Networking Audio Systems

mc²66

Operator's Manual

Version: **V4.16/1**

Edition: 27-Jan-12

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Important Safety Instructions

Warning

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

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

- Check all of the hardware devices for transport damage.
- Any devices showing signs of mechanical damage or damage from the spillage of liquids *MUST NOT* be connected to the mains supply or disconnected from the mains immediately by pulling out the power lead.
- All devices *MUST* be grounded. Grounding connectors are provided on all devices. In addition, all low-voltage devices external to the system must also be grounded before operation.
- For Scandinavian countries, *ALWAYS* use a grounded mains connection, to prevent the device from being grounded through Ethernet or other signal connections.
- All devices *MUST* be connected to the mains using the three-cord power leads supplied with the system. Only supply electrical interfaces with the voltages and signals described in these instructions.
- Do *NOT* use the system at extreme temperatures. Proper operation can only be guaranteed between temperatures of 10° C and 35° C and a maximum relative humidity of 85%.
- Neutrik PowerCon and Harting connectors must *NOT* be disconnected under load.
- Only service staff may replace batteries.
- Servicing of components inside a device *MUST* only be carried out by qualified service personnel according to the following guidelines:
    - Before removing parts of the casing, shields, etc. the device *MUST* be switched off and disconnected from all mains.
    - Before opening a device, the power supply capacitor *MUST* be discharged with a suitable resistor.
    - Components that carry heavy electrical loads, such as power transistors and resistors, should *NOT* be touched until cool to avoid burns.

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

Defective Parts/Modules

Warning

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

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

First Aid (in the case of electric shock):

Warning

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

About This Manual

How to Use This Manual

Before we guide you through the operation of the **mc²66**, first a few words about this manual.

Chapter 1 introduces the console. If you know nothing about the mc² series, then read this chapter to learn about the system's concepts and capabilities.

Chapter 2 covers basic operating principles and provides a step-by-step tutorial to common console operations. If you have limited time to learn the console, then this chapter is for you.

Chapters 3 to 11 cover each area of operation in greater detail.

Use the Table of Contents at the beginning of the manual or Index Directory (Page 817) to locate help on a particular topic. Appendices, Technical data, a Glossary of terms and the Index Directory are provided at the end of the manual.

You will find installation and service information for the **mc²66** in the "mc²66 Technical Manual".

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

Tip

Conventions

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

Topics

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

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

1. To make the route press the **CONNECT** soft key located above the trackball.

*The **Signal List** display updates showing the connection between your source and destination.*

Marginal notes

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

User Tips – useful tips and short cuts.

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

Warning

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

Action Buttons

We will also be using some conventions to help distinguish explanatory text from the text referring to items on the console:

Silk screened text on the console's front panel is referred to in UPPERCASE and button cap engravings are written in **bold** – for example, press the **INPUT** button located on the ACCESS CHANNEL/ASSIGN panel.

On-screen buttons which action a function and descriptive text on the console displays are both referred to in **bold.**

Menu paths are referred to as a string of selections – for example, select "Page -> Signals -> Settings" to open the **Signal Settings** display.

Chapter 1: System Concepts

Welcome

Welcome to the **mc²66**, Lawo's production console for live broadcast and theatre.

This manual covers two revisions of the console:

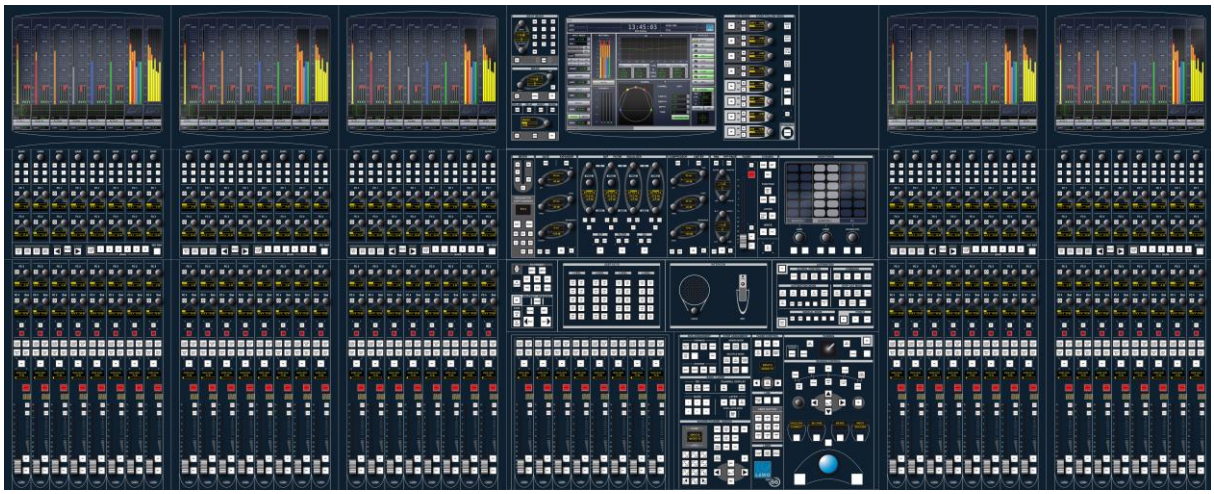
- The classic **mc²66** – covering the operation of both the 'classic' and 'top1'.
- The MKII **mc²66** – delivered from 2009 onwards.

Operation is virtually identical as the main differences lie within the technical features and build of the control surface. This manual uses the MKII **mc²66** to illustrate operations. Notes for classic **mc²66** users are added where necessary.

Control Surface Overview

The **mc²66**'s control surface is constructed in 8-fader sections, with sizes scaling from 16 channel + 8 main faders up to 96 channel + 16 main faders.

The example below shows a 24+8+16 configuration:



Channel Strips

Within each channel section, you will find 8 dedicated fader strips providing level, mute and AFL/PFL monitoring.

Channel Fader Strips

Four assignable rotary controllers (free controls) offer additional local channel control to adjust EQ, Dynamics, auxiliary sends, etc. The lower free control (FC4) may be switched to control level and mute for the second layer of channels. A fifth upper controller is dedicated for input gain.

In addition, every 8-fader channel section houses a high resolution TFT display providing feedback on channel metering and bus assignments.

Centre Section

The centre section houses the touch-screen, central controls and main fader strips.

GUI and Central Control Section

The GUI (Graphical User Interface) is a touch-screen divided into three distinct areas:

1	**Title Bar**	Across the top you will always see the channel in access, the time (local time, timecode or integrated loudness), and the name of the current production and snapshot.
2	**Status Bar**	At the bottom the status bar provides feedback on used data storage space, the progress of operations (such as loading or saving) and console PSU status.
3	**SCREEN CONTROL displays**	The central area works in conjunction with the SCREEN CONTROL panel. Here you can page through displays for Channel settings, Signal routing, Snapshots, etc.

Space is available on the right of the overbridge for options such as external metering.

Monitoring touch-screen

Around and below the GUI touch-screen, the Central Control Section offers direct control of *all* settings for the selected DSP channel – gain, equalisation, dynamics, auxiliary sends, etc.

On the right is the Monitoring touch-screen with source selection, level control and other monitoring functions. (On the classic mc^{2}66, monitoring is controlled from physical user buttons and not a touch-screen).

The area below offers space for up to 3 user panels. Options include Dynamic Automation, Machine Control, Intercom, etc.

Access/Assign and Screen Control

At the bottom of the centre section are the main fader strips, ideal for master VCAs, groups, etc. and a range of controls for bus and fader strip assignment, layering access, joystick panning and SCREEN CONTROL navigation.

Optionally, the centre section may be fitted with an extra main fader panel. This provides 8 additional faders from the same width of console (available for MKII mc^{2}66 only). For details, see Appendix F.

An external display (remote from the console) may provide dedicated access to any GUI display – for example, metering, channel Information or sequence operation.

Colour-coded Controls

The control surface uses intelligent colour coding to help distinguish different types of control (not available on the classic mc²66).

Firstly, colour coding is used within the Central Control Section so that EQ, Dynamics, Panning, etc. can be easily distinguished at a glance. Furthermore, when functions are assigned to the channel strip's free controls, the colour coding follows: blue for EQ, green for Aux sends, etc.

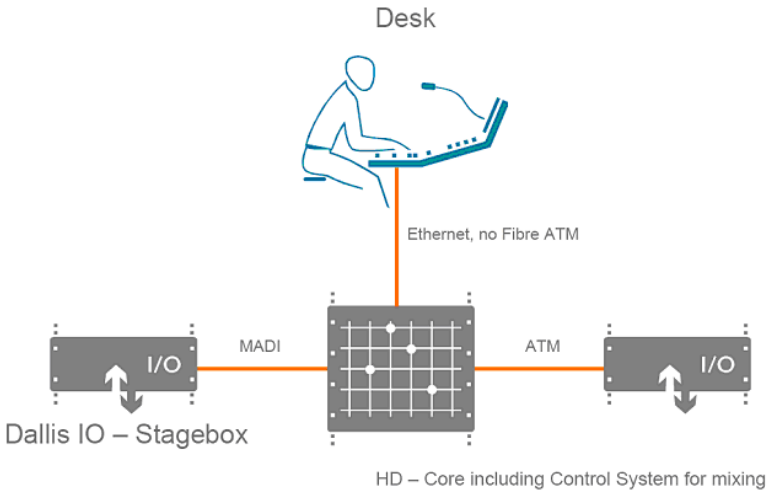
Secondly, at the bottom of each fader strip, the LAWO backlight is colour-coded to indicate the channel type. This enables you to easily distinguish input channels (white) from groups (yellow), aux masters (green), VCAs (blue) and sums (red):

Alternatively you may customise the channel colour coding. For example, you might set music channels to be white, VTRs to be blue, presenter mics to be red and so on.

System Overview

Unlike an analogue console, the **mc²66** system consists of much more than just the control surface. For any single installation, there are three principal components:

- **Console control surface** – operator interface.
- **HD Core** – DSP and routing matrix core.
- **DALLIS I/O interfaces** – offering a range of input and output cards which may be connected remotely to the system (up to 2km from the core using multimode fibre or 8km using single mode fibre).



The exact hardware specification of your system will define how many analogue and digital connections are available for external equipment, and how much DSP processing is available for input channels, monitor return channels, groups, sums (main mix outputs) and auxiliary sends.

Note that the classic **mc²66** differs from the above in the following respects:

Note

- **MKII mc²66 (shown above)** – incorporates the MKII Router Module (980/33). The control system is integrated within the Router Module, and only Ethernet is required to connect the control surface to the HD Core.
- **Classic mc²66** – incorporates the MKI Router Module (980/31 or 980/32). The control system resides within the console surface and both ATM and Ethernet connections are required to connect the control surface to the HD Core.

The differences affect system wiring, connections and access to the control system. In other respects, systems are identical.

System Networking

The **mc²66** console is just one member of the **mc²** family of products. The larger **mc²90** and smaller **mc²56** also utilise the HD Core and DALLIS I/O architecture and even run on the same operating and application software. This allows, not only the transfer of data between **mc²66** consoles, but also from the **mc²66** to a **mc²56** or **mc²90** and vice versa.

In addition, the HD Core and DALLIS I/O system is available in its own right as a stand alone routing matrix called the **Nova73**. A **Nova73** can be used to expand the I/O capacity of a system, or to act as a central routing matrix in a networked installation.

For more details on system networking and sharing sources and destinations, see Page 581.

Signal Flow

The **mc²66** provides a pool of DSP resource which can be configured for input channels, monitor return channels, groups, sums (main mix outputs) and auxiliary sends. Each channel comes with either full signal processing or reduced signal processing (known as tiny channels). This enables EQ, Dynamics, Delay, etc. to be applied to both inputs and outputs.

The number of input, monitor, group, sum and aux channels is determined by three factors:

- The number of channel DSP cards fitted to the HD Core (up to 8).
- The sampling rate of the system: 48/44.1kHz or 96/88.2kHz.
- Your choice of DSP configuration.

DSP configurations are selected from a predefined list and stored when you save a Production. Some offer more input channels, some input and monitor channels, and others more groups and sums. The DSP configuration may be changed at any time, making it easy to modify the mix structure if, for example, the production requires additional groups.

From Version 4.16 software, DSP configurations also offer a choice of channel type:

- **Broadcast Channels** – doubles the number of channels per DSP card, with a simplified channel signal flow ideal for live broadcast applications.
- **Recording Channels** – operate in the same way as previous software releases. These channels provide more processing modules and flexibility.

The main differences between the channel types are that a Broadcast channel has no Track bus send, no Filter section and simplified Dynamics, with a choice of Gate, Expander and Compressor (known as Combi-Dynamics) *or* Limiter.

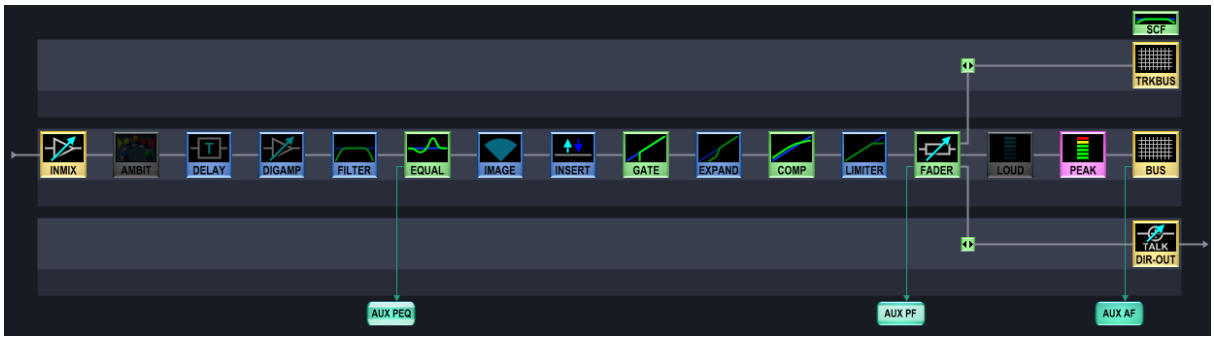

Note

Each DSP configuration supports only one channel type; you cannot mix Broadcast and Recording channels, and not all systems support the Broadcast channel type.

The differences between Broadcast and Recording channels are summarised below:

Input Channel (Broadcast channel DSP Configuration)

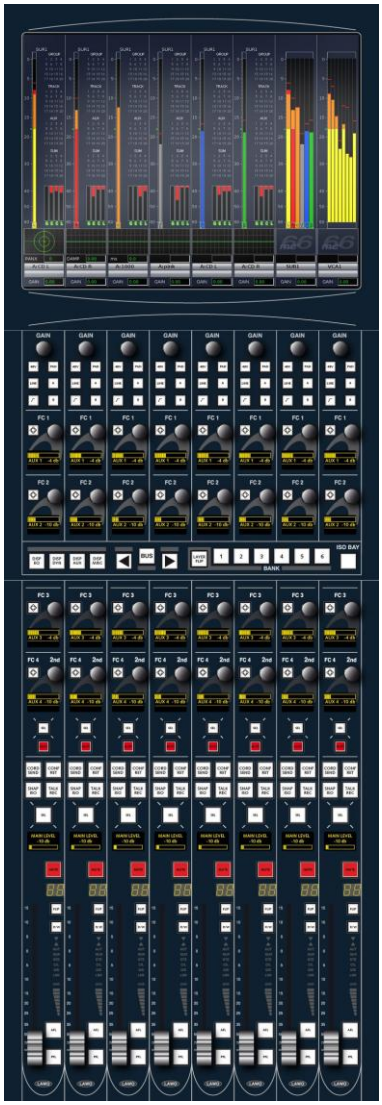
Input Channel (Recording channel DSP Configuration)



Processing modules such as EQ, Delay, Insert, Comp, etc. can be positioned at any point in the chain, enabling you to change the channel signal flow on a channel-by-channel basis. For example, you could put the Limiter post-fader. Or, the Direct Output pre-delay.

For more details on DSP configurations, channel types, and channel signal flow, please refer to Chapter 3.

The Power of Layering



The console's control surface includes both channel and main fader strips. Any fader strip may control any type of channel - input, monitor return, group, sum, auxiliary, VCA or Surround master – allowing you to lay out your source channels and output masters where you want them.

In addition, the physical size of the control surface does not need to restrict the number of processing channels available. Regardless of the size of the control surface, the number of audio processing channels may be scaled by fitting more DSP cards within the HD core. The extra channels are then accessed by paging the console's fader strips using banks and layers:

Up to six control surface banks may be configured; think of each fader bank like a separate console, with fast global switching between banks. They may be used to access different sets of music channels during a live entertainment show or to separate different location sources during a sports production.

Within each of the six banks, each fader strip has two layers – Layer 1 and Layer 2. Layers can be switched either globally or individually and so are ideal for related sources. For example, assign your input channels to Layer 1 and monitor return channels to Layer 2.

Free control 4 (FC4) can be switched to adjust level and mute for the 2nd layer, thus providing dedicated access to both layers simultaneously (not available on the classic mc²66).

To simplify the console's bank and layer switching, you may choose to isolate individual fader strips so that they never switch bank or layer. For example, to keep presenter's microphones on the surface at all times while other sources, such as audience microphones, remain hidden from view until required.

For more details on Banks and Layers, see Page 134.

For more details on isolating fader strips, see Page 140.

Mono, Stereo and Surround

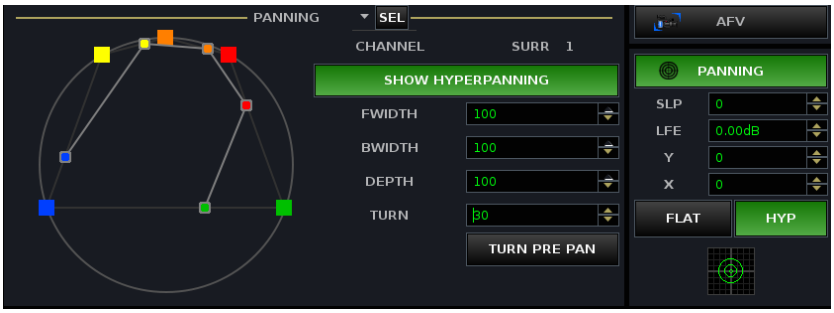
Any odd/even pair of input or output channels may be configured for stereo, and the resultant stereo channel assigned to any fader strip bank or layer. Tools such as LR reverse, L to Both, R to Both, image width and positioning provide fast control of stereo signals from a single fader.

Similarly, multiple input or output channels may be configured for surround. A variety of multi-channel output formats are supported, including Dolby Digital (5.1), DTS and SDDS.

Mono and stereo channels may be assigned onto any surround bus, and positioned using XY rotary controls or the console's motorised joystick.

In addition, a range of specialised tools provide easy management of 5.1 channels:

- **Surround VCAs** provide master control of the surround signal from a single fader strip. You can control the overall level, EQ, compression, etc. while metering all slave channels independently on the **Channel** display (shown opposite).
- **REVEAL** will temporarily assign the individual surround slaves onto fader strips (within a pre-defined area). This enables you to quickly offset fader levels and other relative parameters.
- **Hyper Panning** provides an alternative to conventional XY panning. It is designed to help reposition surround sources within a surround field, for example:



- **AMBIT** (AMBience IT) is a special DSP module designed by Lawo which can be used to:
  - **Upmix** – 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.

For more details on stereo channel operation, see Page 263.

For more details on surround channels, see Page 269.

Comprehensive Control

The console's Central Control Section provides dedicated access to *all* the available settings for a DSP channel:

Simply select any channel, by pressing its fader **SEL** button, and then reach out to control any parameter. Remember that the controls are colour coded (MKII mc^{2}66 only) making it easy to distinguish the different processing sections.

Alternatively, if you are away from the centre section, or if there are multiple operators working on the console, then the ability to access *all* settings from the channel strip is invaluable. Therefore, the console's Free Controls can be utilised in one of two ways:

Decentral Control (the Channel Strip approach)

Each of the four free controls can be assigned to key functions for a particular channel. For example, on a presenter's channel it may be important to have direct access to Input gain, the presenter's mix minus send level, the compressor threshold, etc. Whereas, on a music replay channel, it is more important to access L/R Balance, the Direct Output level, etc.

The Free Control numbers are colour coded (MKII mc^{2}66 only) making it easy to distinguish different functions.

Decentralised Central Operation (ISO Bay)

Alternatively, if you are trying to setup a number of aux sends then you may wish to access all 32 sends from a single channel. While you could do this by assigning the channel to the Central Control Section and paging through the auxes, often it is more convenient to work within the channel bay.

Using ISO BAY, you can temporarily override the Free Control assignments, and use all 32 Free Controls within a fader bay to access all of the AUX parameters for the selected channel:

Multiple Users

One or more 8-fader channel sections may be isolated from the control of the main operator. This allows the main engineer to bank/layer switch the main console bays and control channels from the Central Control Section without affecting the second engineer.

Simultaneously, the second engineer has independent bank/layer switching and DSP parameter control from the decentral centralised operating panel and Free Controls.

In addition, the console supports two independent AFL/PFL Busses allowing the second engineer to monitor isolated bays on a separate output if they desire.

For more details on isolating fader bays, see Page 141.

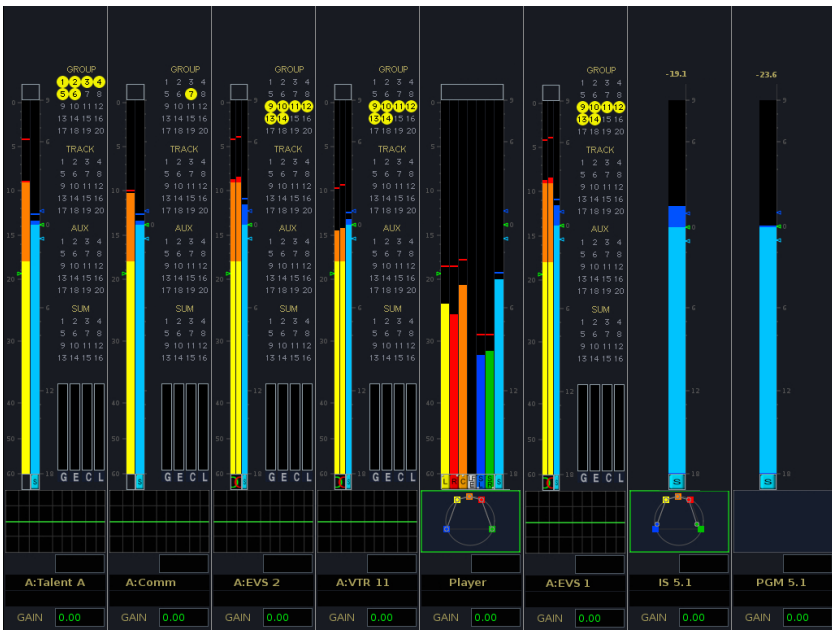
Flexible Metering

The **Channel** display, above each channel section, includes dedicated metering for every fader strip. On the central control screen, the **Main Display** meters signals at other points such as the insert send, direct out and dynamics modules. And the **Metering** display provides four pages of assignable meters for an overview of key signals.

The peak bargraph meter, shown opposite, may be switched to different points within the signal flow, and is mono, stereo or multi-channel according to the channel format. You may change the characteristics and scale for all peak meters across the console, and define colour coding to indicate a safe area (red), operating range (orange) and line up level (green arrow).

In addition, the mc^2 provides loudness metering conforming to the ITU-R BS1770. The loudness meter may be positioned independently from the peak meter within the channel's signal flow. A single bargraph (blue) represents the average energy of the summed component channels: mono, stereo or surround. On summing channels, you may also start an integrated loudness measurement, displayed above the bargraph. This allows you to measure the loudness of summing channels, such as main programme, over longer periods of time.

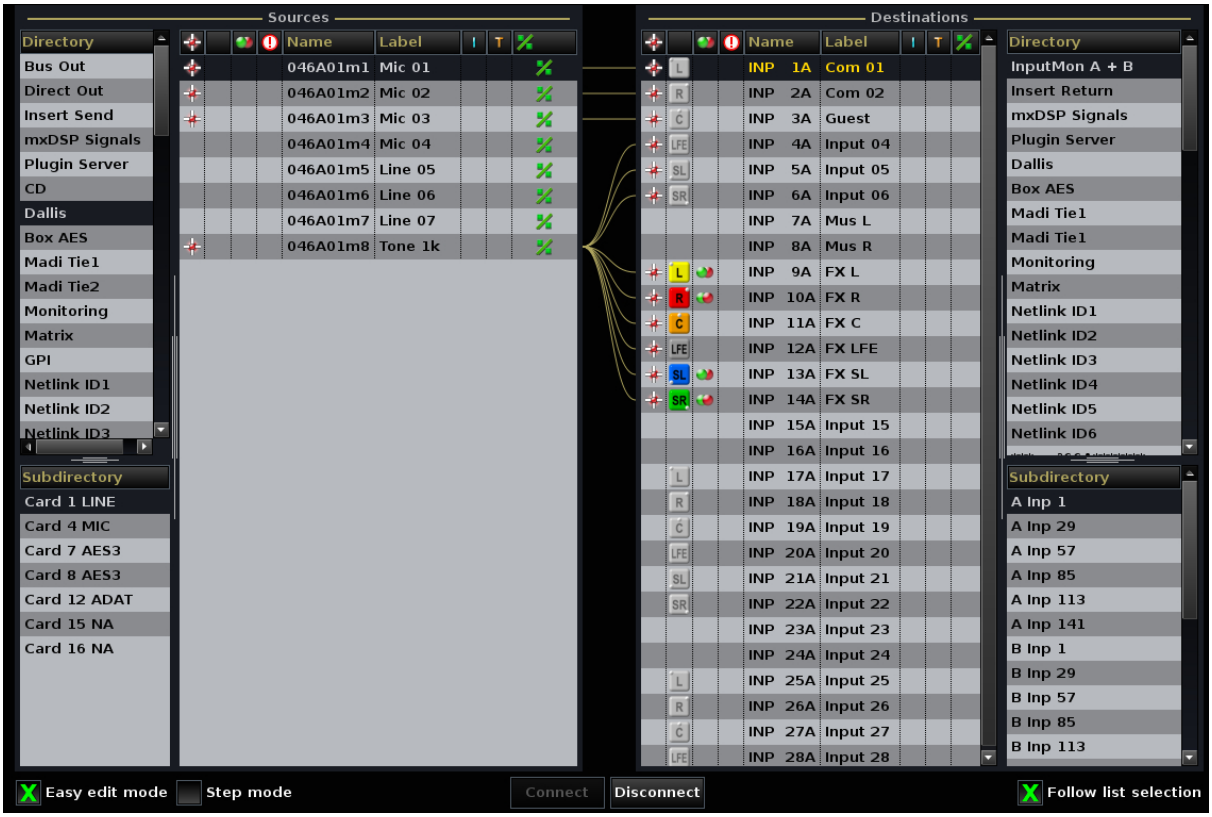
For inputs and/or summing channels, you may choose to display peak metering only, loudness metering only, or a combination of both:



For more details on Metering, see Page 313.

Integrated Digital Routing Matrix

In addition to powerful mixing features, the console includes an integrated digital routing matrix accessible from the **Signal List** display:



Any source may be routed to any channel, and any output mix routed to any destination. In addition, you may route sources directly to destinations, for example to feed a Mic/Line input to an AES output for archive recording purposes.

Multiple consoles may also be networked in order to share I/O resources. For example, to share the same microphone input between two consoles. See Page 581 for details on networking I/O resources.

Perhaps the most important feature of the routing matrix is that all routes may be stored and recalled from a production or snapshot, reducing the amount of manual patching within the installation and saving hours of set up time! For more details on the console's routing capabilities, please refer to Chapter 8: Signal Routing.

Console Reset

One of the major benefits of the **mc²66** is the ability to store and recall all the settings for a live show or type of application.

Productions

Productions form the top level for user data storage and store *all* the settings required for a production or type of job:

Productions may be recalled at any time, reducing the amount of setup time required before repeat or similar shows. Productions store low level settings, such as the DSP configuration, SRC settings, **System Settings** display options and **Metering** display setup, in addition to snapshots, sequences and automation mixes.

Snapshots

Within each production, folders are created to store snapshots:

Snapshots store different mixes for recall before or during the show. For example, to recall a different mix for each band in a live entertainment show, or to recall scene changes during a live theatre production. To manage snapshot recall, snapshot isolate and filtering may be applied to protect channels or elements of the desk.

Sequences

Sequences are provided for convenient recall of snapshots during a live broadcast or theatre production:

A sequence is a list of snapshots which can be loaded in sequence during a live show. The transition between snapshots in a sequence can be cross faded if required. In addition, offsets can be applied to deal with last minute changes such as a change of artist. Note that the sequence itself does not store any settings, but simply creates a list of pointers to snapshots stored within the production folder.

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, you may wish to save your favourite Kick Drum EQ, or the complete settings for an announcer channel.

Storing and Transferring Settings

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

Tip

This enables the transfer of production data, snapshots, mixes or presets to or from any system. Data is fully compatible with any **mc²** console, regardless of the hardware configuration. For example, you can load a snapshot saved on smaller console to a larger console in order to recall settings in another studio. And, not only can data be transferred between **mc²90** consoles, but also to and from the **mc²56** or **mc²66**.

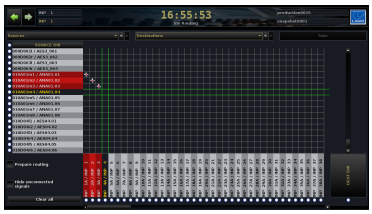
For more details on productions, snapshots, sequences and presets please see Chapter 6.

mxGUI

mxGUI (Matrix GUI) is a software programme which runs the mc^2 graphical user interface on an external computer. It may run either on or offline with any mc^2 system to provide offline setup or remote operation:

- **Offline Setup** - productions, snapshots, sequences, mixes and presets can be prepared and stored on the mxGUI computer, and then transferred to the console at a later date; thus saving valuable setup time before a show.
- **Remote Operation** - mxGUI can run online by connecting the mxGUI computer to the mc^2 Control System (via Ethernet). This provides additional screen displays or remote operation for a second engineer.

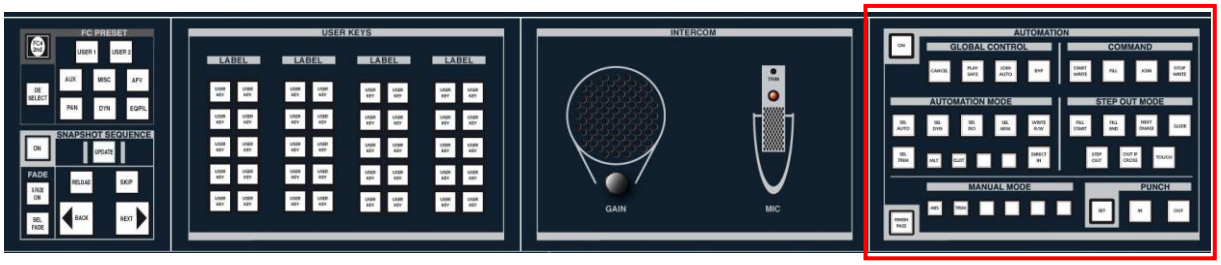
mxGUI runs identical displays to those on your mc^2 console and includes some additional displays to allow offline configuration of fader strips, bus routing, fader levels, etc. This enables the creation of a complete production offline, including signal routing, channel labels, fader strip assignments, processing settings, snapshots, sequences, etc.



For more details on mxGUI please see Chapter 10.

Timecode Automation

The **mc²66**'s automation system automates console settings referenced to timecode, and is controlled from an optional user panel fitted to the centre section (MKII mc²66):



The classic **mc²66** provides a dedicated automation control panel to the right of the central GUI display.

In addition to providing automation of channel parameters such as faders, mutes, aux sends, EQ, etc., the system allows you to automate other settings such as bus routing, channel signal flow, etc. The channels you automate may be any type – inputs, groups, sums, auxes, VCA masters, Surround masters, GPCs.

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.

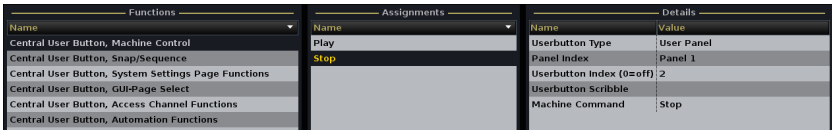
Each stream of automation data is recorded as a 'Pass', and multiple passes are stored within a 'Mix'. The 'Pass Tree' shows the history of the mix and enables you to A/B between different passes. You can also edit mix passes in order to delete, copy, shift, insert or paste sections from different passes.

Multiple mixes may be created for each production and are stored permanently on the system when you update the production. For more details on timecode automation, please see Chapter 7.

Console Configuration

Custom Functions

Functions such as user panel buttons can be re-assigned from the console's **Custom Functions** display:



Note

Functions configured from this display are stored at a lower level to productions. This means that any changes will affect all console users.

AdminHD

At a lower level (not accessible from the console GUI) are a number of files which configure the system's hardware and define settings such as the sampling frequency of the HD Core and the organisation of signals within the Directories and Subdirectories of the console's **Signal List** display. The AdminHD configuration is an essential part of the system. If a hardware component is not defined within the configuration, then it will not be visible to you even if it is powered and connected. In other words, the configuration is always the 'master' of the system, regardless of what physical components are added or removed.

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

For more details on the AdminHD configuration, see the "mc^{2}66 Technical Manual".

TCL Functions

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

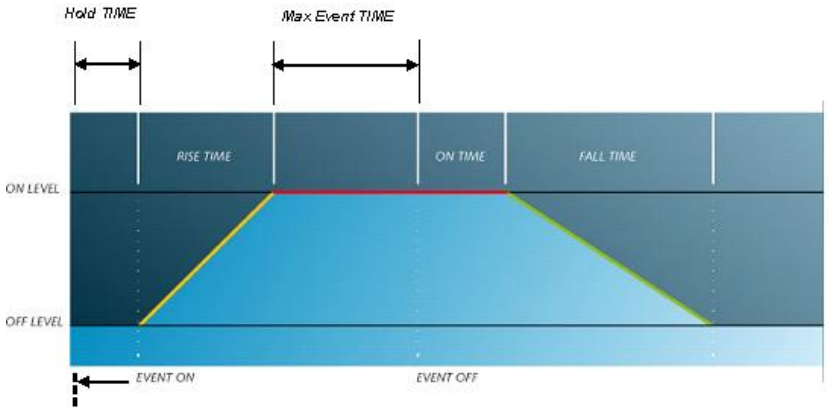
Integration with the Outside World

In modern production environments, communication between the individual components in an audio system takes on more and more importance. Here is an overview of some of the applications supported by the **mc²66**:

Audio Follow Video (AFV)

The **mc²66**'s Audio Follow Video provides the ability to open and close a channel or main fader from an external event, received via TCP/IP Ethernet (using Lawo's Remote MNOPL protocol) or GPIO. For example, during coverage of a live motor racing event, you may programme the audio channels associated with each camera to automatically open and close as the picture cuts between different shots.

Up to 128 events may 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:



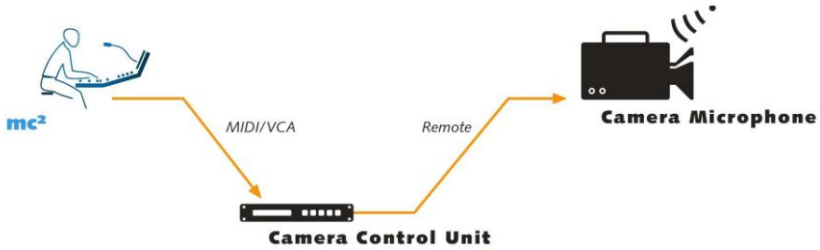
For more details on AFV, see Page 236.

General Purpose Channels (GPCs)

An alternative to controlling onboard DSP, fader strips may be assigned to General Purpose Channels (GPCs) in order to control parameters within external devices.

GPCs are system control channels which connect to the console's MIDI and Ethernet interfaces. The system provides different mapping tables to allow control of digital audio workstations (DAWs), such as ProTools or Sequoia:

Or to other MIDI-based devices – for example, to control and store camera mic amp settings:

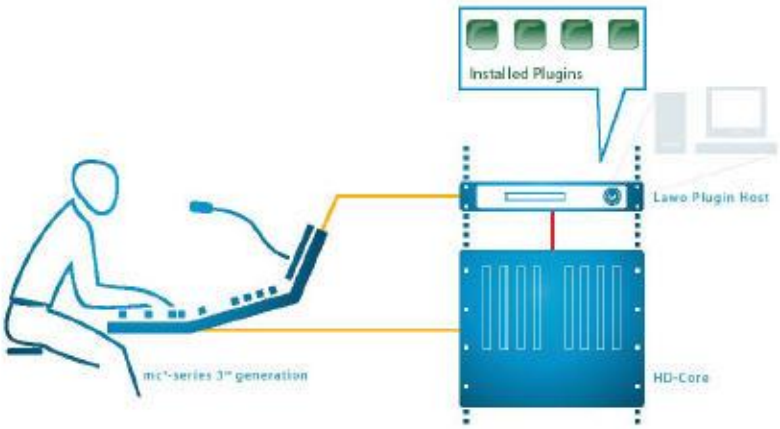


For more details on GPCs, see Page 158.

Plugin Server

The LAWO Plugin Server allows plugins to be controlled from the **mc²** console, and all settings to be stored and recalled by a production or snapshot.

All Plugins are hosted on an external host, with audio connections to/from the HD Core via 64-channel MADI and control connections via Ethernet:



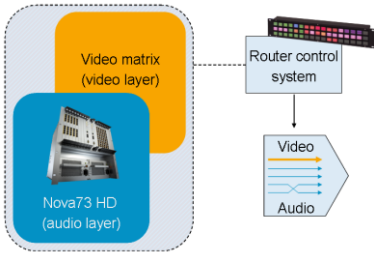
An APC UPS ensures that the Plugin Host shuts down automatically after switching off the power supply of the system.

Plugins are assigned and controlled from the **Plugin** display. Note that this display is only available if the Plugin server is configured for your system.

For more details on how to configure, assign and control plugin parameters, please refer to the “Plugin Server Technical Documentation” guide.

Remote MNOPL Control

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



A typical application is to provide 3rd party matrix control so that crosspoints within the **mc²66**'s routing matrix can be controlled by external control systems such as VSM and Jupiter. Note that if your preferred supplier does not support the protocol, then please ask them to contact Lawo for further details.

Within your AdminHD configuration, each signal may be given a mapping address; up to 16 different mapping tables can be defined so that different control systems can be supported simultaneously. For details on implementation, please refer to the "mc²66 Technical Manual" and to your 3rd party controller's documentation.

Remote Desktop

Any of the console's TFT displays (Channel or Central GUI) can be switched to a remote desktop in order to view and control other applications – for example, a VSM playback system or DAW.

The computer running the desktop must be connected to the Lawo control network. This function is programmed from the **Custom Functions** display, see Page 689.

Lawo Remote App

The Lawo Remote App is a free App which allows you to operate any fader of a mc² console, recall snapshots and control user-defined functions remotely from an iPhone, iPod or iPad. From the App you have access to the following:

- Fader level, Mute and Metering – for any fader assigned to the active Bank and Layer.
- Snapshots – load any Snapshot from any folder within the active Production.
- User Buttons – a special page of buttons allow you to control user defined functions such as monitoring, GPI control, etc. The button assignments are made from the **Custom Functions** display and stored as part of the console configuration.

For more details, see Chapter 11.

Machine Control

The optional machine control panel provides remote control of one of three external machines. The panel provides buttons for locating and looping between timecode points. 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.

Alternatively, machine control functions may be mapped onto User Buttons from the **Custom Functions** display, see Page 689.

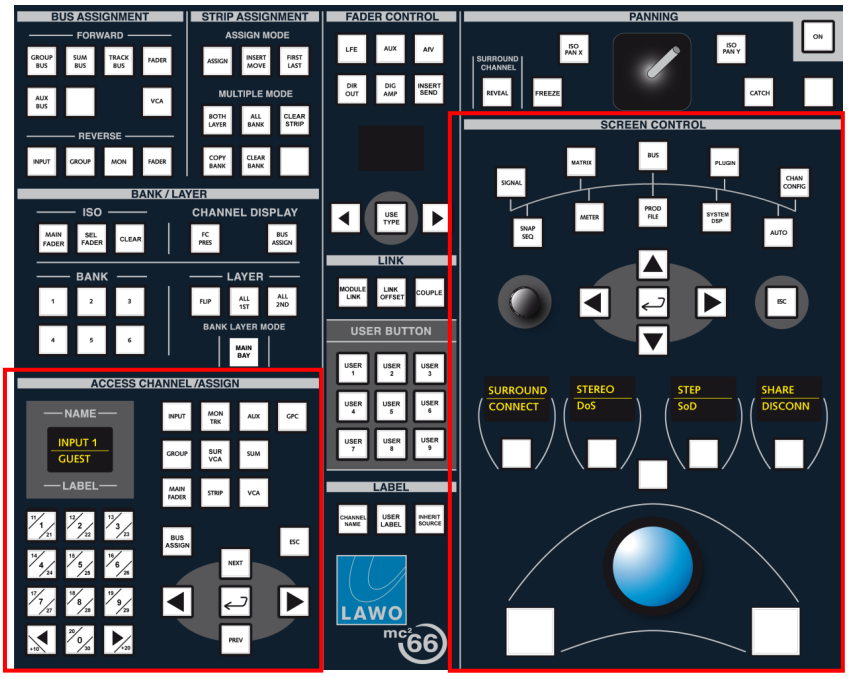
Chapter 2: Tutorial

Introduction

This tutorial is divided into two: first we will cover the operating principles of the console; and then guide you step-by-step through some of the most important operations.

Operating Principles

Located in the centre section of the console are two very important control areas used throughout the operation of the console:

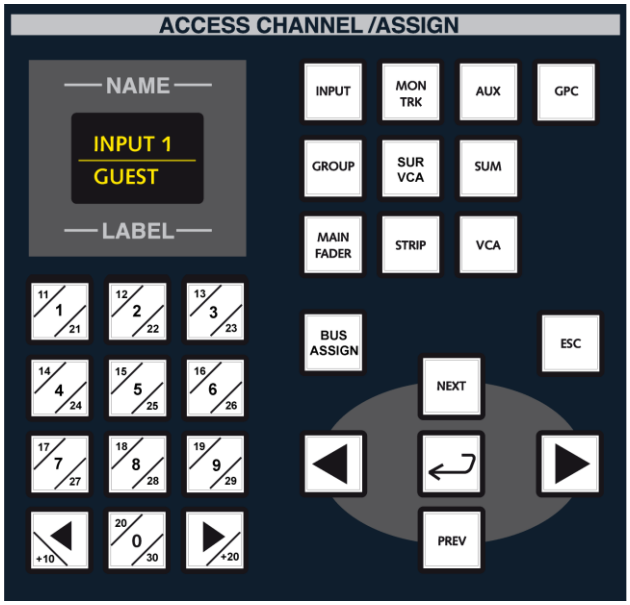


- The ACCESS CHANNEL/ASSIGN control panel is used for a variety of tasks including bus and fader strip assignments. In each case, the philosophy of operation is to place a channel 'in access' and then assign it directly to a destination. This provides fast configuration of the console without navigating through screen-based displays.
- The SCREEN CONTROL panel interacts with the centre control screen and is used for a variety of screen based tasks. In each case, you 'focus' on an area of the display, and then perform operations from the soft keys located above the trackball.

Note

Note that the panel shown above may be replaced if 16 main faders are fitted to the centre section. In this configuration, you will find a cut-down version of the Screen Control panel, with other functions available from the Monitoring touch-screen. Please see Appendix F for more details.

The ACCESS CHANNEL/ASSIGN control panel



The ACCESS CHANNEL/ASSIGN panel consists of:

- Ten channel type selection buttons – **INPUT**, **MON TRK**, **AUX**, **GPC**, **GROUP**, **SUR VCA**, **SUM**, **MAIN FADER**, **STRIP** and **VCA**.
- Two 8-character NAME and LABEL displays.
- The numeric keypad with Left/Right arrows.
- The **BUS ASSIGN** button – changes the operation of the panel from access to bus assign, see page 173 for details.
- The **ESC** button which can be used to exit any operation.
- Navigation buttons – **LEFT**, **RIGHT**, **NEXT** and **PREV**.
- The Enter button – 

Note that the ACCESS CHANNEL/ASSIGN panel is *always* active, and normally, with **BUS ASSIGN** off, selects the channel in access.

Note

The 'channel in access' is always the channel assigned to the Central Control Section; its name and label are shown in the NAME and LABEL displays, and in the top left hand corner of the Central Control Screen throughout all displays:

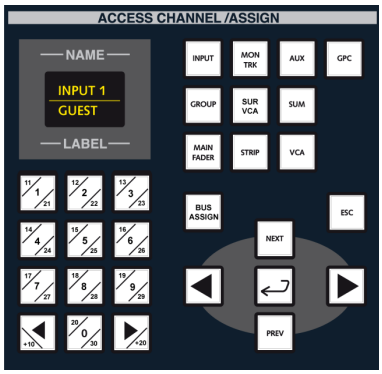
There are three ways in which you can modify the channel in access providing that the **LOCK ACC** (lock access) option is not selected:

1. Press the **SEL** button on a channel or main fader strip.

This is the simplest method for accessing channels on the active control surface.

However, there are times when you will wish to access channels on an underneath bank or layer of fader strips. In these cases, you may use either method 2 or 3 as follows:

2. Select the channel type and number:



- Select a channel type by pressing one of the following:
  - **INPUT** – Input channels (up to 760).
  - **MON TRK** – Monitor channels/Track Busses (up to 96).
  - **AUX** – Auxiliary masters (up to 32).
  - **GPC** – General Purpose Channels (up to 256).
  - **GROUP** – Group masters (up to 64).
  - **SUR VCA** – Surround VCA masters (up to 64).
  - **SUM** – Sum masters (up to 88).
  - **MAIN FADER** – selects the channel type as assigned to one of the main fader strips.
  - **STRIP** – selects the channel type as assigned to one of the channel fader strips.
  - **VCA** – VCA masters (up to 128).

*The channel type button flashes and buttons on the numeric keypad illuminate; the flashing **TYPE NUM** message is guiding you to enter a number.*

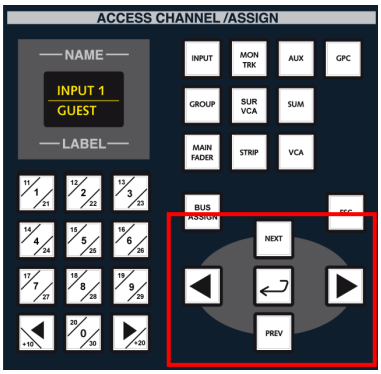
- Enter the channel number by pressing a number on the numeric keypad followed by the Enter button. For example, press **1**, **2** and Enter to enter the number twelve.
- Alternatively, enter a three digit number. For example, pressing **0**, **1**, and **2** will also enter the number twelve.

Having entered a valid number, the channel type button stops flashing and the displays update to show the name and label for the selected channel.

Note

If you try and enter an invalid selection, for example GRP 897, the NAME display tells you by flashing the letters **NOTAVAIL** for 'Not Available'. Press the **ESC** button to exit the operation, and start again.

3. The third method of changing the channel in access is to increment or decrement the current channel number:



- Press the **NEXT** or **PREV** buttons to increment or decrement the channel number by DSP type. For example, to scroll up or down through Input channels 1-384, Monitor channels 1-96, Groups 1-48, Sums 1-48, Auxes 1-32, VCA Masters 1-128, AFL/PFL Busses, General Purpose Channels (GPCs) 1-256 and Surround VCA Masters 1-64.
- Alternatively, press the **LEFT** or **RIGHT** buttons to assign the next channel as assigned to the console control surface. For example, if Input channel 8 is currently in access and assigned to channel fader strip 8, pressing the **LEFT** button selects the DSP channel assigned to fader strip 7.

The name and label for your selected channel are shown in the NAME and LABEL displays.

Note that the channel in access may be locked by pressing the **Lock ACC** touch-screen button located on the **Extra Buttons** display, see Page 369. Therefore, if you cannot update the channel in access, check the status of this button:

Note

Updating the channel in access is how you assign a channel to the Central Control Section, and to a fader strip or bus. We'll cover these operations later in this tutorial, but first let's look at screen display navigation.

SCREEN CONTROL

The centre section houses a touch-screen divided into three distinct areas:

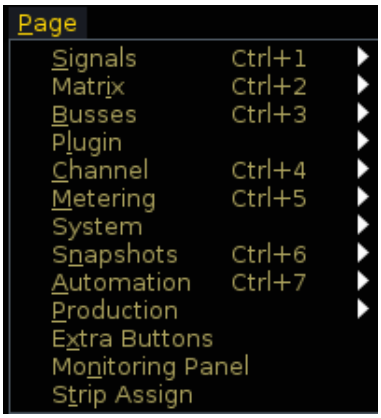
1	**Title Bar**	Across the top you will always see the channel in access (e.g. **INP 1**), the time display (this can show local time, timecode or the integrated loudness of a summing channel), and the name of the current production and snapshot if there is one loaded.
2	**Status Bar**	At the bottom the status bar provides feedback on used data storage space (%) and the progress of operations such as loading or saving a production. In addition, the status of the console's external power supplies is monitored here. See Page 642 for details.
3	**SCREEN CONTROL displays**	The main area of the screen works in conjunction with the SCREEN CONTROL panel and console keyboard. Here you can page through displays for Signal routing, Production management, Snapshots, Metering, Bus Assignments, etc.

Title Bar

The title bar contains some common elements:

Page

Click the **Page** menu to access all the console's SCREEN CONTROL displays (see opposite).



Next/Previous Page buttons

These buttons work just like the Forward and Back buttons on a web browser.

For example, if you have viewed the **DSP Configuration**, then the **Snapshots** list, and then the **Main** display, you can use the previous Page button to step backwards through this sequence of displays. This can be much quicker than reselecting each display from the SCREEN CONTROL buttons or **Page** menu.

The last 16 pages viewed are stored. If you reach the first or last page in the sequence, then the button turns grey indicating no further selections are available.

Information

- The name and label of the channel in access – **INP 1**.
- The title of the selected display – **Signal List**.
- The name of the active production – **production0015** - and the current snapshot if loaded – **snapshot0014**.
- The LAWO logo.

The Time / Integrated Loudness Display

The middle of the title bar can show one of the following:

- **Timecode** – either **Local Time** (**15:09:04**), **Timecode** or **Offset Timecode**.
- **Integrated Loudness** – of a particular summing channel (in LUFS).

Click to select an option, and the relevant sub options appear.

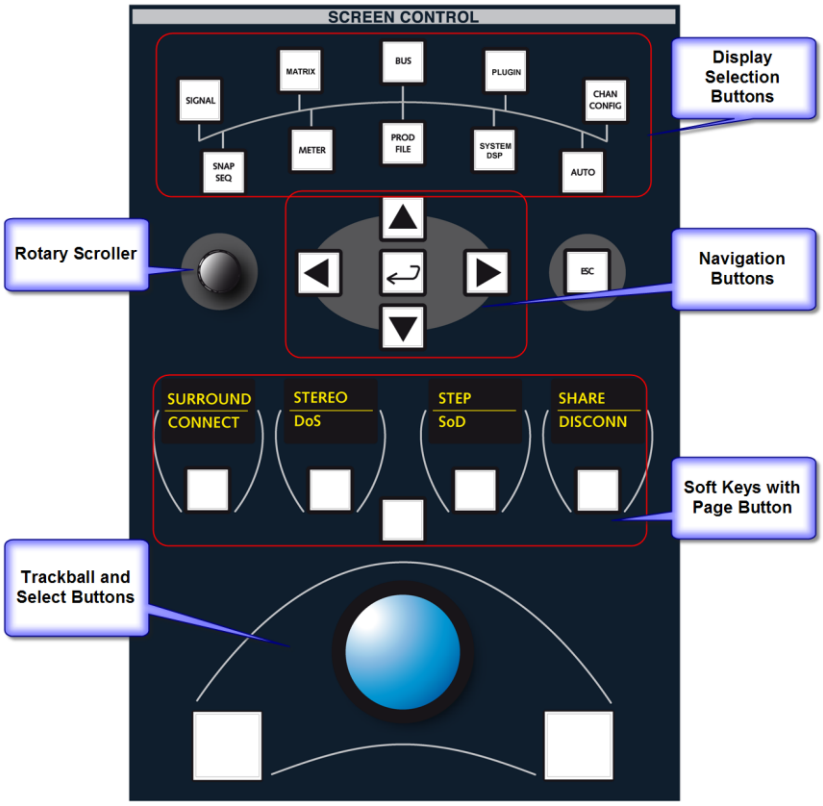
Warnings

You may also see the following:

- A yellow hazard warning flag, if there is a problem with the system status - see Page 600 for details.
- The keyboard locked icon, if the keyboard is locked.

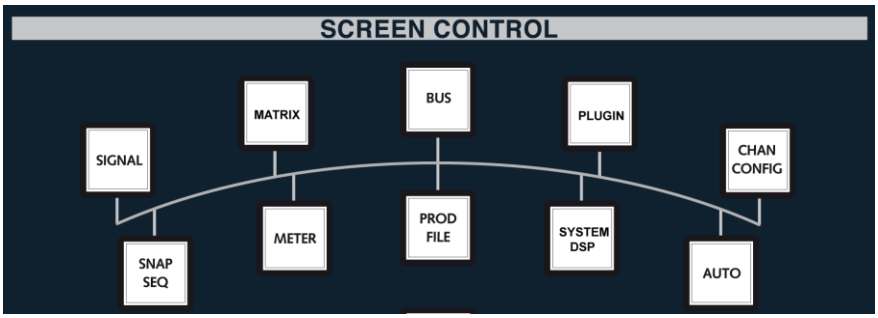
The Screen Control Panel

The SCREEN CONTROL panel controls the remainder of the control screen area. The displays which appear here are common to all mc^2 consoles. One of the displays is *always* active. For clear feedback of information, there are no pop-up windows – every display stands alone with clearly defined control areas:



Changing Display

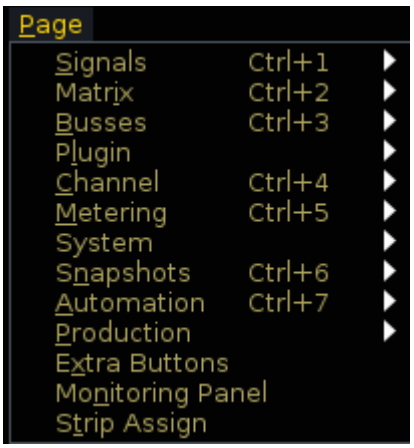
Use the SCREEN CONTROL panel to select a display; keep pressing each button to cycle through the available pages:



Button	Display	Description
SIGNAL	**Signal List**	control signal routing (see Page 563).
“	**Signal Settings**	adjust I/O parameters (see Page 597), and check the system status (see Page 600).
SNAP SEQ	**Snapshots List**	load, save and manage console snapshots (see Page 391)
“	**Sequences**	used to create and run real time sequence automation (see Page 403).
“	**Snapshot Trim Sets**	used to manage snapshot offset parameters (see Page 441).
MATRIX	**mx Routing**	crosspoint control of signal routing (see Page 583).
“	**mxDSP**	control DSP settings on the optional mxDSP cards (Page 622).
“	**Downmix**	control downmix matrix parameters (see Page 635).
METER	**Metering 1 to 4**	four pages of assignable meters (see Page 314).
BUS	**Bus Assign**	view or change bus assignments from the channel in access (see Page 176).
“	**Busses Reverse**	interrogate bus assignments made to the channel in access (see Page 178).
PROD FILE	**Productions**	manage the console’s productions (see Page 374).
“	**File**	import or export productions to/from USB or a network server (see Page 465).
PLUGIN	**Plugin setup**	access to the remote plugin server setup (optional).
“	**Plugin Edit**	access to plugin server editing (optional).

Button	Display	Description
SYSTEM DSP	**System Settings**	set console options (see Page 650).
“	**DSP Config**	view or change the DSP Configuration (see Page 122).
“	**Custom Functions**	configure user buttons for custom functions (see Page 689).
CHAN CONFIG	**Main Display**	view parameters for the channel in access (see Page 183).
“	**Channel Config**	adjust the channel signal flow for the channel in access (see Page 100).
AUTO	**Mixes**	load and manage timecode automation mixes (see Page 535).
“	**Passes**	used to manage passes of timecode automation within the active mix (see Page 539).
Custom configured	**Extra Buttons**	access to on-screen buttons for mc^2 options (see Page 369).

Alternatively you can access *all* the console’s displays from the **Page** menu at the top left of the title bar:



Tip

As an alternative to trackball operation, you can use your keyboard to open a particular display or menu:

1. Press **ALT** + **P** to open the **Page** menu.
2. Then press an underlined letter to select a display – for example, **S** to open **Signals**, **M** to open **Matrix**, etc.

Or use any of the available “Hot Key” commands shown within the **Page** menu. For example:

3. Press [**CTRL**] + [**1**] to cycle through the available Signals displays: **Signal List** and **Signal Settings**.

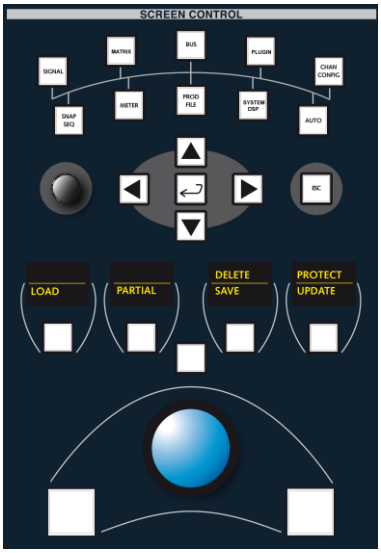
Other “Hot Key” commands, not displayed, are:

4. Press [**ALT**] + [**Cursor Left**]/ [**Cursor Right**] to operate the next or previous Page buttons.

Making Selections and Focussing the Display

Most displays are divided into clearly defined areas – for example, in the **Snapshots List** display there are areas listing **Folders**, **Snapshots** and for entering a **Snapshot Memo**:

Within the **Folders** and **Snapshots** lists, selections are highlighted in black – our selected folder is **Music** and the selected snapshot is **Act 1 Scene 2**.



Screen buttons which perform an operation are always beveled with white text – for example, **Save**, **Save Partial**, **Load**, etc.

For most operations, you make a selection, or 'focus' on an area of the display, and then select one of the on-screen functions, or press a SCREEN CONTROL panel soft key.

For example, to load a snapshot:

1. Select the snapshot.
2. Then touch the on-screen **Load** button, or press the **LOAD** soft key.

Within each display there are three ways to make a selection:

- Touch-screen (MKII mc²66 only)
- Trackball/keyboard
- Navigation buttons/rotary scroller (not available on mc²66 with extra main faders)

Using the Touch-Screen

Anything which is a button or menu option can be selected by touching the screen. So for button-driven displays, such as **Extra Buttons**, the quickest method of working is to reach out and touch the screen:

However, while some displays are designed for touch-screen operation, others are not. For list-driven displays, such as the **Signal List** and **Productions**, we recommend using the trackball and keyboard, or navigation controls.

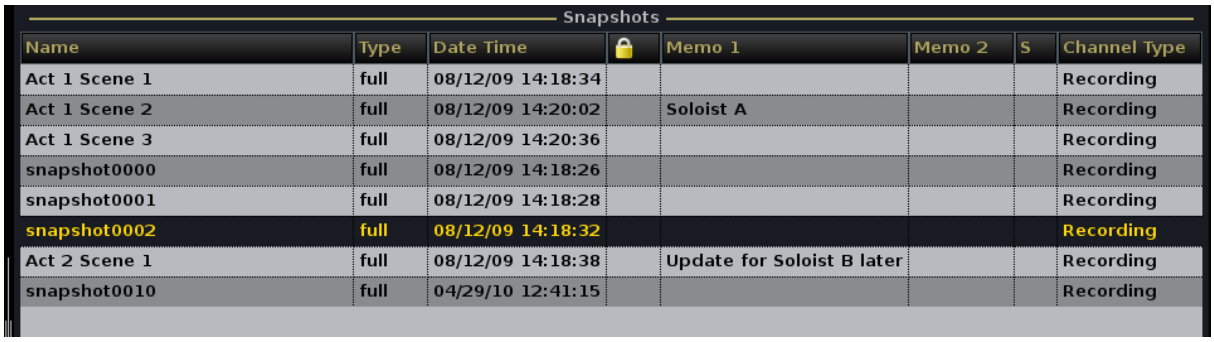
Note

Note that the classic **mc²66** does not support a touch-screen. Use the trackball and mouse keys to action on-screen buttons.

Using the Trackball

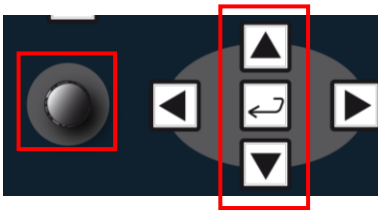
To use the trackball, position the cursor above the name in the list and press the left select button.

The selection – e.g. ***snapshot0002*** *- highlights in black:*

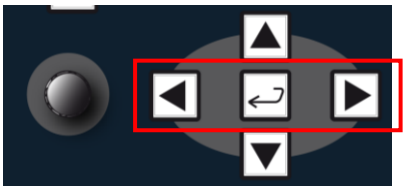


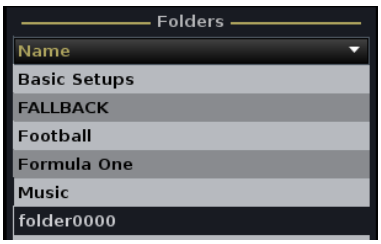
Using the Navigation Controls

Alternatively you can use the rotary scroller or up/down navigation buttons to quickly change the selection.



1. In our example, turn the rotary control to scroll up or down the list of snapshots.
2. Or, press the up or down arrow buttons to step up or down the list.
3. Use the Left/Right navigation buttons to change which part of the display is in focus.





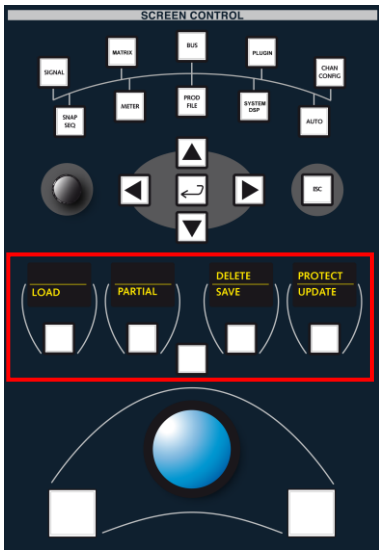
- For example, press the Left arrow button to move focus to the list of **Folders**.
- Now turn the rotary scroller, or press the Up/Down arrows, to move up or down the list as before.

The Right arrow button cycles around the display in a clockwise manner, and the Left arrow in an anti-clockwise manner.

Note that consoles fitted with extra main faders have no SCREEN CONTROL navigation controls. Use the trackball or touch-screen to navigate and make selections.


Note

Soft Key Operations



Having made a selection, or focused on a new area of the display, the four soft keys update to offer operations:

1. In our example, we can **LOAD** or **UPDATE** the selected snapshot or **SAVE** a new snapshot by pressing the appropriate soft key.

Note that there is a second level of soft key functions – **DELETE** and **PROTECT**.

2. To access the second level press the **PAGE** button – this is the middle button between the soft keys.

The displays update so that you can see which soft key to press for each operation.

3. Deselect **PAGE** to go back to the first level.

The soft key functions vary depending on the display and the area which is in focus. So, if you're struggling to find the correct soft key function, try focusing on a different area of the display.

On the classic mc²66 you will only see one level of soft key functions, so remember to select the **PAGE** button when searching for a function.

Tip

Note

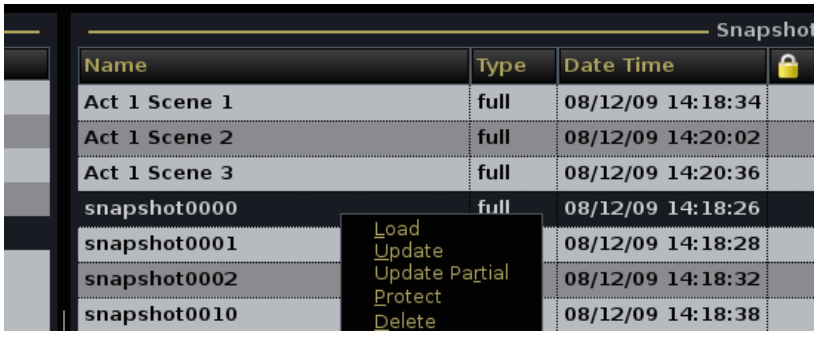
Note that consoles fitted with extra main faders have no SCREEN CONTROL soft keys. Use the trackball or touch-screen to select a function; some may require a right-click as described below.

The Right Select Button

All soft key functions are duplicated either as on-screen buttons, or options when you right-click a selection:

1. Select a snapshot and press the right select button:

You can now **Load**, **Update**, **Protect** or **Delete** the snapshot:



Other Trackball Operations

There are some functions which can only be performed using the trackball. Let's look again at the **Snapshots List** display:

1. Screen buttons are often used at the top of lists – for example, you can sort the **Snapshots** list differently by selecting **Name**, **Date Time**, etc:

2. You can resize a window by selecting and dragging the grey separator bar – for example, to widen the **Folders** list, position the cursor above the grey separator bar, then press and hold the left select button while dragging to the right; the **Folders** and **Snapshots** windows resize accordingly. Note that if there is no grey separator bar, then resizing is not possible.
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 press and hold the left select button while dragging the column to the left or to the right. Release the left select button when you are happy with the new position of the column.

Note that any changes you make to window sizes and list orders will be reset after a console restart.

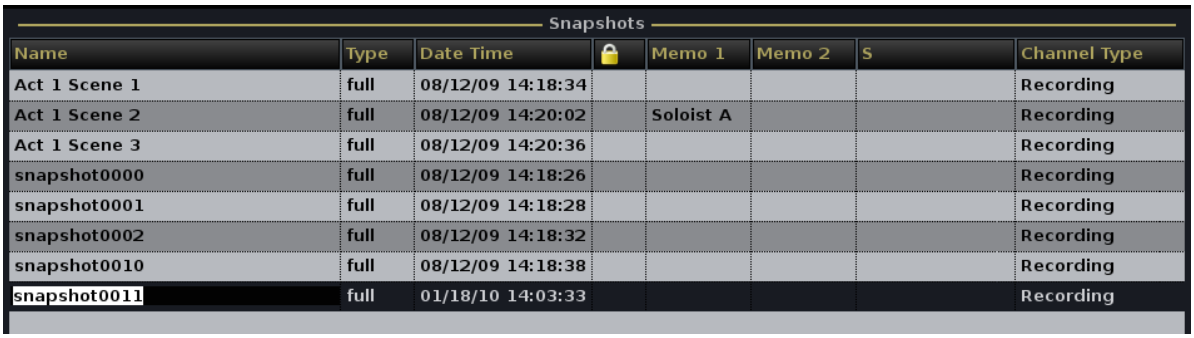
4. If information within a window is hidden, then left/right or up/down scroll bars will automatically appear. Select a scroll bar at the bottom to scroll left/right or up/down.

The Console Keyboard

The console keyboard is used for naming display entries, such as a snapshot, production or signal label.

1. First make your selection – e.g. select a snapshot.
2. And do one of the following:

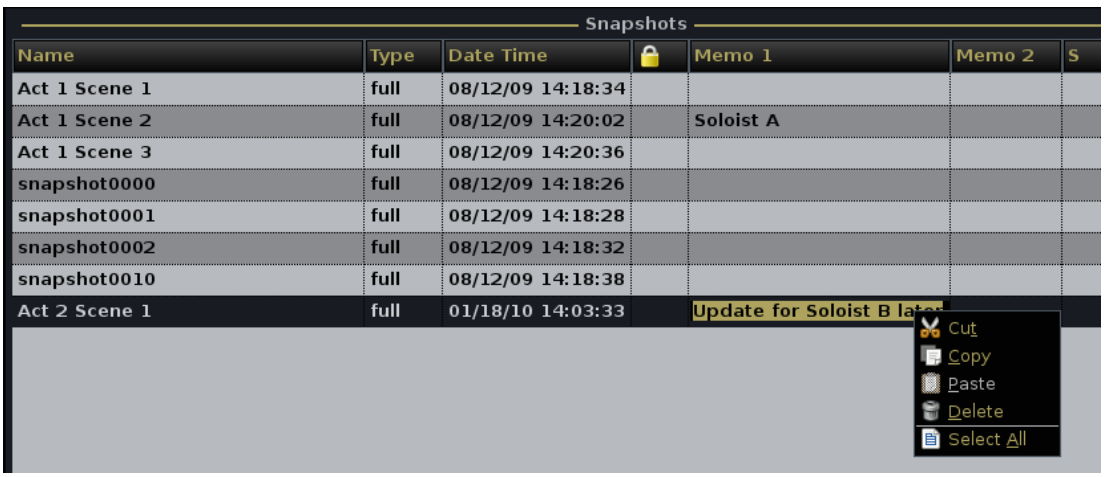
- Click once on the snapshot name using the trackball select button – *all* the existing text is selected (white) so that when you type you will automatically overwrite the existing name:



- Or, click twice to edit the existing name – a cursor appears at the end of the text (black) allowing you to easily append or modify the old name.

3. When you have finished, press the Enter button on the keyboard to confirm the new name.
4. Or, if you make a mistake and want to exit the naming mode without making any changes, press the **Esc** button on the keyboard.

Note that if you right-select a text field, you will access **Cut**, **Copy**, **Paste**, **Delete** and **Select All**:



Use these options to copy and paste text from one field to another – for example, to copy and paste snapshot memo text.

You can also use **CTRL+C** or **CTRL+V** on the console keyboard to copy and paste selections.

If you like working with keyboard shortcuts, then you can also use the keyboard to make selections and change parameters:

To make a selection:

1. Press **TAB** or **Shift**+**TAB** to change the focus area of the display – for example, to move from the list of **Snapshots** to **Folders** on the **Snapshots List** display:

Note that **TAB** cycles around the display in a clockwise manner, and **Shift**+**TAB** in an anti-clockwise manner.

2. Then use the Up and Down keyboard buttons to step through the entries in the list.

On some displays, such as the **Main Display**, you can use the keyboard to change parameter values:

1. Press **TAB** (or **Shift+TAB**) to focus on a parameter – for example, input **GAIN**.
2. Then use the Up and Down keyboard buttons to change the value, or type in a new value.

Tip

You may disable the keyboard to avoid accidental mistakes. To disable and re-enable the keyboard, press and hold **Fn** and then press **ON**. When the keyboard is disabled, you will see 'kbd locked' in the title bar at the top of the Central Control Screen.

You may also connect an external keyboard using the USB ports in the front arm rest of the console.

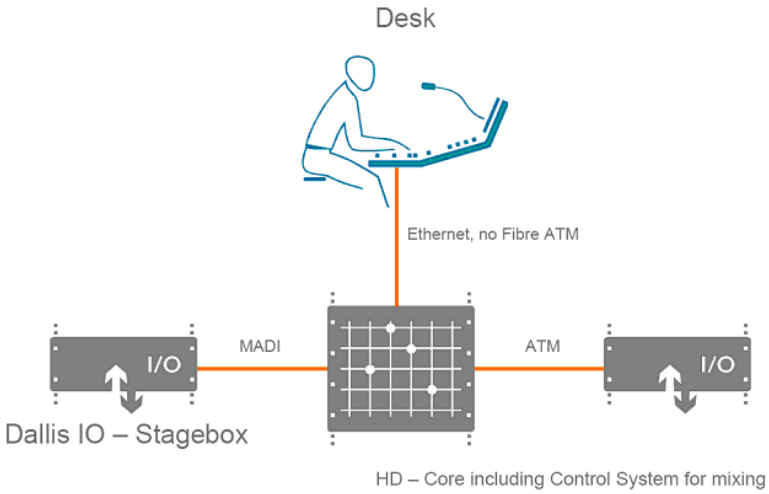
Getting Started

Having covered some of the concepts behind the **mc²66**, let's look at how to get started on the console. We are assuming that your console is fully commissioned such that all of the basic configuration tasks are complete. Your console should also contain a generic setup production which will provide an excellent starting point for new templates you wish to create.

Switching on the Power

The **mc²66** consists of three principal system components:

- Console surface.
- HD Core.
- DALLIS I/O interfaces, which may be connected remotely to the system.



The components may be powered in any order.

Note

Please note the following:

- The diagram above shows the MKII **mc²66**. The control system resides within the HD Core, meaning that the system boots when you turn on power to the HD Core.
- In the classic **mc²66**, the control system resides within the console surface. This means that the system boots when you switch on power to the console's external power supply.

For either system, you can power the console and HD Core before I/O interfaces. This enables you to begin setting up the console before remote I/O interfaces have received power.

From power on, the control system boots in a few seconds; during this time the centre control screen reports back on the boot-up progress.

At the end of boot-up, the control system automatically loads the following:

- **Configuration data** – as programmed and uploaded by AdminHD. These are fixed settings specific to your console. For example, the organisation of Directories and Subdirectories within the **Signal List** display.
- **Warm start data** – the complete status of the console as stored when the system was last shut down.

Depending on who was last using the console, you may be sat in front of a fully configured control surface with DSP settings or a series of blank fader strips! In either case, the fastest way to reset the console is to load a production.

For more details on system shutdown and warm start data, see Page 647.

Loading a Production

Productions form the top level for user data storage and store *all* the settings required for a production or type of job. Depending on the installation, you may have a number of setup productions or only one. Each should be clearly labeled – for example, **Basic Setups**.

All setup productions should *always* be protected and *only* be modified by an authorised member of staff as they provide a common starting point for all users. Use the production to load a starting point; then save a new production to store your own settings.

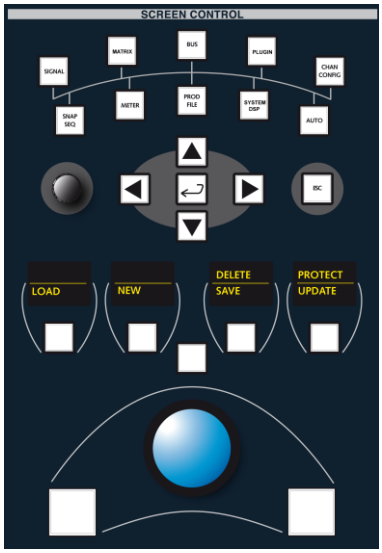
Settings will vary from console to console, but generally a setup production should reset the following console elements:

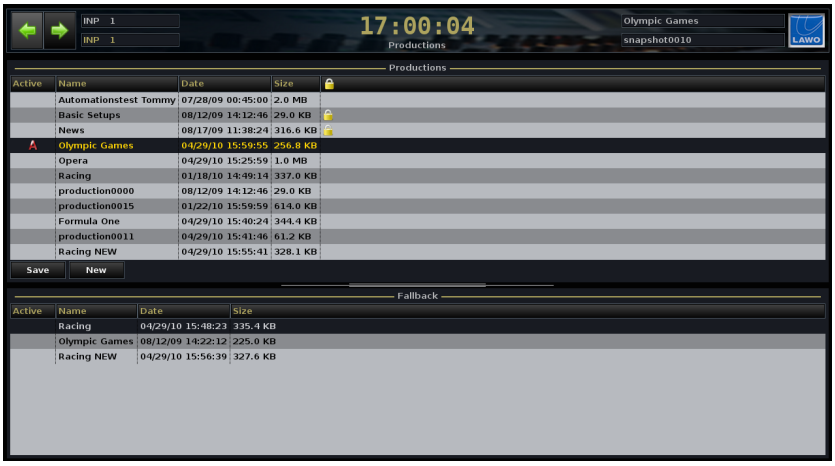
- DSP configuration to a working default.
- Input and Output sample rate converter settings to match installed equipment.
- **System Settings** display options to a working default.
- **Metering** display pages to a working default.
- The assignment of channels to fader strips to a working default.
- DSP settings to flat.
- Basic signal routing and user labels – for example, routing to output distribution, monitoring and external metering.

To load a production:

1. Press the **PROD FILE** button located on the SCREEN CONTROL panel.

*The **Productions** display appears on the centre control screen:*





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, see Page 384 for details.

Note

Note that the active production is shown in the title bar of the display – in our example, **Olympic Games**. You will *always* see the active production name across all displays.

2. Select the production you wish to load from the **Productions** list - for example **Basic Setups**.

The selected production is highlighted in black.

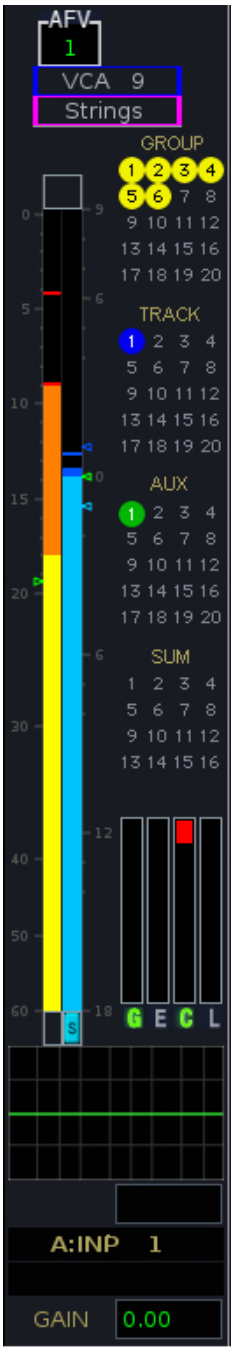
3. Press the **LOAD** soft key to complete the operation.

*The console status will update, and the title bar now shows that **Basic Setups** is the active production.*

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

Interrogating the Channel Fader Strips

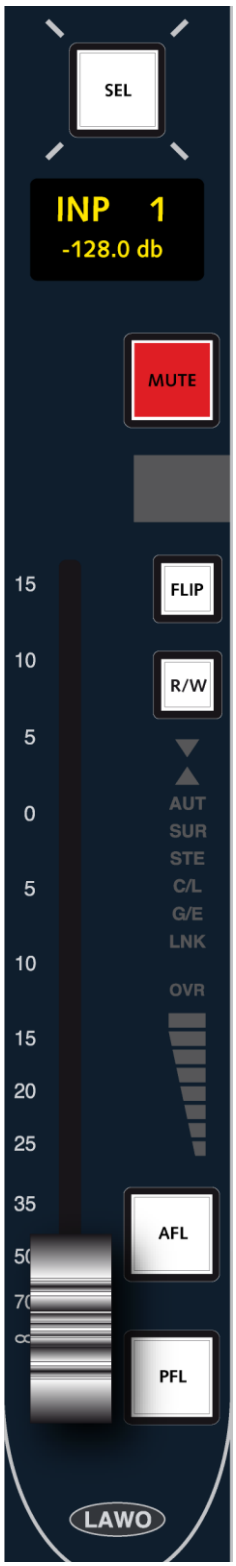
Depending on the settings within the setup production, you may now be able to open the faders and monitor audio! Don't worry if this is not the case as we will look at how to modify the configuration shortly.



You can interrogate which channels have been assigned to the control surface, their input metering and current bus assignments by looking at the **Channel** displays across the console.

Note that the bottom of the **Channel** display tells you which channels you are controlling from each fader strip. The two boxes display the names/labels for the DSP channels assigned to the 1st and 2nd layer fader strips. In our example, input channel 1 is assigned to layer 1 (**INP 1**) and layer 2 is unassigned; both inputs are switched their **A** input. These boxes show the channel name, channel label or inherited source label depending on the LABEL buttons, see Page 573.

Note that the **Channel** display can show peak metering, loudness metering or both on a channel by channel basis, see Page 318.



Switching Banks and Layers

The fader strip provides channel control for the current layer.

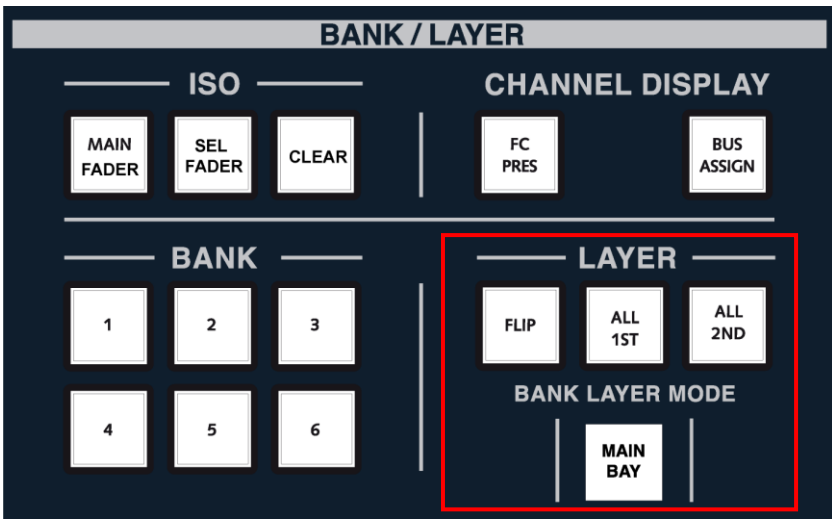
Note that you can switch Free Control 4 (FC4) to control the second layer (not available on the classic mc²66). This provides simulataneous access to level and mute for both layers. See Page 139 .

To invert the layers:

1. Press the **FLIP** button located on the fader strip to switch an individual strip.

*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.*

Alternatively, to invert layers globally across the console, locate the LAYER access buttons in the centre section:



2. With the **MAIN BAY** button turned off, you can switch the layer status of *all* fader strips – channel and main:

- Press **FLIP** to invert the layer for *all* fader strips.

This inverts the current layer selections allowing you to view all 'hidden' channels on the alternate layer with one button push.

3. Turn on the **MAIN BAY** button if you wish to **FLIP** only the main fader strips.
4. Press **ALL 1ST** to reset *all* fader strips to Layer 1.
5. Press **ALL 2ND** to switch *all* fader strips to Layer 2.

When you deselect any of these buttons, the console reverts to its previous layer status.

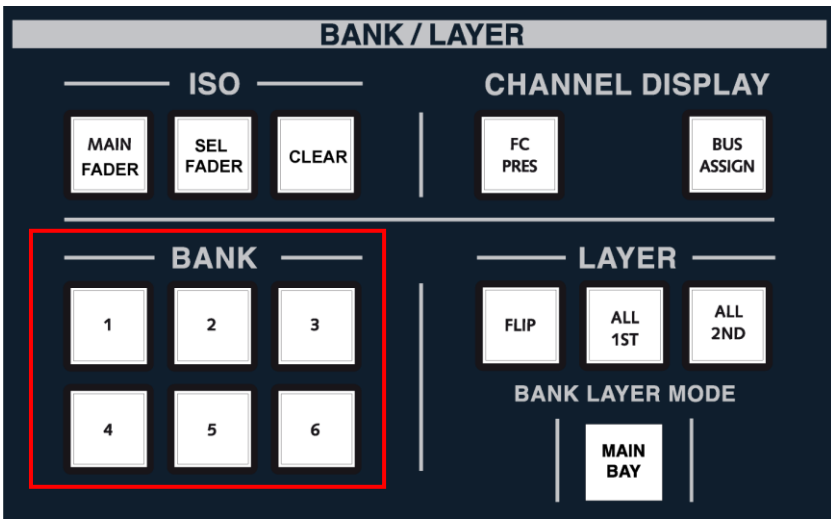
Press and hold the **ALL 1ST** or **ALL 2ND** buttons for more than 3 seconds to reset the layer status to all 1st or all 2nd.

Note

Note that the **MAIN BAY** button does not exist on the classic mc²66. Instead you will find **MAIN 2ND** and **STRIP 2ND** buttons which switch the main or channel faders to the second layer.

To interrogate any of the other banks of fader strips:

1. Locate the six BANK access buttons, numbered **1** to **6** above the ACCESS CHANNEL/ASSIGN control panel in the centre section.



One of these buttons will be illuminated; this is your active fader bank.

2. With the **MAIN BAY** button turned off, you can switch the bank for *all* fader strips – channel and main:
3. Press any numbered button to switch to a new bank.

*As you do this, all fader labels, control positions and **Channel** displays update across the console to reflect the new settings.*

Each bank provides access to two layers of channels. If there are no channels assigned to the bank, then you will switch to a series of blank fader strips.

4. Turn on the **MAIN BAY** button if you wish to use the BANK **1** to **6** buttons only on the main fader strips.

You may also switch banks and layers locally, eight faders at a time. In addition, you may choose to isolate individual fader strips from the bank switching, or isolate a complete 8-fader bay if you are working with a second engineer.

Tip

Note that the **MAIN BAY** button does not exist on the classic mc²66. Instead you will find **BNK 1** to **BNK 6** buttons within the main fader bay, providing bank switching for the main faders.

Note

For more details on banks and layers, please refer to Page 134.

Creating Your Own Configuration

Tip

Having loaded a setup production, you will want to modify the configuration to suit your particular show or mix. You can perform these operations in any order, but the most efficient way is as follows:

- **Select the DSP configuration** – this sets the number of input channels, monitor channels, groups, sums and auxes, and the channel type – Broadcast or Recording – for the production.
- **Set up your signal user labels and routing** – by routing sources to channels before you lay out the control surface, you can make decisions such as which input channels, groups, sums, need to be mono, stereo or surround.
- **Assign your channels to the fader strips** – design your console layout by assigning your input channels, groups, sums, etc. where you want them.

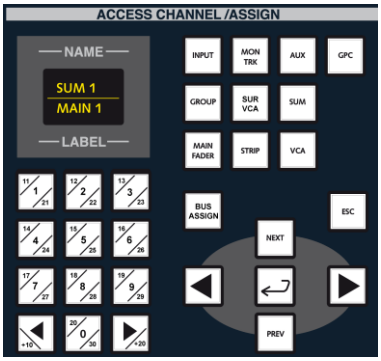
For the purposes of this tutorial, we are going to assume that you have a DSP configuration with some input channels, groups, sums and auxes. For more details on DSP configurations, see Page 122.

We are also going to assign our channels to the control surface before making any routes so that you can see audio appear as it is routed.

Assigning Channels to Fader Strips

Let's take an example where we wish to assign input channels 1 to 24 across fader strips 1 to 24, and assign them to a single sum master channel controlled from main fader strip 8.

If you want to clear down the fader strip assignments loaded from the setup production to start from a series of blank fader strips, use the **CLEAR BANK** function as described on Page 155.



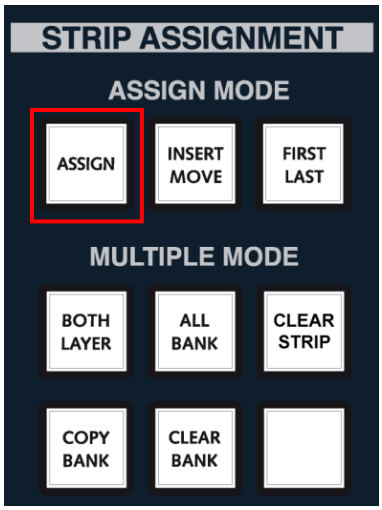
To assign the sum master channel (SUM 1) to main fader strip 8:

1. Select **SUM 1** from the ACCESS CHANNEL/ASSIGN control panel, by pressing **SUM**, the number **1** and the Enter button.

This puts SUM 1 into access as shown on the NAME and LABEL displays.

2. Now press the global **ASSIGN** button, located on the STRIP ASSIGNMENT panel:

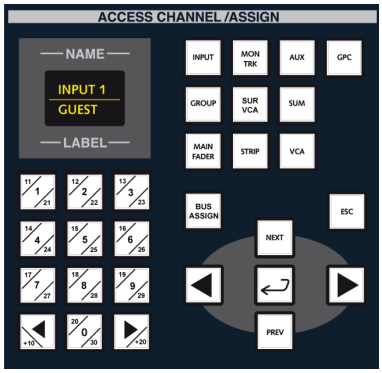
*The **ASSIGN** button flashes, and across the console the fader **SEL** buttons flash, in green, to indicate possible destinations for your selected channel:*



3. Press the fader **SEL** button on main fader strip 8 to complete the assignment.

*The fader **SEL** button stops flashing and changes colour, from green to red, to indicate the assignment. In addition, the Fader Label display updates to show the new system name for the fader strip - **SUM 1**.*

With the **ASSIGN** mode still active, now assign input channels 1-24 onto the control surface:



1. Select **INP 1** from the ACCESS CHANNEL/ASSIGN control panel by pressing **INPUT**, the number **1** and the Enter button.

This puts input channel 1 into access.

2. Select the **FIRST LAST** button, located on the STRIP ASSIGNMENT panel:

3. Press the fader **SEL** button on channel fader strip 1 followed by the fader **SEL** button on channel fader strip 24:

The console incrementally assigns input channels 1 to 24 from the first selection (channel fader strip 1) to the last selection (channel fader strip 24).

4. Deselect the global **ASSIGN** button or press **ESC**, on the ACCESS CHANNEL/ASSIGN control panel, to exit the assign mode

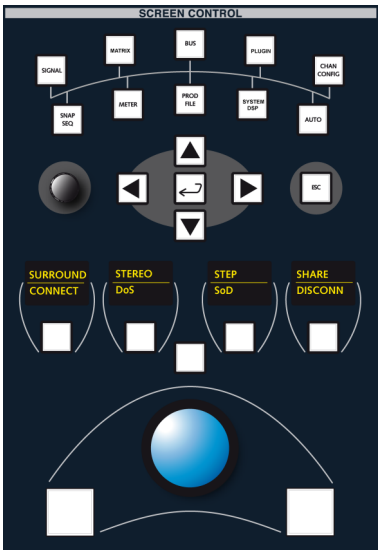
At the bottom of each assigned fader strip, the LAWO backlight is colour-coded to indicate the channel type (MKII mc²66 only). This enables you to easily distinguish input channels (white) from sums (red), etc.

