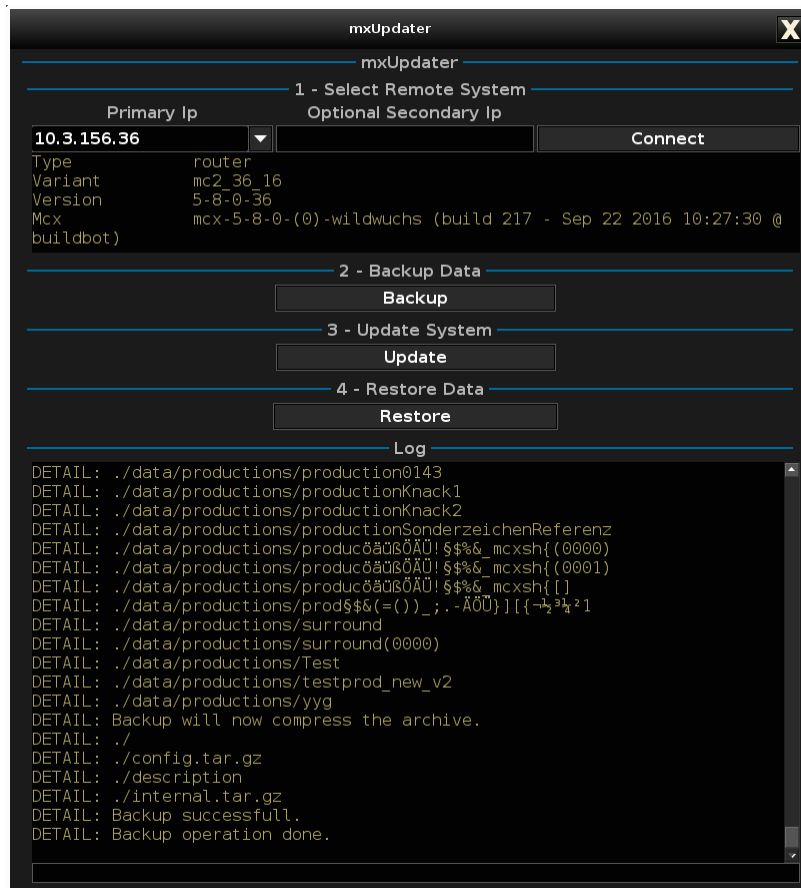


### 21.10.2 Saving a User Data Backup

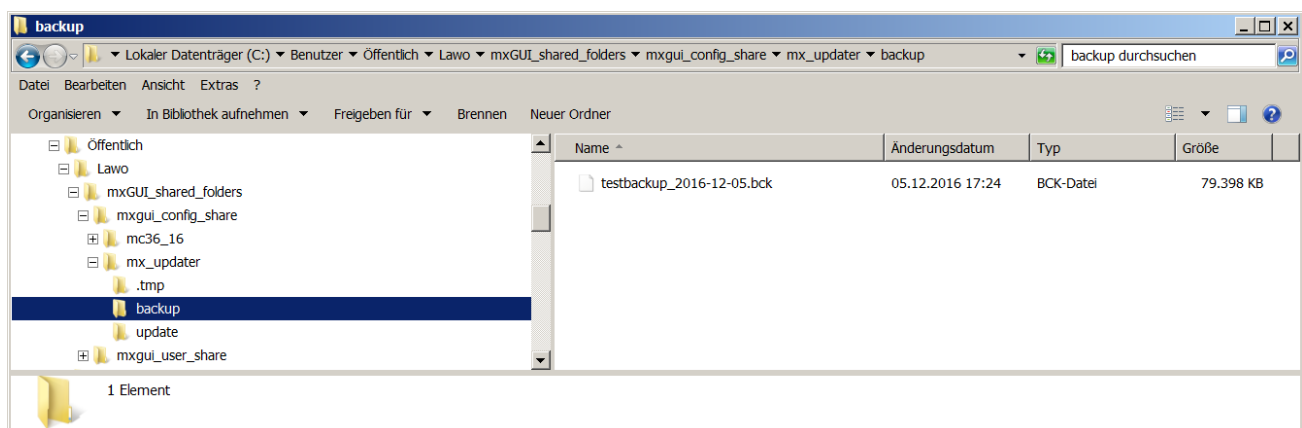
Before updating the software, it is recommended that you save a backup of all user data. This will make a copy of the complete Data Flashcard, described [earlier](#), so that it can be restored at a later date if required.

1. Under "2 - Backup Data", select **Backup**.
2. Enter a file name and then start the backup by clicking on **Save**.

Once the backup is complete, you will see the line **DETAIL: Backup operation done** in the "Log" area:



The backup file is stored on the mxgui computer in the **mxgui\_config\_share -> mxupdater -> backup** folder:



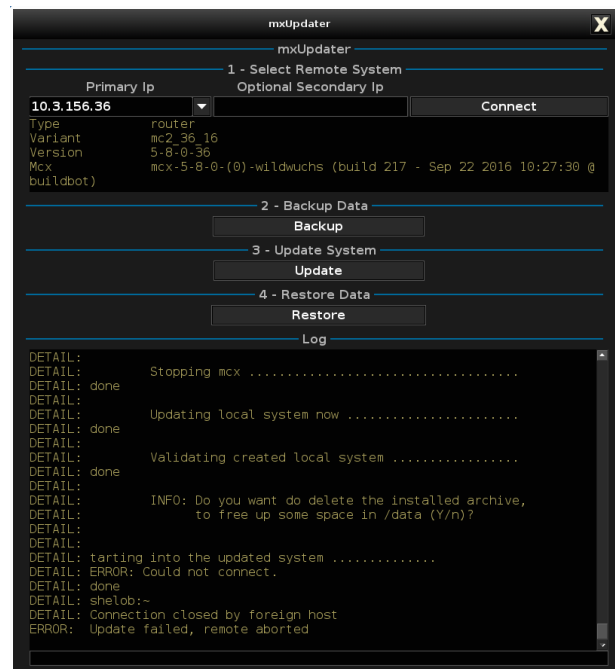
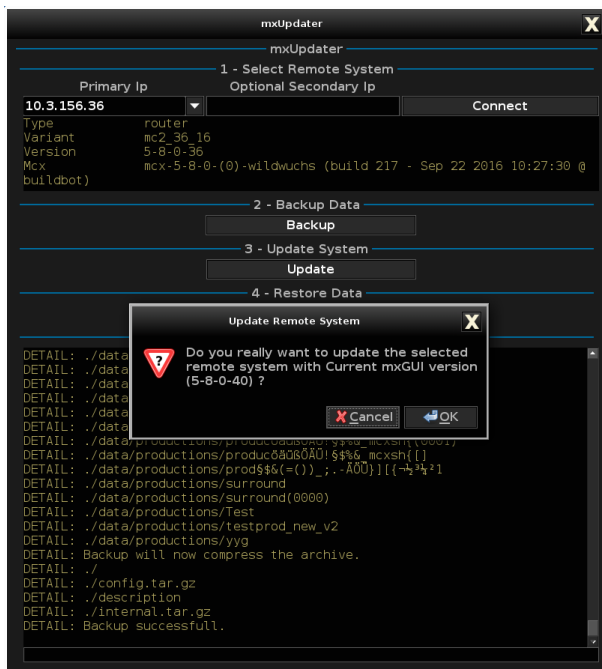
### 21.10.3 Updating the Software Version

**mxUpdater** can be used to update the system software to the version which is concurrent with the mxGUI release. Note that it *only* possible to update to this version. If you wish to update to a different version or downgrade the system, then you should use the auto update tool as described in the software release notes.

To proceed with the update:

1. Under "3 - Update System", select **Update**.
2. Confirm the update by clicking on **OK**.

You will now see the progress of the upload, update and validation steps in the "Log" area. Once the update is complete, a system reboot is triggered:



Note that the last few "Log" lines, including **ERROR: Could not connect** and **ERROR: Update failed, remote aborted**, are a result of the reboot. These lines are normal and can be ignored.

After the reboot, the software update is complete.



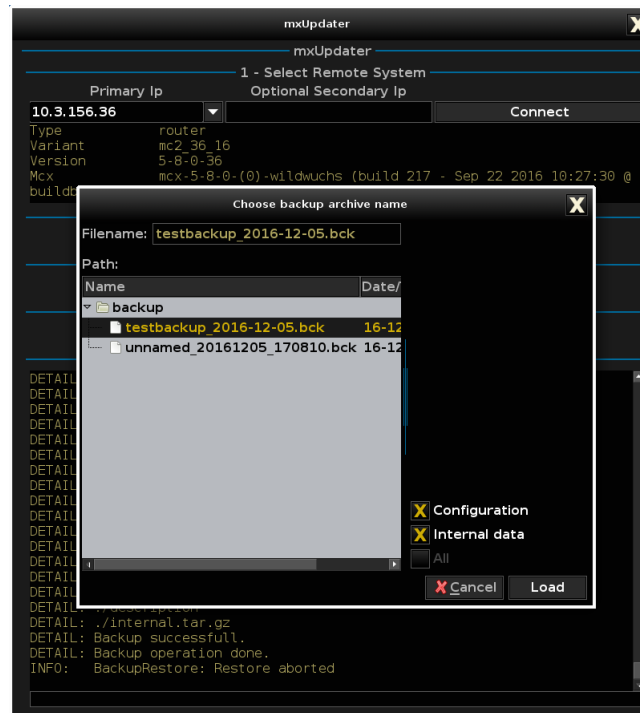
### 21.10.4 Restoring User Data from a Backup File

At any time you can use one of your backup files to restore the system's user data.

**WARNING:** This operation will overwrite all existing data on the Data Flashcard, including productions and configuration files. Therefore, it is a good idea to make a [backup](#) of the current user data before beginning a restore.

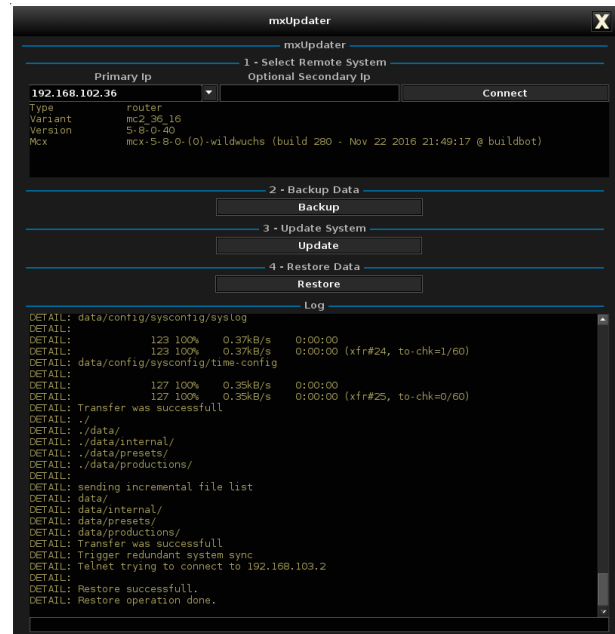
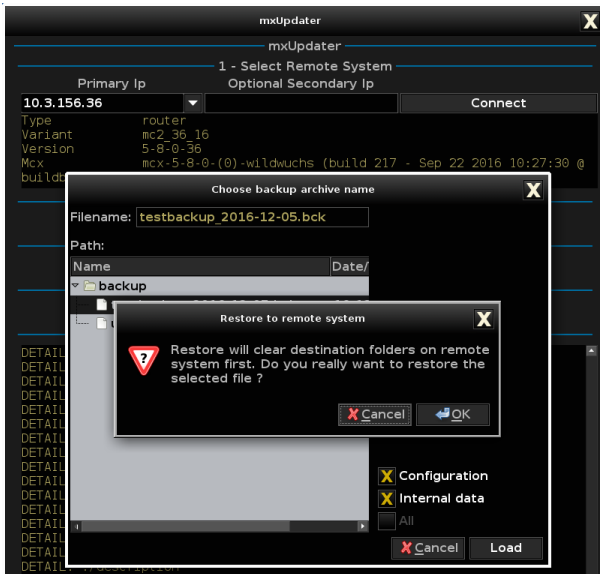
To proceed:

1. Under "4 - Restore Data", select **Restore**.
2. Select one of your backup files and click on **Load**:



3. Confirm the restore by clicking on **OK**.

Once the restore is complete, you will see the line **DETAIL: Restore operation done** in the "Log" area.



## 22. Lawo Remote App

---

This chapter describes how to install and operate the **Lawo Remote App**, a free App which allows you to adjust parameters, recall snapshots and control user-defined functions remotely from an iOS device.

Topics include:

- [Installation & Configuration](#)
- [Starting the Lawo Remote App](#)
- [Configuring a New Connection](#)
- [Connecting to the System](#)
- [iApp Menus](#)
- [Strip Control](#)
- [Snapshots](#)
- [User Buttons](#)
- [Settings](#)

In Version 5.6.0.x, the App was redesigned for iOS iPads, and is fully compatible with the latest iOS versions.

## 22.1 Installation & Configuration

### Installing the Lawo Remote App

The Lawo Remote App can be downloaded, for free, from the App store. Note that from Version 5.6.0 onwards, the App has been redesigned for iOS iPADS, and is fully compatible with the latest iOS versions.

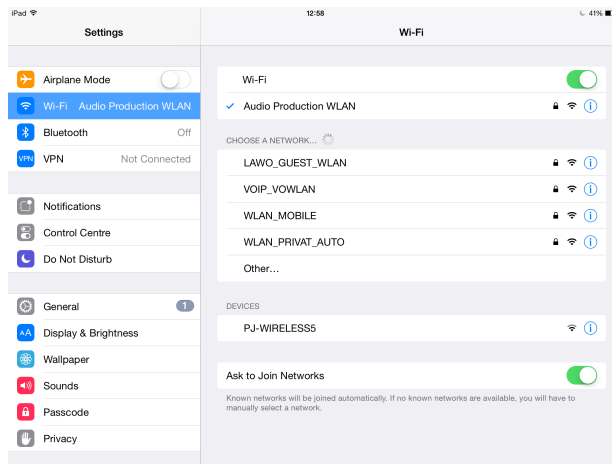
Download and install the Lawo Remote App on your device in the usual manner:



### Configuring the Network

The remote device communicates with the mc<sup>2</sup>/Nova control system via WLAN (Wireless Local Area Network).

To use the Lawo Remote App you must have a properly configured wireless network access point which can connect to your Lawo control system. There are several configuration options depending on your network infrastructure. Please refer to the separate technical document “TD\_WirelessAccessPoint” for details.



### Enabling App Control (on the mc<sup>2</sup> system)

To use the App, remote access must be enabled using the **Safe Mode** option in the **System Settings** display.

1. On the console, select the **Global** -> **System** topic and make sure that the [Safe Mode](#) option is unchecked.

The console can now be controlled from a Lawo Remote App device.

There is no limit on the number of clients. However, if more than one device sets a parameter, the last change wins!