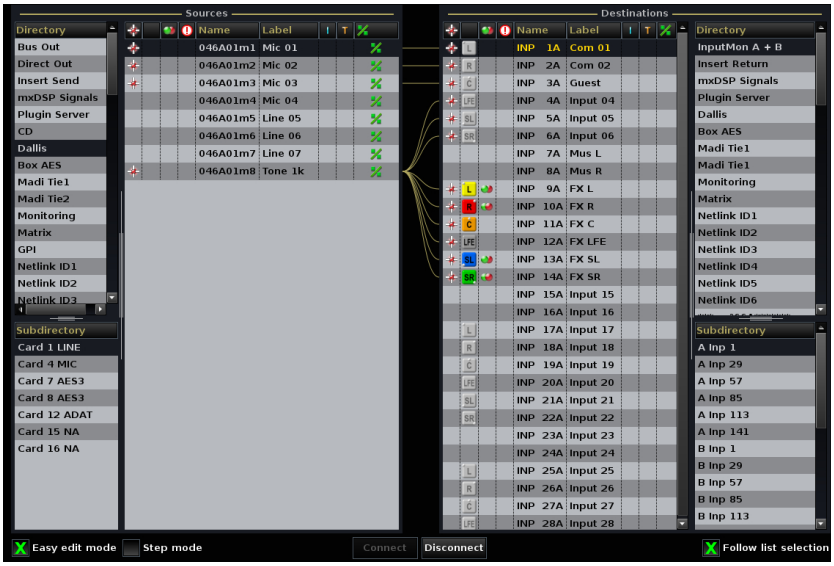
For more details on fader strip assignment, please refer to Page 147.

Source Routing

Now let's route a new audio source into input channel 1.

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

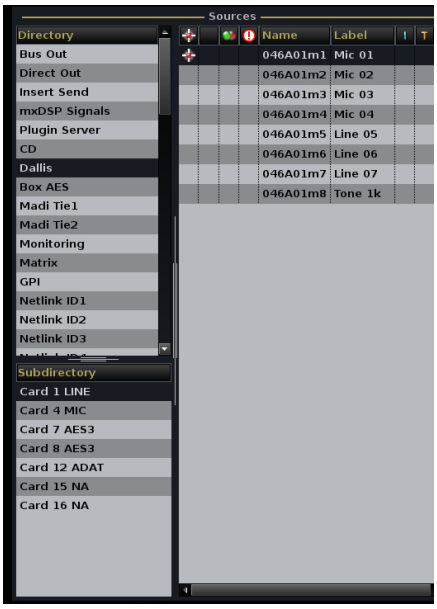




Note that each time you press the **SIGNAL** button you toggle between two pages – **Signal List** and **Signal Settings** – so keep pressing until you see the **Signal List**.

The **Signal List** is used to view and make 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**.**

Use the trackball to select a **Directory**, **Subdirectory** and a **Source** (or **Destination**). Or use the navigation buttons and rotary scroller to focus on different areas of the display and scroll up/down the **Directory**, **Subdirectory** and **Signal List**s:



2. Select the source you wish to connect – in our example, the directory called **DALLIS**, subdirectory called **CARD 1 LINE** and the source named **Mic 01**.

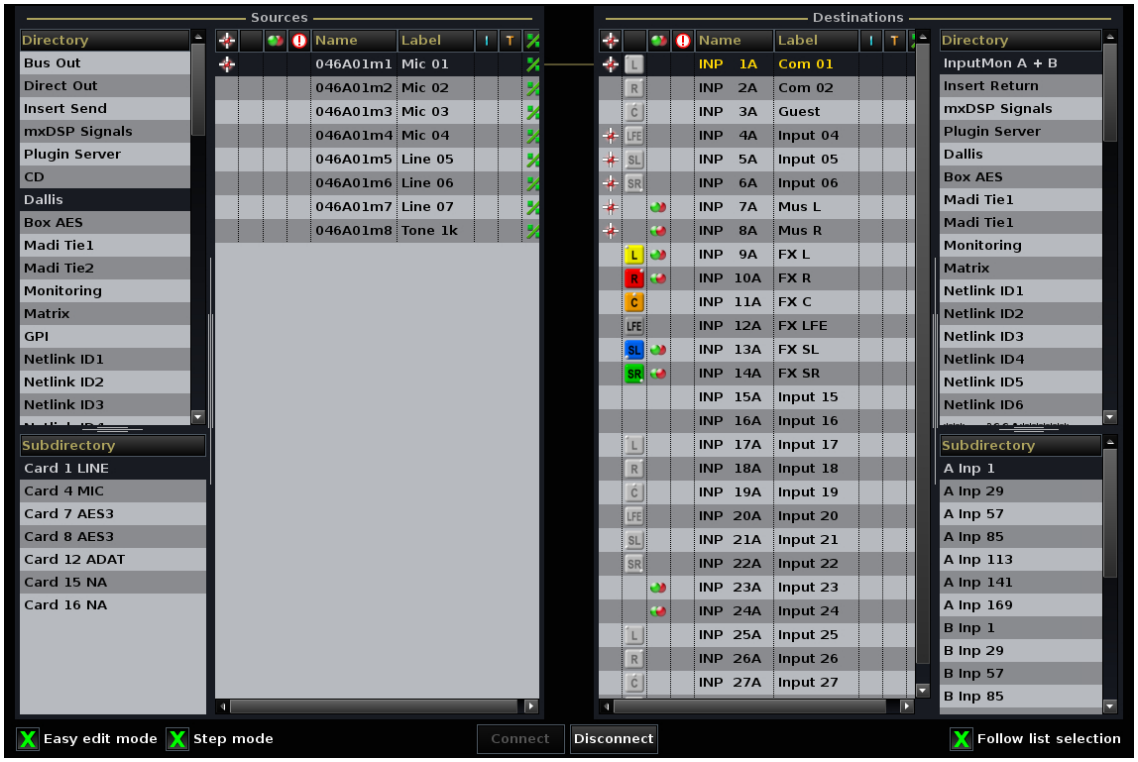
Note that the names of your Directories and Subdirectories are set by the AdminHD configuration, so if you can't find the signal you're looking for, please contact your technical engineer.

3. Next, select the destination in a similar fashion – in our example, the directory called **Input/Mon A + B**, subdirectory called **A Inp 1-28** and destination signal called **INP 1A**.

Note that input and monitor channels are always found in the Directory called **Input/Mon A + B**. The **A** or **B** provides access to either the A or B input of the channel. For now, assign your sources to input A (e.g. **INP 1A**). The B input is provided to assign a back up source, see Page 567.

4. Having selected your source and destination signals, press the **CONNECT** soft key to make the route.

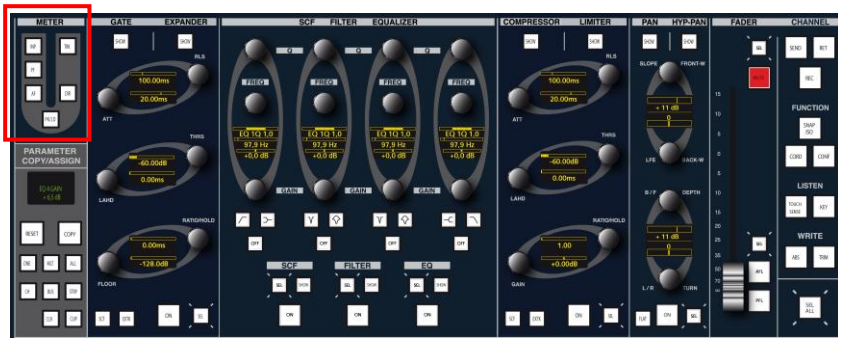
*The **Signal List** updates with a line between the source and destination showing the connection:*



Now look at fader strip 1 on the control surface; the fader strip and **Channel** display name and labels update and hopefully you are metering some audio.

If not, it may be because the meter pickup point is set to after fader. To change the meter pickup point:

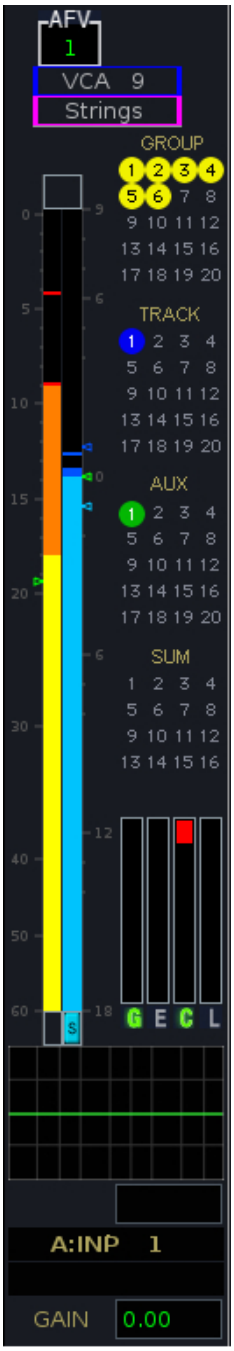
1. Press the fader strip **SEL** button to put INP 1 into access.
2. Then press the METER **INP** button on the Central Control Section:



Note that you can adjust the meter pickup point for peak and loudness metering independently:

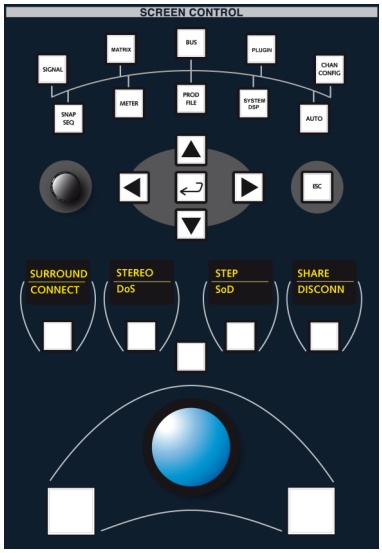
- **PK/LD** off – meter pickup selection is applied to peak metering.
- **PK/LD** on – meter pickup selection is applied to loudness metering.

For more details on metering, see Page 313.



Routing Sources to Multiple Channels

If you wish to assign consecutive sources to consecutive input channels, then you can turn on a short-cut called the step function. Let's assign mics 1-8 to input channels 1-8.

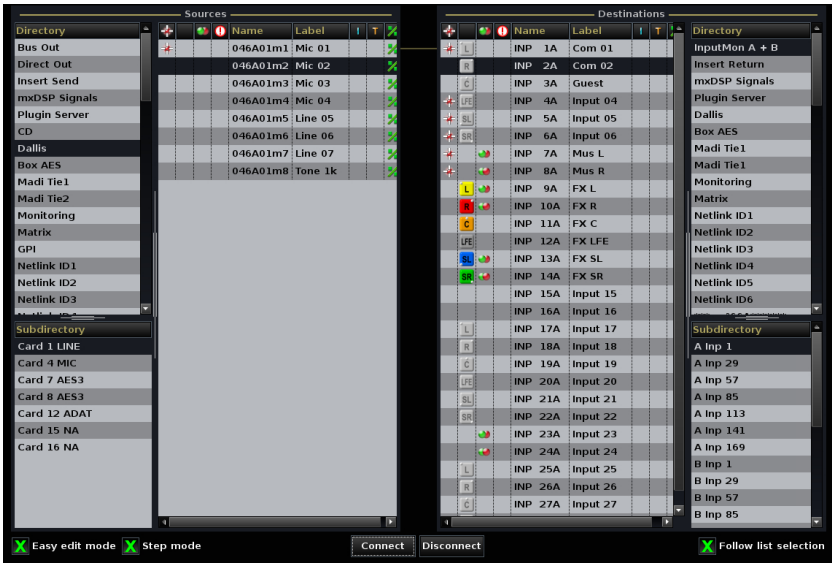


1. Go back to the **Signal List** display.
2. Select the first source you wish to assign – for example, **Mic 1** – and the first destination – for example, **INP 1A**.

At this stage, you could press the **CONNECT** soft key to make the first route. However, to make a number of consecutive routes, it is a good idea to activate the step forward mode first:

3. Page the soft keys to the second level and select **STEP** to activate the step forward mode.
4. Now return to the first page of soft keys and press **CONNECT** to make the first route.

*The **Signal List** updates showing the connection between **Mic1** and **INP1**. And, because **STEP** is selected, the source and destination selections automatically step down to the next entries in the list:*



5. To make all eight routes, continue pressing **CONNECT**.

As you step down through the list, note the red and white crosses which appear in the Connection column. The cross indicates a connection to or from the source or destination.

Note

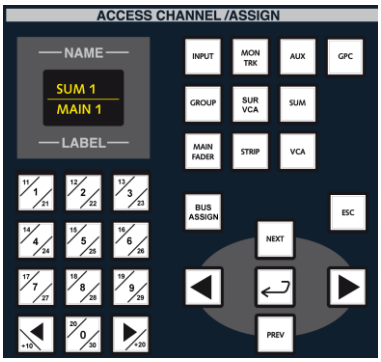
When you reach the last source or destination, the list returns to the top. So, take care not to press **CONNECT** too many times.

6. At any time you can remove a route by selecting the destination and pressing **DISCONN** (Disconnect).

If **STEP** is active, then the list will step down to the next channel allowing you to disconnect a range of destinations quickly.

For more details on signal routing, please refer to Chapter 8.

Bus Assignments

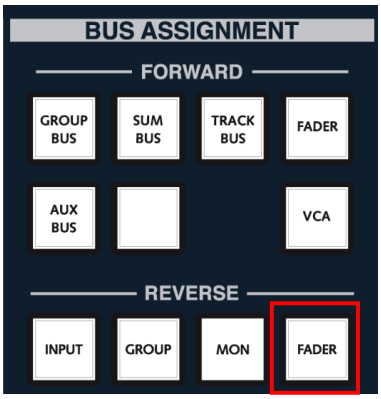


Next we need to assign our input channels onto our main output (SUM 1). We may use either forward or reverse bus assign to perform this operation; let's use reverse bus assign:

1. First select the destination (Sum 1) by pressing the **SEL** button on the main fader strip controlling SUM 1 – main fader strip eight:

This puts SUM 1 into access as indicated on the ACCESS CHANNEL/ASSIGN control panel's displays.

2. Now press the REVERSE **FADER** button, located on the BUS ASSIGNMENT panel.

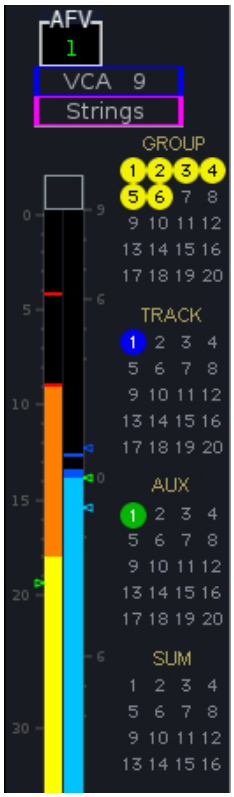


*The **FADER** button flashes, and across the console the fader **SEL** buttons flash, in green, to indicate possible sources for the chosen destination:*

3. Press the **SEL** buttons on the fader strips controlling INP 1 to 24 to complete the assignment.

*The fader **SEL** buttons stop flashing and change colour from green to red to indicate that the channels are assigned to the selected destination.*

The Channel display above the fader strips also shows the bus assignments onto sum 1.



Note that if the SUM is stereo or surround, then you will assign onto all busses within the stereo or surround sum – in our example, Sums 1 to 6.

4. Deselect the **FADER** BUS ASSIGNMENT button or press **ESC**, on the ACCESS CHANNEL/ASSIGN control panel, to exit the assign mode.

For more details on bus assignments, please refer to Page 167.

For more details on surround operation, see Page 269.

Control Room Monitoring

The final step before we can hear our audio is to look at the control room monitoring. The Control Room 1, Control Room 2 and Studio/PFL monitor outputs are controlled from the MONITORING touch-screen panel.

These buttons are programmed within the factory configuration. The example below shows a typical layout with five pages of functions available from the top row; **PAGE 1** is selected:

1. Touch one of the CRM1 pre-programmed buttons to select **SUM 1-6** as your monitor source.
2. Use the CRM1 rotary control to set the main monitor level.

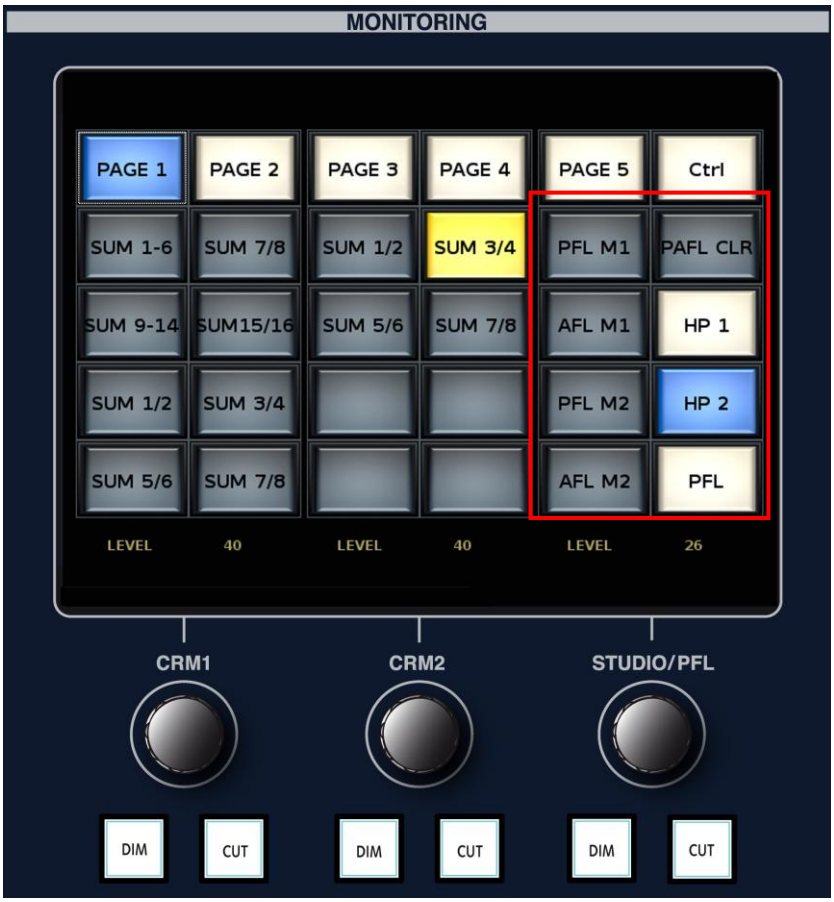
Note

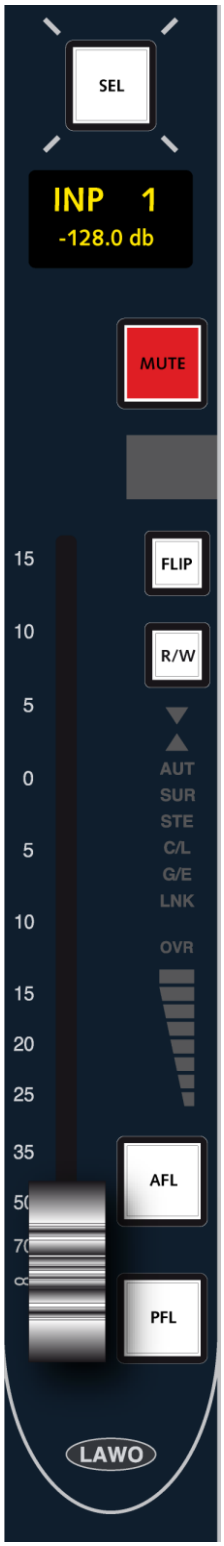
Note that on the classic mc²66, two monitor outputs (CRM1 and CRM2) are controlled from dedicated panels rather than a touch-screen. The buttons are factory-configured and can be programmed from an identical function set to the MKII mc²66.

AFL & PFL Monitoring

At any stage, you may listen to the output of a channel using the AFL and PFL buttons:

1. To monitor the channel post fader, press the **AFL** button located on the fader strip.
2. To listen to the channel pre fader, press **PFL**.
3. Use the touch-screen buttons on the MONITORING panel to clear AFL and PFL (**PAFL CLR**), or select options such as routing PFL to CRM 1 (**PFL M1**):





These functions are programmed within the factory configuration so please refer to your console specification for full details.

The console also supports a number of AFL and PFL options, such as whether the buttons are latching or momentary and additive or exclusive. See Page 673 for more details.

Controlling Mic Pre-amp Settings

Each microphone pre-amplifier may be remotely controlled in order to set input gain, phantom power, etc. prior to analogue-to-digital conversion. These settings may be controlled either from the fader strip or the Central Control Section. Let's use the dedicated controls on the channel fader strip:

1. Use the GAIN control to remotely set the microphone preamplifier gain.

The gain range is normally adjusted from 0dB to 70dB, although this may vary depending on your hardware configuration. Please refer to the DALLIS I/O technical data for details.

2. Press the **48V** button to select 48V phantom power.
3. Press the high pass filter button to insert an analogue subsonic filter prior to the A-D conversion. Toggle the button to cycle through the filter roll-off frequency options: Off, 40Hz, 80Hz and 140Hz.

The button changes colour to indicate the selected frequency - green (40Hz); yellow (80Hz); red (140Hz).

4. Press **PAD** to insert the PAD.

You can get an overview of the input settings for the channel by selecting the **Main Display**:

5. Press **CHAN CONFIG** on the SCREEN CONTROL panel to view the **Main Display** – the status of all input settings are shown on the **SOURCE** area.

For more details on input control, see Page 247.

Saving Your Settings

Console settings are saved within productions onto the internal user data flash card. Each time you update a production you store a one-shot memory of the current console status, including low level settings such as DSP configuration, and high level settings such as your mix and console layout.

It is a good idea to save and organise your productions early on. Don't overwrite your studio's setup production with your own settings! Instead, save a new production for each of your own templates or for a particular show.

Within each production, you may create folders to store snapshots or automation mixes. Snapshots store high level settings and provide the ability to store different mixes/setups within the production. For example, you may use snapshots to recall a different mix or console layout for each band appearing in a live entertainment show. Or, snapshots may be used to recall scene changes during a live theatre production. For more details on folders and snapshots, please see Chapter 6.

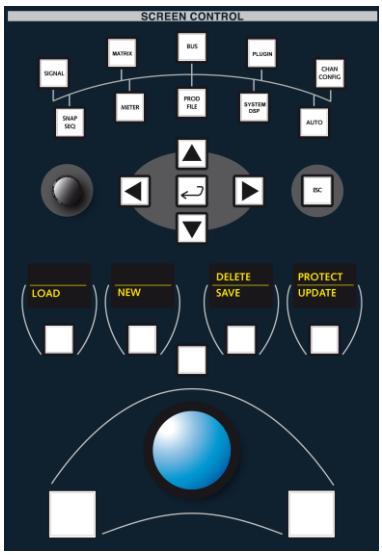
Tip

Any production, folder, snapshot or mix, may be exported to a USB interface or network drive, allowing you to take away your settings. See Page 465 for details.

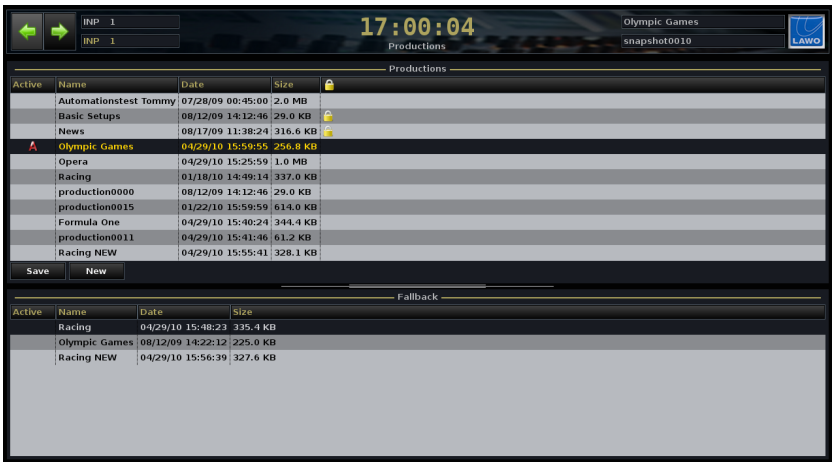
You will see the amount of used data storage space at the bottom of every display within the status bar:

Saving a New Production

To avoid overwriting existing settings, we are going to save the current status of the console into a new production:



1. Press the **PROD FILE** SCREEN CONTROL button to access the **Productions** display:



The last production loaded was **Olympic Games**, therefore this is the active production.

2. Using the trackball or navigation buttons focus on the list of **Productions** in the upper half of the display.
3. Press the **SAVE** soft key, or screen button, to save the current console settings into a new production:

A new entry appears at the bottom of the **Productions** list with a default name (e.g. **production 0012**). This entry contains all the settings of the console and is time and date stamped. The new production automatically becomes the active production as shown in the title bar.

Renaming the Production

To rename the production:

1. Select the production name from the **Productions** list.
2. Click on the production name using the trackball:

Click once to select all the existing text (white) or twice (black cursor) to modify the existing name.

Tip

3. Enter a new name from the keyboard.
4. When you have finished, press the Enter button on the keyboard to confirm the new name – e.g. **Formula One**:

5. Or, if you make a mistake or want to exit the naming mode without making any changes, press the **Esc** button on the keyboard.

Updating the Production

You should save your settings regularly as you work by updating the active production.

You will find that the **UPDATE** Production button on the overbridge acts as a reminder to help you save your settings regularly:

Each time you save or update a snapshot, or create or update an automation pass, the **UPDATE** button flashes.

1. To save the new settings press the button.

The active production is overwritten with the current console settings and the button stops flashing.

Note

Note that if the production is protected you will not be able to update it; the **UPDATE** button continues to flash. Go to the **Production** display and unprotect the active production. Now you can use **UPDATE** to update settings while working.

If you are viewing the **Production** display, then you can confirm the update by looking at the new date and time stamp.

For additional confirmation, watch the status bar and you will see a **saving…** message when production data is being updated.

Note

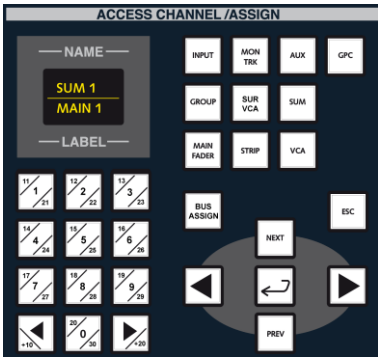
Note that updating overwrites the production data. Therefore, make sure that you have selected the correct production to update. To avoid accidental updates, always protect setup or template productions, see page 379.

If you do make a mistake, don't panic! Every time a production is updated, a copy of the current console settings is created in the fallback production memory. See Page 384 for details.

Creating Stereo Channels or Masters

Up until now, we have been dealing with mono channels. However, any input, monitor, group, sum or aux channel may easily be changed from mono to stereo either from the Central Control Section, **Main** or **Signal List** display.

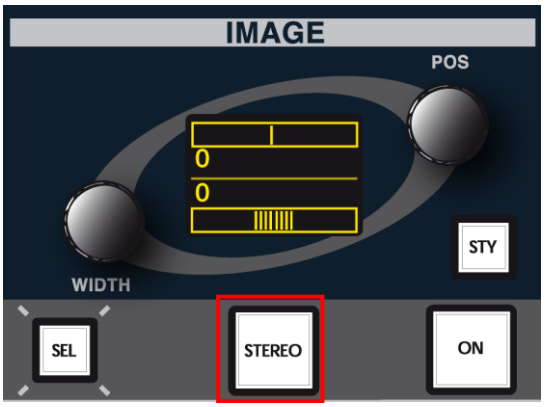
For example, to change SUM 1 from mono to stereo:



1. Press the **SEL** button on the main fader strip controlling SUM 1 to assign it to the Central Control Section.

This puts SUM 1 into access as indicated on the ACCESS CHANNEL/ASSIGN control panel.

2. Locate the IMAGE controls on the Central Control Section overbridge:



3. Press the **STEREO** button.

This links SUM 1 to its adjacent DSP channel (SUM 2) to create the stereo channel.

*To indicate that the channel is now stereo, you have stereo metering and green/red circles on the **Channel** display; a **STEREO** LED on the fader strip; and the Image section becomes active.*

Note that if SUM 2 was assigned to the control surface, then the SUM 2 mono channel disappears leaving a blank fader strip.

For more details on stereo channel operation, please refer to Page 263.

Configuring Audio Sub Group Masters

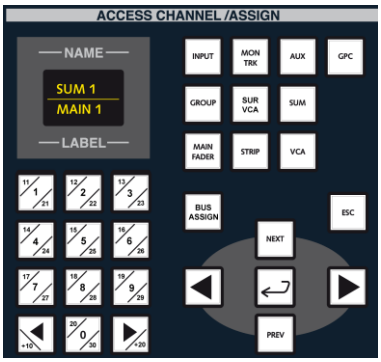
So far, we've routed our input channels directly to a main sum output. However, for many productions, you will want to use groups either to create independent mixes, like an international version, or to provide greater control over separate elements of the mix, for example to compress all of the music channels separately to the main presenter's microphones.


Note

The number of groups is determined by your choice of DSP configuration; note that not all DSP configurations support groups. If you are unable to assign groups to the control surface, check Page 122 for details on DSP configurations.

Providing groups are available, they are assigned to the control surface in exactly the same way we assigned our input and sum channels. Repeat the fader strip assignment operation, described on Page 59, to assign GROUPS 1 to 4 onto main fader strips 1 to 4 now.

Re-assigning Channels to Groups



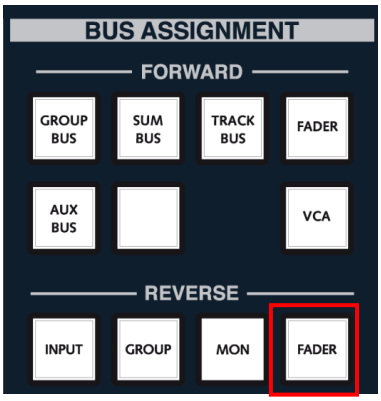
At the moment we have our input channels assigned directly to the sum master (SUM 1). To modify this routing so that our microphone channels are routed via a sub group, let's use reverse bus assign.

First remove input channels 1-8 from SUM 1 as follows:

1. Select the destination (Sum 1) by pressing the **SEL** button on the main fader strip controlling SUM 1.

This puts SUM 1 into access as indicated on the ACCESS CHANNEL/ASSIGN control panel.

2. Now press the **FADER** button, located on the BUS ASSIGNMENT: REVERSE panel.



*The **FADER** button flashes, and across the console the fader **SEL** buttons flash, in green, to indicate possible sources for the chosen destination:*

The **SEL** buttons on the first eight faders strips (INP 1 to INP 8) are illuminated in red showing that they are already assigned to the selected sum master.

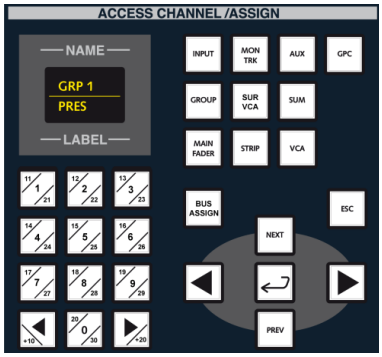
3. Press the **SEL** buttons on the fader strips controlling INP 1 to INP 8 to undo the bus assignments.

*The fader **SEL** buttons change colour from red to green, and the **Channel** display indicates the updated bus assignments.*

4. With **FADER** still selected, now press the fader **SEL** buttons on the fader strips controlling GRP 1 to GRP 4 to assign the group master channels to SUM 1.

*The fader **SEL** buttons stop flashing and change colour from green to red to indicate that the channels are assigned to the selected destination.*

5. Deselect the **FADER** button to complete the operation.



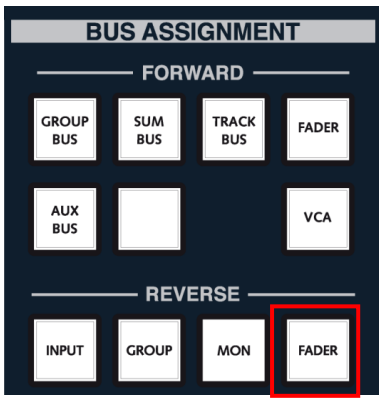
Now, we need to assign input channels 1-8 to one of the groups – let's use Group 1:

1. Select the destination **(**Group 1) by pressing the **SEL** button on the main fader strip controlling GRP 1.

This puts GRP 1 into access as indicated on the ACCESS CHANNEL/ASSIGN control panel.

2. Now press the REVERSE **FADER** button, located on the BUS ASSIGNMENT panel.

*The **FADER** button flashes, and across the console the fader **SEL** buttons flash, in green, to indicate possible sources for the chosen destination:*



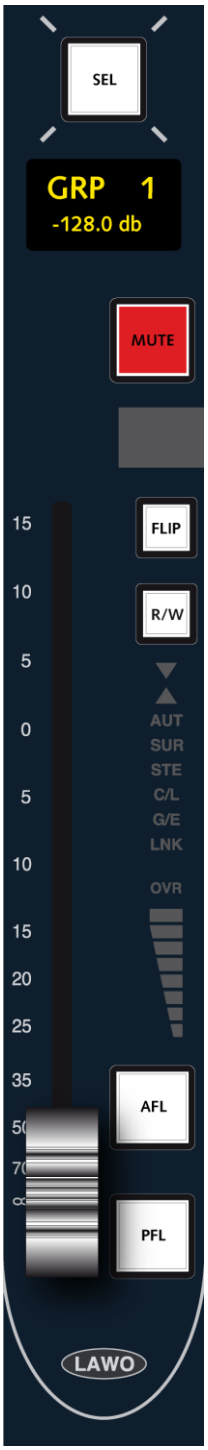
3. Press the fader **SEL** buttons on the fader strips controlling INP 1 to INP 8 to complete the assignment.

*The fader **SEL** buttons stop flashing and change colour from green to red to indicate that the channels are assigned to the selected destination. Note also that the Channel display above fader strips 1 to 8 shows the bus assignments onto group 1.*

4. Deselect the **FADER** button or press **ESC**, on the ACCESS CHANNEL/ASSIGN control panel, to exit the bus assign mode.

Monitoring the Group Output

Your Control Room Monitor output should still be selected to SUM 1, so push open all the faders and you will be hearing a mix of all your channels with the overall level of input channels 1 to 8 controlled by Group master 1.



To monitor just the group output, you may either:

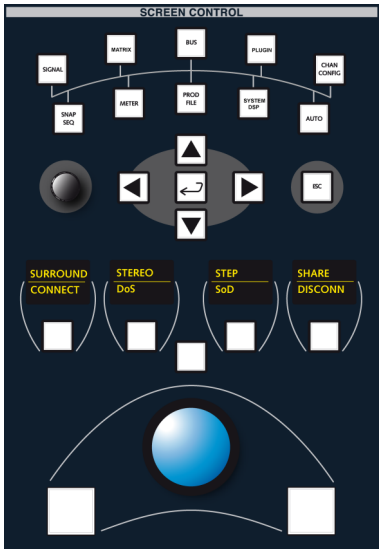
1. Touch one of the pre-programmed monitor selector buttons to monitor GROUP 1, if available:

2. Press the **AFL** button located on the fader strip controlling GRP 1 to listen to the group output post fader.
3. Press the **PFL** button located on the fader strip controlling GRP 1 to listen to the group output pre fader.

Note that depending on your monitoring configuration, AFL and PFL signals may appear on the Control Room 1, Control Room 2 or external monitor speakers. For more details on control room monitoring, see Page 335.

Routing Sum Masters to Output Destinations

So far we have looked at how to route sources into channels, assign channels to group and sum masters, and monitor the various paths. Next let's look at how to assign your groups and sum output to new destinations, for example to feed a recorder or distribution chain. The operation is very similar to routing a new source to a channel, only this time we are going to select the bus master channel as our source (e.g. SUM 1) and a physical output (e.g. AES output 1) as our destination:



1. Press the **SIGNAL** button, located on the SCREEN CONTROL panel, to view the **Signal List** display:
2. Using the trackball or navigation buttons, select **SUM1** as your source signal on the left of the display.

Note that the console's Sums are found within the **Bus Out** directory and **DOUT Sum x-xx** (Direct Output) subdirectory. You will also find the console's other bus outputs here – groups, auxes and AFL/PFL.

3. Next, select the destination in a similar fashion..
4. To make the route press the **CONNECT** soft key located above the trackball.

*The **Signal List** updates showing the connection.*

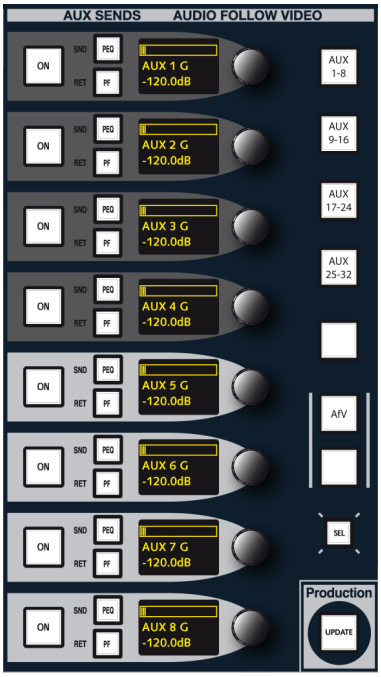
5. Repeat to route your other Sum outputs:

For more details on routing, please refer to Chapter 8: Signal Routing.

Using Auxiliary Sends

Auxiliary sends may be used for a variety of applications such as cue feeds, effects sends, mix minus (N-1) sends, etc. Depending on your choice of DSP configuration, each channel may access up to 32 sends.

Send controls are paged onto the eight rotary encoders within the Central Control Section overbridge. For example, to open an auxiliary send from input channel 23:



1. Press the **SEL** button on the fader strip controlling INP 23 to assign it to the Central Control Section.

The Central Control Section panels update to show the current settings for Input 23.

2. Locate the AUX SENDS/ AUDIO FOLLOW VIDEO controls.
3. Press **AUX 1-8** to assign the first eight auxiliary sends onto the rotary controls.

*The names **AUX1 G** to **AUX 8 G** appear in the alphanumeric displays showing which send is allocated to each control.*

4. Press the **ON** button to activate the auxiliary send.
5. Press **PEQ** to switch to a pre EQ send.
6. Press **PF** to switch to a pre fader send.

*If neither **PEQ** or **PF** are selected, then the send is post fader.*

7. Now use the rotary control to adjust the send level from -128dB to +15dB.

Note that auxiliary send levels may also be controlled from faders using the FADER CONTROL feature, see page 364 for details

Auxiliary masters are assigned onto fader strips in the same way we assigned the input channels, groups and sum master earlier. For more details on auxiliary send operation, see Page 231.

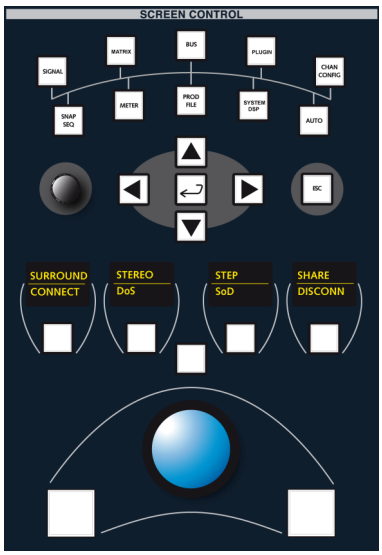
Note

Creating a Mix Minus (N-1)

One of the most common functions required during a live production is the mix minus, or N-1, output. The **mc²66** may use any of its 32 auxiliary sends or 96 track busses (if available within the DSP configuration) to create mix minus feeds. Let's take an example where we wish to create separate mix minus feeds for the first three microphone inputs we assigned to fader strips 1 through 3 earlier.

Configuring the Mix Minus Sends

The first step is to configure the sends to be used for each mix minus feed. This is done from the **Signal List** and **Signal Settings** displays by linking the send to the input signal. To keep things simple let's use auxiliary sends 1 to 3 for our configuration:



1. Press the **SIGNAL** button, located on the SCREEN CONTROL panel, to view the **Signal List** display.
2. Select the source you wish to configure – in our example, the source named **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 switch to the **Signal Settings** display:

This display is used to configure I/O settings for individual signals and to monitor the system status.

The two “trees” on the left of the display show the location of a signal within the **Signals** list (top) and its physical location in the **System** (bottom). Whenever a different signal is selected from the **Signals** list the **System** tree follows and vice versa.

The **Signals** and **System** trees should have automatically opened to reveal your selected source – **Mic1**. If not, then go back to the **Signal List** display and check that the **follow list selection** option is checked.

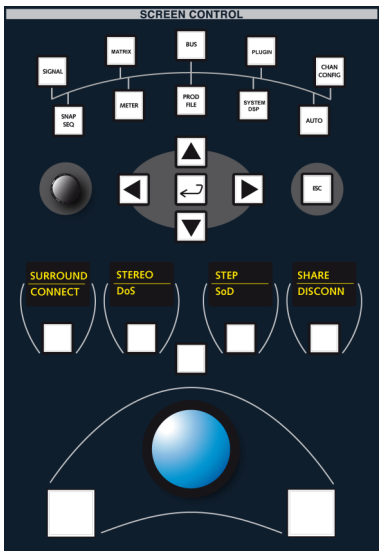
5. With the correct source selected on the left of the display, click on the **Conference** tab to access the Mix Minus parameters:

Two parameters are available:

- **Mix minus Self Monitoring** – check this option 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 a track bus as the mix minus return feed for the selected signal.

6. To assign the aux, click on the **Mix minus Bus** drop-down menu and select **Aux 1**:

7. Repeat these steps to configure auxiliaries 2 and 3 as the Mix-minus sends for Mic inputs 2 and 3.

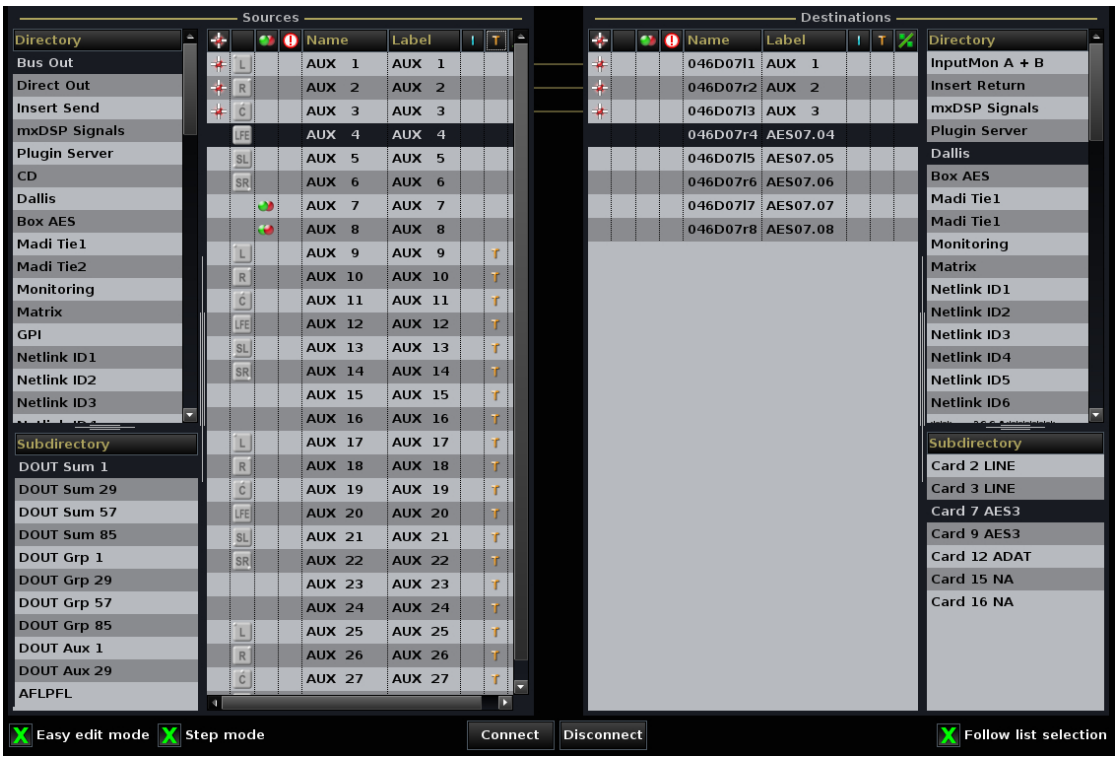


Having configured a link between the input sources and mix minus auxiliary sends, the next step is to route the output of the auxiliary sends to the relevant mix minus destinations. In this example, we want to route auxiliary 1, 2 and 3 to the hybrid feeds for our guest channels (AES outputs 1 to 3):

1. So return to the **Signal List** display by pressing the **SIGNAL** button again.
2. Select the source directory (**BUS Out**), sub-directory (**DirOut AUX X 1-16**) and **Name** or **Label** for the source you wish to route – e.g. **AUX 1**.
3. Then select the destination – e.g. **AES 1**.
4. To make the route press the **CONNECT** soft key.

*The **Signal List** display updates showing the connection.*

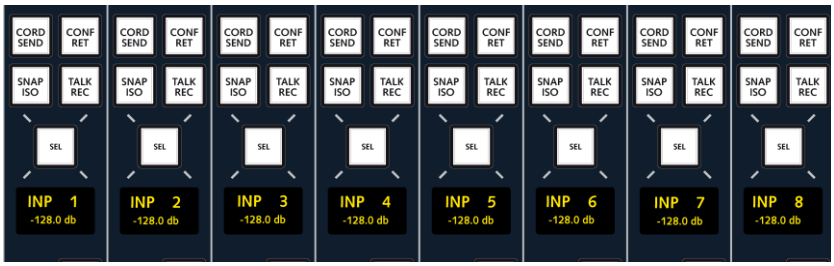
5. Repeat to route all three auxiliary send masters to the corresponding outputs for the mix minus feeds:

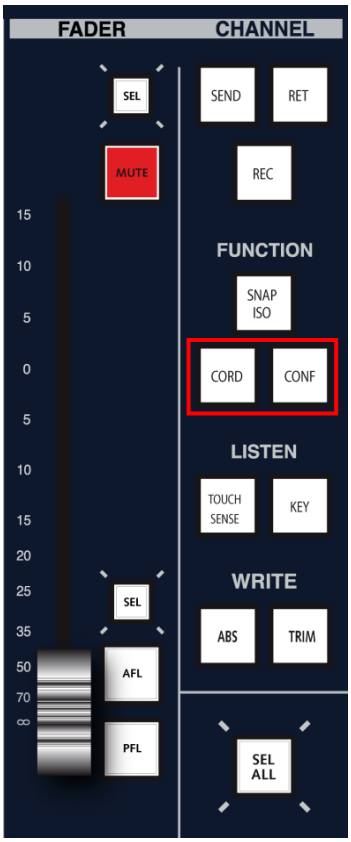


Activating the Mix Minus Sends

Having configured auxiliary sends 1, 2 and 3 to provide mix minus feeds for Microphone Inputs 1 to 3:

1. Go to the fader strips controlling MIC 1 to 3 and press the **CONF** buttons on all three channels:





The mix minus is automatically activated for each of the four channels.

Note that the **CONF**, **CORD** and **TALK** buttons are user buttons which can be re-configured from the **Custom Functions** display. If they are not programmed onto the channel user buttons, then they can be accessed from the Central Control Section's CHANNEL controls.

2. Depending on your talkback configuration, the **TALK** button on each fader strip may be used to talk to the mix minus.
3. To add channels not within the coordination group to the mix minus, press their **CONF** buttons. For example, you may wish to send the output of several replay machines to all the mix minus recipients.

The channels are routed onto the mix minus bus; therefore feed all mix minus sends.

The **CORD** button changes the mix minus from an N-1 into a pre-talk auxiliary send. Use this mode to generate a conference-style feed for your guests and presenters. This allows members of the conference group to talk to each other pre-fader while they are off-air. However, as soon as their channel fader is opened and they are on-air, their conference auxiliary feed is muted.

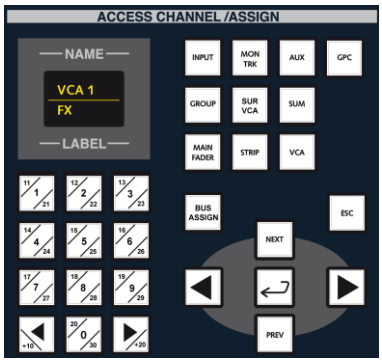
Note that each mix minus is linked to the input source, rather than the DSP channel. This means that if you route the input source (e.g. MIC 2) elsewhere, the mix minus controls automatically follow. For more details on mix minus and conference aux operation, see Page 239.

Note

Using VCA Grouping

A common application for the console's main fader strips is to use them as VCA group masters. The console supports up to 128 VCA masters which may be controlled from main or channel fader strips. In addition, you may assign any type of channel to a VCA. This provides the ability not only to control input and monitor channels but also groups, sums, auxiliary and surround masters.

Assigning VCA Masters to the Control Surface

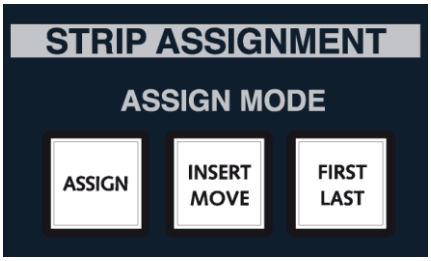


Let's look at an example where we will use the first eight main fader strips to create eight VCA masters.

1. Select VCA master 1 from the ACCESS CHANNEL/ASSIGN control panel, by pressing **VCA**, the number **1** and the Enter button.

*The NAME and LABEL displays show the name (**VCA 1**) and user label for the master.*

2. Select the **FIRST LAST** button, located on the STRIP ASSIGNMENT: ASSIGN MODE panel.



*This automatically selects the global **ASSIGN** button, and across the console the fader **SEL** buttons flash, in green, to indicate possible destinations for your selected channel.*

3. Press the fader **SEL** button on the first main fader strip followed by fader **SEL** on the last main fader strip.

The console assigns VCA masters 1 to 8 to main strips 1 to 8.

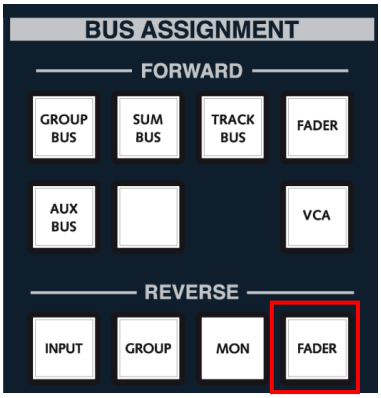
4. Deselect the global **ASSIGN** button or press **ESC**, on the ACCESS CHANNEL/ASSIGN control panel, to exit the assign mode.

Assigning Channels to a VCA Master

Let's assign input channels 23 and 24 to VCA master 1:

1. Press the fader **SEL** button on the fader strip controlling VCA 1.

This puts VCA 1 into access.

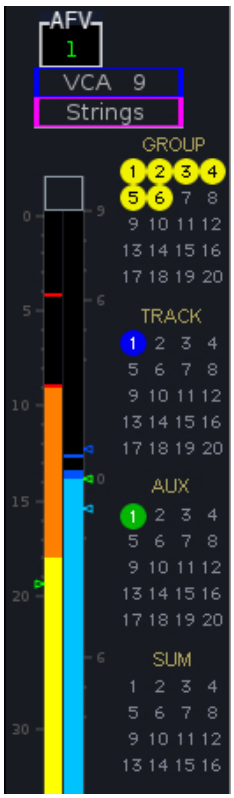


2. Now press the **FADER** button, located on the BUS ASSIGNMENT: REVERSE panel.

*The **FADER** button flashes to indicate that it is active, and across the console the fader **SEL** buttons flash, in green, to indicate possible sources for your chosen master:*

3. Now press the **SEL** buttons on the fader strips controlling input channels 23 and 24.

*The fader **SEL** buttons stop flashing and change colour from green to red to indicate that the channels are assigned to the selected VCA master.*



On each assigned channel, the VCA master number is shown in the figure of eight displays. In addition, the VCA assignment is indicated at the top of the Channel Display.

4. Deselect **FADER** on the BUS ASSIGNMENT, panel or press **ESC**, on the ACCESS CHANNEL/ASSIGN control panel, to exit the VCA set up mode.

VCA groups can use either moving or non-moving slave faders, defined by the **System Settings** display, see Page 661.

When working with non-moving slaves you can see and update slave fader positions even if the VCA master is closed, like an analogue VCA. Pay particular attention to the fader label displays: as you adjust the VCA master, the MAIN LEVEL on the slave channels updates - it is this value which indicates the real channel level and NOT the fader positions.

For more details on VCA operation and other methods of linking fader strips please see Page 350.

Applying Signal Processing

Depending on your choice of DSP configuration, signal processing may be available on your input channels, monitor return channels, groups, sums and/or auxiliary masters. This allows you to compress a group output or EQ an auxiliary master in the same way you would apply signal processing to an input channel.

The following provides a step-by-step guide to some of the signal processing sections within the Central Control Section. For a full tour of the Central Control Section, see Page 181.

1. Press the **SEL** button on a fader strip to assign it to the Central Control Section.

The controls update to show the current settings for the selected channel. Each set of controls within the Central Control Section is colour coded to help you identify EQ, Dynamics, etc. at a glance:

Note that the controls are black (unlit) if a DSP module is not supported. This could be for a variety of reasons: for example, IMAGE is not available for mono channels; DSP modules are suspended if AMBIT or Loudness metering are active; not all DSP modules are supported on Broadcast channels

Note

When controlling processing, all rotary controls are touch sensitive encoders. The dedicated alphanumeric display shows the parameter name and value which is being adjusted. As you touch or move a control, you can also view the parameter value within the PARAMETER COPY/ASSIGN clipboard.

Tip

Controls default to provide fine adjustment. For coarse adjustment (5 x faster), push down as you adjust the control.

2. For an overview of channel parameters, press the **CHAN/CONFIG** button, located on the SCREEN CONTROL panel, to view the **Main Display**.

*This display shows parameters for the channel in access – in our example, **INP 6**:*

The display is divided into the same sub sections as the Central Control Section front panel. 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**.

Note that any sections not supported by the selected DSP channel are greyed out – in our example, IMAGE. On Broadcast channels, several modules are greyed out: FILTER, SCF plus either GATE, EXP, COMP or LIM depending on the dynamics model (see opposite).

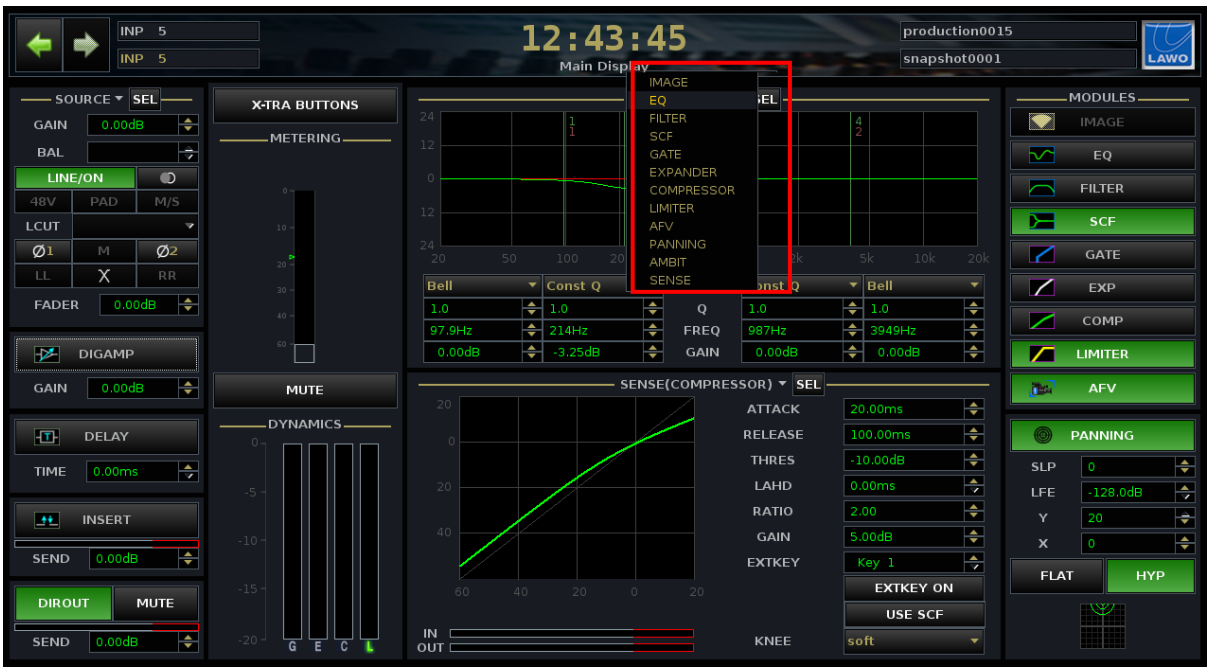
The display *always* shows the following sections:

- **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. If the section is switched on, the **G**, **E**, **C** or **L** is green.
- **MODULES** – on/off status and access to presets.
- **PANNING** – X/Y pan parameters.

Broadcast channel MODULES

In addition, the two central areas can display other modules:

3. Click on the drop-down menu at the top of each assignable section to select a different audio module:



*The **Main Display** updates accordingly.*

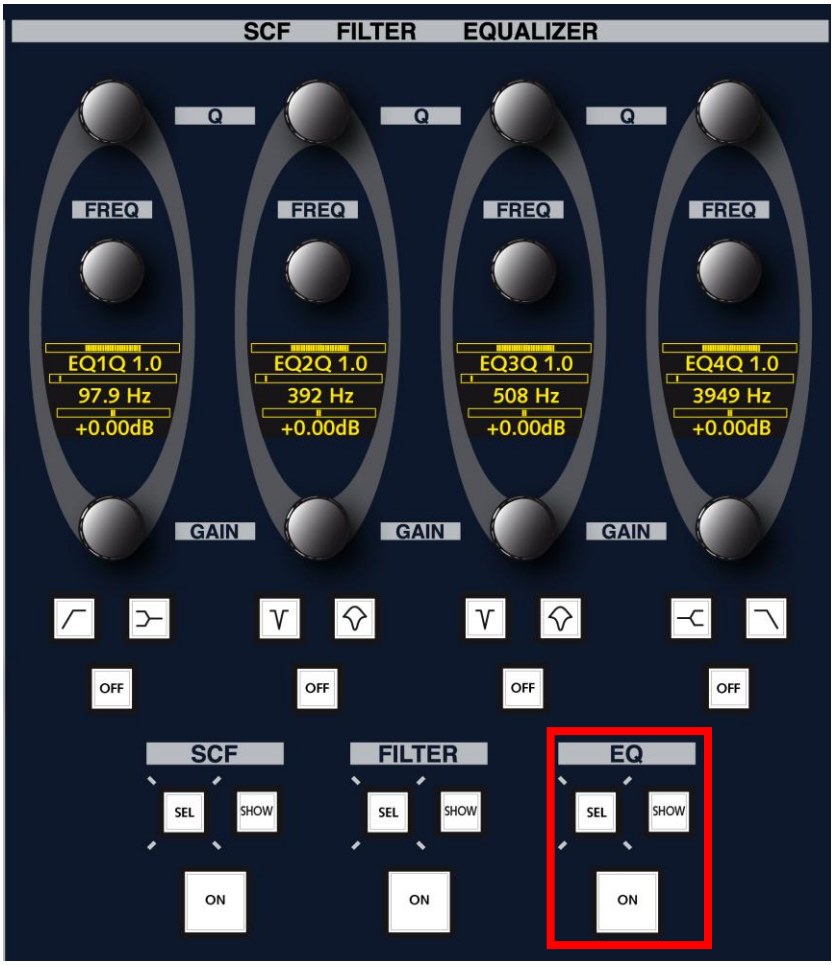
Tip

If you select **SENSE**, the **Main Display** will automatically follow the last control touched. For example, while working on the compressor, the **SENSE** display shows the **COMPRESSOR** settings. If you now touch an EQ control, the **SENSE** display updates to show the **EQ** section:

4. So, assign the lower display area to **SENSE**.

This allows you to view the audio parameters you are working on without needing to update the **Main Display**.

Using the 4-band Equaliser



1. Locate the SCF/FILTER/EQUAIZER panel on the Central Control Section.
2. At the bottom of the panel, press the EQ **SHOW** button to display the 4-band equaliser on the four sets of GAIN, FREQ and Q controls.
3. Turn on the master EQ **ON** button.

From left to right, the controls default to provide low shelf, constant Q, constant Q and high shelf equaliser bands.

4. Use the GAIN, FREQ and Q or Q/SLP rotary controls to set the gain, frequency or Q for each of the 4 bands.

*The parameter values are shown on Central Control Screen's **Main Display**:*

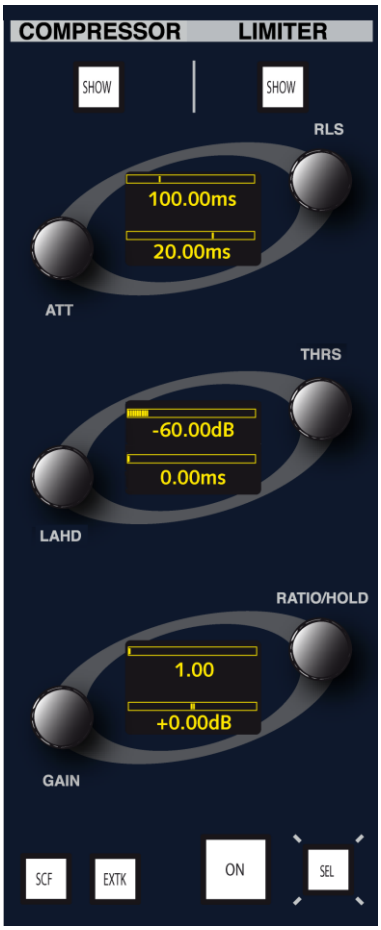
- Frequency may be set from 20Hz to 20kHz.
- Gain may be set from -24dB to +24dB.
- Q may be set from 0.1 to 80 for the Constant Q sections, and the slope of the shelving bands may be set to 6dB per octave, 12 dB per octave (or 18dB per octave on Recording channels).

5. Use any of the four **OFF** buttons to switch an individual band out of circuit.
6. 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 **TYPE** boxes on the **Main Display** update to show the new selection:*

For more details on Equalisation and Filtering, see Page 219.

Setting a Compressor



1. Locate the COMPRESSOR/LIMITER panel on the Central Control Section.
2. Press the COMPRESSOR **SHOW** button to switch the controls to the compressor section.

If the controls are black (unlit), then check the channel's signal flow (using the **Channel Config** display). On Broadcast channels, you may switch the dynamics between **Combi-Dyn** and **Limiter**; **Combi-Dyn** must be selected for the Compressor to be active, see Page 112.

3. Press the **ON** button to switch on the Compressor.
4. Use the six rotary controls to set the compressor attack time (ATT), release time (RLS), threshold level (THRS), look ahead delay (LAHD), gain (GAIN) and ratio (RATIO).

The action of the compressor is best described by looking at the **Main Display**. The **DYNAMICS** meters display the amount of gain reduction applied to the signal: **G**, **E**, **C** and **L**. The **IN** and **OUT** meters show the levels to/from the dynamics section:

The Compressor parameters may be set as follows:

- Threshold Level – from -70dB to +20dB.
- Ratio – from 1:1 to 10:1.
- Attack Time – from 0.29ms to 250ms.
- Release Time – from 40ms to 10s.
- Look Ahead Delay – from 0ms to 10ms.
- Gain – from -20dB to +20dB.
- 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**.

On Recording channels, the compressor may be triggered from an external key input, or filtering may be applied to the sidechain (using the SCF section).

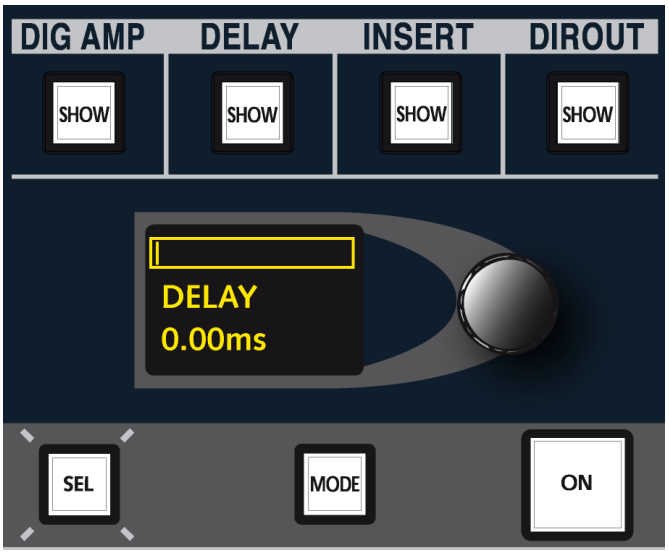

Tip

For more details on Dynamics operation, please refer to Page 201.

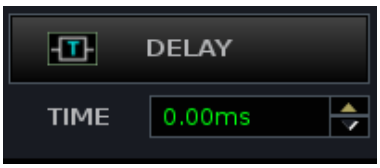
Inserting Channel Delay

To apply delay to a channel, for example to compensate for video processing delays:

1. Locate the DIG AMP/DELAY/INSERT/DIROUT panel on the Central Control Section:



2. Press the DELAY **SHOW** button to assign the controls to the channel delay audio module.
3. Press the **ON** button to switch the delay into circuit.
4. Toggle the **MODE** button to cycle around the channel delay unit options – milliseconds (ms), frames (frms) or meters (m).
5. Move the rotary control to adjust the delay value.



*The amount of delay is displayed in the **TIME** box on the **Main Display**.*

The channel delay parameters vary 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

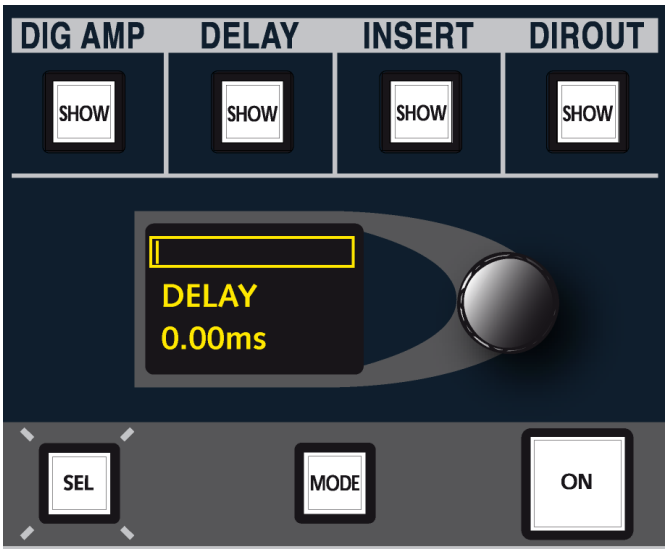
If you want to enter a specific delay time, then click on the **TIME** box and type in a value from the console keyboard.

When adjusting delay in frames, set the frame rate using the **System Settings** display, see Page 681 for details.

Inserting Outboard Processing

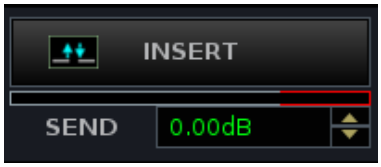
To insert an outboard piece of equipment into the channel path, for example to apply external compression:

1. Press the INSERT **SHOW** button on the DIGAMP/DELAY/INSERT/DIROUT panel to assign the controls to the channel insert module.



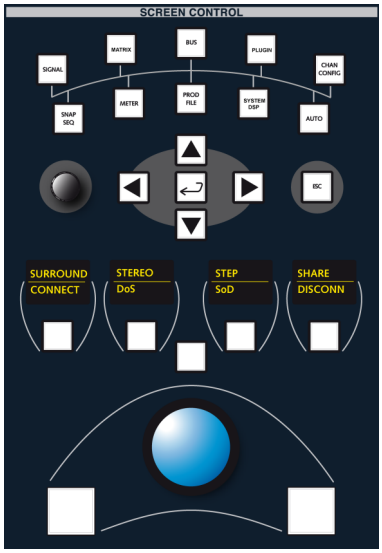
2. Press the **ON** button to switch the insert return into circuit.

If an insert return is not assigned, you will get silence when you switch the insert into circuit.



3. With the insert **ON**, adjust the rotary control to set the level of the insert send.

*The **SEND** level is shown on the **Main Display** and may be adjusted from -128dB to +15dB.*



The insert send and return assignments are made from the **Signal List** display:

1. Press the **SIGNAL** button, located on the SCREEN CONTROL panel, to view the **Signal List**.
2. Using the trackball or navigation buttons, select the insert send of your input channel as the source signal.

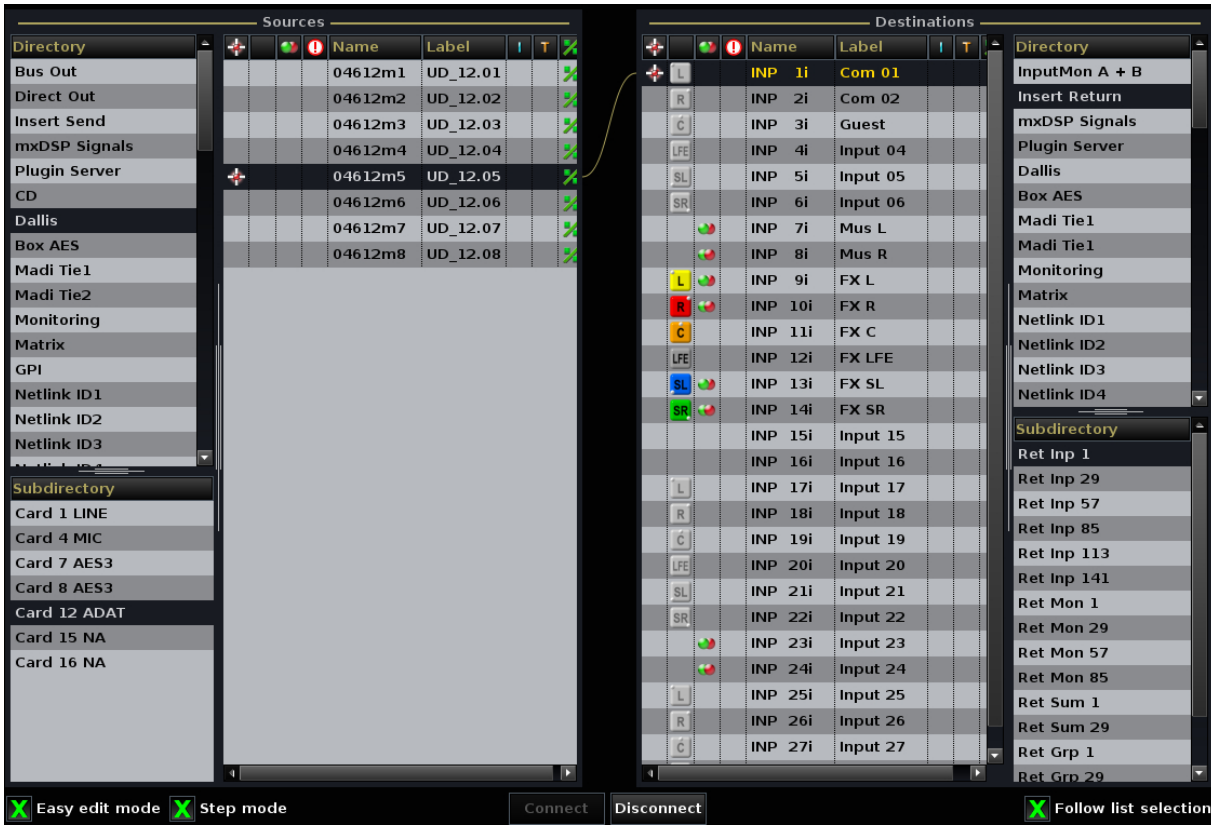
Note that the Insert Sends for all DSP channels (Inputs, Monitor channels, Sums, Groups and Auxes) are found within the **Insert Send** source directory.

3. Next, select the destination.
4. To route the insert send to the compressor press the **CONNECT** soft key:

The insert send is *always* active so you should now see level on your outboard compressor. This means that the insert send can be used as a second direct output from the channel if required.

5. Repeat these steps to route the return from the compressor to the insert return of your input channel.

*The **Signal List** display updates showing the return connection:*



6. Now when you switch the insert return **ON**, you will hear the return through the outboard compressor.

Fader Strip Free Controls

On each channel fader strip are four assignable Free Controls. These provide local channel access to settings such as EQ, Panning, Dynamics, Auxiliary Sends, etc.

Note that the FC 1, FC 2, FC 3 and FC 4 labels are colour coded so that EQ, Dynamics, Panning, etc. can be easily distinguished at a glance (MKII mc^{2}66 only).

Each control is touch sensitive and when turned provides fine control. Push down and rotate the control for coarse adjustment of a parameter value.

Each control also has its own dedicated display and push button. The display shows the parameter function (e.g. **AUX 1 G**) and value (e.g. **-6.50 dB**). In addition, the current position is indicated within the horizontal bar. The button function depends on the assigned control – for example, if the free control is assigned to an aux send, then the button actions the on/off for the send.

There are three ways to assign parameters onto the free controls:

- PARAMETER COPY/ASSIGN - controls may be assigned on an individual basis. For example, you may wish to assign Compressor Threshold and EQ Band 1 Gain on one channel, while assigning Left/Right Pan and Aux 1 Send level on another channel. These assignments are stored within your snapshot/production and become your default free control assignment.
- FREE CONTROL PRESETS – you can temporarily override the default assignments, by recalling a Free Control preset. Each preset changes the Free Control assignments globally across the console. This is a great way to access say Aux Sends 1 and 2 across the console with one button press.
- ISO BAY ACCESS – or, you can override the default assignments using the ISO BAY access buttons within each fader bay. Once a bay is isolated, the **SHOW EQ**, **SHOW DYN**, etc. buttons can be used to assign the 32 Free Controls to EQ parameters, dynamics parameters, aux parameters, etc. for the selected channel.

Note that on the MKII mc^{2}66 free control 4 (FC 4) may also be switched globally to control level and mute for the 2ND layer of channels. When working in this mode, FC 4 is no longer available for assignable parameter access. See Page 139 for details.

To get you started let's look at how to assign an individual parameter onto a Free Control. For more details on FC Presets, please see Page 255 and ISO Bay Access, see Page 144.

Assigning a Free Control

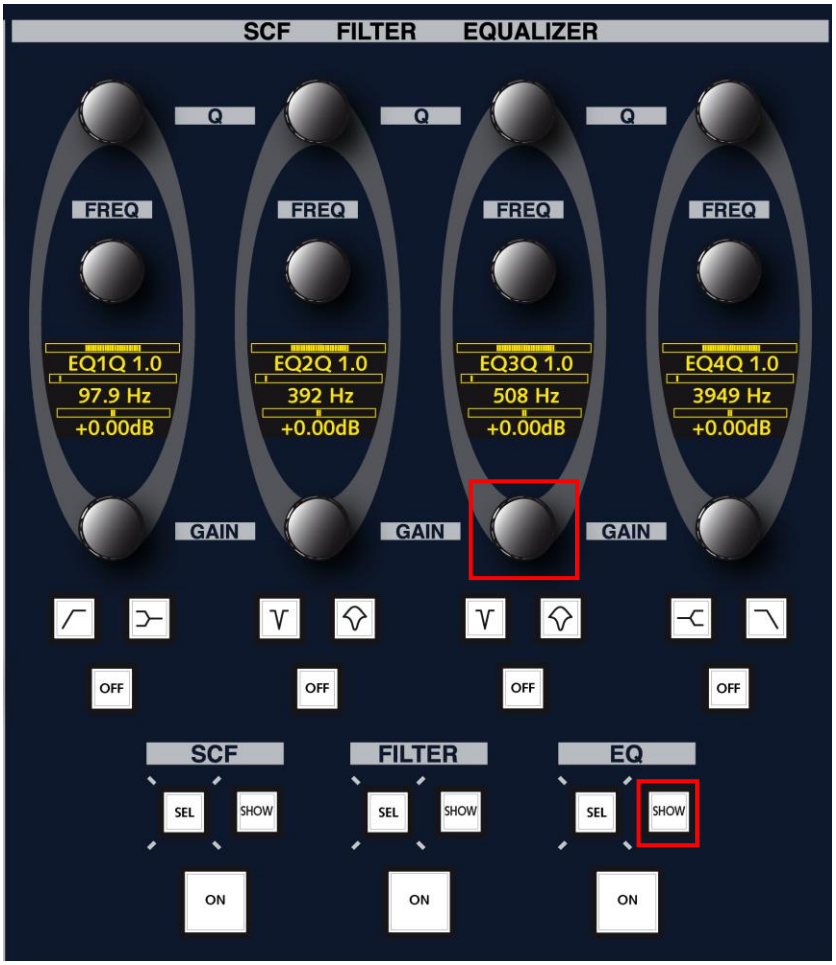
For example, let's assign EQ Band 3 Gain onto FC 1 on fader strip 1:

1. First press the **ONE** button, located on the PARAMETER COPY/ASSIGN panel, to activate a one-shot assignment.

*The **ONE** button flashes to indicate that parameter assign is now active.*

2. Then touch the rotary encoder you wish to assign on the Central Control Section.

For our example, select the EQ **SHOW** button, to assign EQ onto the EQUALIZER/FILTER/SCF controls, and touch the Band 3 GAIN control:



*The **EQ 3 GAIN** parameter is placed into the Parameter clipboard as indicated on the PARAMETER COPY/ASSIGN display.*

3. Now touch the free control on the destination channel strip. In this case, the first free control on channel fader strip 1:

*The assignment is made; the alphanumeric display below the free control updates; and the **ONE** button automatically cancels.*

For more details on assigning Free Controls, please refer to Page 249.

Congratulations on completing this tutorial! Hopefully, we have given you enough information to being working with the console immediately. If you need more assistance, use the Index Directory located at the back of the manual to locate information on a particular topic. Otherwise keep reading to learn more about each area of the console's operation.

Chapter 3: Console Configuration

Introduction

In this chapter we will cover how to configure the signal flow and control surface of the console.

These concepts allow you to configure as many input channels, monitor return channels, track busses, groups, main sums and auxiliary sends as the production requires, and then assign these elements across the console's fader strips as you desire.

First, let's take a closer look at signal flow through the console.

Signal Flow Concepts

The **mc²66** uses a simple, yet flexible, approach to signal flow.

A pool of DSP resource is applied to input channels, monitor return channels (track busses), groups, sums and auxes according to your choice of DSP configuration. This allows you to choose a configuration which provides the right resources for the production. For example, a live production may require lots of input channels, groups and auxiliary sends but no monitor returns, while a recording session requires both input and monitor return channels but perhaps less groups.

Each channel comes with either full signal processing or reduced signal processing (known as Tiny channels). This enables EQ, Dynamics, Delay, etc. to be applied to both inputs and outputs

The number of input, monitor, group, sum and aux channels is determined by three factors:

- How many channel DSP cards are fitted to the HD Core (up to 8).
- The sampling rate of the system: 48/44.1kHz or 96/88.2kHz.
- Your choice of DSP configuration.

The DSP configuration is selected from a predefined list, and is stored when you save the Production. It may be changed at any time, making it easy to modify the mix structure later.

From Version 4.16 software, DSP configurations come in a choice of two channel types:

- **Broadcast Channels** – doubles the number of channels per DSP card, with a simplified signal flow ideal for live broadcast applications.
- **Recording Channels** – operate in the same way as previous software releases. These channels provide more processing modules and flexibility.

The main differences between the channel types are that a Broadcast channel has no track bus send, no Filter section and simplified Dynamics, with a choice of Gate, Expander and Compressor (known as Combi-Dynamics) *or* Limiter.

Note

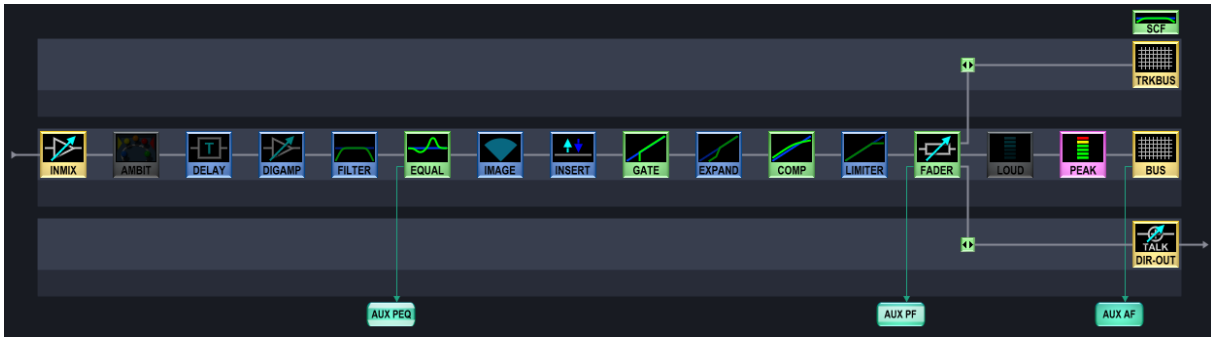
Each DSP configuration supports one channel type; you cannot mix Broadcast and Recording channels, and not all mc²66 systems support the Broadcast channel type.

For more details on choosing the DSP configuration, see Page 122. Or, read on to learn more about the different channel types.

Channel Signal Flow and Channel Types

Recording Channels

Every fully featured input channel (INP), within a Recording DSP configuration, includes *all* of 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.

TRKBUS – pickup point for assignments to track busses.

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

Note that the **AMBIT** module suspends the Delay, Filter, Image, Gate and Expander DSP when active, see Page 290. The **LOUD** module suspends other DSP modules, see Page 318.

With the exception of the yellow **INMIX** and **BUS** sections, modules may be positioned in any order in the chain.

Broadcast Channels

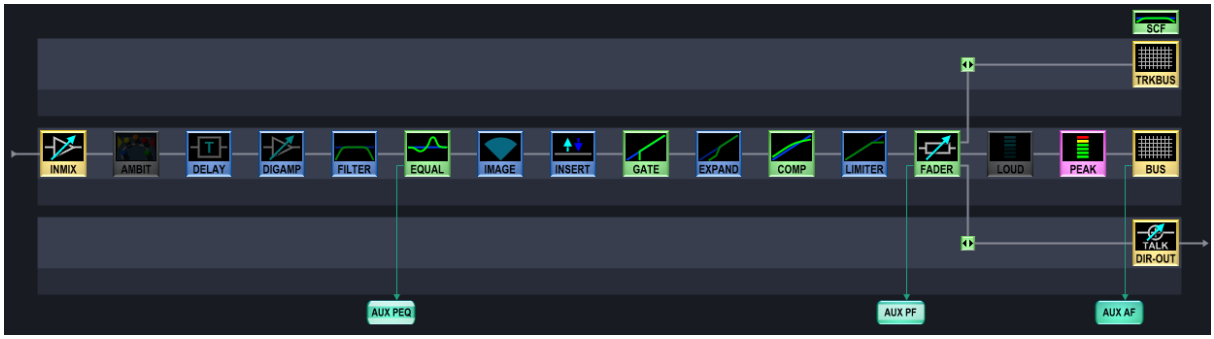
When a Broadcast channel DSP configuration is active, more channels become available and the channel signal flow is simplified. The main differences are that a Broadcast channel has no track bus send, no Filter section and simplified Dynamics, with a choice of Gate, Expander and Compressor (known as Combi-Dynamics) *or* Limiter.

The differences between the two channel types are:

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: **GATE** **EXPANDER** **COMPRESSOR** **LIMITER**	**Combi-Dyn** OR **Limiter** ✓ × ✓ × ✓ × × ✓ In Combi-Dynamics, the GATE, EXP and COMP move together within the channel signal flow. Each section can be turned on/off separately, but thresholds cannot overlap; the 3 sections share one Look Ahead Delay value.	4 independent dynamics ✓ ✓ ✓ ✓ Each section can be positioned independenty with separate on/off. There are no limitations on threshold values, and each section has its own Look Ahead Delay. You can also apply an external key and/or sidechain filtering.
FADER (Level, Mute, AFL, PFL)	✓	✓
LOUD (Loudness Meter)	✓ Suspends selected DSP modules.	✓ Suspends selected DSP modules.
PEAK (Peak Metering)	✓	✓
TRKBUS (Track Bus Send)	×	✓
BUS (Main Bus Send)	✓	✓
DIROUT (Direct Out)	✓	✓
Aux Sends: Pre EQ Pre Fader Post Fader (AF)	 × ✓ ✓ (after fader)	 ✓ ✓ ✓ (pre-bus)

Input Channel (Broadcast channel DSP Configuration)

Input Channel (Recording channel DSP Configuration)



Tip

You should choose a Recording channel DSP configuration if you wish to use track busses (and monitor channels), or if you require more complex signal processing: for example, to position the Gate, Expander, Compressor and Limiter independently.

Use a Broadcast channel DSP configuration if you prefer a simpler channel, and wish to access more channels from the same DSP card resource.

For details on changing the DSP configuration, see Page 122.

Signal Flow Order

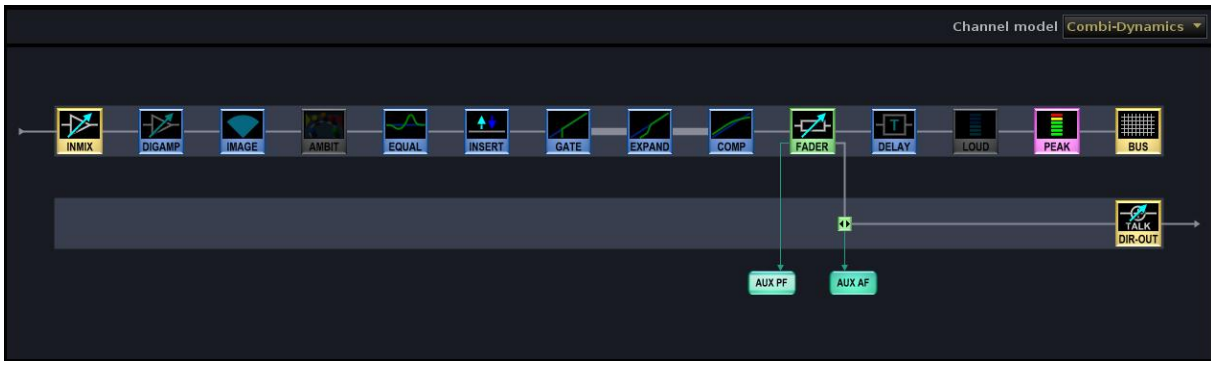
Apart from the exceptions on the previous page, the same signal flow options apply to both Broadcast and Recording channel types.

For example, you could put the Limiter post-fader:

Input Channel (Recording channel DSP Configuration)

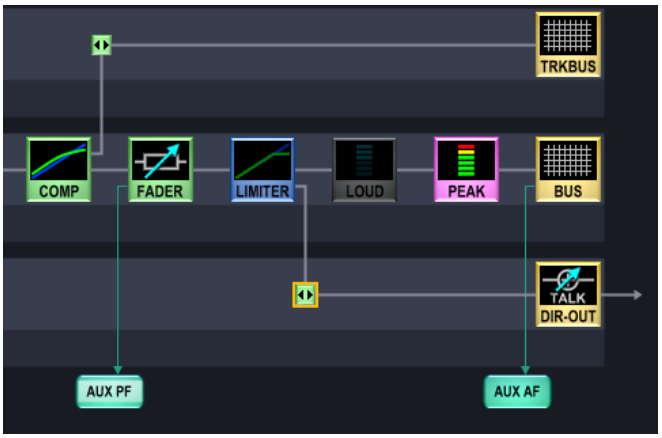
Or, move the Direct Output send to be pre-Delay:

Input Channel (Broadcast channel DSP Configuration)



For Recording channels, you can adjust the pickup point for the track bus independently. So, for example, you may take a feed to track busses pre-fader while the direct output is post-fader:

Input Channel (Recording channel DSP Configuration)



Other Channel Types

In addition to input channels (INP), both types of DSP configuration support other channel types: groups (GRP), sums (SUM), auxes (AUX) and monitor channels (MON). The number of each depends on your choice of DSP configuration.

Group Channels

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

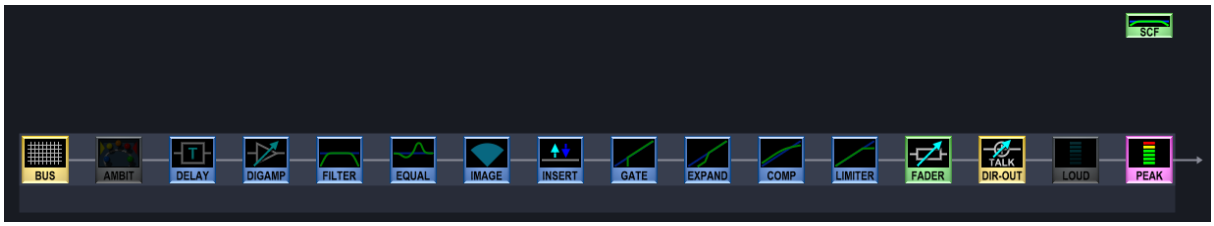
Group Channel (Recording channel DSP Configuration)

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)



Tip

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

Monitor Channels and Track Busses

Note

Recording channel DSP configurations support monitor channels and track busses, so you should select this type of DSP configuration if you wish to run the console in an in-line multitrack recording mode. The number of monitor channels within the DSP configuration determines the number of track busses.

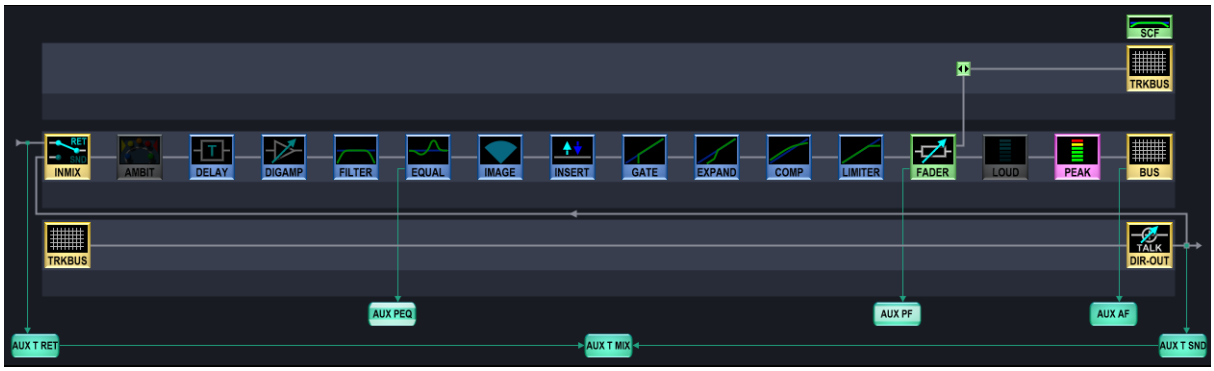
Monitor channels (MON) are designed for monitoring the send or return from a multitrack recorder.

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)



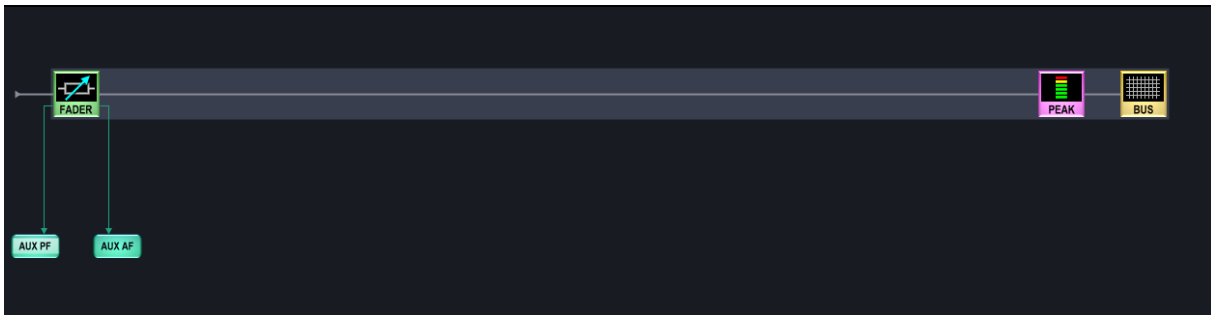
For more details on using monitor channels for multitrack applications, see Page 159.

Reduced (Tiny) DSP Channels

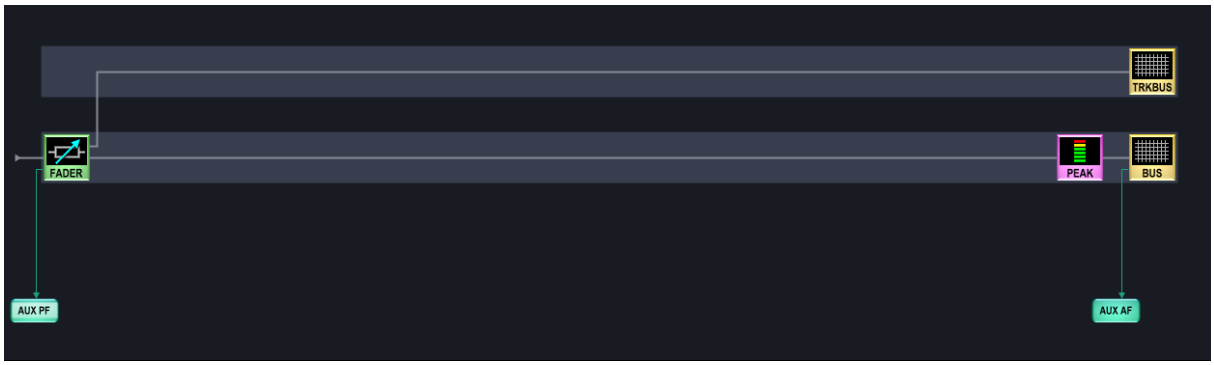
Depending on the DSP configuration, you may also have access to some Tiny Input, Aux and Sum channels.

Tiny channels have reduced processing and include the following audio modules:

Tiny Input Channel (Broadcast channel DSP Configuration)



Tiny Input Channel (Recording channel DSP Configuration)



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 for up to 32 auxiliary sends.

TRKBUS – pickup point for track bus assignments (Recording Channel DSP configurations only).

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

Other Signal Flow Options

Channel Mute

The fader strip MUTE button may be set to one of two options from the **System Settings** display, see Page 652:

- **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.
- **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.

Direct Out Mutes with Fader Open

This option is set from the **Channel Config** display, see Page 115. When selected, the direct output will 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.

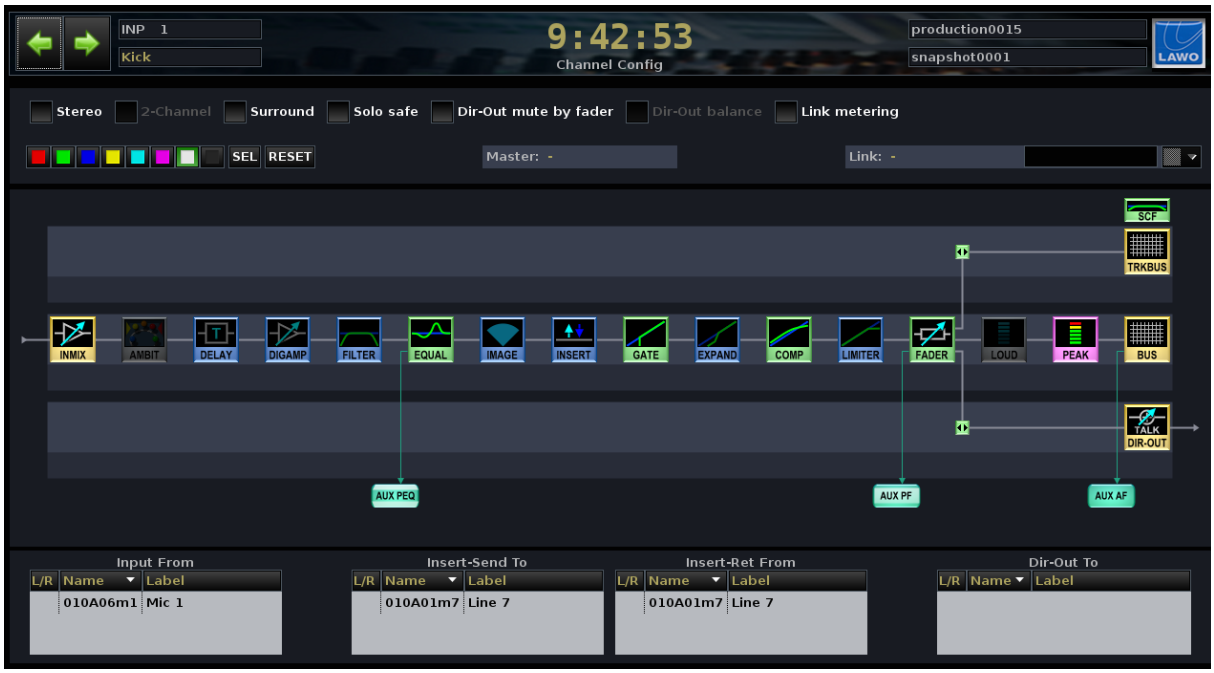
Balance Control for Stereo Channel Direct Out

The default state for a stereo channel is that the panning of the channel does not affect the stereo direct out. By enabling the **Dir-Out Balance** option from the **Channel Config** display, see Page 115, the direct output is panned according to the channel pan position.

The Channel Config Display

Having loaded a DSP configuration, see Page 122, each channel's signal flow may be interrogated and modified from the **Channel Config** display.

1. Select the channel, by pressing its fader strip **SEL** button, or channel type and number from the ACCESS CHANNEL/ASSIGN control panel.
2. Press the **CHAN/CONFIG** button, located on the centre section SCREEN CONTROL panel:



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 may be positioned in any order in the chain. Audio modules coloured blue are switched off; those shown in green are switched on; those in grey are unavailable.

Note

Note that when channels are defined for 5.1 surround with AMBIT processing active, the **AMBIT** module replaces the Delay, Filter, Image, Gate and Expander, see Page 290. When loudness metering is active, the **LOUD** module replaces your choice of DSP modules, see Page 318.

At the top of the display are a number of configuration options, see Page 115. The **Channel Color** options can be used to change the colour coding for the selected DSP channel, see Page 118. Beside **Master** and **Link** you will see the name of any VCA, Surround or Link masters if assigned.

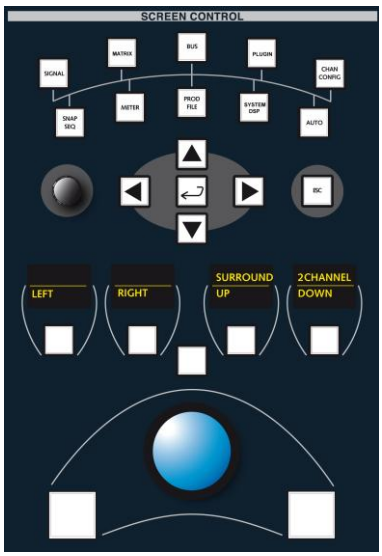
At the bottom of the display you will see the Names and Labels of any connections to and from the channel – the **Input**, **Insert Send**, **Insert Return** and **Direct Out**.

The previous example showed a channel from a Recording channel DSP configuration. If a Broadcast channel DSP configuration is active, 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** – a Gate, Expander and Compressor which can be moved as a single processing block anywhere within the signal flow.
    - **Limiter** – a single Limiter module, which can be positioned anywhere within the signal flow.

Changing the Signal Processing Order

To change the signal processing order for the selected channel:



1. Using the trackball, select the audio processing module you wish to move.

*The selected module – e.g. **LIMITER** - is highlighted.*

2. Use the soft keys or right-click to move the selected module:

- **LEFT** and **RIGHT** – moves the module left or right within the main channel signal path.
- **UP** and **DOWN** – moves the module into or out of the Track Bus, Channel or Direct Output path.

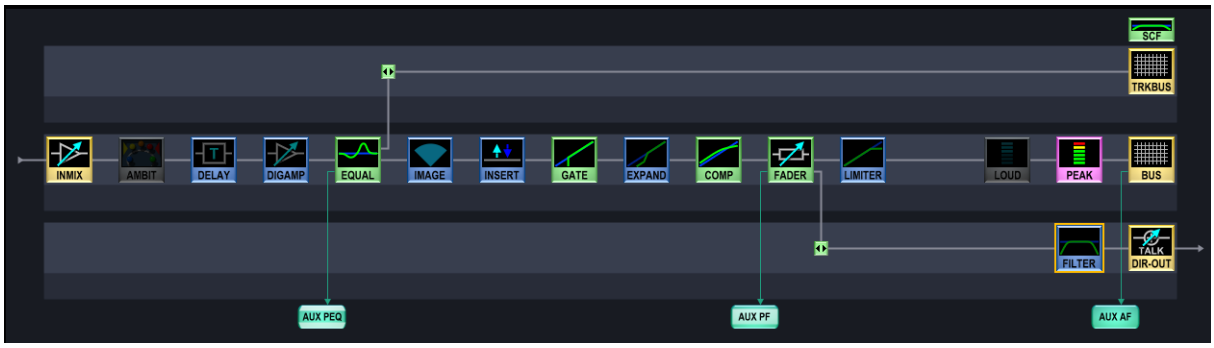
You can also press [**CTRL**] + [**Left/Right/Up/Down**] on the console keyboard to move the selected module.

The display updates to follow your changes.

You cannot move the position of the **INMIX** or **BUS** modules. When using Broadcast channels, you cannot select and move the **DIGAMP** or **IMAGE** modules.

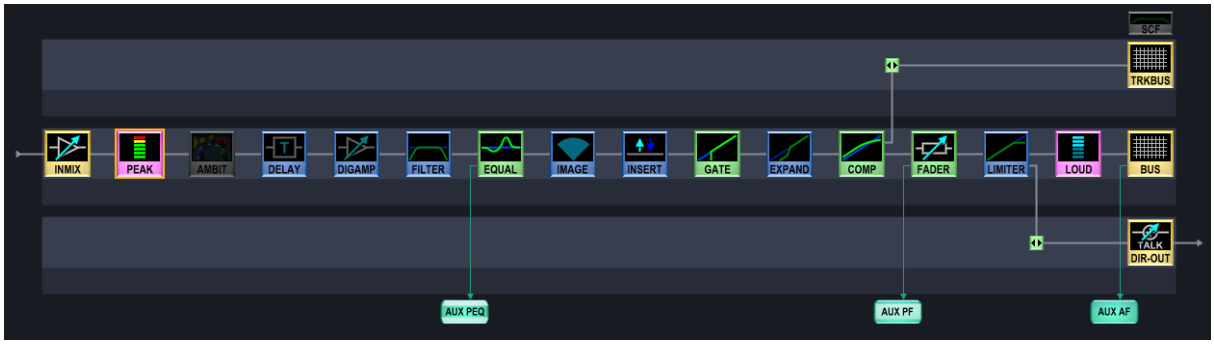
For stereo channels, you can move modules for the left and right sides of the channel simultaneously.

You can adjust the pickup points for the Direct Out and Track Bus (Recording channels only) independently. This allows you to record to a multitrack machine without processing, or use the track busses as a second direct output from the channel:



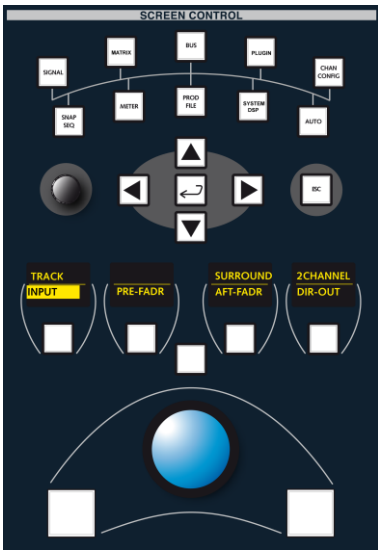
Changing the Meter Pick up Point

1. If you select the **PEAK** audio module (pink), the soft key options allow you to change the channel peak metering point from a number of predefined options:



- **INP** – meters the channel input (post the INMIX section).
- **PF** – meters the pre-fader signal.
- **AF** – use this to meter the input to the BUS assign module (post fader and post processing).
- **DOUT** – meters the direct output.
- **TRACK** (Recording channels only) – meters the track bus output.

2. Select the **LOUD** audio module (pink when active), and the same soft key options allow you to select the pickup point for loudness metering.



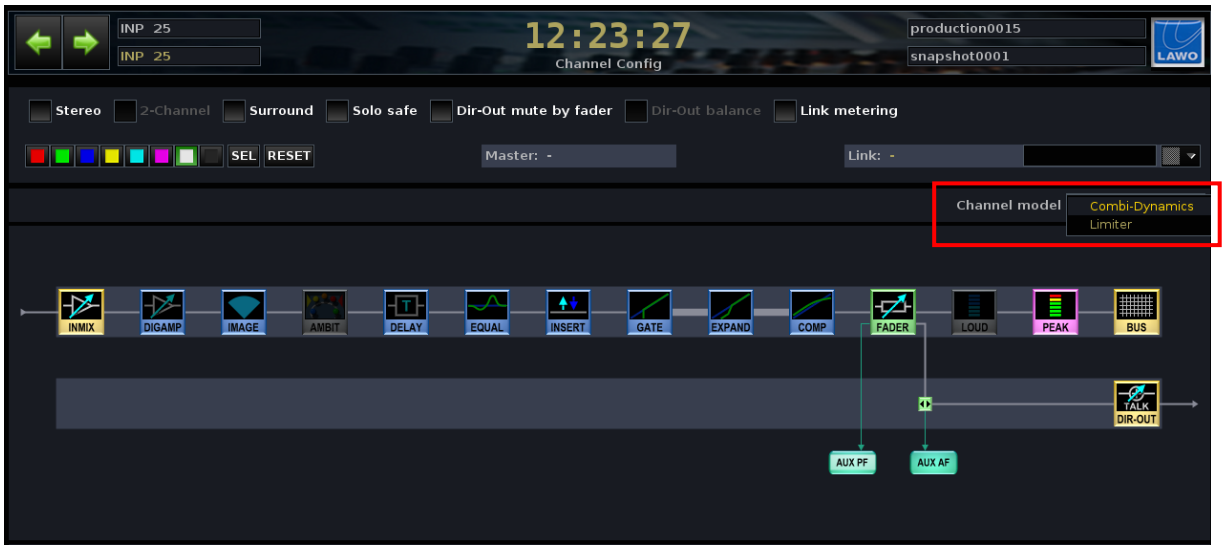
Note that you can select different channel pickup points for the **PEAK** and **LOUD** metering modules.

For more details on loudness metering, see Page 318.

The meter pickup point may also be selected from the Central Control Section, see Page 332 for details.

Changing the Dynamics Model (on Broadcast Channels)

This option is selected, using the trackball, from the **Channel model** drop-down menu when a full processing Broadcast channel is in access:



Note

Note that the **Channel model** option does not appear if a Recording channel DSP configuration is active.

For each full processing Broadcast channel, you can select:

- **Combi-Dynamics** – three modules: Gate, Expander and Compressor.
- **Limiter** – one module: a Limiter.

This allows you to use say Gating and Compression on one input channel, while applying a Limiter to another.

Tip

A quick way to set a range of channels to Combi-Dynamics, or Limiter, is to couple them and then change the **Channel model**. Alternatively, you can copy and paste the channel signal flow (**CH**) using the Parameter Copy/Assign panel, see Page 305.

Note

Note that for surround channels, you may 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.

Limiter Model

With **Limiter** selected, the **LIM** module can be positioned anywhere within the channel signal flow in the usual manner:

Combi-Dynamics Model

With **Combi-Dynamics** selected, the **GATE**, **EXP** and **COMP** modules move together as one block:

1. Select any of the three modules, and you will see a green outline on the **Channel Config** display:

2. Use the soft keys or right-click to move the modules in the usual manner:

- **LEFT** and **RIGHT** – moves the module left or right within the main channel signal path.
- **UP** and **DOWN** – moves the module into or out of the Channel or Direct Output path.

Note that the order of sections within the Combi-Dynamics cannot be changed, and is always Gate, Expander and then the Compressor. If you wish to re-order dynamics modules, or have both a Limiter and Gate, Expander or Compressor, then switch to a DSP Configuration with Recording channels.

Note

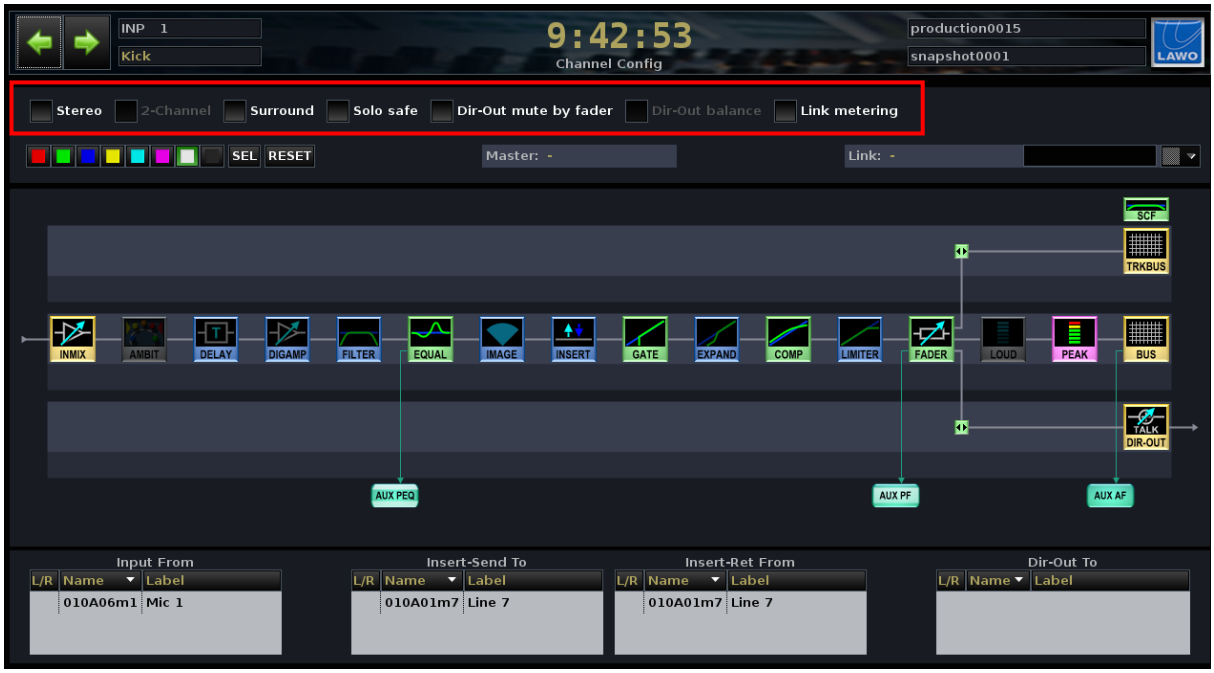
Each module can be turned on or off independently, and has separate threshold, ratio and other parameter values. However, because the Combi-Dynamics works as a single block of processing, please note the following:

- 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).
- There is one look ahead delay (LAHD) for the Combi-Dynamics sidechain. In otherwords, you cannot delay the Gate sidechain independently from the Compressor.
- 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.
- The **IN** and **OUT** meters on the **Main Display** (shown below) 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 (below) 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:

For more details on controlling Dynamics from the Central Control Section, see Page 201.

Channel Config Options

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



Note that some options may be unavailable and are “greyed out” depending on the channel in access.

Stereo

Select this option to make the channel in access stereo:

*The channel is automatically linked to its adjacent DSP path. For example, selecting **Stereo** on input channel 3 creates a stereo channel using inputs 3 and 4.*

For more details on stereo channel operation, please see Page 263.

2-Channel

Any odd/even pair of sum, group or aux channels may be configured as 2-channel as an alternative to stereo. This allows independent fader strip control for the left and right sides of the output channel. For details, please see Page 268.

Surround

This option will configure a surround channel. For details, see Page 269.

Solo Safe

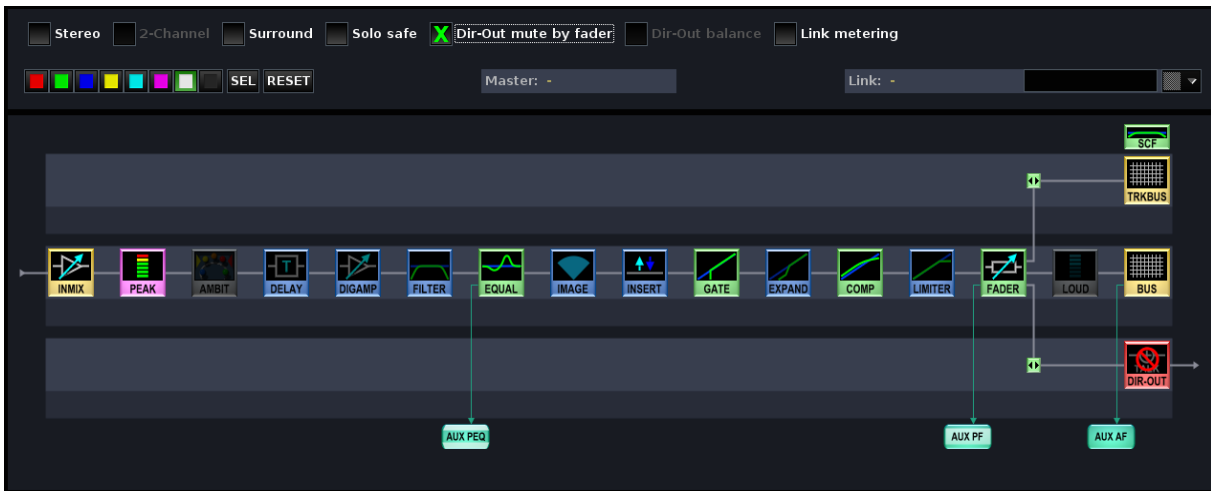
Select this option when working with Solo-in-place to prevent the channel being muted when a Solo is active. For example, you might select this option on your effects return channels so that you can hear both the source and the effect return when a channel is in Solo.

For more details on Solo-in-place, see Page 672.

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

The default state for a stereo channel is that the panning of the channel does not affect the stereo direct out. By enabling the **Dir-Out Balance** option the direct output is panned according to 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 enabled** – the direct output of a stereo channel is panned according to the pan position.
- **Dir-Out balance disabled (default)** – the direct output does not track the channel pan.

Link Metering

This option affects the **Channel** display metering for the selected channel if it is part of a link group. When the option is enabled, the first 8 linked channels are metered on any channel within the link group. This is useful if you want to leave only one channel on the surface and hide the remaining linked channels on another bank or layer.

See Page 353 for more details on link groups.

Channel Colour Coding

Note

The eight coloured buttons at the top of the **Channel Config** display can be used to colour code the selected DSP channel. For example, you might want to set all music channels to be white, VTRs to be blue, presenter mics to be red and so on.

The colour coding affects the LAWO backlight at the bottom of each fader strip and the **Channel Display** sensing.

Note that the LAWO backlight is not present on the classic mc²66 and therefore colour coding only affects the **Channel Display**.

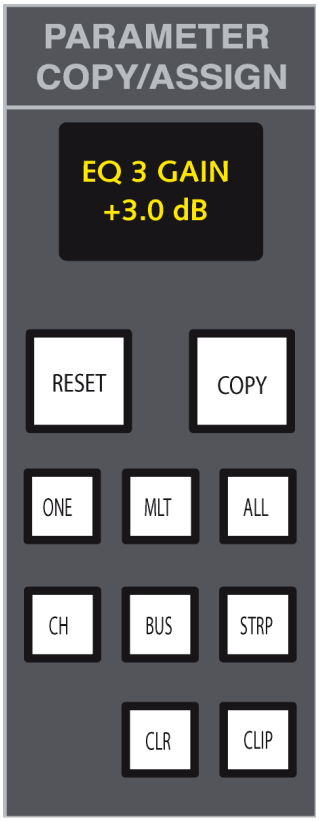
Colour code assignments are saved in snapshots and productions. This allows you to configure different colour coding for different snapshots during a show, or for different types of production.

Assigning a Channel Colour Code

1. Select the **Channel color** for the channel in access from the top of the **Channel Config** display:

Copying or Resetting Colour Codes

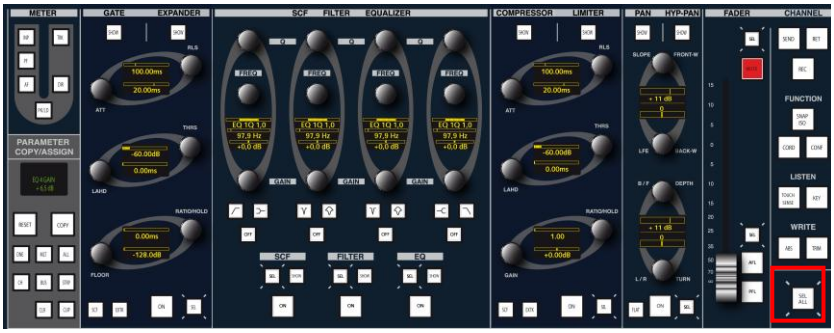
If you wish to change the colour code across multiple channels, then you can perform a copy or reset operation as follows. For example, to copy the colour code:



1. Put the source channel in access, either by pressing its fader **SEL** button or entering the channel type and number from the ACCESS CHANNEL/ASSIGN control panel.
2. Press the **COPY** button, located on the PARAMETER COPY/ASSIGN panel.
3. And activate the **MLT** option.

*All the fader **SEL** buttons across the console flash, in green, to indicate possible destinations:*

4. On the Central Control Section, toggle the **SEL ALL** button so that all channel parameters such as EQ, etc. are deselected:



5. From the **Channel Config** display select the on-screen **SEL** button:

The channel's colour code is now the only option selected for the copy.

6. Select the channels you wish to copy to by pressing their fader **SEL** buttons.

The new colour assignment is copied to all the selected channels.

7. Remember to deselect the **COPY** button once you have finished the operation!

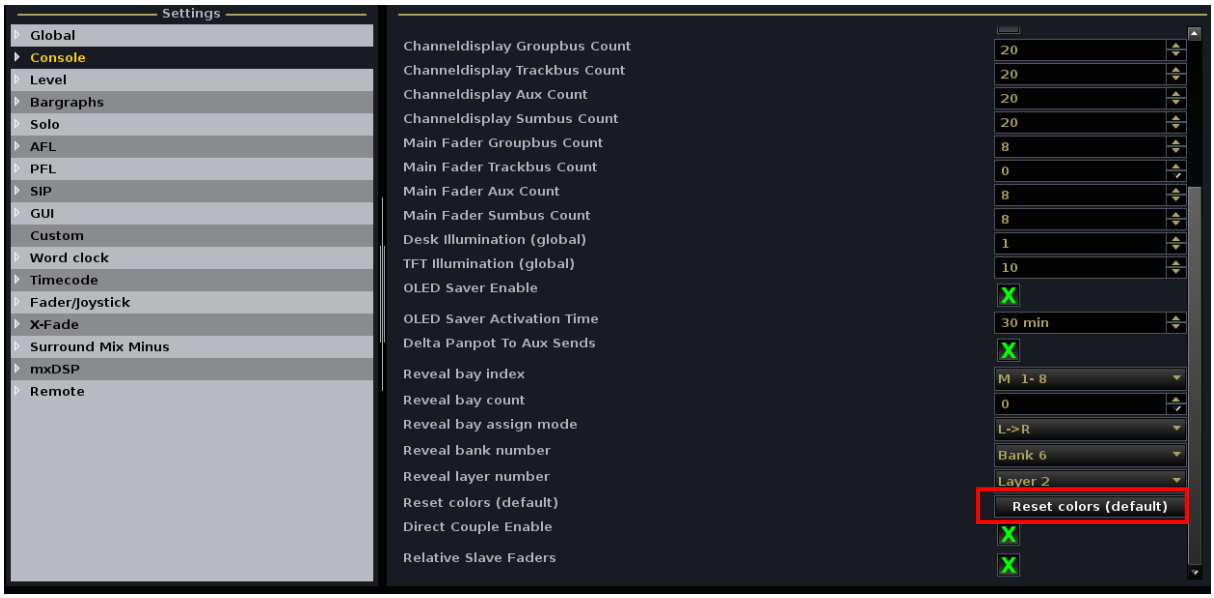
The same method can be used to reset colour codes across multiple channels; during step 2 press **RESET** rather than **COPY**.

Individual Channel Reset

You can also reset an individual channel's colour code to the default setting by selecting the on-screen **RESET** button at the top of the **Channel Config** display:

Global Channel Colour Code Reset

To reset all DSP channels to their default colour codes, select the **Reset colours (default)** option from the **Console** topic of the **System Settings** display:



DSP Configurations

The DSP configuration defines how many input channels, monitor return channels (track busses), groups, sums and auxes are available. In addition, it determines how many paths have fully featured or reduced (Tiny) processing, and whether the channel type defines Broadcast or Recording channels.

Note

Note that the total number of channels is determined by three factors:

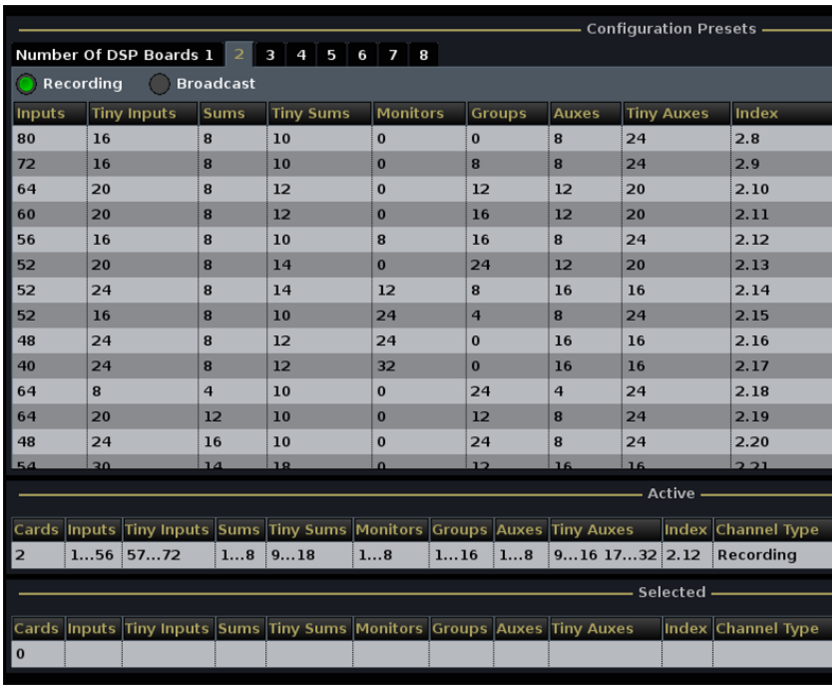
- How many channel DSP cards are fitted to the HD Core (up to 8).
- The sampling rate of the system: 48/44.1kHz or 96/88.2kHz.

This choice is made within the AdminHD configuration and may not be modified by the user. Higher sample rates (e.g. 96kHz or 88.2kHz) use twice as much DSP resource as lower sample rates (e.g. 48kHz or 44.1kHz). Therefore you will be able to configure more input channels at lower rates.

- Your choice of DSP configuration.

Your current DSP configuration may be viewed on the **DSP Configuration** display.

1. Press the **SYSTEM DSP** button, located on the centre section SCREEN CONTROL panel, to view this display:



Inputs	Tiny Inputs	Sums	Tiny Sums	Monitors	Groups	Auxes	Tiny Auxes	Index
80	16	8	10	0	0	8	24	2.8
72	16	8	10	0	8	8	24	2.9
64	20	8	12	0	12	12	20	2.10
60	20	8	12	0	16	12	20	2.11
56	16	8	10	8	16	8	24	2.12
52	20	8	14	0	24	12	20	2.13
52	24	8	14	12	8	16	16	2.14
52	16	8	10	24	4	8	24	2.15
48	24	8	12	24	0	16	16	2.16
40	24	8	12	32	0	16	16	2.17
64	8	4	10	0	24	4	24	2.18
64	20	12	10	0	12	8	24	2.19
48	24	16	10	0	24	8	24	2.20
54	30	14	18	0	12	16	16	2.21

Cards	Inputs	Tiny Inputs	Sums	Tiny Sums	Monitors	Groups	Auxes	Tiny Auxes	Index	Channel Type
2	1...56	57...72	1...8	9...18	1...8	1...16	1...8	9...16 17...32	2.12	Recording

Cards	Inputs	Tiny Inputs	Sums	Tiny Sums	Monitors	Groups	Auxes	Tiny Auxes	Index	Channel Type
0										

The upper part of the display lists the **Configuration Presets** available for different numbers of DSP boards; the number of boards is highlighted at the top – in our example, 2.

Note that even if your system is only fitted with 1 DSP board, you will be able to view the Configuration Presets for up to 8 boards – this tells you what could be available if you upgrade your system!

The **Recording** and **Broadcast** radio buttons appear if your system supports Broadcast channels. Notice that the channel count effectively doubles when you select the **Broadcast** radio button.

The **Active** summary shows the details for your current DSP configuration. This is the configuration preset which is loaded.

The **Selected** summary provides similar details for the selected configuration. This allows you to interrogate an alternative configuration before making it active.

In each case you will find the following information:

- **Cards** – the number of DSP cards in use.
- **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. Note that monitor channels are always created using full audio processing, and are only available when using Recording channels.
- **Groups** – the number of group channels. Note that groups are always created using full audio processing.
- **Auxes** and **Tiny Auxes** – the number of fully featured and reduced processing auxiliary channels.
- **Index** – this is a unique reference number for the DSP configuration. You may be asked for this number when contacting Lawo for operational or technical support.
- **Channel Type** – shows whether the DSP configuration uses Broadcast or Recording channels.

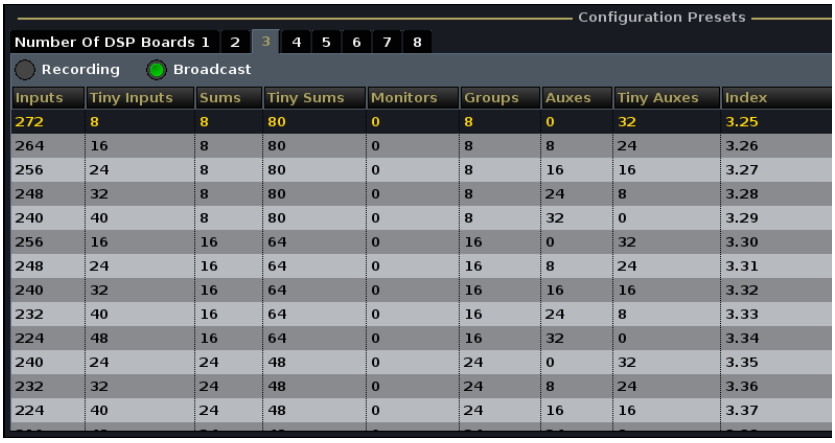
Note

All resources are displayed as mono channels. For example, a configuration with 24 inputs provides 24 mono input channels, or 12 stereo input channels, or any combination such as 16 mono plus 4 stereo input channels. Similarly, if you configure your main sum output for a surround format, this uses 4, 6, 7 or 8 of your available sum channels.

Broadcast or Recording Channels

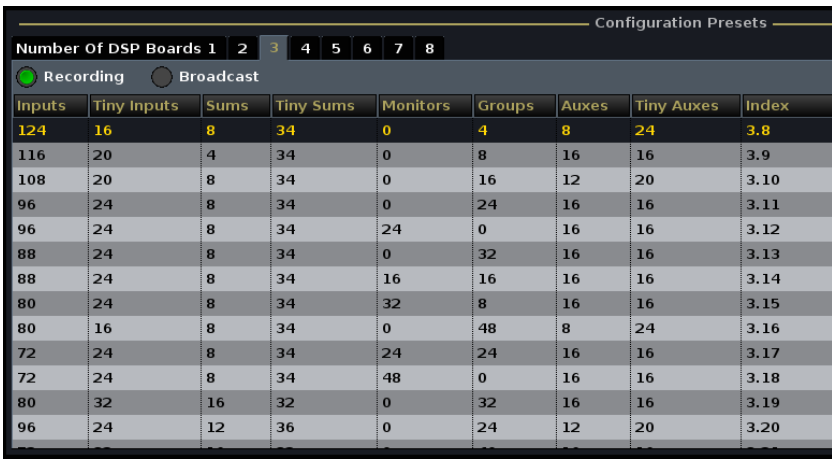
The type of channel is selected globally for the console when you choose a configuration from the **DSP Configuration** display. From Version 4.16 software, DSP configurations come in a choice of two channel types:

- **Broadcast Channels** – doubles the number of channels per DSP card, with a simplified signal flow ideal for live broadcast applications.



Inputs	Tiny Inputs	Sums	Tiny Sums	Monitors	Groups	Auxes	Tiny Auxes	Index
272	8	8	80	0	8	0	32	3.25
264	16	8	80	0	8	8	24	3.26
256	24	8	80	0	8	16	16	3.27
248	32	8	80	0	8	24	8	3.28
240	40	8	80	0	8	32	0	3.29
256	16	16	64	0	16	0	32	3.30
248	24	16	64	0	16	8	24	3.31
240	32	16	64	0	16	16	16	3.32
232	40	16	64	0	16	24	8	3.33
224	48	16	64	0	16	32	0	3.34
240	24	24	48	0	24	0	32	3.35
232	32	24	48	0	24	8	24	3.36
224	40	24	48	0	24	16	16	3.37

- **Recording Channels** – provide more processing modules and flexibility.



Inputs	Tiny Inputs	Sums	Tiny Sums	Monitors	Groups	Auxes	Tiny Auxes	Index
124	16	8	34	0	4	8	24	3.8
116	20	4	34	0	8	16	16	3.9
108	20	8	34	0	16	12	20	3.10
96	24	8	34	0	24	16	16	3.11
96	24	8	34	24	0	16	16	3.12
88	24	8	34	0	32	16	16	3.13
88	24	8	34	16	16	16	16	3.14
80	24	8	34	32	8	16	16	3.15
80	16	8	34	0	48	8	24	3.16
72	24	8	34	24	24	16	16	3.17
72	24	8	34	48	0	16	16	3.18
80	32	16	32	0	32	16	16	3.19
96	24	12	36	0	24	12	20	3.20

The main differences between the channel types are that a Broadcast channel has no track bus send, no Filter section and simplified Dynamics, with a choice of Gate, Expander and Compressor (known as Combi-Dynamics) *or* Limiter.

For more information on the differences between Broadcast and Recording channels, see Page 100.

Note

Note that each DSP configuration supports only one channel type; you cannot mix Broadcast and Recording channels.

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 classic mc²66 systems).
- Your system has DSP 983/02 cards (Broadcast channels are only supported by DSP 983/03 cards).

Note

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).

Broadcast Channels on the Classic mc²66

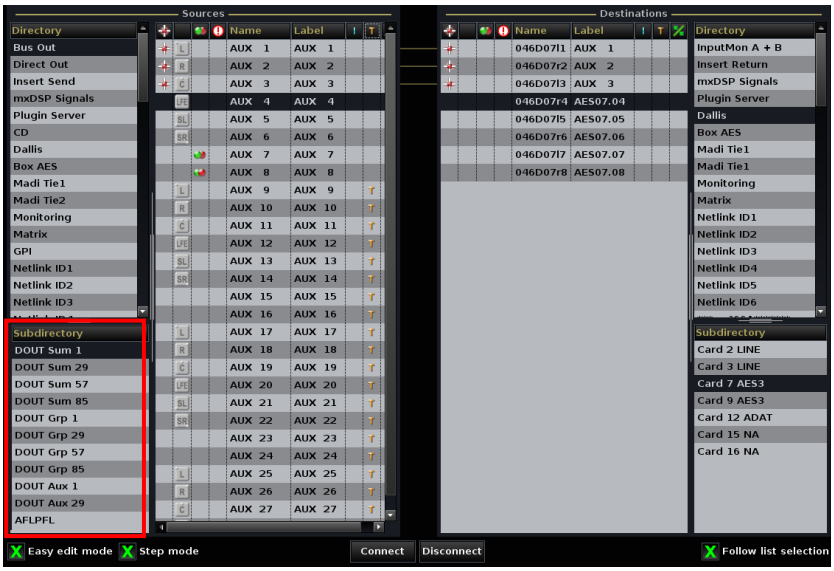
On classic **mc²66** systems, you may see a slow down on the console's graphical displays if you run more than 4 DSP cards with a Broadcast channel DSP configuration. The slow down only affects graphical updates to displays, such as the **Channel Display**, and does not affect the real-time processing of audio.

Note

Accessing the Additional Resources

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 Admin HD, 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**:



Please consult your Technical Representative if this is not the case.

Changing the DSP Configuration

DSP Configurations may be changed at any time, making it easy to modify the mix structure if you decide, for example, that the production requires some additional groups or inputs.


Note

But note:

- 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 the channel type midway through a setup is not advised. Changing from Recording to Broadcast channels, or vice versa, significantly reconfigures the channel signal flow of the console, and therefore a mix started with one channel type will not sound the same on another. To avoid confusion, all channel DSP settings are reset to flat if you change channel type. Therefore, choose the channel type carefully when loading your initial DSP configuration.

If you do load the wrong DSP configuration, then don't panic! The system automatically saves a Fallback Snapshot before each DSP configuration load. This provides a way of recovering settings if, for example, you change the channel type by accident, see Page 129.

To change the DSP configuration:

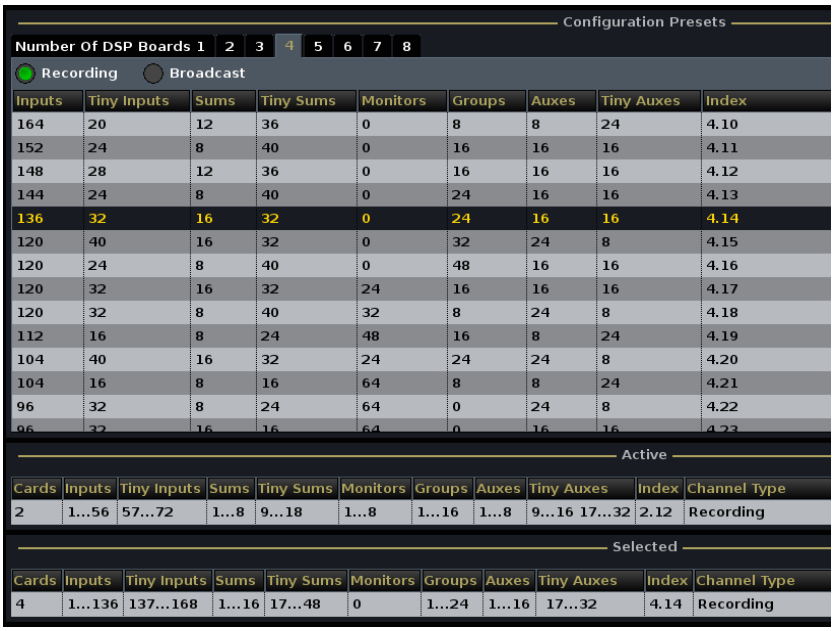
1. Open the **DSP Configuration** display.
2. Select the **Number of DSP Boards** fitted your system – in our example, **4**.
3. Select the channel type, **Recording** or **Broadcast**.

Note that the channel type buttons are not visible if your system does not support Broadcast channels, see Page 125.

Note

4. Then select one of the available **Configuration Preset**s – in our example, **Index 4.14**.

*The details are highlighted in black and are displayed in the **Selected** summary column allowing you to make a side-by-side comparison with your **Active** configuration:*



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

Cards	Inputs	Tiny Inputs	Sums	Tiny Sums	Monitors	Groups	Auxes	Tiny Auxes	Index	Channel Type
2	1...56	57...72	1...8	9...18	1...8	1...16	1...8	9...16 17...32	2.12	Recording

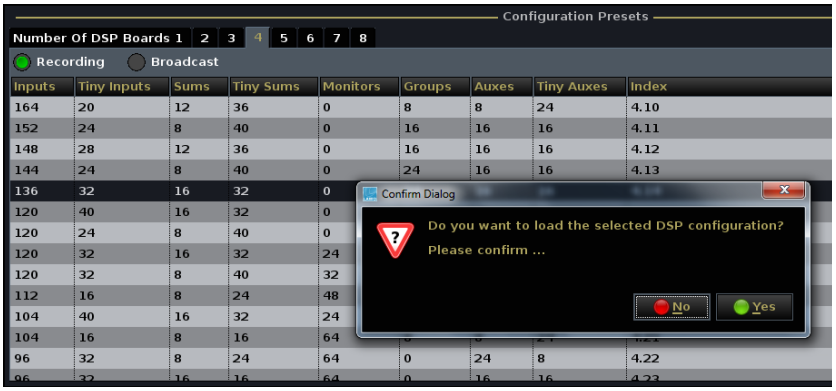
Cards	Inputs	Tiny Inputs	Sums	Tiny Sums	Monitors	Groups	Auxes	Tiny Auxes	Index	Channel Type
4	1...136	137...168	1...16	17...48	0	1...24	1...16	17...32	4.14	Recording

5. Right-click and select **Load** to continue.

One of two possible dialogue confirmation boxes appears:

Changing DSP Configuration (Same channel type)

If you have selected a DSP configuration which uses the same channel type, then loading the new DSP configuration will cause a brief interruption to audio but will not interfere with your channel DSP settings. In this case, you will see the following confirmation box:



6. Select **Yes** to proceed.

*The console re-configures its processing, and the **Active** summary updates to reflect the new configuration.*

Note

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.

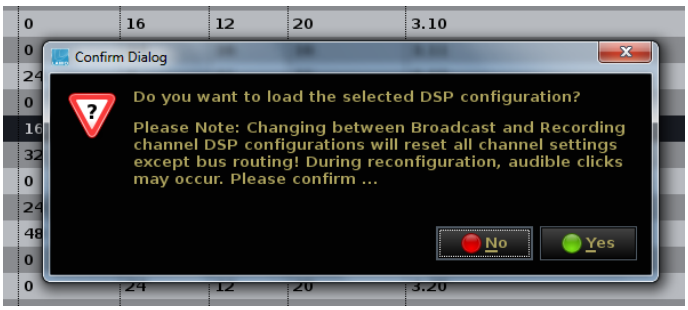
After a successful DSP configuration load, a number of things may happen to each type of DSP resource:

- If you have increased the amount of resource, for example you now have 8 groups rather than 4, any DSP settings applied to groups 1 to 4 remain intact, and the additional groups become available for control 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 while that configuration is active. For example you may have configured monitor return channels such that your input channel count has fallen. The 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.

⏩ Changing DSP Configuration (Different channel type)

If you have selected a DSP configuration which uses a different channel type, then you are significantly changing the signal processing available on the console.

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 other words, any EQ parameters are reset to flat, faders to off, and so on. To warn you that this is about to occur, the following confirmation dialogue box appears:



7. Select **Yes** to proceed.

*The console re-configures its processing, including the channel type, and the **Active** summary updates to reflect the new configuration.*

After a successful DSP configuration load, all channel DSP settings are reset to flat, with the exception of bus routing. Therefore, it is good practice to choose the channel type carefully when selecting your initial DSP configuration.

Fallback Snapshots

If you do load a DSP configuration 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, for example, you change the channel type by accident.

To recover your mix 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 back a compatible DSP - Recording or Broadcast - from the **DSP Configuration** display.
3. Press the **SNAP/SEQUENCE** button, on the SCREEN CONTROL panel, to view the **Snapshots List** display.

4. And select the **FALLBACK** folder:

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!

5. 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.

DSP Configurations and Snapshots

Because Recording and Broadcast channels offer significantly different signal processing, you cannot load channel DSP settings from a Broadcast snapshot to a console running Recording channels, or vice versa.

To help manage this, the **Snapshots List** display includes a channel type column:

1. Press the **SNAP/SEQUENCE** button, on the SCREEN CONTROL panel, to view the **Snapshots List** display.

Scroll to the right to view the **Channel type** column. This shows which channel type was active when the snapshot was saved – in our example, a **Recording** channel DSP configuration:

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 cards or DSP configuration varies.

Tip

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, 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.

DSP Configurations and 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, this may exclude other important parameters, and 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.

DSP Configurations and 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, when it comes to signal processing modules, the recall may exclude other important parameters, and the result may not sound the same.


Tip

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.

DSP Configurations and 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.

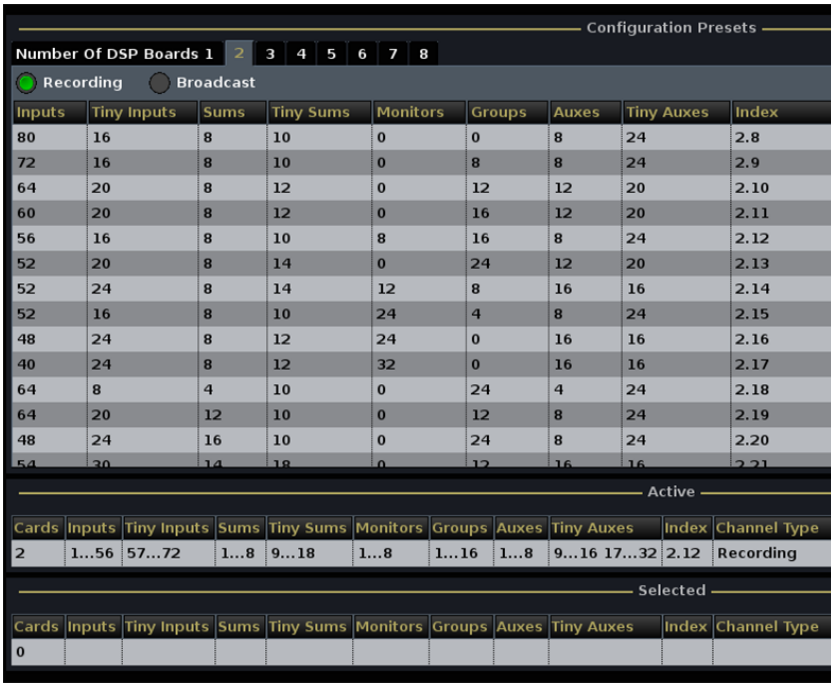

Note

However, note that if you move a production to a console with fewer DSP cards, then the DSP configuration will not load (as it is looking for more physical cards). Therefore, if the 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.

Redundant DSP

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



Inputs	Tiny Inputs	Sums	Tiny Sums	Monitors	Groups	Auxes	Tiny Auxes	Index
80	16	8	10	0	0	8	24	2.8
72	16	8	10	0	8	8	24	2.9
64	20	8	12	0	12	12	20	2.10
60	20	8	12	0	16	12	20	2.11
56	16	8	10	8	16	8	24	2.12
52	20	8	14	0	24	12	20	2.13
52	24	8	14	12	8	16	16	2.14
52	16	8	10	24	4	8	24	2.15
48	24	8	12	24	0	16	16	2.16
40	24	8	12	32	0	16	16	2.17
64	8	4	10	0	24	4	24	2.18
64	20	12	10	0	12	8	24	2.19
48	24	16	10	0	24	8	24	2.20

Cards	Inputs	Tiny Inputs	Sums	Tiny Sums	Monitors	Groups	Auxes	Tiny Auxes	Index	Channel Type
2	1...56	57...72	1...8	9...18	1...8	1...16	1...8	9...16 17...32	2.12	Recording

Cards	Inputs	Tiny Inputs	Sums	Tiny Sums	Monitors	Groups	Auxes	Tiny Auxes	Index	Channel Type
0										

If, for example, your HD core is fitted with 2 DSP boards and the **Active** configuration uses 1, then the second board will provide redundancy in the event of a failure.

This can also be seen on the HD core front panel where the spare board is shown in Standby. Note that the system uses boards from right to left across the front of the HD core. So if board 8 is redundant, it is the DSP board on the left of the core.

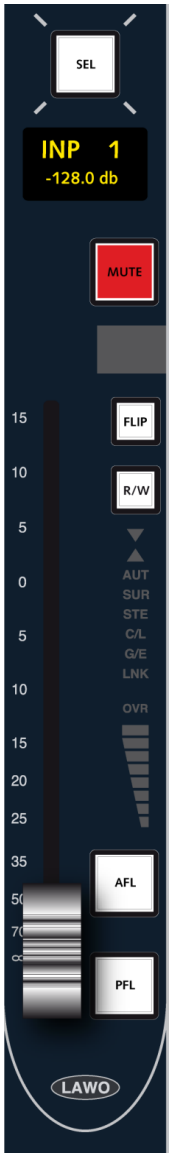
In the unlikely event of a failure, the system automatically switches all DSP resources and settings from the faulty board to the spare; the faulty board may then be safely removed and replaced.

Note that the replaced board now acts as the spare board either until the HD core is restarted or a new DSP configuration is loaded. Following the reconfiguration, boards are utilised from right to left across the HD core, in our example slots 1 to 7 for main DSP resources and slot 8 in standby status.

Upgrading Your DSP Configuration

By now, your hardware specification will have been pre-determined, unless of course you are reading this prior to console purchase! However, you may upgrade your system by retrofitting additional DSP cards at any time in the future.

Control Surface Configuration



The **mc²66** control surface configuration allows you to lay out your input channels, groups, main sums, auxiliary masters, VCA masters, Surround masters and GPCs (General Purpose Channels) across the console's fader strips as you desire. The control surface is capable of accessing many more channels and masters than the physical number of faders in front of you. This access is handled through the configuration of user banks and layers.

Depending on the currently loaded snapshot, you may be sat in front of a pre-configured control surface or a series of blank fader strips. For the moment, let's assume that your console has pre-configured fader strips and cover the operation of the console's bank and layer switching. However, if this is not the case, please refer to Page 147 for details on how to assign channels to fader strips.

Banks and Layers

Up to six control surface banks may be configured; think of each fader bank like a separate console, with fast global switching between banks. They may be used, for example, to access different sets of music channels during a live entertainment show, or to separate live and post production sources during a sports production.

Within each bank, fader strips may also be switched, either individually or globally, between two layers – LAYER 1 and LAYER 2. For example, to switch between input and monitor channels during a recording session, or to switch between main and backup microphone channels during a live production.

Note that in every bank or layer you have both channel and main fader strips. Due to the lack of free controls on a main fader strip, they are most suitable for controlling master channels such as main sums, groups or VCA masters. See Page 346 for more details on main fader strips.

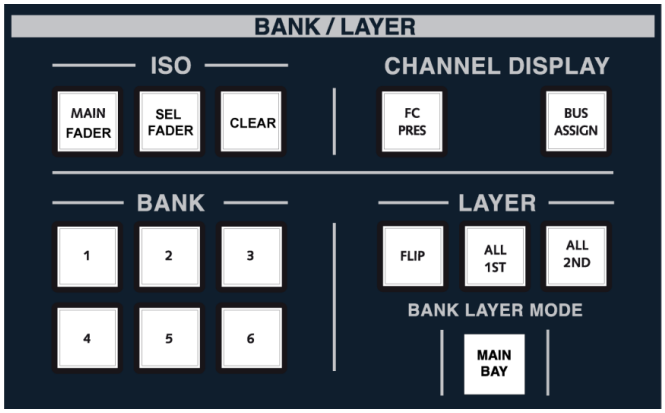
And, remember that on channel strip bays you can switch FC 4 to the level, mute and **SEL** for channels assigned to the alternate layer (MKII mc²66 only).

Bank Switching

There are two ways to switch between the console's six user banks: globally from the centre section or locally, 8 faders at a time, from the fader strips.

To page the control surface globally:

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



One of these buttons will be illuminated; this is your currently selected fader bank.

With the **MAIN BAY** (BANK LAYER MODE) button turned off, you can switch the bank of *all* fader strips – channel and main:

2. Press any numbered button to switch to a new bank.

*As you do this, all fader labels, control positions and **Channel** displays update across the console to reflect the new settings. If your banks are not yet configured with assignments, then you will switch to blank fader strips.*

Note that if a fader bay is isolated, the 8 faders within the isolated bay are not switched by the global banking buttons.

Note

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

Note that the **MAIN BAY** button does not exist on the classic mc²66. Instead you will find **BNK 1** to **BNK 6** buttons within the main fader bay, providing bank switching for the main faders.

To bank switch locally from the channel fader strips:

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

2. Press a numbered button to switch to a new bank.

This time only the 8 fader strips within your local module switch to the new bank.

Note

Note that as soon as you press a global BANK access button, this will reset any local selections, unless the fader bay is isolated. See Page 141 for more details on isolating fader bays.

Note that on the classic mc²66, the local banking buttons (**BNK 1**, **BNK 2**, etc.) can be found above **CORD** and **CONF**.

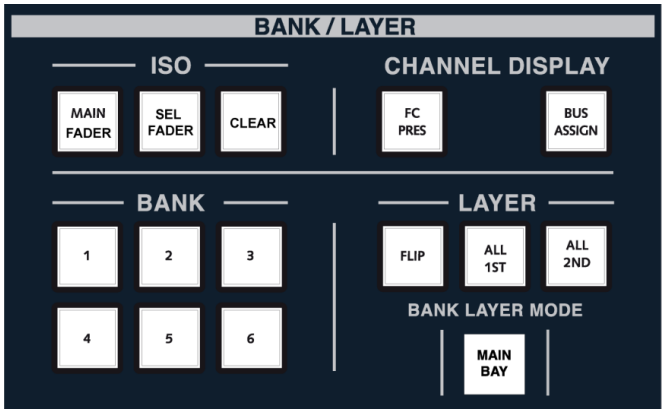
Layer Switching

Within each of the six banks, each fader strip has two layers – Layer 1 and Layer 2. For example, assign a main microphone channel to Layer 1 and a backup microphone channel to Layer 2, or assign your input channels to Layer 1 and monitor return channels to Layer 2.

You can invert the layers so that the channel assigned to LAYER 1 is assigned onto the LAYER 2 controls, and vice versa, as follows:

To switch layers globally:

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

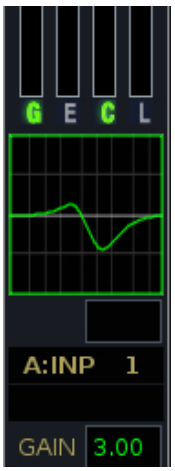


With the **MAIN BAY** button turned off, you can switch the layer of *all* fader strips – channel and main:

2. Press **FLIP** to invert the layer for *all* fader strips.

Turn on the **MAIN BAY** button to use **FLIP** only on the main fader strips.

*The fader labels, control positions and **Channel** displays update across the console to reflect the new settings. If your second layer is not yet configured with assignments, then you will switch to blank fader strips.*



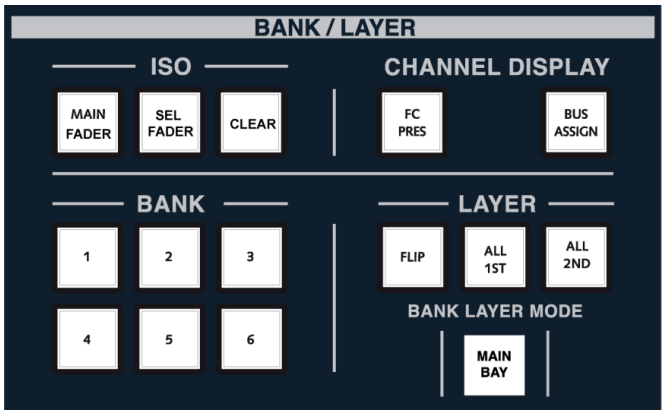
Note that if a fader bay is isolated, the 8 faders within the isolated bay are not switched by the global layering buttons, see Page 141 for details.

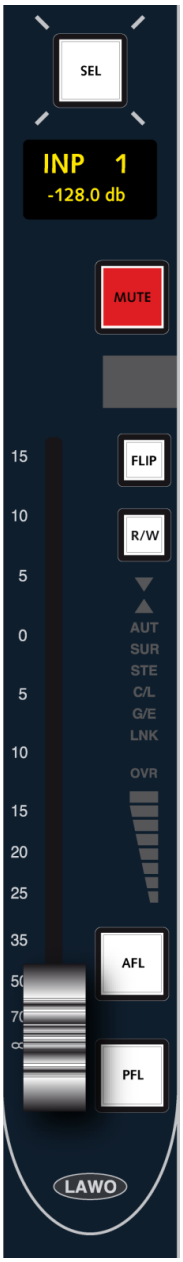
The bottom of the **Channel** display tells you which channels you are controlling from each fader strip. The two grey boxes display the system names for the DSP channels assigned to the 1st and 2nd layers. In our example, input channel 1 is assigned to layer 1 (**INP 1**) and layer 2 is inassigned.

3. Press **ALL 1ST** to switch *all* fader strips to Layer 1.
4. Press **ALL 2ND** to switch *all* fader strips to Layer 2.

When you deselect **ALL 1ST** or **ALL 2ND**, the console reverts to the previous layer status. For example, if you had switched some individual fader strips to the alternate layer, then these selections will be reinstated when you exit the global modes.

To reset the layer status more permanently, press and hold the **ALL 1ST** or **ALL 2ND** buttons for more than 3 seconds.





Note that the **MAIN BAY** button does not exist on the classic mc²66. Instead you will find **MAIN 2ND** and **STRIP 2ND** buttons which switch the main or channel faders to the second layer.

To control layer switching locally from the channel fader strips:

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

This time only the 8 fader strips within your bay are affected.

Note that as soon as you press a global LAYER access button, this will reset any local selections, unless the fader bay is isolated.

Note that on the classic mc²66, the local layer switching button (**FLIP**) can be found above **CORD** and **CONF**.

To switch an individual fader strip:

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

*The fader's label, control positions and **Channel** display update to reflect the settings for the Layer 2 channel. If there is nothing assigned to the second layer, then you will switch to a blank fader strip.*

2. Press the **FLIP** button again to revert back to Layer 1.

Note that any individual layer access selections will be overridden by the local **LAYER FLIP** button and/or global LAYER selection buttons.

Controlling the 2ND Layer

Tip

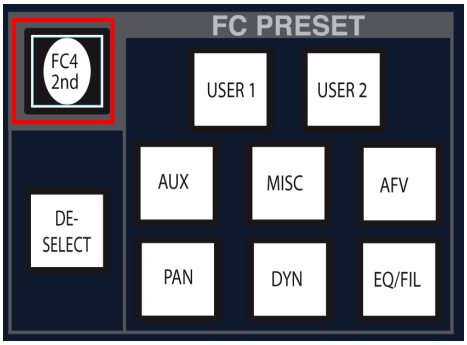
On channel fader strips, Free Control 4 (FC4) can control the 2ND layer of channels. This provides simultaneous access to level, mute and **SEL** for both layers of channels. Ideal for controlling input and monitor channels during a recording sessions, or two layers of inputs during a live production.

Note

Note that this function is not available on the classic mc²66.

The function switches all FC4 controls globally across the console.

1. Locate the FC PRESET buttons in the centre section:



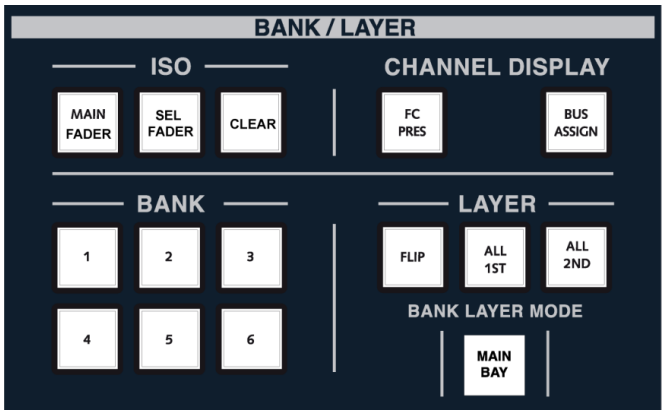
2. Press the **FC4/2nd** button to change mode:

- **FC4/2nd** off – FC4 acts as an assignable Free Control for the main DSP channel; in our example, it is assigned to Aux 4 Gain. In this mode, **SEL** and **MUTE** are inactive.
- **FC4/2nd** on – FC4 controls the level, **SEL** and **MUTE** for DSP channels assigned to the alternate layer. A vertical meter within the Fader Label display provides an indication of 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.

Isolating Fader Strips from Bank/Layer Switching

There will be times when you wish to keep a fader, for example your main presenter or sum master, on the control surface at all times. To isolate fader strips from bank switching (but not layer switching) you may use the ISO buttons as follows:



1. Select the **MAIN FADER** button to isolate *all* main fader strips from bank switching.

The main fader strips are now isolated from bank switching.

Note

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

2. Press the **SEL FADER** button to select individual fader strips to isolate.

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

3. Press the **SEL** button(s) on the fader(s) you wish to isolate. You may select channel or main fader strips.

*The **SEL** buttons change colour from green to red to indicate that they are now isolated from bank switching operations.*

4. Deselect the **SEL FADER** button and now the selected faders remain isolated from bank switching.
5. To clear the bank switching protection, select **CLEAR**.

If you wish 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 BOTH LAYERS and ALL BANK assignment options. Please refer to Page 152 for details.

Alternatively, if you are working with more than one engineer and wish to provide separate 8-fader bays for the second engineer, you may use the isolate fader bay feature.

Isolating Fader Bays

The ability to isolate fader bays can be useful for multi-user operation. For example, one engineer to mix the main broadcast sound and a second engineer to mix the international sound.

Or, if you are mixing by yourself, ISO BAY access allows you to adjust DSP parameters locally within the bay rather than from the Central Control Section, with the advantage of one knob per function for each of the DSP module parameters.

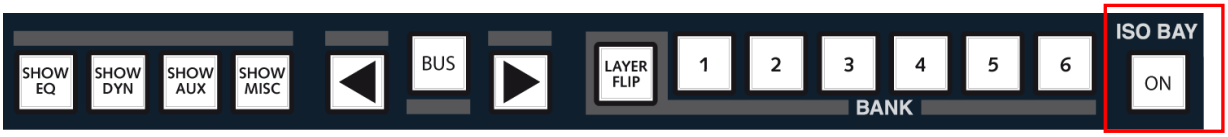
Tip

Any number of 8-fader bays may be isolated from the main console so that two users can have independent bank/layer switching, AFL/PFL monitoring and DSP parameter control. In the example shown below, the last eight faders have been isolated. However, the isolated fader bay(s) may be located in any position across the console.

Isolating a Fader Bay

To isolate a fader bay:

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



The 8 fader strips are now isolated from the centre section's BANK and LAYER access buttons.

Note that on the classic mc²66, this button (**ISO**) can be found above **CORD** and **CONF**.

Bank and Layer Switching

On the isolated bay(s), you may now switch banks and layers independently using the local BANK **1** to **6** and **LAYER FLIP** buttons as described on Page 136.

Independent AFL and PFL

AFL and PFL selections made within an isolated bay(s) may be routed onto a second AFL and PFL bus. For example, to provide the second engineer with independent headphone monitoring. This option is selected from the **System Settings** display, see Page 657 for details.

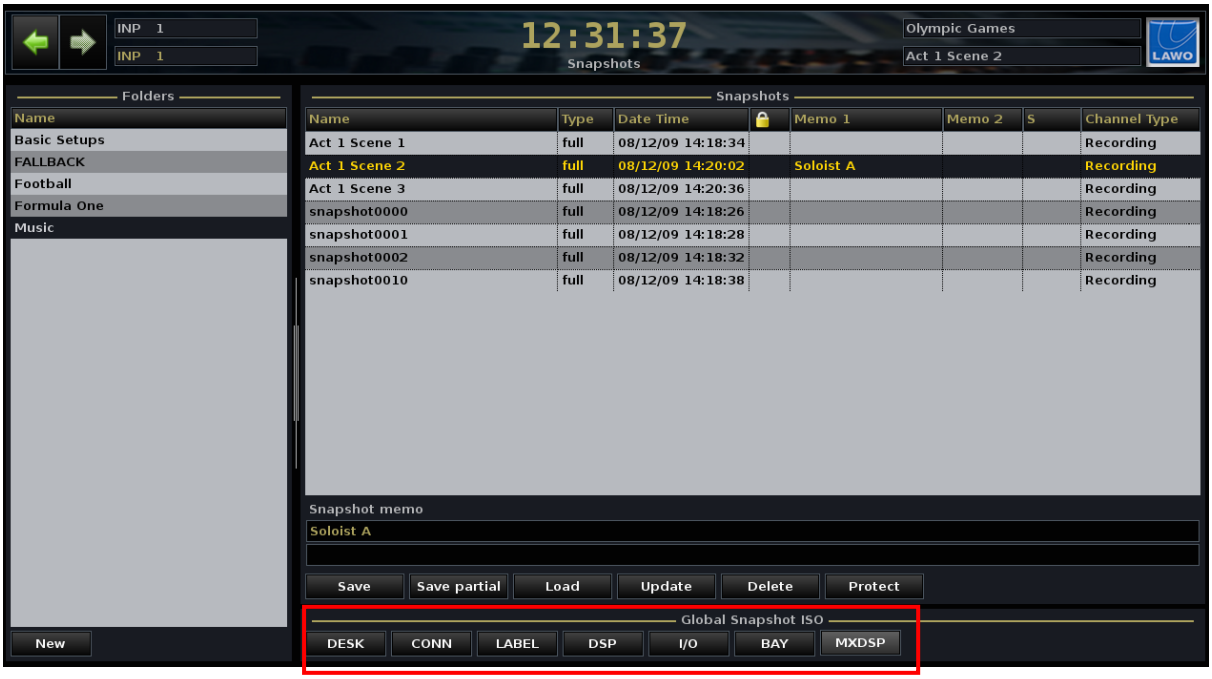
When the ISO AFL2/PFL2 option is selected, any channels in AFL or PFL within an isolated fader bay are routed to the AFL2 and PFL2 Busses. These Busses may then be routed to a separate loudspeaker or headphone feed from the **Signal List** display. Or, monitored on your control room 1 or 2 outputs if the appropriate monitor source selections are configured.

If the ISO AFL2/PFL2 option is not selected, then all AFL and PFL selections across the console feed onto the main AFL and PFL bus.

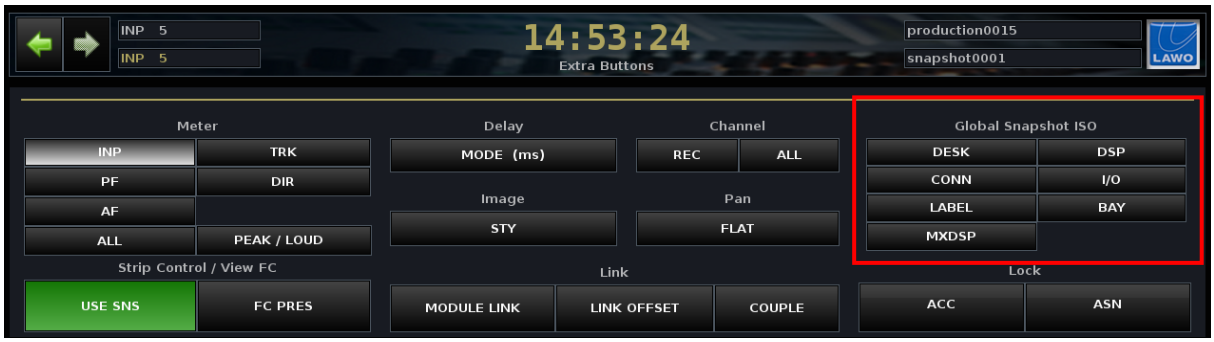
Global Snapshot ISO

To prevent snapshots recalled by the main engineer affecting the configuration of isolated fader bays, use the **BAY** Global Snapshot ISO option to protect settings on the isolated bay.

This option is available at the bottom of the **Snapshots List** display:



Or on the **Extra Buttons** display:



With the **BAY** button enabled, the fader strip configuration and bank/layer switching on isolated bays is protected from a snapshot recall. See Page 395 for more details on Global Snapshot ISO.

DSP Parameter Control (ISO Bay Access)

Within an isolated bay, the **SHOW EQ**, **SHOW DYN**, **SHOW AUX** and **SHOW MISC** buttons can be used to assign the 32 Free Controls to EQ, Dynamics, Aux or Miscellaneous parameters for the selected channel.

Note

Note that on the classic mc²66, these buttons (**DISP EQ**, **DISP DYN**, etc.) can be found above **CORD** and **CONF**.

1. First, if you haven't already done so, press the ISO BAY **ON** button to isolate the fader bay.
2. Next, select the DSP module which you wish to control – for example Aux sends by pressing **SHOW AUX**.
3. Then select the channel you wish to adjust by pressing its fader **SEL** button:

The 32 free controls within the isolated bay update to show the AUX parameters for the selected channel:

4. Turn the controls to adjust each aux send from1 to 32.
5. Press the status button beside each send to turn the aux on or off.
6. Deselect the **SHOW AUX** button to return the free controls to their previous assignments.

Fader Select


Note

Note that the behaviour of the fader **SEL** button within the isolated bay is determined by the **Select Isolate** option set from the **System Settings** display, see Page 657 for details.

If **Select Isolate** is on, then the fader **SEL** buttons within an isolated fader bay do not change the fader 'in access'. In other words, you would use this mode when working with two engineers in order to prevent the second engineer from updating the channel in access while the show is running.

If **Select Isolate** is off, then the fader **SEL** buttons within an isolated fader bay do update the fader 'in access'. In other words, only one **SEL** button may be active across the whole console. You might use this mode when working alone so that the Central Control Section always follows your **SEL** button selection regardless of whether a bay is isolated.

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

SHOW EQ

Select **SHOW EQ** to view or adjust parameters for the 4-band equaliser, high and low pass filters, and dynamics sidechain filters:

You can adjust Gain, Frequency, Q and the EQ Type for each of the 4 Equaliser bands (EQ1 to EQ4), 2-band Filters (FI1 and FI2) and 2-band Sidechain Filters (SC1 and SC2).


Tip

Press the push button beside any of the EQ1 free controls to turn EQ band 1 on/off; press the button beside any of the EQ2 controls to turn EQ band 2 on/off; and so on for the remaining bands and filters.

SHOW DYN

Select **SHOW DYN** to view or adjust gate, expander, compressor and limiter parameters:

You can adjust 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 the appropriate sections.


Tip

Press the push button beside any of the GATE free controls to turn the Gate on/off; press the button beside any of the EXP controls to turn the expander on/off; and so on for the remaining sections.

SHOW AUX

Select **SHOW AUX** to view or adjust aux send parameters:

Each rotary control adjusts the aux gain. Use the Free Control button to turn the send on/off.

Note that if an aux is stereo you can adjust the gain and pan, or gain and balance from a stereo channel, for the stereo send.

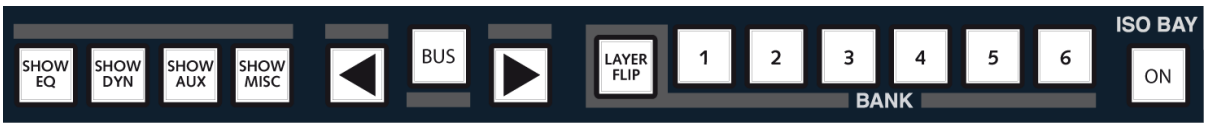
SHOW MISC

Select **SHOW MISC** to view or adjust INMIX, image, DIG AMP, panning, and AFV parameters. You can control:

- 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.

Bus Routing

Within an isolated bay, the **BUS** button can be used to view or change bus assignments:



Select **BUS**, and the Free Control displays update to show bus assignments from the selected channel.

Use the left and right arrows to page through the different sets of bus outputs.

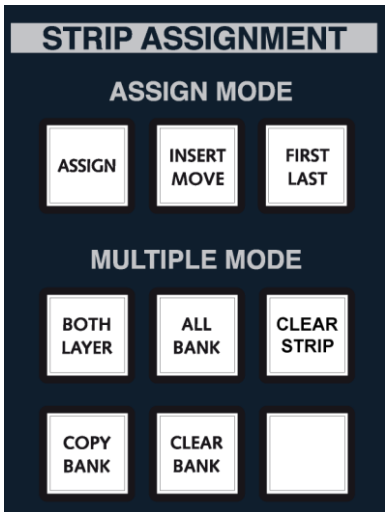
Press the Free Control push button to enable or disable a bus assignment; the rotary control has no function in this mode.

Note that this function is not available on the classic mc²66.

Note

Assigning Channels to Fader Strips

Fader strips are assigned from the STRIP ASSIGNMENT and ACCESS CHANNEL/ASSIGN control panels in the centre section of the console:

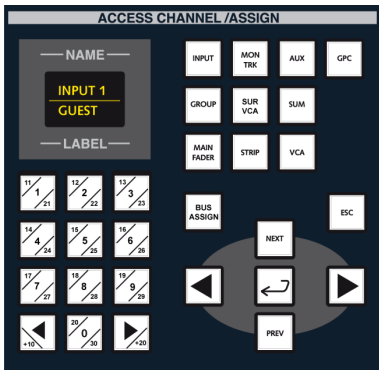


The configuration is stored and recalled with the console snapshot. Therefore, once a configuration is prepared for a particular production, the set up may be recalled in an instant prior to subsequent shows.

Remember that there are two types of fader strip on the control surface – the channel fader strips and the main fader strips. Either may be used to control inputs (input and monitor channels), outputs (auxiliary, group and sum masters) or VCA masters providing access to source channels and masters where you need them.

Fader Strip Assignment

To assign a fader strip, you first select the channel type and number you wish to assign, from the ACCESS CHANNEL/ASSIGN control panel, followed by the fader strip destination. For a reminder on how to put different channel types and numbers into access, please see Page 37.

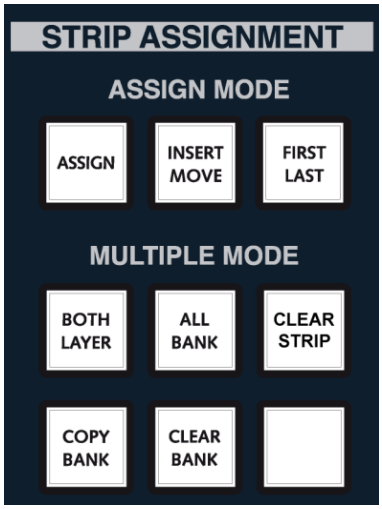


For example, to assign Input channel 1 to channel fader strip 1:

1. Select **INP 1** from the ACCESS CHANNEL/ASSIGN control panel, either by entering **INPUT** and the number **1**, or using the **NEXT** and **PREV** buttons.

This puts INP 1 into access as indicated on the NAME and LABEL displays.

2. Now press the global **ASSIGN** button, located on the STRIP ASSIGNMENT: ASSIGN MODES panel.



*Across the console, the fader **SEL** buttons flash, in green, to indicate possible destinations for your chosen channel:*

3. Press the fader **SEL** button on channel fader strip 1 to complete the assignment.

*The fader **SEL** button stops flashing and changes colour, from green to red, to indicate the assignment. In addition, the fader strip controls update to the show the settings for input channel 1.*

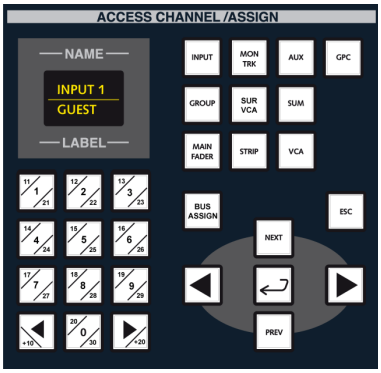
4. Deselect the **ASSIGN** button or press **ESC**, on the ACCESS CHANNEL/ASSIGN control panel, to exit the fader strip assignment mode.

Tip

You can assign the same channel to multiple fader strips on the same bank or layer, or on alternate banks or layers, by keeping the **ASSIGN** button selected, moving to the desired bank or layer and pressing the fader **SEL** buttons on the destination fader strips.

You can use the **FC4/2nd** button (on the FC PRESET panel) to switch all FC4 controls to the second layer. Then use the **SEL** buttons to make assignments to the alternate layer:

Assigning Consecutive Sources to Multiple Strips

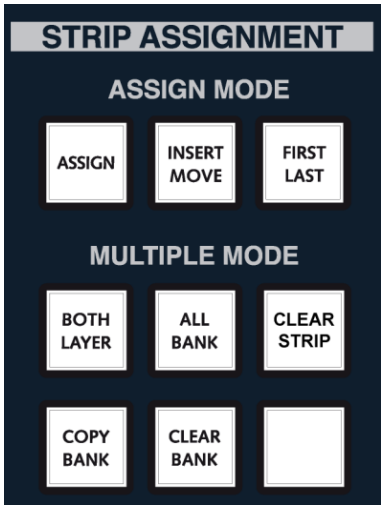


To assign multiple fader strips in one operation, for example, input channels 1-24 to fader strips 1-24:

1. Select **INP 1** from the ACCESS CHANNEL/ASSIGN control panel, either by entering **INPUT** and the number **1** or using the **NEXT** and **PREV** buttons.

This puts INP 1 into access.

2. Select the **FIRST LAST** button, located on the STRIP ASSIGNMENT: ASSIGN MODES panel.



*This automatically selects the global **ASSIGN** button, and across the console the fader **SEL** buttons flash, in green, to indicate possible destinations for your chosen channel.*

3. Press the fader **SEL** button on the first fader in the range you wish to assign (e.g. on fader strip 1) followed by the fader **SEL** button on the last fader in the range (e.g. fader strip 24).

The console incrementally assigns input channels 1 to 24 from the first selection (channel fader strip 1) to the last selection (channel fader strip 24).

4. Deselect the global **ASSIGN** button or press **ESC** to exit the assign mode.

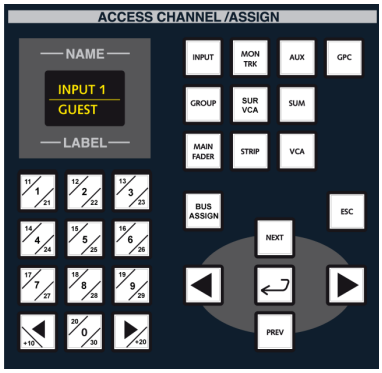
Note

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

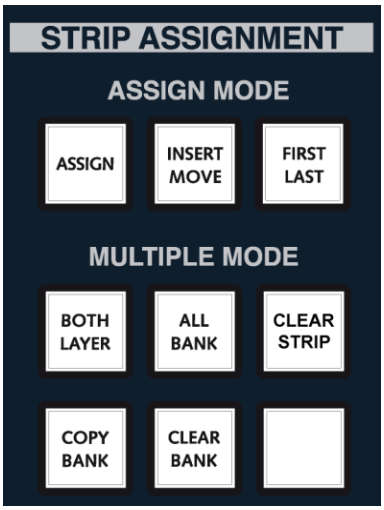
Note that **FIRST LAST** operations treat channel and main fader strips independently, allowing you to assign consecutive channel fader strips without affecting main fader strip assignments or vice versa.

Inserting Channels within a Configuration

Normally any existing fader strip assignments are replaced by the new selection. However, there are times when you may wish to keep your current assignments and insert a channel between two existing faders. For example, to insert an extra guest channel, let's say on channel fader strip 5, during a talk show:



1. Select the channel you wish to insert using the ACCESS CHANNEL/ASSIGN control panel as before.
2. Select the **INSERT MOVE** button, located on the STRIP ASSIGNMENT: ASSIGN MODES panel.



*This automatically selects the global **ASSIGN** button, and across the console the fader **SEL** buttons flash, in green, to indicate possible destinations for your chosen channel.*

3. Press the fader **SEL** button on the fader strip where you wish to insert the new channel.

The selected channel and all channels to its right move one step to the right across the control surface.

Note

Note that this moves the last channel on the current layer off the end of the console. The settings for this fader are stored as 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 brought back onto the control surface if a fader strip is deleted with **INSERT MOVE**.

To delete a channel from the current configuration:

1. Select the channel you wish to delete by pressing its fader strip **SEL** button.

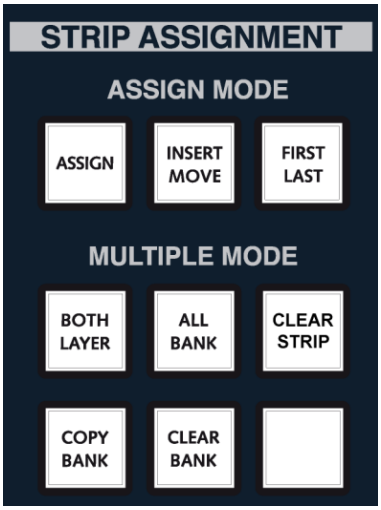
*This puts the channel in access; the **SEL** button should be red.*

2. Select the **INSERT MOVE** button, located on the STRIP ASSIGNMENT: ASSIGN MODES panel.

*This automatically selects the global **ASSIGN** button, and across the console the fader **SEL** buttons flash.*

3. Press the channel's fader **SEL** button again to confirm the delete.

The channels above it ripple down the control surface to fill in the gap.

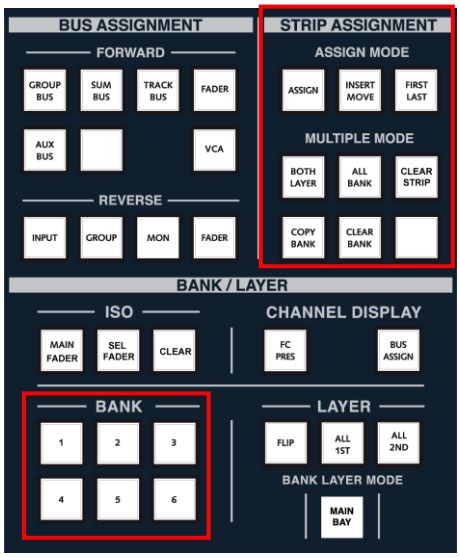


Note

Note that channel and main fader strips are treated independently for **INSERT MOVE** operations so, for example, channels inserted or deleted from channel fader strips do not affect main fader strip assignments or vice versa.

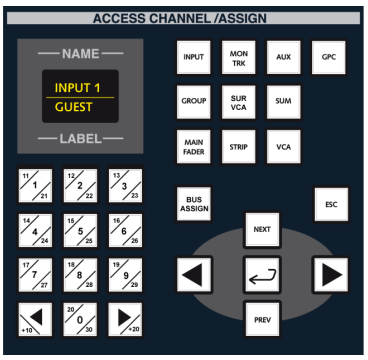
Assigning Channels across All Banks/Both Layers

You can assign channels to any of the console's banks and layers by selecting the bank or layer before you start the assignment process. However, when dealing with multiple bank or layer assignments, the BANK and STRIP ASSIGNMENT buttons can provide a number of short cuts:

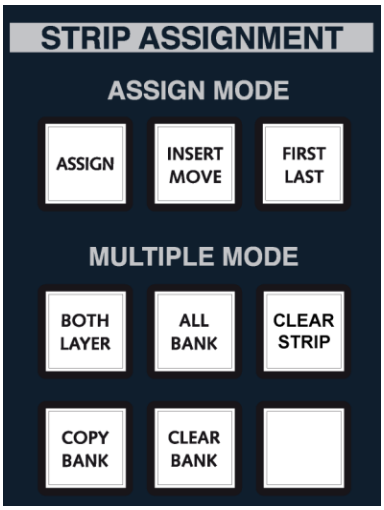


Let's take an example where you wish to assign input channel 1 to fader strip 1 across all six control surface banks.

1. Select **INP 1** from the ACCESS CHANNEL/ASSIGN control panel, either by entering **INPUT** and the number **1** or using the **NEXT** and **PREV** buttons.

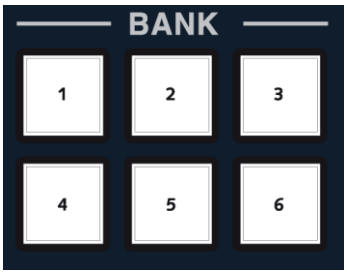


2. Now press **ALL BANK** on the MULTIPLE MODE panel:



*This automatically selects the global **ASSIGN** button, such that the fader **SEL** buttons across the surface start to flash in green.*

In addition, the six BANK select buttons **1** – **6** are illuminated:

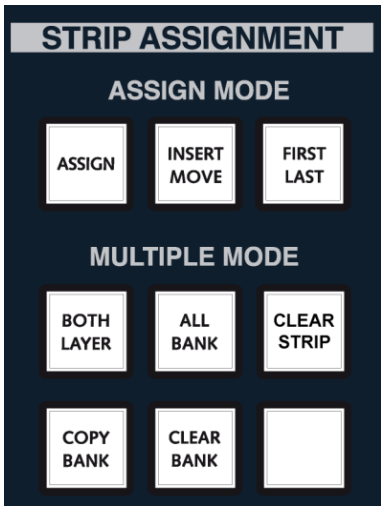


At this stage, you may deselect any bank buttons which you don't want to use as part of the assignment. But, note that you cannot deselect the bank you are working on. For the purposes of our example, keep all six BANK buttons selected.

3. Press the fader **SEL** button on channel fader strip 1.

The input is assigned to channel fader strip 1 across all six banks.