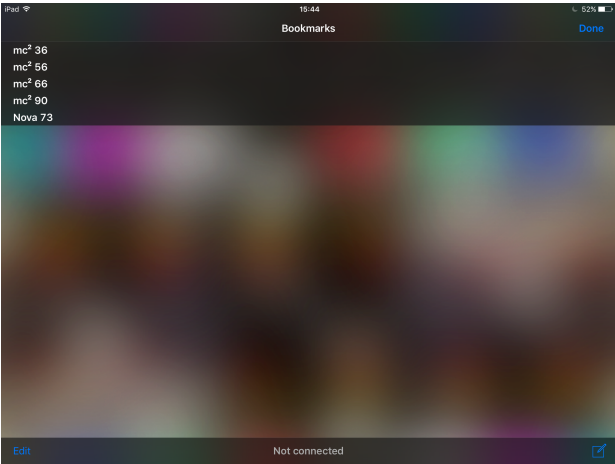
## 22.2 Starting the Lawo Remote App

1. On your device, click on the **Lawo Remote** icon to launch the App.

The Lawo remote welcome page appears showing the status of the existing connection – in our example, “Not connected”:



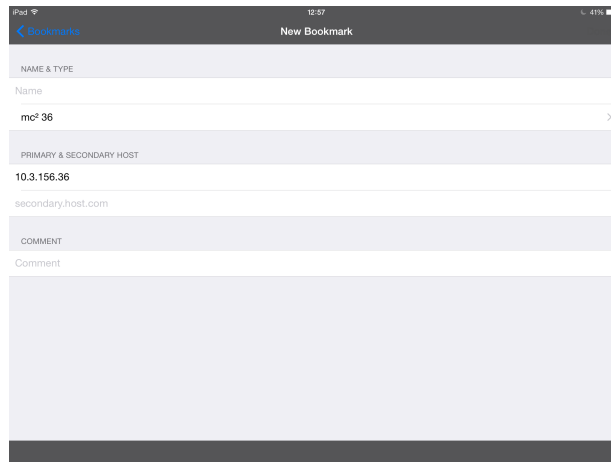
2. Touch the Bookmark icon at the top right of the display - the Bookmarks page opens listing any configured connections. If no connections have been configured, then the list is empty:



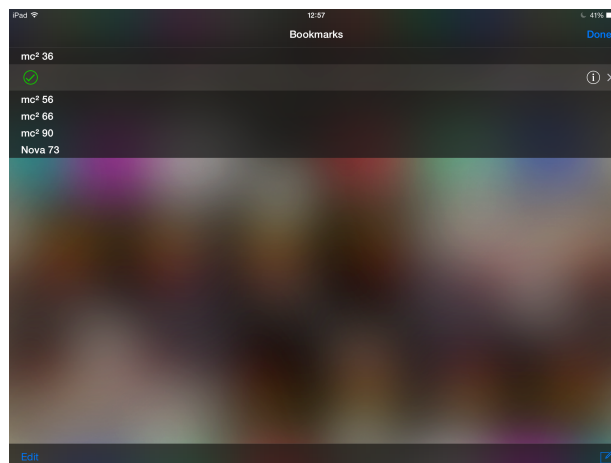
## 22.3 Configuring a New Connection

To configure a new connection:

1. Select the New Bookmark icon at the lower right of the display - the 'New Bookmark' page opens:



2. Touch each entry to edit the:
  - **Name** – this field is used for reference within the Lawo Remote App and can be used to name the system, e.g. **Studio A**.
  - **System Type** – choose an entry from the list of supported systems. The system type must match that of the system you wish to connect to.
  - **Primary & Secondary Host** – enter the IP address of the control system you wish to connect to. If you have a redundant control system, then you will need to enter the primary and secondary IP addresses. (You can check the IP address of your control system from the **System Settings** display, see [IP Address Primary](#).)
  - **Comment** - enter a Comment if you wish.
3. When you have completed each field, touch **Done** to return to the Bookmarks list - a green tick appears beside the new connection:

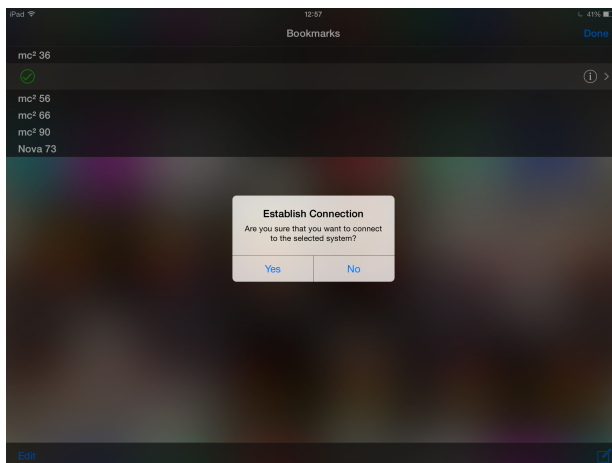


To edit an existing bookmark, touch the **i** icon. Or, to delete an existing bookmark, select the **Edit** button at the lower left of the **Bookmarks** page.

## 22.4 Connecting to the System

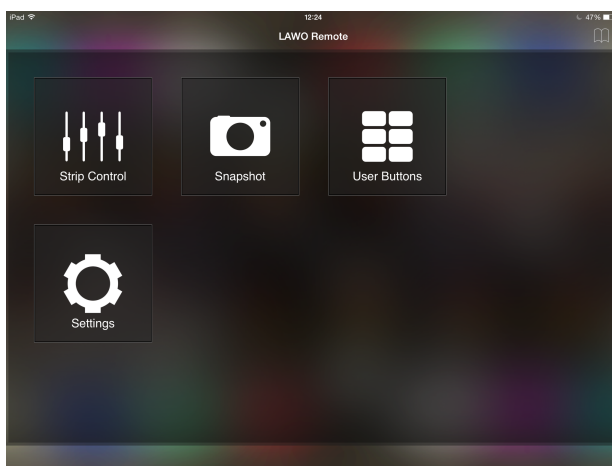
You can connect to any system configured within the **Bookmarks** page. You can only connect to one system at a time.

1. Open the **Bookmarks** page, and touch the bookmark for the system you wish to connect to - the following confirmation dialogue appears:



2. Touch **Yes** to continue.

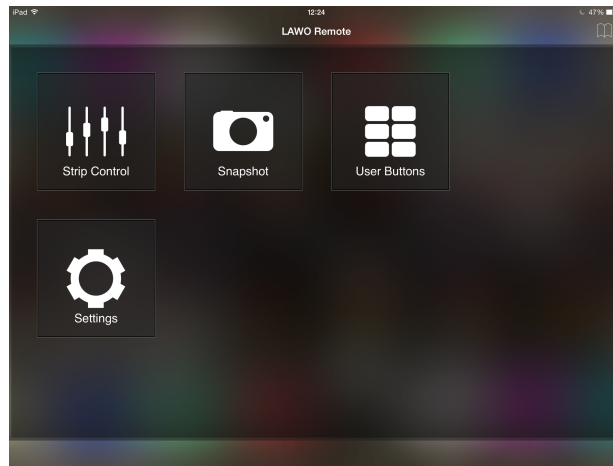
The device attempts to connect. If successful, the operational menus appear:



If the connection fails, then an error will appear. Check the system type and IP settings from the **Bookmarks** page. Check that the device is connected to the correct WLAN. If the connection still fails, then there is a problem with your network or its configuration. Please contact your network administrator for assistance.

## 22.5 iApp Menus

The main operational menus appear once you have an active connection to the mc<sup>2</sup>66 MKII system:



From the Lawo Remote App you can access:

- [Strip Control](#) – to adjust fader levels, input parameters, panning or aux sends.
- [Snapshots](#) – load any Snapshot from any folder within the active production.
- [User Buttons](#) – user defined functions programmed from the [Custom Functions](#) display.
- [Settings](#) - for the Lawo Remote App.



## 22.6 Strip Control

In "normal" view, this page shows the main input parameters, channel name or user label, **MUTE** and fader level. Eight channels are displayed at a time (as selected from the CONTROL buttons on the right of the page):



To change the 8-channel bay, either press the left or right arrow buttons (below CONTROL). Or, tap in the "Selected Bay" field (e.g. on **2.Bay / 9-16**) to open a selector pop-up where you can choose a new bay to view. Press **FLIP** to access the alternate layer on all eight channels.

Note that all controls are local, and so are not affected by banking or layering operations on the main console.

To adjust parameters:

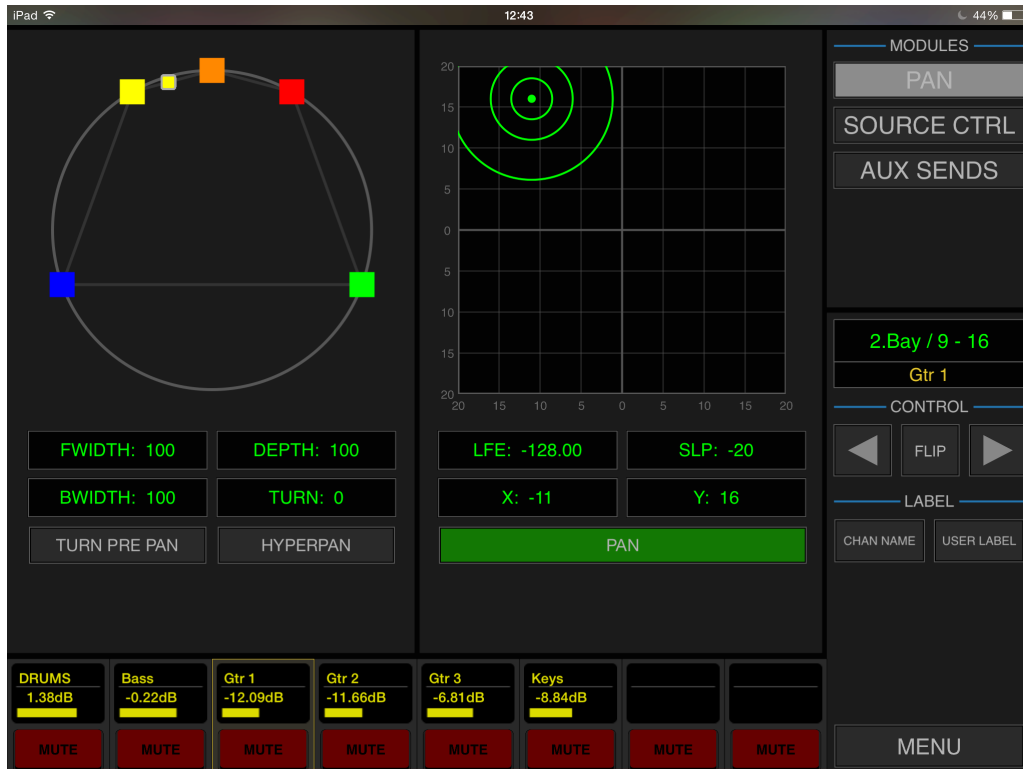
- **Input control** - tap to enable or disable the options for each source. (If an option is "greyed out", then it is not available for that source.)
- **Label** - shows either the channel name or user label (as selected using the LABEL buttons). Note that user labels are always channel user labels (not inherit source). The label field also doubles as the fader SELECT button - touch a label to change the fader in access. The yellow "Channel in access" field updates accordingly.
- **Fader level** - either touch and drag the fader, or double-tap to reset the fader value. The reset level is defined in the iPad [Settings](#) menu.
- **MUTE** - tap to enable or disable.
- **color coding** - is defined by the channel color.

Use the MODULE buttons to access the other Strip Control views.

To return to the main menus, select the **MENU** button (bottom right).

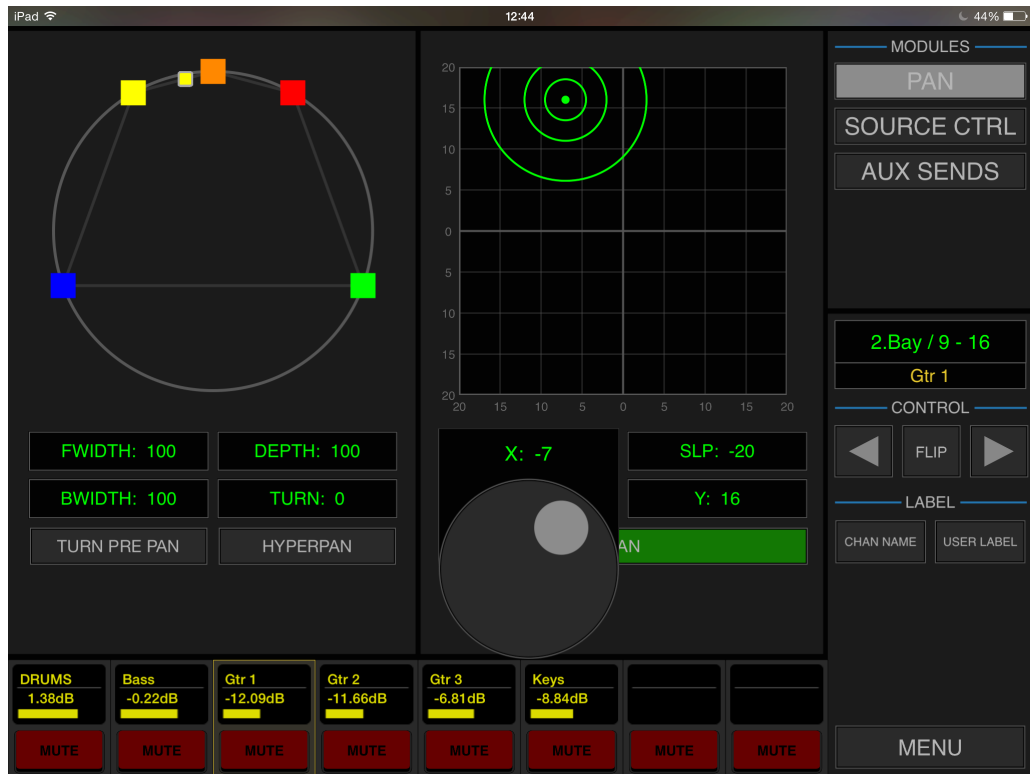
## 22.6.1 PAN / SOURCE CTRL

Select the **PAN** module (top right) to view or adjust panning for a single channel - in our example, for **Gtr 1**:



# 22. Lawo Remote App

You can either tap and drag on the pan position, or tap in a value field (e.g. on **X**) and use the on-screen rotary control to adjust the value:



Tap on a different channel name/user label field (at the bottom of the page) to change the channel in access.

Select the **SOURCE CTRL** module (top right) to adjust source control, dig amp, delay and/or the insert in a similar manner.

## 22.6.2 AUX SENDS

The **AUX SENDS** module can be used to view and adjust the send levels to a selected Aux master - for example, to Aux 1/2 (**Drum RVB**).

This works in a similar manner to the [FADER CONTROL of Levels](#) mode on the console front panel - first, select an Aux master (from the top half of the page), and then use the eight faders to adjust the send levels, turn the SEND ON/OFF, and select the aux send position (post-fader, pre-fader or pre-EQ).