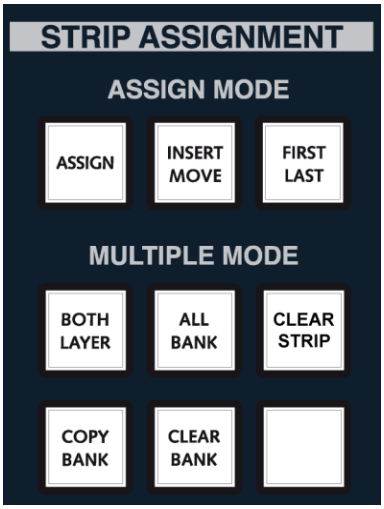
In addition to bank assignments, the **BOTH LAYERS** button may be used to assign the channel in access to both the 1st and 2nd layers of the selected bank or banks. Repeat steps 1 to 4 but select the **BOTH LAYERS** button in addition to or instead of **ALL BANK**:



Clearing Individual Fader Strip Assignments

The **CLEAR** button is used to clear fader strip assignments:

1. Press the **CLEAR** button on the MULITPLE MODE panel.



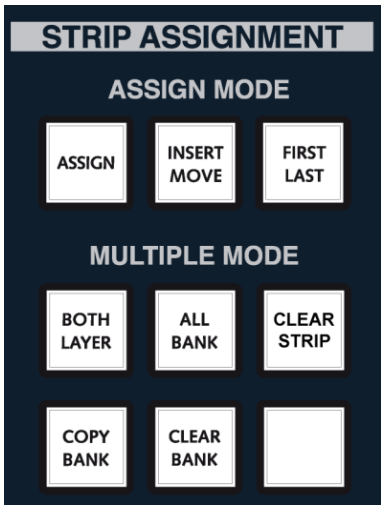
*This automatically selects the global **ASSIGN** button, such that the fader **SEL** buttons on the current surface start to flash.*

2. Press the fader **SEL** button(s) on any fader strips you wish to clear.
3. When you are finished, deselect the **CLEAR** button to prevent accidental changes to your configuration!

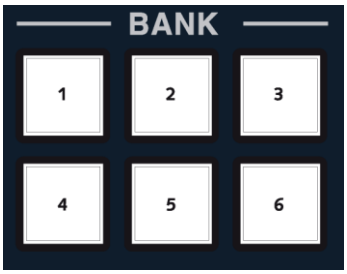
Clearing a Bank of Fader Strips

The **CLEAR BANK** button may be used to clear a complete bank of fader strip assignments. Note that this operation applies globally to both layers of the selected bank.

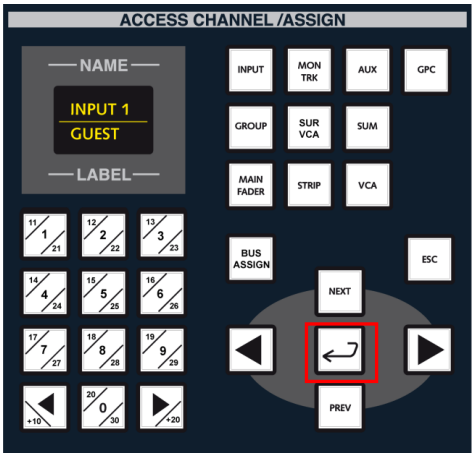
1. Press the **CLEAR BANK** button on the MULITPLE MODE panel:



2. Select the bank or banks you wish to clear using the **1** to **6** BANK access buttons:



3. Press the Enter button, located on the ACCESS CHANNEL/ASSIGN control panel, to complete the operation.



Copying Banks of Fader Strip Assignments

Tip

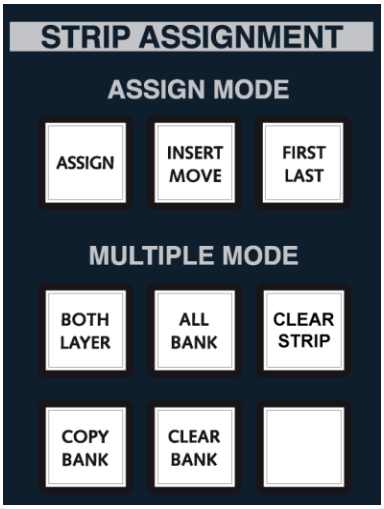
When making fader strip assignments, you can copy the current control surface configuration to a new bank or banks.

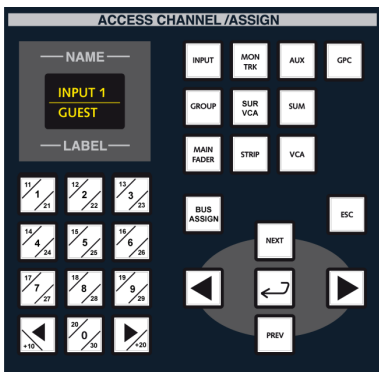
This can be very useful when you wish to keep some channels common across banks. For example, you may wish to keep fader strips 25 to 32 allocated to your main presenter and guest channels while other fader strips (1-24) bank switch between different sets of music channels during an entertainment show.

1. Bring the bank you wish to copy to the active surface using the **1** to **6** BANK access buttons:

The control surface updates to show the settings for the selected bank.

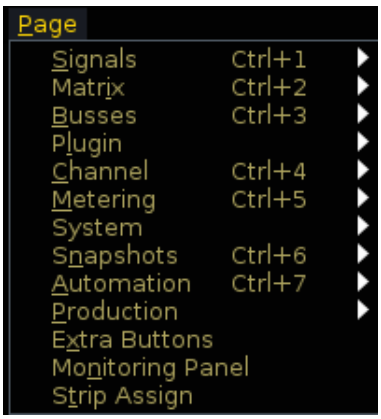
2. Press the **COPY BANK** button on the MULITPLE MODE panel:





3. Now select the destination by pressing one of the **1** to **6** BANK access buttons.
4. Press the Enter button, located on the ACCESS CHANNEL/ASSIGN control panel, to complete the operation.

Locking the ACCESS and ASSIGN Control Panels

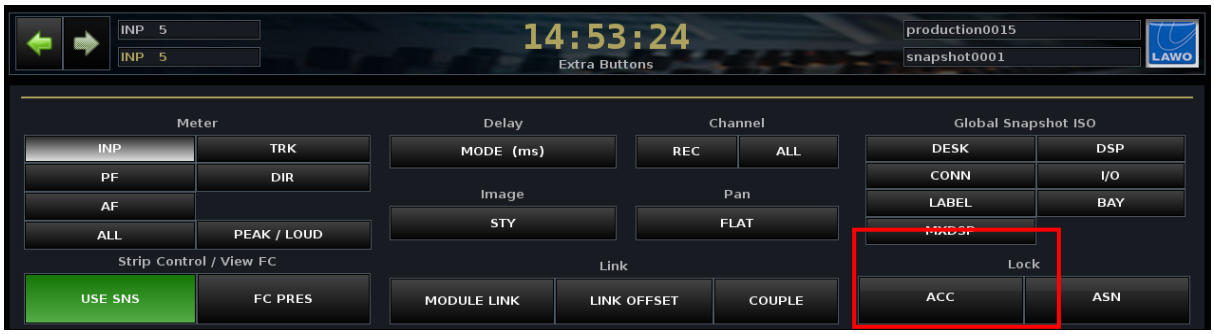


In order to protect the channel in access and other assignments during a live production, you may use the Lock functions located on the **Extra Buttons** display.

You can access the **Extra Buttons** display from:

- The **Page** menu – "mc²66 Pages -> Extra Buttons"
- The **Xtra-Buttons** GUI button on the **Main** display.
- Or from a programmable USER BUTTON if configured.

1. Select the Lock **ACC** touch-screen button to lock the current channel in access.



For example, you may wish to lock INP 24 into access so that it remains accessible from the Central Control Section at all times during the production.

When Lock **ACC** is selected, you cannot use the ACCESS CHANNEL/ASSIGN control panel or press fader **SEL** buttons to update the channel in access.

2. Select the Lock **ASN** touch-screen button to disable the STRIP ASSIGNMENT and BUS ASSIGNMENT buttons:

This prevents you from accidentally changing your fader strip and bus assignments from the front panel during a production.

Note that you can still assign a channel to an aux send, or make bus assignments from the **Bus Assign** display with Lock **ASN** active.

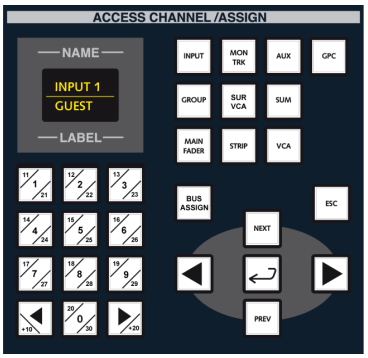
Note

General Purpose Channels (GPCs)

In addition to controlling onboard DSP, fader strips may be assigned to GPCs (General Purpose Channels), allowing control of parameters within external devices via MIDI.

Typical applications include using faders or rotary controls to adjust and store camera microphone levels via MIDI to VCA converters; to adjust fader levels and other parameters within an external DAW; to adjust reverb settings within an external effects unit.

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. The assignment of channel objects to MIDI program changes and controller values is configured within the MIDI setup of the console. This is set within the factory configuration, so please refer to your console specification for details.



Assigning GPCs to Fader Strips

GPCs may be assigned to any channel or main fader strip on the control surface 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, you may use **SNAP ISO** to isolate a GPC from snapshot recall, or protect all GPCs using the **DSP** Filter option. Please refer to Page 395 for more details.

DSP Parameter to GPC Mapping

In addition to controlling external devices, GPCs may be used to offer a different way of controling and automating DSP 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, see Page 689.

Multitrack Recording and Monitor Channels

Several of the Recording channel DSP configurations support both input and monitor channels, providing the ability to easily configure the **mc²66** for multitrack recording applications. A number of special features apply to monitor return channels.

Note that monitor channels and track busses are not supported by Broadcast channel DSP configurations.

In-Line Console Configuration

Using a traditional in-line approach, the console may be configured with input channels providing control of sends to the recorder and monitor return channels providing switched monitoring of the sends and returns to/from the recorder. Let's take an example where we have a 24 track recorder.

1. First assign your input and monitor channels onto the control surface.


Tip

By assigning your input channels to layer 1 and monitor channels to layer 2 of the same fader bank, you will have simultaneous access to your send and return channels by switching FC4 to 2nd layer control. Please see Page 147 for details on assigning channels to fader strips.

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.

The next step is to route your input channels to the track Busses feeding the recorder.

Note that a fixed relationship exists between each track bus and monitor channel, in that track bus 1 always feeds monitor send 1, track bus feeds send 2, etc. Therefore, to route our input channels to our 24 track recorder, we need to route to track Busses 1-24 (MON 1-24).

4. Use either Forward or Reverse Bus Assign to route your input channels onto MON 1-24. Please see Page 167 for details.

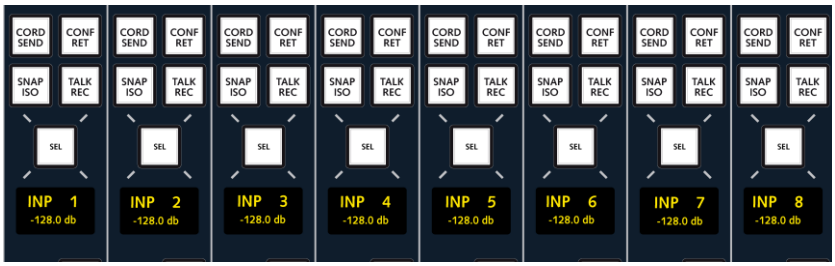

Tip

Remember that you can change the track bus pickup point from the **Channel Config** display, see Page 108.

You can make a track bus mono, stereo or surround by configuring the corresponding monitor channels to be mono, stereo or surround, see Page 269.

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

5. Now flip your monitor channels 1-24 onto the LAYER 1 faders, and use the **SEND** and **RET** buttons to switch the monitor channel input between:

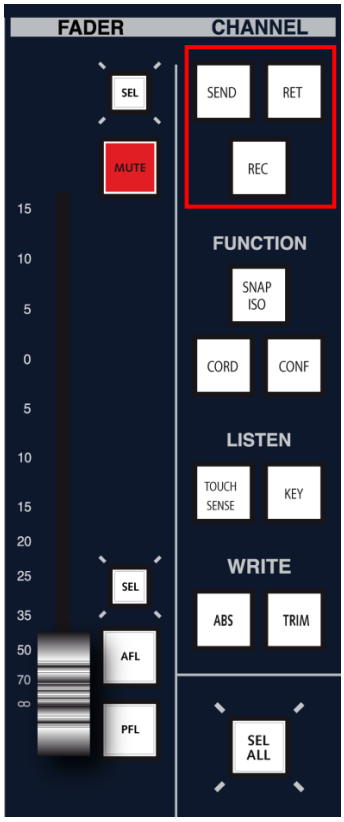


- **SEND** – the recorder send.
- **RET** – the recorder return.

Tip

If you want to switch multiple channels, then use the **ALL** touch-screen button as described on the next page.

6. Use the **REC** button to record arm the track (if machine control is configured).



Note that the **SEND**, **RET** and **REC** buttons are user buttons which can be re-configured from the **Custom Functions** display. If they are not programmed onto the channel user buttons, then they can be accessed from the Central Control Section's CHANNEL controls.

7. You can switch the metering on your monitor channels using the **METER** pickup selection buttons.
8. Use the individual or global layer switching buttons to flip between your input channels (to control the send levels to the recorder) and monitor channels (the monitor mix).

Note that 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 may override this feature from the **System Settings** display, see Page 652 for details.

Switching the Input for Multiple Monitor Channels

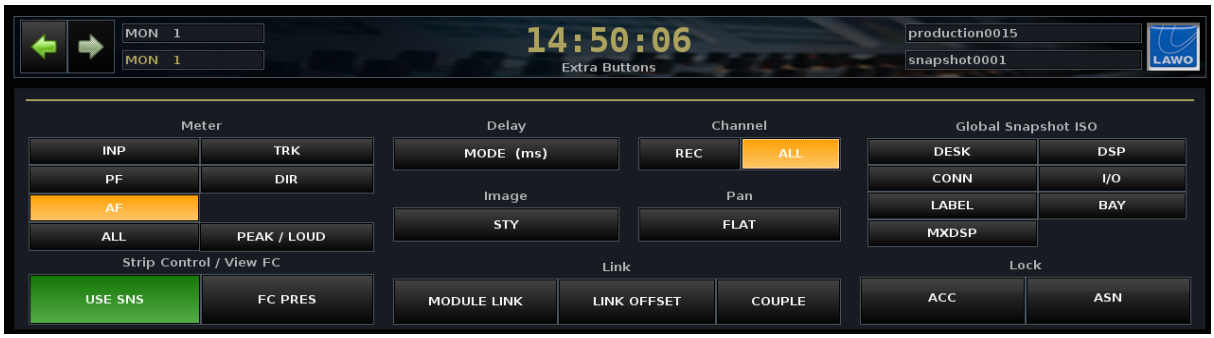
The **ALL** button on the **Extra Buttons** display can be used to define a cluster of channels so that inputs are switched across multiple channels. For example, when recording, you may use this feature to switch all your monitor channels from send to return.

This function is only available for monitor channels.

You can access the **Extra Buttons** display from:

- The **Page** menu – "mc²66 Pages -> Extra Buttons"
- The **Xtra-Buttons** GUI button on the **Main** display.
- Or from a programmable USER BUTTON if configured.

1. First assign one of the monitor channels you wish to switch to the Central Control Section by pressing its fader **SEL** button.
2. Select the **ALL** button, located on the **Channel** section:

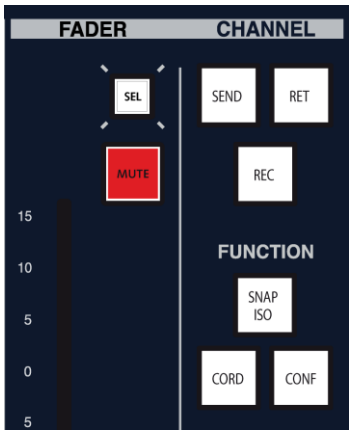


*The **ALL** button flashes and the fader **SEL** buttons across the console flash, in green:*

3. Add channels to the cluster by pressing their fader **SEL** buttons.

*The fader **SEL** buttons turn red:*

4. Now from the Central Control Section press CHANNEL **SEND**:

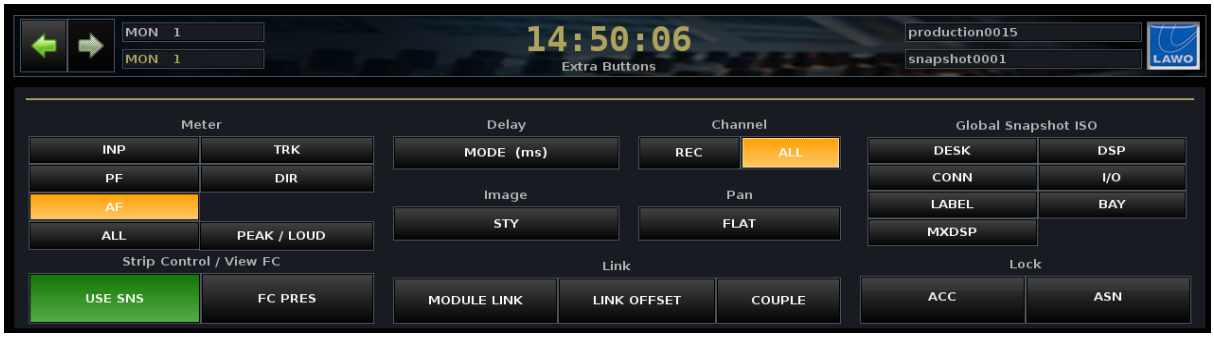


All channels within the cluster are switched to the send; channels not in the cluster are unaffected.

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

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

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



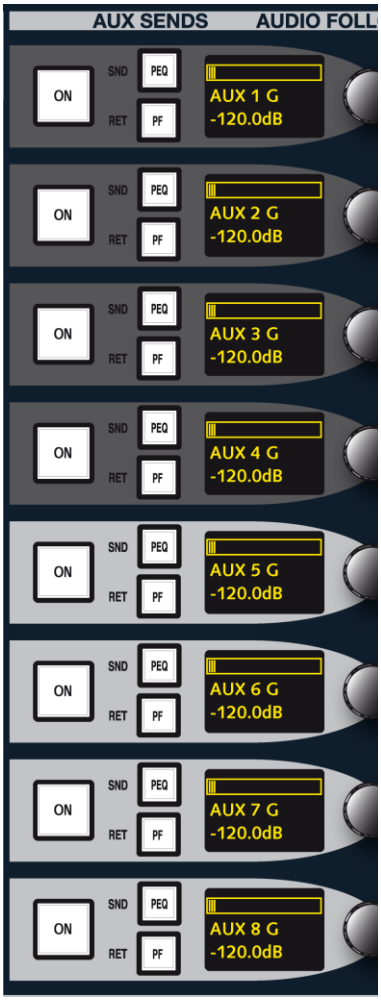
Other Monitor Channel Applications

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 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.

Alternatively, you can use the track bus (from the monitor channel) as a mix minus feed, see Page 240.

Monitor Channels and Auxiliary Cue Feeds

A couple of special rules apply to the signal flow of a monitor channel, and auxiliary sends 17 to 32 which are fed from them.



Firstly, the direct output on a monitor channel is used to create the track send to the multitrack recorder. By default, this is assigned to the corresponding track bus, for example, track bus 1 feeds monitor channel send 1, but it may be re-assigned to any input source from the **Signal List** display - for example, to record an input directly, or to record a pre-fader send from the input channel.

Secondly, auxiliary sends 17 to 32 have special properties when assigned from monitor channels. When any auxiliary from 17 to 32 is assigned from a monitor channel, its source can be switched between the send and return from the auxiliary control panel:

- Press **PEQ (SND)** to switch the monitor send signal to the auxiliary send.
- Press **PF (RET)** to switch the monitor return signal to the auxiliary send.

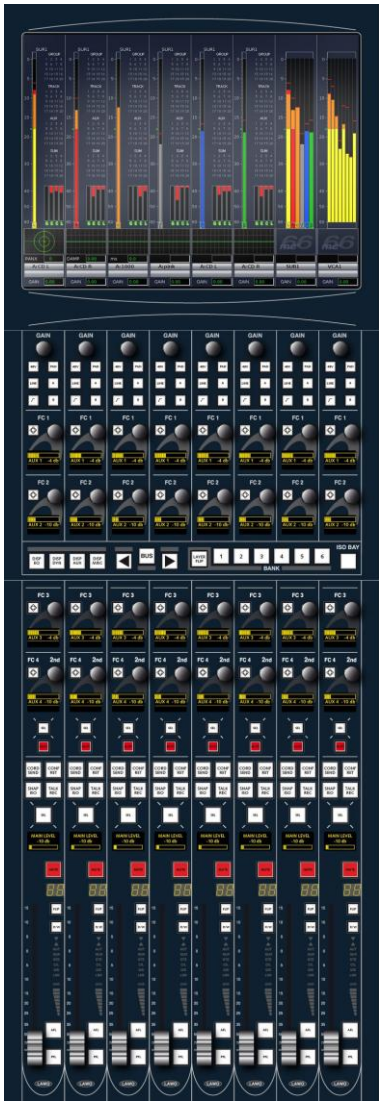
Note that this source selection occurs automatically on auxiliary sends 17 to 32 *only*. Therefore, use these sends for cue feeds when overdubbing. Also note that the source selection *only* affects auxiliaries 17-32 when assigned from monitor channels. In non recording applications, these sends behave in a conventional manner.

If you wish to use monitor channels for non-multitrack applications, then you can disable the automatic source selection for aux sends 17 to 32 from the **System Settings** display. See the **Cue Aux Send/Return** option on Page 652 for details.

Chapter 4: Channel Control

Introduction

In this chapter you will learn about the two main areas where you can adjust channel controls - the console's channel strips and the Central Control Section.

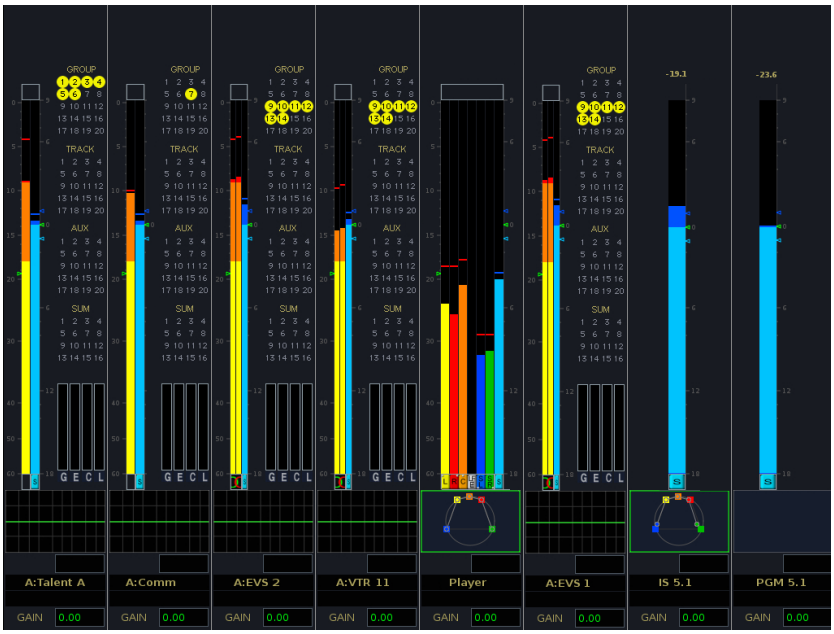


Note that the console's fader strips do not become active until they are assigned to channels. You can assign input channels, monitor channels, groups, sums, auxiliary masters, VCAs, etc. to any position on the control surface. Depending on the last production you loaded, you may be sat in front of a pre-configured control surface or a series of blank fader strips. We will assume that your console has pre-configured fader strips. If this is not the case, please turn to Page 147 for details on assigning channels to fader strips.

We will also assume that you are controlling a full processing channel (not a Tiny channel). Remember that the **mc²66** supports two channel types – Recording and Broadcast. Broadcast channels do not support all the DSP modules found within a Recording channel, and there are also some operational differences. You can find more details on the differences in signal flow on Page 100. This chapter deals with the operation of both channel types.

The Channel Display

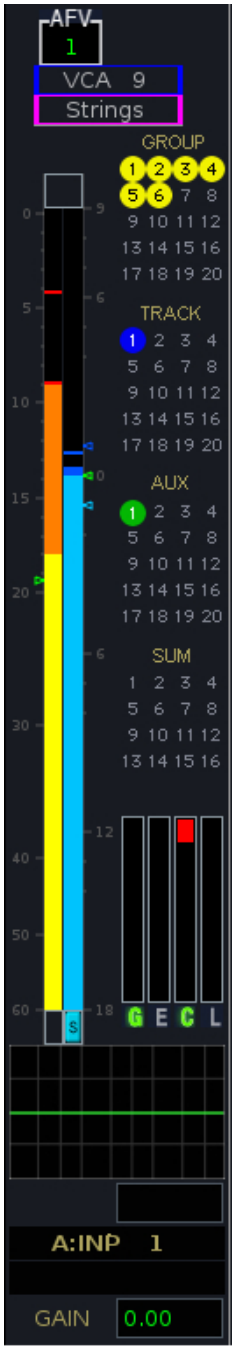
For every channel strip, the **Channel** display provides metering and feedback on inputs, outputs and local parameter values.



The primary function is to provide metering for each channel. You may choose to display peak metering, loudness metering or both, see Page 315.

To help quickly identify the channel you are working on, you can enable the show fader/encoder sense mode from the **System Settings** display, see Page 655. When enabled, each time you touch a fader or free control, the corresponding channel within the **Channel** display is highlighted with a coloured outline. The colour of the outline matches the colour coding for the channel type, selected from the **Channel Config** display, see Page 118.

Tip



If a channel is assigned an Audio Follow Video (AFV) event, a VCA or Surround master, or is part of a link group, then this information is provided at the top of the display:

- **AFV** assignments – the number of the Audio Follow Video (AFV) event.
- **VCA** or **Surround** master assignments – the number and colour coding of the master (e.g. VCA 9).
- **Link group** assignments – the name and colour coding of any link groups (e.g. Strings).

The remainder of the display shows:

- **Bus assignments** onto the:
  - Group Busses
  - Track Busses (Recording channels only)
  - Aux Busses - with colour coding to indicate pre-fader, pre-EQ (Recording channels only) or post-fader assignments.
  - Sum Busses

The number of displayed busses can be adjusted from the **System Settings** display, see Page 658. On surround channels, you can hide bus assignments to provide more space for multi-channel metering, see Page 367.

- **Channel Metering** – follows the peak and loudness metering options set for the production (see Page 313).
- **Dynamics gain reduction metering** for the:
  - **G** – Gate
  - **E** – Expander
  - **C** – Compressor
  - **L** – Limiter

If the dynamics section is in circuit, then the **G**, **E**, **C** or **L** letters change from white to green.

- **INFO window** – this area provides graphical feedback on parameter values (e.g. EQ). If the section is turned on, then the outline is green. The window responds to touch-sense or the FC Preset selection, see Page 367.
- **Name or Label** - the two boxes display the name or label for the DSP channels assigned to the 1st and 2nd layer fader strips. In our example, input channel 1 is assigned to layer 1 (**INP 1**) and there is nothing assigned to layer 2. Both inputs are switched to their **A** input. The choice of whether you see the channel name, channel label or inherited source label is made from the LABEL buttons as described on Page 573.
- **Input GAIN** – this value displays the input gain for the channel. Note that this could be mic, line or digital gain depending on the source. See Page 247.

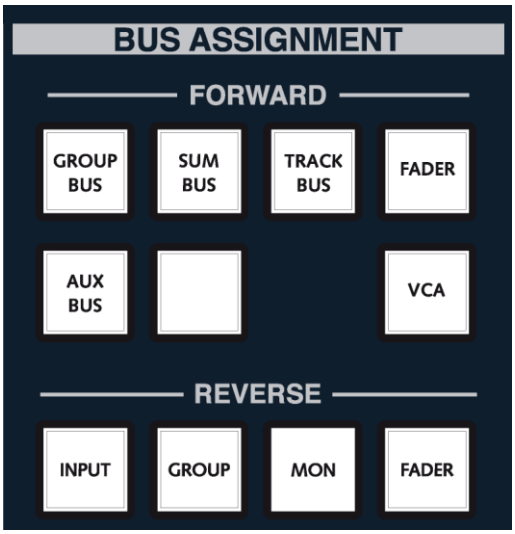
Source Routing

The console's integrated digital routing matrix allows you to route any source to any channel or to multiple channels. For more details on using the console's integrated router, please refer to Page 563.

Bus Routing

The **mc²66** offers a number of methods for assigning channels onto the console's mix Busses:

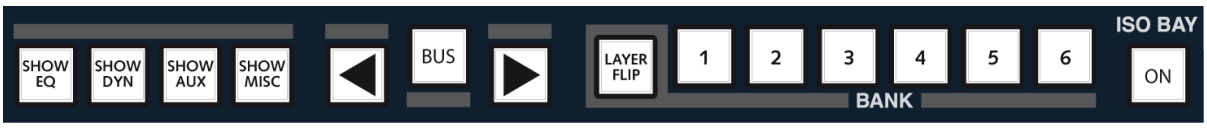
- The BUS ASSIGNMENT buttons in the centre section offer FORWARD or REVERSE bus assign:



FORWARD Bus Assign – this is the conventional method for routing a channel onto a bus, and allows you to route a single channel onto single or multiple bus outputs. For example, to assign input channel 1 to Group 1 and Sums 1 and 2.

REVERSE Bus Assign – this method allows you to interrogate and modify the assignments onto an individual bus, and is often quicker than conventional routing when, for example, you wish to route a range of channels to a single bus output.

- ISO BAY - if you are away from the centre section or working with more than one engineer, you can make bus assignments locally within the isolated bay using the BUS button:



For details on ISO Bay access operations, see Page 144.

- The **Bus Assign** display works in a similar manner to FORWARD bus assign, and provides touch-screen control of all assignments from the channel in access:

- The **Busses Reverse** display works in a similar manner to REVERSE bus assign, and provides touch-screen control of assignments to the channel in access. For example to view all the channels assigned to a group, sum, aux or track bus:

Any of these methods may be used to make or interrogate bus assignments.

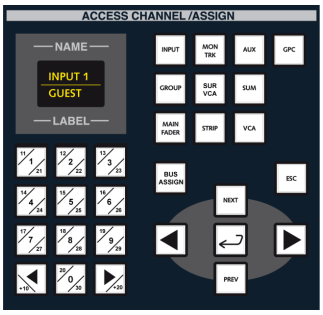
Note

Note that you may route a group onto a sum bus in the same way you assign an input channel.

Outputs may be configured as mono, stereo or multi-channel. For example, if a channel is assigned onto six sum Busses configured for 5.1, then the corresponding pan law is applied. For more details on routing to surround outputs, see Page 273.

You can use any of the bus assignment methods to route a channel to an auxiliary send. The assignment will not affect the current aux send level or pre/post fader selection. So, if the assignment does not appear to work, check that your aux send level is open, and that the correct pre/post fader selection is made from the AUX SENDS/AUDIO FOLLOW VIDEO panel in the Central Control Section.

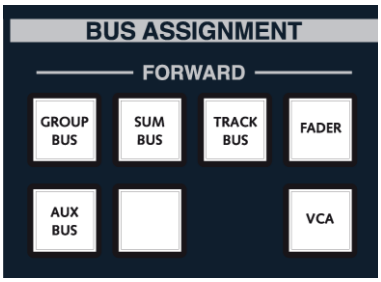
Forward Bus Assign



This method of routing is ideal for assigning a single channel onto multiple bus outputs. For example, let's route an input channel (e.g. INP 1) onto group 1 (GRP 1):

1. First put input channel 1 into access either by pressing the **SEL** button on the fader strip controlling INP1, or using the ACCESS CHANNEL/ASSIGN control panel - press the **INPUT** channel type button, the numbers **1**, followed by the Enter button.

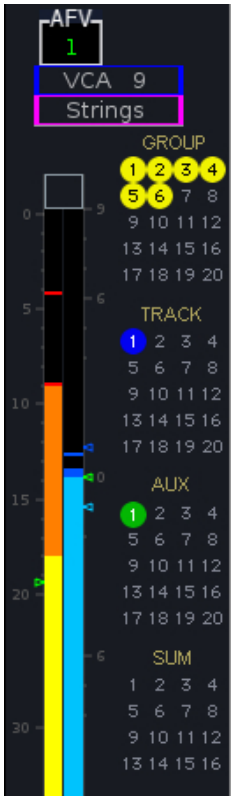
This puts the input channel into access as indicated on the ACCESS CHANNEL/ASSIGN control panel's displays.



2. Now press the **GROUP BUS** button, located on the BUS ASSIGNMENT: FORWARD panel.

*The **GROUP BUS** button flashes, and across the console the fader **SEL** buttons on fader strips which are controlling group channels (GRP 1-48) flash, in green, to indicate possible destinations for the chosen input channel:*

3. Press the fader **SEL** button on the fader strip controlling GRP 1 to make the assignment. If GRP 1 is not assigned to the active control surface, see page 173.



*The fader **SEL** button stops flashing and changes colour from green to red to indicate that the channel is assigned to the selected destination. Note also that the **Channel** display above the fader strip updates to show the assignment onto group 1.*

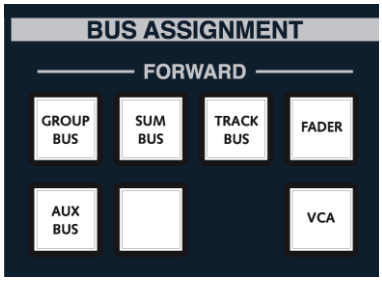
4. To undo the assignment, press the red fader **SEL** button on the GRP 1 fader strip.

The assignment is undone and the button returns to its flashing green status.

5. To route the channel onto a different group bus, select one of the other green fader **SEL** buttons.

Note that if the bus is stereo or surround, the output assignments are made in one operation. See Page 273 for details

6. When you are finished, deselect **GROUP BUS** or press **ESC**, on the ACCESS CHANNEL/ASSIGN control panel, to exit bus assign mode.



To route onto a different type of output bus, repeat the operation but make a different selection from the BUS ASSIGNMENT: FORWARD buttons:

- **GROUP BUS** - selects Groups (up to 96).
- **SUM BUS** - selects main Sums (up to 96).
- **TRACK BUS** - assigns channels onto Track Busses (up to 96, Recording channels only).
- **FADER** selects *all* Busses regardless of their type.
- **AUX BUS** - selects Auxiliary sends (up to 32).
- **VCA** selects VCA masters (up to 128). Note that this does not assign the channel to a bus, but to a VCA control master.

You should use the **GROUP BUS**, **SUM BUS**, **TRACK BUS**, **AUX BUS** or **VCA** buttons when you wish to limit the choice of destinations – for example, to prevent accidental assignments onto the wrong bus type.


Tip

For fast and flexible bus assignments, use the **FADER** button to make assignments to any destination.

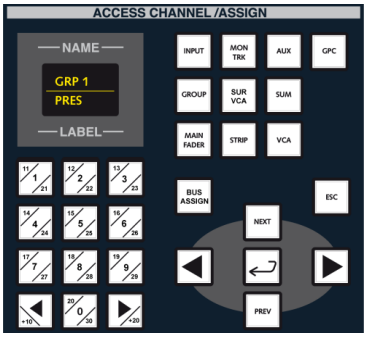

Note

Note that a Track Bus is always tied to its corresponding Monitor return channel. Therefore, to route to a Track Bus, press the fader **SEL** button(s) on the corresponding Monitor return channel. Track busses and monitor channels are only supported by Recording channel DSP configurations.

Note that routing a channel onto an aux bus is equivalent to turning on the auxiliary send from the channel controls. The send gain and other parameters will remain at their previous values.

Reverse Bus Assign

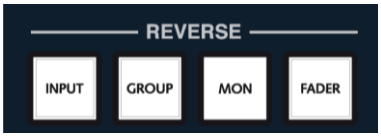
This time rather than selecting the channel you wish to assign followed by the output destination, we reverse the thought process and select the destination output followed by the source channels.



For example, let's route eight input channels (e.g. INP 1-8) onto group 1 (GRP 1):

1. First select the destination either by pressing the **SEL** button on the fader strip controlling GRP 1 or using the ACCESS CHANNEL/ASSIGN control panel – press the **GRP** channel type button, the number **1**, followed by the Enter button.

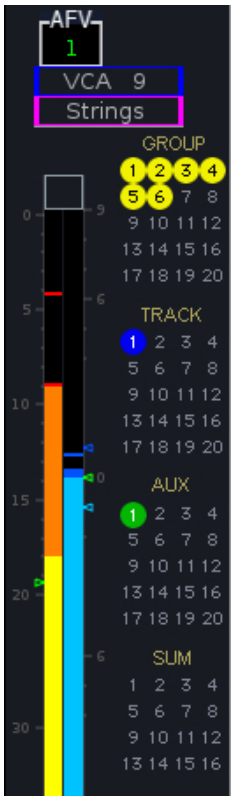
This puts group 1 into access.



2. Now press the **INPUT** button, located on the BUS ASSIGNMENT: REVERSE panel.

*The **INPUT** button flashes, and across the console the fader **SEL** buttons on fader strips which are controlling input channels (INP 1-192) flash, in green, to indicate possible sources for the chosen destination:*

If INP1 to INP8 are not assigned to the active control surface, then see page 173.



3. Press the fader **SEL** buttons on the fader strips controlling INP 1-8 to complete the assignment.

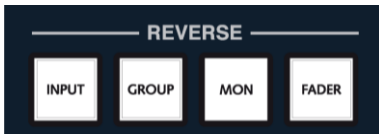
*The fader **SEL** buttons stop flashing and change colour from green to red to indicate that the channels are assigned to the selected destination. Note also that the **Channel** display updates to show the bus assignments onto group 1.*

4. To undo the assignment, press the red fader **SEL** buttons on the fader strips controlling INP 1-8.

The assignments are undone and the buttons return to their flashing green status.

5. When you are finished, deselect the **INPUT** button or press **ESC**, on the ACCESS CHANNEL/ASSIGN control panel, to exit bus assign mode.

Note that if the bus is stereo or surround, the assignment is made in one operation. See Page 273 for details.



To route sources other than input channels onto the group, repeat the operation but make a different source selection from the REVERSE BUS ASSIGNMENT buttons:

- **INPUT** - selects fader strips assigned to input channels.
- **GROUP** - selects fader strips assigned to groups.
- **MON** - selects fader strips assigned to monitor return channels.
- **FADER** - selects *all* fader strips regardless of their channel type.


Tip

Use the **INPUT**, **GROUP** and **MON** buttons when you wish to prevent accidental assignments from different channel types.

Use the **FADER** button when you wish to assign any type of channel onto the same bus; to assign input channels and groups onto a sum bus for example.

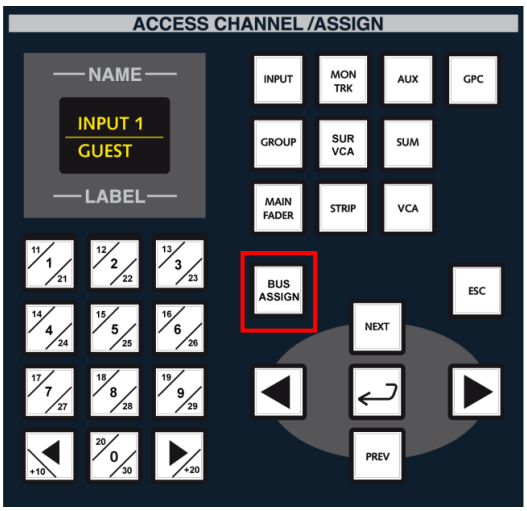
Bus Assign from ACCESS CHANNEL/ASSIGN

If the busses you wish to access are not assigned to the control surface, then it may be quicker to make routes from the ACCESS CHANNEL/ASSIGN control panel. This method routes onto Track, Group, Sum or Aux Busses up to 30.

1. First put the channel you wish to assign into access – for example, select input channel 49 by pressing the **INP** channel type button and the numbers **4** and **9** followed by the Enter button.

This puts input channel 49 into access, as indicated by the name and label in the NAME and LABEL displays.

2. Now press the **BUS ASSIGN** button located on the ACCESS CHANNEL/ASSIGN panel:



This changes the functionality of the panel to bus assignment.

3. Select the bus you want to route to by choosing a type:

- **MON TRK** – access to track Busses.
- **GROUP** – access to audio sub groups.
- **SUM** – access to sum outputs.
- **AUX MASTER** – access to aux Busses.

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 49) is assigned onto the selected bus; the numeric keypad illuminates to show the assignment.

Note that you cannot select **VCA**, **SUR VCA** or **GPC** channel type buttons when working in this mode as these are not valid bus destinations.

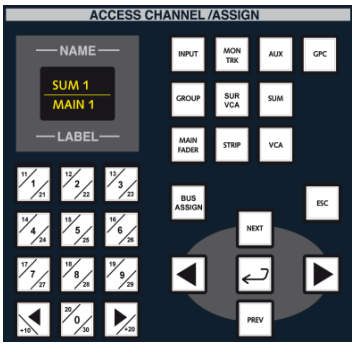

Note

Also note that the **MAIN FADER** and **STRIP** type buttons can be used to assign the channel in access to a fader strip:

- Select either **MAIN FADER** or **STRIP**.
- Then press a flashing fader **SEL** button to make the strip assignment.

5. Exit bus assign by deselecting the **BUS ASSIGN** button.

Bus Re-assign

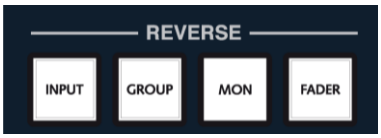


As you can see, either forward or reverse bus assignments may be used to route any type of channel, not just input channels, onto bus outputs. Let's take an example where we wish to assign both input channels and groups onto sum 1. Reverse bus assign would be the quickest method to achieve this result:

1. Press the **SEL** button on the fader strip controlling SUM 1.

This puts Sum 1 into access.

2. Now press the **FADER** button, located on the BUS ASSIGNMENT: REVERSE panel.



*The **FADER** button flashes, and across the console the fader **SEL** buttons on all potential source fader strips flash, in green:*

3. Now press the fader **SEL** buttons on the fader strips controlling the input channels (INPUT) and group channels (GRP) to make the assignments.

*The fader **SEL** buttons stop flashing and change colour from green to red to indicate that the channels are assigned to the selected destination.*

4. Exit bus assign by deselecting the **FADER** assignment button or pressing **ESC** on the ACCESS CHANNEL/ASSIGN control panel.

The Bus Assign display

An overview of the bus assignments for the channel in access is provided by the **Bus Assign** display. You may also change bus assignments from this display providing a fast way of routing onto many different bus outputs from a single channel.

Tip

The **Bus Assign** display also provides a method of editing assignments made to stereo outputs. For example, if Sum 1 and Sum 2 are linked for stereo operation, then Forward and Reverse Bus Assign will automatically route source channels onto both sums. If you wish to assign a channel only onto Sum 2, for example, then make this assignment from the display.

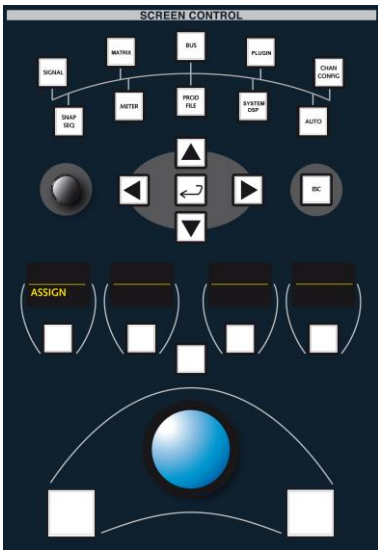
1. Press the **BUS** button, located on the SCREEN CONTROL panel, to view the display now:

Note that each time you press the **BUS** button you toggle between two pages – **Bus Assign** and **Busses Reverse** – so keep pressing until you see the **Bus Assign** display.

The display shows all the bus assignments for the channel in access – the name of the channel shown at the top left of the display. To change to a different channel, either press a fader strip **SEL** button or enter a channel type and number from the ACCESS CHANNEL/ASSIGN control panel.

Assignments are colour coded with groups shown in yellow; track sends in blue; auxes in green; sums in red; VCAs outlined in blue; link groups outlined in the link group colour. Depending on your choice of DSP configuration you may vary the number of groups, auxes and sums available for each production, see Page 122 for details.

To change bus assignments from this display, touch or select an on-screen button. Or use the SCREEN CONTROL soft keys as follows:



1. Select the bus you wish to route to.
2. Press the **ASSIGN** soft key located above the trackball to make the assignment.

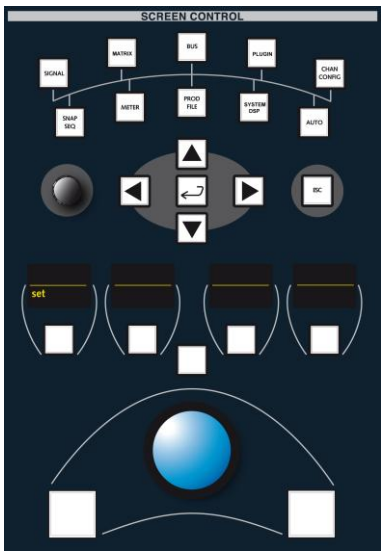
The display updates to show the new assignment.

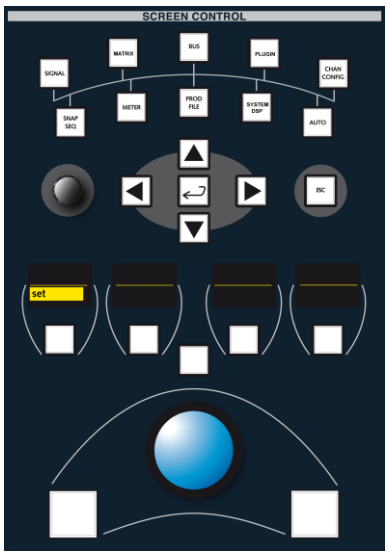
3. Press **ASSIGN** again to undo an assignment.

For auxiliary assignments, you may adjust the level of the aux send from the display:

1. Select the aux send you wish to adjust.
2. Press the **SET** soft key located above the trackball.

*The **SET** key highlights:*





3. Turn the rotary control to adjust the aux send level.
4. Or click on the up/down arrows beside the send level.
5. Or, type in an aux send value using the console keyboard.

The display updates to show the new value.

For stereo aux sends, you may use the same method to adjust aux pan.

The Busses Reverse display

The **Busses Reverse** display can be used to interrogate all DSP channels assigned to the channel in access. For example to view all channels assigned to a group, sum, aux or track bus.

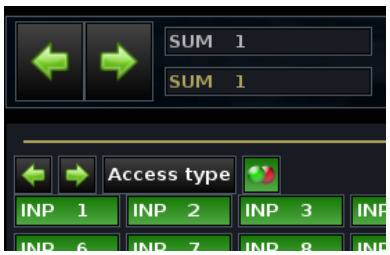
1. Press the **BUS** button, located on the SCREEN CONTROL panel, to view the display now:

Note that each time you press the **BUS** button you toggle between two pages – **Bus Assign** and **Busses Reverse** – so keep pressing until you see the **Busses Reverse** display.

In our example, Sum 1 is in access so the display shows all DSP channels assigned to Sum 1.

Note that the assigned channels are colour coded: inputs (white), groups (yellow), etc.

You can change the channel in access either from the console by pressing a **SEL** button or from the **Busses Reverse** display:



2. Select the left/right arrows beside **Access Type** to increment or decrement the channel in access.

3. Select **Access Type** to cycle through the different DSP channel types: Inputs, Monitors (Track Busses), Groups, Sums and Auxes.
4. Select (or unselect) the green/red circle icon to change the mono/stereo status of the access channel – in our example, Sum 1 is stereo.
5. You can also change the channel in access by using the right-select button – for example, right-click on Input 1 and select **Access** to change to Input 1.

As well as viewing assignments, you can make changes from the **Busses Reverse** display:

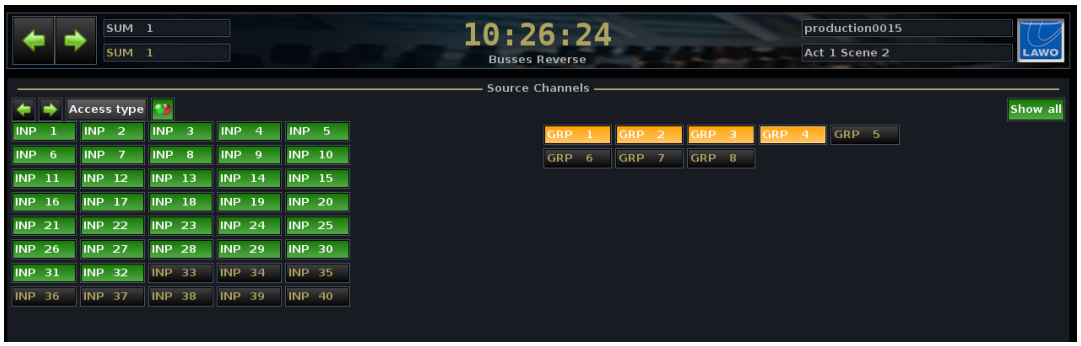
1. With **Show All** off, select an on-screen channel button to remove the bus assignment.

In our example, we have unassigned Inputs 17 to 24 from Sum1:

2. Turn on **Show All** when you wish to make new assignments:

The display updates showing all available channels within your DSP configuration. Note that you will only see the channels which can be assigned to the channel in access – in our example, inputs and groups to Sum1:

3. Left-select a grey (unassigned) channel to assign it to the channel in access:



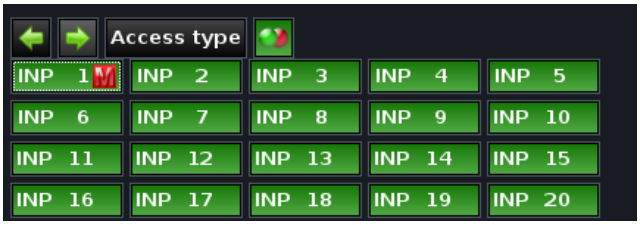
Bus Assign Mute

The **Busses Reverse** display also introduces a new feature which can only be actioned from this display – Mute. This allows you to mute a channel feeding the selected bus rather than removing the assignment:

1. Use the right select button to right-click on the channel you wish to mute – in our example, Input 1:

2. 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:



The Central Control Section

The Central Control Section provides dedicated access to *all* channel modules – input control, signal processing, panning, level, monitoring facilities, auxiliary sends and audio follow video (AFV) set up.

Select a channel, and the controls update to show its current settings. Each set of controls is colour coded to help you identify EQ, Dynamics, etc. at a glance.

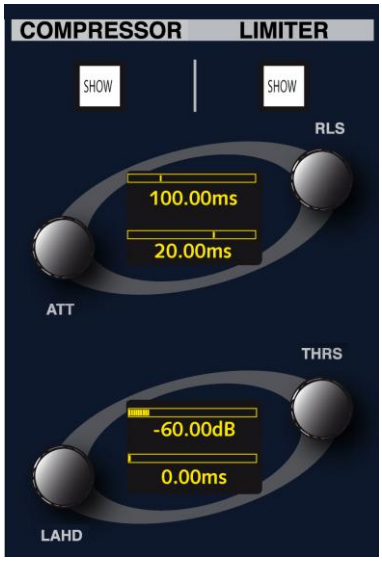
Note that the controls are black (unlit) if a DSP module is not supported. This could be for a variety of reasons: for example, IMAGE is not available for mono channels; DSP modules are suspended if AMBIT or Loudness metering are active; not all DSP modules are supported on Broadcast channels.

Working from top to bottom and left to right, controls are divided into the following sections:

- INPUT MIXER/SOURCE – source and inmix parameters such as mic gain, phase reverse, etc.
- IMAGE – width and positioning for a stereo channel source.
- DIGAMP/DELAY/INSERT/DIROUT – digital gain, channel delay, insert switching and the channel direct output.
- METER – meter pick up point selection.
- PARAMETER COPY/ASSIGN – used to copy or reset parameters, and assign parameters to Free Controls.
- GATE/EXPANDER – gate and expander dynamics processing.
- SCF/FILTER/EQUALIZER – 2-band filter and 4-band equaliser sections.

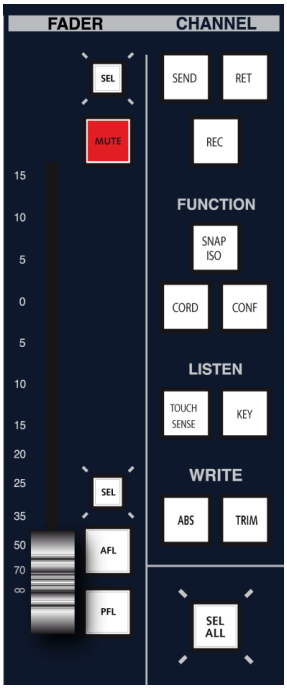
- COMPRESSOR/LIMITER – compressor and limiter dynamics processing.
- PAN/HYP-PAN – panning and hyperpanning.
- FADER – local level, mute, AFL and PFL control.
- CHANNEL – various channel functions.
- AUX SENDS/ AUDIO FOLLOW VIDEO – auxiliary sends and audio follow video functionality.

All rotary controls on the **mc²66** are touch-sensitive encoders with the following features:



- All controls offer a dedicated alphanumeric display showing the parameter name and/or value which is being adjusted.
- The current position is indicated within the horizontal bar. If the parameter varies from a nominal value then the bar is filled in to show the degree of variation – e.g. our compressor threshold has been adjusted to -60 dB.
- The controls default to provide fine parameter adjustment. For coarse adjustment (5 times faster), push down on the control as you adjust the parameter.

Note that on the classic mc²66, not all rotary controls offer a dedicated alphanumeric display. Some provide a ring of LEDs to indicate the current position; for levels, a corona appears indicating the amount of deviation from the default value. The LED square beneath each control changes from green to yellow when a parameter is not set to its default value.



Every module of controls within the Central Control Section includes the following:

- **SEL** (Selection) button - this is used in conjunction with:
  - COPY AUDIO/PARAMETER to copy parameters between channels, see Page 305.
  - LISTEN controls to AFL any individual processing section, see Page 230.
  - LINK to link selected modules, see Page 353.
  - SNAPSHOT/SEQUENCE to select modules for cross fades between snapshots when running a sequence, see Page 435.
  - AUTOMATION – to select modules for timecode automation, see Chapter 7.

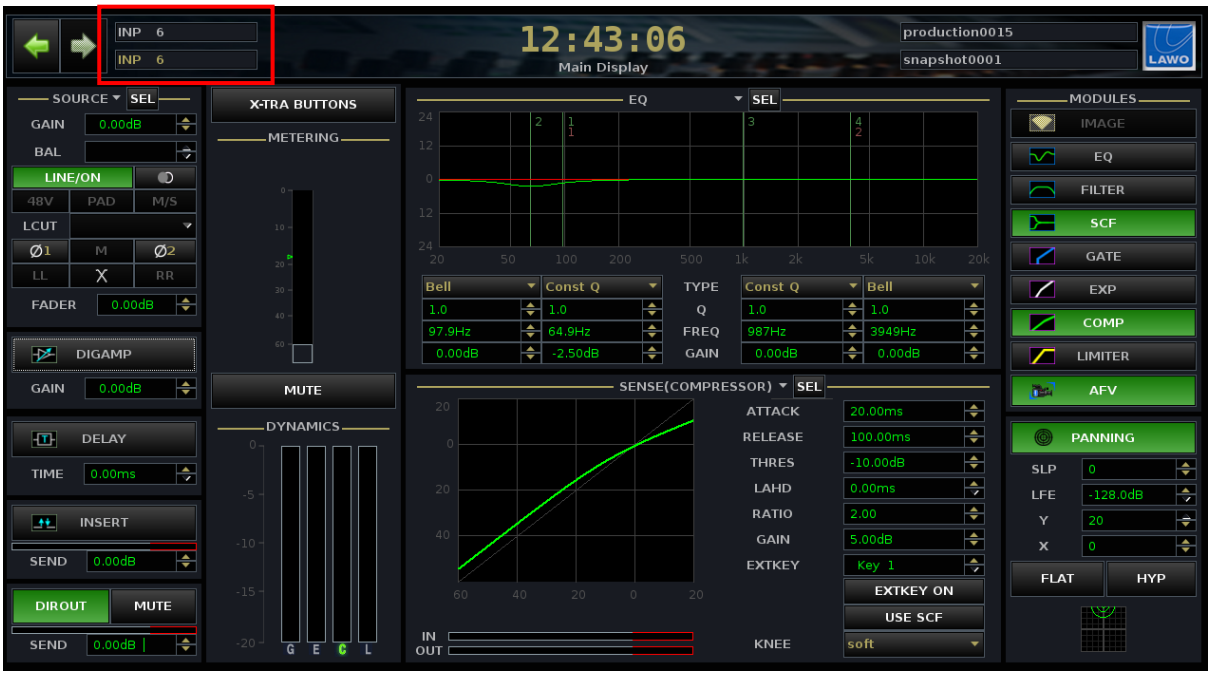
The **SEL ALL** button, at the bottom of the CHANNEL controls, can be used to select all modules for the above functions.

The Main Display

The Central Control Section works in conjunction with the centre control screen's **Main** Display.

1. Press the **CHAN/CONFIG** button, located on the centre section SCREEN CONTROL panel, to view the **Main Display**:

*This display shows parameters for the channel in access – in our example, **INP 6**:*



The display is divided into the same sub sections as the Central Control Section front panel. 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.

Broadcast channel MODULES

Note that any sections not supported by the selected DSP channel are greyed out – in our example, IMAGE. On Broadcast channels, several modules are greyed out: FILTER, SCF plus either GATE, EXP, COMP or LIM depending on the dynamics model (see opposite).

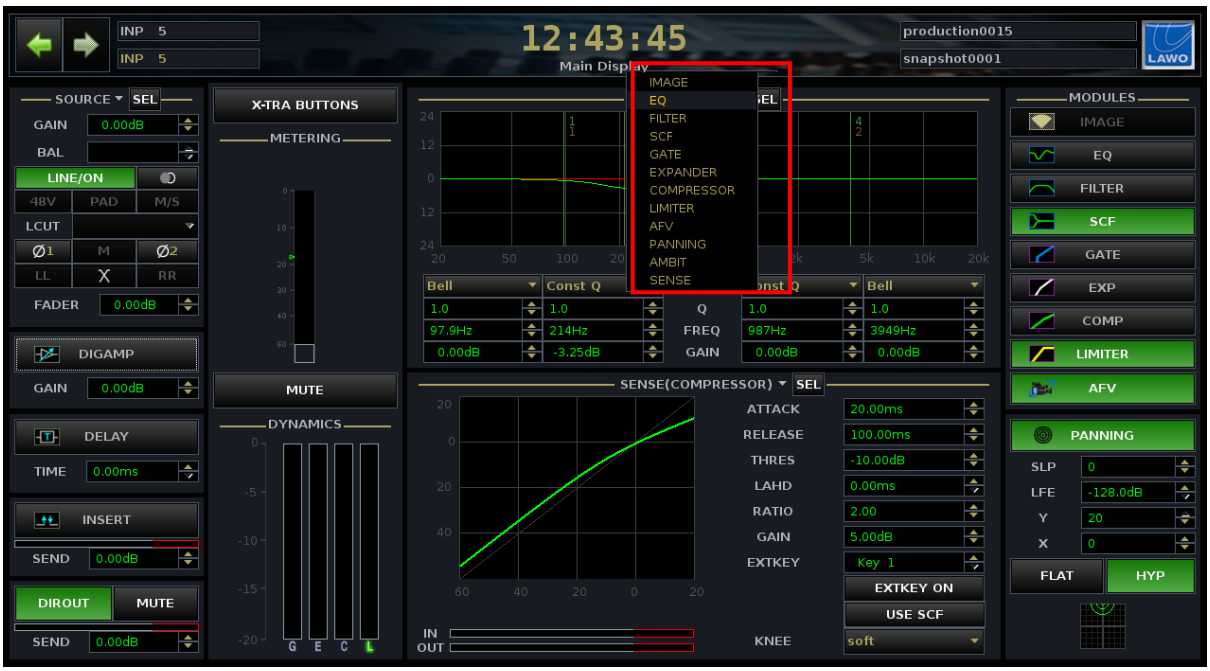
The display *always* shows the following sections:

- **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 with the same options as set for the **Channel** display, see Page 313.
- **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 and access to presets.
- **PANNING** – X/Y pan parameters.

In addition, the two central areas can display other modules:

2. Click on the drop-down menu at the top of each assignable section to select a different audio module:



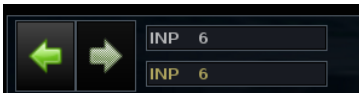
*The **Main Display** updates accordingly.*

Tip

If you select **SENSE**, the **Main Display** will automatically follow the last control touched.

Note that these areas 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.

Assigning Channels to the Central Control Section

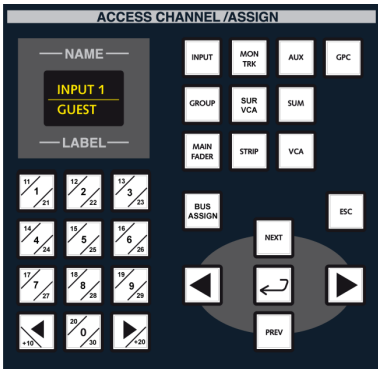


Remember that the channel in access is *always* the channel assigned to the Central Control Section. You can view the name and label of the channel currently assigned in the NAME and LABEL displays on the ACCESS CHANNEL/ASSIGN control panel and at the top left of the **Main Display**:

To assign a new channel to the Central Control Section, use any of the methods for updating the channel in access:

1. If the channel is on the active control surface, press the **SEL** button on the channel fader strip.

If the channel you wish to assign is not on the active surface, for example it is allocated to an underneath layer or bank of fader strips:



2. Select the channel type and number using the **INPUT**, **MON TRK**, **AUX**, **GPC**, **GROUP**, **SUR VCA, SUM**, **MAIN FADER, STRIP** or **VCA** buttons and numeric keypad.
3. Alternatively, use the **NEXT** and **PREV**, or **LEFT** and **RIGHT** buttons to increment and decrement the channel number by DSP type or across the active control surface.

Please refer to Page 37 for details on any of these operations.

The Central Control Section may be used to control a channel which you do not want to have on the active fader strips. For example, during a live production you may wish to 'hide' your sum master channels to prevent accidental changes. Then when you wish to adjust settings on the channel, assign the sum to the Central Control Section using method 2 above.

Tip

In addition, you may protect the channel assigned to the Central Control Section by locking the channel in access.

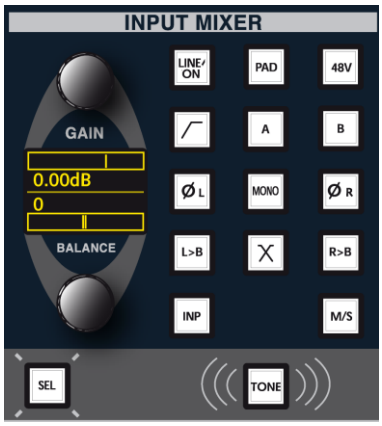
4. Select the **Extra Buttons** display and press the **LOCK ACC** touch-screen button:

*When **LOCK ACC** is selected, you cannot use the ACCESS CHANNEL/ASSIGN control panel or press fader **SEL** buttons to update the channel in access.*

Mono Channel Operation

This section deals with the Central Control Section in more detail, starting with the operation for a mono channel. For details on stereo channels, please see Page 263. For details on surround operation, see Page 269.

INPUT MIXER



This panel controls *all* input parameters.

Note that the **INP** and **TONE** buttons are reserved for future implementation.

For a mono channel, the BALANCE, **MONO**, **L>B**, **R>B**, L/R Reverse, Phase Reverse Right and **M/S** controls are inactive. Please refer to Page 263 for full details on stereo channel operation.

All parameters are displayed within the **SOURCE/INMIX** section on the **Main Display**:

Note that different parameters are available depending on the type of input connected to the channel:

- Mic/Line level analogue (variable gain)
- Line Level analogue (fixed gain)
- Digital (AES, SDI, MADI)
- Internal signals such as a summing bus

Any parameters which are not available for your input are greyed out on the **Main Display** and cannot be selected from the front panel.

INPUT MIXER Modes

From Version 4.14 software onwards, the INPUT MIXER can control both SOURCE and INMIX parameters.

The default mode is to control source parameters. However, each input channel also includes an INMIX DSP module, providing gain and other parameters within the channel DSP.

For example, on a mic/line input you can adjust *both* the analogue mic preamp gain (on the DALLIS I/O card) *and* the digital channel input gain (on the INMIX DSP module). Changes made to SOURCE parameters will affect all destinations routed from that source; changes to the INMIX parameters affect only the input channel.

The INPUT MIXER mode is selected from the **Main Display**:

1. Using the trackball select either **SOURCE** or **INMIX** from the drop-down menu:

- **SOURCE** – parameters are applied to the source (the default mode).
- **INMIX** – parameters are applied to the INMIX channel DSP module.

Note that the choice of mode affects GAIN, BALANCE and sometimes phase controls depending on the type of input. It also affects the operation of the **SEL** button; select **SOURCE** to select source gain or **INMIX** to select channel gain.

The INPUT MIXER backlight illuminates in red for INMIX mode, and turns off when working in SOURCE mode (the default):

You can programme a user button to switch the INPUT MIXER mode from the **Custom Functions** display, see Page 689.

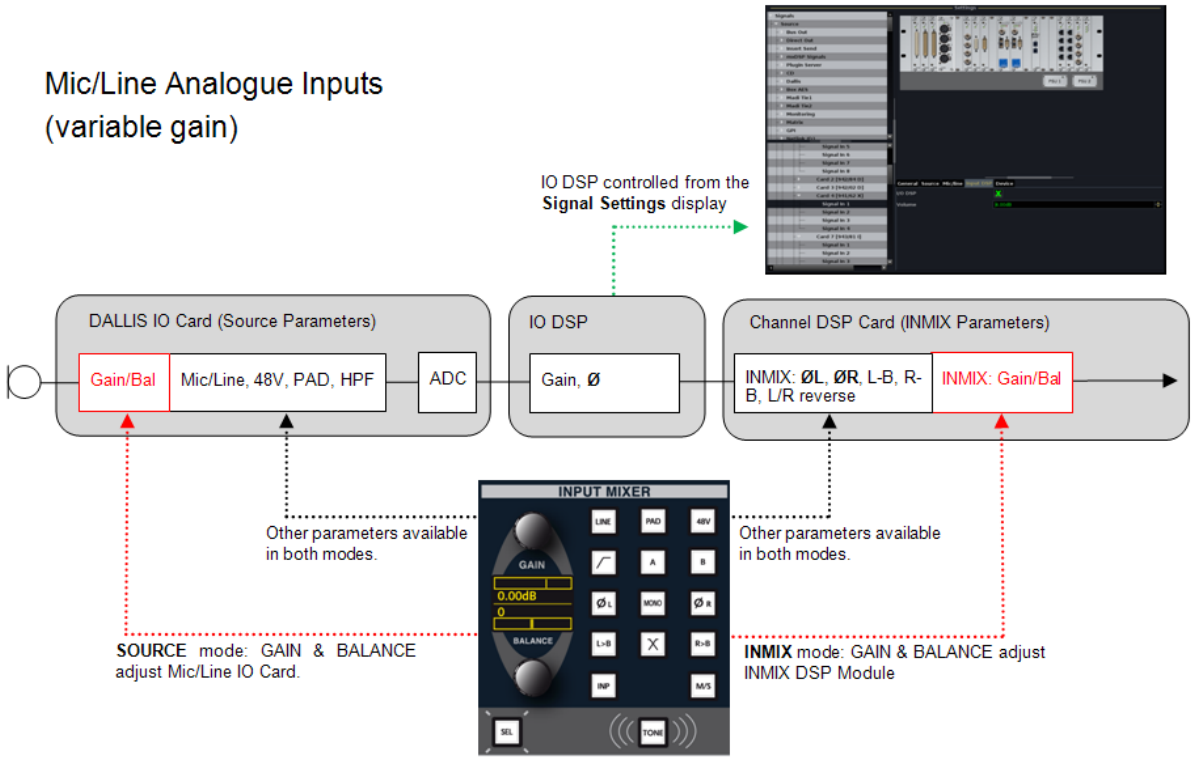
Tip

We recommend working in SOURCE mode most of the time to ensure that the INPUT MIXER GAIN is applied to the source. Switch to INMIX mode if you need to adjust the channel input gain. For example, to access additional input gain for a digital microphone channel.

Mic/Line Level Analogue Inputs

Channels routed from a mic/line analogue input card (with variable gain) have access to:

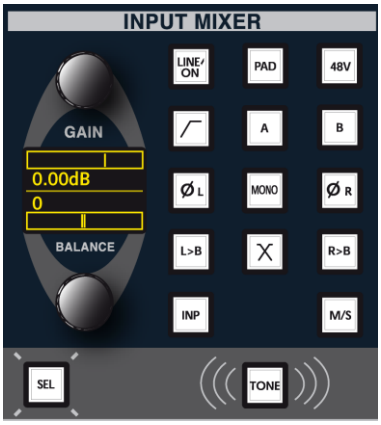
- **I/O Card Parameters (SOURCE mode)** – mic/line switching, gain, balance, 48V, PAD and a high pass filter are applied in the analogue domain before analogue-to-digital conversion.
- **I/O DSP** – volume and phase can also be applied by DSP on the I/O card. These parameters are adjusted from the **Signal Settings** display, see Page 618.
- **INMIX DSP Parameters (INMIX mode)** – gain, balance, phase and stereo input control are applied within the channel's INMIX DSP.



Note that gain may be applied in three places:

- **INPUT MIXER (SOURCE mode)** – GAIN adjusts the analogue mic preamp gain.
- **Signal Settings** display – the **I/O DSP Volume** parameter adjusts gain within the routing matrix.
- **INPUT MIXER (INMIX mode)** – GAIN adjusts the INMIX channel input gain.

The SOURCE and INMIX parameters are controlled from the INPUT MIXER as follows:



Mic Level Signals

1. Make sure that the INPUT MIXER mode is switched to **SOURCE** (the default).

*The **Main Display** should show **SOURCE** and the INPUT MIXER backlight should be turned off.*

2. For a mic level signal, deselect the **LINE/ON** button.
3. Use the GAIN control to remotely set the microphone preamplifier gain within the analogue domain prior to the A-D conversion.

The gain range is normally adjusted from -20dB to +70dB, although this may vary depending on your hardware configuration. Please refer to the DALLIS I/O technical data.

4. Press the **48V** button to select 48V phantom power.
5. Press the high pass filter button to insert an analogue subsonic filter prior to the A-D conversion.
6. Toggle the high pass filter button to cycle through the froll-off frequency options: Off, 40Hz, 80Hz and 140Hz.
7. Press **PAD** to insert the PAD.

*The **Main Display** shows the status of the settings.*

Line Level Signals

1. Select the **LINE/ON** button.

*The **LINE/ON** indicator lights on the **Main Display**, 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 analogue domain prior to the A-D conversion.
3. Set the high pass filter as described above.

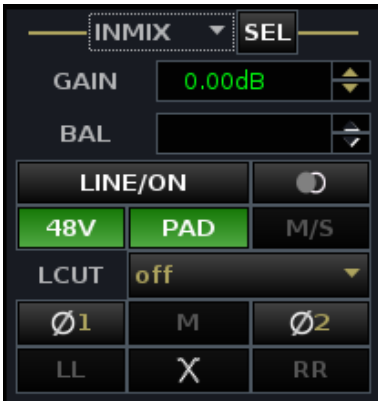
INMIX Parameters

1. To adjust the channel input gain, switch the Input Mixer mode to **INMIX** from the **Main Display**.

*The **Main Display** should show **INMIX** and the INPUT MIXER backlight should be red.*

2. Use the GAIN control to adjust the INMIX gain within the digital domain.

Gain may be adjusted from -128dB to +70dB.



Phase Reverse

1. Press the **Ø L** button to reverse the phase of the mono source.

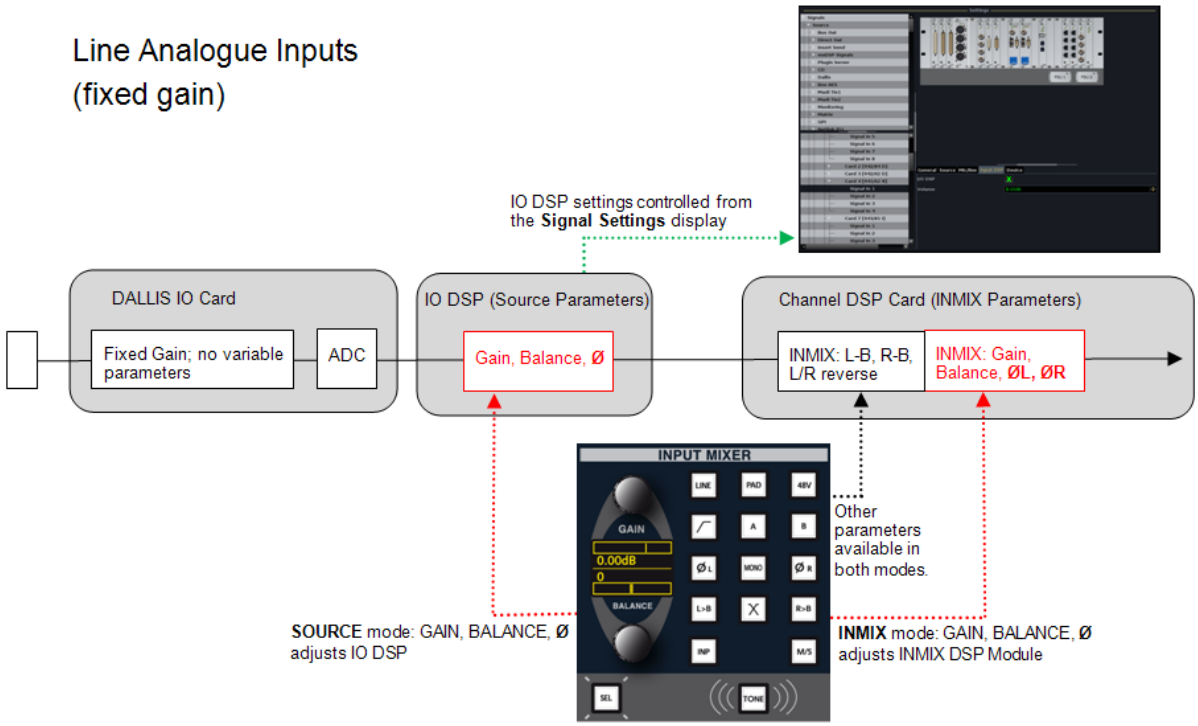
*The **Ø 1** and **Ø 2** indicators light on the **Main Display**.*

Note that for a mic/line input, the **Ø L** button adjusts the phase within the INMIX DSP module. Therefore, this reverses the phase of the channel and not the source. If you wish to reverse the phase of the source, then use the I/O DSP **Ø** which can be controlled from the **Signal Settings** display.

Line Level Analogue Inputs

Channels routed from a line level analogue input card (with fixed gain) have no variable I/O card parameters. Therefore, the I/O DSP is used to provide source parameter control. Channels have access to:

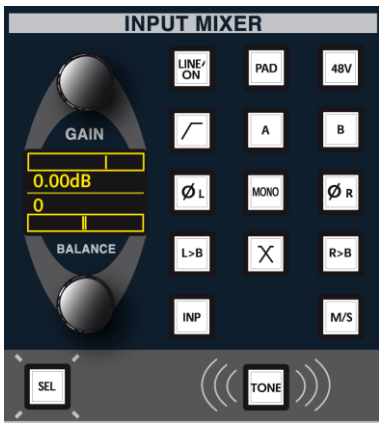
- **I/O DSP Parameters (SOURCE mode)** – digital gain, balance and phase are applied by DSP on the I/O card.
- **INMIX DSP Parameters (INMIX mode)** – gain, balance, phase and stereo input control are applied within the channel's INMIX DSP module.



Note that gain may be applied in two places:

- **INPUT MIXER (SOURCE mode)** – GAIN adjusts the **I/O DSP Volume** within the routing matrix.
- **INPUT MIXER (INMIX mode)** – GAIN adjusts the INMIX channel input gain.

Also note that I/O DSP parameters can be controlled both from the INPUT MIXER (working in **SOURCE** mode) and from the **Signal Settings** display, see Page 618.



The SOURCE and INMIX parameters are controlled from the INPUT MIXER as follows:

Source Parameters (I/O DSP)

1. Make sure that the INPUT MIXER mode is switched to **SOURCE** (the default).

*The **Main Display** should show **SOURCE** and the INPUT MIXER backlight should be turned off.*

2. Select the **LINE/ON** button.

This button turns the I/O DSP on or off:

- **LINE/ON** On = I/O DSP On
- **LINE/ON** Off = I/O DSP Off

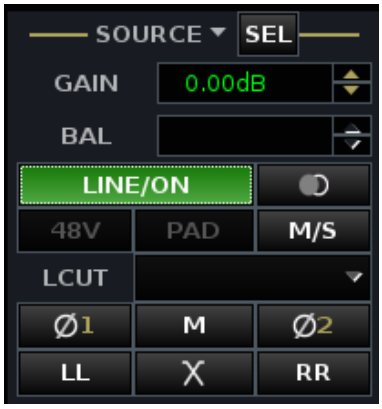
3. Use the GAIN control to adjust the I/O DSP gain (volume).

Gain may be adjusted from -128dB to +15dB.

4. Press the **Ø L** button to reverse the phase of the mono source.

*The **Ø 1** indicator lights on the **Main Display**.*

Note that any changes you make to the I/O DSP will also appear on the **Signal Settings** display.



INMIX Parameters

1. To adjust the channel input gain, switch the Input Mixer mode to **INMIX** from the **Main Display**

*The **Main Display** should show **INMIX** and the INPUT MIXER backlight should be red.*

2. Use the GAIN control to adjust the INMIX gain within the channel DSP.

Gain may be adjusted from -128dB to +70dB.

3. Press the **Ø L** button to reverse the phase of the channel (INMIX phase).

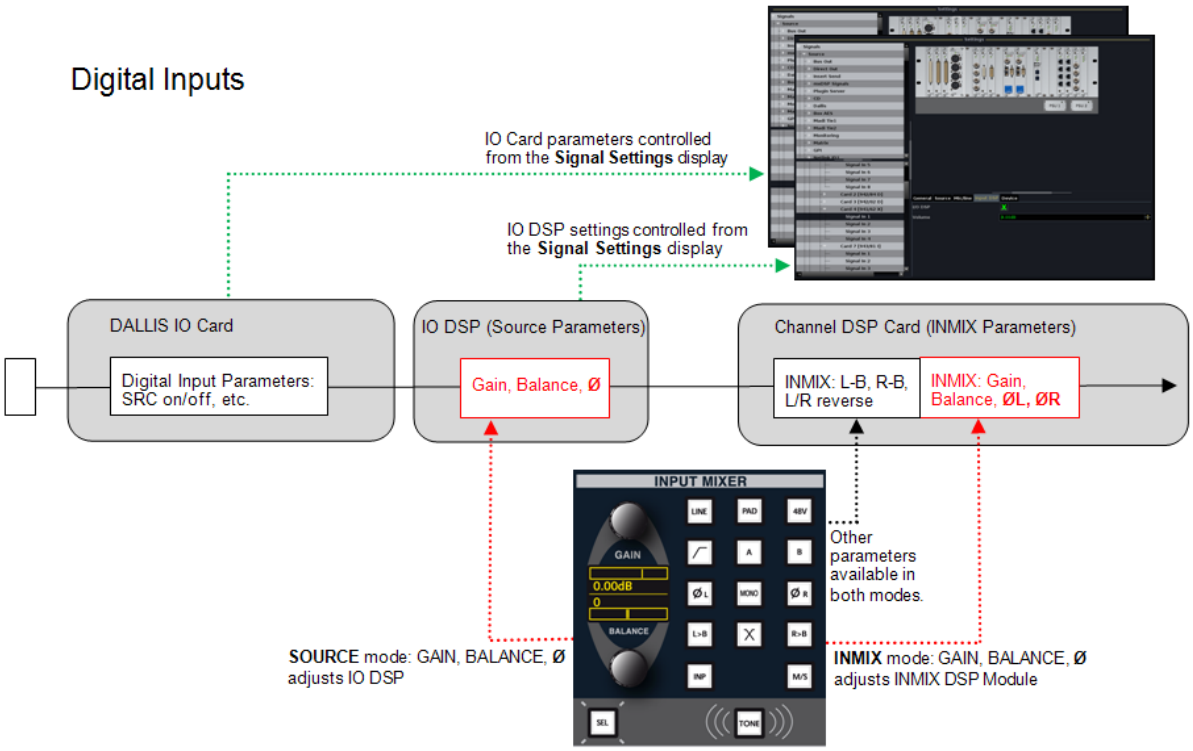
*The **Ø 1** indicator lights on the **Main Display**.*

Note that when a fixed gain analogue input is routed to a channel, the **48V**, **PAD** and analogue filter buttons are inactive.

Digital Inputs

Channels routed from a digital input card may have some I/O card parameters, such as SRC on/off, which are adjusted from the **Signal Settings** display, see Page 602. The I/O DSP is used to provide source parameters. Therefore, channels have access to:

- **I/O Card Parameters** – for example, SRC on/off. These parameters are adjusted from the **Signal Settings** display, see Page 618.
- **I/O DSP Parameters (SOURCE mode)** – digital gain, balance and phase are applied by DSP on the I/O card.
- **INMIX DSP Parameters (INMIX mode)** – gain, balance, phase and stereo input control are applied within the channel's INMIX DSP module.



Note that gain may be applied in two places:

- **INPUT MIXER (SOURCE mode)** – GAIN adjusts the **I/O DSP Volume** within the routing matrix.
- **INPUT MIXER (INMIX mode)** – GAIN adjusts the INMIX channel input gain.

Also note that I/O DSP parameters can be controlled both from the INPUT MIXER (working in **SOURCE** mode) and from the **Signal Settings** display, see Page 618.

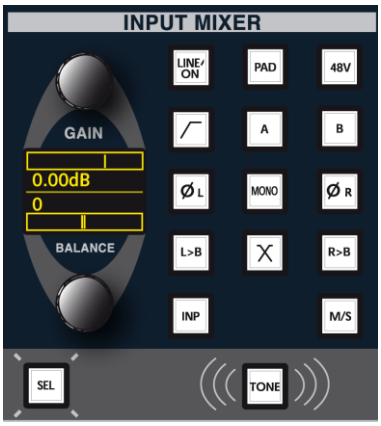
Parameters are controlled from the INPUT MIXER in an identical manner to a fixed gain analogue input, so please refer to the previous page for details.

Internal Signals

Input channels routed from an internal signal such as a summing bus have no I/O card or I/O DSP parameters. This leaves the INMIX DSP module.

Use the INPUT MIXER gain, balance, phase and stereo input controls in the usual manner to adjust the input parameters of the channel (INMIX DSP).

A/B Input Switching



For any input or monitor DSP channel, you may assign a back up source (B) from the **Signal List** display. For example, assign the main presenter's wireless mic to INP 1 source A, and a spare mic to INP 1 source B. You can then switch quickly from A to B during the show if the first mic fails.

Sources are assigned to the A and B inputs from the **Signal List** display, see Page 567 for details.

1. Press the **B** button to switch to the B source.

Note that if there is no source assigned to B input, then the **B** button cannot be selected.

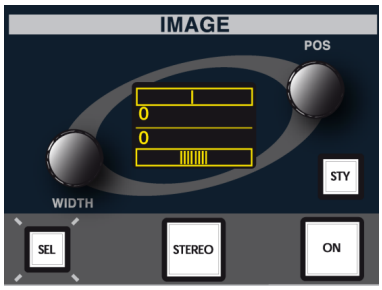
2. Press the **A** button to return to source A.
3. Use the GAIN control to set the gain for the selected input.

Note that the INPUT MIXER should be in **SOURCE** mode if you wish to set an independent gain value for source A and source B. Depending on the type of input, you may be adjusting analogue gain before ADC or digital I/O DSP gain.

If you do NOT wish to recal independent gain values for source A and B, then switch the INPUT MIXER GAIN to **INMIX** mode (from the **Main Display**). This adjusts the channel's input gain after the A/B input switch.

Please refer to the previous pages for more details on INPUT MIXER modes.

IMAGE



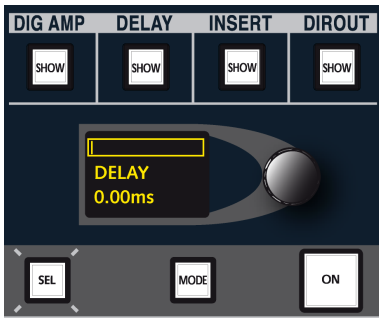
The IMAGE section of controls deals with image positioning and width on stereo channels, and also contains the **STEREO** button which may be used to create a stereo channel.

Note that this section is only active for a stereo channel, and will remain blank for a mono source. Please refer to Page 263 for full details on stereo channel operation.

DIG AMP/DELAY/INSERT/DIROUT

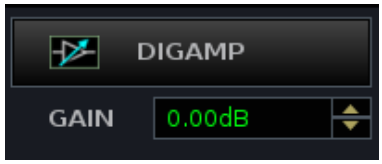
Below IMAGE, the DIGAMP/DELAY/INSERT/DIROUT section of controls may be assigned to adjust any of the following four audio modules:

- **DIG AMP** – **DIG**ital **AMP**lifier – provides a flexible gain control which may be positioned anywhere within the channel signal flow.
- **DELAY** – provides control of channel delay which may be set in ms, frames or meters.
- **INSERT** – the channel insert point, which may be positioned anywhere within the channel signal flow.
- **DIROUT** – **DIR**ect **OUT**put – the direct output, which may be positioned anywhere within the channel signal flow.



Digital Amplifier (DIG AMP)

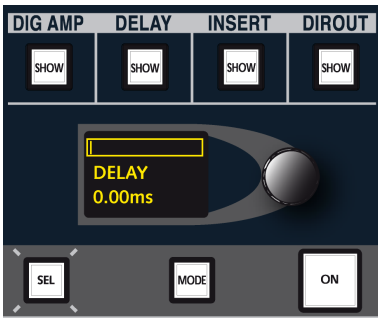
1. Press the DIG AMP **SHOW** button to assign the rotary controller and buttons to the Digital Amplifier audio module.
2. Press the **ON** button to switch the gain element in and out of circuit.
3. Move the rotary control to adjust the digital gain.

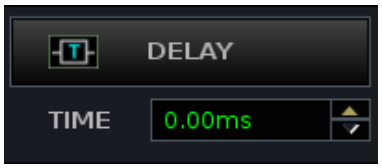


*The gain value is displayed in the **DIGAMP GAIN** box on the **Main Display**. Gain may be adjusted from -128dB to +15dB.*

Note that the **MODE** button is inactive for the digital amplifier.

Channel Delay (DELAY)





1. Press the DELAY **SHOW** button to assign the rotary controller and buttons to the channel delay audio module.
2. Press the **ON** button to switch the delay in and out of circuit.
3. Toggle the **MODE** button to cycle around the channel delay unit options – milliseconds (ms), frames (frms) or meters (m).
4. Move the rotary control to adjust the delay time.

The channel delay parameters vary 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

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 want to enter a specific delay time, then click on the **TIME** box on the **Main Display** and type in a value from the console keyboard.

When adjusting delay in frames, set the frame rate using the **System Settings** display, see Page 681 for details.

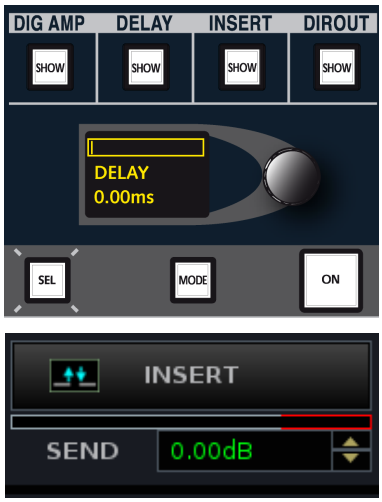
Tip

Push down on the rotary control to set the delay time coarsely.

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.

Depending on the hardware configuration of your console, an additional 48 delays may be available from the DSP Module 983-03. These are fixed time delays which may be inserted into any routing crosspoint and are programmed within the system configuration.



Channel Insert (INSERT)

1. Press the INSERT **SHOW** button to assign the rotary controller and buttons to the channel insert module.
2. Press the **ON** button 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. With the insert **ON**, adjust the rotary control to set the level of the insert send.

*The **SEND** level is shown on the **Main Display** and may be adjusted from -128dB to +15dB.*

The **MODE** button is inactive for the insert section.

Note that 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 may be taken from any point in the channel signal flow. Please refer to Page 108 for details on changing the channel's signal processing order.

The insert send and return assignments are made from the **Signal List** display by routing the DSP channel's insert send to the output feeding the insert device, and routing the output of the external device to the corresponding insert return. See Page 94 for details.

Direct Output (DIROUT)

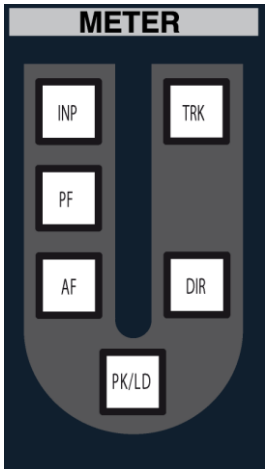
1. Press the DIROUT **SHOW** button to assign the rotary controller and buttons to the direct output module.
2. Press the **ON** button to activate the direct output.
3. Move the rotary control to adjust the direct output send level.

*The SEND level is displayed on the **Main Display** and may be adjusted from -128dB to +15dB.*

4. Route the direct output to a destination using the **Signal List** display, see Chapter 8 for details.
5. You can mute the direct output by selecting the **MUTE** on-screen button on the **Main Display**.

You can also set the direct out to mute when the channel fader opens. Please refer to Page 108 for more details.

Note that the direct output may 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.