The labels displayed on the Aux master select buttons can show either the channel name or user label (as selected using the LABEL buttons).

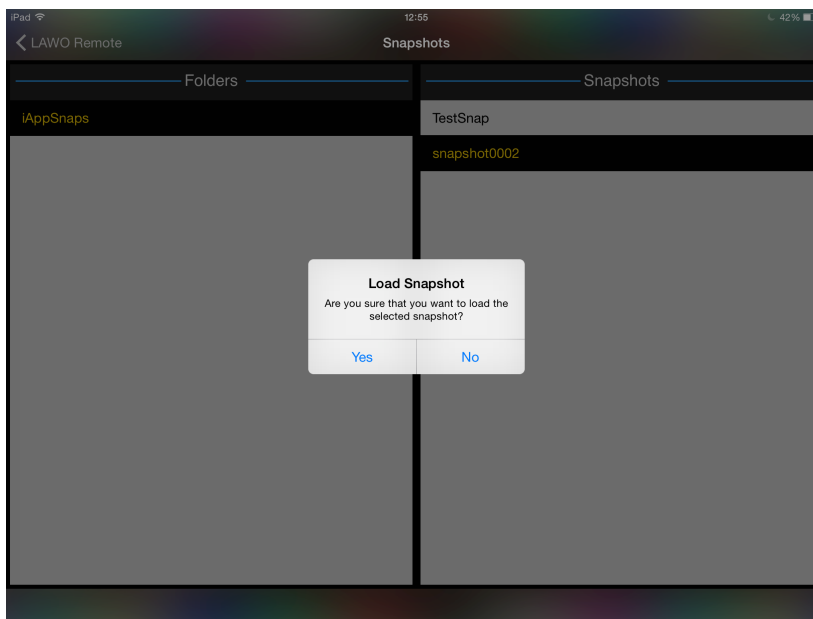
You can also adjust the level of the Aux master or **MUTE** its output (from the top half of the page); the Aux master select buttons are colored red if an aux master is muted.

To access all available Aux masters, swipe downwards.

## 22.7 Snapshots

Return to the main menus, and select **Snapshots** to load a Snapshot from any folder within the active production:

1. Select the folder - e.g. **iAppSnaps**.
2. Then select the snapshot followed by **Load** and click **Yes** to confirm - the snapshot is loaded to the console. If any [snapshot isolates](#) are active, then these are applied.
3. To return to the main menus, select the **Lawo Remote** button (top left).



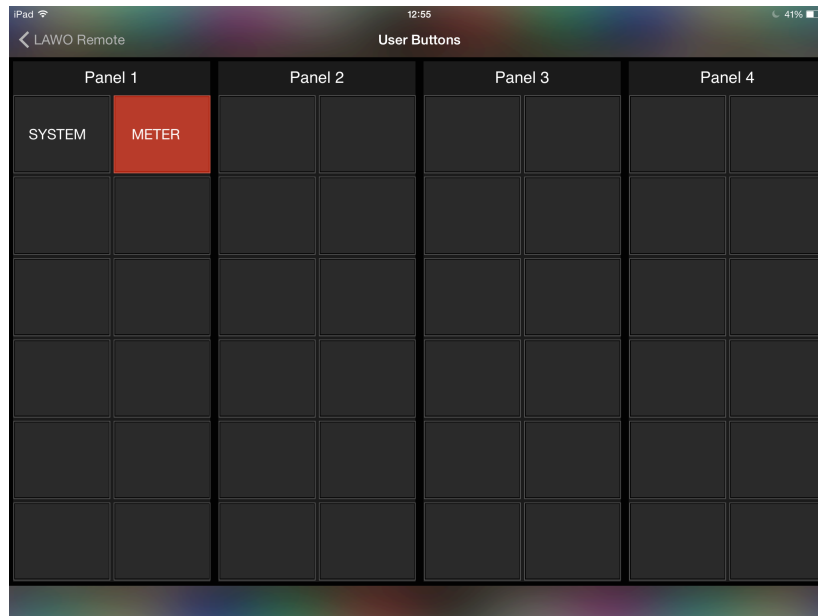
Note that you cannot save or update snapshots from the Lawo Remote App, or change production.

## 22.8 User Buttons

Select **User Buttons** to access functions programmed the [Custom Functions](#) display:

1. Touch a button to action its function.
2. To return to the main menus, select the **Lawo Remote** button (top left).

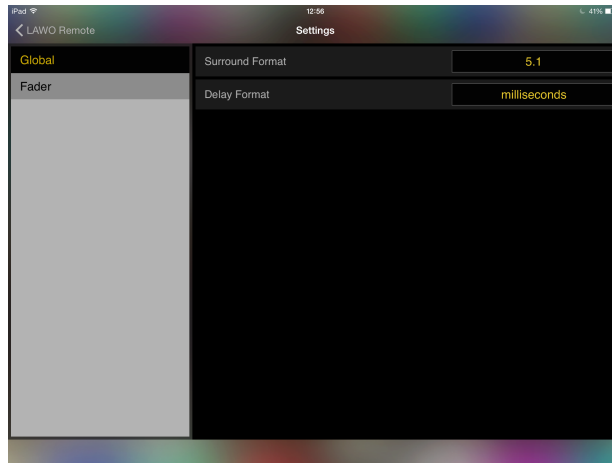
Note that the Lawo Remote user buttons are stored with the console configuration, and therefore may vary when you connect to a different console. For a list of potential functions, please see the [Custom Functions List](#).



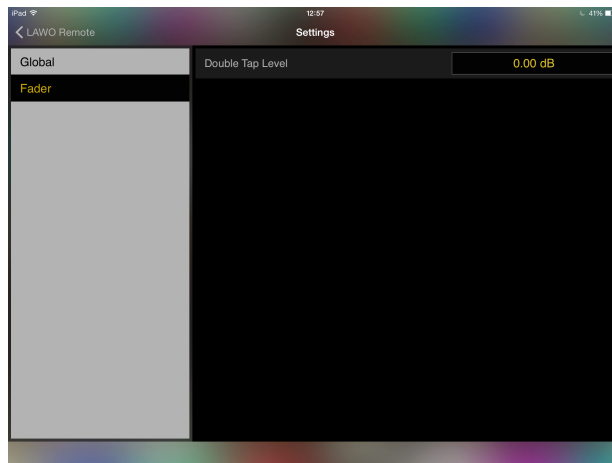
### 22.9 Settings

This menu provides access to settings which are specific to the iApp. Some can be adjusted; others are for information only:

- **Global -> Surround Format** - shown for information purposes only.
- **Global -> Delay Format** - click to select milliseconds, metres or frames. The selection affects how delay parameters are displayed in the SOURCE CTRL view on the [Strip Control](#) page.



- **Fader -> Double Tap Level** - click to enter the reset value which will be used when a fader is double tapped on the [Strip Control](#) page:



## 23. Fault Finding & Diagnostics

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This chapter describes the fault finding and diagnostics tools available to the operator.

Topics include:

- [Software Versions](#)
- [Shutdown & Restart](#)
- [Diagnosing System Errors](#)
- [Control Surface PSU Alarms](#)
- [Redundant Router Module](#)
- [Restarting a Bay Server](#)

For more information on further diagnostics and service procedures, please refer to your product's Technical Manual.



## 23.1 Software Versions

### Compatibility

All Lawo products use a consistent software release numbering system to indicate compatibility. In each case, the first three digits of the software versions *must* match. This affects mxGUI and AdminHD, as well as other networked mc<sup>2</sup>/Nova systems.

### Checking the Software Version

You can check the software version of your mc<sup>2</sup>/Nova system from the **System Settings** display: select [Global -> System](#) and look at the **Product Release Version** field.

### Software Updates

The latest software for your product is available from the **Download-Center** at [www.lawo.com](http://www.lawo.com) (after **Login**). Information about the software release can be found in the "Release\_Notes\_X.xx" documentation.

From Version 5.8.2 onwards, the **mxUpdater** utility (included with mxGUI) should be used to update the system software. Note that the utility contains *only* the version which is concurrent with the mxGUI release. Therefore, it is only possible to update to this version. To update to a different release, or downgrade the system, you will need to use the "new CF cards" method described in your Technical Manual.

Note that a software update affects only the System Flashcard, and will not alter any of your user data.

Once running Version 5.8 (or later), there can be a mismatch in your configuration if you install an earlier release than 5.8. Therefore, please contact the Lawo support department if you wish to downgrade your software version to a release < Version 5.8.

### Changing Firmware Revisions

From Version 5.6, all Nova73 IO modules will automatically update to the required firmware (according to their AdminHD configuration) once they are plugged into the Nova73 frame. This makes it easier than ever to reconfigure a system, and prevents any mismatch between Control System and IO software revisions.

## 23.2 Shutdown & Restart

### Shutdown

The system should be shut down by powering off the Nova73 (via the mains connections at the front of the unit). Note that the control system is located on the Router Module MKII within the Nova73. Therefore, it is not necessary to power off the control surface in order to shut down the control system. However, if you intend to leave the console for any length of time, then powering off the surface is recommended.

Following switch-off, power is provided to the control system for a further few 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 signaling that the shut down has been successfully completed. The system is shut down when the blue LED of the trackball is off.

You can switch off the power to other components, such as remote IO devices, at any time.

### Starting the System (Warm Start)

The system starts automatically when power is supplied to the Nova73. If the control surface is not powered, then you should also power up the surface.

The control system boots in a few seconds; during this time you will see the boot-up progress on the console's displays. 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. Once boot-up is complete, the displays refresh to show the Channel Display and Central GUI screens. The console is now ready for operation.

The following settings are stored in the warm start data, and are recalled following a warm start:

- Core configuration settings changed by an online AdminHD computer.
- Matrix crosspoints and IO parameters (Mic preamp gain, SRC on/off, etc.)
- The DSP configuration and parameters (EQ, Dynamics, Fader levels, etc.)
- All other user settings (fader strip assignments, etc.)

### Starting the System (Cold Start)

Alternatively, the system can be set to cold start, following the next reboot, by selecting the **Global** -> "[Prepare Coldstart](#)" option in the **System Settings** display. First, enable the option, and then restart the control system (e.g. power off and on).

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.

Following a cold start:

- All configuration files (defined by AdminHD) return to their cold start defaults (config.tcl, gui\_config.tcl, etc.)
- All matrix connections are cleared, unless protected by the factory-configuration.
- All IO parameters are set to factory default values.
- The default DSP configuration is loaded. This can be defined from the **Custom Functions** display.
- All DSP parameters are set to factory default values.
- All other user settings are cleared (e.g. no fader strip assignments).

The best way to reset the console for a new job or show is to [load](#) a production.

## 23.3 Diagnosing System Errors

In the event of a component failure, a hazard warning flag appears in the title bar of the Central GUI. Hover over the warning triangle to view the last ten alarm messages. Messages in red indicate active alarms; messages in yellow are resolved.

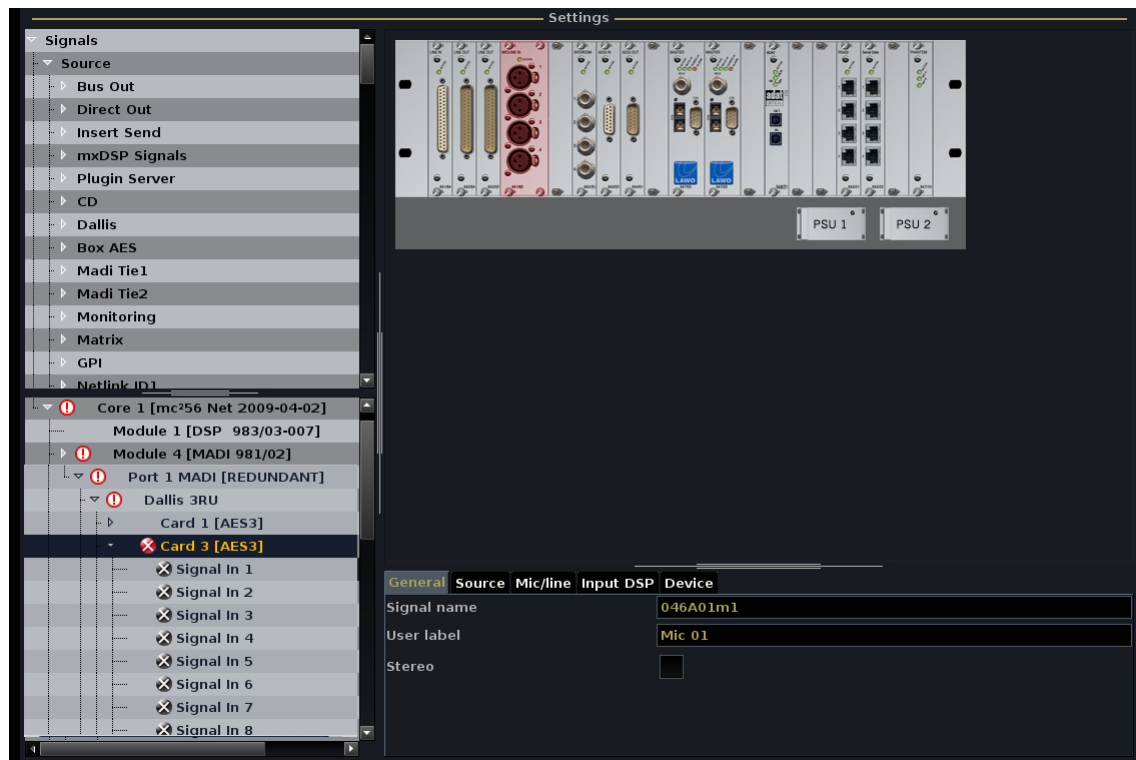


To interrogate further:

1. Open the **Signal Settings** display.

This display monitors all of the components defined in the AdminHD configuration. In the event of a problem, a red/white cross appears in the **System** tree.

2. 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:



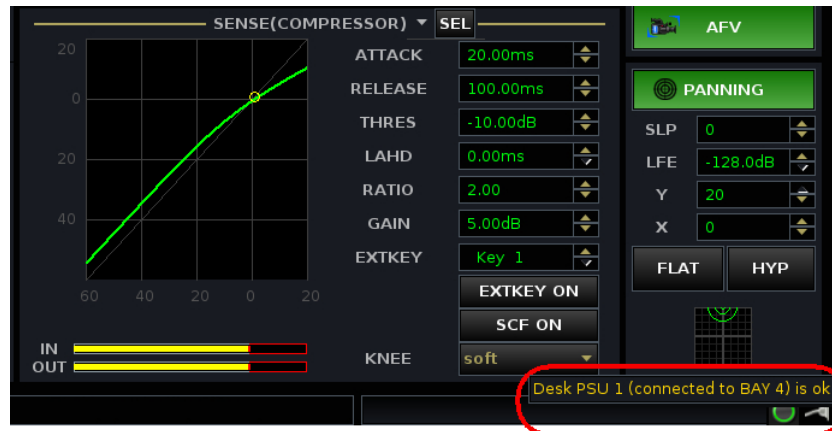
3. Check and replace the card if necessary.

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.

## 23.4 Control Surface PSU Alarms

The Central GUI offers status monitoring for all external power supplies.

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



The number of symbols relates to the number of external power supplies.

The symbols indicate:

- **Green Circle** – the PSU is working fine.
- **Yellow triangle with an exclamation mark** – the PSU is working fine, but there was a fault in the past which has now been cleared. Click on the icon to reset it.
- **Red circle with an exclamation mark** – there is a fault.

Hover over the symbol to reveal more information:



Our example shows the status of the external power supply connected to Bay 4.

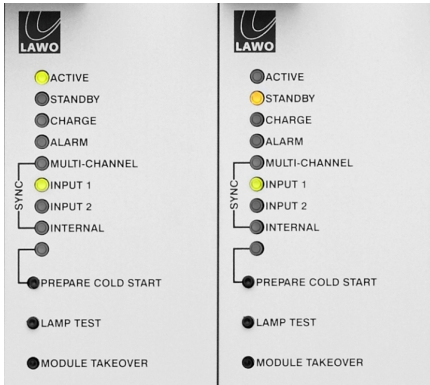
Note that within the text on the GUI, bays are counted from BAY 1 upwards. However, internally bays are addressed from 0. This means that BAY 1 on the GUI relates to an internal Bay Server address of 0, BAY 2 to an internal address of 1, and so on.

## 23.5 Redundant Router Module

By fitting two Router Modules (980/33) to the central slots of the Nova73, the system supports redundancy for both the routing matrix AND control system.

When the system first boots, the module on the left is active, while the module on the right is redundant. This is indicated by the **ACTIVE** and **STANDBY** LEDs.

*Main & Redundant Router Module LEDs*



### 23.5.1 Automatic Takeover

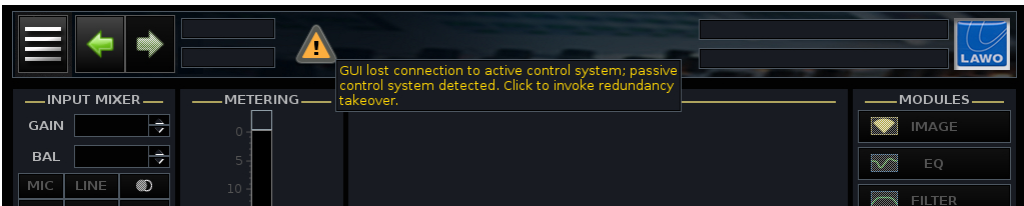
If the active Router Module fails or there is a control system error, the system will automatically switch to the redundant Router Module. This ensures a seamless recovery without any interruption to operation.

Note that there will be a brief interruption to audio, of around 1 second, while routes are reconfigured.

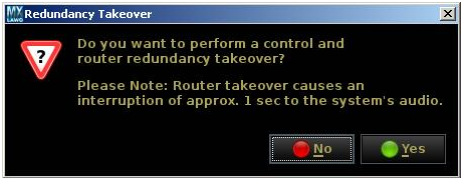
### 23.5.2 Control Surface Connection Failure

If the ETHERNET A connection between the control surface and Router Module fails, then an automatic takeover does *not* occur, as the failure could be deliberate (for example, you may have disconnected the network cable).

Instead the operator is presented with an error message on the Central GUI:



Click on the message - a confirmation pop-up appears:



Select **Yes** to switch to the redundant Router Module; this will result in a brief interruption to audio (as for an automatic takeover).

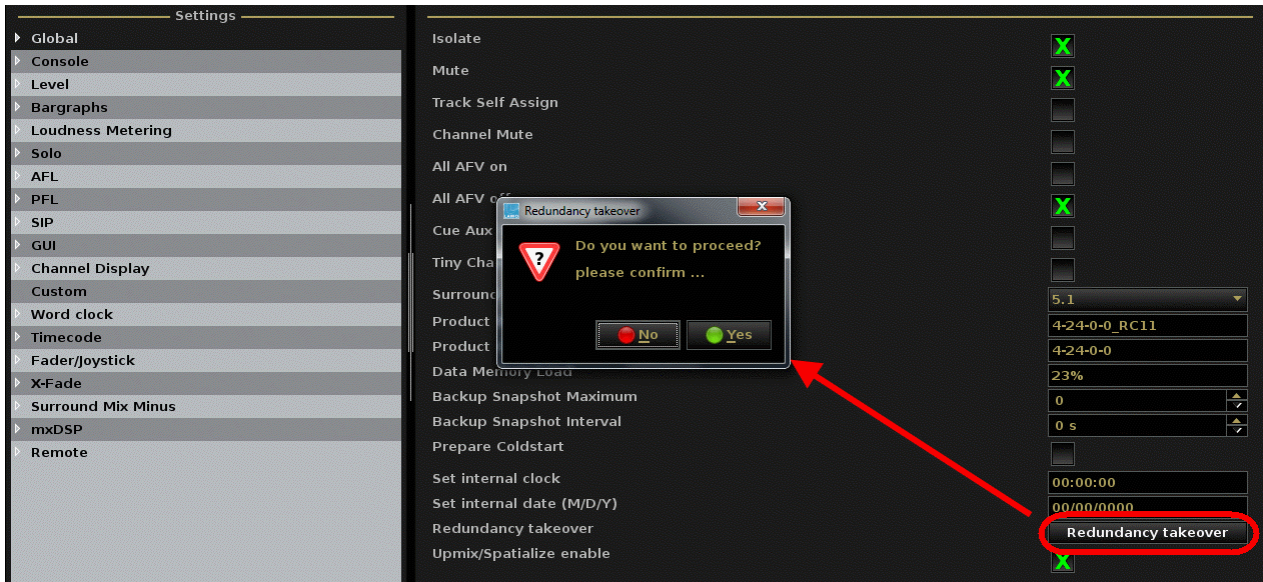
Select **No** to ignore the error and close the pop-up. In this instance, there will be no interruption to audio, but you will lose control from the console surface until such time as the missing ETHERNET A connection is re-instated.

### 23.5.3 Manual Takeover

The system can be forced to switch to the redundant Router Module using any of the following methods: the Central GUI, the MODULE TAKEOVER button or the ROUTER TAKEOVER contact closure.

#### Using the Central GUI

1. Open the **System Settings** display and select the **Global** topic.
2. Click on **Redundancy takeover** - a confirmation dialogue box appears:



3. Select **Yes** to confirm or **No** to cancel the operation.

If you select **Yes**, then the system will switch to the redundant Router Module; this will result in a brief interruption to audio (as for an automatic takeover).

#### Using the MODULE TAKEOVER Button

1. On the [front](#) of the Nova73, identify the redundant Router Module - this is one with the **STANDBY** LED lit (yellow).
2. On this module, press the recessed **MODULE TAKEOVER** button.

The system will switch to the redundant Router Module; a brief interruption to audio will occur while routes are reconfigured (as above).

Once the takeover is complete, you will see the **ACTIVE** and **STANDBY** LEDs update accordingly.

#### Using the ROUTER TAKEOVER Contact Closure

A manual takeover can also be forced by triggering a positive edge at the **ROUTER TAKEOVER (IN)** input of the Nova73's GPI 1 connector.

## 23.6 Restarting a Bay Server

Each TFT display on the mc<sup>2</sup>66 MKII has its own Ethernet Bay Server which can be restarted from the front panel. You should perform this procedure, rather than a complete 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 loses its Ethernet connection to the control system.

1. Using a pointed object, press the recessed button at the bottom of the display:



The Bay Server restarts in a few seconds; during this time you will see the boot-up screen on the display. Once complete, communication with the control system is re-established, and the Channel (or Central GUI) display is reinstated.

## 24. Trouble-shooting

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This chapter includes a series of typical problems and tips to help you fault find the system.

Topics include:

- [Boot-up Issues](#)
- [Control Surface Issues](#)
- [Network Communication Issues](#)
- [mxGUI Issues](#)

For further assistance, please contact your local Lawo representative or email [support@lawo.com](mailto:support@lawo.com).



### 24.1 Boot-up Issues

#### 24.1.1 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 User Data Flashcard.

4. If this is still unsuccessful, then you should try replacing the System Data Flashcard with a backup copy.

#### 24.1.2 The system boots up but I have no audio

1. Check the [System Settings](#) display to see if there any reported errors.

If an IO module or remote IO device/card is shown in red, then there is a problem with the connection or the hardware.

2. Check the connections to the remote IO device/card.

Are the fibres reversed?

3. Check the indicators on the Nova73 and remote IO device/card.

The **ACTIVE** LEDs on all Nova73 modules and DALLIS cards should blink in time with each other at around 1Hz. 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. If the symptom persists, replace the plug-in card.

4. If everything still looks ok, try reloading the DSP configuration from the [DSP Configurations](#) display.

## 24.2 Control Surface Issues

### 24.2.1 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 module.
3. If not, power off the Nova73 and wait for the system to shutdown. And power on to try a [warm start](#).

### 24.2.2 One of the control surface panels is not working

1. Try [restarting](#) the Ethernet Bay Server.
2. Carefully 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.

### 24.2.3 The graphics on the console displays appear to freeze

This can 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, the problem should resolve.

### 24.2.4 The graphics on one of the console displays freezes or looks odd

This can occur if a Bay Server loses 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.

### 24.2.5 The USB ports are not working

The USB ports in the control surface have a ganged short circuit protection. This means that a short circuit at one of the ports will shut down all ports together.

To reset the short circuit protection:

1. Power the control surface off and on in order to power cycle the internal USB hub.

If the problem persists, then the USB hub may be faulty.

### 24.2.6 The console keyboard or trackball are not working

This can occur if the USB short circuit protection has been triggered (as if one of the USB ports has a short circuit, then all ports will shut down together).

1. First, check that the keyboard is installed correctly.
2. Then check if the other USB ports are powered.
3. If not, power the control surface off and on in order to power cycle the internal USB hub.

If the problem persists, then the USB hub may be faulty.

## 24.3 Network Communication Issues

### 24.3.1 The network connection to the control system is not working

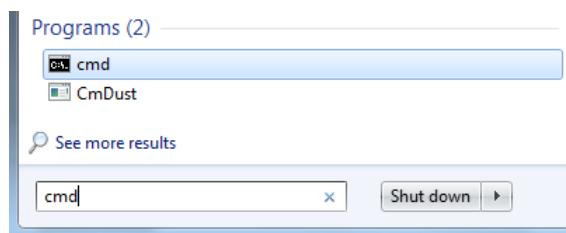
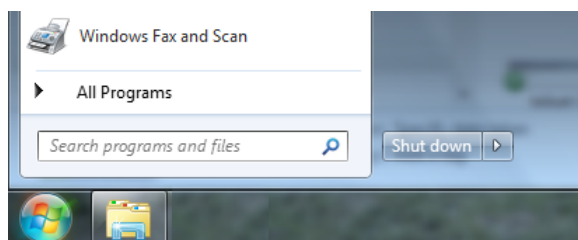
If you cannot establish network communication with the mc<sup>2</sup>/Nova control system:

1. Check the network connections from your device to the Lawo network, and from the Lawo network to the mc<sup>2</sup>/Nova system.
2. Check the [TCP/IP settings](#) on the connecting device's Network Interface Card.
3. If applicable, check that the software you are running is [compatible](#) with the mc<sup>2</sup> system. When connecting from mxGUI or AdminHD, the first three digits of the software versions *must* match.
4. Try running a [PING](#) test:
  - If the ping test fails, then there is something wrong with your network configuration.
  - If the ping test is successful, then the network communication is working. If you still cannot connect to the mc<sup>2</sup>/Nova system, then something may be blocking the connection. Try disabling any firewall and/or antivirus software on the connecting device.

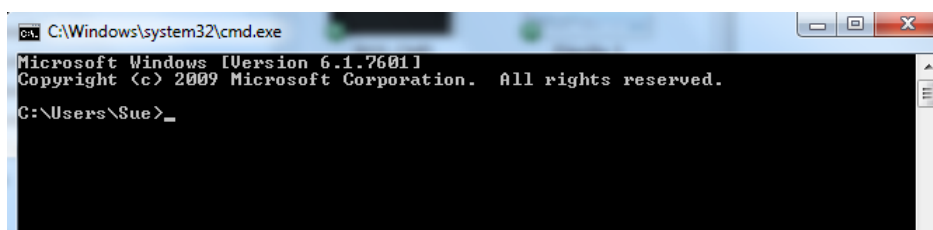
### 24.3.2 Running a PING test

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 correct network port, 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).

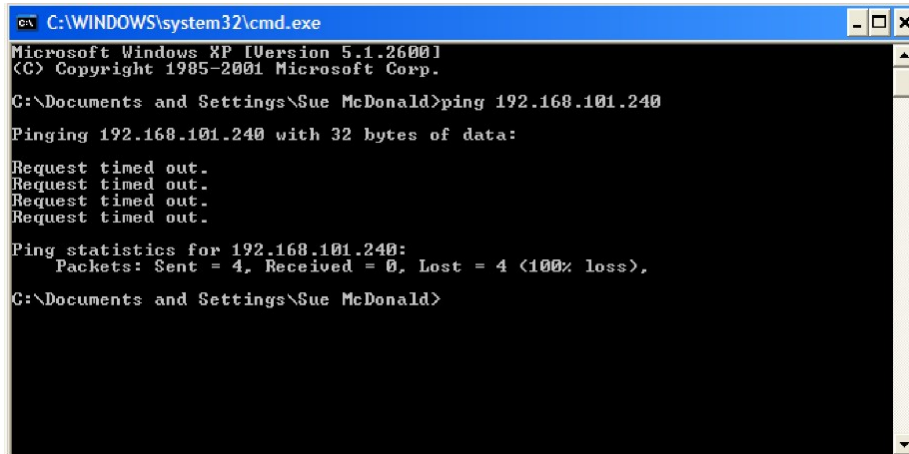
3. On both platforms, perform the ping test as follows:

Type **ping xxx.xxx.xxx.xx** (where **xx..** is the IP address of the device you are trying to connect to) and press Enter.