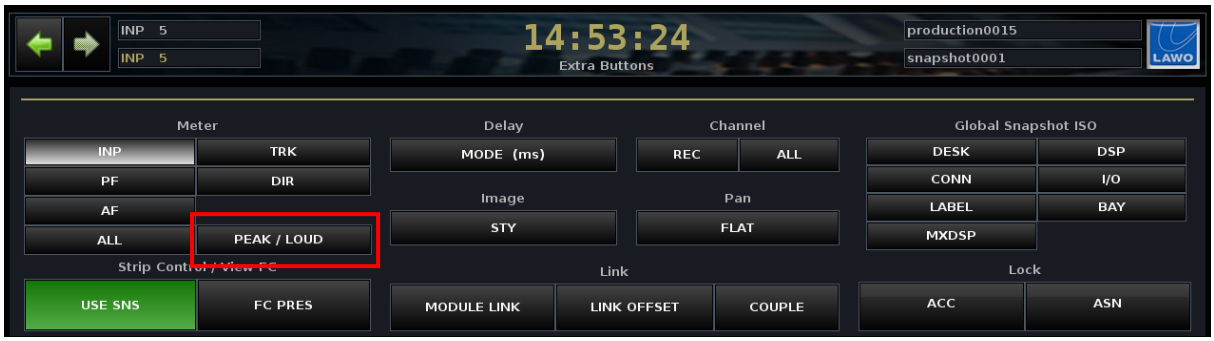
METER Pickup Point

The METER buttons select the metering point for peak and loudness meters across the console. The selection affects all metering displays: **Channel**, **Main** and **Metering**.

The pickup point may be set independently for peak and loudness meters:

- **PK/LD** off – meter pickup selection is applied to peak metering.
- **PK/LD** on – meter pickup selection is applied to loudness metering.

Note that this option is also available on the Extra Buttons display:



You may select from the following pick up points:

- **INP** – meters the channel input (post the INMIX section).
- **PF** – meters the pre fader signal.
- **AF** – meters the post fader signal.
- **TRK** – meters the track bus output (Recording channels only).
- **DIR** – meters the direct output.

Note

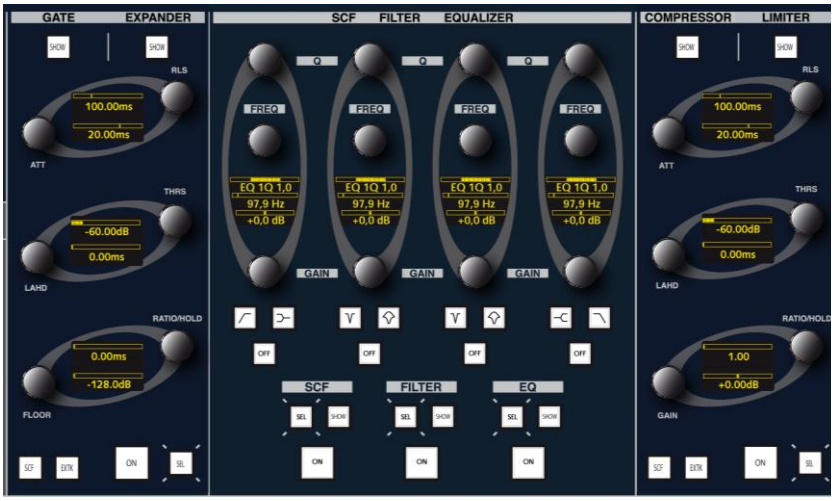
The meter pick up point may also be modified from the **Channel Config** display, please see Page 111 for details.

Dynamics Processing

The console's dynamics processing varies between Broadcast and Recording channels. Therefore, this section covers the two channel types separately. See Page 210 if you are using Broadcast channels, or below for Recording channels.

Recording channel Dynamics

On Recording channels, each full processing channel contains four independent blocks of dynamics processing (Gate, Expander, Compressor and Limiter). The GATE/EXPANDER and COMPRESSOR/LIMITER sections are controlled from either side of the SCF/FILTER/EQUALIZER panel:



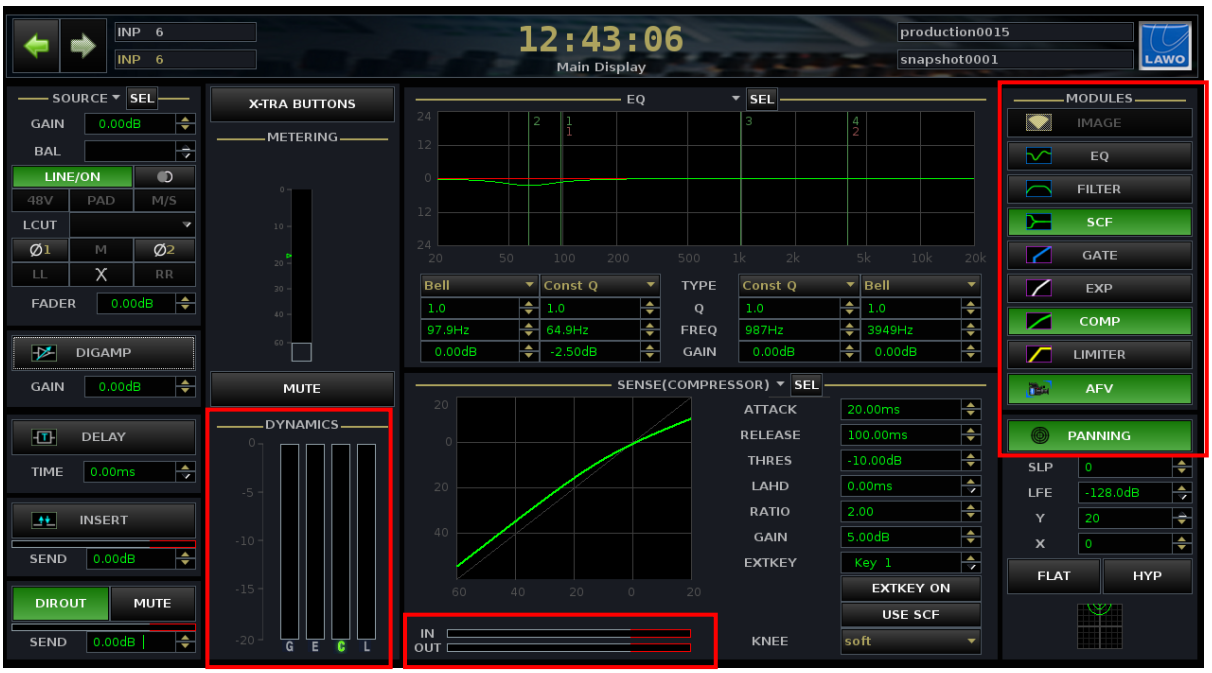
Note that any of the four sections may be placed anywhere within the channel signal flow. For example, to gate pre EQ and compress post EQ, or to limit the channel signal post fader while compressing the feed to the direct output. Here we will deal with using the front panel controls. Please refer to Page 108 for details on changing the channel signal processing order.

Note

In addition, a dedicated 2-band filter section may be inserted into the sidechain of the compressor or gate. Please see Page 207 for details.

The **EXTK** (External Key) button can be used to trigger the gate and compressor sections from an external dynamics key, see Page 208.

The **Main Display** always shows gain reduction metering (DYNAMICS) and the on/off status (MODULES) for all 4 sections. In addition, the current Gate, Expander, Compressor or Limiter parameters can be assigned onto the display:

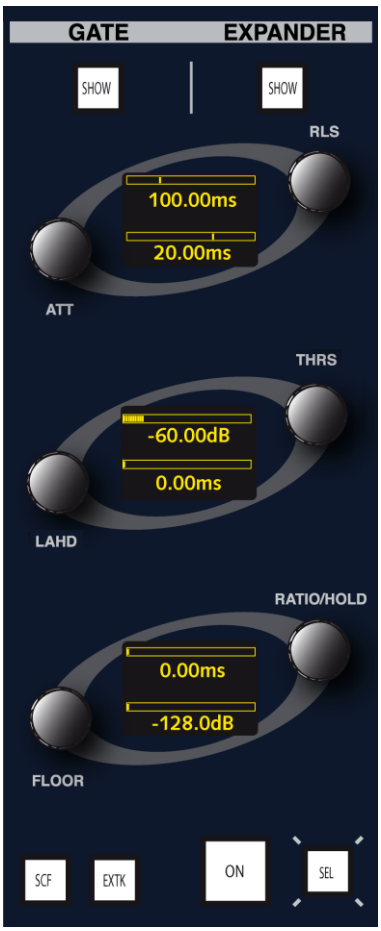


Tip

Use the section's Look Ahead Delay (LAHD) to delay the main signal path relative to the gate, expander, compressor or limiter. This will result in pleasant dynamics processing even for widely varying dynamic signals.

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.

GATE/EXPANDER



This section of controls is switched between setting up the Gate and the Expander by pressing either of the **SHOW** buttons. Note that both sections can be used independently such that you could be gating at low levels and expanding at higher levels on the same channel.

Setting a Gate

1. Press the GATE **SHOW** button to switch the controls to the gate section. (On the classic mc²66, deselect the **EXP** button).
2. Press the **ON** button to switch on the Gate.
3. Use the six rotary controls to set the gate attack time (ATT), release time (RLS), threshold level (THRS), look ahead delay (LAHD), floor level (FLOOR) and hold time (RATIO/HOLD).

The front panel displays update to show the relevant settings.

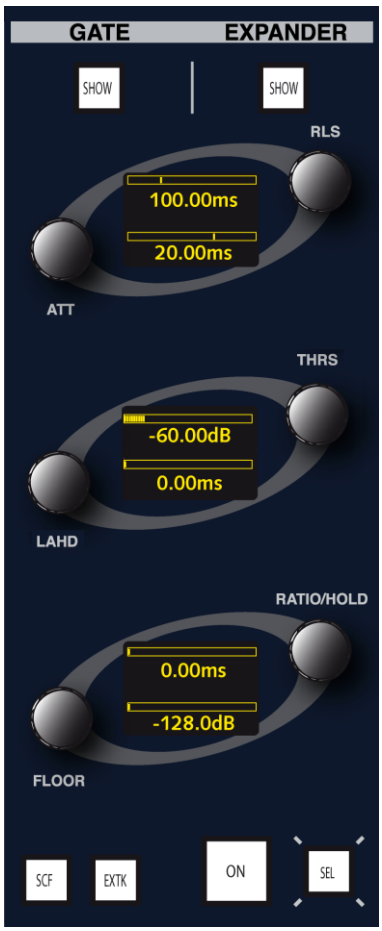
Note that the classic mc²66 provides 4 rotary controls. Page the controls to a second layer by pressing the **2nd** button.

The action of the gate is best described by looking at the **GATE** graph and **DYNAMICS** gain reduction metering on the **Main Display**:

The Gate parameters may be set as follows:

- Threshold Level – from -80dB to 0dB.
- 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.

Using the Expander



1. Press the EXP **SHOW** button to switch the controls to the expander section. (On the classic mc²66, select the **EXP** button).
2. Press the **ON** button to switch the Expander into circuit.
3. Use the six rotary controls to set the expander attack time (ATT), release time (RLS), threshold level (THRS), look ahead delay (LAHD), floor level (FLOOR) and ratio (RATIO/HOLD).

The front panel displays update to show the relevant settings.

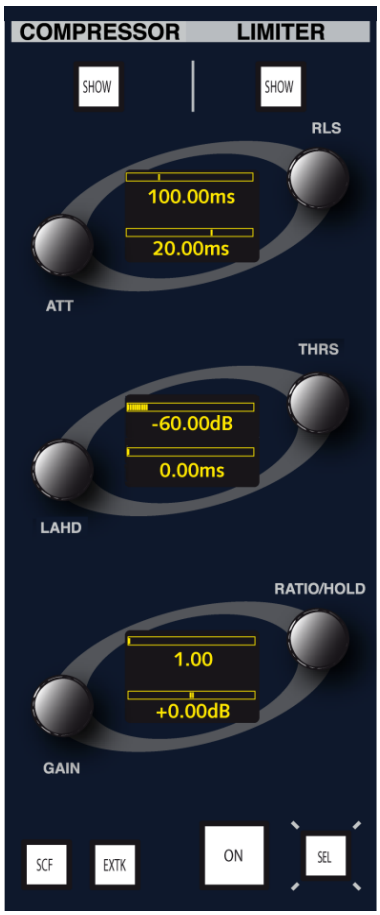
Note that the classic mc²66 provides 4 rotary controls. Page the controls to a second layer by pressing the **2nd** button.

The action of the expander is best described by looking at the **EXPANDER** graph and **DYNAMICS** gain reduction metering on the **Main Display**:

The Expander parameters may be set as follows:

- Threshold Level – from -80dB to 0dB.
- 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.

COMPRESSOR/LIMITER



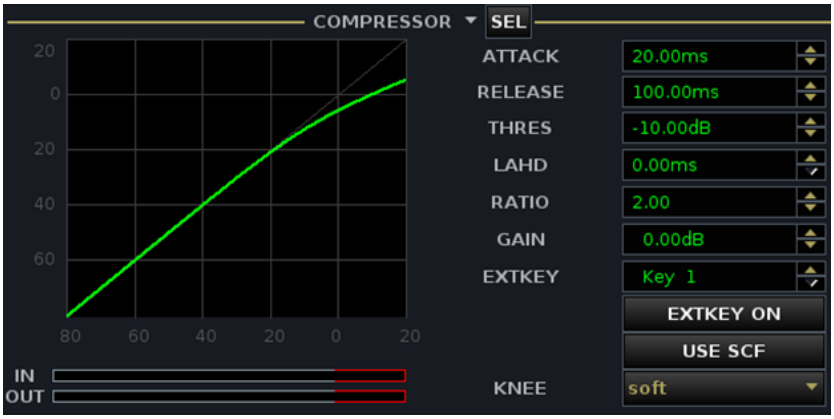
Move across to the COMPRESSOR/LIMITER section to set the Compressor and Limiter dynamics processing. Both sections can be used independently such that you could be compressing at low levels and limiting at higher levels on the same channel.

Setting a Compressor

1. Press the COMPRESSOR **SHOW** button to switch the controls to the compressor section. (On the classic mc²66, deselect the **LIM** button).
2. Press the **ON** button to switch on the Compressor.
3. Use the six rotary controls to set the compressor attack time (ATT), release time (RLS), threshold level (THRS), look ahead delay (LAHD), GAIN and RATIO.

Note that the classic mc²66 provides 4 rotary controls. Page the controls to a second layer by pressing the **2nd** button.

The action of the compressor is best described by looking at the **COMPRESSOR** graph on the **Main Display**:



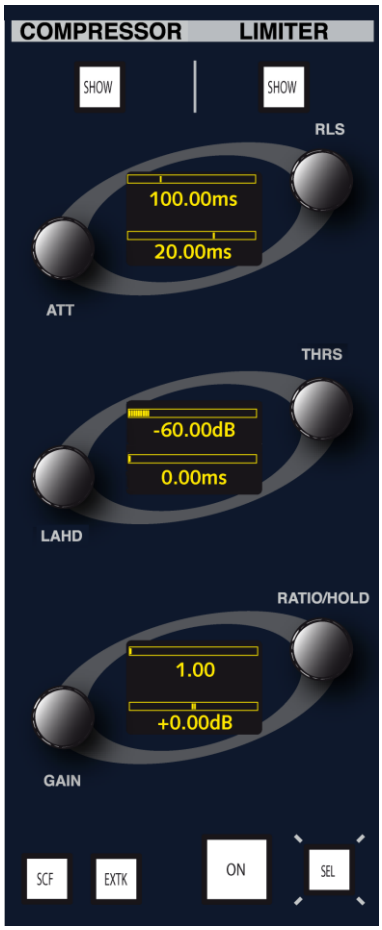
The Compressor parameters may be set as follows:

- Threshold Level – from -70dB to +20dB.
- Ratio – from 1:1 to 10:1.
- Attack Time – from 0.29ms to 250ms.
- Release Time – from 40ms to 10s.
- Look Ahead Delay – from 0ms to 10ms.
- Gain – from -20dB to +20dB.
- 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**.

Tip

For a smoother compressor, assign the 2-band sidechain filter to the compressor and set -10dB gain for an 18dB/octave low shelf at around 125Hz to remove unwanted low frequencies, see Page 207 for details.

Setting a Limiter



1. Press the LIMITER **SHOW** button to switch the controls to the limiter section. (On the classic mc²66, select the **LIM** button).
2. Press the **ON** button to switch on the Limiter.
3. Use the rotary controls to set the limiter attack time (ATT), release time (RLS), threshold level (THRS), look ahead delay (LAHD) and hold time (RATIO/HOLD).

The front panel displays update to show the relevant settings.

Note that the classic mc²66 provides 4 rotary controls. Page the controls to a second layer by pressing the **2nd** button.

The action of the limiter is best described by looking at the **LIMITER** graph and **DYNAMICS** gain reduction metering on the **Main Display**:

The Limiter parameters may be set as follows:

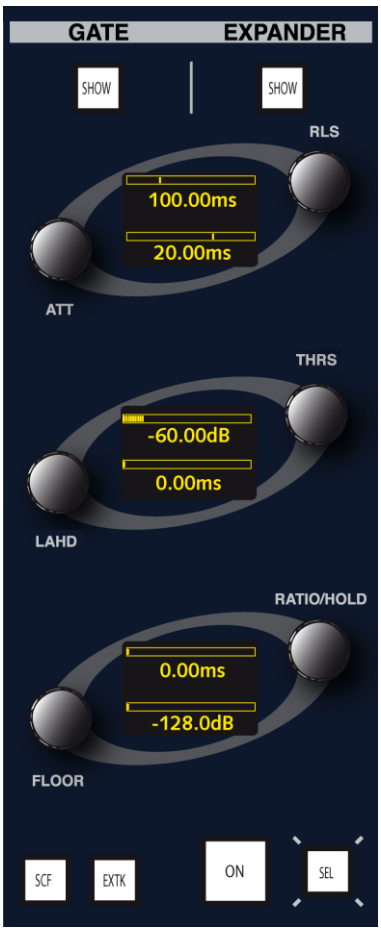
- Threshold Level – from -40dB to +20dB.
- Attack Time – from 0.29ms to 20ms.
- Release Time – from 40ms to 10s.
- Hold Time – from 0ms to 500ms.
- Look Ahead Delay – from 0ms to 10ms.
- Knee – hard or soft. This parameter is set from the **Main Display**. Use the trackball to set the **KNEE** option to either **hard** or **soft**.

Tip

For best results you should give the limiter the chance to 'see' signal peaks in advance by setting a look ahead delay of 5ms.

Filtering the Dynamics Sidechain

On both the GATE/EXPANDER and COMPRESSOR/LIMITER panels, you will find the **SCF** (Sidechain Filters) button.



1. Select GATE **SHOW** and press **SCF** to key the gate from the filtered sidechain.
2. Or, select COMPRESSOR **SHOW** and press **SCF** to key the compressor from the filtered sidechain.

Note that you may not select sidechain filtering for more than one section of dynamics processing.

3. To view the sidechain filter settings on the **Main Display**, assign the **SCF** module to the display, or if **SENSE** is already assigned, touch a sidechain filter control to update the **SENSE** area:

4. Now move over to the SCF/FILTER/EQUALIZER section and use the SCF (Sidechain Filter) controls as described on Page 219 to process the sidechain signal.

Note that you may audition the sidechain signal by using the **KEY** LISTEN function as described on Page 230.

For a smoother compressor, assign the 2-band sidechain filter to the compressor and set -10dB gain for a 18dB/octave low shelf at around 125Hz to remove unwanted low frequencies.

Tip

Dynamics External Key Inputs

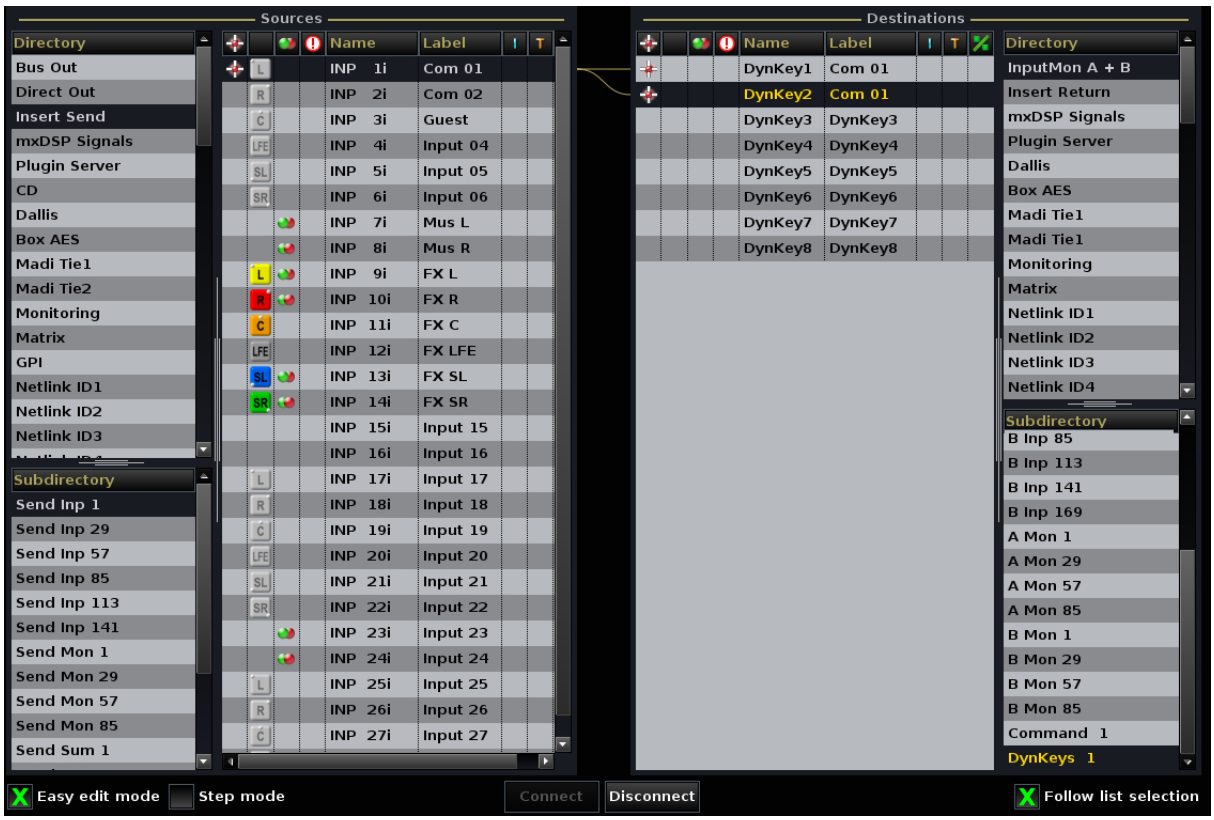
On both the GATE/EXPANDER and COMPRESSOR/LIMITER panels, you will find the **EXTK** (External Key) button.

The console supports eight external key inputs which can be assigned to any Gate or Compressor section. Each dynamics key may be routed from any source and each key may be assigned to one or more dynamics sections.

Routing the External Key Source

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:



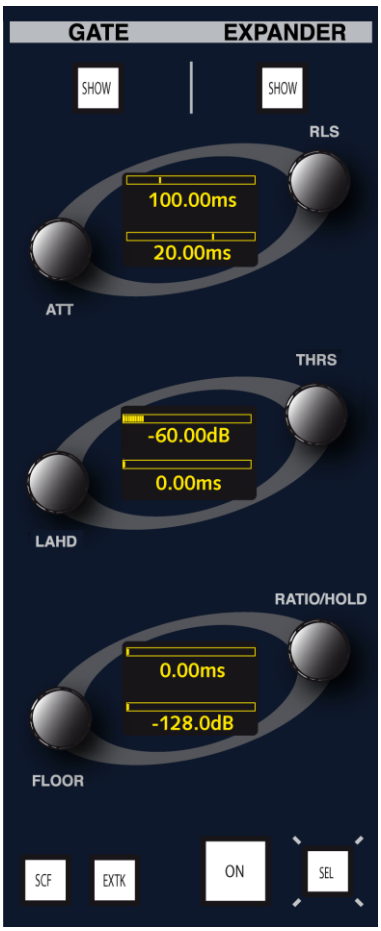
2. Select the subdirectory and connect sources to each dynamics key in the usual manner.

Tip

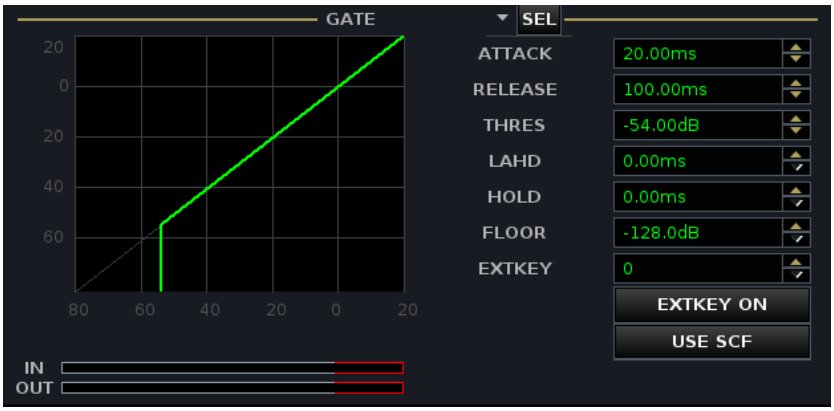
You can assign a physical input or internal signals such as a mix bus, insert send or direct out. For example, if you wish to trigger a gate from another channel, choose the channel insert send as the source for the key signal.

Assigning the Key to a Gate/Compressor

Each of the eight dynamics key signals can be assigned to any Gate or Compressor section from the **Main** display:



1. Enter the number (**Key 1** to **Key 8**) of the signal you wish to assign into the EXTKEY field:



2. Activate the key signal by enabling **EXTKEY ON** or pressing the **EXTK** button on the front panel.

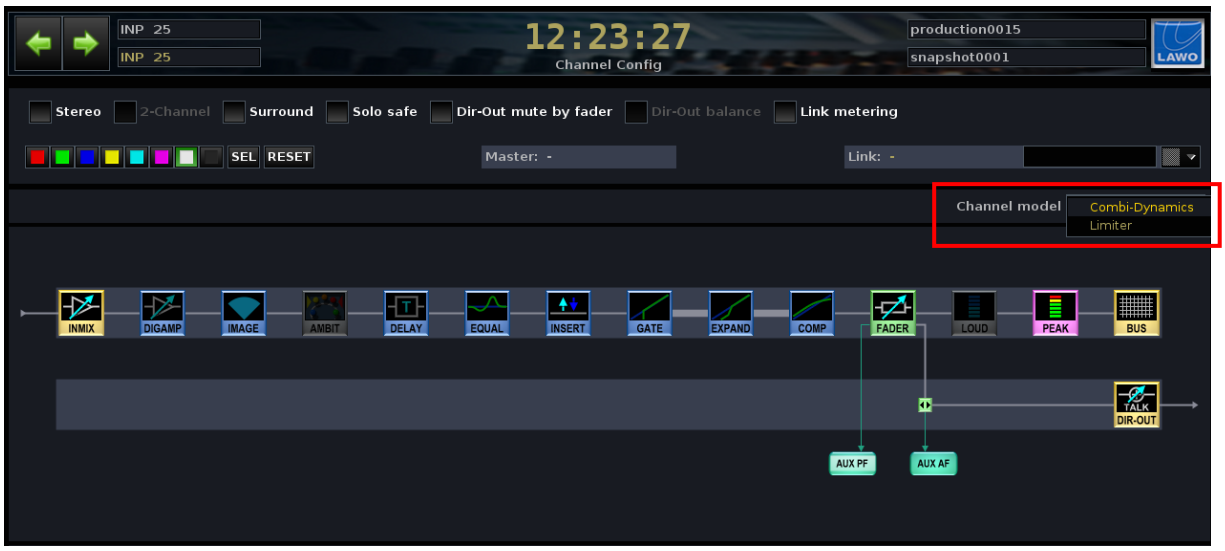
Note that you can assign a key signal to several dynamics sections if you wish.

Broadcast channel Dynamics

On Broadcast channels, each full processing channel has dynamics which can operate in one of two models:

- **Combi-Dynamics** – three modules: Gate, Expander and Compressor:
- **Limiter** – one module: a Limiter.

This option is selected from the **Channel Config** display for the channel in access (e.g. INP 25):



You can change the **Channel model** independently for each processing channel, and the status is stored as part of the channel signal flow. This allows you to use say Gating and Compression on one input channel, while applying a Limiter to another.

Tip

A quick way to set a range of channels to Combi-Dynamics, or Limiter, is to couple them and then change the **Channel model**. Alternatively, you can copy and paste the channel signal flow (**CH**) using the Parameter Copy/Assign panel, see Page 305.

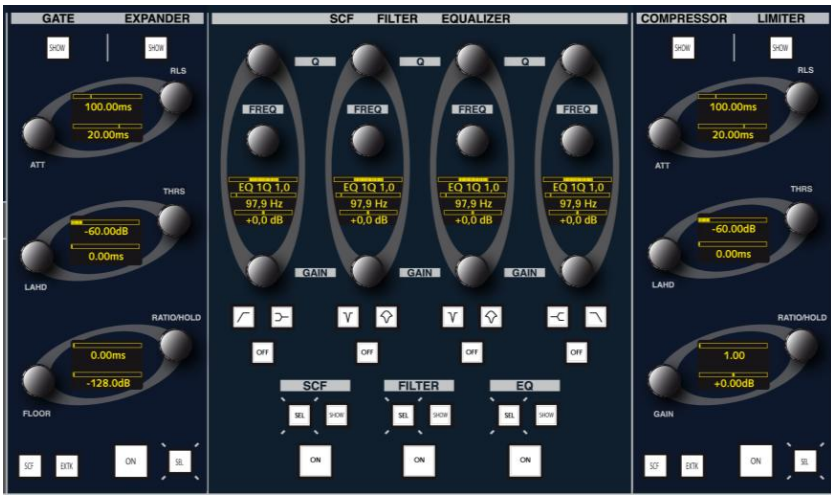
Note

Note that for surround channels, you may 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.

Note that Broadcast channels do not support sidechain filtering or external key inputs.

Note that the Limiter or Combi-Dynamics may be placed anywhere within the channel signal flow, but the order within the Combi-Dynamics is always Gate, Expander, Compressor. Please refer to Page 108 for details. Here we will deal with the operation of the front panel controls.

The GATE/EXPANDER and COMPRESSOR/LIMITER sections are used to control the dynamics processing. Press **SHOW** to access each section:



Depending on the dynamics model for the channel in access, some controls will appear black (unlit):

- **Combi-Dynamics** – does not support the Limiter, and therefore the LIMITER section is black (unlit).
- **Limiter** – does not support the Gate, Exapnder or Compressor, and therefore the GATE, EXPANDER and COMPRESSOR sections are black (unlit).

The **Main Display** reflects this within the MODULES list. Unsupported modules are greyed out, in our example: IMAGE, FILTER, SCF, LIMITER, UPX, SPZ:

Limiter Model

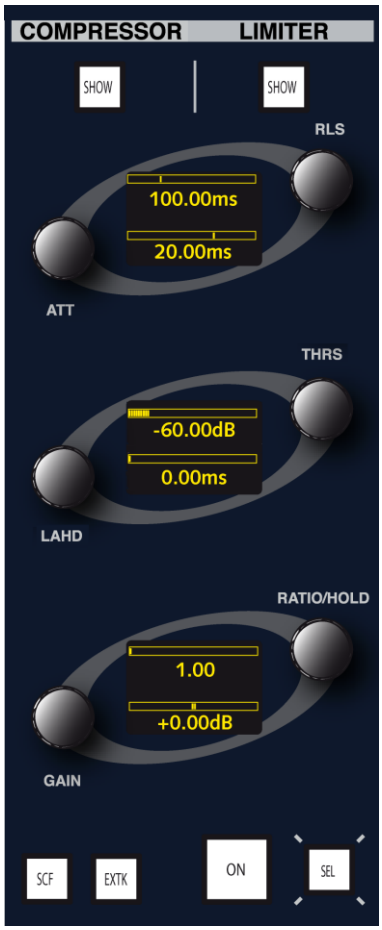
When the **Limiter** model is selected:

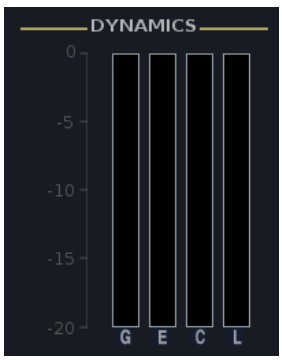
1. Press the LIMITER **SHOW** button to switch the controls to the limiter section. (On the classic mc²66, select the **LIM** button).
2. Press the **ON** button to switch on the Limiter.
3. Use the rotary controls to set the limiter attack time (ATT), release time (RLS), threshold level (THRS), look ahead delay (LAHD) and hold time (RATIO/HOLD).

The front panel displays update to show the relevant settings.

Note that the classic mc²66 provides 4 rotary controls. Page the controls to a second layer by pressing the **2nd** button.

The action of the limiter is best described by looking at the **LIMITER** graph and **DYNAMICS** gain reduction metering on the **Main Display**:





The **IN** and **OUT** meters show the levels to and from module. The **DYNAMICS** metering shows the amount of gain reduction when the limiter is active; the **L** lights in green if the limiter is turned on.

The Limiter parameters may be set as follows:

- Threshold Level – from -40dB to +20dB.
- Attack Time – from 0.29ms 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**.

Tip

For best results you should give the limiter the chance to 'see' signal peaks in advance by setting a look ahead delay of 5ms.

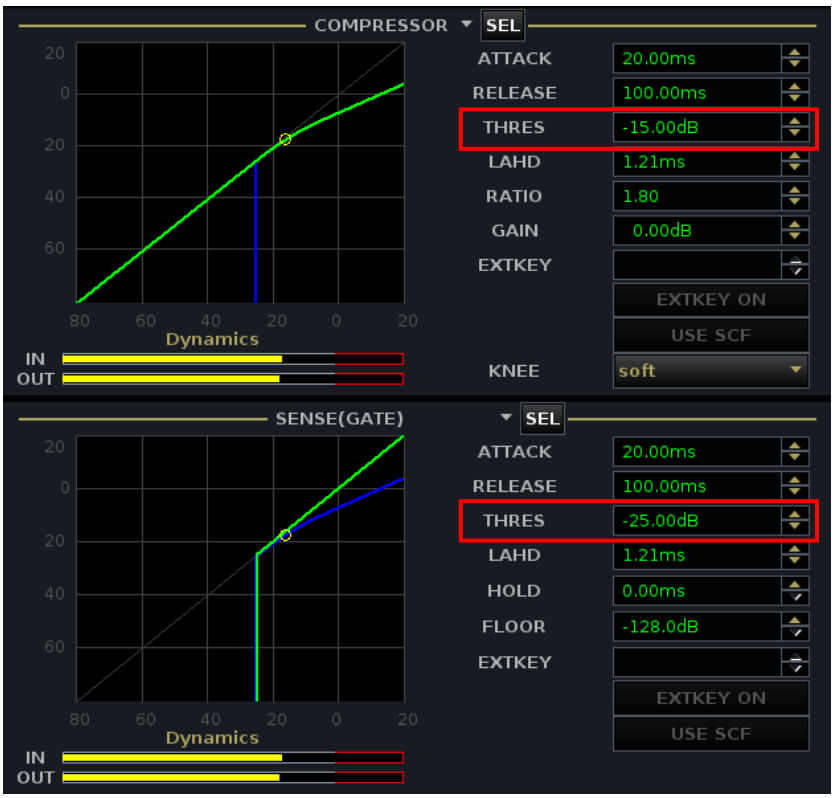
Combi-Dynamics Model

When the **Combi-Dynamics** model is selected, three dynamics modules can be adjusted: GATE, EXPANDER and COMPRESSOR.

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, please note the following:

- 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).

So, 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:

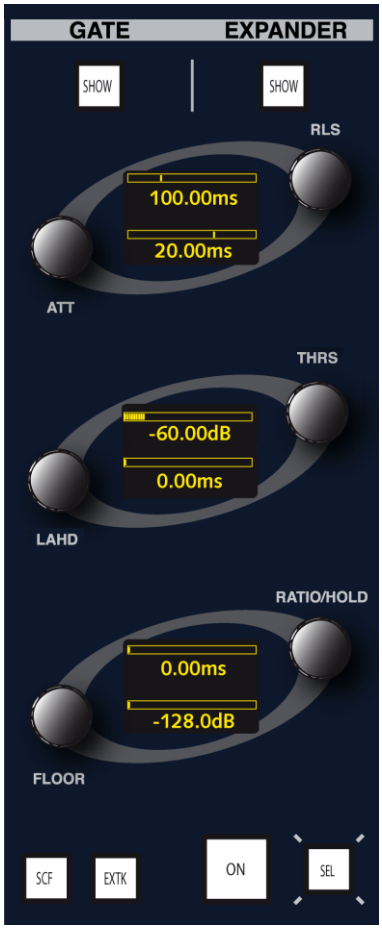


- There is one look ahead delay (LAHD) for the Combi-Dynamics sidechain. In otherwords, you cannot delay the Gate sidechain independently from the Compressor.

So, 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** (shown above) 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 (shown above) 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 Page 230 for details on the LISTEN function.

Setting a Gate

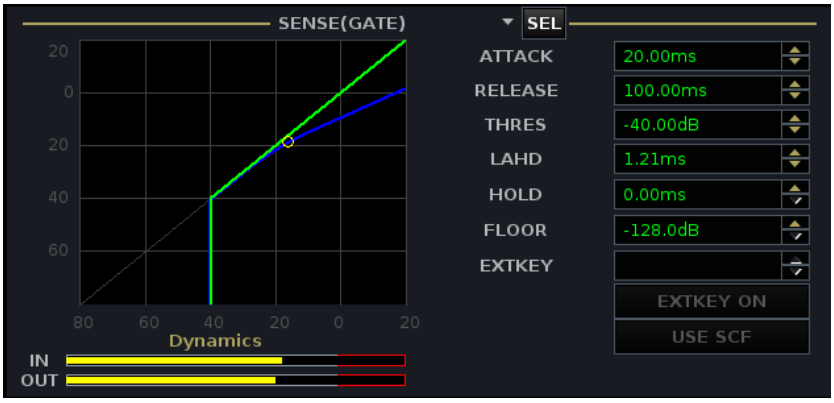


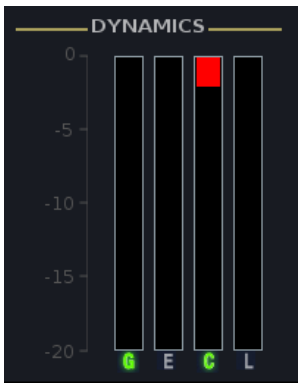
1. Press the GATE **SHOW** button to switch the controls to the gate section. (On the classic mc²66, deselect the **EXP** button).
2. Press the **ON** button to switch on the Gate.
3. Use the six rotary controls to set the gate attack time (ATT), release time (RLS), threshold level (THRS), look ahead delay (LAHD), floor level (FLOOR) and hold time (RATIO/HOLD).

The front panel displays update to show the relevant settings.

Note that the classic mc²66 provides 4 rotary controls. Page the controls to a second layer by pressing the **2nd** button.

The action of the gate is best described by looking at the **GATE** graph and **DYNAMICS** gain reduction metering on the **Main Display**:



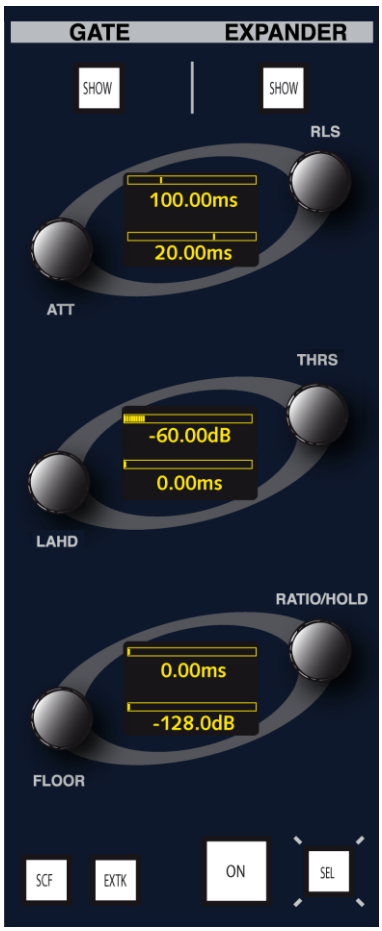


The **IN** and **OUT** meters show the levels to and from the Combi-Dynamics. The **DYNAMICS** metering shows the amount of gain reduction; the **G**, **E** and **C** light in green if the modules are turned on.

The Gate parameters may be set as follows:

- Threshold Level – from -80dB to 0dB (must be equal to or lower than the Expander Threshold.)
- 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 (look ahead delay affects all three Combi-Dynamics modules).

Using the Expander

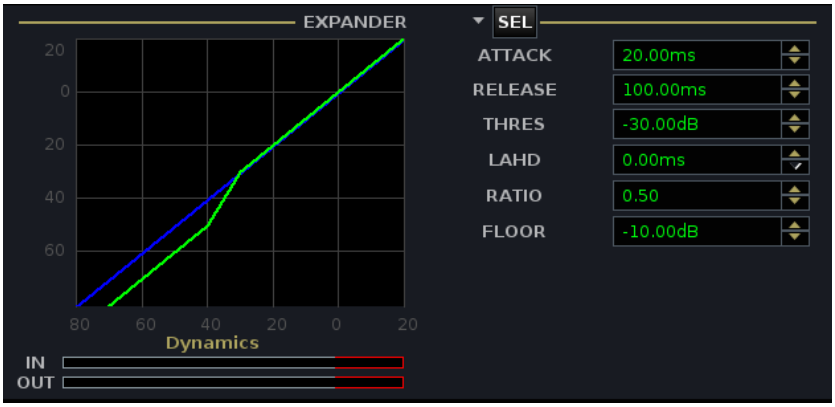


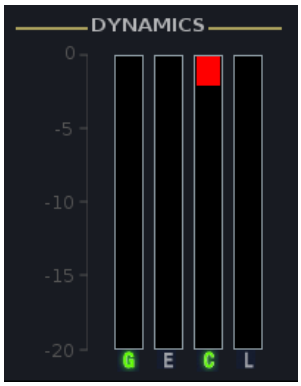
1. Press the EXP **SHOW** button to switch the controls to the expander section. (On the classic mc²66, select the **EXP** button).
2. Press the **ON** button to switch the Expander into circuit.
3. Use the six rotary controls to set the expander attack time (ATT), release time (RLS), threshold level (THRS), look ahead delay (LAHD), floor level (FLOOR) and ratio (RATIO/HOLD).

The front panel displays update to show the relevant settings.

Note that the classic mc²66 provides 4 rotary controls. Page the controls to a second layer by pressing the **2nd** button.

The action of the expander is best described by looking at the **EXPANDER** graph and **DYNAMICS** gain reduction metering on the **Main Display**:



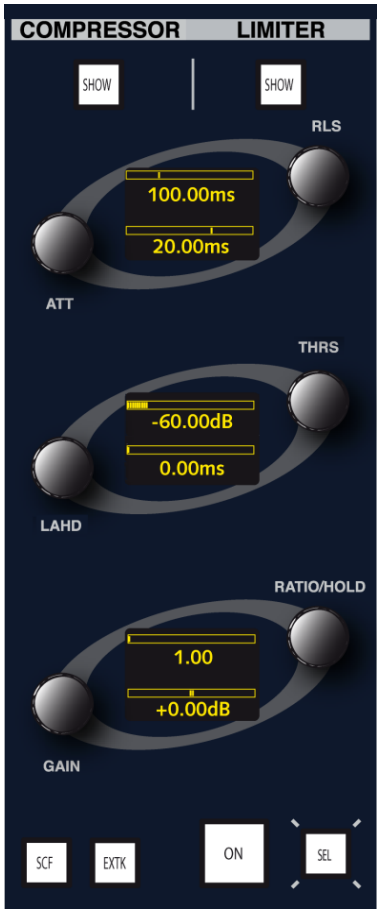


The **IN** and **OUT** meters show the levels to and from the Combi-Dynamics. The **DYNAMICS** metering shows the amount of gain reduction; the **G**, **E** and **C** light in green if the modules are turned on.

The Expander parameters may be set as follows:

- Threshold Level – from -80dB to 0dB (must be equal to or higher than the Gate Threshold, and at least 10dB lower than the Compressor Threshold.)
- 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 (look ahead delay affects all three Combi-Dynamics modules).

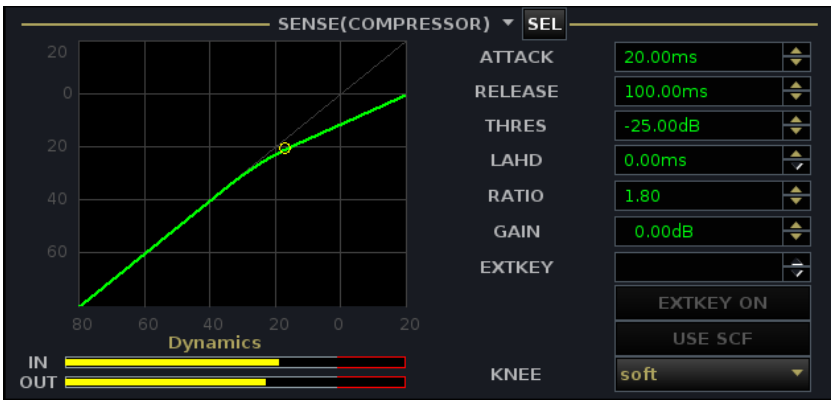
Setting a Compressor



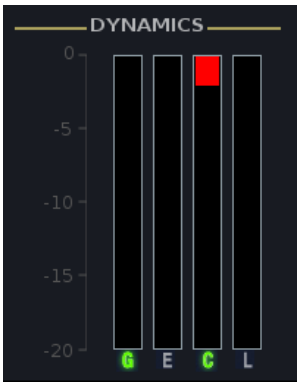
1. Press the COMPRESSOR **SHOW** button to switch the controls to the compressor section. (On the classic mc²66, deselect the **LIM** button).
2. Press the **ON** button to switch on the Compressor.
3. Use the six rotary controls to set the compressor attack time (ATT), release time (RLS), threshold level (THRS), look ahead delay (LAHD), GAIN and RATIO.

Note that the classic mc²66 provides 4 rotary controls. Page the controls to a second layer by pressing the **2nd** button.

The action of the compressor is best described by looking at the **COMPRESSOR** graph on the **Main Display**:



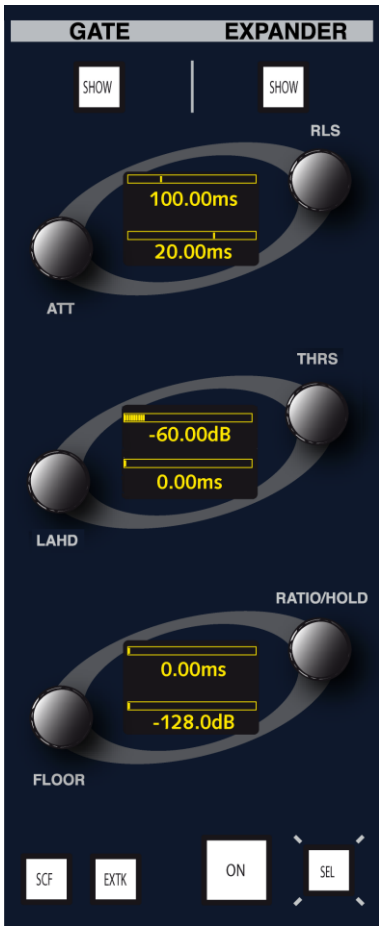
The **IN** and **OUT** meters show the levels to and from the Combi-Dynamics. The **DYNAMICS** metering shows the amount of gain reduction; the **G**, **E** and **C** light in green if the modules are turned on.



The Compressor parameters may be set as follows:

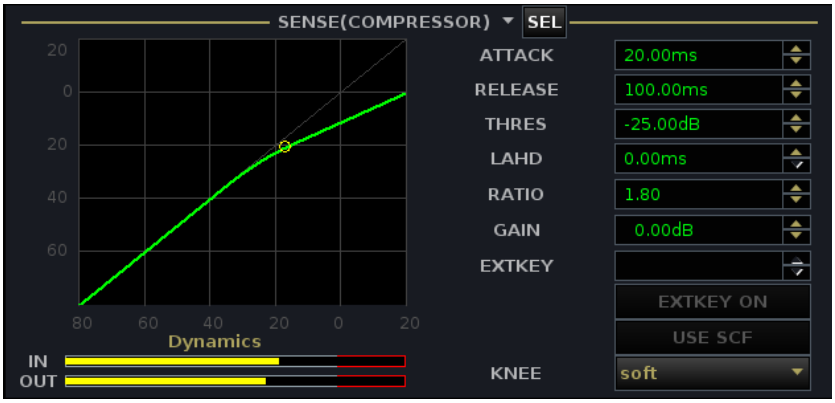
- Threshold Level – from -70dB to +20dB (must be at least 10dB higher than the Expander Threshold.)
- Ratio – from 1:1 to 10:1.
- Attack Time – from 0.29ms to 250ms.
- Release Time – from 40ms to 10s.
- Look Ahead Delay – from 0ms to 10ms (look ahead delay affects all three Combi-Dynamics modules).
- Gain – from -20dB to +20dB.
- 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**.

Other Controls



Broadcast channels do not support sidechain filtering or external key inputs. Therefore:

- The **SCF** keys cannot be selected to switch filters into the dynamics sidechain.
- The **EXTK** keys cannot be used to turn on an external key input. You will find the eight external key inputs remain within the **Signal List**, but they cannot be assigned to a dynamics module:

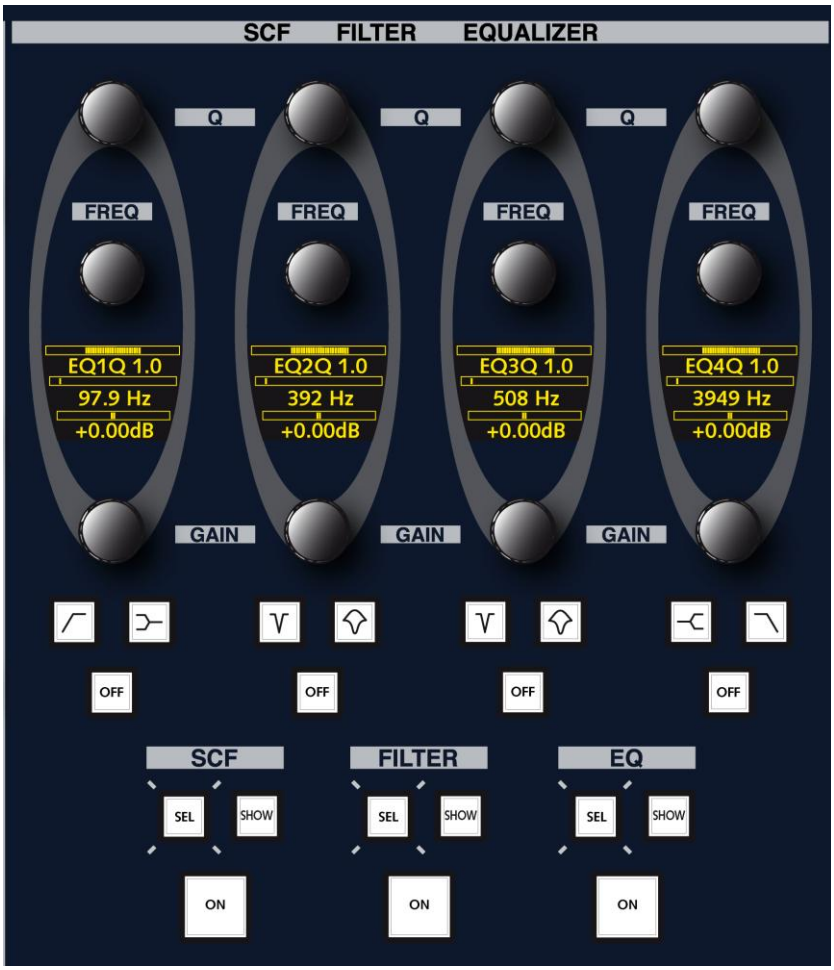


Equalisation and Filtering

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 may be arranged in any order within the channel signal flow and are controlled from the SCF/FILTER/EQUALIZER control area:



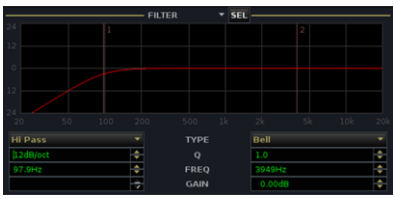
Four sets of dedicated GAIN, FREQ and Q/SLP controls, with band **OFF** and equalisation type buttons are provided.

1. Switch the four sets of controls between sidechain filters (SCF), main channel filters (FILTER) and the 4-band equaliser (EQ) using the **SHOW** (Display) buttons at the bottom of the panel.

Note that on Broadcast channels, if you press **SHOW** SCF or **SHOW** FILTER, then the controls appear black (unlit).

2. Press the EQ, FILTER or SCF **ON** buttons to turn each module on or off.
3. Now adjust the GAIN, FREQ and Q settings.

*The **Main Display** provides valuable feedback on your parameter values. You can view the **EQ**, (and **FILTER** or **SCF** modules 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. Press the EQ type buttons to change 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

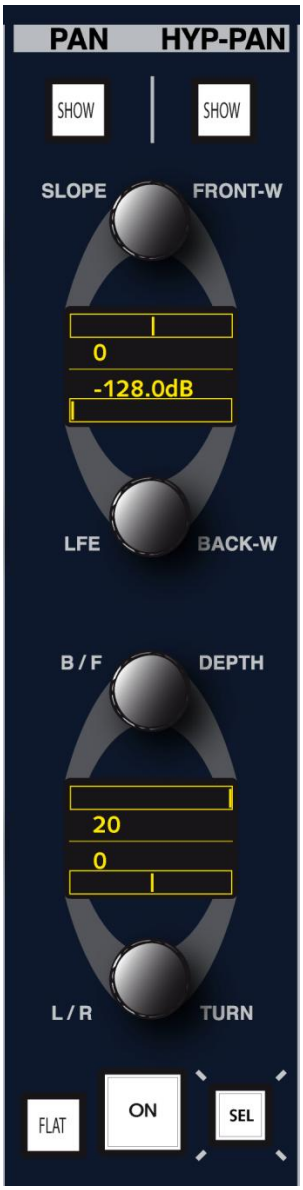
Note that if you load a Recording channel EQ setting to a Broadcast channel (e.g. using a Preset), and the stored parameter lies outside the range supported by Broadcast channels, then the closest available value is applied. For example, if the preset is attempting to load a 3rd order filter, then a 2nd order filter (the maximum) is applied.

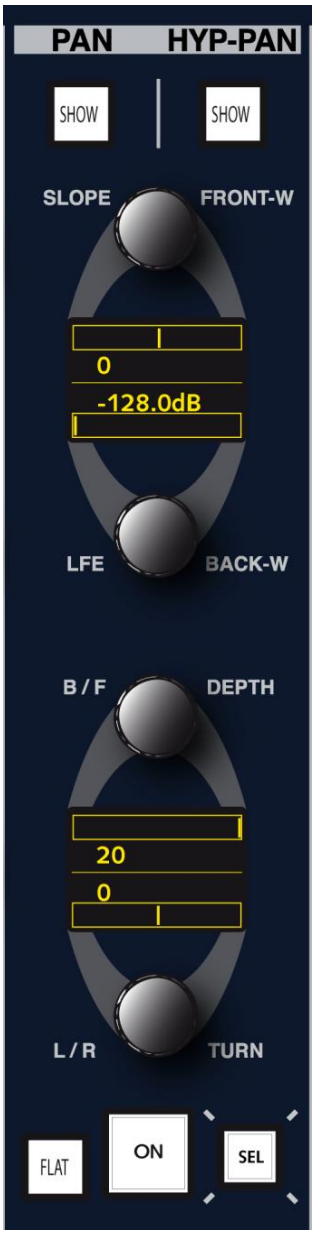
PANNING

Depending on the output format of your bus master, the PANNING controls provide stereo or multi-channel surround positioning. Note that the controls operate in one of two modes:

- **X/Y PAN** – conventional X/Y pan positioning.
- **HYPER PAN** – a new mode, ideal for adjusting the position of a surround source within a surround field.

In this section, we will deal with X/Y panning and using the console's joystick. For details on Hyperpan, see Page 284.





X/Y Panning

The following description explains panning from a mono channel. For more details on panning from a stereo channel, please refer to Page 263.

1. First switch the panning section into circuit by pressing the **ON** button at the bottom of the PANNING section.

Note that if your channel is only routed to a mono output, then the panning section cannot be turned on; you must be routed to either a stereo or surround output for panning to be active.

2. To operate the panel in conventional X/Y mode, press the HYP-PAN **SHOW** button and check that the **ON** button is off.

This turns hyperpan off.

3. Return to X/Y mode by selecting PAN **SHOW**.

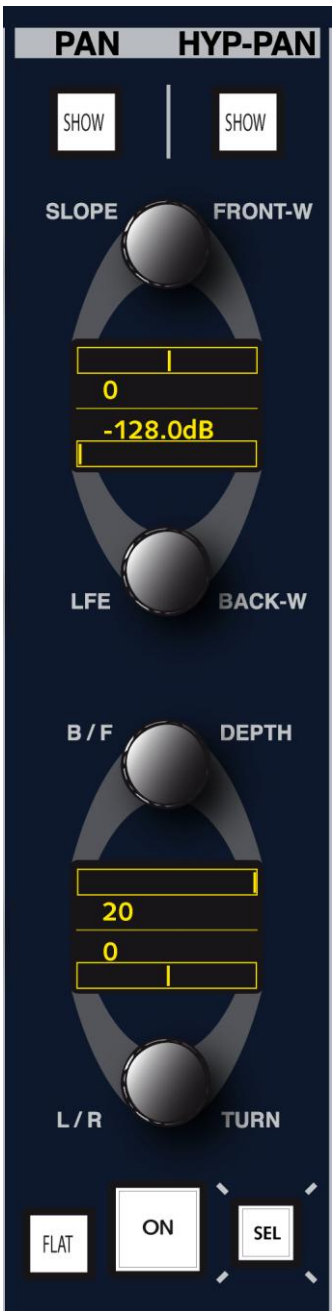
The status of your X/Y pan position is always shown on the **Main Display**. You can also use this display to check that **PANNING** is on (green) and Hyper Pan mode off (**HYP** is grey):

4. Use the lower rotary control to adjust the left/right pan position (L/R).

5. You can view a graphical representation of the pan position by assigning the PANNING module to the **Main Display**:

Note that the PANNING module normally follows the channel in access. However, if you are using the **FREEZE** function to lock the joystick to a particular channel, then the Central Control channel and the panning channel may be different. Therefore, the CHANNEL name is always shown on the **Main Display** – in our example, **INP 7**.

Note that the LFE, B/F and SLOPE rotary controls are inactive when panning onto a stereo bus.



When panning onto a surround bus:

1. Use the B/F control to adjust the Front/Back pan position.
2. The LFE control adjusts the level to the Effect (LFE or subwoofer channel).

*The **LFE** level may be set from -128dB to +15dB.*

3. The SLOPE control adjusts the slope of the channel

This control adjusts signals feeding to the discrete centre channel within the surround field, and may 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 Appendix B for more details on the effect of the SLOPE control.

4. The level of signal feeding the centre channel is also affected by the selection of the **FLAT** button.

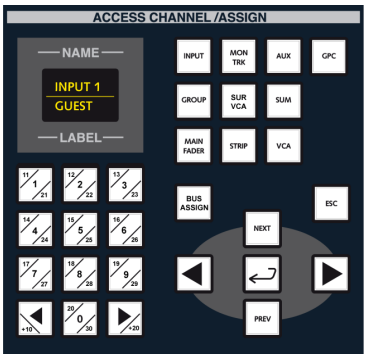
The default (**FLAT** off) is to apply level compensation as you pan across left, centre, right channels. Select **FLAT** on if you wish the level feeding the centre channel to remain constant as you pan across the LCR speakers.

Using the Joystick

In X/Y Panning mode, the joystick provides another method of adjusting the X/Y pan position:

Note that the joystick will follow the Central Control Section unless you use the **FREEZE** button as follows:

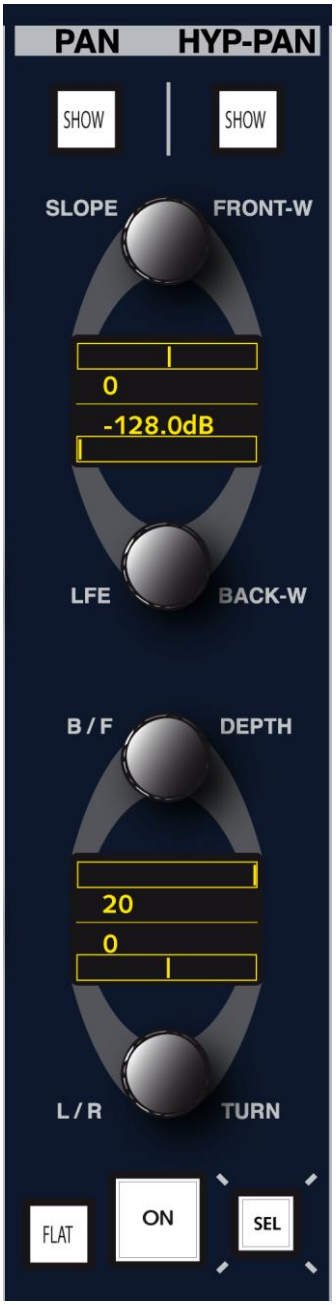
1. First make sure that **FREEZE** is deselected.
2. Update the channel in access, either by pressing the **SEL** button on a fader strip or selecting the channel type and number using the **INPUT**, **MON TRK**, **AUX**, **GPC**, **GROUP**, **SUM**, and **VCA**, **MAIN FADER** or **STRIP** buttons and numeric keypad.



The channel is assigned to the Central Control Section (and the joystick).

3. Select **FREEZE** to lock the assignment.

The joystick remains 'locked' to the assigned channel until you deselect **FREEZE**. When **FREEZE** is active, the channel in access may 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**:

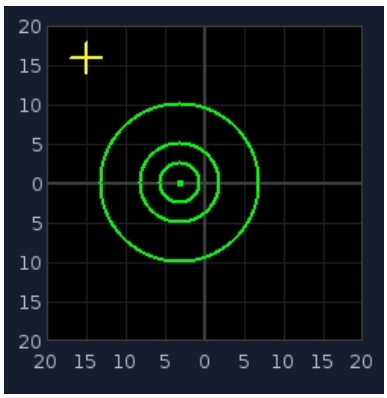


Once assigned, you can use the joystick to control the channel's X/Y pan position:

1. Check that panning is on and hyperpan is off (using the PAN/HYP-PAN panel).
2. Activate the joystick by pressing the **ON** button below:

- If the joystick is motorised, then it will automatically move to the current pan position of the channel, and the **CATCH** button will light. Move the joystick to change the pan position.
- If the joystick on your console is not motorised, then the joystick may be in a different position to the current pan position. You can either:
  - Press **CATCH** to change the pan position to the position of the joystick.
  - Or, move the joystick to 'catch' the channel; nothing happens until you move the joystick through the current pan position. At this point, the **CATCH** button lights to indicate that you now have control and are changing the panning.

Note that if the joystick position is different from the current pan position, then this is indicated within the **Main Display** panning window. 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.

The joystick motor is enabled or disabled from the **System Settings** display and saved within the production. Note that the joystick motor cannot be enabled on US systems.

3. Move the joystick left or right to control the Left-Right pan position.
4. Move the joystick up or down to control Front-Back (Y-axis).

Y-axis movements are ignored when panning onto a stereo output.

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.


Tip

You may also enable a notch for the joystick which provides tactile feedback when using the joystick. See Page 683 for details.

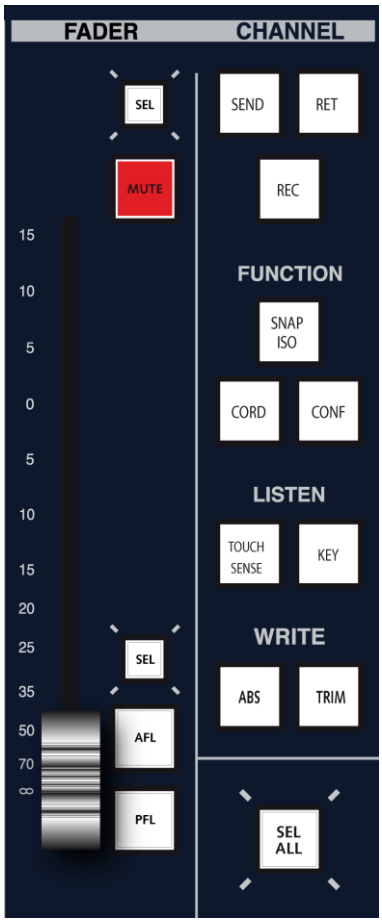
5. You may disable the joystick panner to protect the current pan positions of the channel in access by turning **ON** off.

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, please refer to Page 284 for more details.

The **REVEAL** button is used with surround and VCA master channels as described on Page 278.

FADER, MUTE, AFL and PFL



Within the FADER section you will find a dedicated fader, mute and AFL/PFL monitoring controls:

1. The fader provides convenient local control of level while using the Central Control Section.

*As you adjust the fader position, the **FADER GAIN** box updates on the **Main Display**.*

2. Press the **MUTE** button to mute the channel.

Note that the Mute button may be set to one of two options from the **System Settings** display, see Page 652:

- Fader Mute – mutes post fader signals. Use this option when you wish to mute post fader signals but not pre fader signals such as the auxiliary pre fader sends.
- Channel Mute – mutes post fader signals, the insert send and the output of the INMIX section. Use this option when you wish to mute both pre and post fader signals.

In addition, mute buttons may be disabled to prevent accidental muting of channels, see Page 651 for details.

3. Press **AFL** to listen to the post fade channel signal.
4. Press **PFL** to listen to the pre fade channel signal.

Depending on your monitoring configuration, AFL and PFL signals may appear on the Control Room 1, Control Room 2 or external monitor speakers. In addition, you may have access to AFL to Mains and PFL to Mains switching from the programmable MONITORING panel buttons. These settings are programmed within the factory configuration; please refer to your console's specification for details.

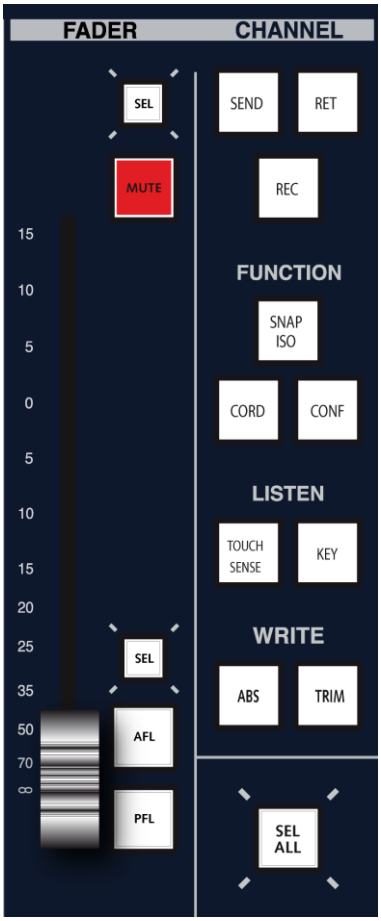
Note that a number of options may be set for AFL, PFL and Solo-in-Place within the **System Settings** display, see Page 672 for details.

Tip

Both PFL and AFL are stereo Busses, enabling you to listen and pan a channel pre fader before sending it to the mix. In addition, depending on your DSP configuration, the AFL bus may be multi-channel, enabling you to listen non-destructively to your surround mix.

CHANNEL

The CHANNEL controls include several sets of buttons for monitor channel control; mix minus activation; snapshot protection; module AFL; and oversnap status selection.



Monitor Channel Input Control

The **SEND** and **RET** buttons are only active on monitor channels and provide input source selection as follows:

- Press **SEND** to monitor the track send to the recorder.
- Press **RET** to monitor the track return from your recorder.

The **REC** button can be used to record arm the recorder depending on your machine control configuration.

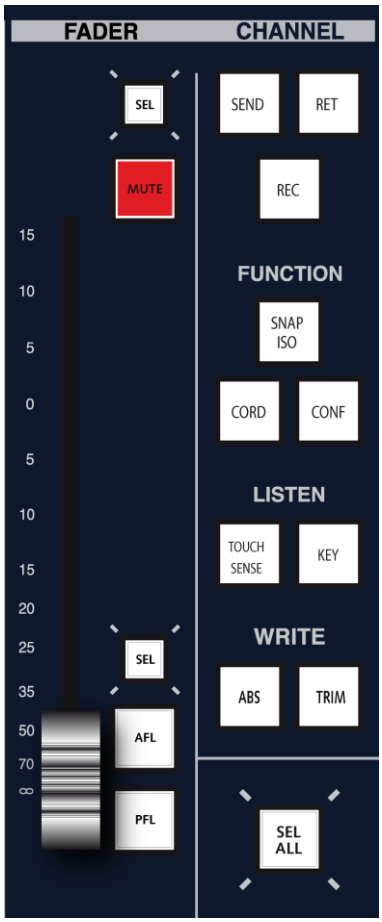
For more details on monitor channels and configuring the console for multitrack recording, please refer to Page 159.

Function Controls

The **SNAP ISO** button is used to isolate the channel strip from a snapshot recall. If a snapshot is recalled, all settings on the isolated channel remain unchanged. Note that a system option provides the ability to disable all **SNAP ISO** buttons across the console, see Page 651 for details.

The **CORD** and **CONF** buttons are used for mix minus activation as described on Page 243.

LISTEN Controls



The LISTEN buttons are used to provide AFL monitoring for individual audio module within the Central Control Section. Note that the selection of the Listen Latch mode in the **System Settings** display sets latching or momentary operation, see Page 656.

Pressing the **KEY** button allows you to AFL the dynamics sidechain. For example, to audition sidechain filtering applied to a compressor or AFL a channel pre the dynamics section. Note that the **KEY** function can only be used on Recording channels:

1. Select **KEY** from the LISTEN buttons.

The button flashes.

2. Touch any of the compressor controls.

*You are now monitoring the compressor sidechain on your AFL bus; the Sidechain Filter **SEL** button illuminates to indicate this.*

If LISTEN mode is sensing, the AFL cancels when you let go of the controls.

3. Alternatively, if LISTEN mode is latching, deselect the **KEY** button, press **ESC** or press **CLEAR AFL/PFL** to cancel AFL monitoring.

The **TOUCH SENSE** button is used to turn each module's **SEL** button into its own AFL enable. For example, to AFL post EQ:

1. Press **TOUCH SENSE** from the LISTEN buttons.

The button flashes.

2. Now touch an Equaliser control.

You are now monitoring the output of the Equaliser section on your AFL bus.

If LISTEN mode is sensing, the AFL automatically cancels when you stop touching the control.

3. Alternatively, if LISTEN mode is latching, deselect the **TOUCH SENSE** button, press **ESC** or press **CLEAR AFL/PFL** to cancel AFL monitoring.

Note

Note that you may 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!

WRITE Controls

The **ABS** and **TRIM** buttons within the CHANNEL section are used in conjunction with the Central Control Section's **SEL** buttons to define the write status for oversnaps (snapshot offsets). Please see Page 441 for more details.

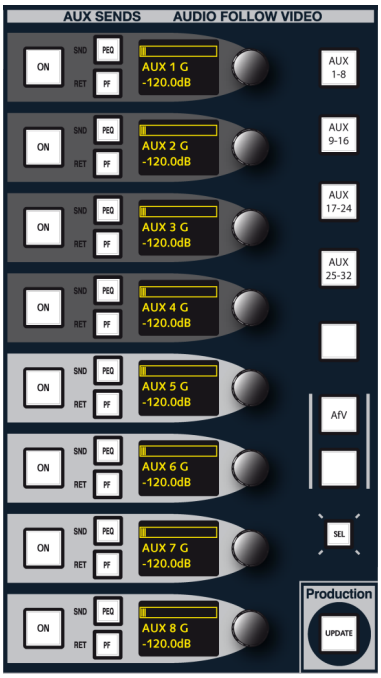
Note

Note that on the classic mc²66, the **ABS** and **TRIM** buttons are located on the SNAP/SEQUENCE panel (below COMPARE).

AUX SENDS/AUDIO FOLLOW VIDEO

The area to the right of the centre control screen provides access to the channel's auxiliary sends and audio follow video (AFV) functionality.

Auxiliary Sends



Each channel may access up to 32 auxiliary sends, which are paged onto the eight rotary controls using the access buttons at the bottom of the panel:

1. Press **AUX 1-8** to assign the first eight auxiliary sends onto the rotary controls.

*The names **AUX 1** to **AUX 8** appear in the alphanumeric displays showing which send is allocated to each control.*

2. Press the **ON** button to activate the auxiliary send.

*Notice that when you turn sends on and off, the AUX 1 to 32 boxes on the **Channel** display update to reflect your assignments.*

3. Now use the rotary control to adjust the send level.

The send level may 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 only) to switch to pre EQ.

The bus assign boxes on the **Channel** display are colour 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: white writing on green/white – e.g. Aux 8.

The aux send options vary slightly between Recording and Broadcast channels:

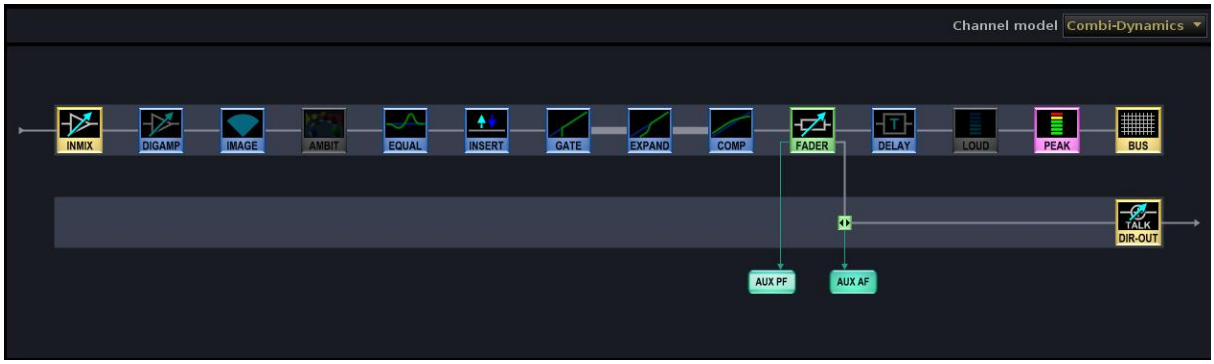
Aux Send	Recording channels	Broadcast channels
Pre EQ	✓	×
Pre Fader	✓	✓
Post Fader	✓ (pre-bus)	✓ (after fader)

Note

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:

Input Channel (Broadcast channel DSP Configuration)



See Page 108 for more details on changing the channel signal flow.

5. Press the **AUX 9-16**, **AUX 17-24** or **AUX 25-32** buttons to access the remaining auxiliary sends for the channel.

Note that auxiliary send levels may also be controlled from faders using the FADER CONTROL feature, see page 364 for details.

The **SEL** button is used to select the aux sends, in groups of 8, for operations such as copy or reset, channel linking, etc.

Auxiliary Master Channels

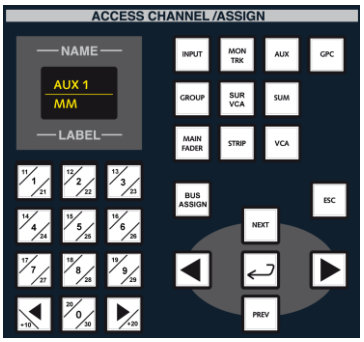
Remember that each auxiliary master channel may be assigned onto a channel or main fader strip, in the same way as you would assign an input channel to a fader. This creates a fader strip auxiliary master with access to full or tiny channel processing depending on your DSP configuration.

For more details on how to assign auxiliary masters to the control surface, please refer to Page 147. Assuming that you have assigned your auxiliary masters onto a series of fader strips, here a few reminders of what you can do with auxiliary master channels:

- Control the level, mute, AFL and PFL and assign free controls as you would for an input channel. See Page 249.
- Apply full signal processing, using the Central Control Section. See Page 181.

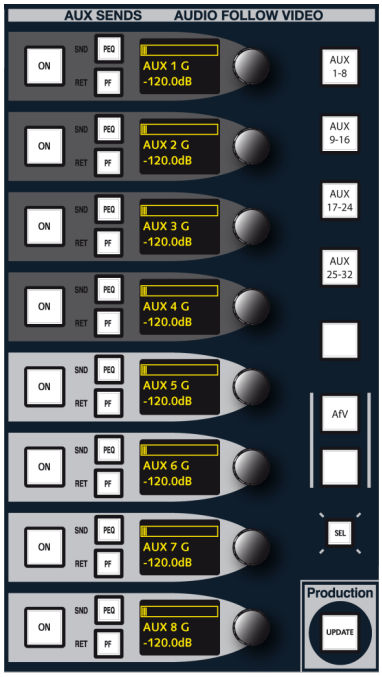
Stereo Auxiliary Sends

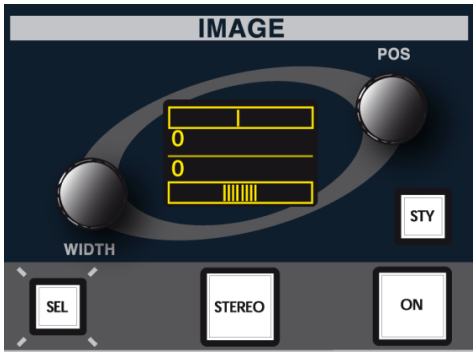
Stereo sends are created by linking adjacent mono sends (e.g. Aux 1&2, Aux 3&4, etc.). Any number of sends may be set to mono or stereo and the configuration is stored as part of the production snapshot.



To make a stereo send, you change the auxiliary master channel from mono to stereo, in the same way you would change an input channel from mono to stereo:

1. Assign the auxiliary master fader strip to the Central Control Section by pressing the fader strip **SEL** button.
2. Or, selecting an **AUX** from the ACCESS CHANNEL/ASSIGN control panel, by pressing **AUX** and the number followed by the Enter button.
3. Now go to the IMAGE section of controls and press **STEREO**.





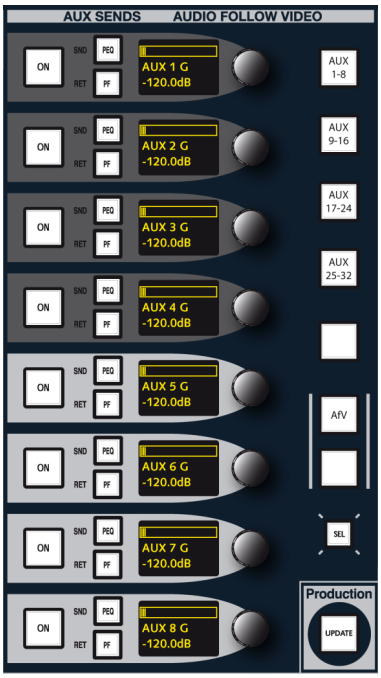
*This changes the auxiliary master channel to stereo, as indicated by the stereo meter on the **Channel** and **Main Display** and the **STE** indicator beside the fader.*

4. Now re-assign an input channel which is feeding the stereo auxiliary master to the Central Control Section.
5. Access the appropriate bank of sends using the **AUX 1-8, AUX 9-16**, **AUX 17-24** or **AUX 25-32** buttons as before.
6. Notice that when you press the **ON**, or **PEQ** and **PF**, buttons on either of the odd or even sends, the functions are linked for stereo operation.
7. Use the rotary control on the left to set the level of the aux send.
8. Use the rotary control on the right to adjust the pan position, or stereo balance if routed from a stereo input channel.

Note

Note that by default the pan (balance) onto a stereo aux send is linked to the channel pan position. You can disable this option from the **System Settings** display, see Page **659** for details.

Surround Auxiliary Sends



You can also create surround auxiliary sends by configuring any block of 8 aux master channels (e.g. Auxes 1-8, 9-16, 17-24 or 25-32) as a surround output.

Surround aux outputs are created in the same way as surround group or sum outputs so please refer to Page 269 for details. Having made the surround output:

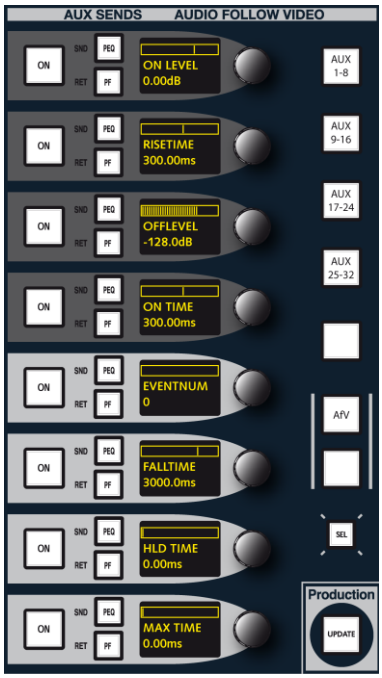
1. Assign an input channel which is feeding the surround auxiliary master to the Central Control Section.
2. Access the appropriate bank of sends using the **AUX 1-8, AUX 9-16**, **AUX 17-24** or **AUX 25-32** buttons as before.
3. When you press an **ON** button, all linked aux send channels are turned on.

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.

4. Use the first aux in the surround group to adjust the level of all aux sends within the surround group.

Note that the panning onto a surround aux send is always linked to the channel pan position.

Audio Follow Video



AFV 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 may program the audio channels associated with each camera to automatically open and close as the picture cuts between different shots.

Up to 128 events may be programmed; connections to the external controller are made via one of the console's Ethernet ports and one event relates to one Tally of the video mixer. Please refer to the mc²66 Technical Manual for full details.

Assuming that you have connected the external controller, and have the channel you wish to control assigned to the Central Control Section:

1. Press **AFV** on the AUX SENDS/AUDIO FOLLOW VIDEO panel.

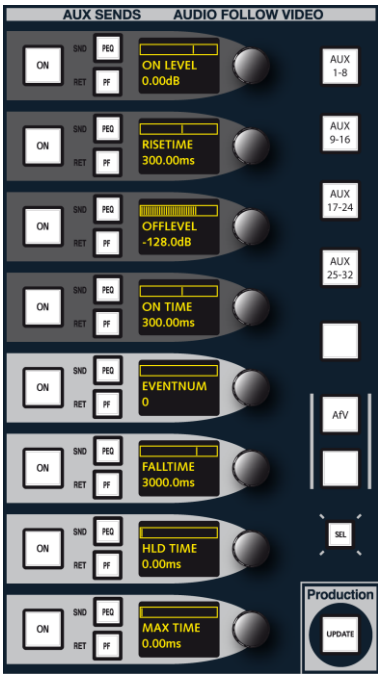
The eight rotary controls switch to AFV functions as indicated on the alphanumeric displays.

2. Use the **EVENTNUM** control to assign the external event. Up to 128 events can be assigned for AFV functions. Scroll the rotary control until the correct event number for your Ethernet port configuration is selected.

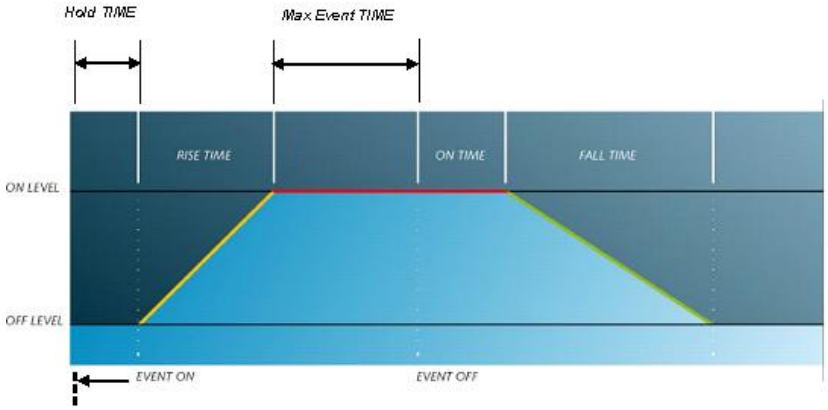
*The event number appears beside the control and on the **Main Display** when the AFV module is assigned:*

Active events are numbered from 1 to 128. Select 0 for no event.

3. Enable AFV for the channel by selecting the **ON** button beside the **ON LEVEL** control.
4. To action the event locally from the console, press the **EVENTNUM** control **ON** button.



You will see the fader which you are programming open according to the following event settings:



- **On Level** – this is the level which the fader will open to when triggered by the AFV event. Use the **ON LEVEL** rotary control to adjust the level from -128dB to +15dB.
- **Off Level** - this is the level which the fader will close to when the event is switched off. Use the the **OFFLEVEL** rotary control to adjust the level from -128dB to +15dB.
- **Hold Time** – use the **HLD TIME** control to delay the opening of the fader after the event on trigger.
- **Rise Time** – use the **RISETIME** control to set the time taken for the fader to move from off to on level after the hold time has expired.
- **Max Event Time** – use the **MAX TIME** control to set the amount of time the fader will stay open for, even if the event is not switched off.
- **On Time** – use the **ON TIME** control to set the amount of time the fader stays at the on level after the event has switched off.
- **Fall Time** - use the **FALLTIME** control to set the time taken for the fader to move from on to off level.

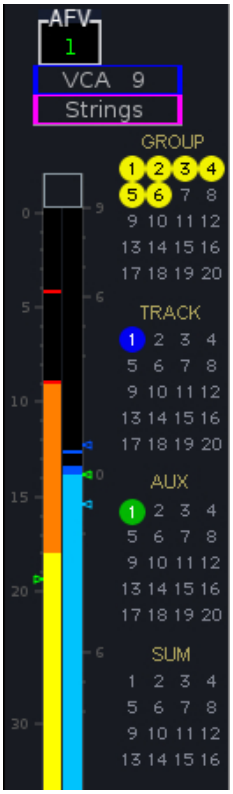
Each of the time adjustments may be set from 0 to 10 seconds.

Now sit back and watch your fader(s) open and close from the AFV event controller! Or press the **EVENTNUM** control's **ON** button to action the AFV event locally.

Note that you can manually override a fader at any time, for example, to temporarily 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.

Tip

*The **Main Display** shows the progress of the AFV event when the **AFV** module is assigned: 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 may link as many channel or main faders to external events as you wish, providing flexible AFV control for individual and groups of faders.

AFV assignments are shown across the console at the top of the **Channel** display.

Note that if channels are grouped to a VCA master which is controlled by Audio Follow Video, then the slave faders may be automated by the AFV master event. If you do not wish the slave levels to be automated by the AFV master, then deselect the AFV enable (**ON** button beside the **On Level** control) on the slave channels.

Tip

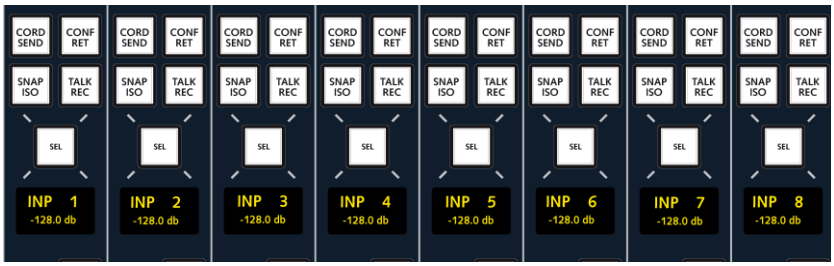
There is an option to set Audio Follow Video either on or off for all channels from the **System Settings** display, see Page 652.

Mix Minus (N-1) and Conference Sends

The **mc²66** may use any of its 32 auxiliary sends or 96 track busses to create mix minus (N-1) or conference-style communications feeds.

Note that track busses (monitor channels) must be configured within the DSP Configuration, see Page 122. The only difference between using an Aux and a Track bus for mix minus operation is that Track busses do not offer a send control. You can use the **Channel Config** display to move the DIGAMP module into the track bus; this can then be used to adjust the send level onto the mix minus Track bus if required.

Any number of auxiliary sends and/or track busses may be configured for mix minus operation from the **Signal Settings** display. Once configured, the mix minus is then controlled from the fader strip's **CORD**, **CONF** and **TALK** buttons:



Note that the **CONF**, **CORD** and **TALK** buttons are user buttons which can be re-configured from the **Custom Functions** display. If they are not programmed onto the channel user buttons, then they can be accessed from the Central Control Section's CHANNEL controls.

- The conference (**CONF**) buttons activate any corresponding mix minus sends.

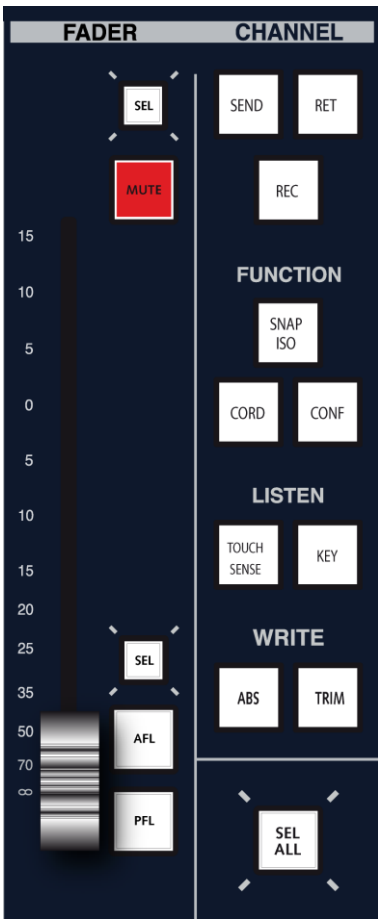
For example, if three remote sources have been configured for mix minus operation, then pressing the **CONF** buttons on all three channel strips activates the individual N-1 sends.

- The **CORD** button changes the mix minus from an N-1 into a pre-talk auxiliary send.

Use this mode when you wish to generate a conference-style feed for your guests and presenters. All channels with **CORD** selected contribute to the feed such that members can talk to each other pre-fader while they are off-air. However, as soon as their channel fader is opened and they are on-air, their conference auxiliary feed is muted.

- Depending on your talkback configuration, the **TALK** button may be used to talk to the mix minus.

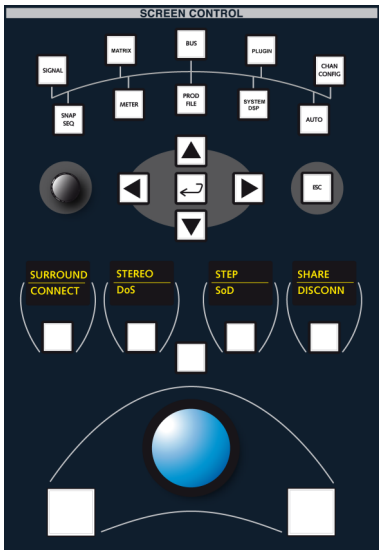
Note that each mix minus is linked to the input source, rather than the DSP channel. This means that if you route the input source (e.g. MIC 8) elsewhere, the mix minus operation automatically follows.



Note

Configuring Mix Minus Auxiliary Sends

The first step is to configure the bus to be used for each mix minus feed. This is done from the **Signal List** and **Signal Settings** displays by linking the auxiliary or track bus you wish to use to the input signal. To keep things simple let's use auxiliary sends 1 to 3 for our configuration:



1. Press the **SIGNAL** button, located on the SCREEN CONTROL panel, to view the **Signal List** display.
2. Select the source you wish to configure – in our example, the source named **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 switch to the **Signal Settings** display:

This display is used to configure I/O settings for individual signals and to monitor the system status.

The two “trees” on the left of the display show the location of a signal within the **Signals** list (top) and its physical location in the **System** (bottom). Whenever a different signal is selected from the **Signals** list the **System** tree follows and vice versa.

The **Signals** and **System** trees should have automatically opened to reveal your selected source – **Mic1**. If not, then go back to the **Signal List** display and check that the **follow list selection** option is checked.

5. With the correct source selected on the left of the display, click on the **Conference** tab to access the Mix Minus parameters:

Two parameters are available:

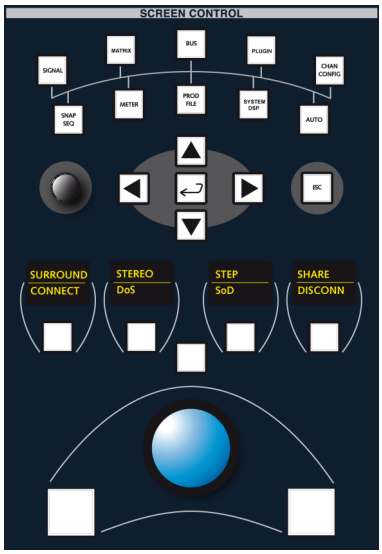
- **Mix minus Self Monitoring** – check this option if you wish to add the selected signal back onto the mix minus feed. For example, if the Talent wants to hear their own microphone.
- **Mix minus Bus** – use this field to assign an auxiliary send or a track bus as the mix minus return feed for the selected signal.

6. To assign the aux, click on the **Mix minus Aux** drop-down menu and select **Aux 1**:

7. Repeat these steps to configure auxiliaries 2 and 3 as the Mix-minus sends for Mic inputs 2 and 3.

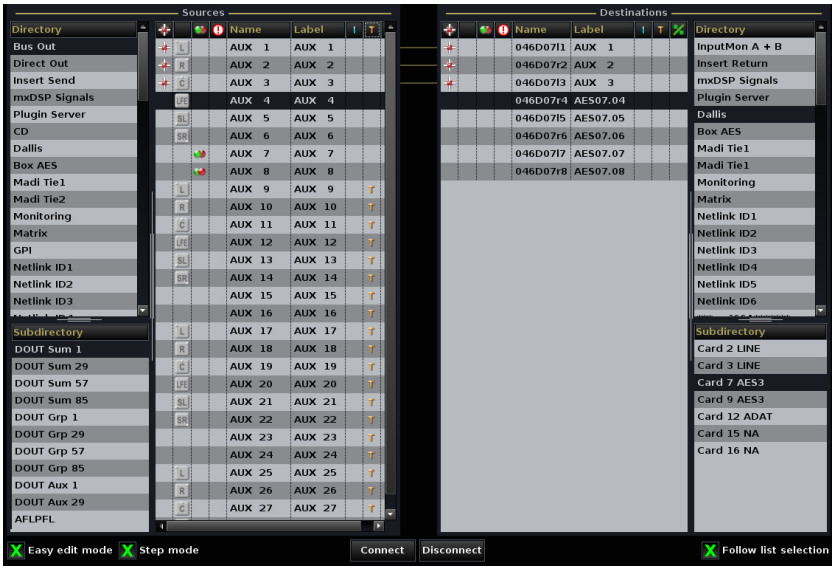
Having configured a link between the input sources and mix minus auxiliary sends, the next step is to route the output of the auxiliary sends to the relevant mix minus destinations. In this example, we want to route auxiliary 1, 2 and 3 to the hybrid feeds for our guest channels (AES outputs 1 to 3):

1. So return to the **Signal List** display by pressing the **SIGNAL** button again.
2. Select the source directory (**BUS Out**), sub-directory (**DirOut AUX X 1-16**) and **Name** or **Label** for the source you wish to route – e.g. **AUX 1**.
3. Then select the destination – e.g. **AES 1**.
4. To make the route press the **CONNECT** soft key.



*The **Signal List** display updates showing the connection.*

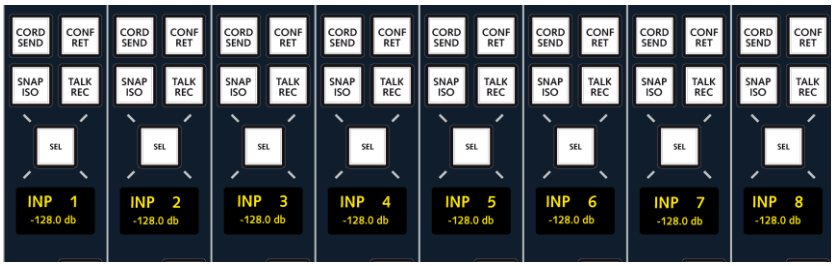
5. Repeat to route all three auxiliary send masters to the corresponding outputs for the mix minus feeds:



Activating the Mix Minus Sends

Having configured auxiliary sends 1, 2 and 3 to provide mix minus feeds for Microphone Inputs 1 to 3:

1. Go to the fader strips controlling MIC 1 to 3 and press the **CONF** buttons on all three channels:



The mix minus is automatically activated for each of the four channels.

Note that the **CONF**, **CORD** and **TALK** buttons are user buttons which can be re-configured from the **Custom Functions** display. If they are not programmed onto the channel user buttons, then they can be accessed from the Central Control Section's CHANNEL controls.

Note

2. Depending on your talkback configuration, the **TALK** button on each fader strip may be used to talk to the mix minus.
3. To add channels not within the coordination group to the mix minus, press their **CONF** buttons. For example, you may wish to send the output of several replay machines to all the mix minus recipients.

The channels are routed onto the mix minus bus; therefore feed all mix minus sends.

4. To control the master output level or AFL/PFL a mix minus send, assign the auxiliary master channels onto channel or main fader strips and use the fader, AFL or PFL buttons. For more details on assigning channels to fader strips, please refer to Page 147.

Tip

5. To meter the mix minus sends, use the **Channel** display metering on the auxiliary master channels.

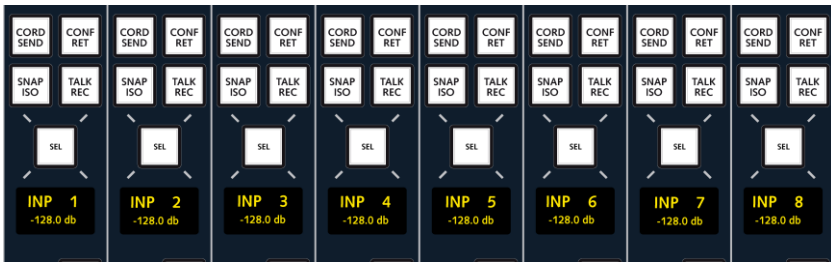
Each mix minus is linked to the input source, rather than the DSP channel. This means that if you route the input source (e.g. MIC 2) elsewhere, the mix minus controls follow.

Note that you can create an N-many send. For example, if you have three guests in the studio and remote feeds from New York and Australia, you could use auxiliary 1 to feed all three guests while auxiliary sends 2 and 3 feed New York and Australia. To set this up, follow the same configuration operations, but select Auxiliary 1 as the Mix-minus send for all three guest sources from the **Signal Settings** display.

If you activate the **CORD** or **CONF** buttons on a surround master channel, then you can choose which of the surround slaves will feed the mix minus bus. See Page 686 for details.

Conference (Pre-Talk) Mix Minus Sends

Having configured your mix minuses and activated the **CONF** buttons, the auxiliary sends may be switched to provide conference-style sends using the **CORD** buttons.



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 auxiliary receives a pre-fader mix of all **CORD** contributors minus themselves. As soon as the channel fader is opened, and they are back on-air, the pre-fader auxiliary reverts to a post fader mix minus. To activate the conference-style mix minus:

1. Go to the fader strips controlling the mix minus sources 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.

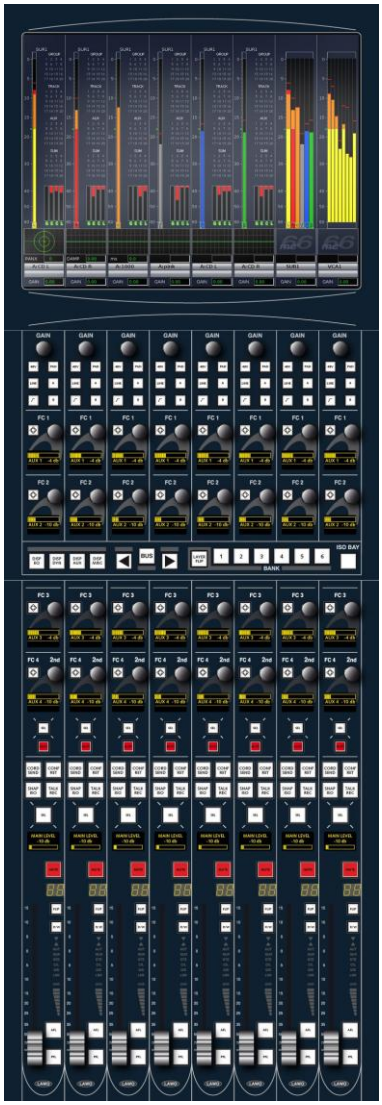
Tip

You can use 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!

You can also add any other channel onto the mix minus bus by pressing its **CONF** button.

Congratulations! You have completed your tour of the Central Control Section audio modules. For details on the PARAMETER COPY/ASSIGN section, see Pages 251 and 305. Next, we will look at the local channel strip controls.

The Channel Fader Strip



The **mc²66** channel sections are presented as a series of physical 'fader strips', each providing:

- **Channel** display feedback on signal metering, bus assignments and source names.
- Dedicated rotary control and buttons for input gain settings.
- Four assignable 'Free Controls' where FC4 may be switched to 2nd layer control. (2nd layer control not available on the classic mc²66).
- ISO BAY Control – isolates each block of 8 fader strips from the main console for independent bank and layer switching and local parameter control.
- Four programmable user buttons normally configured for communications functions or recorder control and snapshot protection.
- **SEL** button for assignment operations.
- Fader cassette with an 8-character label display, group assignment display and AFL, PFL, mute, layer access and automation read/write buttons.

Channel Display

For every channel strip, the **Channel** display provides metering and feedback on inputs, outputs and local parameter values. For more details on this display, please refer to Page 165.

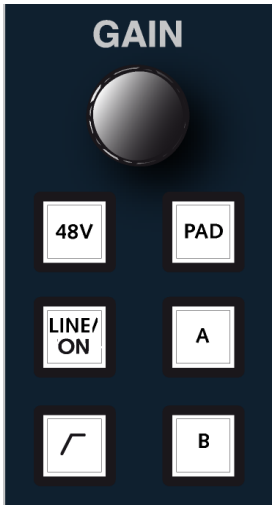
Input Control

The upper rotary control and buttons on the channel fader strip are dedicated to providing input control.

You will be presented with a slightly different set of controls depending on the type of input connected to your channel (mic/line analogue, fixed gain analogue or digital).

Note that the GAIN control on the fader strip *always* controls source gain (either analogue gain or I/O DSP gain depending on the type of input). If you wish to adjust channel input gain (INMIX gain), then use the Central Control Section INPUT MIXER, see Page 186.

For a Mic/Line Input:



Mic Level Signals

1. Deselect the **LINE/ON** button.
2. Use the GAIN control to remotely set the microphone preamplifier gain within the analogue domain prior to the A-D conversion.

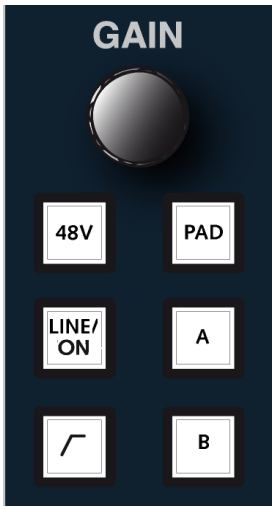
The gain range is normally adjusted from -20dB to +70dB, although this may vary depending on your hardware configuration. Please refer to the DALLIS I/O technical data.

3. Press the **48V** button to select 48V phantom power.
4. Press the high pass filter button to insert an analogue subsonic filter prior to the A-D conversion.
5. Toggle the high pass filter button to cycle through the froll-off frequency options: Off, 40Hz, 80Hz and 140Hz.
6. Press **PAD** to insert the PAD.

Line Level Signals

1. For a line level signal, select the **LINE/ON** button.
2. Use the GAIN control to remotely set the input gain within the analogue domain prior to the A-D conversion.
3. Set the high pass filter as described above.

Note that **48V** and **PAD** are inactive for a line level input.



For a Fixed Gain Line Level Input:

This type of input has no variable analogue gain, therefore source gain is applied using the I/O DSP within the routing matrix:

1. Select the **LINE/ON** button.

This button turns the I/O DSP on or off:

- **LINE/ON** On = I/O DSP On
- **LINE/ON** Off = I/O DSP Off

2. Use the GAIN control to adjust the I/O DSP gain (Volume) within the digital domain.

Gain may be adjusted from -128dB to +15dB.

Note that the **48V**, **PAD** and analogue filter buttons are inactive for a fixed gain analogue input.

For a Digital Input:

Source gain is applied using the I/O DSP within the routing matrix. Gain is controlled in an identical manner to above.

A/B Input Switching

Main and backup sources may be assigned to a channel's A and B inputs from the **Signal List** display.

1. Press the **B** button to switch to the B source.

Note that if there is no source assigned to B input, then the **B** button cannot be selected.

2. Press the **A** button to return to source A.
3. Use the GAIN control to set the gain for the selected input.

Please see Page 195 for more details.

Free Controls

Next on the channel fader strip are the four assignable Free Controls (FC1 to FC4). These provide local channel access to settings such as EQ, Panning, Dynamics, Auxiliary Sends, etc.

Each control includes a backlight LED (e.g. FC1, FC2, etc.) which is colour coded so that EQ, Dynamics, Panning, etc. can be easily distinguished at a glance (not available on the classic mc²66).

The controls are touch sensitive and when turned provide fine control. Push down and rotate the control for coarse adjustment of a parameter value.

Each control also has its own dedicated display and push button (not on the classic mc²66, see below). The display shows the parameter function (e.g. **AUX 1 G**) and value (e.g. **-6.50 dB**). In addition, the current position is indicated within the horizontal bar. The button function depends on the assigned control. For example, if the free control is assigned to an aux send, then the button actions the on/off for the send; if the free control is assigned to EQ Band 1 Gain, then the button actions the on/off for the EQ band, etc.

Note that the lowest Free Control (FC4) can either act as an assignable Free Control or be used to control the 2nd layer of channels (not on the classic mc²66). For more details 2nd layer control see Page 139.

Note that Free Controls are black (unlit) if assigned to a DSP module which is not supported. For example, on Broadcast channels, if Free Control 1 is assigned to Limiter Threshold, then the control will turn black (unlit) if the Channel model is switched to Combi-Dynamics.

On the classic mc²66, there are some differences to free control operation:

Note

- Each free control offers a single 4-character display. This can be switched to show the control function, value or respond to touch by selecting the **FC CTRL**, **FC VALUE** or **USE SNS** buttons within the STRIP CONTROL area of the centre section.
- Each free control provides a ring of LEDs to indicate the current position; for levels, a corona appears indicating the amount of deviation from the default value. The LED square beneath each control changes from green to yellow when a parameter is not set to its default value.
- On the classic mc²66, free controls do not have an associated push button. Therefore, the four buttons below FC4 provide fast access to EQ, delay (DEL), GATE and compressor (COMP) on/off switching.

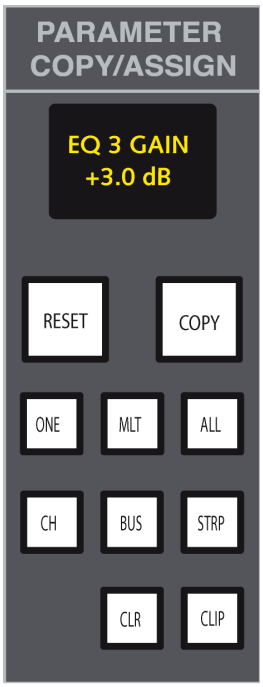
There are three ways to assign functions onto the free controls:

- PARAMETER COPY/ASSIGN - controls may be assigned on an individual basis. For example, you may wish to assign Compressor Threshold and EQ Band 1 Gain on one channel, while assigning Left/Right Pan and Aux 1 Send level on another channel. These assignments are stored within your snapshot/production and become your default free control assignment.
- FC PRESETS – you can temporarily override the default assignments, by recalling a Free Control preset. Each preset changes the Free Control assignments globally across the console. This is a great way to access say Aux Sends 1 to 4 across the console with one button press.
- ISO BAY ACCESS – or, you can override the default assignments using the ISO BAY access buttons within each fader bay. Once a bay is isolated, the **SHOW EQ**, **SHOW DYN**, **SHOW AUX** and **SHOW MISC** buttons can be used to assign the 32 Free Controls to EQ, dynamics, aux or other parameters for the selected channel.

Note that the global FC PRESET and local ISO BAY ACCESS buttons only temporarily override the default assignments. This means that you will always return to your custom assignments once you deselect these modes.

For more details on ISO BAY access, please see Page 144. Read on for PARAMETER COPY/ASSIGN and FC PRESETS.

Parameter Assign



The PARAMETER COPY/ASSIGN panel is used to assign free controls when you wish to configure controls on an individual basis. For example, on one channel you may wish to have control of Pan L/R and EQ Band 1 Gain, Frequency and Q, while on a different channel you would like Pan L/R and Compressor Threshold, Ratio and Gain.

These default free control assignments are stored in snapshots, and they relate to the DSP channel. Therefore, if you assign the same channel to another fader strip or bank, the free control assignments follow.

Let's assign EQ Band 3 Gain onto the first free control on fader strip 1:

1. Press the **ONE** button, located on the PARAMETER COPY/ASSIGN control panel, to activate a one-shot assignment.

*The **ONE** button flashes to indicate that parameter assign is now active.*

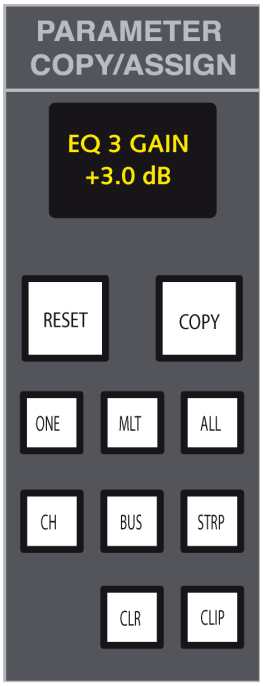
2. Touch the rotary encoder you wish to assign on the Central Control Section.

For our example, select the EQ **SHOW** button to assign EQ onto the SCF/FILTER/EQUALIZER controls and touch the Gain control on the left of the panel.

*The **EQ 3 GAIN** control is placed into the Parameter clipboard as indicated on the CLIPBOARD display.*

3. Now touch the free control on the destination channel strip. In this case, the first free control on channel fader strip 1.

*The assignment is made, as indicated in the alphanumeric display around the free control, and the **ONE** button automatically cancels.*



When you wish to assign more than one control at a time, you can use the **MLT** button to latch the parameter assign mode. This saves you having to reselect the **ONE** button before each assignment.

1. Press the **MLT** button, located on the PARAMETER COPY/ASSIGN control panel, to activate multiple assignments.

*The **MLT** button flashes to indicate that parameter assign is now active.*

2. Select the rotary control you wish to assign by touching it on the Central Control Section.

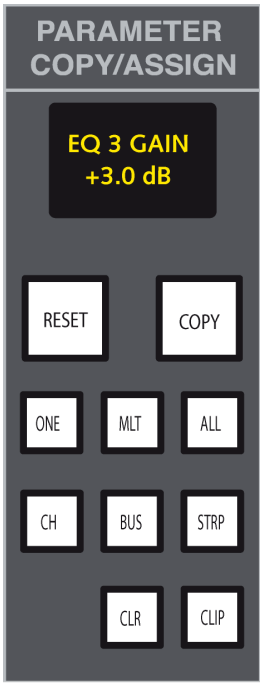
The control is placed into the Parameter clipboard as indicated on the CLIPBOARD display.

3. Now you may touch as many free controls across the surface as you wish.

The CLIPBOARD control is assigned onto each free control you touch.

4. When you are finished, remember to deselect **MLT**, or press the **ESC** button on the ACCESS CHANNEL/ASSIGN control panel, to exit from the parameter assign mode. If you don't the next time you touch a channel free control, you will re-assign it!

Alternatively, you may assign a parameter to the same free control position across *all* fader strips for a certain channel type. For example, to place L/R Pan across the first free control on all INPUT fader strips:



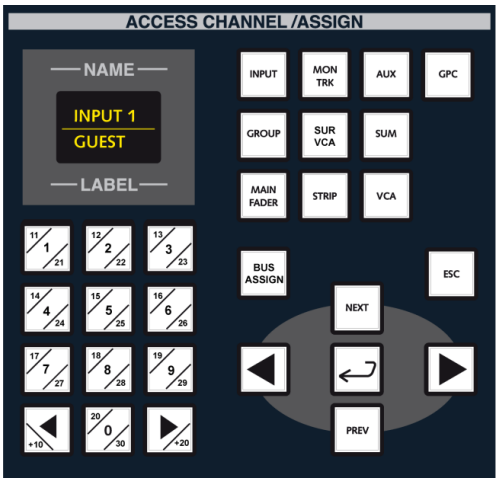
1. Press the **ALL** button located on the PARAMETER COPY/ASSIGN control area.

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

2. Select the rotary control you wish to assign by touching it on the Central Control Section. In this example, touch the L/R Pan control.

***PANX** (Pan L/R) is placed into the Parameter clipboard as indicated on the CLIPBOARD display.*

3. Now choose the type of channel which you wish to copy to from the ACCESS CHANNEL/ASSIGN panel – for example, press **INPUT**:



You can select multiple channel types if you wish – e.g. press **INPUT**, **GRP** and **SUM** to assign the free control across all input, group and sum channels. You may select from:

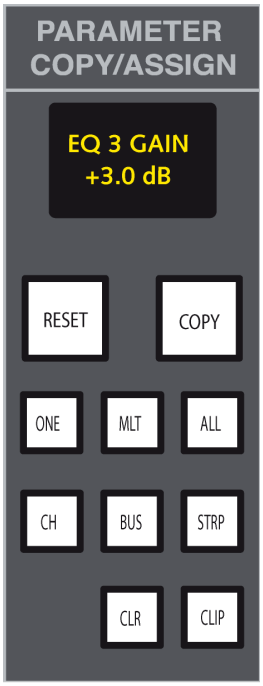
- **INPUT** – Input channels.
- **MON TRK** – Monitor channels.
- **AUX** – Auxiliary masters.
- **GPC** – General Purpose Channels (MIDI channels).
- **GROUP** – Group masters.
- **SUM** – Main sum masters.
- **VCA** – VCA masters.
- **SUR VCA** – surround VCA masters.

Note that you may not select MAIN or STRIP in this mode as these are not valid DSP channel types.

4. Now touch the first free control on any INPUT fader strip.

PANX *is assigned to the first free control across all INPUT channel strips on the current control surface layer.*

When working in **ONE** shot mode, parameter assign automatically cancels. However, if you are working in multiple assignment mode, remember to deselect **MLT** or press **ESC**, on the ACCESS CHANNEL/ASSIGN control panel, to exit parameter assign.



Clearing a Free Control Assignment

If you wish to clear a free control assignment so that it becomes inactive, use the **CLR** button as follows:

1. Press the **CLR** button located on the PARAMETER COPY/ASSIGN control area:

Notice that this automatically selects the ***ONE*** *button for a one-shot operation. If you wish to clear multiple assignments select* ***MLT*** *instead of* ***ONE****.*

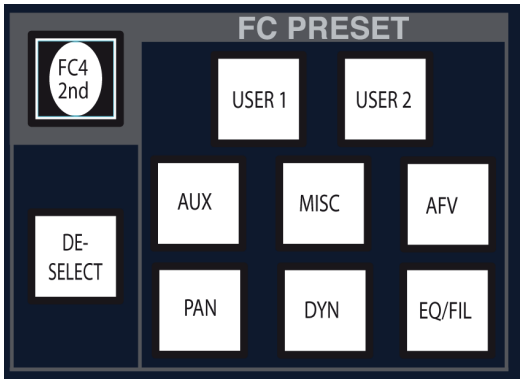
2. Select the free control you wish to clear by touching it on the fader strip.

The assignment is cleared and Free Control displays go blank.

3. If you have selected **MLT**, remember to deselect **MLT**, or press the **ESC** button to exit from the parameter assign mode. If you don't the next time you touch a channel free control, you will clear its assignment!

FC PRESETs

The four free controls may be temporarily re-assigned globally using the FC PRESET buttons:



Each of these buttons temporarily overrides the default free control assignments on all four free controls across the console.

Controls are mapped, wherever possible, in an identical layout to the Central Control Section. Each free control has its own display showing the name of the parameter (e.g. **EQ 1 G** – EQ Band 1 Gain) which is currently assigned.

1. Select a preset – for example, the **EQ/FI** button.

Working up the channel, the four free controls are assigned to On/Off, Gain, Frequency and Q for band 1 of the EQ section.

2. Now press the button again to access the next page of EQ controls – EQ Band 2.
3. Keep pressing to page through all the available EQ and Filter bands.
4. To cancel the FC Preset and return the free controls to their previous configuration, press **DE-SELECT**.

The FC PRESETs provide access to the following control sets:

- **AUX** – Auxiliary Sends 1-4, 5-8, 9-12, etc. up to 32.
- **MISC** – Digital Amplifier Gain, Delay Time, Insert Send Level, Direct Output Level, INMIX and Image controls.
- **AFV** – Audio Follow Video set up functions.
- **PAN** – panning controls.
- **DYN** – Dynamics (gate, expander, compressor and limiter).
- **EQ/FI** – 4-band EQ, 2-band filters and sidechain filters.
- **USER 1** and **USER 2** – two user defined presets, see next page.

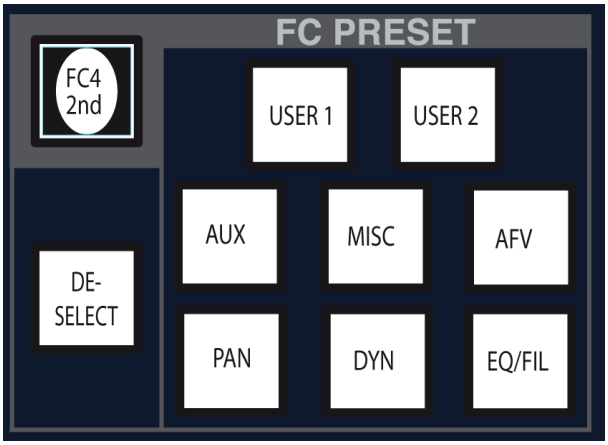
Note that on the classic mc²66, each FC Preset may access a first or second page of controls. For example, press **EQ 1** to access the first EQ section. Then press **PAGE 2** to access the first Filter section (**FI 1**).

Note

USER 1 and USER 2

These two user presets can be stored and recalled as follows:

1. Assign the parameters you wish to store onto the Free Controls on any channel strip.
2. Make sure the fader strip is in access by pressing its fader **SEL** button.
3. Now press and hold one of the **USER** FC PRESET buttons until it flashes (for more than 3 seconds):



The free control assignments are stored in the preset.

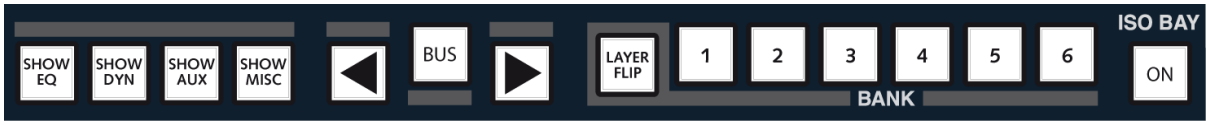
4. Now press the **USER** preset button quickly to recall the assignments globally across all channels.

The free controls across all fader strips update to your stored assignments.

5. To revert to the default free control assignments, deselect the **USER** preset or press **DE-SELECT**.

ISO Bay Access

Dividing the upper and lower free controls is the ISO BAY access panel which provides the following functions:



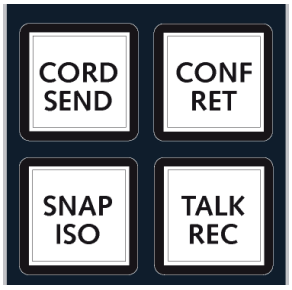
- **Fader Bay Isolate** - the ISO BAY **ON** button is used to isolate any 8-fader bay from the main console's bank/layer switching and AFL/PFL monitoring. This is ideal when working with more than one engineer, as each engineer can have independent control surface switching and AFL/PFL monitoring. See Page 141 for more details.
- Bank and Layer switching – the BANK 1 to 6 and LAYER FLIP buttons provide local bank and layer switching
- **DSP Parameter Assign** - within an isolated bay, the **SHOW** buttons assign Free Controls to EQ, dynamics, aux or other parameters for the selected channel. This feature allows you to adjust DSP parameters locally rather than from the Central Control Section and has the advantage of providing one knob per function for each of the DSP module parameters. See Page 144.
- **BUS Routing** (not on the classic mc²66) – select **BUS**, and the Free Control displays update to show bus assignments from the selected channel. You can use this mode to change bus assignments locally from the isolated bay.

Note

Note that on the classic mc²66 the ISO Bay Access functions are available from the bottom row of small buttons above CORD and CONF: **DISP EQ**, **DISP DYN**, **DISP AUX**, **DISP MISC**, **FLIP**, **BNK 1** to **6** and **ISO**. The classic mc²66 does not support ISO Bay bus routing.

Channel User Buttons

Below the free controls you will find four programmable channel user buttons. Each button may be programmed from the **Custom Functions** display, see Page 689. Normally they are delivered and engraved with the following default functions:



- **CORD**/**SEND**, **CONF**/**RET** and **TALK/REC** – on normal input channels, these buttons will perform mix minus functions (**CORD**, **CONF** and **TALK**). If a monitor channel is assigned to the fader strip, then they control send/return switching and record arming (**SEND**, **RET** and **REC**).

Please see Pages 239 and 159 for details on mix minus operation and monitor channel switching.

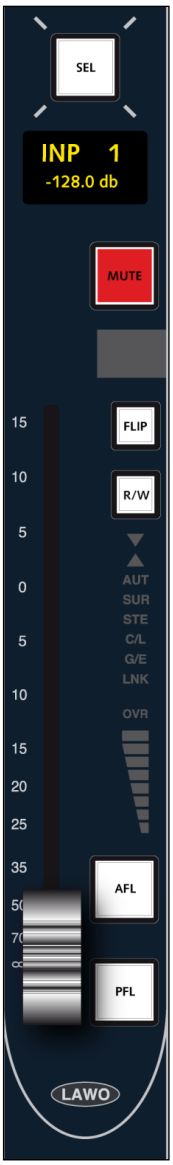
- **SNAP ISO** – this button is used to isolate the channel strip from a snapshot recall. If a snapshot is recalled, all settings on the isolated channel remain unchanged.

Use **SNAP ISO** to isolate your main presenter channels and other key feeds when using snapshots to recall different mixes during a live production. Please refer to Chapter 6 for more details on using snapshots.

Note that a system option provides the ability to disable all **SNAP ISO** buttons across the console, see Page 651 for details.

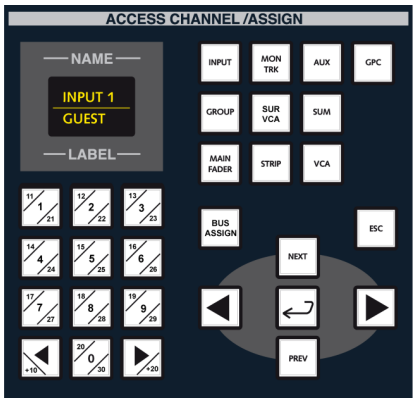
Fader SEL Button

The fader **SEL** button is used to put a channel into access and to perform assignments.

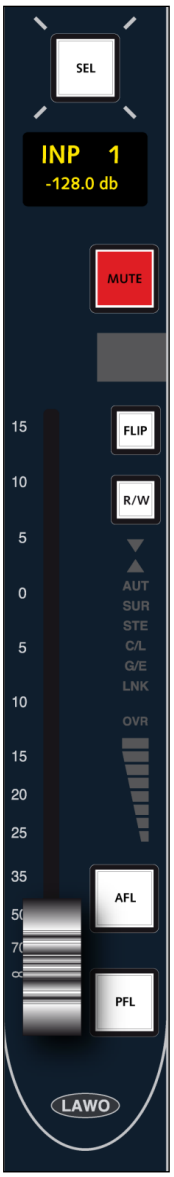


1. Press the **SEL** button on any fader strip.

On the Central Control Section, controls update to reflect the new channel settings, and within the ACCESS CHANNEL/ASSIGN control panel, the NAME and LABEL displays update to show the name and label for the selected channel:



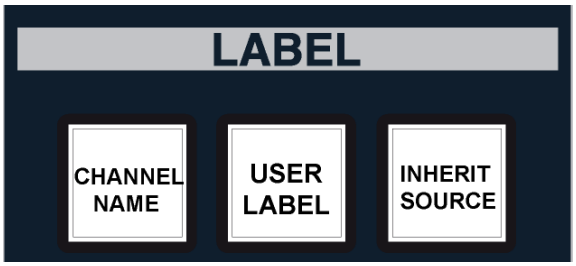
Please see Page 37 for details on the ACCESS CHANNEL/ASSIGN control panel.



Fader Label Display

The Fader Label Display shows the names of your fader strips and the main channel level.

Each name may be switched between 3 options using the LABEL buttons in the centre section of the console:

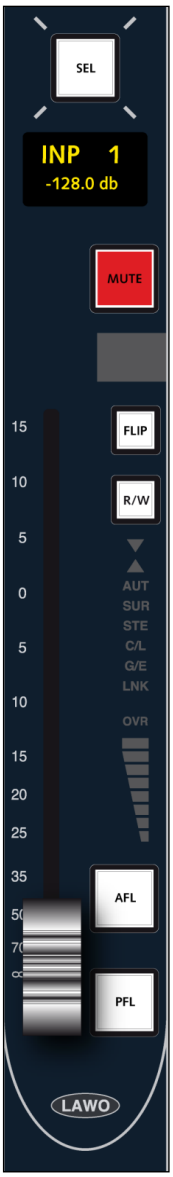


- **CHANNEL NAME** – this is the name of the DSP channel assigned to the fader strip (e.g. **INP 1**).
- **USER LABEL** – this is a programmable user label given to the DSP channel (e.g. **GUEST**).
- **INHERIT SOURCE** – this is a programmable user label given to the Source which is routed to the DSP channel (e.g. **MIC 1**).

Up to 8 characters may be displayed for each name or label. (Note that the classic mc^{2}66 supports 4 character labels.)

For more details on how to change and program Channel and Source Labels, please see Page 573.

Level and Mute



1. The channel fader is a touch sensitive fader providing gain control from –128dB to +15dB.

*As you adjust the fader position, the gain may replace the fader label. Note that this option can be disabled from the **System Settings** display, see Page 655 for details.*

Note that if the display is flashing, then the fader is controlling a different channel parameter to main level – for example, you may assign your aux send levels onto the faders. See Page 364 for more details.

2. Press the **MUTE** button to mute the channel.

Note that the Mute button may be set to one of two options from the **System Settings** display, see Page 652:

- Fader Mute – mutes post fader signals. Use this option when you wish to mute post fader signals but not pre fader signals such as the auxiliary pre fader sends.
- Channel Mute – mutes post fader signals, the insert send and the output of the INMIX section. Use this option when you wish to mute both pre and post fader signals.

In addition, mute buttons may be disabled to prevent accidental muting of channels, see Page 651 for details.

Layer Access

1. Press the **FLIP** button to toggle the channel strip between channels assigned to Layer 1 and Layer 2.

*The fader label, control positions and **Channel** display update accordingly.*

Note that if there is nothing assigned to layer 2, then the fader strip will go blank.

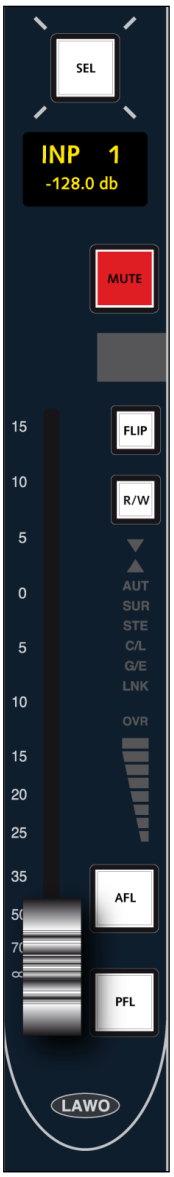
Automation Control

The **R/W** button provides dynamic automation Read/Write access. See Chapter 7 for further details.

AFL and PFL

1. Press **AFL** to listen to the post fade channel signal.
2. Press **PFL** to listen to the pre fade channel signal.

See Page 342 for details.



VCA Group Assignment Display

The figure of eight display beside the fader is used to indicate VCA grouping assignments. The console can support up to 128 VCA group masters.

For more details on making VCA assignments, please see Page 350.

Fader Meter and Status Indicators

Beside the fader, you will find a confidence level meter. This *always* meters the channel input level (the output of the INMIX audio module).

In addition, a number of status indicators provide the following feedback:

- Up/Down arrows – are used during automation to indicate the direction of the read pass.
- **AUT** – shows that dynamic automation is enabled.
- **SUR** (not available on the classic mc^{2}66) – indicates that the channel is surround.
- **STE** – indicates that the channel is stereo.
- **C/L** – shows that the compressor or limiter is active; lights when gain reduction occurs.
- **G/E** – shows that the gate or expander is active; lights when gain expansion occurs.
- **LNK** – indicates that the channel is linked to another channel on the console, see Page 353 for details.
- **OVR** – indicates an overload at the channel input. Note that the overload threshold may be adjusted from the **System Settings** display, see Page 664 for details.

Stereo Channels

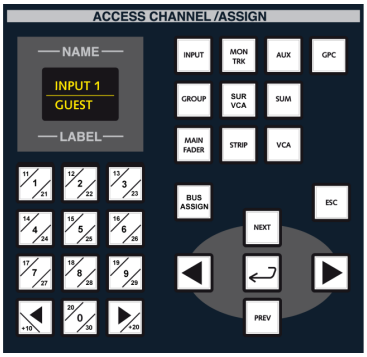
Stereo channels may be created from any two full or tiny processing DSP channels to create a stereo input, stereo group, stereo sum, stereo auxiliary, etc. The operation of a stereo channel is identical to that of a mono channel, with the following additional features:

- Stereo Balance and Input Control
- Image Width and Positioning
- Surround Panning of a Stereo Source

Creating a Stereo Channel

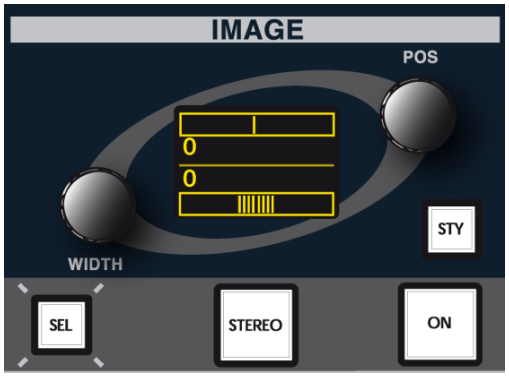
You can create a stereo channel either from the IMAGE panel on the Central Control Section, from the **Signal List** or from the **Channel Config** display. For more details on the **Signal List** see Page 563, and **Channel Config** see Page 115. Here we will use the IMAGE panel:

1. Assign your desired channel to the Central Control Section by pressing its fader strip **SEL** button, or selecting a channel type and number from the ACCESS CHANNEL/ASSIGN control panel.



The NAME and LABEL displays update to show the system name and label for the selected channel.

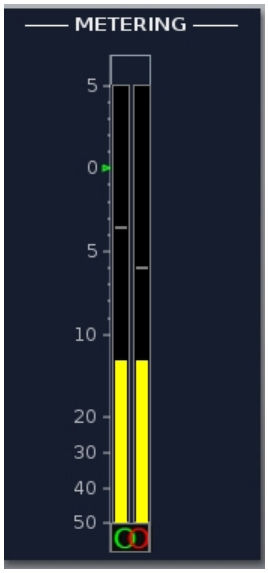
2. Locate the IMAGE controls on the Central Control Section:



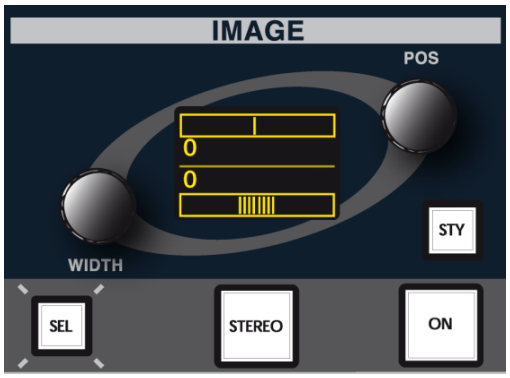
3. Press the **STEREO** button.

*This links the selected channel to its adjacent DSP path. For example, pressing **STEREO** on input channel 3 creates a stereo channel using input channels 3 and 4.*

To indicate that the channel is now stereo, you have stereo metering, a **STEREO** LED on the fader strip, a stereo indicator on the **Main Display** and the Image section becomes active.



4. To change a stereo channel back to mono, deselect the **STEREO** button:



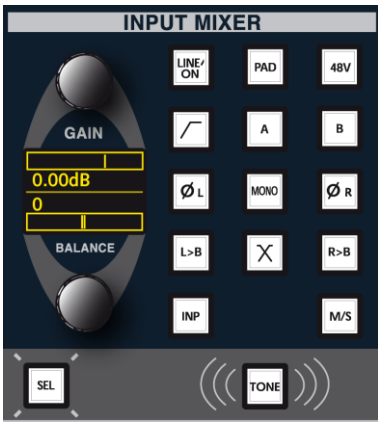
*The **STEREO** fader indicator goes out and the channel metering reverts to a mono bargraph.*

Note

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 4) 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 4 will return to the active surface. However, if you have assigned another channel to its old position, you will need to reassign input 4 to a different fader strip location.

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.

Stereo Input Settings



When a channel is stereo, a number of additional controls become available from the INPUT MIXER control section: BALANCE, **Ø R** and stereo input management.

Note that GAIN, BALANCE and **Ø** may be applied to the SOURCE or to the channel (INMIX) according to the INPUT MIXER mode. Please see Page 186 for more details.

1. With the INPUT MIXER switched to **SOURCE** mode (the default), use the GAIN control to adjust source gain.

The gain for left and right inputs is adjusted in parallel; any offsets are retained and represented by a positive or negative BALANCE value.

The gain range depends on the type of input, see Page 186.

2. Use the BALANCE control to set the Left/Right input balance for the stereo input.

If you wish to adjust source gain independently for left and right, then you can use the **Signal Settings** display: select the input signal followed by the **Mic/Line** or **Input DSP** parameter tabs. Then adjust either the mic/line or I/O DSP gain for each signal. See Page 602 for details.

3. Press the **MONO** button to sum the Left and Right inputs.
4. Press the X button to reverse the Left and Right inputs.

Use this button to deal quickly with an incorrectly patched source signal.

5. Press **Ø L** or **Ø R** to reverse the phase of either the left or right input source.
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.

Use **L>B** and **R>B** to deal with situations where either the left or right source signal has disappeared during a live production.

7. Select **M/S** for sources recorded using sum and difference coding.
8. Switch the INPUT MIXER to **INMIX** mode if you wish to adjust the GAIN and BALANCE for the channel. See Page 186 for details.

*The status of all settings is indicated within the INPUT MIXER section on the **Main Display**.*

IMAGE

The IMAGE section of controls deals with image positioning and width on stereo channels, and also contains the **STEREO** button which may be used to create a stereo channel.

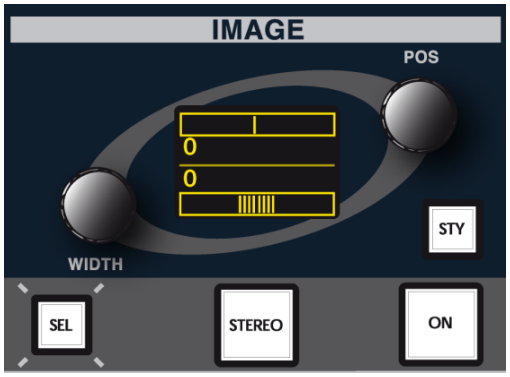


Image Control

The Image controls adjust the position and width of the stereo channel and may be used in of two styles:

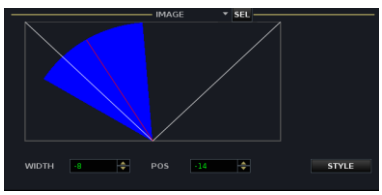
- New style - use the new style Image control when you want to retain the width of the stereo image but offset its position within the stereo field.
- Old style - use the old style Image control when you want to collapse the width of the stereo image as you adjust its left/right position.

To adjust the controls:

1. Select the **ON** button to switch the Image section into circuit.
2. Use the **STY** button to switch between the new and old image styles.

*As you toggle the **STY** button, the selected **STYLE** updates on the **Main Display**.*

3. First, let's start with the new style which is active when the **STY** button is off.
4. Use the WIDTH control to widen or narrow the stereo image.



*The **IMAGE** graph on the **Main Display** updates to show your changes by narrowing or widening the blue image area.*

5. Now adjust the POS control to move the narrowed or widened image within the stereo field.

Note how 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.

6. Now switch to the old style by deselecting the **STY** button.
7. You may use the WIDTH control as before to narrow or widen the stereo image.

*The **IMAGE** graph on the **Main Display** updates to show your changes by narrowing or widening the blue image area. Be careful not to widen the stereo image too far to avoid phasing problems.*

8. Now adjust the POS control to collapse the stereo image from its current width to either the left or right sides of the stereo field.

*Note this time how the stereo width collapses as indicated by the narrowing blue area on the **IMAGE** graph.*

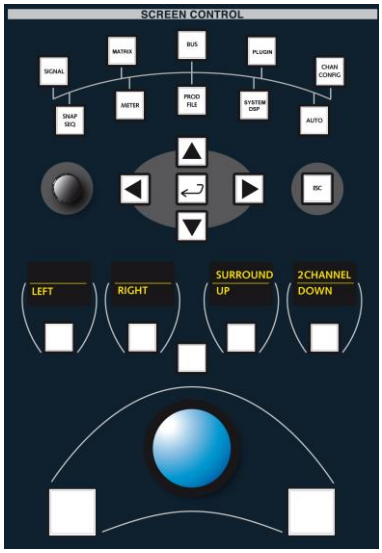
Panning from a Stereo Channel

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.

Joystick Panning

When assigned to a stereo channel, the joystick operation is very similar to a mono channel with one exception: X-axis movement of the joystick adjusts the left/right balance of the stereo channel.

2-Channel Mode



Any odd/even pair of sum, group or aux channels may be configured as 2-channel as an alternative to stereo. This allows independent fader strip control for the left and right sides of the output channel. For example:

1. Put the channel you wish to configure into access, either by pressing its fader strip **SEL** button, or selecting a channel type and number from the ACCESS CHANNEL/ASSIGN control panel.

Note that only odd/even pairs of channels can be configured for 2-channel operation, therefore always select an odd numbered channel. Let's assume that you have selected GRP1.

2. Press the **CHAN/CONFIG** button to select the **Channel Config** display.
3. Page to the second level of soft keys and press the **2-CHANNEL** soft key.
4. Or select the **2-Channel** screen option:

GRP 1 and GRP 2 are configured for 2-channel operation.

If you now bus assign an input channel onto GRP 1, the channel 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.

5. To undo the 2-channel configuration, put GRP 1 back into access and deselect the **2-CHANNEL** option.

Surround Channels

Surround channels are used when handling both surround inputs and outputs. For example, you would link a number of sum, group or aux channels to make a surround master, group or aux send output. Or you could link a number of input channels to make a multi-channel return. To make a surround track bus, link the corresponding monitor channels as a surround return.

A variety of multi-channel output formats are supported, including Dolby Stereo (SR), Dolby ProLogic, Dolby Digital, DTS and SDDS. The surround format is set globally for each production from the **System Settings** display. Having selected a format (e.g. Dolby Digital 5.1), then all surround channels are defined accordingly (e.g. L, R, C, LFE, Sl, Sr).

This section deals with everything you need to work in surround including:

- Defining the global surround format.
- Configuring surround outputs.
- Bus assignments to a surround output.
- Monitoring.
- Surround VCAs – master control of a surround channel.
- Configuring surround inputs for multi-channel returns.
- Hyper Pan.
- AMBIT Upmix and Spatialise processing.

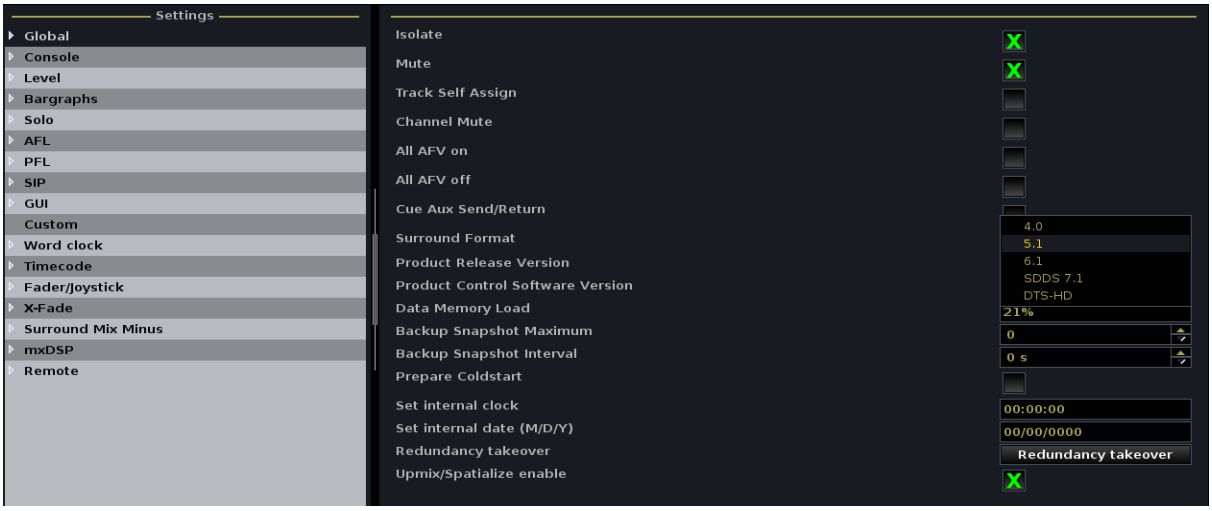
Defining the Global Surround Format

The global surround format is set from the **System Settings** display and determines which surround format will be utilised for surround panning and monitoring options within the console.

A variety of multi-channel output formats are supported, including Dolby Stereo (SR), Dolby ProLogic, Dolby Digital, DTS and SDDS. Having selected a format (e.g. Dolby Digital 5.1), then all surround channels are defined accordingly (e.g. L, R, C, LFE, sL, sR). Please refer to Appendix A for more details on each of the available surround formats.

To select a format:

1. Press the **SYSTEM DSP** button, located on the SCREEN CONTROL panel.
2. Using the trackball or navigation buttons focus on the list of topics on the left hand side of the display and select **Global**.
3. Then select the **Surround Format** parameter:



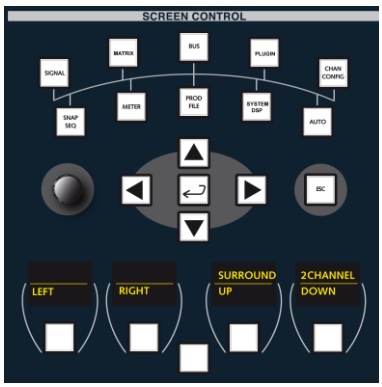
4. Use the soft keys, or drop-down menu, to make your selection:

- **4.0** – L, R, C, S for Dolby ProLogic.
- **5.1** – L, R, C, LFE, sL, sR for Dolby Digital and DTS.
- **6.1** – L, R, C, LFE, sL, sR, sC for Dolby Digital EX and DTS ES.
- **SDDS 7.1** – L, R, cL, cR, C, LFE, sL, sR for 7.1 SDDS.
- **DTS-HD** – L, R, C, LFE, mL, mR, sL, sR for 7.1 DTS-HD.

Configuring Surround Outputs

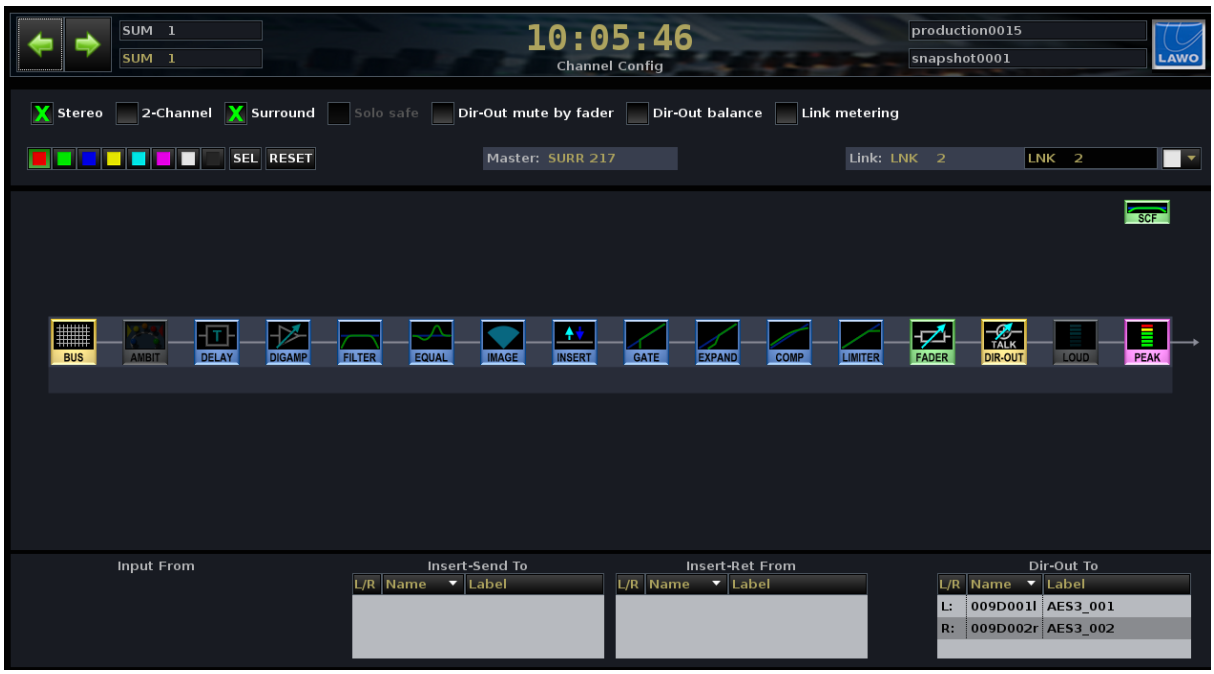
Any full or tiny DSP channel may be configured for surround, but it helps to think separately in terms of inputs and outputs. So, first let's look at how to configure a surround group, sum or aux master:

1. Start by putting the first channel you wish to configure into access, either by pressing its fader strip **SEL** button, or selecting a channel type and number from the ACCESS CHANNEL/ASSIGN control panel.



Note that you *MUST* select channel number 1, 9, 17 or 25, etc. – see the note below. Let's assume that you have selected SUM 1:

2. Next, press the **CHAN/CONFIG** button to select the **Channel Config** display.
3. Page to the second level of soft keys and press the **SURROUND** soft key.
4. Or select the **Surround** screen option:



Sums 1 to 8 are now configured according to your global surround format.

In addition, a Surround VCA is assigned to act as the master for Sum channels 1 to 8. The Surround VCA number – e.g. ***SURR 217*** *– is shown under* ***Master channel****.*

Surround channels are *always* created in 8-channel blocks, even if the surround format only uses 4 or 6 channels. In other words, SUM 1, SUM 9, SUM 17, etc. *MUST* be the first channel of the surround master. The remaining channels are defined according to the surround format, with any spare channels at the end of the block left for mono or stereo operation.

Note

So, for example, when working in Dolby Digital 5.1, channels could be configured as follows:

- Sum 1, 9, etc. – Front Left
- Sum 2, 10, etc. – Front Right
- Sum 3, 11, etc. – Front Centre
- Sum 4, 12, etc. – LFE
- Sum 5, 13, etc. – Surround Left
- Sum 6, 14, etc. – Surround Right
- Sums 7, 8, 15, 16, etc. – freely configurable as mono or stereo.

You can assign SUM 9 to 14 as surround, even if the sums are tiny channels!

Note

Note also that when channels are selected for surround operation, the front and rear left/right pairs of the surround channel are automatically linked for stereo. This provides convenient front L/R and rear L/R stereo channel control should you assign the individual components of the surround channel to fader strips. The centre and LFE channels remain mono. Note that the stereo linking is only a default state; you can deselect the stereo link at any time.

5. To undo the surround configuration put Sum 1 back into access and deselect the **Surround** option.

Tip

You can also make a source or a destination surround from the **Signal List** display by selecting the first source or destination of the surround grouping, pressing the right trackball button and selecting the **Surround** menu option.

The components of the surround channel are clearly marked in the Surround column:

Bus Assignments to a Surround Output

Having configured your surround output, bus assignments from your source channels are made using forward or reverse bus assign, or the ACCESS CHANNEL/ASSIGN panel as described on Page 167. However, there are a few points to note about the operation.

When you assign a mono or stereo channel onto a surround output, the console assumes that you wish to make the assignment onto all of the Busses within the multi-channel output.

For example, let's say SUMS 1 to 6 have been configured as a 5.1 surround output.

1. Assign a mono or stereo channel to SUM 1.

Rather than just assigning the channel to SUM 1, the console assumes that you wish to route to the complete surround output, and assigns the channel to SUMs 1, 2, 3, 4, 5 and 6 in one operation.

2. However, having made the assignment, you can now edit it. So, for example, if you wish to remove the channel from SUM 4 (LFE), you can do so by deselecting the assignment to SUM 4.

So, when you route *onto* a surround output, assignments are made onto *all* Busses within the output.

But, when you *deselect* routes from a surround output, they are deselected *one by one* allowing you to edit a surround assignment.

Monitoring the Surround Output

The **mc²66** provides two monitor outputs:

- Control Room Monitor 1 (CRM 1) – surround (up to 7.1).
- Control Room Monitor 2 (CRM 2) – stereo.

So, to monitor your surround output, assign it to the CRM 1 output using one of your factory-configured monitor source selection buttons to the right of the centre control screen:

Note that these functions are programmed within the factory configuration. In our example, **SUM 1-6** is available from **PAGE 1** of the touch-screen functions.

Note that on the classic mc²66, CRM1 is controlled from a dedicated panel rather than a touch-screen. The buttons are factory-configured and can be programmed from an identical function set to the MKII mc²66.

Surround VCAs

Surround VCAs are used to provide master control for a surround channel. By assigning the surround VCA to a fader strip you can have single fader control of the surround output, meter all its slaves on the **Channel** display, and control master parameters such as EQ, compression, AMBIT upmixing and spatialise, etc.

When working with Surround VCA masters, faders are always moving. Therefore, you will need to open the surround VCA master fader in order to offset the slaves.

Note that the master/slave behaviour varies depending on the parameter. For example, parameters such as main level, input gain, etc. are controlled relatively so that you can offset the slave positions. Other parameters, such as EQ frequency, EQ Q, etc. are always set by the master (absolute), so that any change on the master is inherited by all slaves. For switches such as MUTE, the parameter is switched ON from a Surround VCA master but not OFF. You can find more details on the behaviour for Surround VCA masters in Appendix D.

Note

Surround VCAs are automatically created each time you configure a surround channel. So, in our example, Surround VCA 217 (**SUR 217**) will provide master control of our surround sum output.

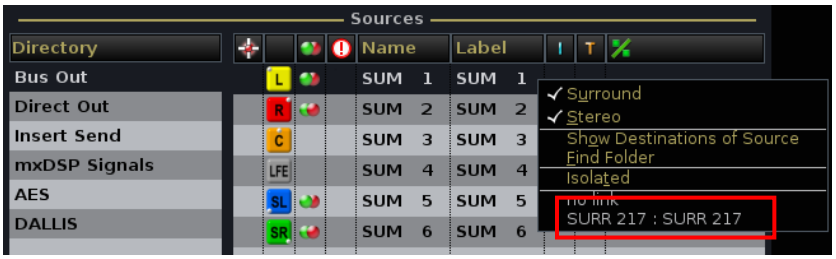
If you are unsure which surround VCA is allocated to a surround channel:

1. Put the first channel of the surround master into access – e.g. SUM 1.
2. And select the **Channel Config** display.

*You will see the Surround VCA number allocated to the channel under **Master channel**:*

3. Alternatively, open the **Signal List** display, select one of the 5.1 component channels and right-click.

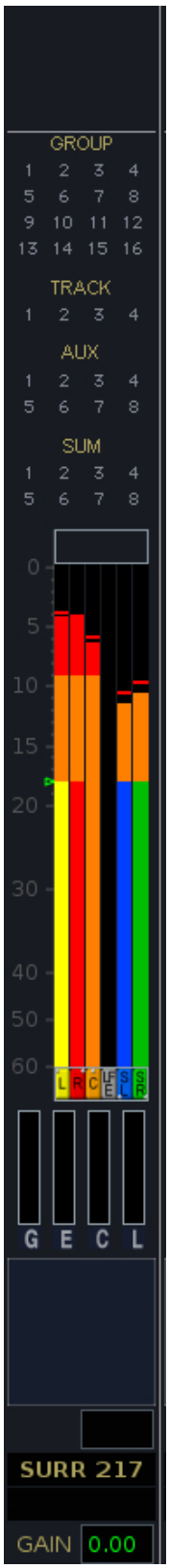
The surround VCA number is displayed in the drop-down list:



The number of the surround VCA is automatically determined by the system; you will find that surround Sum channels are controlled by higher Surr VCA numbers while Input channels by lower numbers, etc.

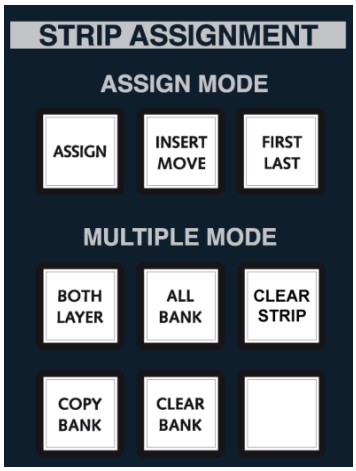
Working with Surround VCAs

By assigning the Surround VCA to a fader strip, you will be able to control the overall level of the surround output, and meter the individual slaves from the **Channel** display.



Assign the Surround VCA to a fader strip as follows:

1. Select **SUR VCA 217** from the ACCESS CHANNEL/ASSIGN control panel.
2. Now press the global **ASSIGN** button, located on the STRIP ASSIGNMENT panel.



*Across the console, the fader **SEL** buttons flash, in green, to indicate possible destinations for your chosen channel:*

3. Press the fader **SEL** button on a channel fader strip to complete the assignment.

Note that you can assign a surround VCA to any fader strip – channel or main fader. However, if you want to meter the slaves as shown opposite, choose a channel fader strip.

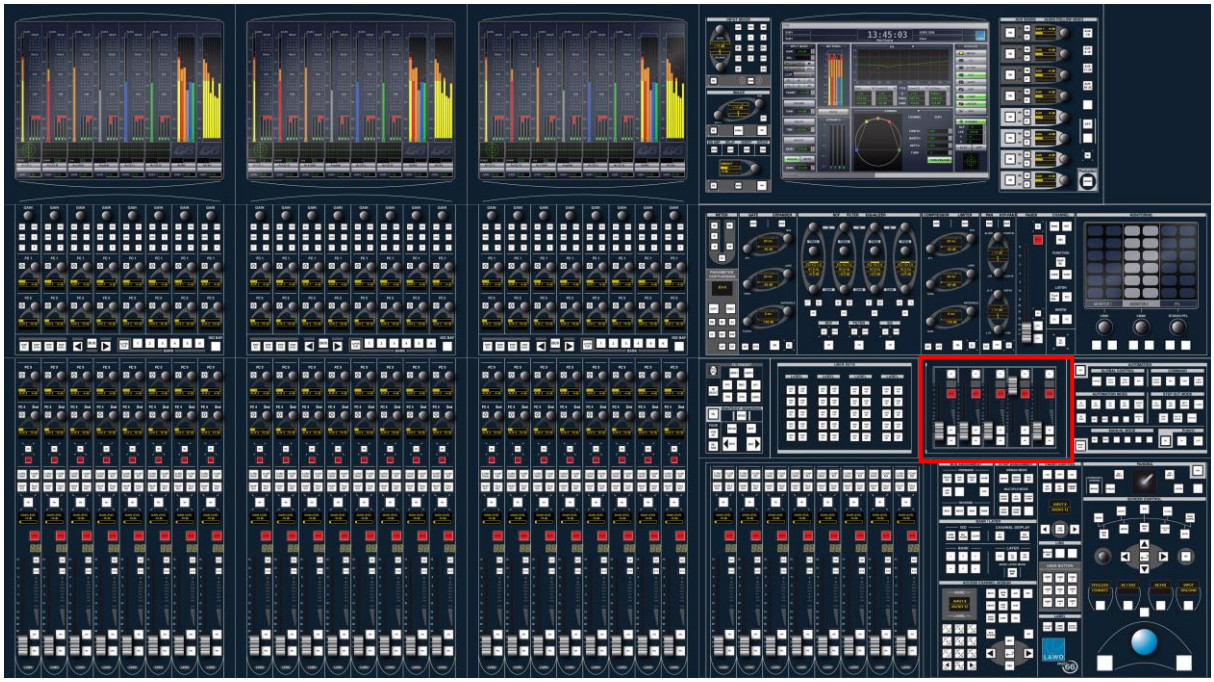
4. You can now adjust the master level of the surround channel from the fader, meter its slaves and control master parameters from the Free Controls or Central Control Section.
5. You can rename the surround VCA by clicking on the 'channel in access' label in the title bar:

Revealing the Surround/VCA Slaves

The **REVEAL** function provides a quick way to bring surround or VCA slaves onto fader strips so that you can offset fader levels and other relative parameters.

Note

Note that the faders used to “reveal” slaves may be any bay of normal fader strips or an optional user panel (outlined below):



Reveal on Fader Strips

When revealing onto normal fader strips, **REVEAL** may reveal the slaves of any VCA group: a Surround or normal VCA.

1. First, determine which fader strips will be used from the **System Settings** display, see Page 660.

You can use a single bay or multiple bays (e.g. 16 faders).

2. Then put the Surround or VCA master channel into access by selecting its fader **SEL** button.
3. Press **REVEAL** located beside the joystick:

The slaves automatically appear on the control surface.

If the slave channels do not appear, check the **Reveal bay count** option on the **System Settings** display. The bank and layer used for reveal should not be used for normal operation.

4. Adjust the fader positions or other relative parameters.
5. Select a different VCA master to reveal its slaves.

Note that when working with Surround VCA masters, faders are always moving. Therefore, you will need to open the surround VCA master fader in order to offset the slaves.


Note

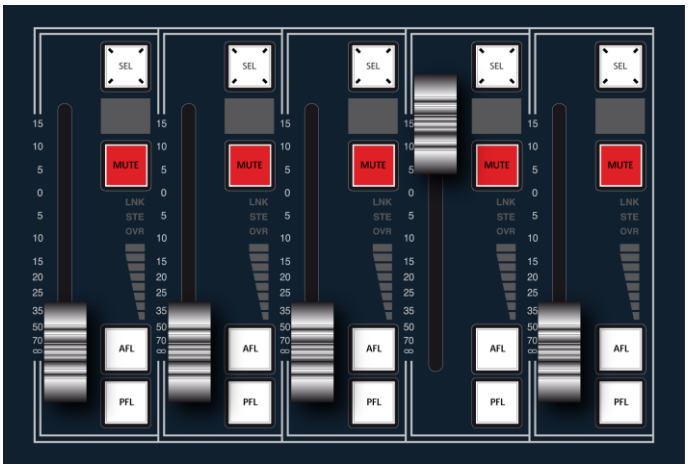
Note also that when channels are selected for surround, the front and rear left/right pairs are automatically linked for stereo. This means that when you reveal the slaves, the front L/R and rear L/R components appear as stereo channels. If you wish to control Left and Right independently, unmake the stereo link – press **SEL** on the L/R slave channel and deselect the **STEREO** button from the IMAGE panel.

6. Deselect **REVEAL** to revert the fader strips to their previous assignments.

Note that a VCA can be master of a surround VCA. If this is the case, then put the VCA master into access and press **REVEAL** to reveal the VCA group slaves. Then press **SEL** on the surround VCA master to reveal the surround slaves.

The Reveal Fader Surround User Panel

The optional Reveal Fader Surround panel may be fitted to any centre section User Panel slot. See Page 345 for details on User Panels. The panel provides five dedicated faders for controlling surround VCA slaves:



The main differences to revealing on normal fader strips are:

- The user panel is dedicated to surround VCA slaves and does not reveal normal VCAs.
- The faders are always active; the last selected surround VCA remains assigned to the reveal faders even if you select a different channel type.
- The user panel provides a 60mm motorised fader with input meter, overload (**OVR**), stereo (**STE**) and link group (**LNK**) status LEDs.

With the Reveal Fader Surround user panel fitted:

1. Put a Surround VCA master channel into access by selecting its fader **SEL** button.

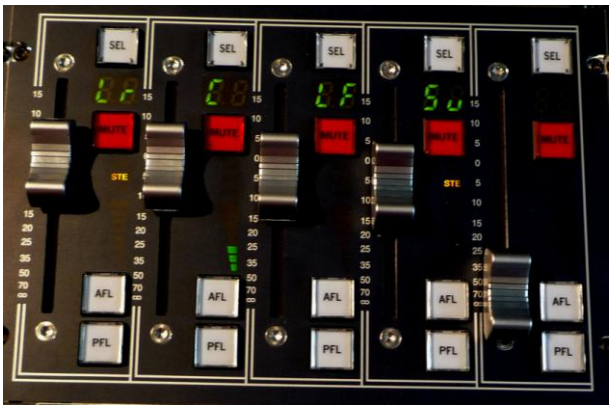
The slaves appear on the five faders; you will see the name of the component channel (e.g. Lr, C, LF, etc.) in the fader display.

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.

Note that the last selected surround VCA remains active even if you press **SEL** on a different channel type.

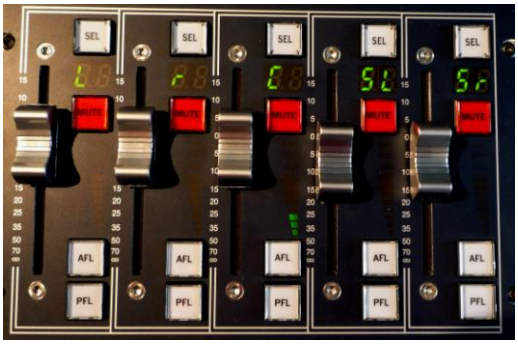
Note that the layout of component channels varies depending on the surround format, and whether channels are linked for stereo. For example, if the surround format is 5.1, you will see:

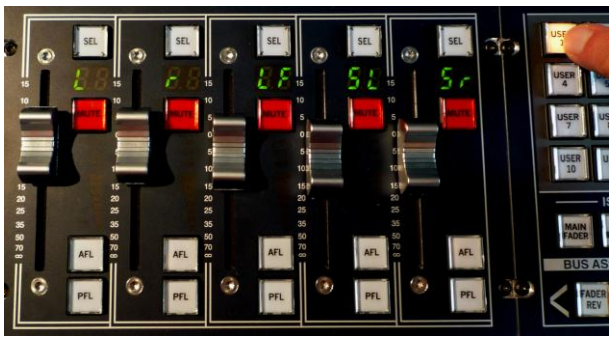
Note



- 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

Note that 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 user button may be configured; in our example, the user button switches fader 3 between Centre and LFE:





Please contact Lawo for more information on configuring this user button.

Note that you can reveal to both console fader strips and the user panel if you wish.

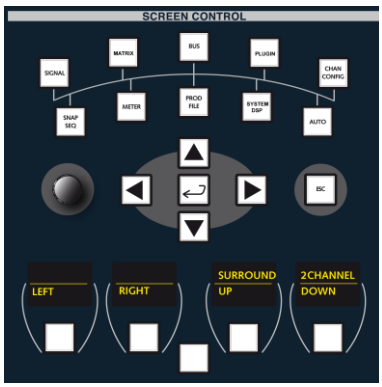
Alternatively, set the **Reveal bay count** option to **0** to disable reveal on the console's fader strips.

Configuring Surround Inputs

In addition to configuring sums, groups or auxes as surround outputs, input or monitor DSP channels may be defined to operate in surround. This is ideal for handling multi-channel returns such as a premix or surround microphone source.

Input and monitor channels are configured for surround in exactly the same way as before. Note that if you configure monitor channels for surround, then you will automatically create a surround track bus.

To configure INP 1 to 6 for a 5.1 surround return:

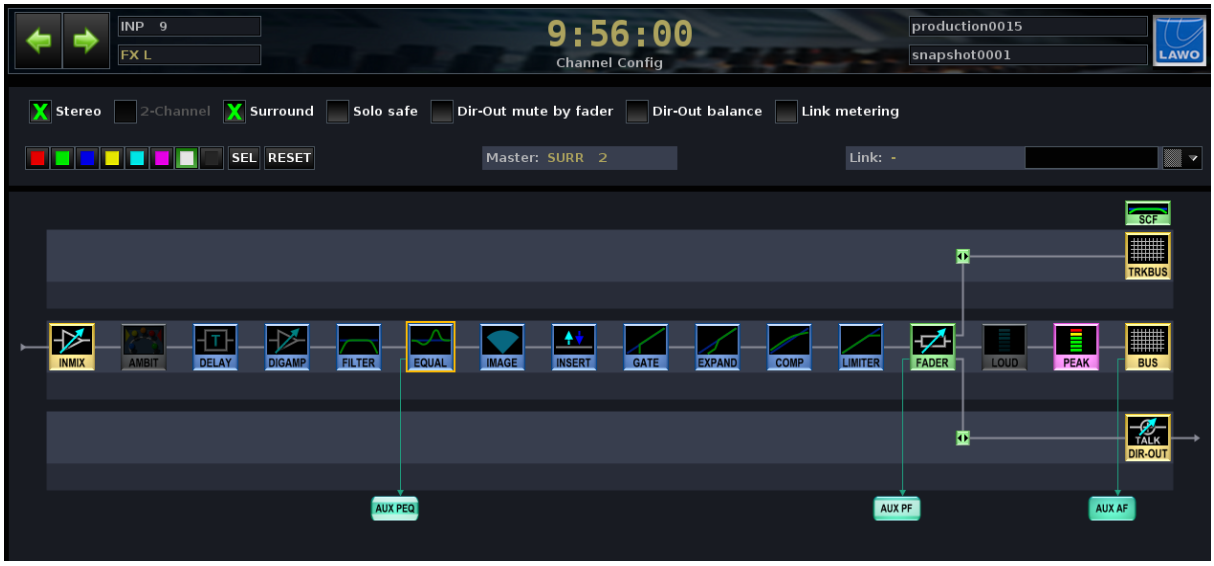


1. Put the first input channel you wish to configure into access, either by pressing its fader strip **SEL** button, or selecting a channel type and number from the ACCESS CHANNEL/ASSIGN control panel.

Remember that, as for surround outputs, only certain selections are valid. For example, you must select INP 1, 9, 17, etc.

Let's assume that you have selected INP 9.

2. Press the **CHAN/CONFIG** button to select the **Channel Config** display.
3. Press the **SURROUND** soft key or screen option to configure INP 9 to INP 15 as a surround channel:



The surround channel is made, and a surround VCA is assigned to act as the master for the input channels. The Surround VCA number – e.g. ***SURR 2*** *– is shown under* ***Master channel*** *on the display.*

4. Assign the surround input to a surround output, by putting each of the input slaves – INP9, 10, 11, etc. – into access and using Forward or Reverse bus assign to route onto your surround output – e.g. SUM 1.


Note

Note that when you assign each input to the surround sum, you only need to select one Sum – e.g. SUM 1 – the input will then automatically be assigned onto Sums 2 to 6 in one operation. If you wish, you may then deselect individual Sum outputs – for example, to remove the input from the LFE Sum.

Also note that when a surround input is created, panning is automatically reset so that assignments are made onto a surround output automatically using a cross matrix assignment:

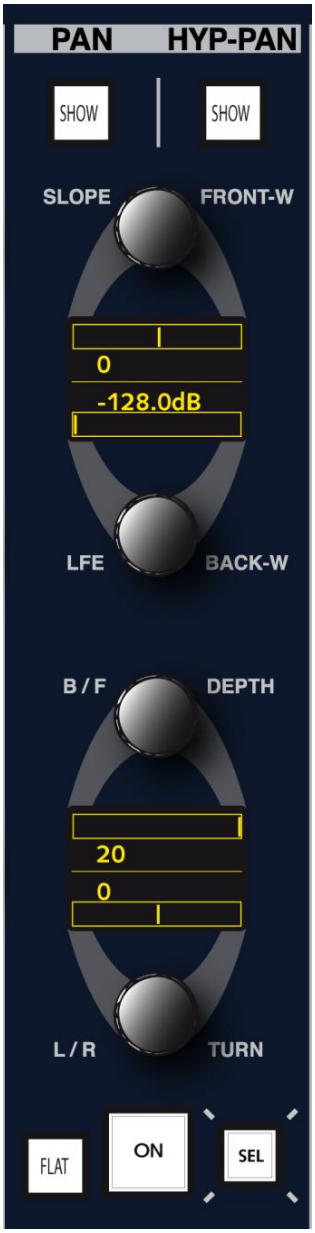
i.e. the surround cross matrix maps INP9 to SUM1, INP10 to SUM2, etc.

To adjust the position of the surround channel within the surround field, use the console's Hyper Pan controls as described on Page 284.

5. If you want to adjust the master level for the surround input, then assign the Surround VCA allocated to it to a channel fader strip as before.

6. You can then use **REVEAL** to adjust the individual slave channels.

Note that when channels are selected for surround operation, 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 as stereo channels. If you wish to control Left and Right independently, then unmake the stereo link – press **SEL** on the L/R slave channel and deselect the **STEREO** button from the IMAGE panel.



Hyper Pan

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.

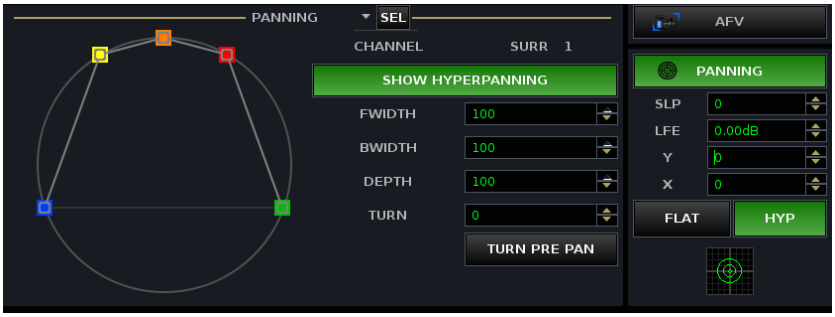
Let's look at Hyper Pan control of the surround VCA master:

1. Put the Surround VCA master channel (e.g. **SUR 1**) into access by selecting its fader **SEL** button.
2. Make sure panning is turned on – press the PAN **SHOW** button and enable the **ON** button.
3. Switch the controls from X/Y to Hyper Pan mode, by pressing the HYP-PAN **SHOW** button and select **ON**.

Note that Hyper Pan is affected by the current joystick (X/Y) pan position. The default starting point is the sweet spot (X = 0 and Y = 0). If you are unsure, then reset the panning section using the **RESET** function as described on Page 311.

4. Hyper Pan is best used in conjunction with the **Main Display** graphics, so select this display now by pressing the **CHAN CONFIG** SCREEN CONTROL button.

The default parameters are shown below:

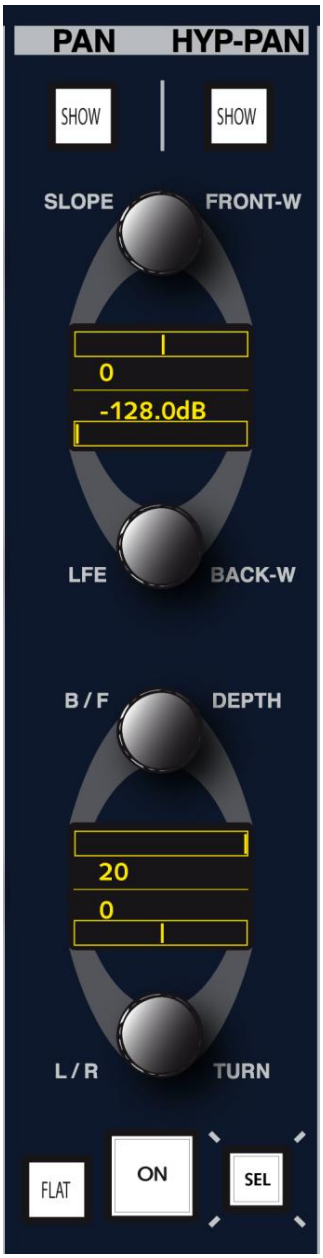


The current positions of each node within the surround field are colour coded according to the surround format of the console (as defined by the AES). In our 5.1 example, the colours are:

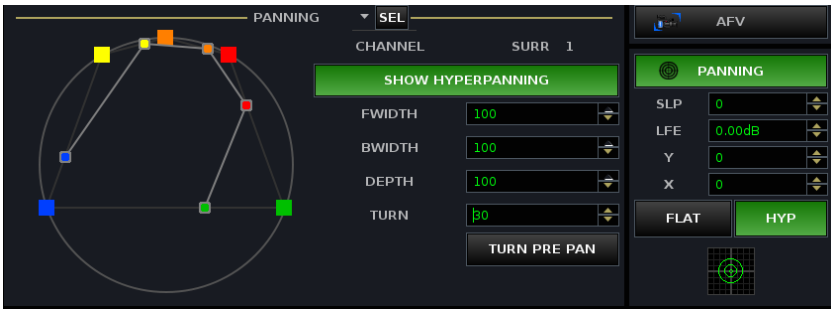
- Yellow = Front Left
- Orange = Front Centre
- Red = Front Right
- Blue = Surround Left
- Green = Surround Right

Let's look at each of the Hyper Pan controls in turn. Note that in each case we will reset each control before adjusting the next to show the affect of each parameter:

1. Use the TURN rotary control to adjust the turn of the surround source:

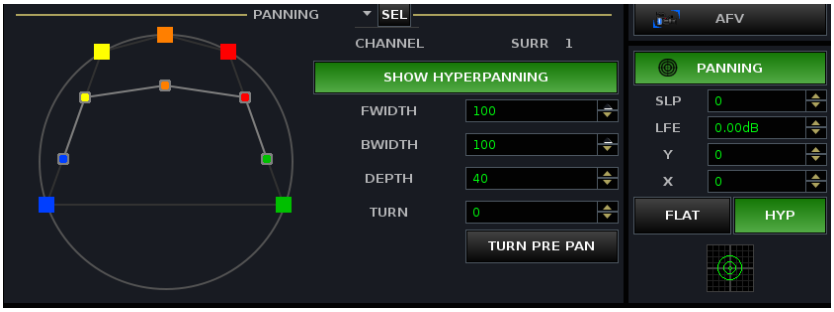


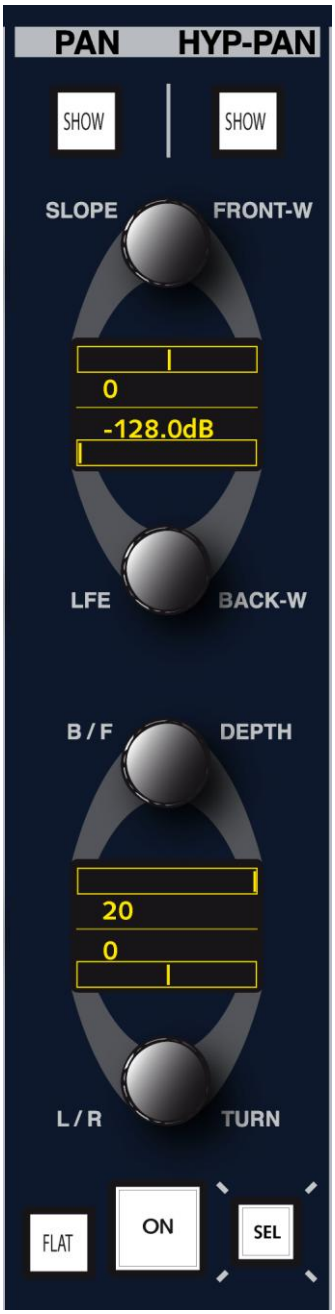
This parameter can be used to rotate the surround source within the surround field. It can be adjusted from 0 degrees to +180 or -180 degrees:



2. Use the DEPTH rotary control to adjust the depth of the channel.

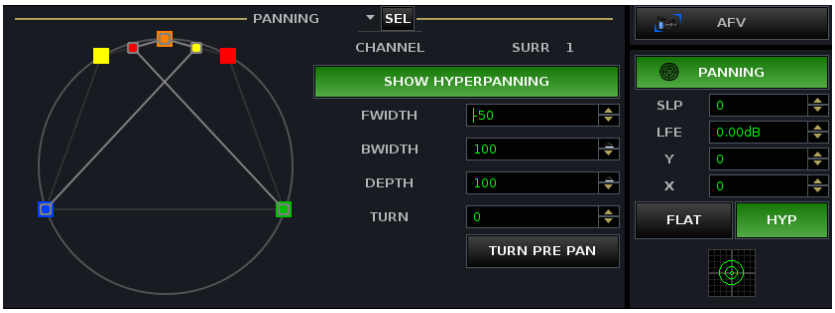
This parameter reduces the depth of the surround source with respect to the sweet spot. It can be adjusted from +100% through 0% (all nodes are aligned at the sweet spot) to -100% (front and rear nodes are reversed) – our example shows the depth reduced to +40%::





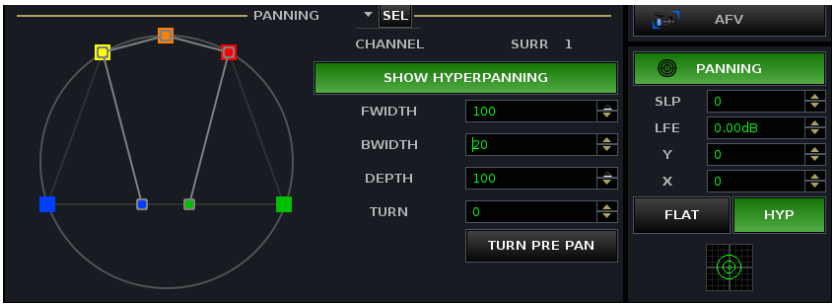
3. Use the FRONT-W rotary control to adjust the Front Width.

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):



4. Use the BACK-W rotary control to adjust Back Width.

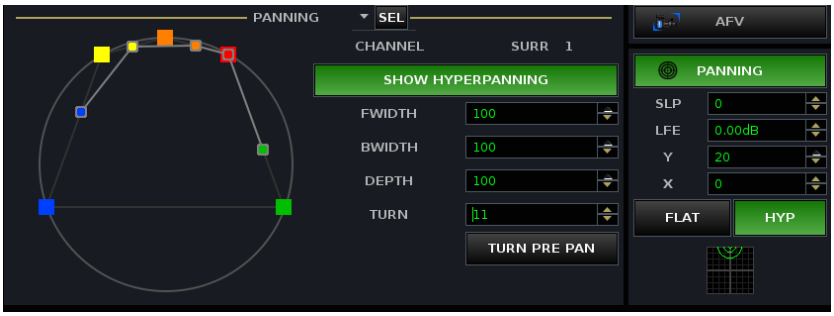
This parameter adjusts the width of the rear channels. It can be adjusted from +100% (full width) through 0% (all channels centered) to -100% (left and right channels are reversed) - our example shows Back Width set to +20%::



Of course, you can combine any of the above parameters.

And you can 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:

If you now adjust the TURN control, you will find that the surround source rotates around front centre (the current joystick position):

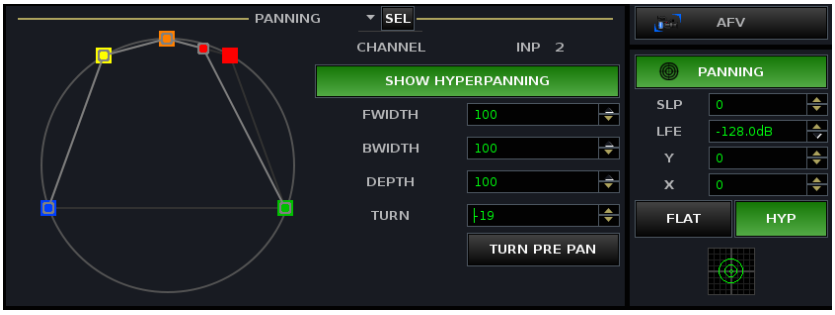


By enabling the **TURN PRE PAN** button (on-screen), you can turn the surround source and then position the rotated source using the joystick.