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:



```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\Sue McDonald>ping 192.168.101.240

Pinging 192.168.101.240 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

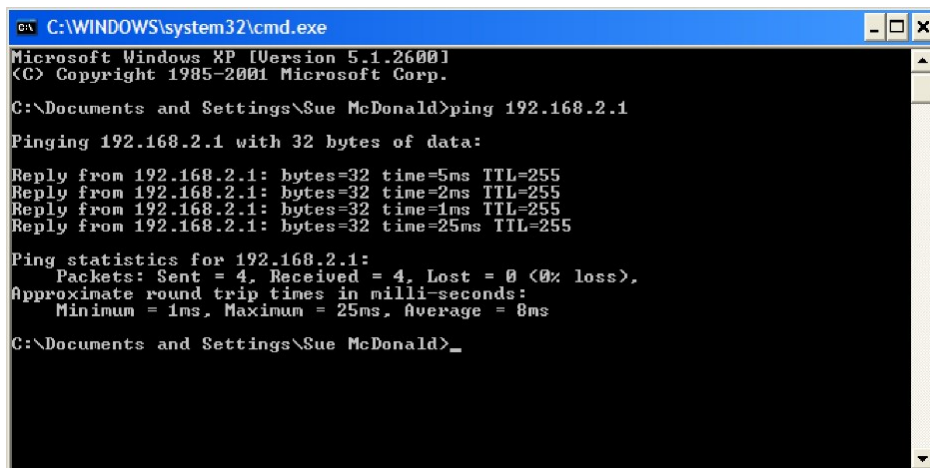
Ping statistics for 192.168.101.240:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\Documents and Settings\Sue McDonald>
```

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:



```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\Sue McDonald>ping 192.168.2.1

Pinging 192.168.2.1 with 32 bytes of data:

Reply from 192.168.2.1: bytes=32 time=5ms TTL=255
Reply from 192.168.2.1: bytes=32 time=2ms TTL=255
Reply from 192.168.2.1: bytes=32 time=1ms TTL=255
Reply from 192.168.2.1: bytes=32 time=25ms TTL=255

Ping statistics for 192.168.2.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 25ms, Average = 8ms

C:\Documents and Settings\Sue McDonald>_
```

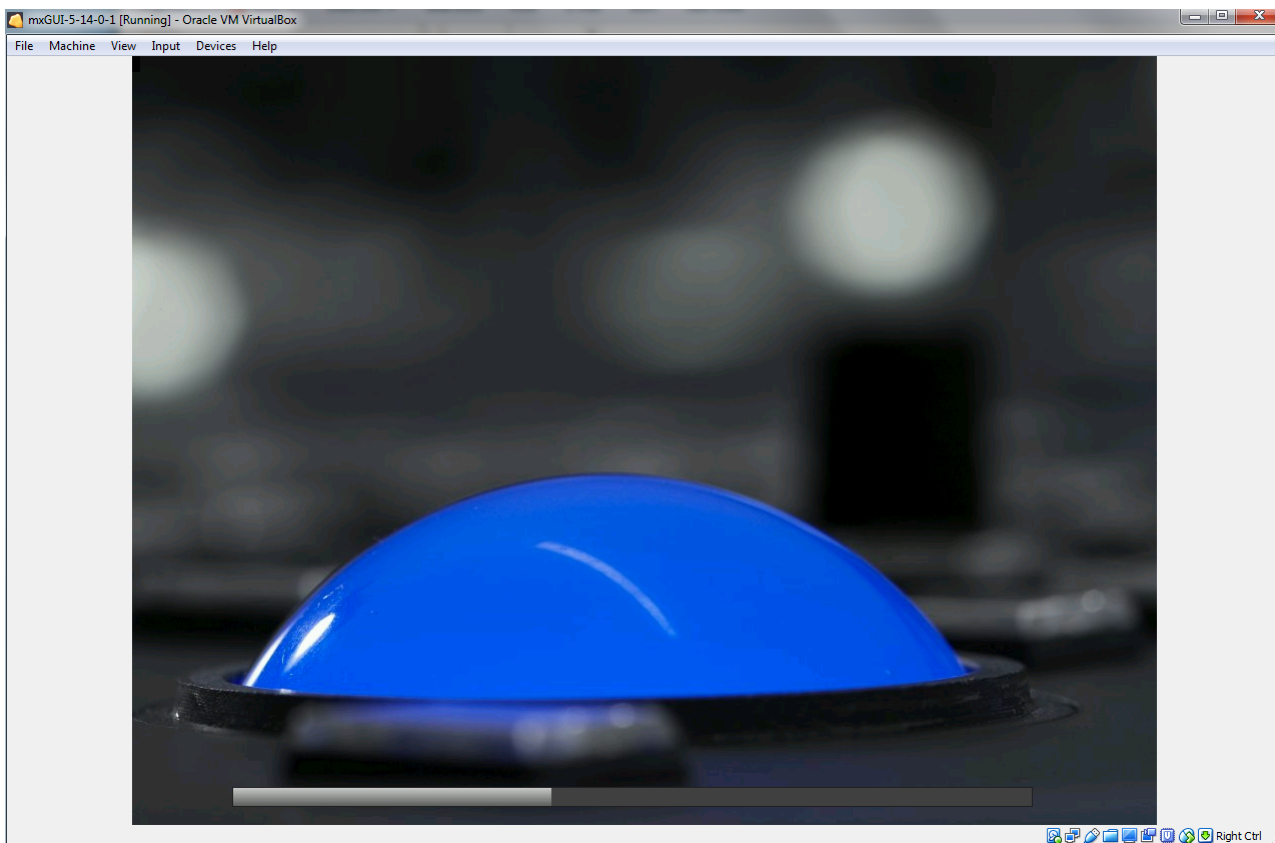
This confirms that the network communication is working. If you still cannot connect, then something on your computer is blocking the network connection. Try disabling any firewall and/or antivirus software.

## 24.4 mxGUI Issues

### 24.4.1 mxGUI is not booting up

If, when you [start](#) mxGUI, you see only a black screen and not the trackball shown below, then you should check the [BIOS setup](#) of your PC.

1. Enter the BIOS system of your computer - the exact method varies depending on the PC manufacturer, so please refer to your computer's manual for details.
2. Search for a checkbox called "VTX" or "Virtual Technology" - on most computers, it can be found under security or something similar. This option MUST be enabled.
3. Then restart mxGUI, and you should see the blue trackball screen appear:



## 25. Appendices

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This chapter includes further information which you may find useful.

Topics include:

- [Control System Locations](#)
- [Default TCP/IP Settings](#)
- [Surround Levels](#)
- [Pan Slope](#)
- [Central User Button Numbering](#)
- [Controlling Virtual Devices \(A line, LCU, DMI-8\)](#)
- [Digital Output Settings](#)
- [SDI Parameters \(3G SDI Card\)](#)
- [SDI Parameters \(non 3G SDI Cards\)](#)
- [VCA, Surround, Link & Couple Masters: Master/Slave Behaviour](#)

## 25.1 Control System Locations

The table below shows the location of the control system for different mc<sup>2</sup> and Nova products.

Note that the Router Module MKII (980/33) control system provides two network ports: **ETHERNET A** connects to the mc<sup>2</sup> control surface; **ETHERNET B** connects to the Lawo system network.

System	Router Module	Control System	Location	System Network Port
mc <sup>2</sup> 36	980/33	Intel	Control Surface	ETHERNET B
mc <sup>2</sup> 56 MKII	980/33	Intel	Nova73	ETHERNET B
mc <sup>2</sup> 66 MKII	980/33	Intel	Nova73	ETHERNET B
mc <sup>2</sup> 96	980/33	Intel	Nova73	ETHERNET B
Nova73 HD MKII	980/33	Intel	Nova73	ETHERNET B
Nova73 Compact MKII	980/33	Intel	Nova73 Compact	ETHERNET B
mc <sup>2</sup> Micro Core	980/33	Intel	Micro Core	ETHERNET B
Nova37	980/33	Intel	Nova37	ETHERNET B

## 25.2 Default TCP/IP Settings

### Default IP Addresses

The default IP addresses, for different Lawo product control systems, are:

- **mc<sup>2</sup>36** = 192.168.102.36
- **mc<sup>2</sup>56** = 192.168.102.56
- **mc<sup>2</sup>66** = 192.168.102.65
- **mc<sup>2</sup>96** = 192.168.102.96
- **Nova73** (HD & Compact) = 192.168.102.1
- **mc<sup>2</sup> Micro Core** = 192.168.102.136
- **Nova37** = 192.168.102.137
- **mxGUI** (local control system) = 192.168.56.101

You can check the IP address of your control system from the **System Settings** display under **Global** -> **System** -> **IP Address Primary**.

### Subnet Mask

For all products, the default Subnet Mask = **255.255.255.0**

### Other IP Addresses

The table below lists the other IP addresses used within a mc<sup>2</sup>66 MKII installation:

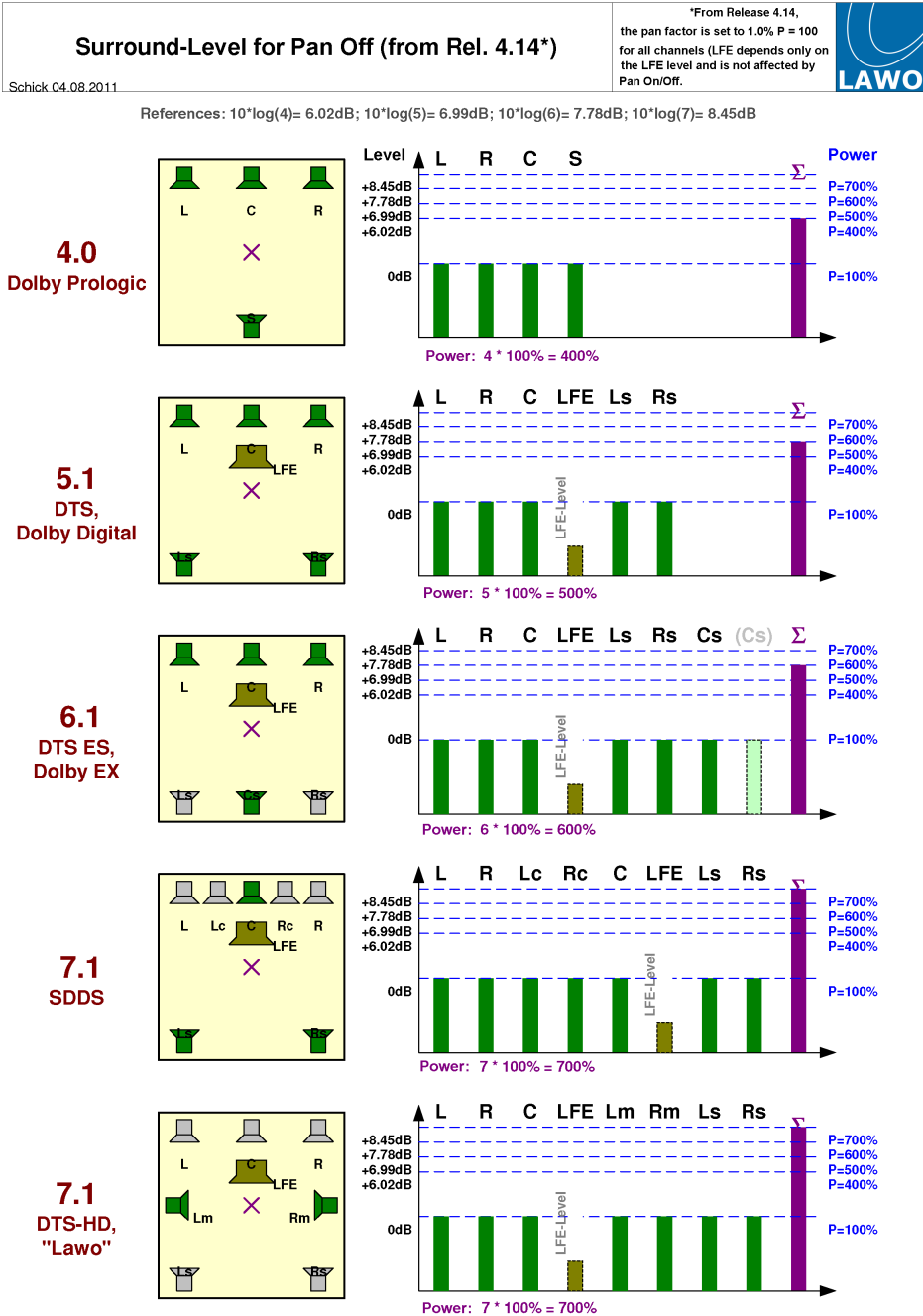
Device	Port	IP Address	Notes
Router Module 980/33 Slot A	ETHERNET A (internal network)	192.168.105.1	Fixed address.
Router Module 980/33 Slot A	ETHERNET B (external network)	192.168.102.xxx	Default address of the control system (as listed above).
Router Module 980/33 Slot B (optional)	ETHERNET A (internal network)	192.168.106.1	Fixed address.
Router Module 980/33 Slot B (optional)	ETHERNET B (external network)	192.168.102.xxx	This address is <i>always</i> one digit higher than that of the main control system.
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. The control system address (ETHERNET B) can be changed in a file called "ip-address" located on the data card (in the **/data/config** folder).



## 25.3 Surround Levels

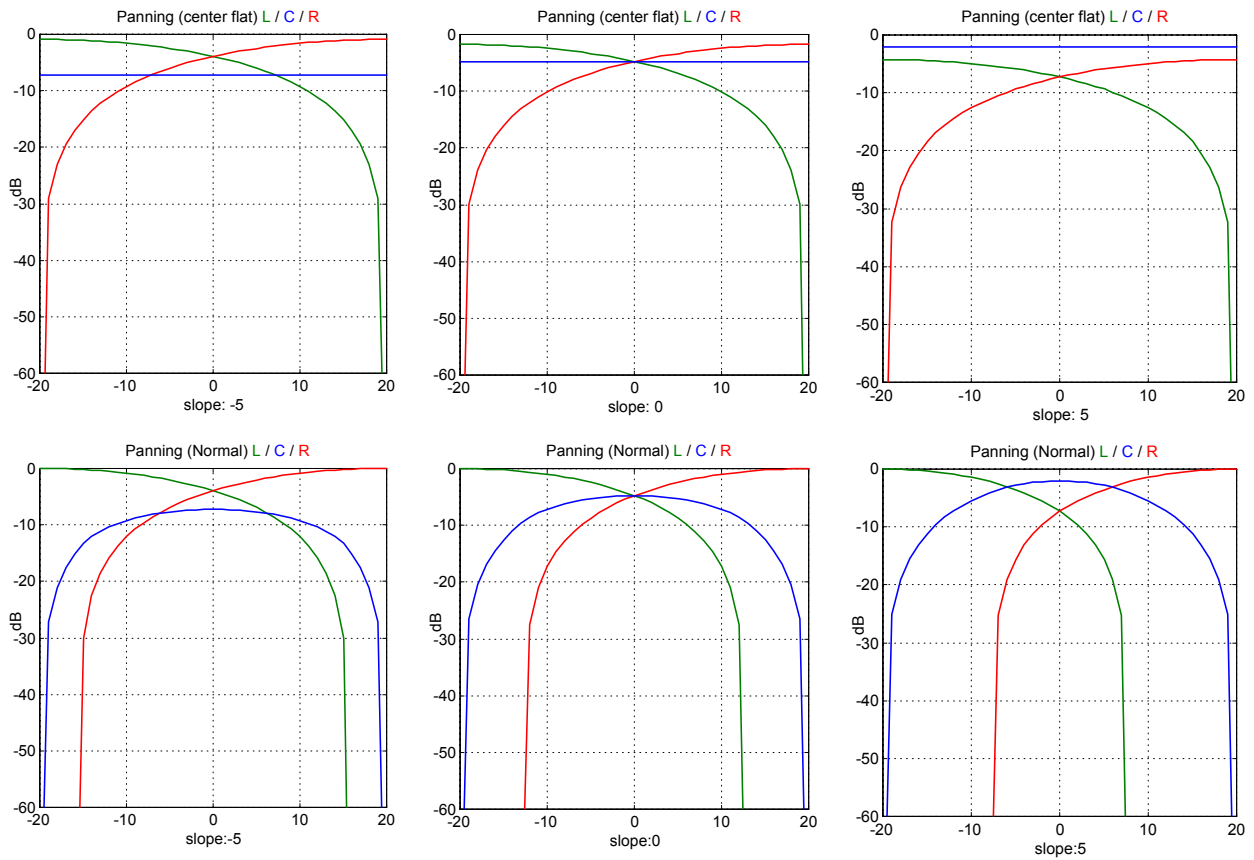
The following diagrams show the power output to each channel, when panning is off, for each of the console's surround formats.