Hyper Pan on Surround Slave Channels

Note

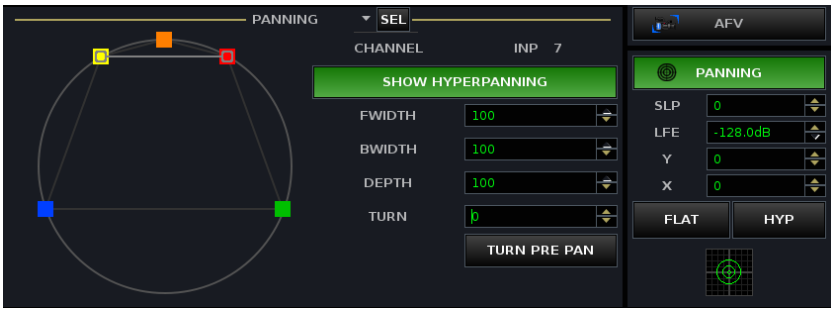
Note that you can use Hyper Pan on individual surround slaves to adjust the relative position of an individual channel – for example, if a surround source is offset slightly to the right, then put the right channel (e.g. INP 2) into access and use the Hyper Pan TURN control to adjust the offset independently from the other slaves. Remember to undo the stereo linking for inputs 1 and 2 first!



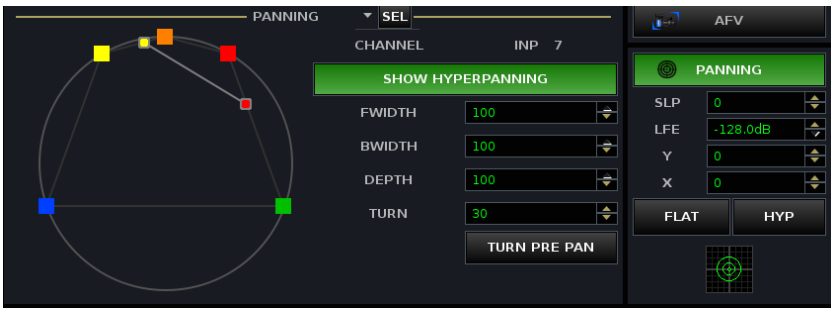
Hyper Pan on Mono or Stereo Channels

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:

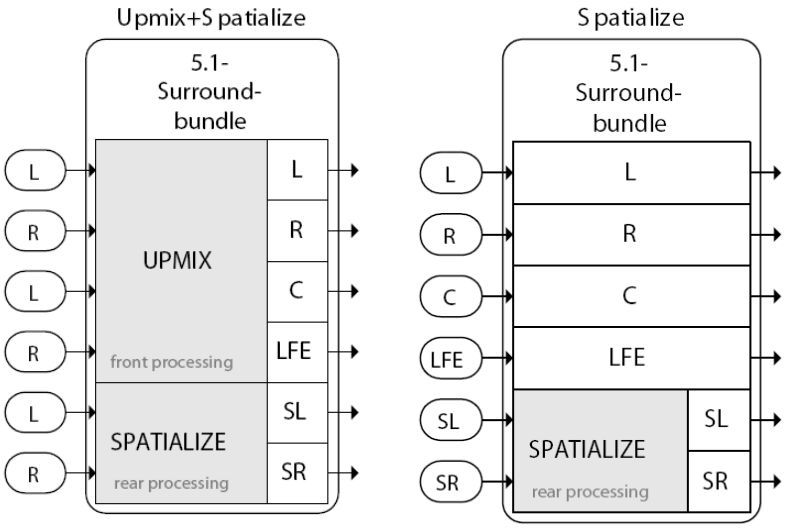


1. Set the Y pan position (front/rear) to 0 and then use the TURN control to rotate the stereo source within the surround field.



AMBIT

The Lawo AMBIT (AMBience IT) is a DSP module specifically designed for 5.1 surround channels providing upmix and spatialise processing. It may 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 may be applied to 5.1 input channels, monitor channels, groups and sums.

Note

Note that AMBIT modules *only* become available if the global surround format is set to 5.1 from the **System Settings** display. If a different format is selected, the AMBIT module is not available. AMBIT processing can also be disabled using the **Global** -> **Upmix/Spatialize Enable** option, see Page 654.

Note also that once an AMBIT module is active, the 5.1 component channels lose other DSP:

- On Recording channels, the Delay, Filter, Image, Gate and Expander modules are suspended.
- On Broadcast channels, the Delay, Insert and Dynamics modules are suspended.

This is necessary to support the extra processing required for the AMBIT algorithm. To apply both AMBIT processing and other suspended DSP, you must configure two 5.1 channels.

All AMBIT parameters are stored in productions and snapshots.

AMBIT processing is fully compatible with any downmix.

AMBIT Upmix & Spatialise

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** – if you wish 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.

Parameter Options

Imagine that you are sitting in a virtual room, listening to the source from a pair of stereo speakers. 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 speakers.
- **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 speaker, 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 Spatiliase mode, only the rear processing is applied to the incoming surround left and surround right channels.

Access to the AMBIT DSP Module

The AMBIT DSP module is enabled, disabled and controlled from the surround VCA master of a 5.1 channel.

Note that AMBIT processing can be applied to Inputs, Monitor channels, Groups or Sums, but not to Auxes.

Note

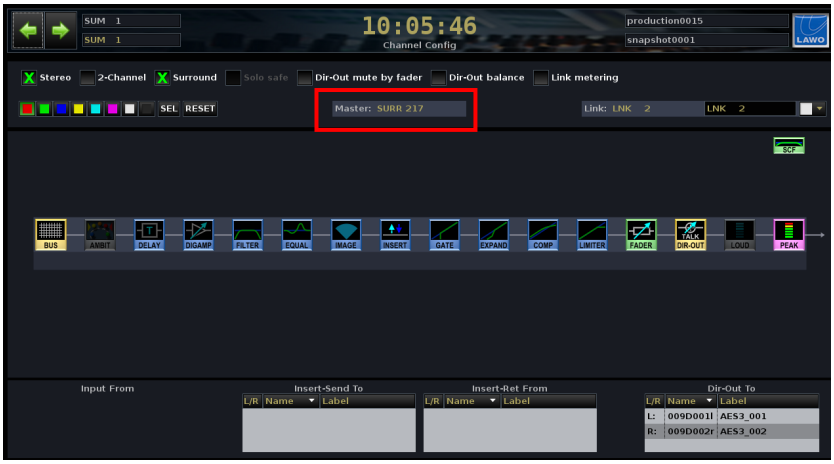
Note that the global surround format must be 5.1 (**System Settings** display: **Global** -> **Surround Format**). In addition, AMBIT processing must be enabled from the **System Settings** display (**Global** -> **Upmix/Spatialize Enable**).

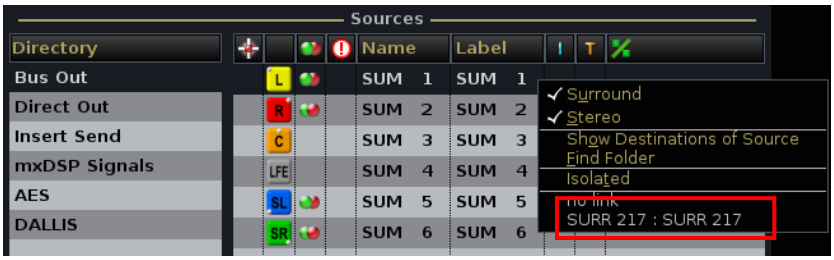
To access and control the AMBIT DSP module:

1. Configure the Input, Monitor, Group or Sum channels for 5.1 surround, either from the **Signal List** or **Channel Config** displays as described on Page 271.
2. Assign the surround VCA master to a fader strip.

Use either the **Channel Config** or **Signal List** display, as described on Page 275, to find the surround VCA number:

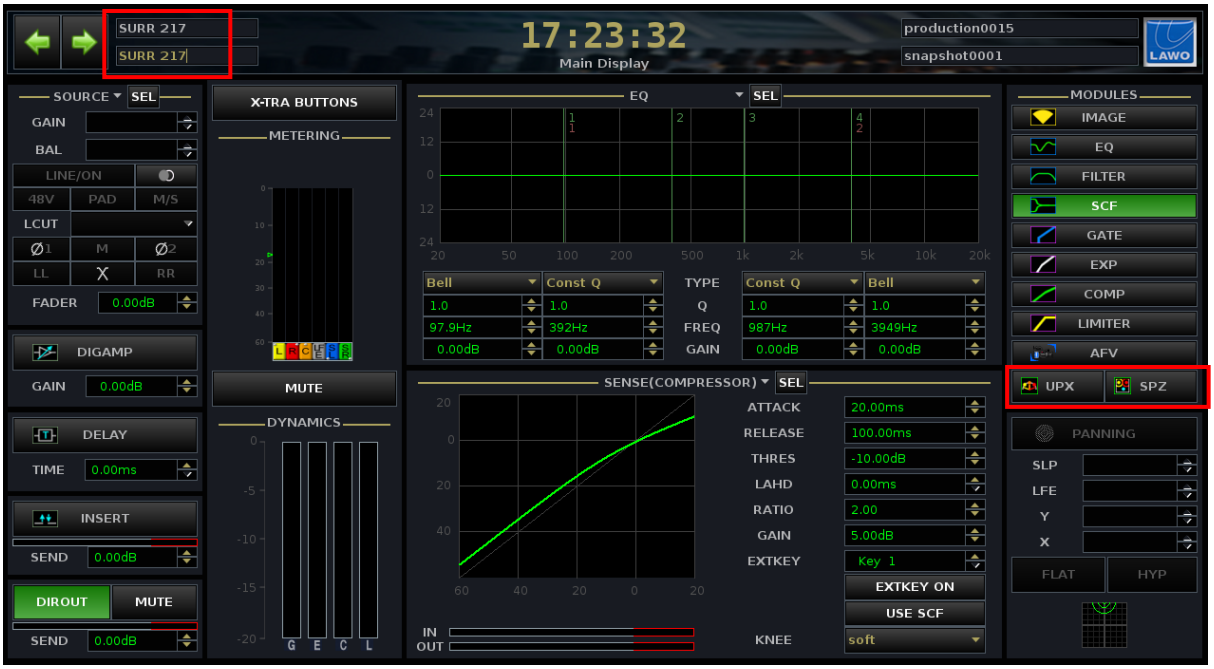
Tip





3. Open the **Main Display** – press the **CHAN/CONFIG** button, located on the SCREEN CONTROL panel.
4. Put the surround VCA into access - press **SEL** on the surround VCA fader strip.

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?

Turning On the AMBIT Processing

1. Turn on the Upmix & Spatialise mode (2 in: 6 out) by selecting the **UPX** touch-screen button.

Both **UPX** and **SPZ** are enabled (green).

2. Alternatively, turn on Spatialise mode (6 in: 6 out, rear processing only) by selecting **SPZ** only.

Note that you cannot work with Upmix on and Spatialise off.

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).

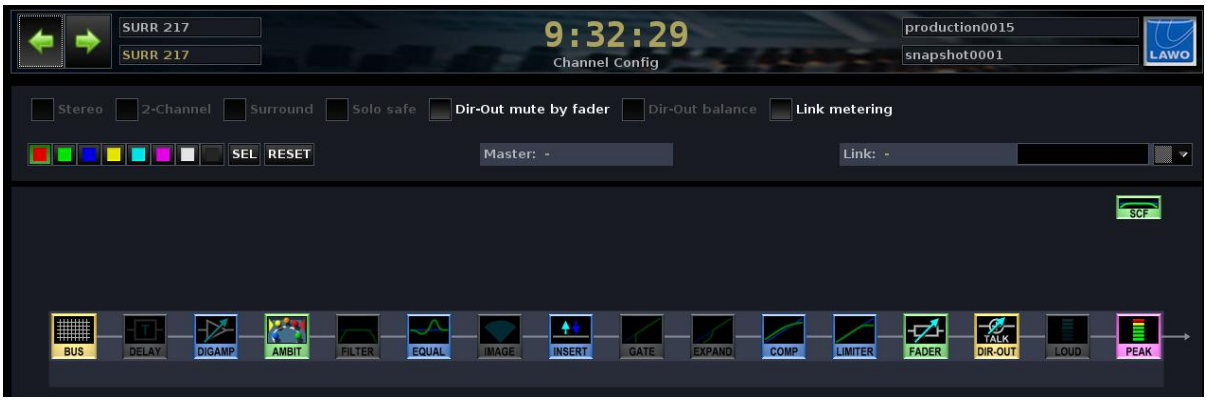
This is reflected by the greyed-out module icons on the **Main Display**.

3. To reinstate the suspended DSP modules, you must turn off the AMBIT processing – deselect **UPX** and **SPZ**.

Changing the Signal Flow

The AMBIT module can be moved within the channel signal flow in the same manner as other DSP modules.

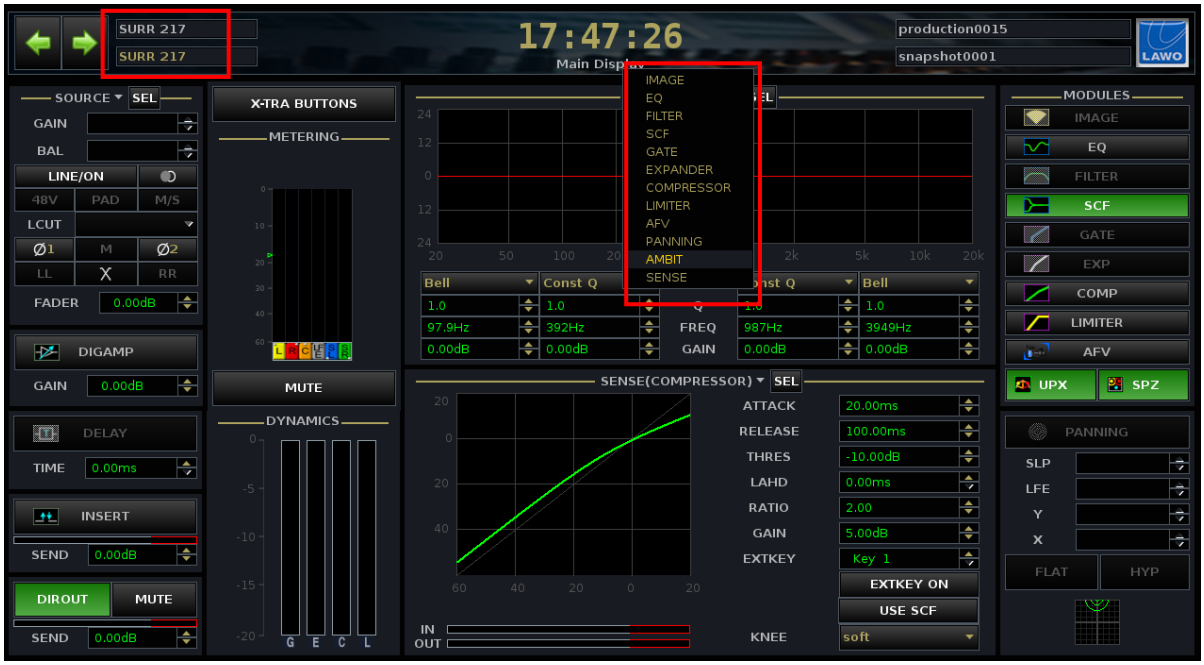
1. Put the surround VCA into access – press **SEL** on its fader strip.
2. Open the **Channel Config** display.
3. Select the AMBIT module and adjust its position using either the **LEFT**/**RIGHT** or **UP**/**DOWN** soft keys as described on Page 108:



Controlling the AMBIT Processing

AMBIT parameters are adjusted from the **Main Display**:

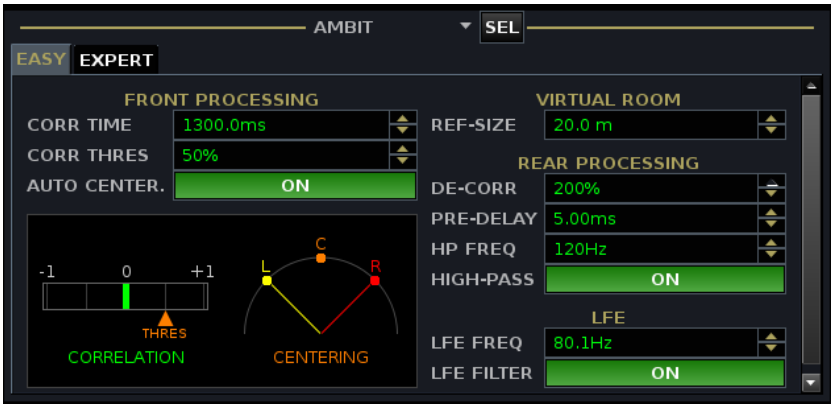
1. Make sure that the surround VCA is in access and open the **Main Display**.
2. Assign the **AMBIT** module to one of the assignable views on the display:



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 using either **Easy** or **Expert** setup.

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.

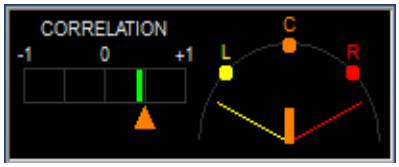
The correlated signal threshold and time determine the working point for the auto-centering algorithm:

- **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.

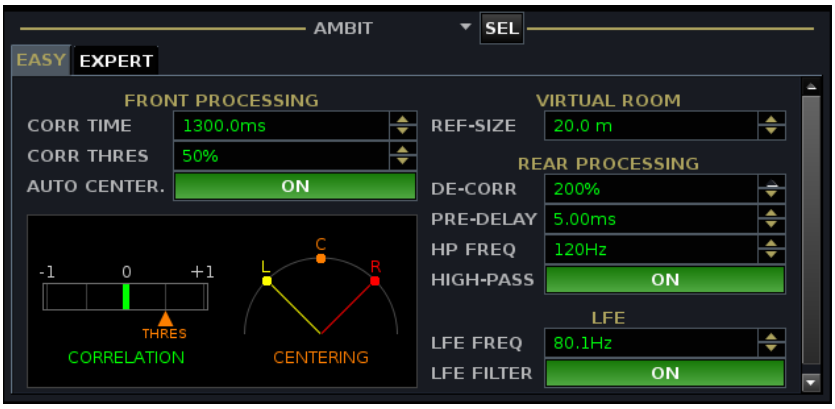
You can monitor the affect of the auto-centering algorithm using the on-screen graphics:



If you wish to control the front processing parameters manually, then use **Expert** setup.

Note

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.


Tip

You can use the **REVEAL** function to assign the surround component channels to the surface, in order to apply offsets to Left, Right, Centre, Surround Left, Surround Right or the LFE, see Page 278.

Expert Setup

The **Expert** tab provides access to more advanced parameters.

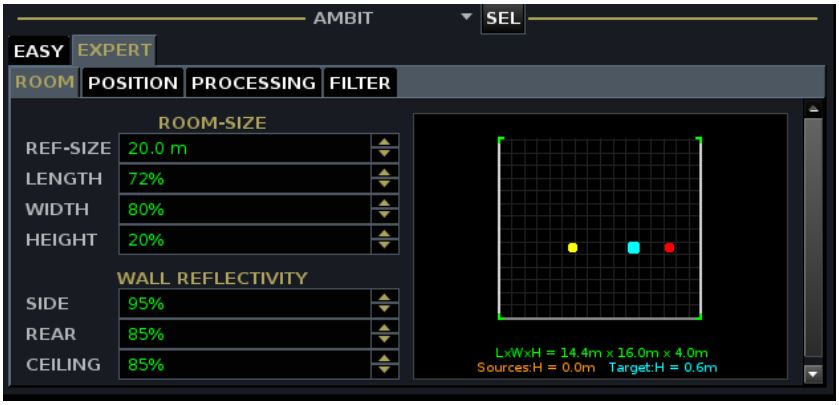
When working in **Expert** setup, assign the AMBIT module to both assignable views within the **Main Display**. This allows you to view different tabs simultaneously.

Tip

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 graphic:

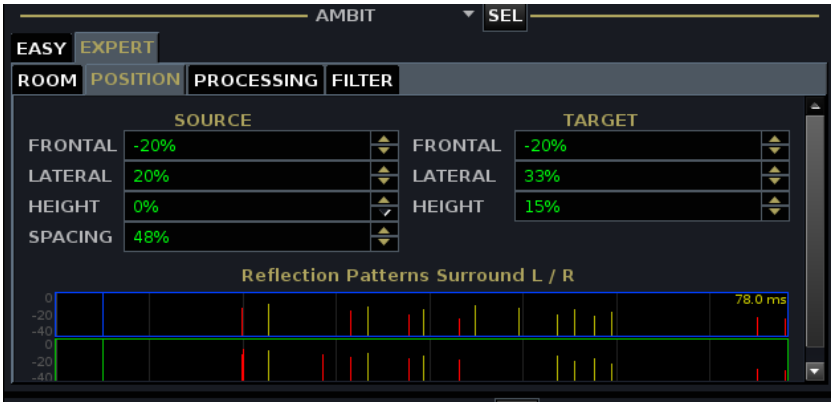
3. Use the WALL REFLECTIVITY parameters to define the reflectivity of the surfaces within the virtual room:

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 speakers:

- **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 spaving: 100% = full width; 0% = mono.

3. Use the TARGET parameters to define the position of the listening target:

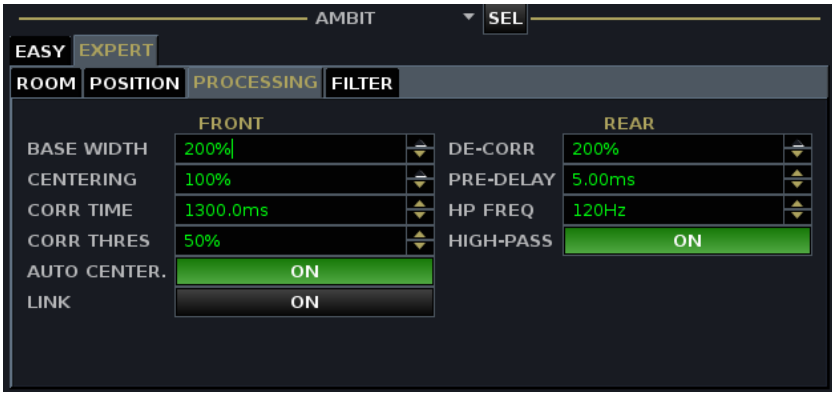
- **FRONTAL** - front/rear target position: 100% = front; 0% = middle of the room; -100% = rear.
- **LATERAL** - left/right target position: 100% = default.
- **HEIGHT** - height of target position: 100% = default.

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 speaker), red (right speaker) and turquoise (target) dots.

PROCESSING

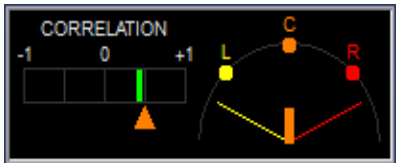
1. Select **PROCESSING** to define the front and rear processing parameters.



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 on Page 297.
- **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 speakers.

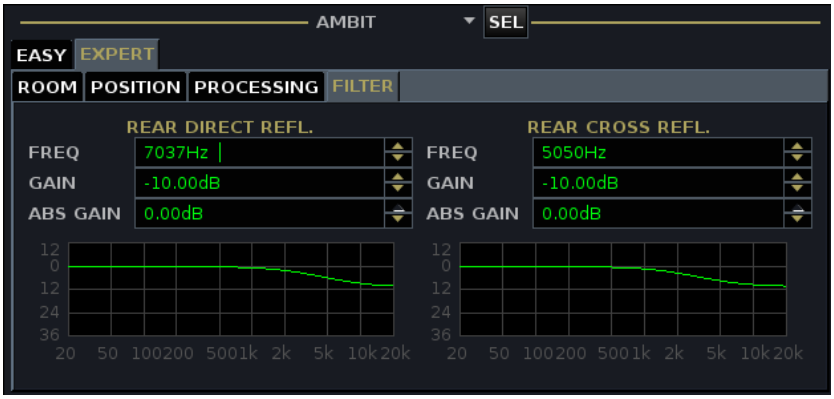
The results are best represented by the on-screen graphic within the Easy tab:



3. The REAR processing parameters are identical to those in **Easy** setup, see Page 297.

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).

Note

Direct reflections describe reflections from the closest wall; cross reflections come from an opposing wall. So, if a signal eminates from the left source speaker, 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.

Saving and Loading AMBIT Parameters

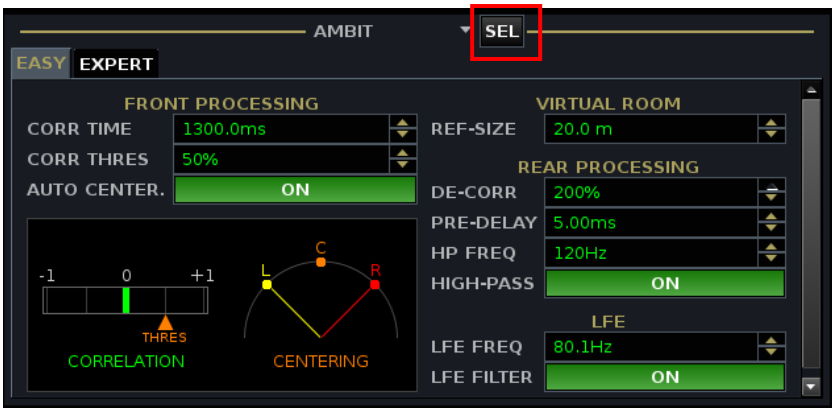
All AMBIT parameters are stored in productions and snapshots. Therefore, you can easily store and recall upmix processing as part of your mix. See Chapter 6 for details.

AMBIT parameters may 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**.
2. Load or Save presets as described on Page 457.

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

Note that the AMBIT module is automatically selected by pressing **SEL ALL**.

AMBIT Copy and Reset

Note that the following operations are supported:

- **Copy Parameters** - AMBIT parameters can be copied between surround VCAs as described on Page 305. You cannot copy AMBIT parameters to other channel types.
- **Reset Parameters** - AMBIT parameters can be reset as described on Page 311.

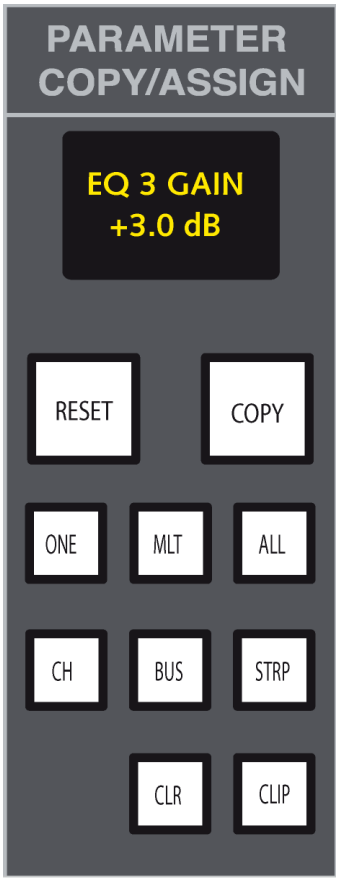
The following cannot be applied to the AMBIT module:

- LINK or COUPLE, see Page 353.
- LISTEN controls to AFL any individual processing section, see Page 230.
- SNAPSHOT/SEQUENCE to select modules for cross fades between snapshots when running a sequence, see Page 435.
- AUTOMATION – to select modules for timecode automation.

Copying Channel Parameters

The PARAMETER COPY/ASSIGN buttons, located within the Central Control Section, may be used to copy DSP parameters, bus assignments, channel signal flow configuration and/or fader strip free control assignments between channels.

Individual or groups of settings may be copied to single or multiple destinations.



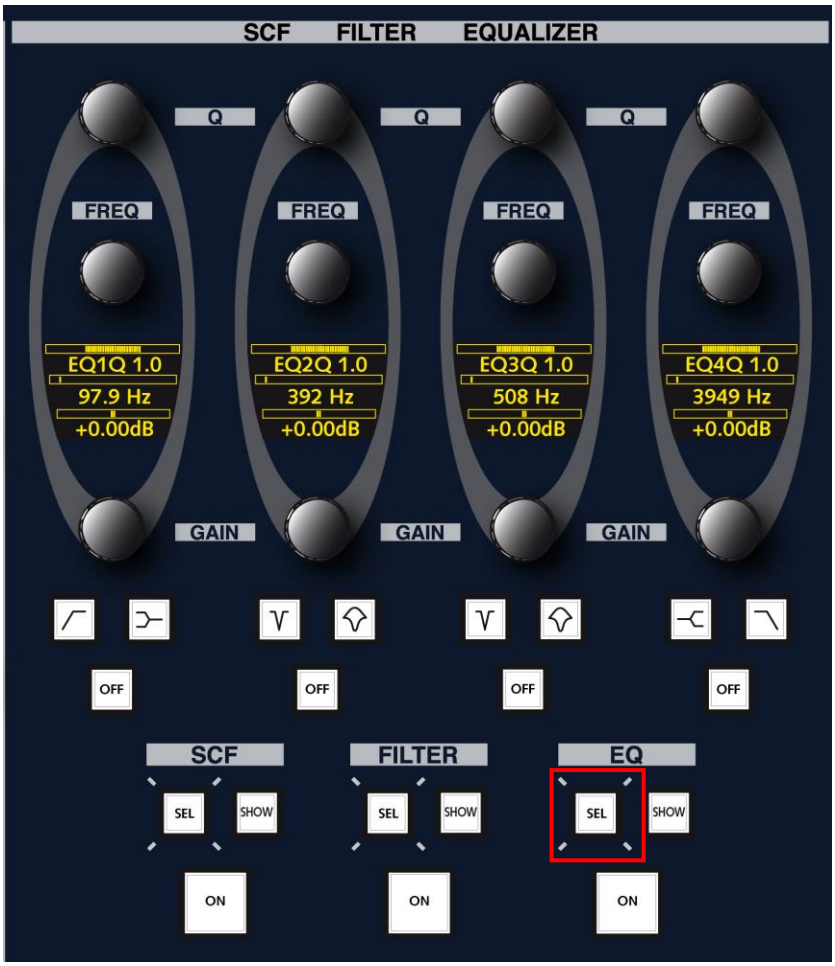
Copying to a Single Channel

For example, to copy an EQ setting between two channels:

1. Assign the source channel to the Central Control Section, either by pressing its fader **SEL** button or entering the channel type and number from the ACCESS CHANNEL/ASSIGN control panel.
2. Press the **COPY** button, located on the PARAMETER COPY/ASSIGN panel.

*This automatically activates the **ONE** button for a one-shot copy assignment and all the fader **SEL** buttons across the console flash, in green, to indicate possible destinations:*

3. On the Central Control Section, select the audio module you wish to copy, in this example the EQ section, by pressing the **SEL** button above EQ **ON**:



4. Now select the channel you wish to copy to by pressing its fader **SEL** button.

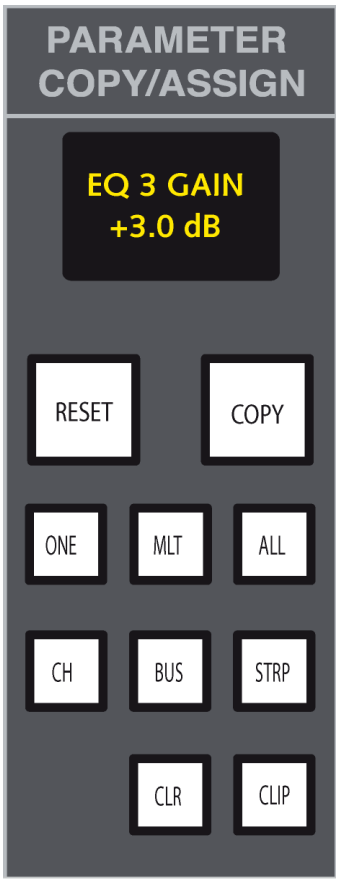
*The 4-band EQ setting is copied, and the **COPY** function automatically cancels.*

5. If you wish to exit the copy mode without copying any settings, just deselect the **COPY** button or press **ESC**, on the ACCESS CHANNEL/ASSIGN control panel, at any point during the operation.

If you wish to copy more settings than just the EQ, then select multiple **SEL** buttons from the Central Control Panel during step 3. Channel sections are selected using the **SEL** buttons as follows:

- INPUT MIXER – either source OR INMIX parameters, depending on the INPUT MIXER mode, see Page 186.
- IMAGE – stereo image and position.
- DIG AMP - digital amplifier gain.
- DELAY– channel delay.
- INSERT – channel insert.
- DIROUT – direct output.
- GATE – gate.
- EXPANDER – expander.
- SCF – sidechain filter settings (Recording channels only).
- FILTER – 2-band filter settings (Recording channels only).
- EQ – 4-band EQ settings.
- COMPRESSOR – compressor.
- LIMITER – limiter.
- PAN – stereo/surround panning.
- MUTE **SEL** – status of the mute button.
- Fader **SEL** – the fader position.
- AUX SENDS/AUDIO FOLLOW VIDEO - auxiliary sends and audio follow video setup.

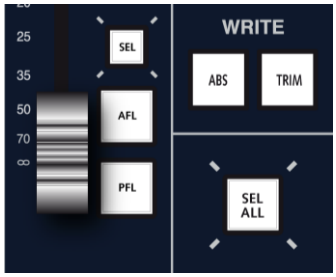
Note that you can select each page of auxiliary sends (e.g. **AUX 1-8**, **AUX 9-16**) separately allowing you to copy eight send levels at a time and/or the AFV parameters.



You can also copy other channel parameters using the following buttons on the PARAMETER COPY/ASSIGN panel:

- **CH** - selects the channel signal processing order as set on the **Channel Config** display. (On Broadcast channels, this includes the dynamics model).
- **BUS** - selects the channel's bus assignments. Note that aux sends are not included; use the **SEL** button on the AUX SENDS/AFV panel to select aux assignments.
- **STRP** - selects the fader strip's Free Control assignments.

To select *all* settings for a channel, press the **SEL ALL** button beside the Central Control Section fader:



By deselecting **SEL** buttons, you may then edit the selection to copy a subset of parameters.

Note that every time you re-enter the copy mode, the last selections made from the **SEL** buttons are retained. To clear down all the selections:

1. Press the **SEL ALL** button above the Central Control Section Fader to select all audio modules.
2. Then deselect **SEL ALL**.

If you wish to select just one parameter from a processing section – for example EQ 3 Gain – then use the **CLIP** button on the PARAMETER COPY/ASSIGN panel as follows:

1. Put the source channel into access and touch the parameter control you wish to copy.

Your chosen parameter is displayed in the PARAMETER COPY/ASSIGN clipboard – e.g. **EQ 3 GAIN +3.0dB**.

2. Press the **COPY** and **CLIP** buttons.

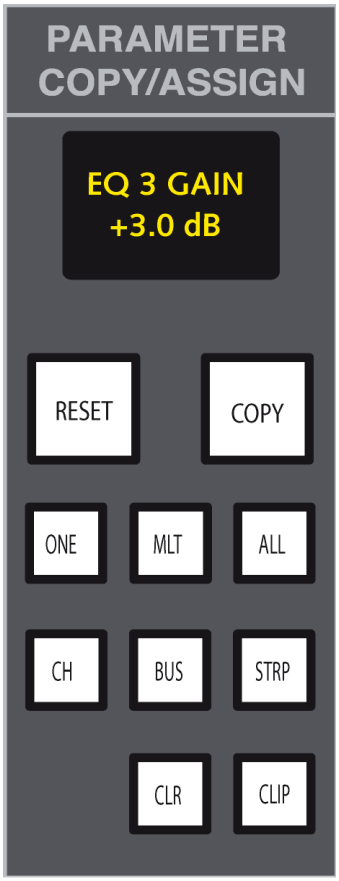
ONE *will automatically be selected for a one-shot copy assignment and all the fader* ***SEL*** *buttons across the console flash, in green, to indicate possible destinations*

3. Select your destination by pressing a fader **SEL** button.

The EQ 3 Gain parameter is copied to the destination channel; all other EQ parameters are unchanged.

Copying to Multiple Channels

You may copy the same parameters to multiple channels by latching the Copy Parameter mode using the **MLT** button:

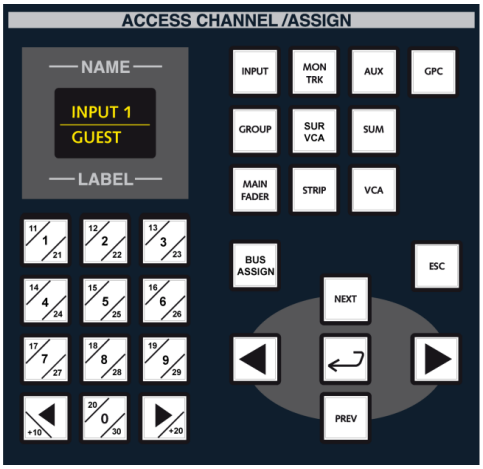


1. Assign the source channel to the Central Control Section either by pressing its fader **SEL** button or using the ACCESS CHANNEL/ASSIGN control panel.
2. Press **COPY** and **MLT** from the PARAMETER COPY/ASSIGN control area.

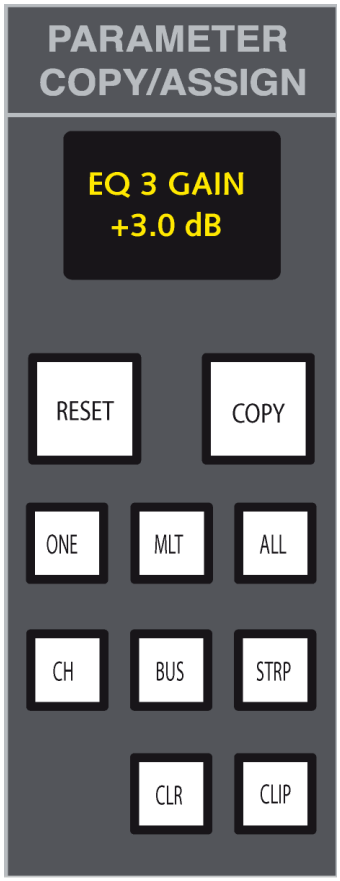
*This activates the multiple copy mode and all the fader **SEL** buttons across the console flash, in green, to indicate possible destinations.*

3. On the Central Control Section, select the audio module(s) you wish to copy. For example, select all audio modules by pressing the **SEL ALL** button.
4. Now you may press multiple destination fader **SEL** buttons to copy the settings to as many channels as you like.

Note that you may edit your source channel selection without exiting the copy mode by pressing the **NEXT** or **PREV** buttons on the ACCESS CHANNEL/ASSIGN control panel:



When you are finished, remember to deselect **COPY** or press **ESC**, on the ACCESS CHANNEL/ASSIGN control panel, to exit from the parameter copy mode. If you don't the next time you press a fader **SEL** button, you will be copying parameters to that channel!

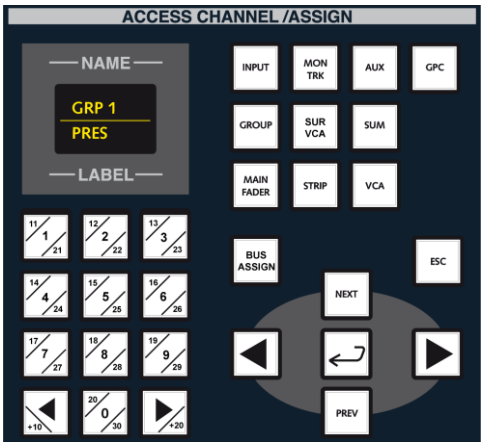


Alternatively, to copy parameters to *all* channels of a particular type (for example, to copy a limiter setting across all groups):

1. Assign the source channel to the Central Control Section either by pressing its fader **SEL** button or using the ACCESS CHANNEL/ASSIGN control panel.
2. Press **COPY** and **ALL** from the PARAMETER COPY/ASSIGN control area. XE “

*This automatically selects the **ONE** button for a one-shot copy, and all the fader **SEL** buttons across the console flash, in green, to indicate possible destinations. If you wish to make multiple **ALL** copies select **MLT** instead of **ONE**.*

3. On the Central Control Section, select the audio module(s) you wish to copy. For example, by pressing **LIM** and **SEL** from the COM/LIM section.
4. Now use the ACCESS CHANNEL/ASSIGN control panel to select the type(s) of DSP channel you wish to copy to:



In our example, you would press **GROUP**, but you may select any or all types from:

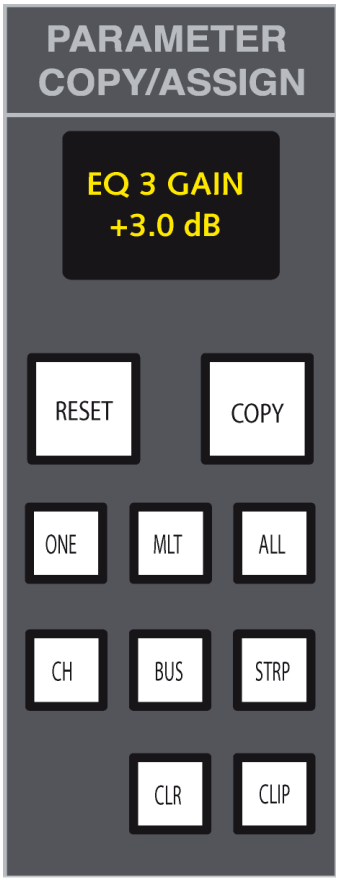
- **INPUT** – Input channels.
- **MON TRK** – Monitor channels.
- **AUX** – Auxiliary masters.
- **GPC** – General Purpose Channels (MIDI channels).
- **GROUP** – Group masters.
- **SUR VCA** – Surround VCA masters.
- **SUM** – Main sum masters.
- **VCA** – VCA masters.

Note that you may not select MAIN or STRIP in this mode as these are not valid DSP channel types.

5. Press the illuminated Enter button on the ACCESS CHANNEL/ASSIGN control panel to complete the copy operation.
6. Deselect **COPY** or press **ESC** to exit the copy mode.

Resetting Channel Parameters

The **RESET** button, located on the PARAMETER COPY/ASSIGN panel, may be used to reset channel parameters to their default values. This operation works in a similar manner to copying parameters. Note that as we are not copying from a source to a destination channel, any channel may be assigned to the Central Control Section.



1. Press the **RESET** button, located on the PARAMETER COPY/ASSIGN panel.

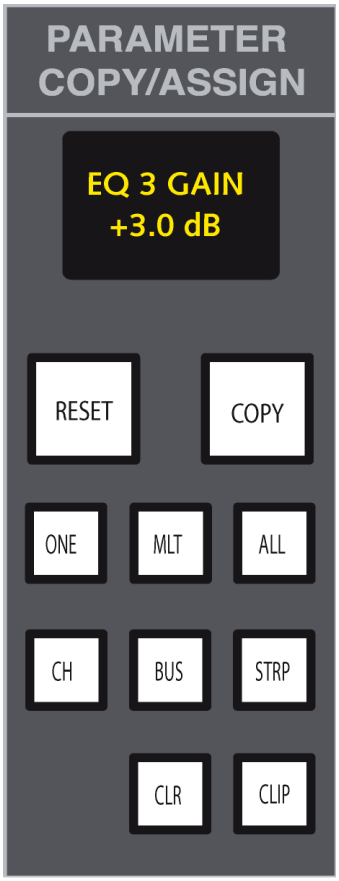
*This automatically activates the **ONE** button for a one-shot reset assignment and all the fader **SEL** buttons across the console flash, in green, to indicate possible destinations:*

*If you wish to perform multiple resets select **MLT** instead of **ONE**.*

2. On the Central Control Section, select the audio module(s) you wish to reset by pressing the **SEL** buttons for the control section(s), OR press the **CLIP** button on the PARAMETER COPY/ASSIGN panel to just reset the clipboard parameter.
3. Now select the channel you wish to reset to by pressing its flashing fader **SEL** button.

The channel section is reset.

4. If you selected the **MLT** button to perform multiple reset operations remember to deselect **RESET** or press **ESC**, on the ACCESS CHANNEL/ASSIGN control panel, to exit from the parameter reset mode.

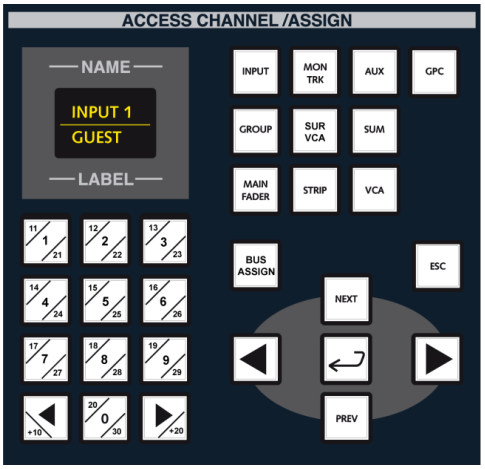


As with the copy function, you may also reset parameters for all channels of a certain DSP type (for example, to reset all your mute buttons to off across all input and monitor channels):

1. Press **RESET** and **ALL** from the PARAMETER COPY/ASSIGN control area.

*This automatically activates the **ONE** button for a one-shot assignment and all the fader **SEL** buttons across the console flash, in green, to indicate possible destinations. If you wish to perform multiple resets select **MLT** instead of **ONE**.*

2. On the Central Control Section, select the audio module(s) you wish to reset. For example, by pressing the **SEL** button beside the mute button.
3. Now use the ACCESS CHANNEL/ASSIGN control panel to select the type(s) of DSP channel you wish to copy to:



In our example, you would press **INPUT** and **MON TRK** but you may select any or all types from:

- **INPUT** – Input channels.
- **MON TRK** – Monitor channels.
- **AUX** – Auxiliary masters.
- **GPC** – General Purpose Channels (MIDI channels).
- **GROUP** – Group masters.
- **SUR VCA** – Surround VCA masters.
- **SUM** – Main sum masters.
- **VCA** – VCA masters.

Note that you may not select MAIN or STRIP in this mode as these are not valid DSP channel types.

4. Press the illuminated Enter button on the ACCESS CHANNEL/ASSIGN control panel to complete the reset.

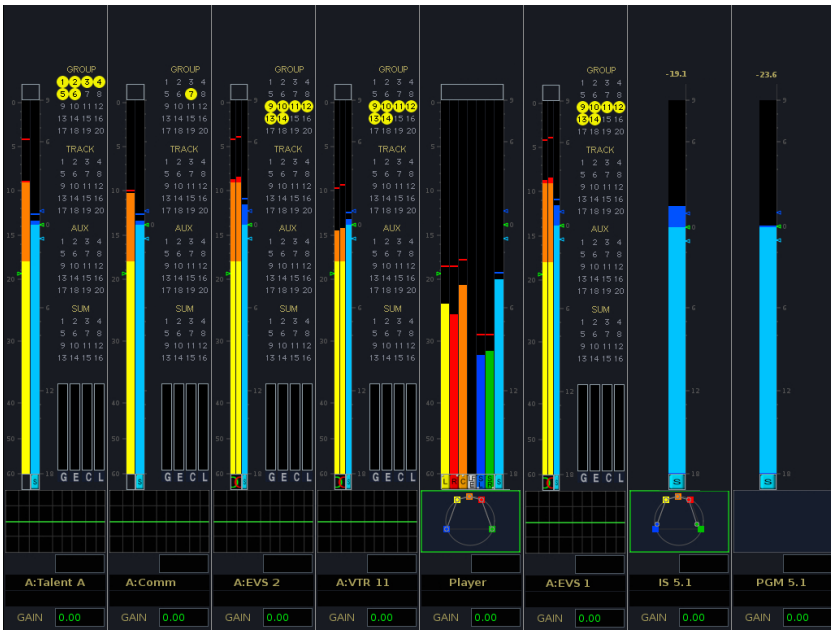
The mute buttons across all input and monitor channels are turned off.

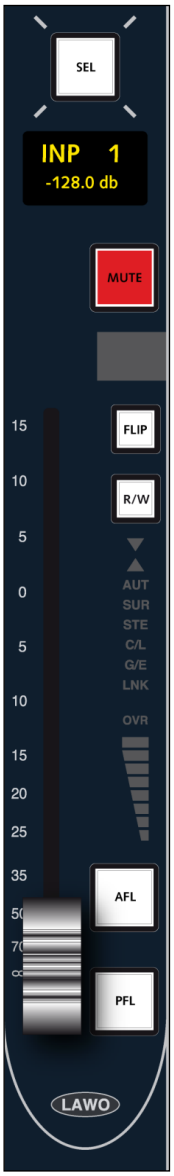
5. Deselect **RESET** or press **ESC** to exit the reset mode.

Metering

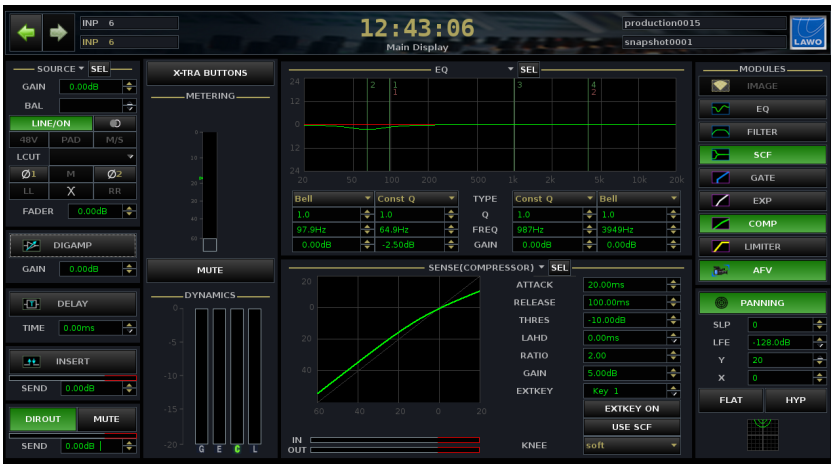
There are several places where channel signals are metered:

- The **Channel** display (below) provides dedicated metering for every channel fader strip:





- The fader meter (opposite) is a confidence level meter. This always meters the channel input level (the output of the INMIX audio module).
- The **Main Display** (below) includes a meter which follows the same options as applied to the **Channel** display.
- The **Main Display** (below) also meters signals at other points such as the insert send, direct out and dynamics modules:



The Metering Display

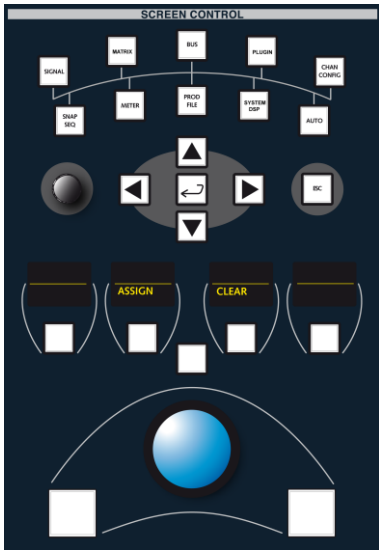
In addition, the **Metering** display contains four pages of assignable meters to provide an overview of key channels: inputs, monitors, groups, auxes, sums, surround or VCA masters.

1. Press the **METER** button, located on the SCREEN CONTROL panel, to view this display now:

Note that each time you press the **METER** button you cycle through four pages of assignable meters. The current page is always highlighted at the top – in our example, **Metering 1**.

You can programme any DSP channel onto any of the meters in any page:

2. Select the meter you wish to assign, either by using the trackball or left/right navigation buttons.



The selected meter is highlighted.

3. Now choose the DSP channel you wish to meter by placing it in access from the ACCESS CHANNEL/ASSIGN control panel or fader strip **SEL** button.
4. Press the **ASSIGN** soft key to assign the channel to the selected meter.

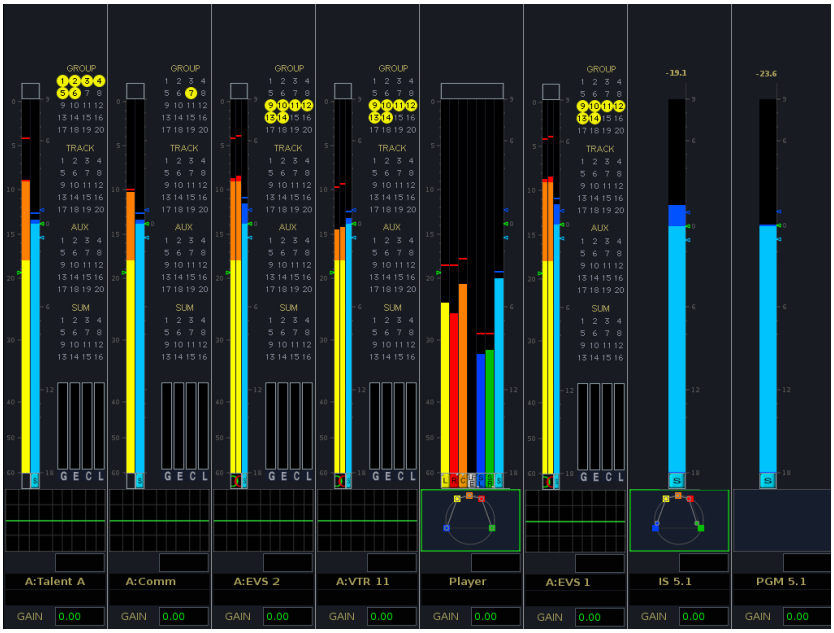
The meter label updates and the display automatically selects the next meter. This makes it easy to make multiple meter assignments quickly.

5. To remove an assignment from the selected meter so that it shows as blank, press the **CLEAR** soft key.

Meter assignments are saved within the production.

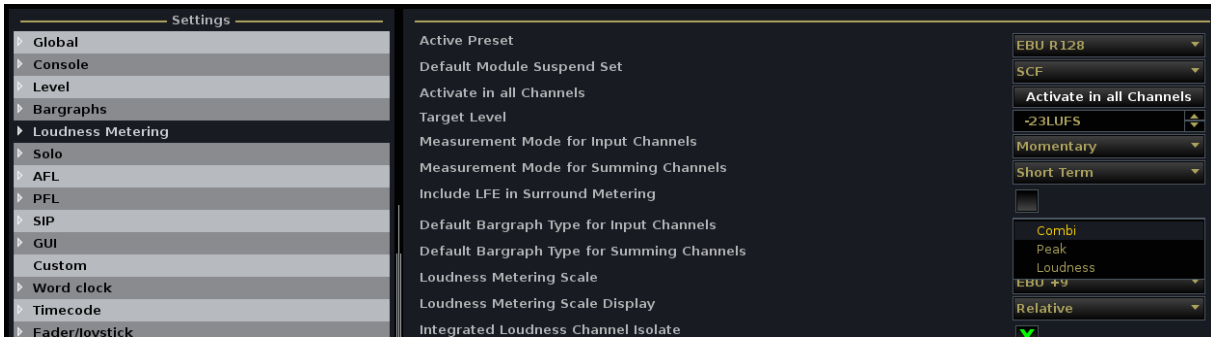
Bargraph Types

For all on-screen meters you may choose to display peak metering, loudness metering, or a combination of both:



The default selection is made from the **System Settings** display for input channels (input and monitor channels) and summing channels (groups, auxes and sums):

1. Press the **SYSTEM DSP** button, on the SCREEN CONTROL panel to open the **System Settings** display.
2. Select **Loudness Metering** from the list of topics.
3. Select **Default Bargraph Type for Input Channels**:



This option sets the metering type for all input and monitor channels. You may choose from:

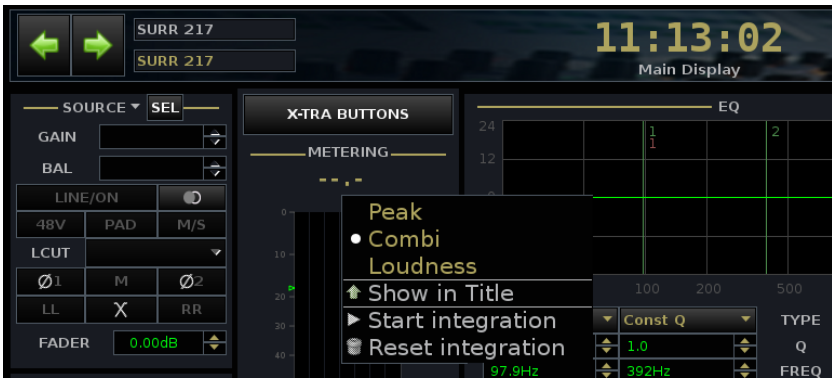
- **Combi** – peak and loudness metering side by side.
- **Peak** – peak metering only
- **Loudness** – loudness metering only

4. Select the **Default Bargraph Type for Summing Channels** and repeat the operation.

This option sets the metering type for all summing channels (groups, auxes and sums).

Having set the default options, you may change the bargraph type for an individual channel as follows:

1. Select the channel by pressing its fader **SEL** button.
2. Then 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 **Peak**, **Combi** or **Loudness** from the pop-up window:



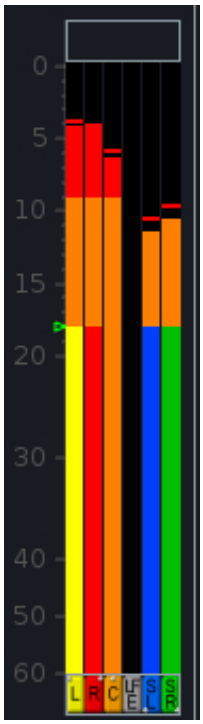
Note that the bargraph type selection affects all on-screen meters, including the **Channel**, **Main** and **Metering** displays.

Note

Note that loudness metering must be activated, see Page 318, before any loudness measurements are displayed.

Peak Metering

Peak metering bargraphs are mono, stereo or multi-channel according to the format of the channel.



Pickup Point

The meter be switched to different points within the signal flow by adjusting the position of the **PEAK** DSP module, see Page 332.

Peak Meter Scales and Characteristics

A range of meter scales and characteristics are available from the **System Settings** display, see Page 665.

Note that for ITU compliant operation, you should choose **True Peak** as the meter characteristic, and **dBFS** as the Scale mode. Then use the **Level** options to set the **Reference Level** equal to your maximum Analogue Level and the **Headroom** to 0dB. This ensures that the dBFS metering across the console matches any external AES metering you may have.

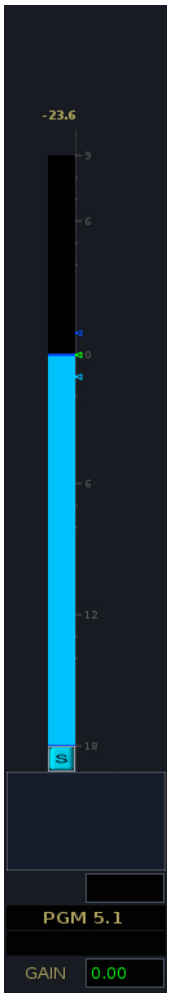
You may also use the **Safe Area**, **Operation Range** and **Line Up Level** options to colour code the meter scale and help manage your own headroom.

Peak Hold

Also from the **System Settings** display, you can enable the peak hold facility which monitors and marks the peak level reached on each meter across the console:

Options are available to clear the peak hold indicator automatically after a certain time period, or manually using the **CLEAR** peak hold soft key. You can also set the colour for the peak hold indicator.

Loudness Metering



The mc^2 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 bargraph colour indicates whether loudness is above (dark blue) or below (light blue) the Target Level. Upper and lower scale markers (dark and light blue arrows) indicate a tolerance of +/- 1 LU.

The **M** or **S** at the bottom of the bargraph represents the integration time for the measurement: Momentary or Short term. This option is set from the **System Settings** display, see Page 668.

Integrated Loudness Measurement

On summing channels, you may 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 programme transmission.

Pickup Point

The loudness meter may be positioned independently from the peak meter by adjusting the position of the **LOUD** DSP module with the channel, see Page 332.

Presets and Options

All options for loudness metering are adjusted from the **System Settings** display, see Page 668. A choice of Active Presets recall the default settings specified by the EBU R128 or ATSC A/85.

Note that 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.de/en/products/mixing-consoles/loudness-metering.html

German:

http://www.lawo.de/de/produkte/mischpulte/loudness-metering.html

The next few pages describe how to configure, activate and work with Loudness metering.

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. However, the quickest method is to select the default, applied to all channels, and then modify this as required.

Note that if you choose to suspend the EQ DSP module, then on Recording channels you will lose the pre-EQ Aux send (AUX PEQ). This is due to the fact that the send is taken from the input to the EQ module:

Note

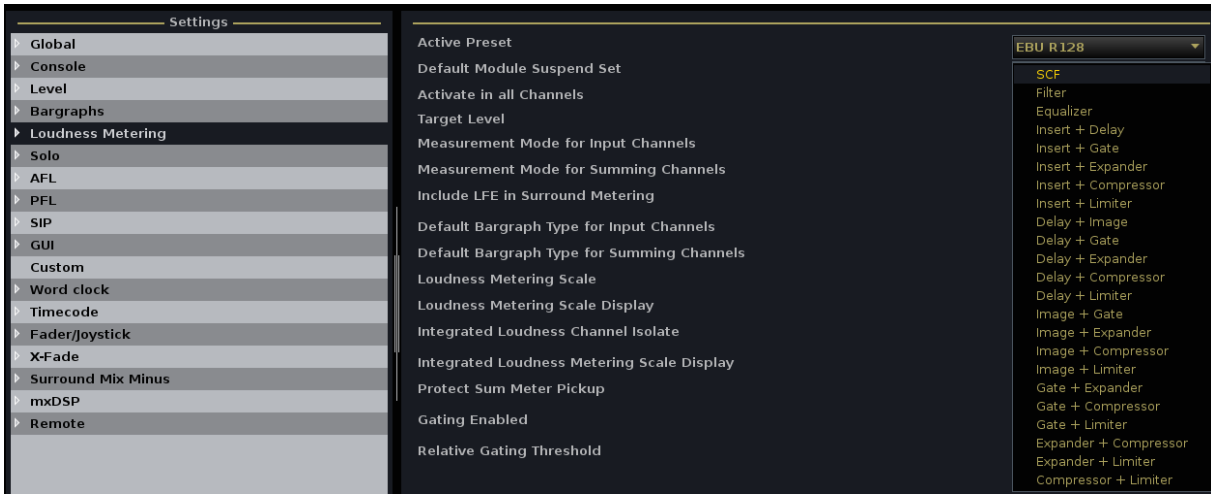
Note also that if you wish to activate loudness metering *and* AMBIT processing:

- 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).

If not, loudness metering cannot be enabled for an AMBIT processed channel.

The default suspended DSP module is set from the **System Settings** display:

1. Press the **SYSTEM DSP** button, on the SCREEN CONTROL panel to open the **System Settings** display.
2. Select **Loudness Metering** from the list of topics.
3. Select **Default Module Suspend Set** and choose a DSP module combination from the drop-down menu – our example shows the options for Recording channels:



*For example, if you select **SCF**, then the sidechain filters will be suspended when loudness metering is activated.*

To modify the suspended DSP module on an individual channel:

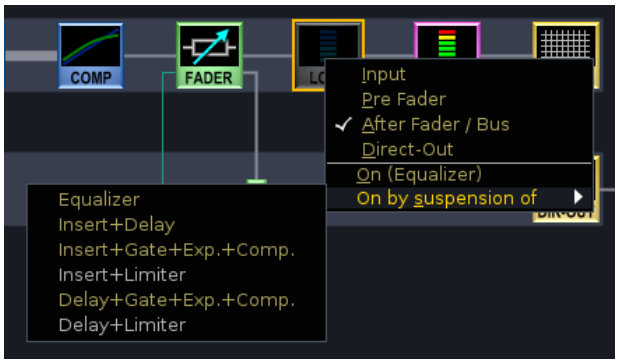
1. Select the channel you wish to modify by pressing its fader **SEL** button.
2. Press the **CHAN CONFIG** button, on the SCREEN CONTROL panel, to open the **Channel Config** display.
3. Right-click on the **LOUD** DSP module to access the loudness metering options.

*In our example, the suspended module will be **SCF** as indicated at the bottom of the drop-down menu: **On (SCF)**:*

4. Select **On by suspension of** to open a second drop-down menu where you may alter the selection:

On Recording channels you can select from:

On Broadcast channels you can select from:



For example, when working with Recording channels, select **Delay + Image** and the display updates accordingly:

Note that 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**).

The choice of suspended DSP module(s) is saved in the production.

Note that if you return to the **System Settings** display and select a different **Default Module Suspend Set** option, then the next time you activate loudness metering globally, the default option overrides any individual modifications.

Note

Activating the Loudness Meter Bargraphs

Before activating loudness metering, you should check that you have:

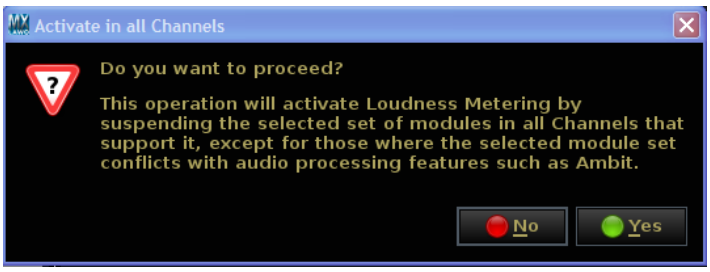
- Configured input and/or summing channels to display either **Loudness** or **Combi** metering, see Page 315.
- Recalled an **Active Preset** (either EBU R128 or ATSC A/85) and adjusted the loudness metering options, see Page 668.

Activate in all Channels

To activate loudness metering globally across the console:

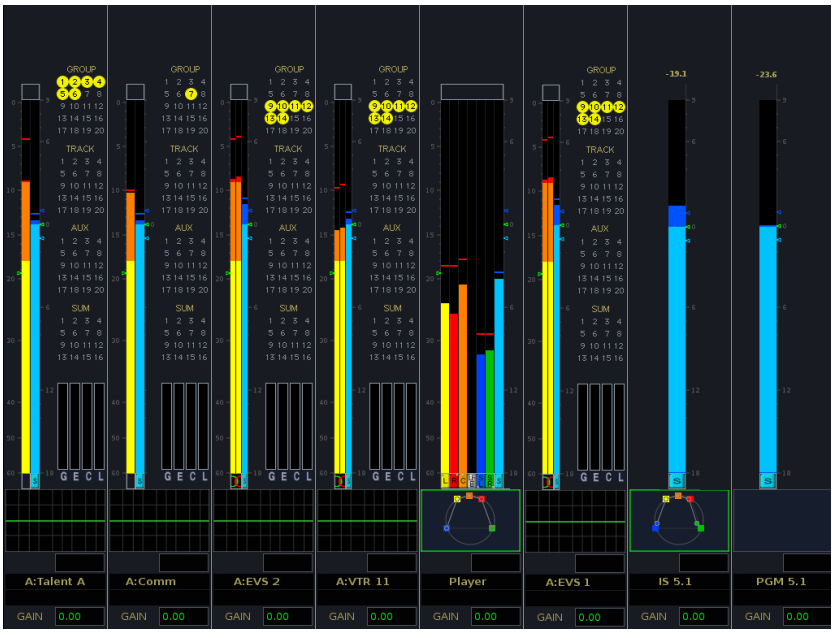
1. Press the **SYSTEM DSP** button, on the SCREEN CONTROL panel to open the **System Settings** display.
2. Select **Loudness Metering** from the list of topics.
3. Then select **Activate In all Channels**:

You will be presented with a confirmation pop-up:



4. Select **Yes** to proceed.

Loudness metering is now 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 **Default Bargraph Type**:



Each blue bargraph represents the average energy of the summed component channels: mono, stereo or surround. The colour 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.

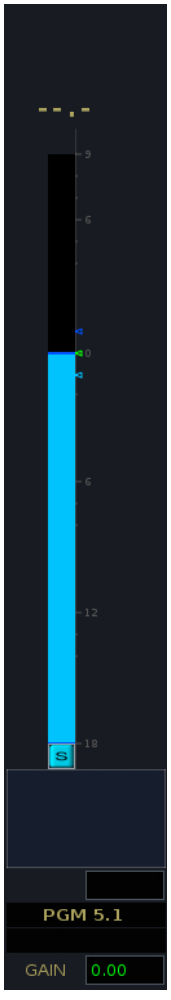
The dark and light blue scale markers indicate a tolerance of +/- 1 LU.

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)

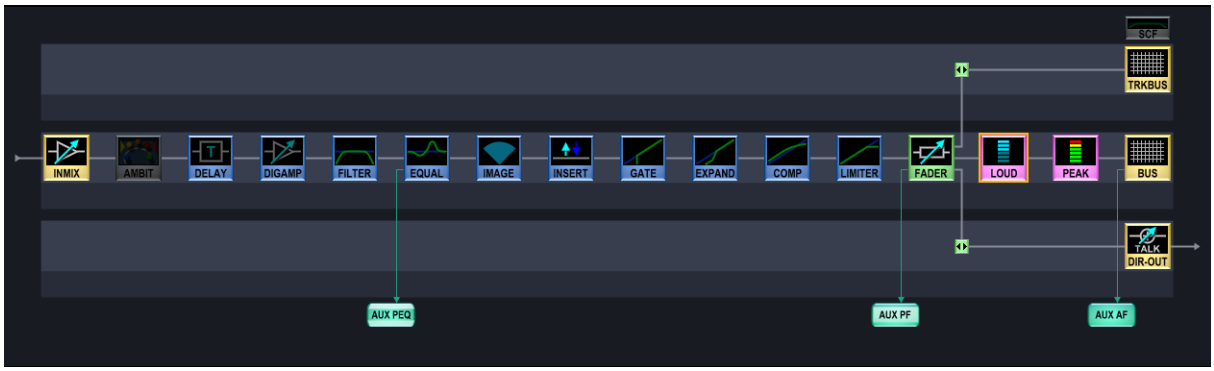
This and other options are defined within the **System Settings** display, see Page 668.

If loudness metering is activated on summing channels, then you will see the integrated loudness measurement above the bargraph in LUFS or LU. Note that this value remains until you start the integrated measurement. See Page 326 for details.



Note that activating loudness metering disables (suspends) your choice of DSP module(s).

You can see this by opening the **Channel Config** display. In our example, loudness metering is on (**LOUD** is pink), and sidechain filtering has been suspended (**SCF** is grey):



Or by opening the **Main Display** where the MODULES list shows any suspended modules (e.g. **SCF**) in grey:

Activate in a Single Channel

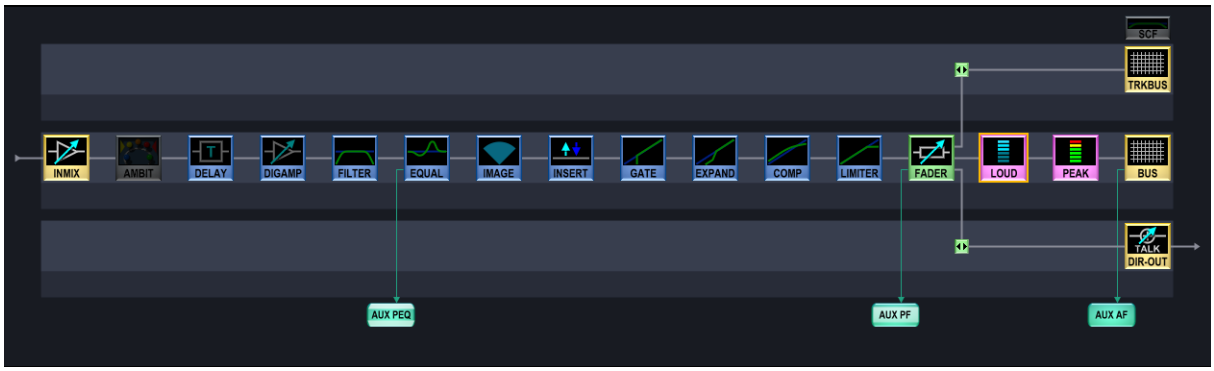
You can also activate loudness metering on a channel by channel basis from the **Channel Config** display:

1. 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**):*



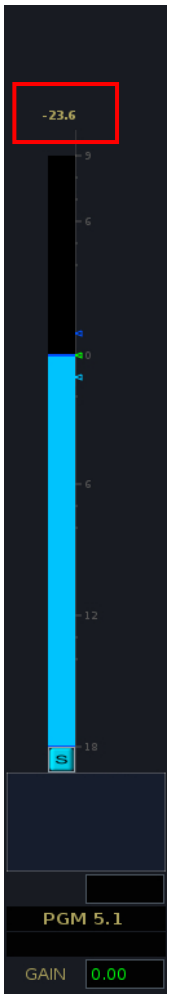
To Disable Loudness Metering

To disable loudness metering, so that any suspended DSP module(s) are reinstated, use the **Channel Config** display:

1. Right-click on the **LOUD** DSP module to access the loudness metering options:
2. Select the **On (xxx)** option so that it becomes unticked.

*Loudness metering is off when the **LOUD** module is grey.*

Integrated Loudness Measurement

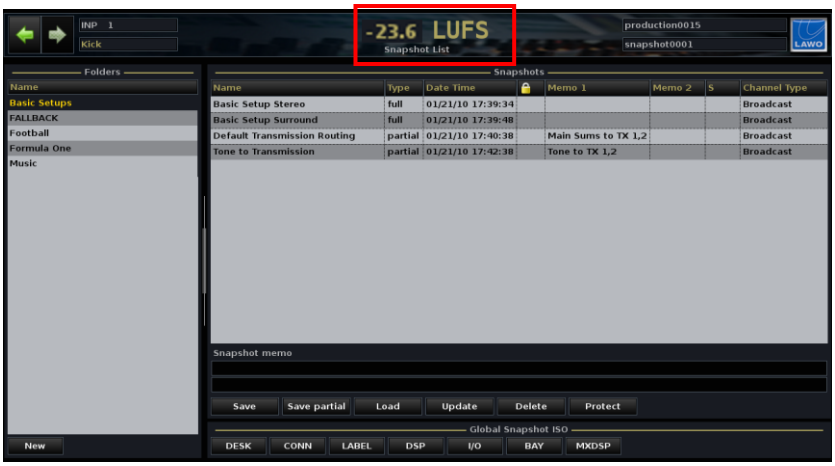


On any summing or monitor channel you may start and stop an integrated loudness measurement. This allows you to measure the loudness of channels, such as main programme or a clean feed, from start to finish. You can even pause the measurement during any unwanted periods such as an advert break.

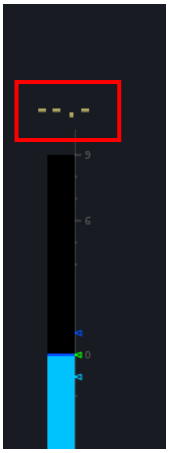
Note that the integrated loudness measurement is only available on summing channels (Sums, Groups, Auxes) and monitor channels. It is not available for input channels.

The result of the integrated measurement is displayed above the loudness bargraph in LU (Loudness Units) or LUFS (Loudness Units Full Scale). 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 programme, 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:



Starting the Integrated Loudness Measurement:



When you first activate loudness metering, the integrated loudness measurement remains blank, as shown opposite. This indicates that either the integration has not been started, or that there is no signal to measure.

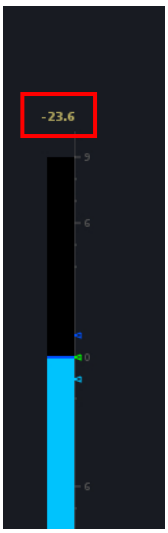
Note that to comply with the ITU standard, the signal's loudness must be greater than -70 LUFS before an integrated measurement is registered.

To start the measurement:

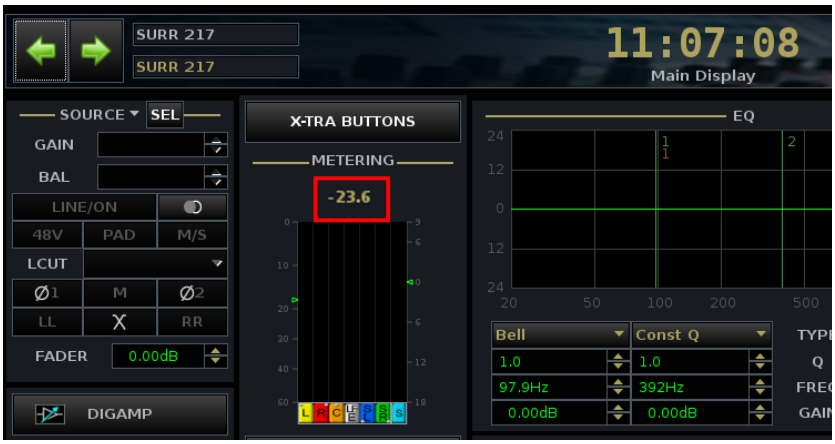
1. Select the summing channel by pressing its fader **SEL** button.

Note that that on a surround channel, you must select the Surround VCA (e.g. **SURR 217**), 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, see Page 668.

Note

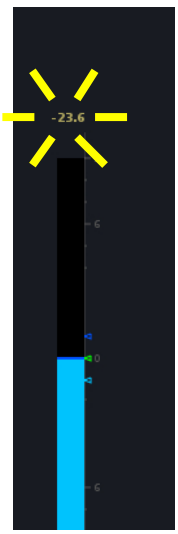
Note that when you start the integration, the channel's **SNAP ISO** button may also be enabled. This protects the summing channel from snapshot recalls which may destroy the integrated loudness measurement. This default option can be modified from the **System Settings** display, see Page 668.

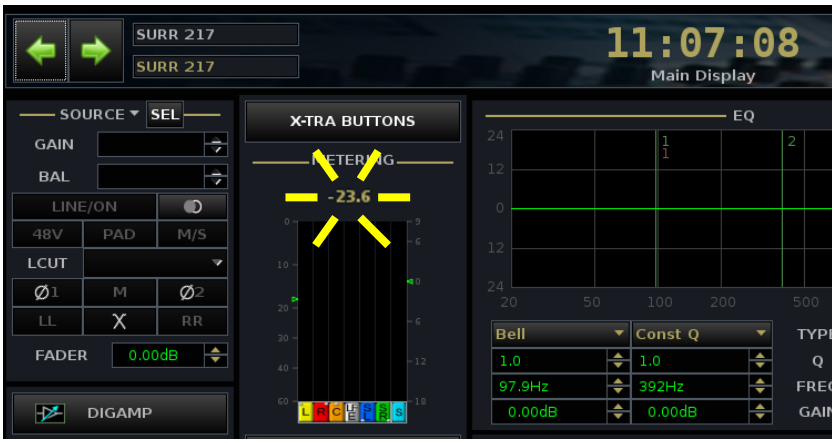
Stop (Pause) and Reset

To pause the integration:

1. Make sure that the correct channel is selected (**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 may exclude any advert breaks from the programme 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.

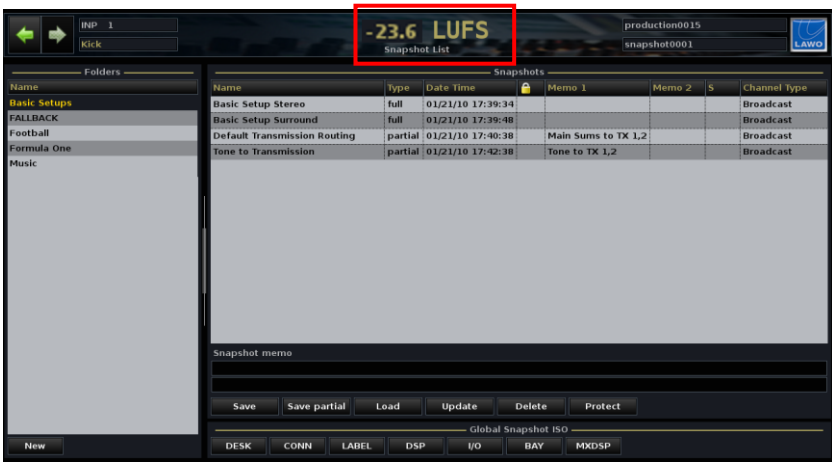
Tip

As an alternative to using the on-screen METERING pop-up window, you can programme user buttons to start, pause and reset the integrated loudness measurement. These functions are available from the **Custom Functions** display, see Page 689.

Tip

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 local time (or timecode) and select **Loudness metering display** from the pop-up window:

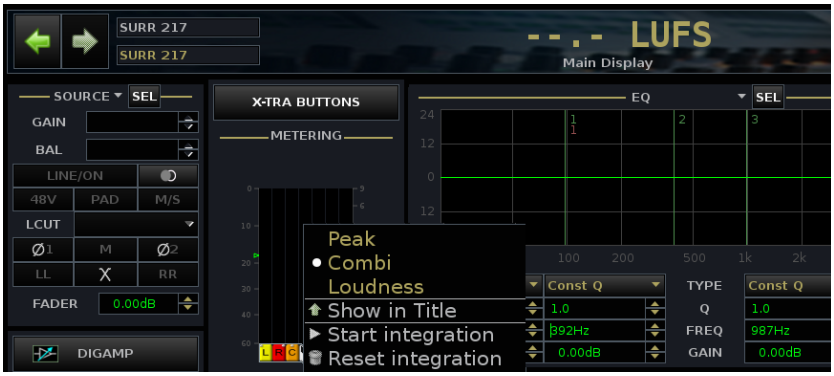
The local time (or timecode) is replaced by loudness metering.

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, see Page 668.

Note that the local time (or timecode) moves to the status bar at the bottom of the GUI so that it remains visible.

Next assign the summing channel you wish to meter:

1. Select the channel by pressing its fader **SEL** button – in our example, we have selected **SURR 217**, the Surround VCA master for our 5.1 programme.
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:

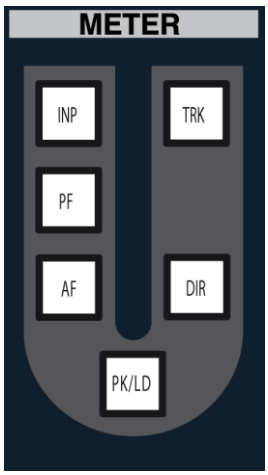
You can confirm the assignment by hovering the cursor over the reading; a message appears stating the name of the assigned channel.

4. To assign a different summing channel, repeat steps 1 to 3.

Start, Stop (Pause) and Reset from the Title Bar

Once assigned, you can start, pause or reset the integrated loudness measurement from the title bar:

1. Click on the loudness measurement and select **Start/Pause integration** or **Reset integration** from the pop-up window:



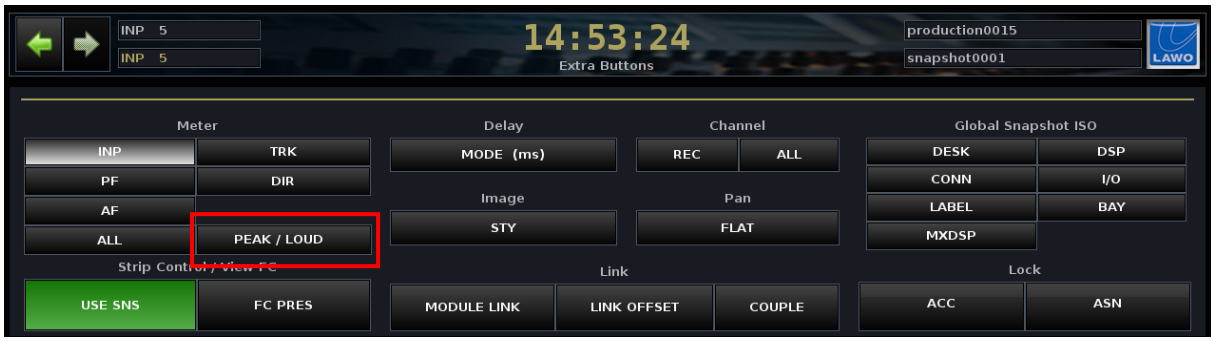
Meter Pickup Points

The METER buttons on the front panel select the metering point for peak and loudness meters across the console. The selection affects all metering displays: **Channel**, **Main** and **Metering**.

The pickup point may be set independently for peak and loudness meters:

- **PK/LD** off – meter pickup selection is applied to peak metering.
- **PK/LD** on – meter pickup selection is applied to loudness metering.

Note that this option is also available on the **Extra Buttons** display:



You may choose any of the following pick up points:

- **INP** – meters the channel input (post the INMIX section).
- **PF** – meters the pre fader signal.
- **AF** – meters the post fader signal.
- **TRK** – meters the track bus output.
- **DIR** – meters the direct output.

Note

The meter pick up point may also be modified from the **Channel Config** display, please see Page 111 for details.

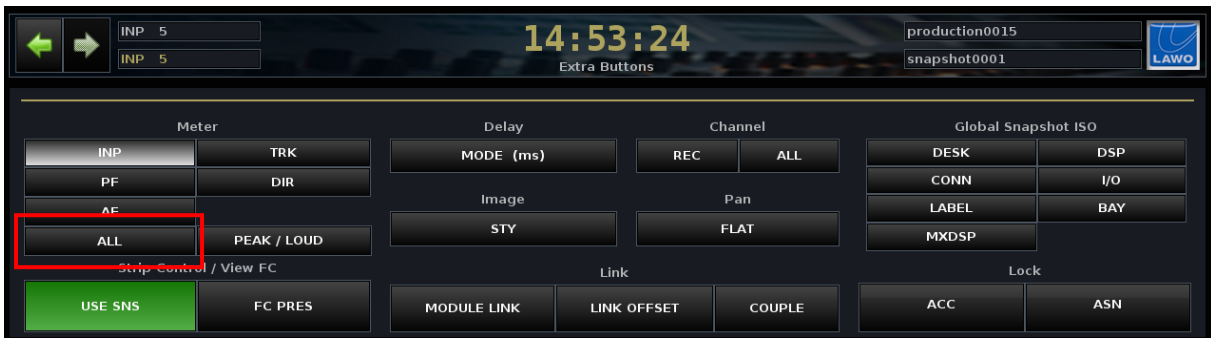
You

Note that you cannot alter the loudness metering pickup point for summing channels, if the **Protect Sum Meter Pickup** option is selected on the **System Settings** display, see Page 668.

Switching the Meter Point for Multiple Channels

The meter pickup can be altered for consecutive channels by coupling the channels, and then changing the pickup selection from the front panel METER buttons. See Page 361 for more details on the Couple group.

Alternatively, you can define a cluster of channels, and then switch their meter point using the **ALL** button on the **Extra Buttons** display:



1. Select the **ALL** button from the touch-screen display.

*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 on channels added to the cluster.*

3. To switch the meter point for all channels in the cluster, change the Meter pickup – for example, press **INP**.

The channels are switched to meter input; channels not in the cluster are unaffected.

The meter pickup buttons will continue to switch metering for the cluster while **ALL** is lit.

4. To return to individual channel meter switching, deselect **ALL**.

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

Remember that you can switch meter pickup points for Peak and Loudness metering independently.

Chapter 5: The Centre Section

Introduction

This chapter deals with the centre section functions normally presented to the operator including functions available from the **Extra Buttons** display, see Page 369. Note that several control areas, such as snapshots, are dealt with in other chapters of the manual. Please refer to the page references as follows:

- **The Central Control Section** – dedicated channel control (see Page 181).
- **MONITORING** – (see Page 335).
- **External Metering** – (see Page 344).
- **FC PRESETS** – Free Control presets (see Page 255).
- **SNAPSHOT/SEQUENCE** – snapshot and real-time sequence control (see Page 391).
- **User Panels** – (see Page 345).
- **The Main Fader Strips** – (see Page 346).
- **VCA Grouping** – (see Page 350).
- **BUS ASSIGNMENT** – forward and reverse bus assign (see Page 167).
- **STRIP ASSIGNMENT** – fader strip assign (see Page 147).
- **BANK/LAYER** – bank and layer switching (see Page 134).
- **CHANNEL DISPLAY** – options for the **Channel** display (see Page 367).
- **ACCESS CHANNEL/ASSIGN** – assigns channels to the Central Control Section, fader strips and bus outputs (see Pages 185, 147 and 167 respectively).
- **FADER CONTROL** – enables faders to control aux sends, LFE levels, etc. (see Page 364).
- **LINK** – link odd/even fader strips (see Page 353).
- **USER BUTTON** – 9 programmable user buttons (see Page 366)
- **LABEL** – Fader Label display switching (see Page 368).
- **PANNING** – joystick panning (see Page 225).
- **SCREEN CONTROL** – display selection and navigational controls (see Page 40).

The SCREEN CONTROL panel may be repaced by an additional main fader panel (available for MKII mc^{2}66 only). For details, see Appendix F.

Monitoring

The **mc²66** provides three monitor outputs:

- Control Room Monitor 1 (CRM1) – surround (up to 7.1).
- Alternate (ALT) – an alternate set of speakers fed from CRM1.
- Control Room Monitor 2 (CRM2) – stereo.

The console may also support headphone outputs, separate studio monitoring and/or external AFL/PFL speakers depending on the configuration.

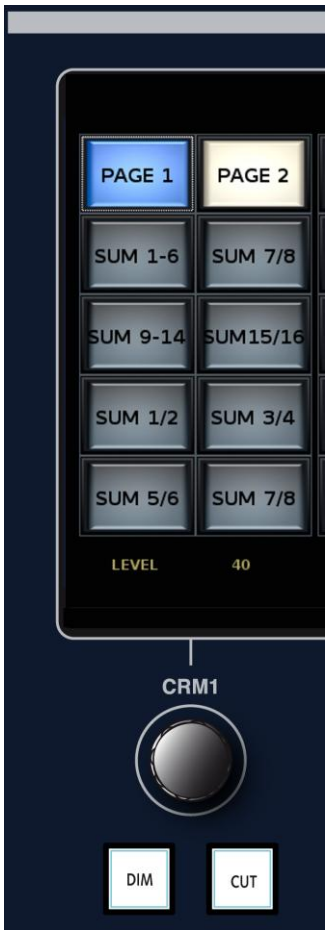
The touch-screen MONITORING panel provides access to all monitoring functions. These functions are programmed within the factory configuration and so not all the functions described in this section may be configured on your console. Below is a typical layout.