04.08.2011

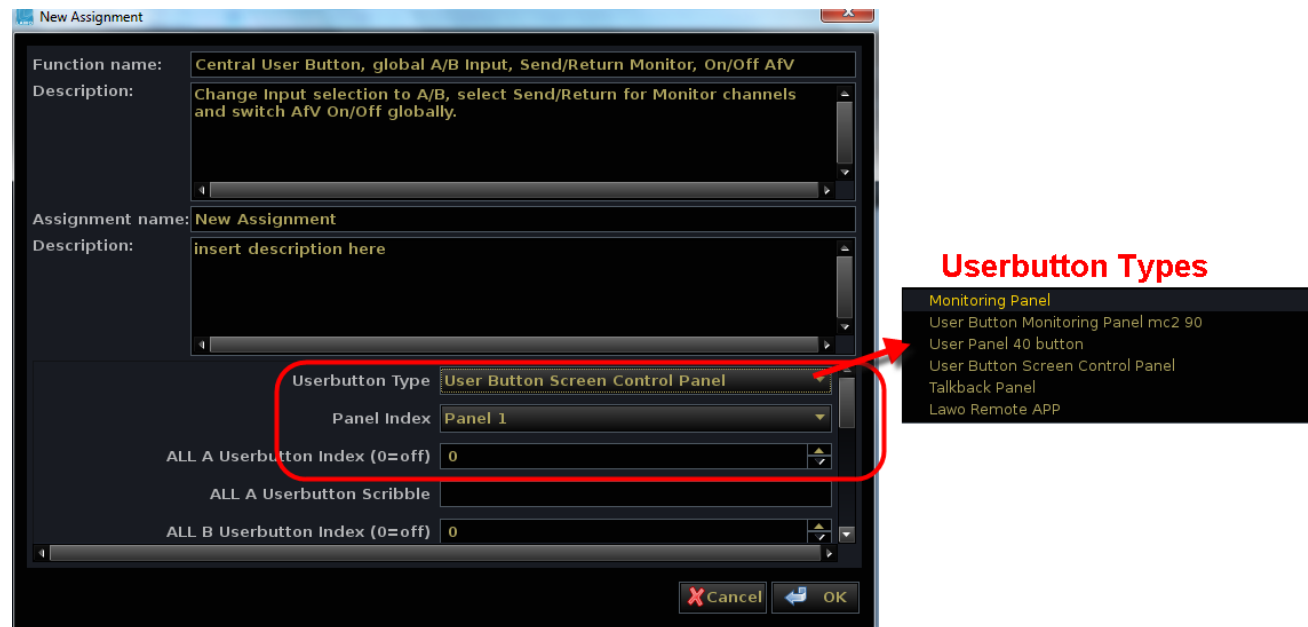
## 25.4 Pan Slope

The following diagrams demonstrate how the slope control affects Left-Centre-Right panning:



## 25.5 Central User Button Numbering

The following information describes the panel type, index and button numbering for each "central" user button panel on your mc<sup>2</sup> console. You will need this information to address user buttons from the [Custom Functions](#) display:

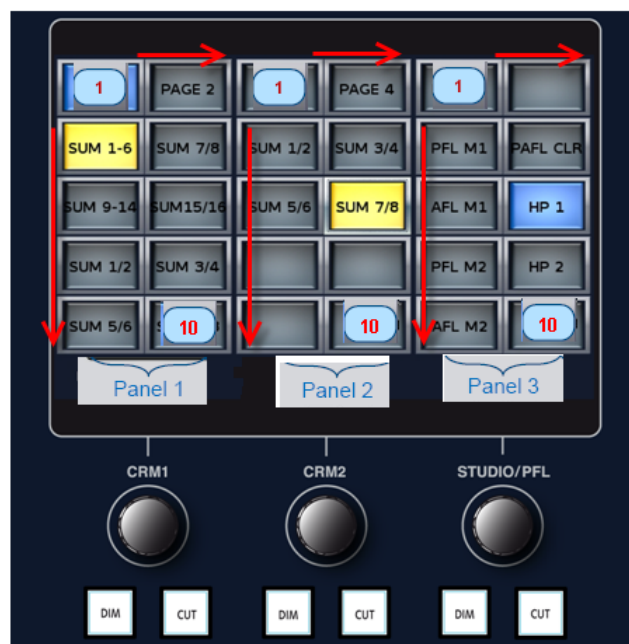


Note that not all panel types are supported by all consoles. When configuring a Nova73, the only relevant panel type is the [Lawo Remote App](#).

### 25.5.1 Monitoring Panel

This panel type addresses the touch-screen buttons on the console's MONITORING panel. The panel indexing and button numbering is as follows.

mc<sup>2</sup>66 - MONITORING Panel

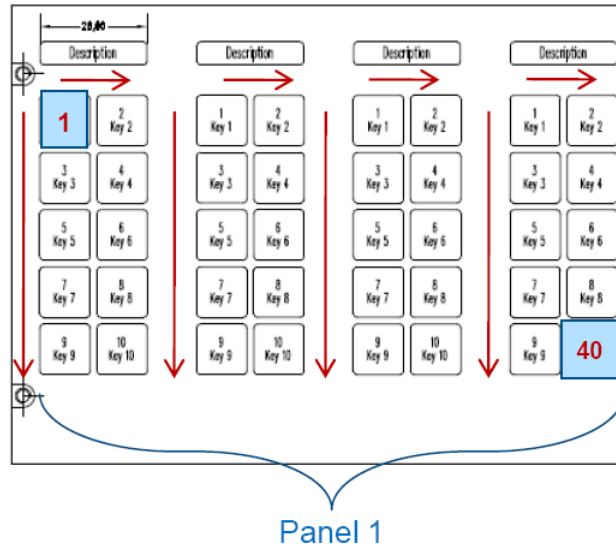


## 25.5.2 User Panel 40 Button

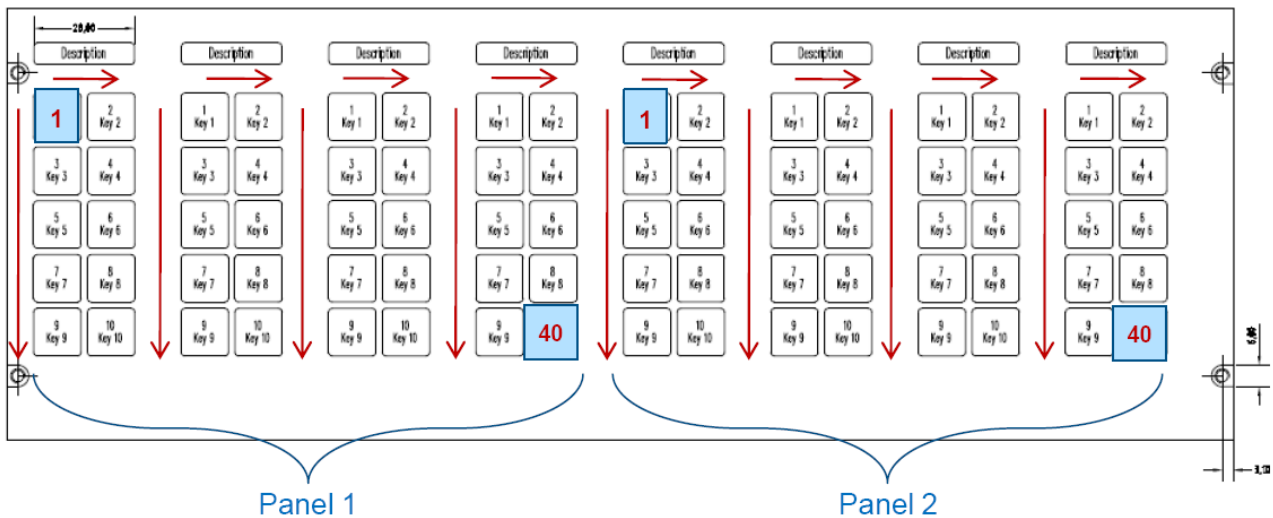
This panel type addresses the 40-button user panels that can be fitted to the [centre section](#).

The panel index and button numbering is as follows.

User Panel 40

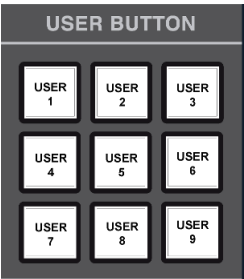


User Panel 80



## 25.5.3 User Button Screen Control Panel

This panel type addresses the CENTRAL USER BUTTONS on the console surface.  
The panel index is always 1 and button numbering is as shown below.

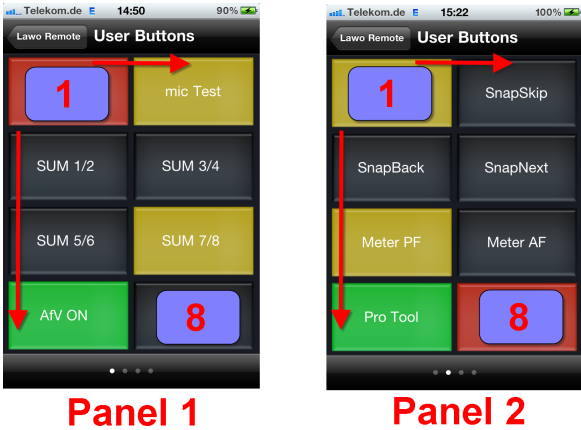


## 25.5.4 Talkback Panel

This panel type has no meaning on the mc<sup>2</sup>66. It is used on other mc<sup>2</sup> consoles to address buttons on the TALKBACK panel. This panel type addresses the user buttons on the TALKBACK panel.  
The panel index is always 1 and buttons are numbered 1 to 4 from left to right.

## 25.5.5 Lawo Remote APP

This panel type addresses the user buttons within the [Lawo Remote App](#) (running on iPhone, iPod or iPad).  
The panel index and button numbering for the first two panels is shown below. Up to four User Button panels can be configured.



## 25.6 Controlling Virtual Devices (A\_\_line, LCU, DMI-8)

The following RAVENNA Virtual Devices can be controlled directly from the mc<sup>2</sup> console: Lawo's **A\_\_mic8**, **A\_\_dig8** and **LCU (Lawo Commentary Unit)** and Neumann's **DMI-8**.

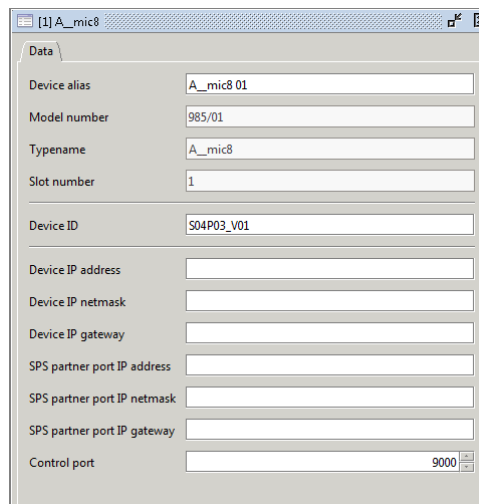
Note that the devices must be correctly configured as described in your Technical Manual and the "RAVENNA for mc<sup>2</sup>/Nova User Guide".

### 25.6.1 A\_\_mic8 & A\_\_dig8



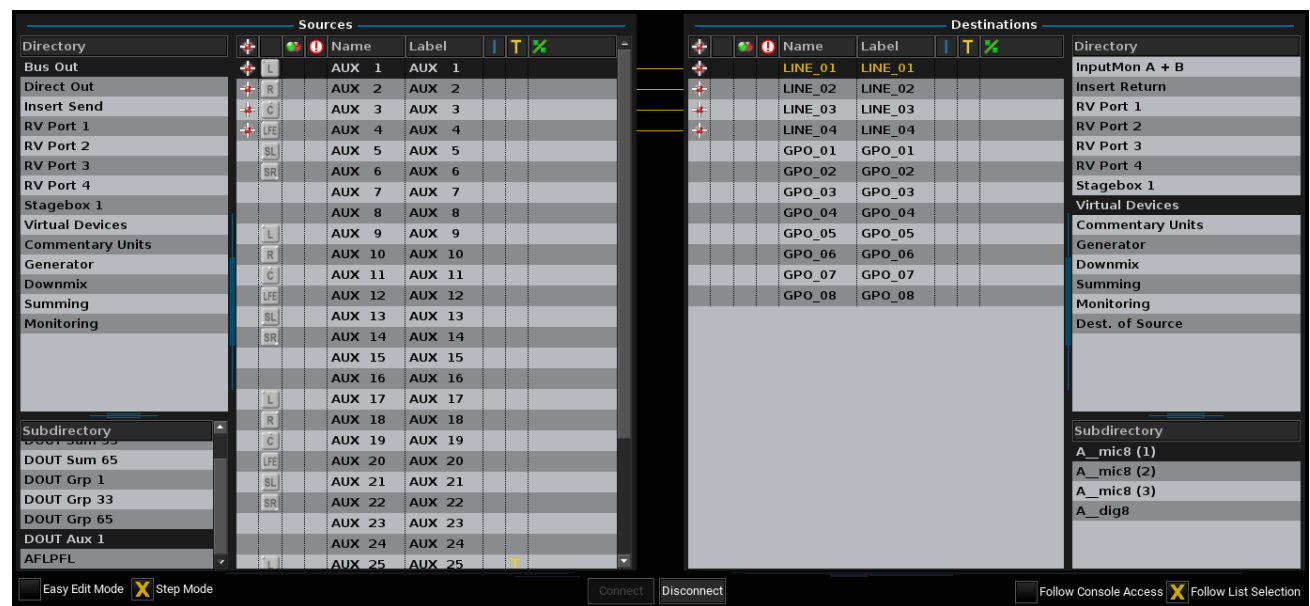
### Signal Routing

All local audio and GPIO signals will appear in the **Signal List** display once your system is configured. This allows you to route sources, from say an **A\_\_mic8**, to the console's DSP channels:



[1] A__mic8	
Data	
Device alias	A__mic8 01
Model number	985/01
Typename	A__mic8
Slot number	1
Device ID	S04P03_V01
Device IP address	
Device IP netmask	
Device IP gateway	
SPS partner port IP address	
SPS partner port IP netmask	
SPS partner port IP gateway	
Control port	9000

Or, say an Aux bus back to an **A\_\_mic8** Line output:



## Parameter Control

If an **A\_\_mic8** input is routed to a DSP channel, and channel is assigned to a fader strip, you can use the console's [INPUT](#) section to control:

- **GAIN** - mic input gain.
- **48V** - 48V phantom power.
- **PAD** - a -20dB PAD.
- **HPF** - cycles through the roll-off frequency options: **Off**, **40Hz**, **80Hz** and **140Hz**.

Note that there are no accessible parameters for the **A\_\_dig8**.

## 25.6.2 LCU (Lawo Commentary Unit)



### Signal Routing

All local audio signals will appear in the **Signal List** display once your system is configured. This allows you to route sources from the LCU to the console's DSP channels:



The screenshot displays the 'Signal List' interface with a central clock showing 15:40:11. The interface is divided into several sections:

- Top Bar:** Includes navigation arrows, input selection (INP 1), and a clock.
- Sources Table:**

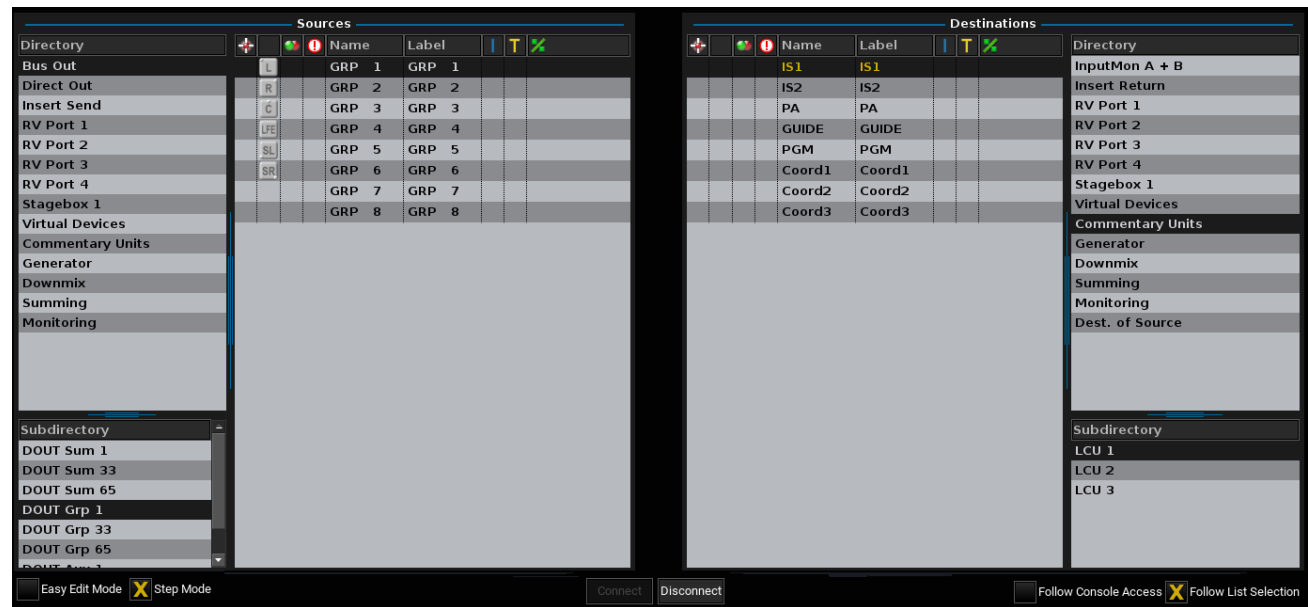
Directory	Name	Label	I	T	X
Bus Out	MIC A	MIC A			
Direct Out	MIC G	MIC G			
Insert Send	MIC B	MIC B			
RV Port 1	Aux	Aux			
RV Port 2	PGM	PGM			
RV Port 3	Coord1	Coord1			
RV Port 4	Coord2	Coord2			
Stagebox 1	Coord3	Coord3			
Virtual Devices					
Commentary Units					
Generator					
Downmix					
Summing					
Monitoring					
- Destinations Table:**

Name	Label	I	T	X
INP 1A	INP 1A			
INP 2A	INP 2A			
INP 3A	INP 3A			
INP 4A	INP 4A			
INP 5A	INP 5A			
INP 6A	INP 6A			
INP 7A	INP 7A			
INP 8A	INP 8A			
INP 9A	INP 9A			
INP 10A	INP 10A			
INP 11A	INP 11A			
INP 12A	INP 12A			
INP 13A	INP 13A			
INP 14A	INP 14A			
INP 15A	INP 15A			
INP 16A	INP 16A			
INP 17A	INP 17A			
INP 18A	INP 18A			
INP 19A	INP 19A			
INP 20A	INP 20A			
INP 21A	INP 21A			
INP 22A	INP 22A			
INP 23A	INP 23A			
INP 24A	INP 24A			
INP 25A	INP 25A			
- Right Panel:**
  - Directory:** InputMon A + B, Insert Return, RV Port 1, RV Port 2, RV Port 3, RV Port 4, Stagebox 1, Virtual Devices, Commentary Units, Generator, Downmix, Summing, Monitoring, Dest. of Source.
  - Subdirectory:** A Inp 1, A Inp 33, A Inp 65, A Inp 97, A Inp 129, A Inp 161.

At the bottom, there are controls for 'Easy Edit Mode', 'Step Mode', 'Connect', 'Disconnect', 'Follow Console Access', and 'Follow List Selection'.



Or, say a Group bus back to an LCU output:



## Parameter Control

If one of the microphone inputs (**MIC A**, **MIC B** or **MIC Guest**) is routed to a DSP channel, and channel is assigned to a fader strip, you can use the console's [INPUT](#) section to control:

- **GAIN** - mic input gain.
- **48V** - is mapped to the **On-Air** request: On = on-air; Off = off-air.
- **HPF** - is mapped to the **LF Cut**.

Note that the mic input gain and LF Cut functions are usually controlled by the LCC operator, and are not available on the LCU front panel.

Note also that when an LCU is controlled from an mc<sup>2</sup>/Nova, it is the AdminHD configuration which determines the partnering RAVENNA connection. Therefore, the **LCU ID** (which can be defined in the LCU's Settings Subtree) has no function.

Please refer to the "LCU Quick Start Guide" for more details on the available parameters and signals.

### 25.6.3 DMI-8 (from Neumann)

The DMI-8 is an 8-channel microphone interface from Neumann which supports a RAVENNA Net connection.

#### Signal Routing

The eight microphone input signals from the device will appear as **Sources** in the **Signal List** display once your system is configured.

Note that there are no **Destinations** available for this device.



#### Parameter Control

If one of the microphone inputs is routed to a DSP channel, and channel is assigned to a fader strip, you can use the console's [INPUT](#) section to control:

- **GAIN** - mic input gain. Note that the Lawo GAIN range (0 to 70dB) is mapped to the DMI-8 gain range (0 to 64dB) in a linear fashion.
- **48V** - is mapped to the DMI-8's **Mute** function: On = mute on; Off = mute off.
- **PAD** - is mapped to the DMI-8's **-18dB PAD**.
- **HPF** - is mapped to **LF Cut**, and cycles through the three frequency options. Note that the Lawo **140Hz** roll-off option equates to a **160Hz** LF Cut in the DMI-8.

Note that all other DMI-8 parameters, such as the choice of mic polarity, must be adjusted by the DMI-8's own GUI system.

## 25.7 Digital Output Settings

For each digital output, sample rate conversion and dither are applied automatically depending on your choice of **sample rate** and **word length** from the [Signal Settings](#) display.

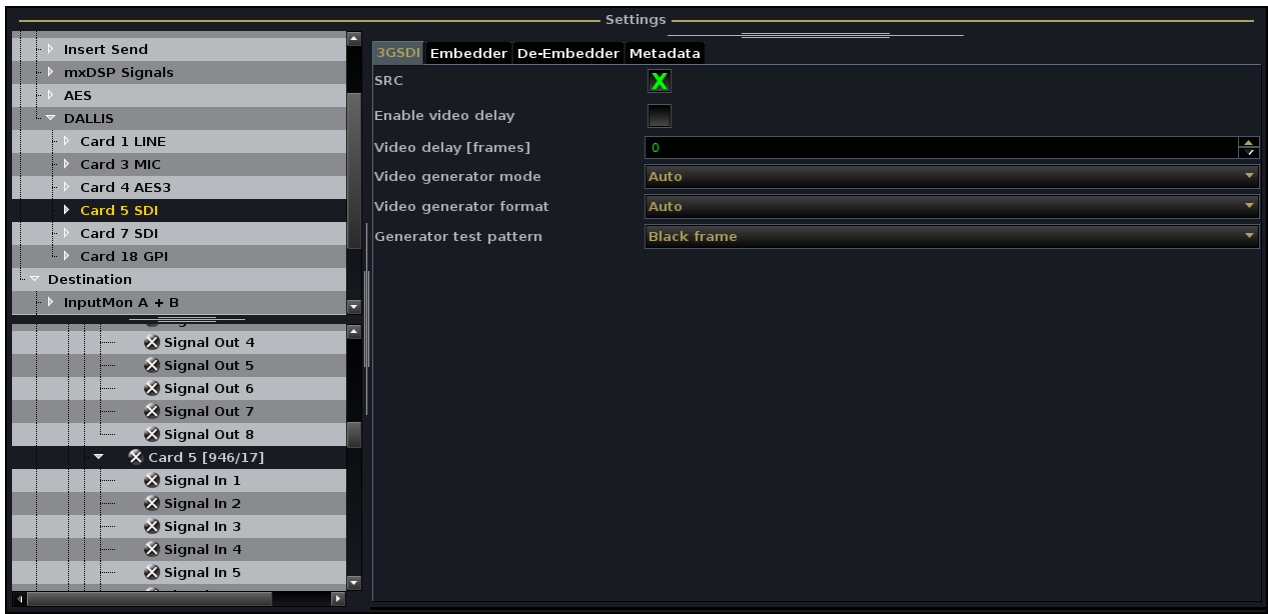
The following table explains the results of each clock selection and word length combination:

Clock Selection	Word Length Selection	SRC on/off	Dither Status
System	24-bit	SRC off	Off (Truncate)
System	20-bit	SRC on	Dither on
System	16-bit	SRC on	Dither on
44.1kHz	24-bit	SRC on	Off (Truncate)
44.1kHz	20-bit	SRC on	Dither on
44.1kHz	16-bit	SRC on	Dither on
48kHz	24-bit	SRC on	Off (Truncate)
48kHz	20-bit	SRC on	Dither on
48kHz	16-bit	SRC on	Dither on
Follow Input	24-bit	SRC on	Off (Truncate)
Follow Input	20-bit	SRC on	Dither on
Follow Input	16-bit	SRC on	Dither on

## 25.8 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 can be configured to run in a number of different modes using AdminHD.

1. Select the **946/17** card from the **System** tree.
2. Then select one of the four parameter tabs: **3GSDI**, **Embedder**, **De-Embedder** or **Metadata**.



Note that SDI card parameters can 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 can use the [Global isolate of SDI parameters](#) custom function to isolate SDI parameters so that settings are not affected by a production load.

### 25.8.1 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 contained 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.

### 25.8.2 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.

### 25.8.3 De-Embedder

- **DALLIS signal in source 1 to 16** – use these options to define the source for each de-embedder.

### 25.8.4 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-type 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 **Metadata embedder line**.

## 25.9 SDI Parameters (non 3G SDI Cards)

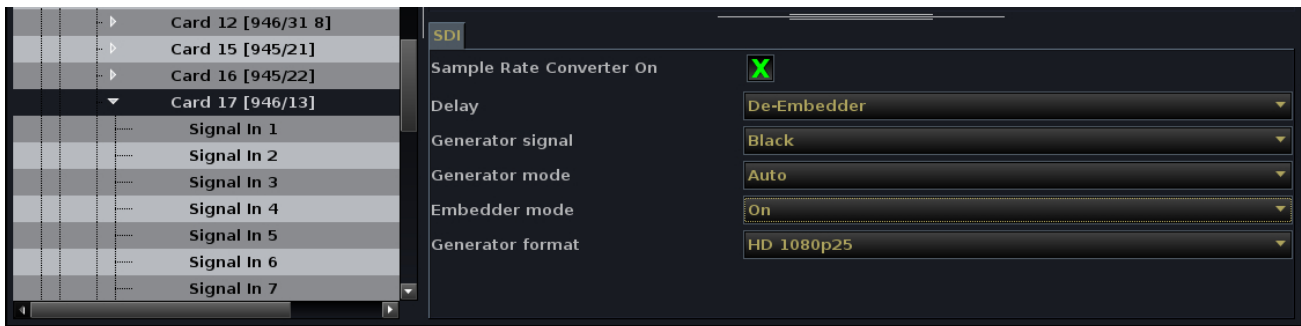
The DALLIS HD or SD SDI cards (946/13, 09, 05, 01) provide the ability to route a maximum of 8 channels to/from the SDI stream. Sample rate conversion can be applied to the whole card (all 8 channels), and delay can be applied to either the embedded or de-embedded signals.

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 can use the [Global isolate of SDI parameters](#) custom function to isolate SDI parameters so that settings are not affected by a production load.

### 25.9.1 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.

## 25.9.2 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**.

## 25.9.3 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.

## 25.10 VCA, Surround, Link & Couple Masters: Master/Slave Behaviour

The master/slave behaviour of VCA, Surround VCA, Link and Couple masters vary depending on the parameter and type. Firstly, each parameter behaves according to a mode:

- **Relative Control** – these parameters are controlled relatively, allowing you to offset slave positions.
- **Absolute Control** - these parameters are set by the master; any change is inherited by all slaves.
- **On Master** – for some switches the parameter can be switched ON from a master but not OFF. For example, you can use a VCA master MUTE button to mute all slaves, and then individually unmute slaves.
- **Off Master** – for other switches the parameter can be switched OFF by a master but not ON.

The following conditions affect what happens when channels are linked or unlinked:

- **Apply on Assign** – the parameter value of the master is added to the slave channel when a link is created.
- **Restore** – the parameter value of the master is subtracted from the slave channel when a link is removed.

Some special conditions apply to faders and AFV:

- **Relative Faders** – this condition sets whether slave faders are moving (Relative Fader OFF) or non-moving (Relative Fader ON).
- **Slave Controls Master** – this condition determines whether a change on a slave fader updates the master.
- **Invert** - for the Audio Follow Video enable parameter (ON function), the Invert condition inverts settings between the master and slave.

These conditions apply to [Link](#) groups:

- **Ignore Module Link** – this condition means that a parameter is linked as soon as a Link group is created, whether any modules are selected for linking or not.
- **Ignore Suspend** - this condition means that the parameter cannot be suspended from the link or couple.

Each mode and condition can differ between a VCA, a Surround VCA, a Link or the Couple master so please use the following tables to check the behaviour for specific parameters.

Remember that when using VCA grouping, slave faders can be moving or non-moving, defined by the [Relative Slave faders](#) option in the **System Settings** display. For all other group types (Surround VCAs, Links and the Couple group), slave faders always move.

### 25.10.1 VCA MasterTable

VCA Master Table									
Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
Isolate	ON_MASTER	On	Off	Off	Off	Off	Off	Off	Off
DigiAmp level	RELATIVE	On	Off	Off	On	Off	Off	Off	Off
DigiAmp on	ON_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Input gain	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Input balance	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Input phase revert left	ON_MASTER	On	Off	Off	Off	Off	Off	Off	Off



VCA Master Table									
Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
Input phase revert right	ON_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Input stereo swap	ON_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Input left to both	ON_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Input right to both	ON_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Input M/S matrix	ON_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Input mono	ON_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Insert send level	RELATIVE	On	Off	Off	On	Off	Off	Off	Off
Insert on	OFF_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Insert level bypass	OFF	On	Off	Off	Off	Off	Off	Off	Off
Insert soft clip	OFF	On	Off	Off	Off	Off	Off	Off	Off
Insert meter source	OFF	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 1 to 4 gain	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 1 to 4 frequency	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 1 to 4 Q	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 1 to 4 on	OFF_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 1 to 4 slope	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 1 to 4 type	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 2 & 3 notch	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Equalizer on	ON_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Filter /SCF gain	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Filter/SCF frequency	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Filter/SCF Q	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Filter/SCF 1 & 2 on	OFF_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Filter/SCF slope	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Filter/SCF type	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Filter/SCF on	ON_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Delay time	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Delay on	ON_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off

VCA Master Table									
Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
Image width	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Image position	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Image on	ON_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Image style	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Direct out level	RELATIVE	On	On	On	On	Off	Off	Off	Off
Direct on	OFF_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Direct out level bypass	OFF	On	Off	Off	Off	Off	Off	Off	Off
Direct out soft clip	OFF	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Aux send level	RELATIVE	On	On	On	On	Off	Off	Off	Off
Aux send pan/balance	RELATIVE	On	On	On	Off	Off	Off	Off	Off
Aux send on	ON_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Aux send mix cue	OFF	On	Off	Off	Off	Off	Off	Off	Off
Aux send independent	OFF	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Metering position	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Direct out position	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Track path position	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Track switch	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Aux send position	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Channel module order	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Fader Level	RELATIVE	On	On	On	On	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Mute	ON_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Left-right panning	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Front-back panning	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Pan slope	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
LFE level	RELATIVE	On	Off	Off	On	Off	Off	Off	Off
Hyperpan front width	ABSOLUTE	On	Off	Off	Off	On	Off	Off	Off
Hyperpan back width	ABSOLUTE	On	Off	Off	Off	On	Off	Off	Off

VCA Master Table									
Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
Hyperpan depth	ABSOLUTE	On	Off	Off	Off	On	Off	Off	Off
Hyperpan turn	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Pan on	ON_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Pan mode center-flat	ON_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Hyperpan on	ON_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Hyperpan turn pre pan	ABSOLUTE	On	Off	Off	Off	On	Off	Off	Off
Direct out balance	OFF	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Busses	ON_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
PFL	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
AFL	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
DirOut mute by fader	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Coordination	ON_MASTER	On	Off	Off	Off	Off	Off	Off	Off
Conference	ON_MASTER	On	Off	Off	Off	Off	Off	Off	Off
AfV on level	RELATIVE	On	Off	Off	On	Off	Off	Off	Off
AfV off level	RELATIVE	On	Off	Off	On	Off	Off	Off	Off
AfV attack time	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
AfV hold time	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
AfV release time	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
AfV event number	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
AfV state	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
AfV enable	OFF_MASTER	On	Off	Off	Off	Off	On	Off	Off
AfV event state	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
AfV hold time	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
AfV max event time	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Module Link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Channel source selection	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off

### 25.10.2 Surround VCA Master Table

Note that analog input gain is not linked by the Surround VCA Master; only digital input gain for AES or MADI sources is linked when using a Surround VCA Master.

Surround VCA Master Table									
Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
Isolate	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
DigiAmp level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
DigiAmp on	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Input gain	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Input balance	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Input phase revert left	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Input phase revert right	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Input stereo swap	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Input left to both	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Input right to both	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Input M/S matrix	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Input mono	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Insert send level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Insert on	ON_MASTER	On	On	On	Off	Off	Off	Off	Off
Insert level bypass	OFF	On	Off	Off	Off	Off	Off	Off	Off
Insert soft clip	OFF	On	Off	Off	Off	Off	Off	Off	Off
Insert meter source	OFF	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 1 to 4 gain	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 1 to 4 frequency	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Equalizer 1 to 4 Q	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Equalizer 1 to 4 on	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Equalizer 1 to 4 slope	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Equalizer 1 to 4 type	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Equalizer 2 & 3 notch	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Equalizer on	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Filter/SCF gain	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Filter/SCF frequency	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Filter/SCF Q	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off

Surround VCA Master Table									
Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
Filter/SCF 1 & 2 on	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Filter/SCF slope	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Filter/SCF type	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Filter on	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Expander threshold	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Expander gain	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Expander ratio	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Expander attack	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Expander hold	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Expander release	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Expander delay	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Expander on	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Gate threshold	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Gate floor	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Gate hysteresis	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Gate attack	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Gate hold	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Gate release	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Gate delay	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Gate on	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Gate SCF on	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Gate external key on	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Gate external key	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Compressor threshold	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Compressor gain	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Compressor ratio	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Compressor attack	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Compressor hold	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Compressor release	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Compressor delay	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Compressor on	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off

Surround VCA Master Table									
Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
Compressor SCF on	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Compressor external key on	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Compressor external key	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Compressor soft knee	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Limiter threshold	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Limiter gain	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Limiter hysteresis	OFF	On	Off	Off	Off	Off	Off	Off	Off
Limiter attack	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Limiter hold	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Limiter release	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Limiter delay	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Limiter on	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Limiter soft knee	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Delay time	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Delay on	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Image width	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Image position	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Image on	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Image style	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Direct out level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Direct on	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Direct out level bypass	OFF	On	Off	Off	Off	Off	Off	Off	Off
Direct out soft clip	OFF	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Aux send level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Aux send pan/balance	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Aux send on	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Aux send mix cue	OFF	On	Off	Off	Off	Off	Off	Off	Off

Surround VCA Master Table									
Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
Aux send independent	OFF	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Metering position	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Direct out position	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Track path position	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Track switch	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Aux send position	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Channel module order	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Fader Level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Mute	ON_MASTER	On	On	On	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Left-right panning	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Front-back panning	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Pan slope	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
LFE level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Hyperpan front width	ABSOLUTE	On	On	Off	Off	On	Off	Off	Off
Hyperpan back width	ABSOLUTE	On	On	Off	Off	On	Off	Off	Off
Hyperpan depth	ABSOLUTE	On	On	Off	Off	On	Off	Off	Off
Hyperpan turn	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Pan on	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Pan mode center-flat	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Hyperpan on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Hyperpan turn pre pan	ABSOLUTE	On	On	On	Off	On	Off	Off	Off
Direct out balance	OFF	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Busses	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
PFL	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
AFL	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
DirOut mute by fader	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Coordination	ON_MASTER	On	On	On	Off	Off	Off	Off	Off

Surround VCA Master Table									
Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
Conference	ON_MASTER	On	On	On	Off	Off	Off	Off	Off
AfV on level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
AfV off level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
AfV attack time	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
AfV hold time	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
AfV release time	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
AfV event number	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
AfV state	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
AfV enable	OFF_MASTER	On	Off	On	Off	Off	On	Off	Off
AfV event state	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
AfV hold time	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
AfV max event time	ABSOLUTE	On	On	On	Off	Off	Off	Off	Off
Module Link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Channel source selection	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off

### 25.10.3 Link Group Master Table

Link Group Master Table									
Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
Isolate	ABSOLUTE	On	Off	Off	Off	Off	Off	On	Off
DigiAmp level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
DigiAmp on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Input gain	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Input balance	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Input phase revert left	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Input phase revert right	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Input stereo swap	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Input left to both	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Input right to both	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Input M/S matrix	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Input mono	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off



Link Group Master Table									
Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
Insert send level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Insert on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Insert level bypass	OFF	On	Off	Off	Off	Off	Off	Off	Off
Insert soft clip	OFF	On	Off	Off	Off	Off	Off	Off	Off
Insert meter source	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 1 to 4 gain	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 1 to 4 frequency	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 1 to 4 Q	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 1 to 4 on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 1 to 4 slope	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 1 to 4 type	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 2 & 3 notch	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Equalizer on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Filter/SCF gain	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Filter/SCF frequency	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Filter/SCF Q	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Filter/SCF 1 & 2 on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Filter/SCF slope	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Filter/SCF type	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Filter on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Expander threshold	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Expander gain	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Expander ratio	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Expander attack	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Expander hold	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Expander release	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Expander delay	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Expander on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Gate threshold	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off

Link Group Master Table									
Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
Gate floor	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Gate hysteresis	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Gate attack	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Gate hold	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Gate release	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Gate delay	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Gate on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Gate SCF on	OFF	On	Off	Off	Off	Off	Off	Off	Off
Gate external key on	OFF	On	Off	Off	Off	Off	Off	Off	Off
Gate external key	OFF	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Compressor threshold	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Compressor gain	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Compressor ratio	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Compressor attack	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Compressor hold	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Compressor release	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Compressor delay	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Compressor on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Compressor SCF on	OFF	On	Off	Off	Off	Off	Off	Off	Off
Compressor external key on	OFF	On	Off	Off	Off	Off	Off	Off	Off
Compressor external key	OFF	On	Off	Off	Off	Off	Off	Off	Off
Compressor soft knee	OFF	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Limiter threshold	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Limiter gain	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Limiter hysteresis	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Limiter attack	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Limiter hold	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Limiter release	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Limiter delay	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Limiter on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off

Link Group Master Table									
Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
Limiter soft knee	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Delay time	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Delay on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Image width	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Image position	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Image on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Image style	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Direct out level	RELATIVE	On	Off	Off	Off	On	Off	Off	Off
Direct on	ABSOLUTE	On	Off	Off	Off	On	Off	Off	Off
Direct out level bypass	ABSOLUTE	On	Off	Off	Off	On	Off	Off	Off
Direct out soft clip	ABSOLUTE	On	Off	Off	Off	On	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Aux send level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Aux send pan/balance	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Aux send on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Aux send mix cue	OFF	On	Off	Off	Off	Off	Off	Off	Off
Aux send independent	OFF	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Metering position	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Direct out position	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Track path position	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Track switch	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Aux send position	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Channel module order	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Fader Level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	Off	Off	Off	Off	Off	Off	Off	Off
Mute	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Left-right panning	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off

Link Group Master Table									
Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
Front-back panning	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Pan slope	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
LFE level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Hyperpan front width	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Hyperpan back width	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Hyperpan depth	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Hyperpan turn	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Pan on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Pan mode center-flat	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Hyperpan on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Hyperpan turn pre pan	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Direct out balance	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Busses	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
PFL	OFF	On	Off	Off	Off	Off	Off	Off	Off
AFL	OFF	On	Off	Off	Off	Off	Off	Off	Off
DirOut mute by fader	OFF	On	Off	Off	Off	Off	Off	Off	Off
Coordination	OFF	On	Off	Off	Off	Off	Off	Off	Off
Conference	OFF	On	Off	Off	Off	Off	Off	Off	Off
AfV on level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
AfV off level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
AfV attack time	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
AfV hold time	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
AfV release time	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
AfV event number	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
AfV state	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
AfV enable	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
AfV event state	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
AfV hold time	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
AfV max event time	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Module Link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Channel source selection	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off

### 25.10.4 Couple Group Master Table

Couple Group Master Table									
Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
Isolate	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
DigiAmp level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
DigiAmp on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Input gain	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Input balance	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Input phase revert left	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Input phase revert right	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Input stereo swap	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Input left to both	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Input right to both	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Input M/S matrix	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Input mono	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Insert send level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Insert on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Insert level bypass	OFF	On	Off	Off	Off	Off	Off	Off	Off
Insert soft clip	OFF	On	Off	Off	Off	Off	Off	Off	Off
Insert meter source	OFF	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 1 to 4 gain	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 1 to 4 frequency	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 1 to 4 Q	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 1 to 4 on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 1 to 4 slope	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 1 to 4 type	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Equalizer 2 & 3 notch	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Equalizer on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Filter/SCF gain	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Filter/SCF frequency	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off

Couple Group Master Table									
Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
Filter/SCF Q	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Filter/SCF 1 & 2 on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Filter/SCF slope	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Filter/SCF type	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Filter on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Expander threshold	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Expander gain	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Expander ratio	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Expander attack	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Expander hold	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Expander release	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Expander delay	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Expander on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Gate threshold	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Gate floor	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Gate hysteresis	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Gate attack	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Gate hold	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Gate release	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Gate delay	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Gate on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Gate SCF on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Gate external key on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Gate external key	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Compressor threshold	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Compressor gain	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Compressor ratio	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Compressor attack	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Compressor hold	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Compressor release	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Compressor delay	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off

Couple Group Master Table									
Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
Compressor on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Compressor SCF on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Compressor external key on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Compressor external key	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Compressor soft knee	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Limiter threshold	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Limiter gain	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Limiter hysteresis	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Limiter attack	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Limiter hold	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Limiter release	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Limiter delay	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Limiter on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Limiter soft knee	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Delay time	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Delay on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Image width	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Image position	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Image on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Image style	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Direct out level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Direct on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Direct out level bypass	OFF	On	Off	Off	Off	Off	Off	Off	Off
Direct out soft clip	OFF	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Aux send level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Aux send pan/balance	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Aux send on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off

Couple Group Master Table									
Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
Aux send mix cue	OFF	On	Off	Off	Off	Off	Off	Off	Off
Aux send independent	OFF	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Metering position	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Direct out position	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Track path position	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Track switch	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Aux send position	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Channel module order	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Fader Level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Mute	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Left-right panning	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Front-back panning	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Pan slope	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
LFE level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Hyperpan front width	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Hyperpan back width	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Hyperpan depth	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Hyperpan turn	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Pan on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Pan mode center-flat	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Hyperpan on	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Hyperpan turn pre pan	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Direct out balance	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Busses	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
PFL	OFF	On	Off	Off	Off	Off	Off	Off	Off
AFL	OFF	On	Off	Off	Off	Off	Off	Off	Off
DirOut mute by fader	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off



Couple Group Master Table									
Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
Coordination	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
Conference	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
AfV on level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
AfV off level	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
AfV attack time	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
AfV hold time	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
AfV release time	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
AfV event number	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
AfV state	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
AfV enable	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
AfV event state	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off
AfV hold time	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
AfV max event time	RELATIVE	On	Off	Off	Off	Off	Off	Off	Off
Module Link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Channel source selection	ABSOLUTE	On	Off	Off	Off	Off	Off	Off	Off