Note

1. Use the **PAGE** buttons to access the monitoring functions; our example shows **PAGE 1**:

Note that on the classic mc²66, two monitor outputs (CRM1 and CRM2) are controlled from dedicated panels rather than a touch-screen. The buttons are factory-configured and can be programmed from an identical function set to the MKII mc²66.

Control Room Monitor 1 (CRM1)



The CRM1 output may be mono, stereo or any surround format up to 7.1. The format is defined by the console's surround format option, set from the **System Settings** display. Please refer to Page 653 for details.

Source Selection

Sources are selected from the touch-screen MONITORING buttons. They can be used to switch external sources, analogue or digital, or internal busses, such as the main sum or group outputs, to the CRM1 monitor output.

Note that some of the buttons may be assignable allowing you to programme the source from the **Signal List** display. Please refer to your console specification for details.

1. Press one of the pre-programmed buttons to select your monitor source.

The selected source appears on the CRM1 speakers.

Monitor Level

1. Use the CRM1 rotary control to set the level.

The monitor level is shown on the touch-screen display.

The maximum monitoring level is set in the factory configuration; please refer to your console specification for details.

Monitor Cut

1. Press **CUT** to cut the CRM1 monitors.

Monitor Dim

1. Press **DIM** to dim the main CRM 1 monitors.

The dim level is shown on the touch-screen display.

Note that the console features two independent monitor dim settings:

- Monitor Dim – actioned by pressing the **DIM** button
- Talkback Monitor Dim – actioned either by pressing an internal **TALK** button or external GPI trigger; for example, to dim the main monitoring when you press a Talkback button.

Monitoring Parameters

The **CTRL** page of touch-screen buttons can be used to change monitoring parameters such as dim level, speaker trims, etc. Note that these buttons are factory-configured, so may access some or all of the following functions.

1. Use the **Sel Mon1** touch-screen button to adjust parameters for Control Room Monitor 1 (CRM1):

Dim Level

1. Press **SET** to enter the set parameter mode.
2. Then press **DIM** to adjust the monitor dim level.

*The CRM1 **LEVEL** display changes to **DIM LEVEL**.*

3. Adjust the monitor dim level using the CRM1 control.
4. Press **SET** again to set the amount of talkback dim.

*The CRM1 touch-screen display changes to **TB DIM LEVEL** showing that you are in Talkback Dim Level mode.*

5. Adjust the talkback dim level using the CRM1 control.
6. Deselect **SET** to exit the set parameter mode.

Mono Left/Right

1. The **MONO** button will mono the Left and Right CRM1 monitor outputs to both speakers.

This automatically applies a 3dB reduction to the left and right channels to compensate for the mono sum.

You may adjust the mono gain reduction level:

1. Use **SET** to enter the set parameter mode.
2. And touch the **MONO** button to select the mono gain trim parameter.

*The CRM1 **LEVEL** display changes to **TRIM MONO** to show that you are in Trim Mono mode.*

3. Adjust the mono trim level using the CRM1 control.

As long as you keep touching the control, the trim level is shown on the touch-screen display.

4. Deselect **SET** to exit the set parameter mode.

Stereo Monitoring Functions

1. Select **LtoB** to monitor the Left CRM1 output on both left and right speakers.
2. Select **RtoB** to monitor the Right CRM1 output on both left and right speakers.
3. Select **PH L** to reverse the phase of the Left CRM1 output.
4. Select **PH R** to reverse the phase of the Right CRM1 output.

Note that both phase left and phase right buttons are available to deal with phasing issues on either speaker.

Left/Right Monitor Balance

The monitor balance control allows you to offset the Left and Right CRM1 levels to compensate for poorly aligned stereo speakers.

1. Use **SET** to enter the set parameter mode.

*The CRM1 **LEVEL** display changes to **BALANCE** showing that you are in set Balance mode.*

2. Adjust the balance using the CRM1 control.

As long as you keep touching the control, the balance value is shown on the touch-screen display. Balance may be adjusted from -20dB to +20dB.

3. Deselect **SET** to exit the set parameter mode.

Individual Speaker Mutes

The **L**, **C**, **R**, **S1L**, **S1R**, **S2L**, **S2R** 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 not all mute buttons may be active depending on your choice of surround format.

Individual Speaker Solos

The **L**, **C**, **R**, **S1L**, **S1R**, **S2L**, **S2R** and **LFE** touch-screen buttons may also be used to solo individual surround speakers. 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!


Note

Individual Speaker Level Trims

Each of the CRM1 speaker outputs may be individually trimmed to help align your surround speakers.

1. Use **SET** button to enter the set parameter mode.
2. Choose the speaker you wish to adjust by touching the corresponding speaker mute button - **L**, **C**, **R**, **S1L**, **S1R**, **S2L**, **S2R** or **LFE**.

The CRM1 ***LEVEL*** *display changes to show that you are in Trim level mode; the exact display depends on your choice of speaker, for example* ***TRIM FL*** *for Trim Front Left.*

For more details on the available surround formats and how they correspond to the front panel mute buttons, see Appendix A on Page 781.

3. Adjust the level of the selected output using the CRM1 control.

As long as you keep touching the control, the level is shown on the touch-screen display. Levels may be trimmed between -128 and +15dBr.

4. Deselect **SET** to exit the set parameter mode.

Alternate Speaker Switching

1. Use the **ALT** touch-screen button to switch the CRM1 monitoring output to an alternate set of speakers, for example your minis.

The CRM1 output is now switched to the alternate speakers.

Control Room Monitor 2 (CRM 2)

The second monitor output is stereo and is designed for simultaneous use with the main control room monitoring. For example, you may connect your mini speakers to this output if you wish to audition sources on the minis while keeping another on the mains. Alternatively, you may use this output to feed a separate destination such as the video gallery.

1. Press one of the pre-programmed buttons to select a monitor source.
2. Use the CRM2 rotary control to set the monitor output level.
3. Press **DIM** to dim the monitor 2 output.
4. Press **CUT** to cut the monitor 2 output.
5. Select the **CTRL** page, and the **Sel Mon2** touch-screen button to adjust parameters for Control Room Monitor 2.

These functions are factory-configured and may include **MONO**, **Left to Both**, **Right to Both**, etc.

AFL and PFL Monitoring

AFL and PFL signals may appear on the Control Room 1, Control Room 2 or external monitor speakers.

The touch-screen MONITORING buttons are factory-configured. In our example:

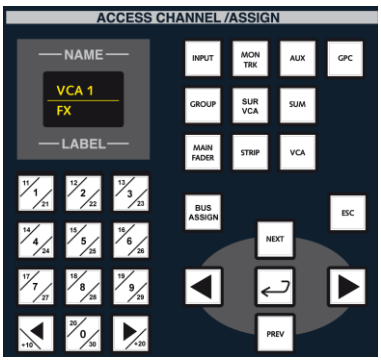
- **AFL M1** – switches the AFL bus to CRM 1.
- **PFL M1** - switches the PFL bus to CRM 1.
- **AFL M2** – switches the AFL bus to CRM 2.
- **PFL M2** - switches the PFL bus to CRM 2.
- **PAFL CLEAR** - clears any AFL or PFL selections.
- By selecting the **PFL** touch-screen button, PFL level may be adjusted from the STUDIO/PFL control.
- Select **HP1** or **HP2** to adjust the headphone output level from the STUDIO/PFL control.

Routing AFL and PFL Busses

To route the AFL or PFL busses to an external speaker, or assign them to a meter, use the **Signal List** display. The AFL and PFL bus outputs are normally found within the **Bus Out** directory:

AFL and PFL Bus Levels

In order to change the level of an AFL/PFL bus or for metering purposes, the AFL and PFL sums can be put into access. You will find the AFL and PFL busses after VCA channel 128 in the access channel sequence. For example:



1. Using the ACCESS CHANNEL/ASSIGN control panel, press **VCA** and enter **128** to put VCA 128 into access.
2. Then press the **NEXT** button.

This puts the first PFL bus into access.

3. Continue pressing **NEXT** or **PREV** to select the different AFL and PFL sums.

AFL and PFL Options

A number of options exist for defining the behaviour of AFL and PFL buttons, or AFL may operate as Solo-in-Place. See Page 672 for more details.

Also note that a second AFL and PFL bus exists for isolated fader bays. This allows a second engineer to have independent monitoring from the main console in a multi user situation. See Page 141 for details.

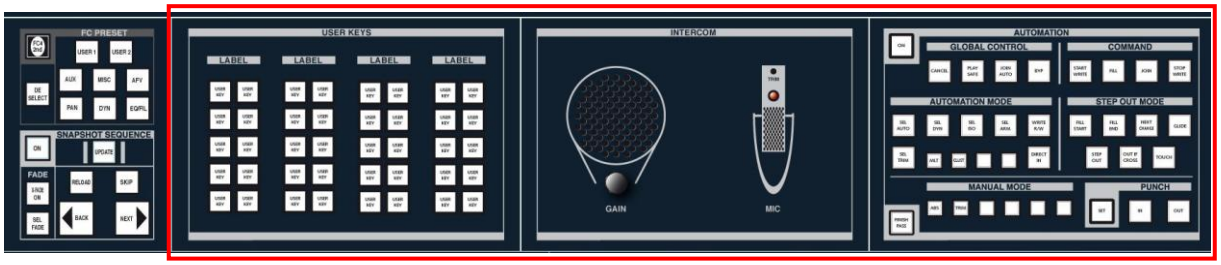
External Metering

The space to the right of the AUX SENDS/AUDIO FOLLOW VIDEO panel is reserved for custom functions such as external metering:

Please consult your console specification for more details.

User Panels

To the right of the FC PRESET and SNAPSHOT/SEQUENCE controls is an area which may house up to three user panels:



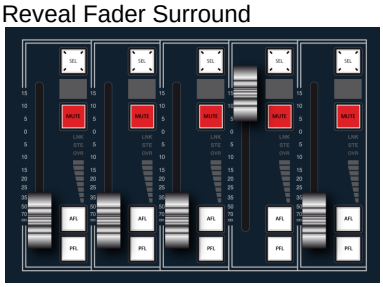
Our layout includes:

- USER KEYS – 40 additional user buttons.
- INTERCOM – talkback speaker and microphone.
- AUTOMATION – dynamic automation controls.

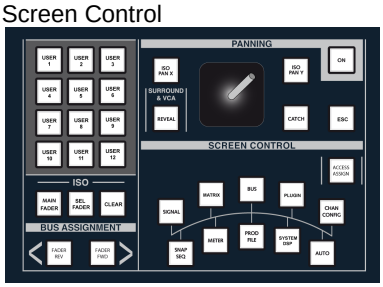
Other options include:

- A User Key panel with 80 user buttons (occupies two panel slots).
- A panel with 8 assignable rotary controls (one panel slot).
- The mc^2 REMOTE MACHINE CONTROL panel (two panel slots).
- A 19” integration kit (occupies all three user panel slots).
- The Reveal Fader Surround panel with 5 dedicated faders for revealing surround slaves, see Page 280.
- The Screen Control user panel. This panel *MUST* be fitted to consoles with 16 main faders. See Appendix F for details.

Reveal Fader Surround



Screen Control



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

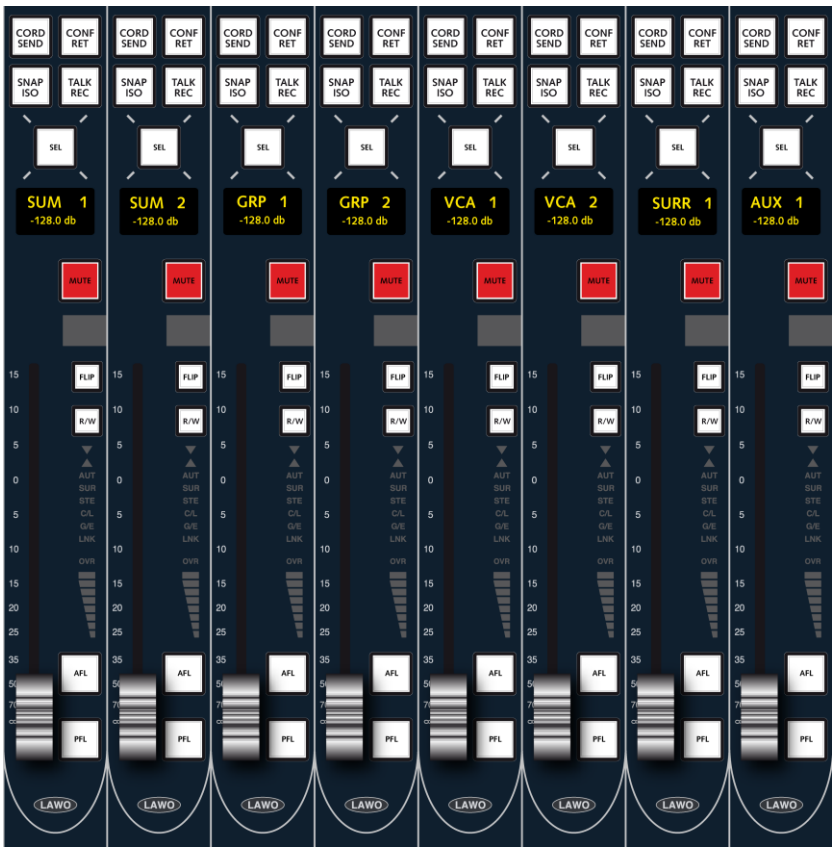
User buttons can be configured from the **Custom Functions** display, see Page 689.

For more information on the mc^2 AUTOMATION and REMOTE MACHINE CONTROL panels, please see Chapter 7.

Note that on the classic mc^{2}66, user panels may be fitted by ordering a short main fader panel. Please consult your Lawo representative for details.

Main Fader Strips

The main fader strips in the centre section may be used to control any channel type – input channels, monitor return channels, groups, sums, auxiliaries, VCA masters, surround masters – in exactly the same way as a channel fader strip.



Each main fader strip provides:

- Four programmable channel user buttons, normally configured either for communications functions (CORD, CONF, TALK) or recorder control (SEND, RET, REC), and snapshot isolate (SNAP ISO).
- **SEL** button for assignment operations.
- Fader cassette with 8-character label display, group assignment display and AFL, PFL, mute, layer access and automation read/write buttons.

The only differences in operation from channel fader strips are that the main strips do not have free controls, input gain controls or **Channel** display metering.

Note that you can meter the main fader strips by selecting the **Main Faders** display on the central GUI, see Page 314.

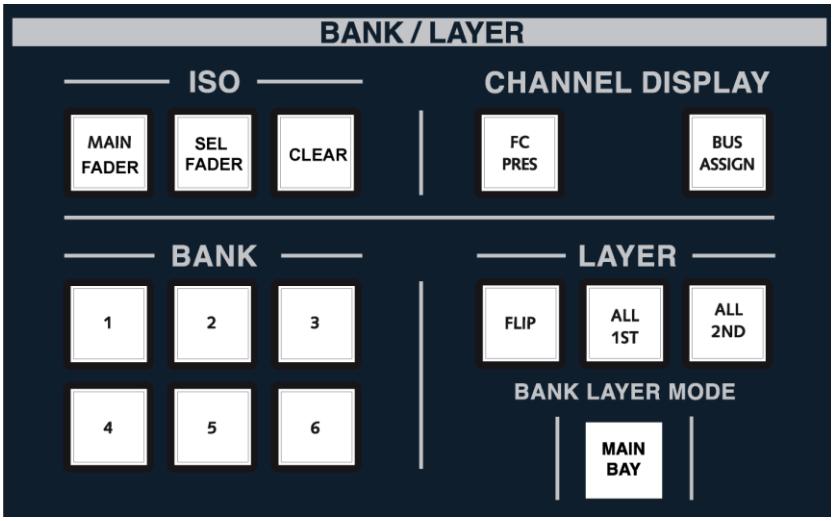
On the classic mc^{2}66, the main fader strips include 2 assignable free controls.

On the MKII mc^{2}66, the centre section may be fitted with 16 main faders. See Appendix F for details.

Banking and Layering the Main Fader Strips

There are many applications for the main fader strips, and therefore they may be configured in banks and layers in the same way as channel strips. Each of the six BANK buttons provides access to a new set of main faders. In addition, for each bank, you may configure two layers of assignments.

Banks and Layers are switched globally from the BANK/LAYER panel:



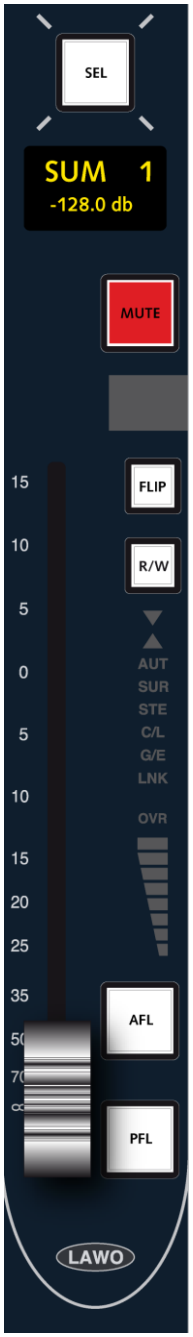
With the BANK LAYER MODE **MAIN BAY** button turned off, banks and layers are switched for *all* fader strips – channel and main.

With the **MAIN BAY** button turned on, banks and layers are switched *only* for the main fader strips.

1. To switch between banks, press one of the six BANK buttons **1** to **6**.
2. To invert the layer press the LAYER **FLIP** button.
3. Alternatively, you may switch individual main faders between layer 1 and layer 2 by pressing the **FLIP** button on the fader strip.

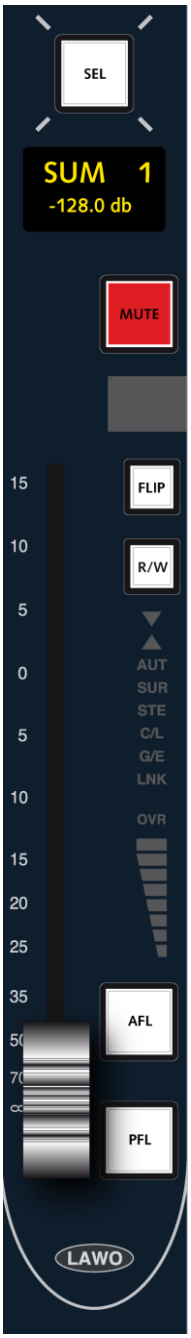
If there is nothing assigned to other banks or layers, then you will switch to a blank fader strip.

Note that the **MAIN BAY** button does not exist on the classic mc²66. Instead you will find **MAIN 2ND** and **STRIP 2ND** buttons which switch the main or channel faders to the second layer.



Note

Group or Sum Master Channels



Typical applications for the main fader strips include providing master channel control for your group and sum outputs.

1. To assign a group or sum master channel onto one of the main fader strips, use the ACCESS CHANNEL/ASSIGN control panel and STRIP ASSIGNMENT buttons as described on Page 147.
2. Press the **SEL** button to attention the main fader strip to the Central Control Section and adjust signal processing settings. See Page 181.

Note that if the Group or Sum is a Tiny channel, not all signal processing will be available.

3. To make the Group or Sum stereo, go to the IMAGE area of the Central Control Section and press the **STEREO** button to change the Group or Sum master to a stereo channel. For more details on stereo channel operation, see Page 263.

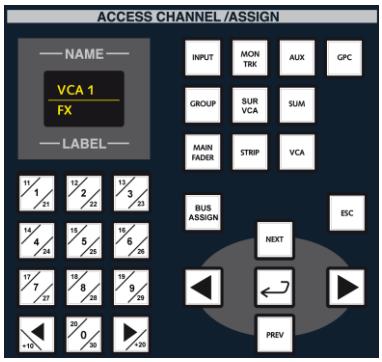
*Alternatively, you can choose to keep the Group or Sum master channels independent but have sends routed to them with 2-channel panning using the **2-CHANNEL** output format option from the **Channel Config** display, see Page 268.*

4. To make the Group or Sum surround, go to the **Channel Config** display, see Page 269.

Note that you may re-assign Groups to Groups and Groups to Sums, using Forward or Reverse Bus Assign as described on Page 167. However, it is not possible to assign Sums back to Group busses.

VCA Masters

Another common application for the main fader strips is to use them as VCA master channels. The console supports up to 128 dedicated VCA masters.

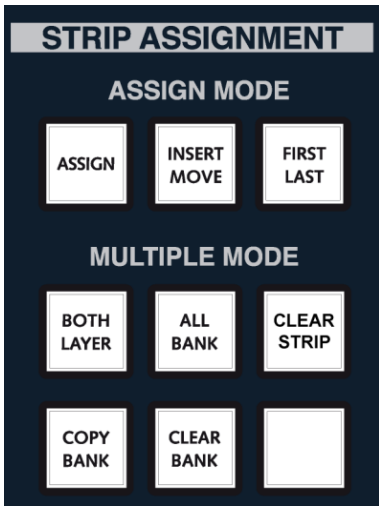


1. Put VCA master 1 into access from the ACCESS CHANNEL/ASSIGN control panel, either by entering **VCA** and the number **1** or using the **NEXT** and **PREV** buttons.

*The NAME and LABEL displays should now show the name (**VCA 1**) and user label for the master.*

2. Select the **FIRST LAST** button, located on the STRIP ASSIGNMENT: ASSIGN MODES panel.

*This automatically selects the global **ASSIGN** button, and across the console the fader **SEL** buttons flash, in green, to indicate possible destinations for your chosen channel:*



3. Press the fader **SEL** button on the first main fader strip followed by the fader **SEL** button on the last main fader strip.

The console incrementally assigns VCA masters 1 to 8 from the first selection (main fader strip 1) to the last selection (main fader strip 8).

4. Deselect the global **ASSIGN** button or press **ESC**, on the ACCESS CHANNEL/ASSIGN control panel, to exit the assign mode.

VCA Grouping

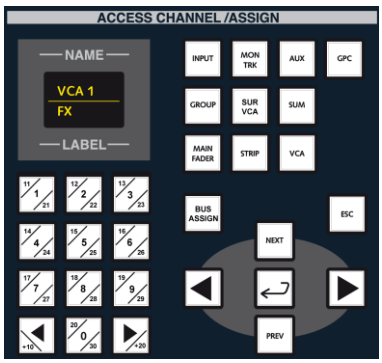
The console supports up to 128 dedicated VCA masters and you may assign any number of fader strips to a dedicated VCA master. This provides the ability not only to control input channels but also groups, sums, auxiliary masters, GPCs and surround masters from a single fader strip.

VCA groups can use moving or non-moving slave faders, defined from the **System Settings** display, see Page 661. When working with non-moving slaves you can see and update slave fader positions even if the VCA master is closed, like an analogue VCA.

Note

Note that the master/slave behaviour varies depending on the parameter. For example, parameters such as main level, input gain, etc. are controlled relatively so that you can offset the slave positions. Other parameters, such as EQ frequency, EQ Q, etc. are always set by the master (absolute), so that any change on the master is inherited by all slaves. For switches such as MUTE, the parameter is switched ON from a VCA master but not OFF. You can find more details on master/slave behaviour for VCA masters in Appendix D.

Also note that a channel may only ever be assigned to a single VCA, and a VCA master cannot be slaved to another VCA. You can slave a Surround VCA master to a VCA, and this method can be used to create groups within groups if required.

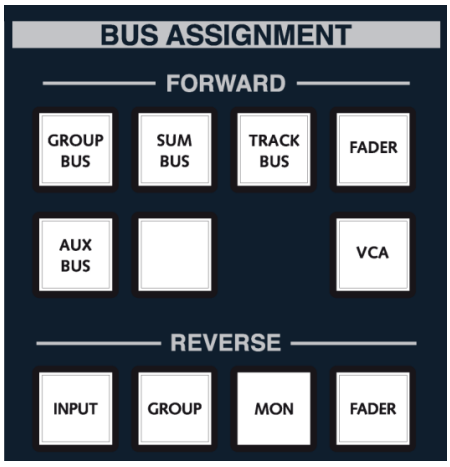


Creating a VCA Group

1. Put the VCA master into access, either by pressing its fader strip **SEL** button, or entering the channel type (**VCA**) and number from the ACCESS CHANNEL/ASSIGN control panel.

This puts the VCA master into access as indicated on the ACCESS CHANNEL/ASSIGN control panel's NAME and LABEL displays.

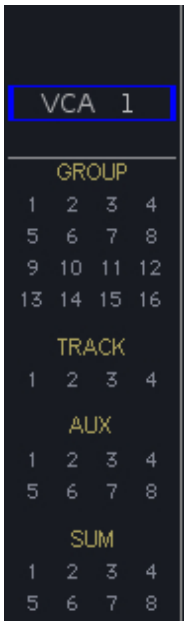
2. Press the **VCA** button, located on the BUS ASSIGNMENT panel in the centre section:



*The **VCA** button flashes to indicate that it is active, and across the console the fader **SEL** buttons flash, in green, to indicate possible sources for your chosen master.*

3. Press the **SEL** buttons on the fader strips you wish to assign to the VCA group. Remember that you can assign any type of channel to a VCA including output masters such as groups or auxes.

*The fader **SEL** buttons stop flashing and change colour from green to red to indicate that the channels are assigned to the selected VCA master.*



The VCA assignment is indicated at the top of the Channel Display and on the fader strip in the figure of eight display.

4. You may now control the slave channels from the VCA master.

Note that slave faders can be moving or non-moving; this option is defined from the **System Settings** display, see Page 661.

5. To remove an assignment press the red fader **SEL** button on a slave.

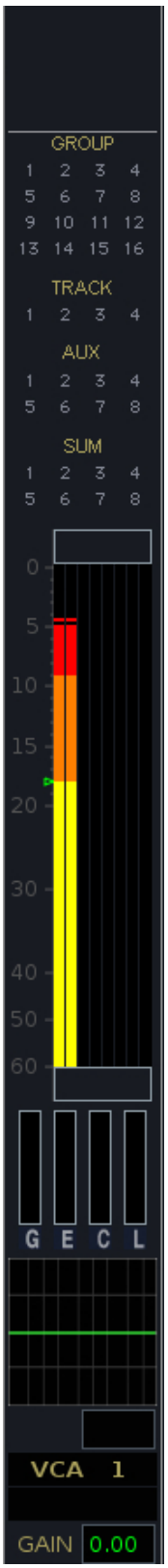
It reverts to its flashing green status, and the group assignment display goes blank.

6. To set up the next VCA master, put the next VCA master into access.

The flashing green and steady state red fader SEL buttons update to reflect the current assignments to the new master, and allow you to set the next group.

7. Repeat until all your assignments are made, and then deselect **VCA**, on the BUS ASSIGNMENT panel, or press **ESC**, on the ACCESS CHANNEL/ASSIGN control panel, to exit the VCA set up mode.

VCA Channel Metering



If you assign a VCA master to a channel strip, then you will meter the first 8 slaves on the channel display.

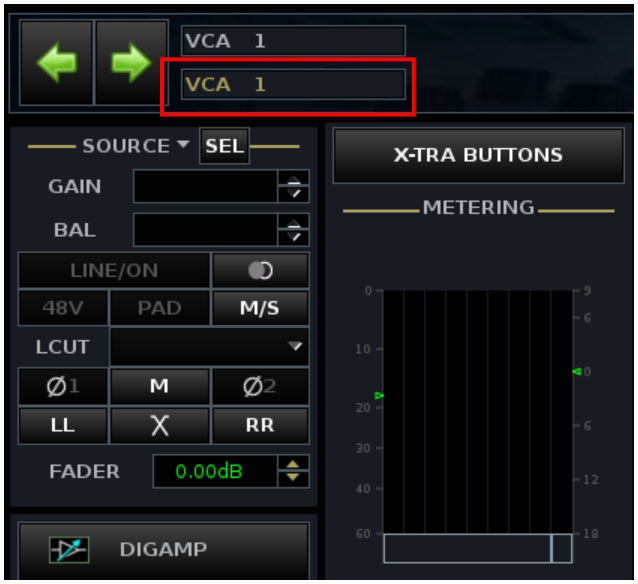
This is extremely useful for multi-channel inputs, such as VTR returns, as you can operate the master level from one fader and see the slave metering all the time.

Note that the meters from left to right show the slave channels from the lowest to highest channel strip number – therefore, if you wish to view the slave metering in a specific order, take care when assigning the slave inputs to the channel strips on the surface.

Also note that the pickup point for the slave channel metering is set from the VCA master. So make sure you have the VCA master in access when you want to change the meter pickup point as described on Page 332.

Renaming a VCA Master

You can rename a VCA master by clicking on the ‘channel in access’ label in the title bar:



The name you enter will appear in the fader strip label display when channel labels are in view.

Revealing VCA Slaves

The **REVEAL** function provides a quick way to temporarily bring VCA slaves onto fader strips so that you can offset fader levels and other relative parameters. See Page 278 for details.

Link and Couple Groups

In addition to VCA grouping, the console supports two other grouping functions: links and the couple group.

Both can be used to link channels where every channel is master. For example, moving any of the 8 faders within a link or couple adjusts the level of all 8 channels.

The difference between the two functions is their application:

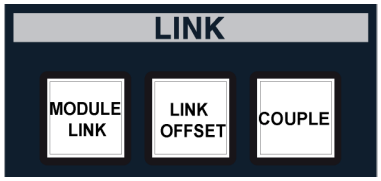
- **Links** – are ideal for “permanent” grouping where channels need to remain linked throughout a scene or production.
- **The Couple group** – is ideal for temporary operations such as adjusting the mic gain across a range of channels.

Note that the new Link groups replace the odd/even Links found in older versions of mc^2 software (before V4.8).


Note

Link Groups

Each link group must be prepared using the **MODULE LINK** button.



A link can apply to all channel parameters or to individual processing sections – for example, to link EQ sections but not faders.

Any number of channels can be assigned to a link, and channels can be of a different DSP type. In addition, channels can be in any control surface location – for example, across different banks or layers.

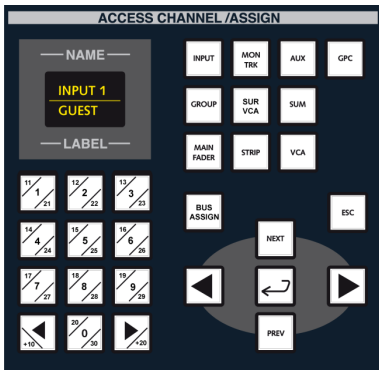
Once a link group is created, moving a control adjusts the parameter across all the linked channels; any offsets are retained. The **LINK OFFSET** function can be used to temporarily suspend the link, and allow adjustments to individual control positions.

Note that the hierarchy of the different group types in the system is as follows: Couple, Link, VCA and Surround VCA. This means that a channel can be assigned to both a link group and a VCA. For example, a group of vocal soloists within a choir can now be controlled by a link group for the choir, and by a separate VCA for the soloists; the link group takes overall priority.

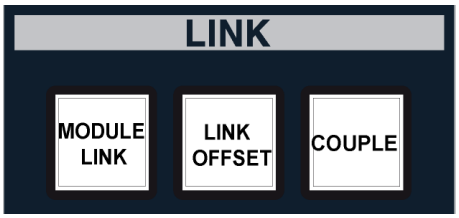
When working with Link masters, faders are always moving. Therefore, you will need to open the Link master fader in order to offset the slaves. For other parameters, the master/slave behaviour varies depending on the parameter. See Appendix D for details.

An unlimited number of link groups may be created, and links are stored within snapshots. This allows you to recall different link groups for different setups or scenes within a production.

Creating a Link Group



1. Put any of the channels you wish to link into access, either by pressing its fader strip **SEL** button, or entering the channel type and number from the ACCESS CHANNEL/ASSIGN control panel.
2. Press the **MODULE LINK** button:



*The **MODULE LINK** button flashes to indicate that it is active, and across the console the fader **SEL** buttons flash, in green.*

3. First, press the **SEL** buttons on the Central Control Section to select which audio modules you wish to link – for example, press **SEL** beside the fader and EQ sections to link faders and EQ:

Note

Note that you can link bus assignments by selecting the **BUS** button on the PARAMETER COPY/ASSIGN panel.

4. Then press the fader **SEL** buttons on the channels you wish to link:

*The fader **SEL** buttons change from green to red.*

5. Deselect **MODULE LINK** to complete the operation.

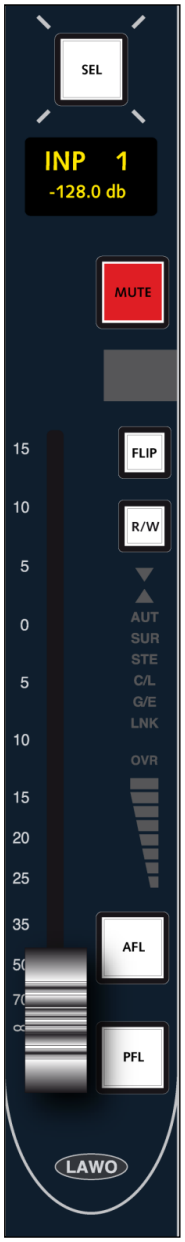
The selected audio modules across the selected channels are linked.

6. Repeat these steps to create additional link groups.

To edit an existing link group, access any channel within the link, press **MODULE LINK**, and adjust the Central Control Section and/or fader **SEL** buttons.

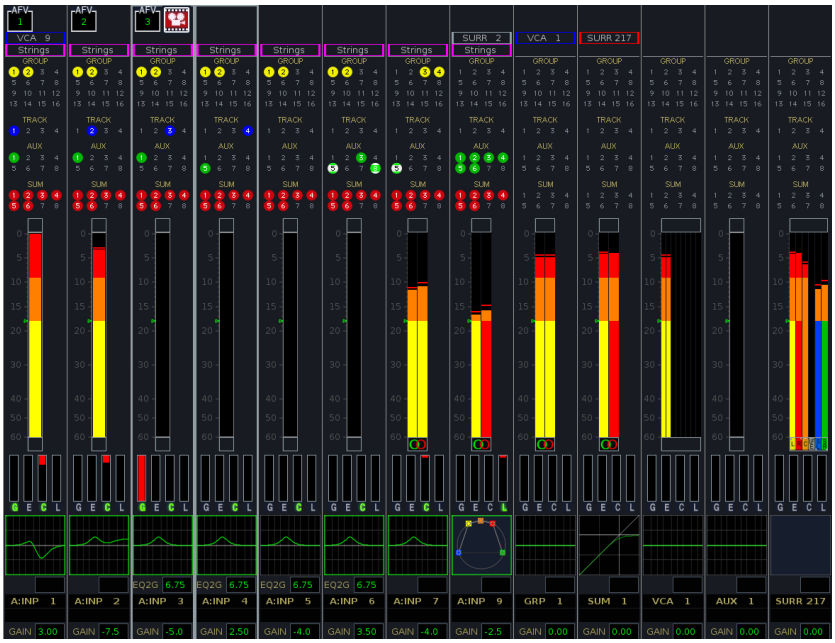
To clear the link, deselect all the fader **SEL** buttons.

Interrogating Link Groups



When any audio module within a channel is linked, the **LNK** LED on the fader strip illuminates.

In addition, link groups are indicated on **Channel** display – in our example, input channels 1 to 8 are part of the link group named “Strings”:



For each link group the **Channel** display shows:

- The name – e.g. Strings.
- The colour coding – e.g. purple.

In addition, if the Link metering option is enabled, then you will meter the first 8 linked channels on each of the grouped channels. This is useful if you want to leave only one channel on the surface and hide the remaining linked channels on another bank or layer.

Link Group Options

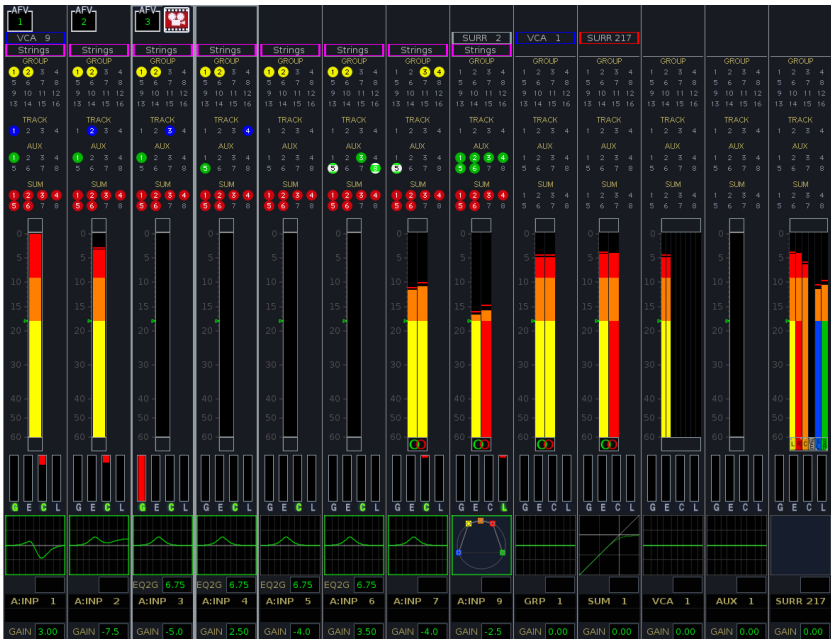
These options are set from the **Channel Config** display:

1. Put any of the linked channels into access, either by pressing its fader strip **SEL** button, or entering the channel type and number from the ACCESS CHANNEL/ASSIGN control panel.
2. Press the **CHAN/CONFIG** button, located on the centre section SCREEN CONTROL panel, to select the **Channel Config** display.

Our example shows that the channel in access (INP 1) is assigned to Link 1:

3. To edit the link group name, click within the **LINK 1** field and type a new name – e.g. Strings.
4. To assign a colour, use the drop-down menu:

The new name and colour code appear on all channels within the link group across the **Channel** displays:



Link Metering

If the Link metering option is enabled, then you will meter the first 8 linked channels on each of the grouped channels. This is useful if you want to leave only one channel on the surface and hide the remaining linked channels on another bank or layer.

1. Enable the **Link metering** option from the Channel Config display::

Each channel within the link group now meters signal level for the first 8 channels of the link.

Link Group Operation and Offsets

Once a link group is created, any channel within the link group may be used as the master; moving a control adjusts the parameter across all the linked channels.

Any offsets which were present when the link was created are retained. To adjust the offsets, there are two methods:

Touch-Sense

To quickly adjust offsets between controls:

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.

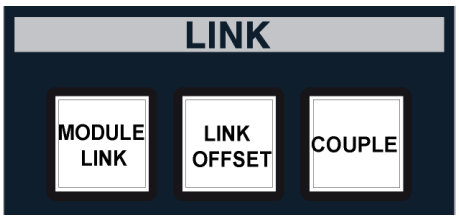
You are now adjusting the offset position of fader 5 relative to the rest of the link group.

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** as follows:

1. Select **LINK OFFSET**:



*The **LINK OFFSET** 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** or press **ESC**, on the ACCESS CHANNEL/ASSIGN control panel.

The link groups now return to their normal “grouped” mode of operation.

Managing the Link Group Assignment

Every time you create a link, a link group number is automatically assigned by the system. So, the first link you create is link group 1, the second is link group 2, and so on.

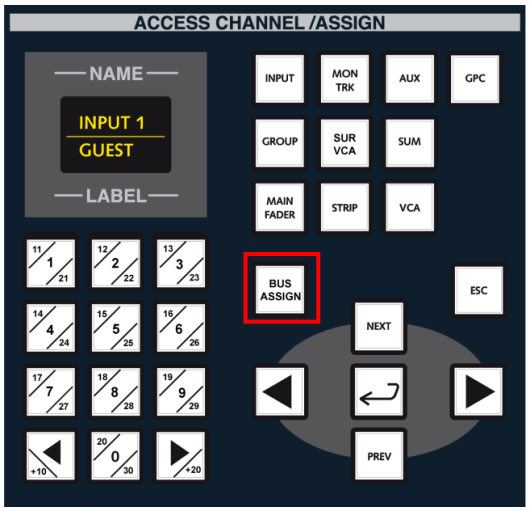
For most operations this is fine. However, there are a few instances when you may need to select a different link group number. One example is if you wish to recall a snapshot or automation with stored links to one part of the console, while retaining an existing link group (using SNAP ISO).

If the link group on the console is Link 1, and the stored snapshot already uses Link 1 then there will be a conflict and the links will not operate correctly. The solution is to change the link group currently in use on the console. You can do this as follows:

1. Press the fader **SEL** button on any channel within the link group.
2. And select **MODULE LINK**.

This puts the link group into edit mode.

3. Now locate the **BUS ASSIGN** button on the ACCESS CHANNEL/ASSIGN panel:



4. Press the BUS ASSIGN button until it is flashing.

In this mode, the NAME and LABEL display shows the current link group number – e.g. LINK 1.

5. Press the **NEXT** or **PREV** buttons to increase or decrease the link group number.
6. When you are finished, deselect **MODULE LINK** to exit the edit mode.

You can verify the link group number from the **Channel Config** display.

The Couple Group

In addition to links, the console supports a single couple group which is ideal for temporary operations such as adjusting EQ across a range of channels.

The couple group is similar to link groups but has some important differences:

- There is only one couple group – you cannot create multiple couples. (Use links whenever you need multiple groups.)
- 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 fast operation of the couple group makes it ideal for temporary applications.


Tip

For example, to apply an EQ setting across a range of channels; assign the channels to the couple group; adjust the EQ parameters on any of the coupled channels, then dissolve the couple.

Using the couple group in this way can be faster than copying audio parameters via the COPY function.


Note

Note that the hierarchy of the different group types in the system is as follows: Couple, Link, VCA and Surround VCA. This means that when a channel is assigned to the couple, any other groups are temporarily suspended. Therefore, the couple can be used at any time and across all types of channels and groupings.

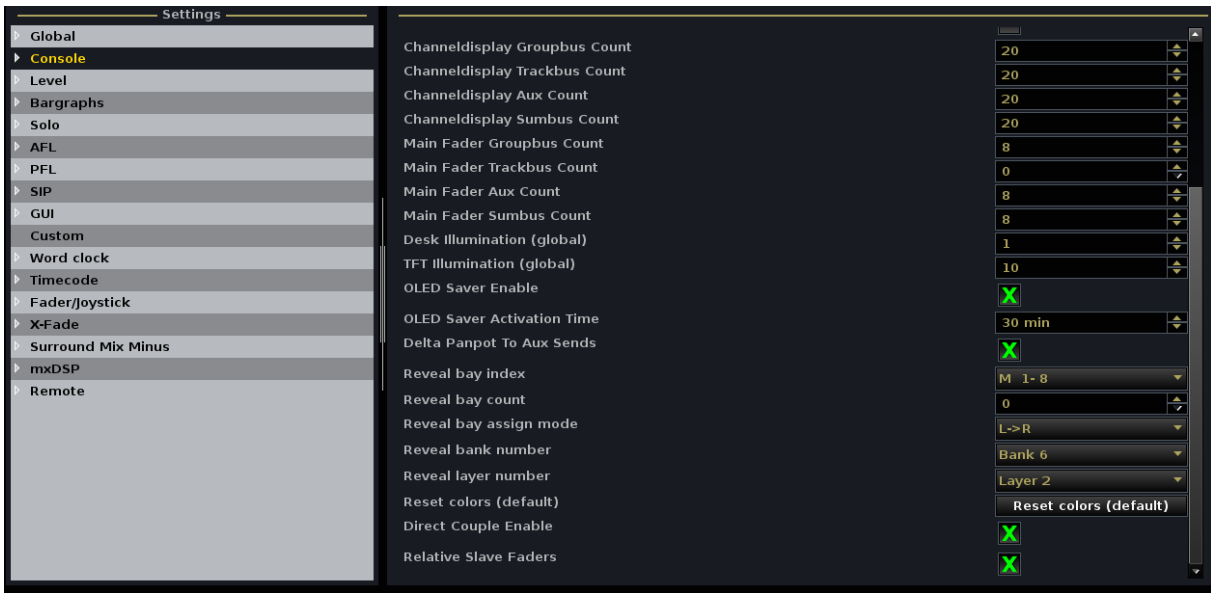
When working with a Couple master, faders are always moving. Therefore, you will need to open the Couple master fader in order to offset the slaves. For other parameters, the master/slave behavior varies depending on the parameter. See Appendix D for details.

Assigning the Couple Group

There are two methods:

Fader SEL

This method can only be used if the **Direct Couple Enable** option is turned on from the **System Settings** display. By default, this option is turned on:



When the option is enabled, then the couple group can be assigned as follows:

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

2. Then press the fader **SEL** button on the last channel.

*All channels within the range, including the first and last, are assigned to the couple group. Their fader **SEL** buttons turn red to indicate that the couple is active.*

3. Now adjust a parameter – for example, turn the EQ gain control on any channel within the couple.

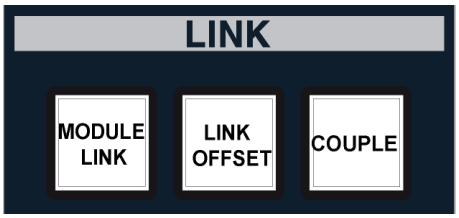
All EQ gains across the couple group are adjusted; any offsets are retained.

4. To dissolve the couple, press the fader **SEL** button on any fader strip outside the couple group range.

COUPLE

Alternatively, if you prefer not to use the **Direct Couple** option, the couple group can be assigned as follows:

1. Select the **COUPLE** button:



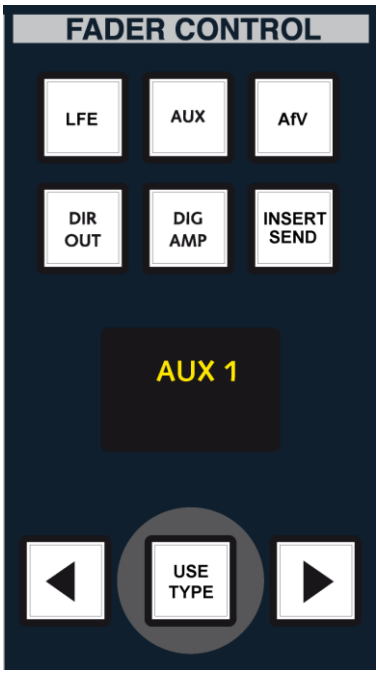
*The **COUPLE** button flashes to indicate that it is active.*

2. Press and hold the fader **SEL** button on the first channel you wish to couple:
3. Then press the fader **SEL** button on the last channel.

All channels within the range are assigned to the couple group.

4. Make your parameter adjustment – for example, turning on Aux 5 will enable aux 5 for all channels in the couple.
5. To dissolve the couple group, deselect the **COUPLE** button.

Fader Control of Levels



The FADER CONTROL section enables faders to control other object types. For example, to control auxiliary send levels from the channel faders to set up a quick headphone balance.

There are two approaches you may use to assign faders to a different object:

- Select and scroll through the object types on the faders.
- Pre-select the object by copying it to the FADER CONTROL CLIPBOARD and then assign it directly onto the faders.

Using the first approach:

1. Select the object type by pressing one of the following buttons:

- **LFE** – The surround panning LFE control.
- **AUX** – Send levels for any of the console's 32 auxiliaries.
- **AFV** – Audio Follow Video On level.
- **DIR OUT** – Direct output level.
- **DIG AMP** – Digital amplifier gain.
- **INSERT SEND** – Insert send level.

*The name of the selected object (e.g. **AUX 1**) flashes in the CLIPBOARD display and the faders move to reflect the positions for that object.*

The fader label display across all fader strips also updates to show the name of the parameter you are controlling and flashes to warn you that you are now controlling something other than fader level!

2. If you have selected **AUX**, use the Left and Right arrow buttons to scroll up and down through the 32 sends.

Each time a new send or object is selected, the faders across the console move to reflect the current positions for that send.

3. Now move the faders to adjust the send or object levels.
4. When you have finished, deselect the object type button (e.g. **AUX**) to return the faders to their normal operation.

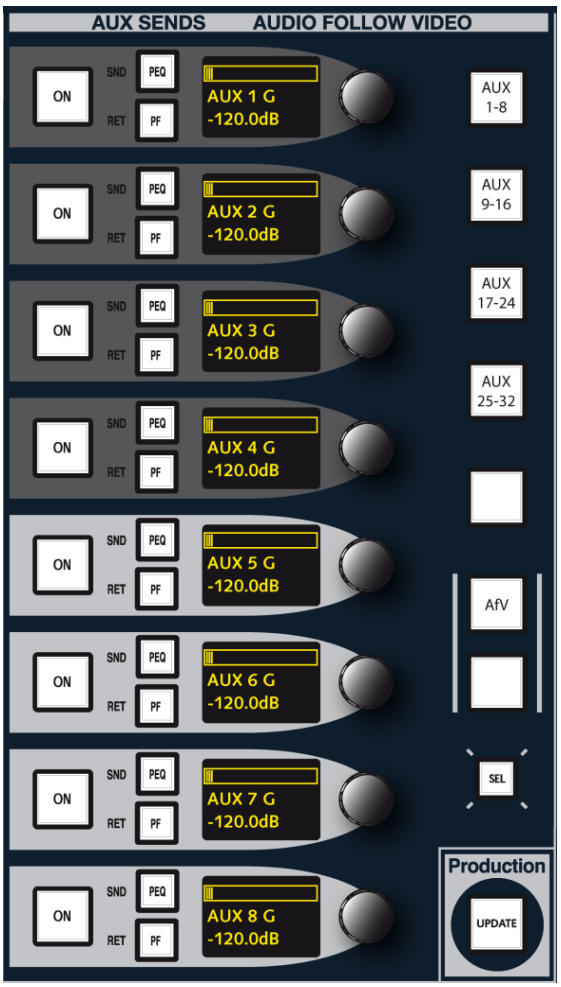
You may bank and layer switch while in the FADER CONTROL mode to gain access to all assigned levels across multiple banks and layers of channels.

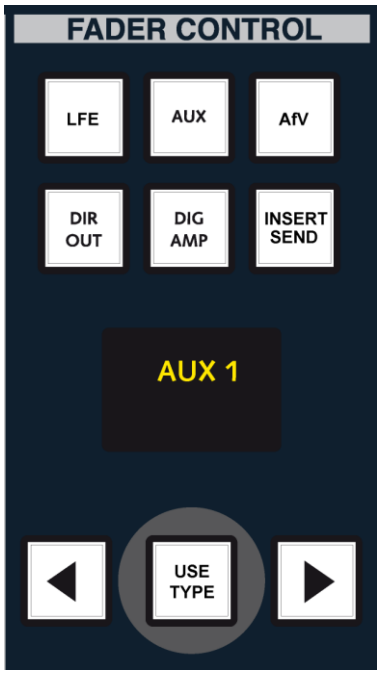

Tip

To quickly set all auxes on 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 each aux number using the Left and arrow buttons – each aux send is set in turn to 0dB.

The second approach is designed to provide fast access to a pre-selected object. For example, during a live production you may wish to switch the faders between channel fader level and a particular mix minus auxiliary send.

1. Select the object you wish to control by touching a control on the Central Control Section. For example, touch auxiliary send 1 gain to place it in the clipboard.





The name and number of the object is shown in the PARAMETER COPY/ASSIGN CLIPBOARD.

2. When you are ready to switch the object to the faders, press the **USE TYPE** button.

The faders are now controlling your selected object. The fader label display across all fader strips also updates to show the name of the parameter you are controlling and flashes to warn you that you are now controlling something other than the main level!

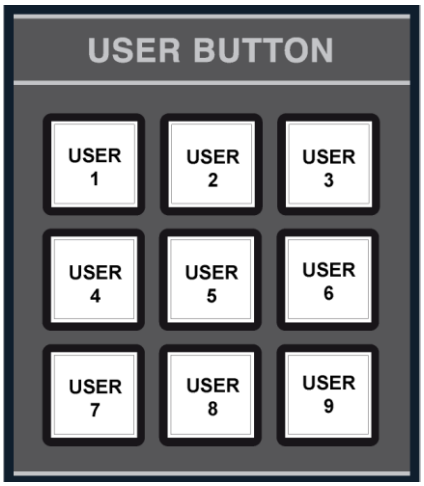
3. To switch back to normal fader level operation, deselect **USE TYPE.**

Note that you may only assign valid parameters to the FADER CONTROL function. For example, if you try to select EQ, then the **USE TYPE** function cannot be selected.

Note

User Buttons

Below the FADER CONTROL section are 9 User Buttons (not available on the classic mc²66):

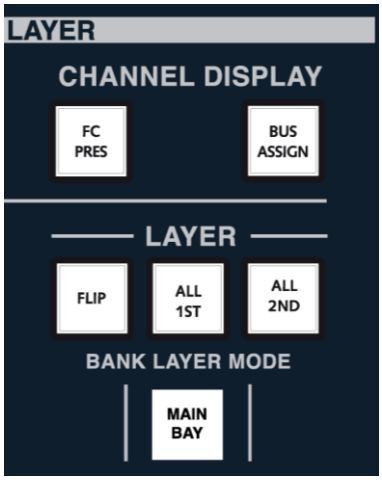


These are programmed from the **Custom Functions** display, see Page 689 for details.

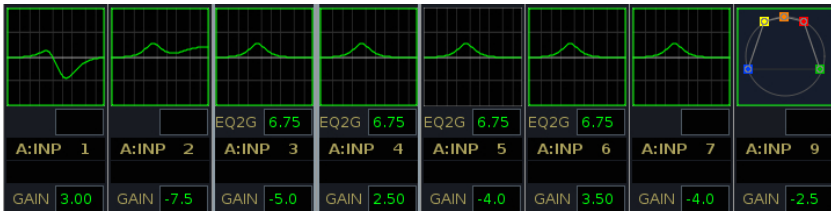
Note that a 16 main fader console supports 12 user buttons, see Appendix F for details.

Channel Display Views

The CHANNEL DISPLAY buttons in the centre section are used to control what is displayed across the fader strip **Channel** displays:



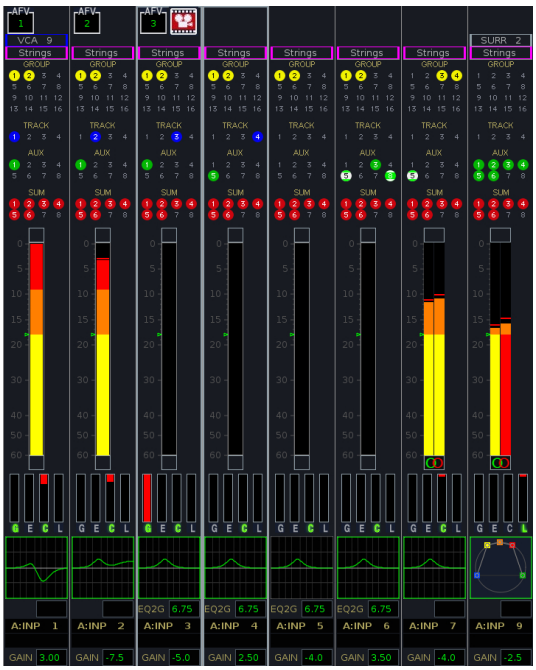
The **FC PRES** button changes the INFO window (the black area located below the channel meter) as follows:

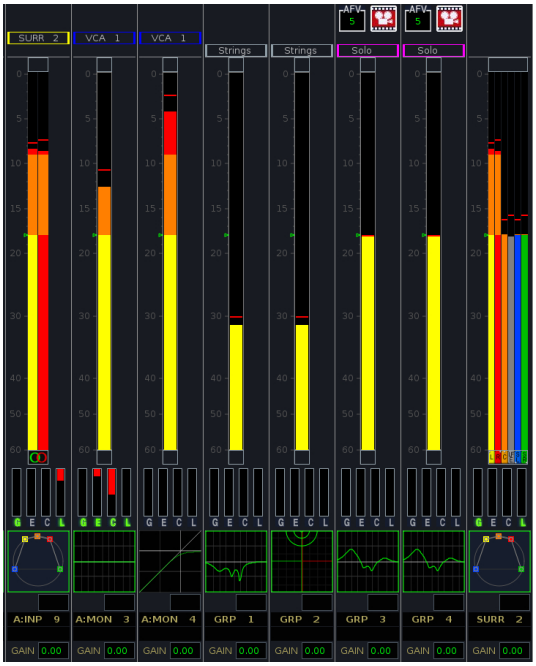


- The default mode (**FC PRES** off) reacts to the controls you touch on the channel fader strip. For example, if you touch an **EQ1G** free control (EQ Gain Band 1) on a fader strip, the INFO window displays the EQ graph and the parameter value for the EQ Gain on Band 1. This parameter continues to be displayed until you touch a different free control on the channel strip.
- Select the **FC PRES** button to change the INFO windows so that they follow the choice of FC PRESET buttons in the centre section. If you select an EQ FC PRESET, all INFO windows show the EQ graph, etc.

If the fader strips are blank, the console's logo is displayed in the INFO window.

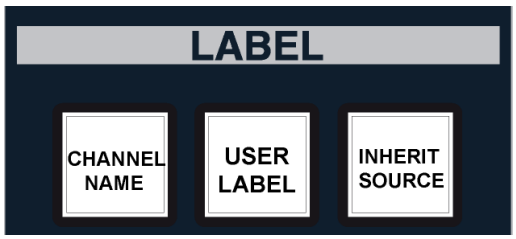
BUS ASSIGN turns on or off the bus assignments for multi-channel metering as shown below:





Fader Label Views

The LABEL buttons are used to change what is viewed on the fader strip label displays, the destination names within the **Signal List** display and the auxiliary names on the AUX SENDS/ AUDIO FOLLOW VIDEO panel.



1. Press **CHANNEL NAME** to view the channel name. For example, **INP1**.

Use this mode when you preparing a console configuration. This enables you to easily view where you are assigning your input channels, monitor returns, group masters, auxiliary masters, etc.

2. Press **USER LABEL** to view the user channel label. For example, **Guest 1**.
3. Press **INHERIT SOURCE** to view the source label of the source assigned to the DSP channel. For example, **Mic 1**.

Remember that in the case of the fader strip label display, the name will be shortened to 8 characters.

For more details on how to program your Channel and Source Labels, please see Page 573.

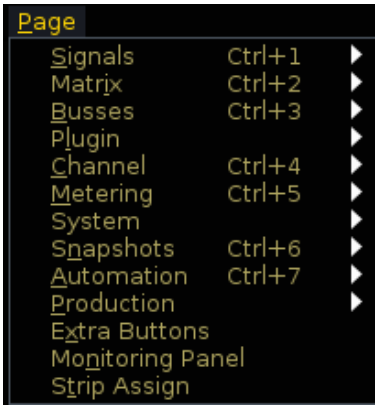
The Extra Buttons Display

The **Extra Buttons** display contains functions which you may only need from time to time.

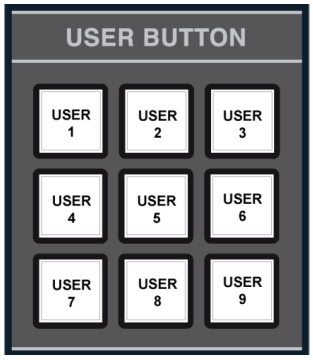
Note that most functions are also available from the front panel on the mc²66. These functions are included for compatibility with the mc²56 where they are only available on-screen.

The **Extra Buttons** display controls functions which you may only need from time to time.

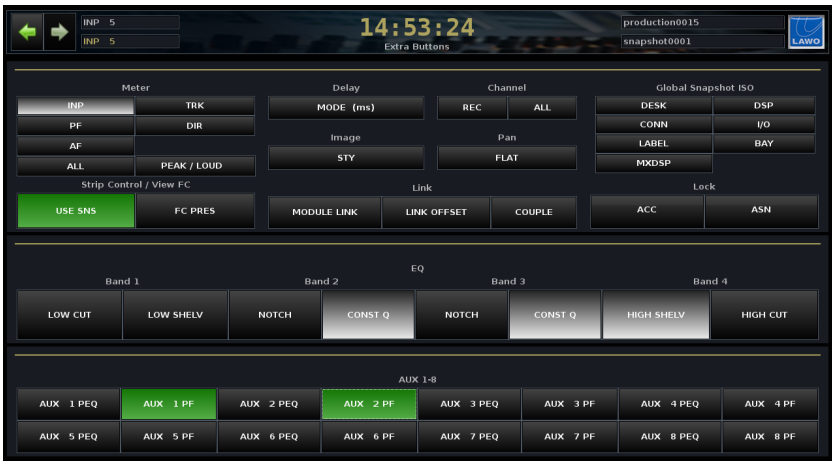
1. You can access the **Extra Buttons** display from the **Page** menu – “Page -> Extra Buttons:



2. Or, quick access may be available from a programmable USER BUTTON:



Each function is described in detail in the relevant section of the manual, so please use the page references for full details:



- **Meter** – selects the meter pick-up point for the channel in access, including the ability to switch a cluster of channels. See Page 332.
- **Strip Control/View FC** – this option has no function on the MKII mc²66 and is included for compatibility with the classic mc²66, mc²56 and mc²90.
- **Delay MODE** – cycles the delay mode for the channel in access between milliseconds, frames and meters. See Page 197.
- **Image STY** – switches the Image section for the channel in access between new and old styles. See Page 266.
- **Channel REC and ALL** – global send/return switching for monitor channels, see Page 161.
- **Pan FLAT** – affects level compensation applied to the centre channel when panning across the front surround speakers. See Page 224.
- **Global Snapshot ISO** – these buttons allow you to isolate different console elements from a snapshot recall. See Page 395.
- **Lock ACC and ASN** - protect the channel in access and other assignments. See Page 157.
- **Link** – activates link assign mode. See Page 353.
- **EQ** – these buttons change the EQ type for the EQ, Filter or Sidechain filter sections. The selection of EQ, Filter or Sidechain Filter follows the front panel EQ, FILTER and SCF **SHOW** buttons. See Page 219.
- **Aux 1-8** – these buttons change the aux send from post fader to either pre-EQ (**PEQ**) or pre-fader (**PF**). 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. See Page 231.

Chapter 6: Console Reset

Introduction

This chapter explains the reset capabilities of the console and covers the operation of productions, snapshots, sequences and presets.

Productions form the top level for user data storage and store *all* the settings required for a production or type of job. Productions may be recalled at any time, reducing the amount of setup time required before repeat or similar shows. Productions store low level settings, such as the DSP configuration, SRC settings, **System Settings** display options and **Metering** display setup, in addition to snapshots, sequences and automation mixes.

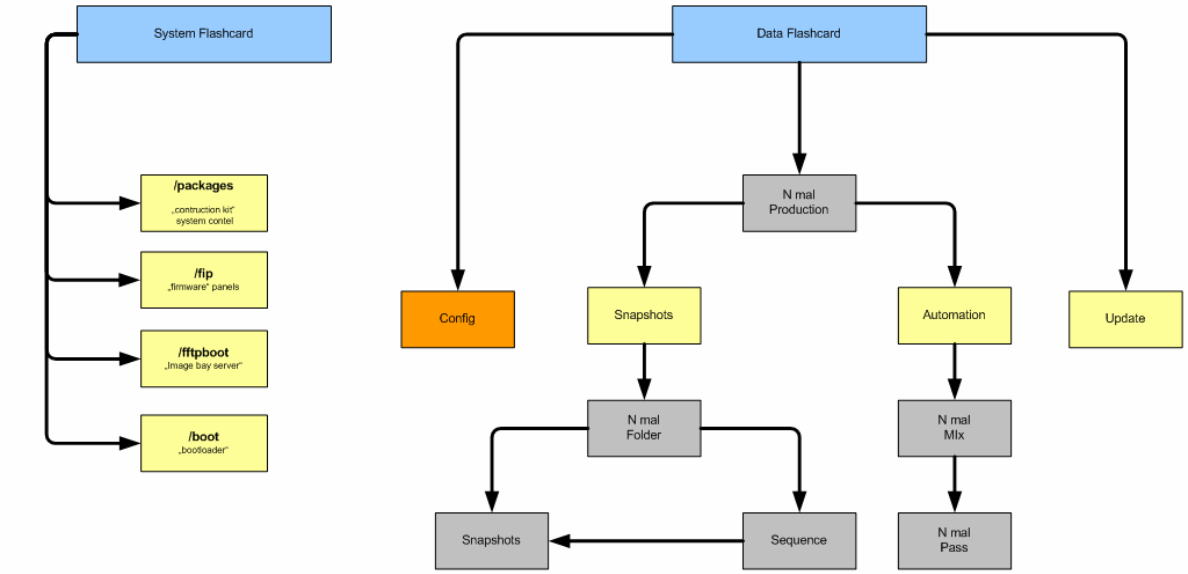
Within each production, folders may be created to store snapshots and sequences. Snapshots are one-shot memories of the console, and provide the ability to store different mixes/setups for recall before or during a show. For example, you may use snapshots to recall a different mix for each band appearing in a live entertainment show. Or, snapshots may be used to recall scene changes during a live theatre production.

Sequences are provided for convenient recall of snapshots during a live broadcast or theatre production. A sequence is a list of snapshots which can be loaded in sequence during a live show. The transition between snapshots in a sequence may be cross faded. In addition, offsets can also be applied to snapshot recall to deal with last minute changes such as a change of artist. Note that the sequence itself does not store any settings, but simply creates a list of pointers to snapshots stored within the production folder.

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, you may wish to save your favourite Kick Drum EQ, or the complete settings for an announcer channel.

All user data is stored on the console's internal flashcard and may be exported to USB interface, or to an mxGUI computer. In a networked installation, a central file server can be made accessible from each console within the network. Data is fully compatible with any **mc²** console, regardless of the hardware configuration. For example, you can load a snapshot saved on smaller console to a larger console in order to recall a setup in another studio. And, data can be transferred between the **mc²66** and **mc²56** or **mc²90**.

What's Stored in a Production?



Each production holds multiple folders to store snapshots and sequences. Each production also holds multiple automation mixes, each one with its own Pass Tree.

In addition, the production snapshot stores everything included in a snapshot plus the following low level user settings:

- DSP configuration.
- Input and Output sample rate converter settings
- **System Settings** display options.
- **Metering** display setup.
- Fader bay **ISO** status.

This means that you can store the current settings of the console, including your balance, simply by updating or creating a new production. You only need to create folders and snapshots if you wish to store and recall different setups within the same production.

As productions store and recall low level settings which may cause a brief interruption to audio, they should not be loaded during a live show. Instead, use snapshots to recall settings while live on-air.

What's Stored in a Snapshot?

The console offers two types of snapshot:

Full Snapshots

These are one-shot memories which may be used to recall settings during a live show. Every full snapshot stores *all* of the following settings:

- **DESK**: the Console Configuration for the main desk; the assignment of channels to fader strips across all banks and layers, and the current status of bank and layer switching.
- **DSP**: DSP Settings; all channel DSP settings including analogue input control.
- **CONN**: signal routing connections for all sources and destinations using the **Signal List** display.
- **I/O**: remote mic preamp and router I/O settings such as router level and word length.
- **LABEL**: User Labels; the source and destination labels as made from the **Signal List** display.
- **BAY**: the Console Configuration for any isolated (ISO) bays; 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 cards.

Partial Snapshots

A "partial snapshot" stores selected routing crosspoints only. 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.

In this chapter we will deal with full snapshots. For more details on partial snapshots, see Page 594.

Using Productions and Snapshots

You should create a production for each client or type of work. For example, a production named 'Olympic Games' may store the low level settings required for a series of shows. Within this production, you may then create a number of folders to store and recall snapshots to bring back different signal routing, DSP settings and console layouts, for each show transmission.

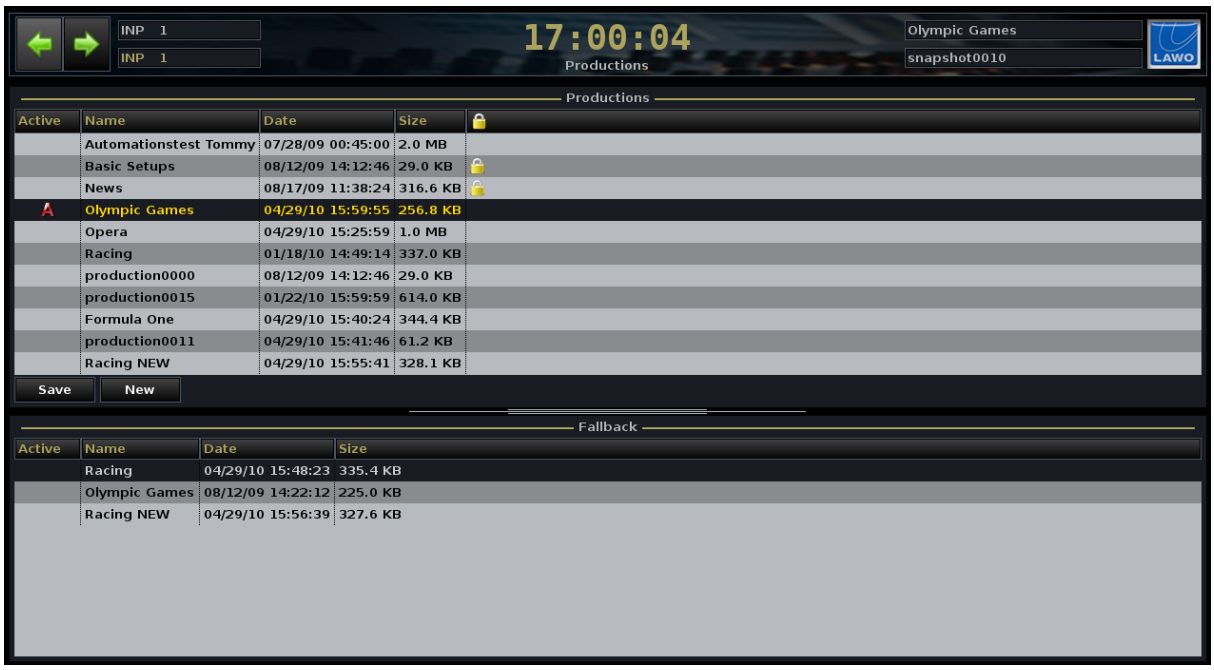

Tip

Remember to save the settings of the console regularly, either by saving a new production or updating the current one. Even if you have saved several snapshots, they are not stored on the internal flashcard until you update the production.

Productions

Productions are managed from the **Production** display.

1. Press the **PROD FILE** button, located on the SCREEN CONTROL panel, to view this display:



Note that each time you press the **PROD FILE** button you toggle between two pages – **Productions** and **File** – so keep pressing until you see the **Productions** display.

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, see Page 384 for details.


Note

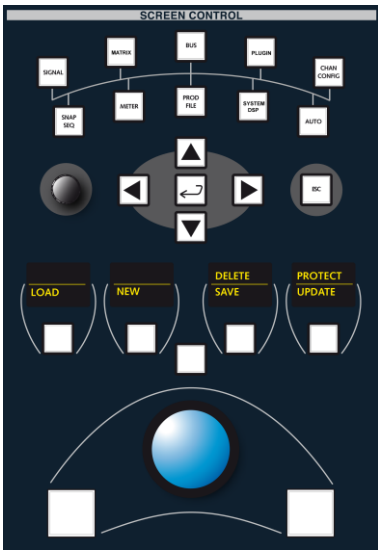
Note that the active production is shown in the title bar of the display – in our example, **Olympic Games**. You will *always* see the active production name across all displays.

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 may also see a padlock icon indicating that the production is protected.


Tip

If the list of **Productions** or **Fallback**s 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 using the trackball and/or use the on-screen scroll bars.

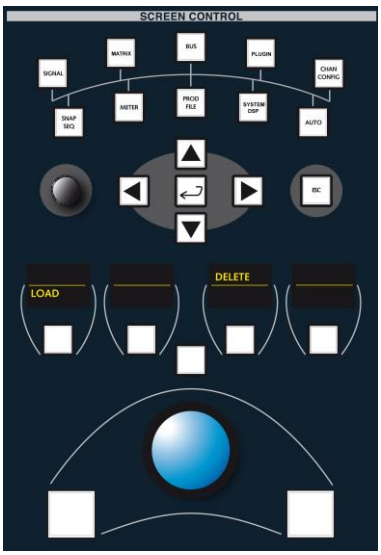
2. Focus on the **Productions** list and the following soft key functions are available:



- **LOAD** – loads the selected production settings to the console.
- **NEW** – creates a new production with empty snapshot/sequence folders and mixes.
- **SAVE** – creates a new production by saving the current console settings, including any snapshot/sequence folders and mixes.
- **UPDATE** – saves the current console settings into the selected production.

3. Press **PAGE** to access:

- **DELETE** – deletes the selected production.
- **PROTECT** – protects the selected production.



4. Now focus on the **Fallback** list:

The soft key functions update to:

- **LOAD** – loads the selected fallback production.

5. Press **PAGE** to access:

- **DELETE** - deletes the selected fallback production.

Fallback productions are covered on Page 384. Let's deal with the main **Productions** list first.

Loading a Production

You can load stored settings to the console at any time by loading a production.

Note

Note that when you load a production you will lose the current settings of the console, so make sure that you have saved these settings if you wish to retrieve them at a later date.

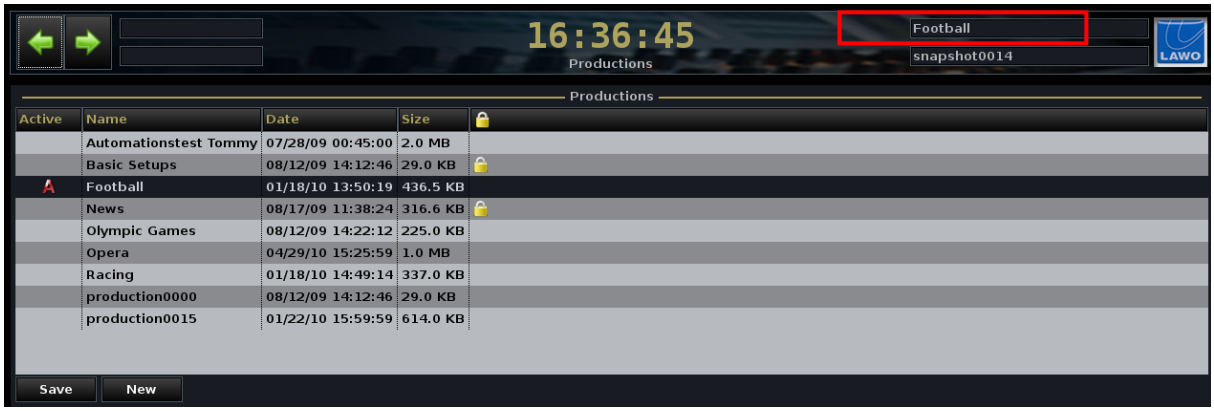
If you do make a mistake, don't panic! Every time a production is loaded, a copy of the current console settings is created in the **Fallback** list. See Page 384 for more details.

1. Select the production you wish to load from **Productions** list (e.g. **Football**).

The selected production is highlighted in black:

2. Press the **LOAD** soft key to complete the operation.

*The console status will update, and the title bar shows that **Football** is now the active production:*



For additional confirmation, watch the status bar and you will see a **loading…** message indicating that production data is being loaded.

Saving a New Production

You can save the current settings of the console, including any snapshot/sequence folders and automation mixes, into a new production using the **SAVE** function.

If you want to clear out any existing snapshot/sequence folders or automation mixes in the memory, then create a new production using the **NEW** function, see Page 381.

Tip

It is a good idea to save and organise your productions early on. Don't overwrite your studio's setup production with your own settings! Instead, save a new production for your own templates or for a particular show.

To save a new production:

1. Using the trackball or navigation buttons focus on the list of **Productions** in the upper half of the display.
2. Press the **SAVE** soft key to save the current console settings into a new production:

*A new entry appears in the **Productions** list with a default name (e.g. **production 0012**).*

This entry contains all the settings of the console and is time and date stamped. The new production automatically becomes the active production as indicated in the title bar.

For additional confirmation, watch the status bar and you will see a **saving…** message indicating that production data is being saved.

Renaming a Production

To rename the production:

1. Select the production name from the **Productions** list.
2. Click on the production name using the trackball:

Tip

Click once to select all the existing text (white) or twice (black cursor) to modify the existing name.

3. Enter a new name from the keyboard.
4. When you have finished, press the Enter button on the keyboard to confirm the new name (e.g. **Formula One**):

5. Or, if you make a mistake or want to exit the naming mode without making any changes, press the **Esc** button on the keyboard.

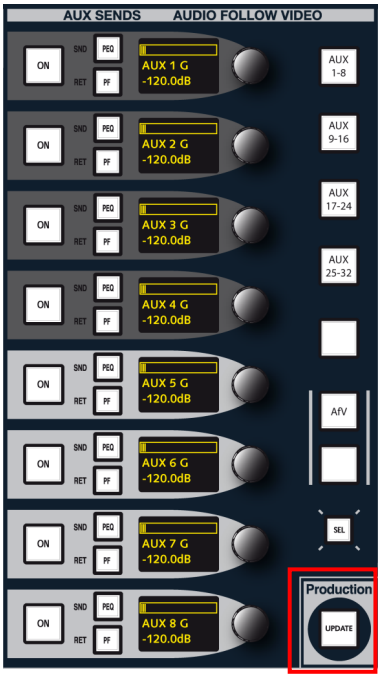
Updating a Production

Having saved your settings in a new production, and renamed it, you should continue to save your settings regularly as you work by updating the active production.

Note that updating overwrites the settings on the user data flash card. Therefore, make sure that you have selected the correct production to update. To avoid accidental updates to important productions, always protect them using the Protect function, see Page 379.

Note

If you do make a mistake, don't panic! Every time a production is updated, a copy of the current console settings is created in the **Fallback** list. See Page 384 for more details.



There are three ways to update a production:

- From the **Productions** display using the **UPDATE** soft key.
- From the **Productions** display using the right-click **Update** menu option.
- From the **UPDATE** button at the bottom of the AUX SENDS/AUDIO FOLLOW VIDEO panel – this method allows you to update the active production regardless of which display you are currently viewing.

You will find that the **UPDATE** button also acts as a reminder to help you save your settings regularly. Each time you save or update a snapshot the button flashes.

1. Press **UPDATE** to update the active production.

The active production is overwritten with the current console settings and the button stops flashing.

For additional confirmation, watch the status bar and you will see a **saving…** message when the production data is being updated.

Note that if the production is protected you will not be able to update it; the **UPDATE** button continues to flash. Go to the **Productions** display and unprotect the active production. Now you can use **UPDATE** to update settings while working.

To update a production from within the **Productions** display:

1. Select the production you wish to update from the **Productions** list.

*The selected production is highlighted in black (e.g. **Formula One**):*

Note that you can choose to update any production, not just the active one, so take care NOT to overwrite someone else's settings!

2. Now either press the **UPDATE** soft key, or press the right select trackball button and choose **Update** from the drop-down menu options.

Note that if you use the trackball and drop-down menus to select **Update**, you will be presented with an additional confirmation box; select **OK** to confirm the Update.

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 and you will see a red **saving…** message indicating that the production data is being saved.

Remember that a protected production cannot be updated.

New Production

The **NEW** soft key creates a new production with an empty set of snapshot folders and mixes. Use this before saving a production when you wish to clear out any existing snapshots or mixes from the current console memory.

To create a new production:

1. Using the trackball or navigation buttons focus on the list of **Productions** in the upper half of the display.
2. Press the **NEW** soft key.

A new empty production is created – this is indicated by the empty active production name in the title bar at the top of the display:

If you now change displays to view **Snapshots List** or **Mixes** you will find that all folders and mixes have been emptied from the console memory.

3. To save the current console settings into the new empty production and give it a name, press the **UPDATE** soft key.

*All current console settings are saved into the production which is given a default name (e.g. **production 0011**):*

The production is time and date stamped and may be renamed or protected in the usual manner.

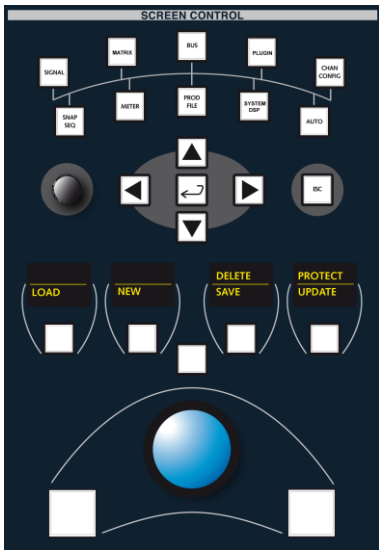
Deleting a Production

Deleting a production removes the production and all of its contents – snapshots, sequences and mixes - from the internal user data flash card.

To prevent accidental deletion, protected productions may not be deleted.

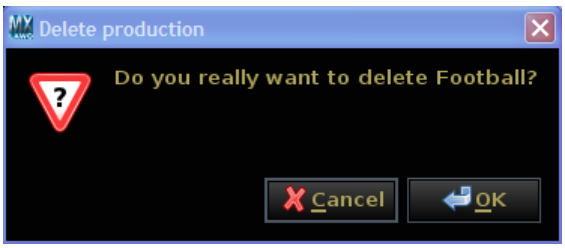
1. Select the production you wish to delete from the **Productions** list (e.g. **Football**).

The selected production is highlighted in black:



2. To delete the production, press the **DELETE** soft key, or press the right select trackball button and choose **Delete** from the drop-down menu options.

Note that if you use the trackball and drop-down menus to select, you will be presented with an additional confirmation box; select **OK** to confirm the Delete.



Note that a protected production cannot be deleted.

Protecting a Production

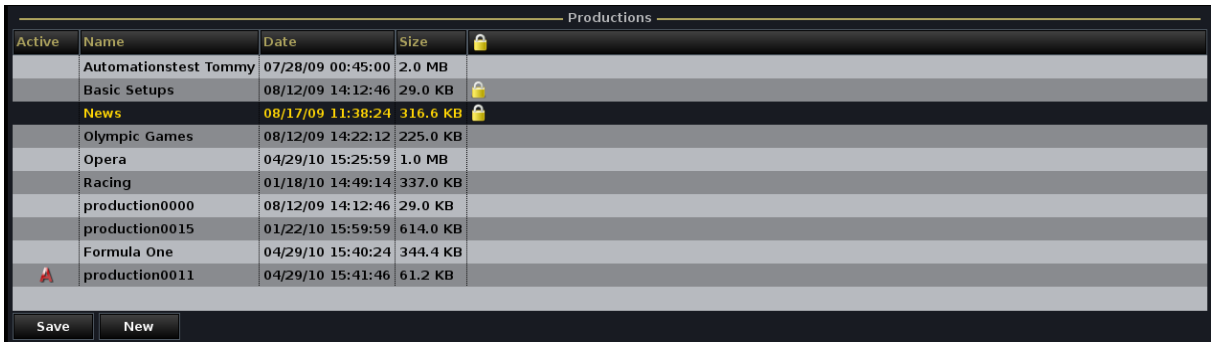
A protected production cannot be updated or deleted. Always protect your productions when leaving the console as this will prevent accidental changes from using **UPDATE** or **DELETE**.

Tip

1. Select the production you wish to protect from the **Productions** list (e.g. **News**).

The selected production is highlighted in black.

2. To protect the production, press the **PROTECT** soft key:



A padlock icon appears to show that the production is now protected.

Importing and Exporting Productions

A complete production, or elements of a production (such as a folder, snapshot or mix) can be imported and exported to a USB interface, network drive or to an external computer running mxGUI. 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.

Take care when moving a production to a system with fewer DSP cards. In this case, the DSP configuration will not load (as it is looking for more physical cards). Therefore, if the channel type is not compatible with the production snapshot, your DSP settings will not load either.

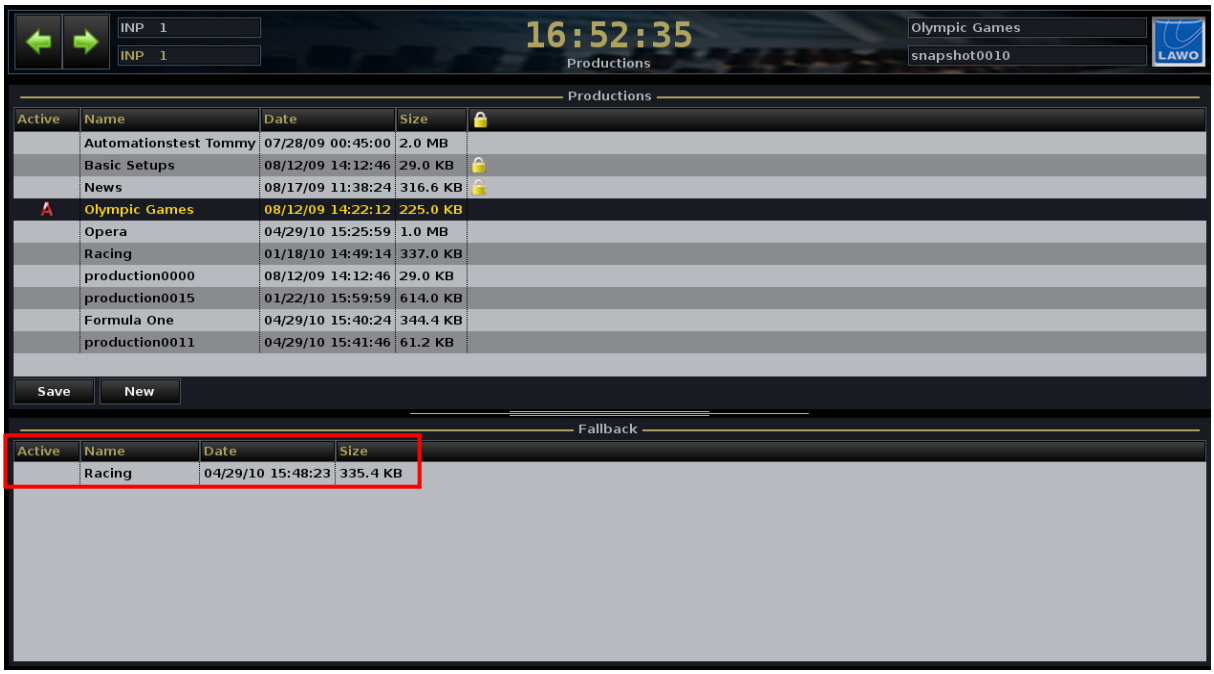
To overcome this, save a snapshot on the original console in addition to saving the production. When you move the production to the new console, load the production, then manually load a DSP configuration with a compatible channel type. Now load the snapshot. Your settings will be recalled to all available DSP channels.

See Page 465 for details on the File Import/Export functions and Chapter 10 for details on mxGUI.

Fallback Productions

When a production is loaded, updated, deleted or cleared (using **NEW** production), a temporary copy of the current console settings is created in the fallback productions memory. Five fallback productions are stored providing five levels of undo if you perform an operation accidentally without first saving your settings.

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, the console automatically creates a fallback production of **Racing**:



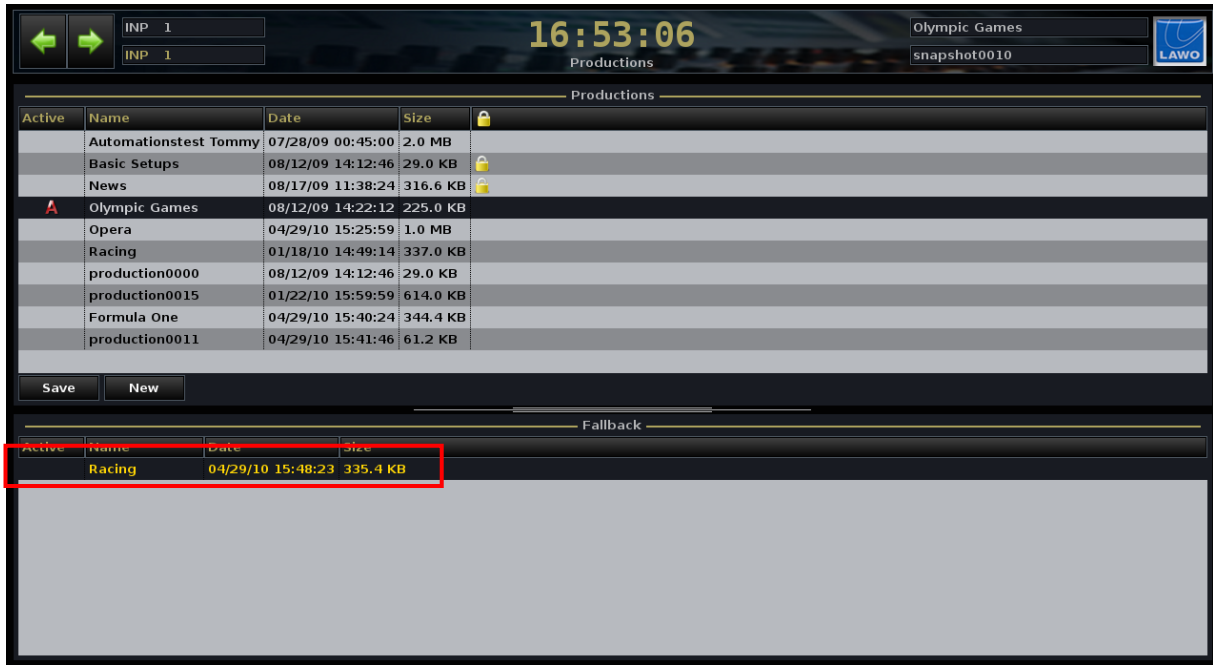
Note that the name of the fallback production is taken from the active production, in our example **Racing**. However, the fallback is not a copy of the active production but of the console settings before the load operation was performed. This means that the settings stored within the fallback production are the settings which the operator forgot to save before changing. You can see this by the different time and date stamp date for the Fallback called **Racing**.

The operator then loads back the production for **Racing** and realises their mistake.

To recover the unsaved settings:

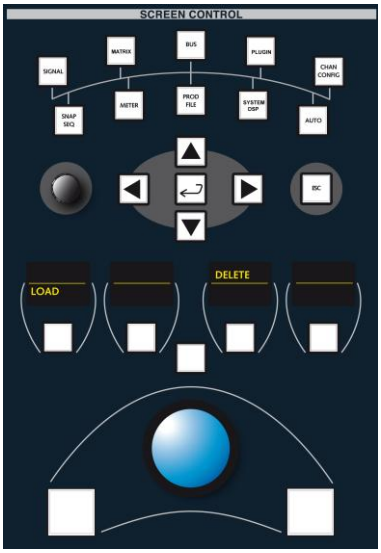
1. Select the entry named **Racing** from the **Fallback** list.

The production is highlighted in black.



2. Press the **LOAD** soft key to load the fallback production.

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 use **SAVE** to save the settings in a new production with a new name, or **UPDATE** to update the original Racing production.

In our example, we have saved a new production and named it **Racing New**:

Warning


Warning

If you do not save or update the settings to a permanent production, then they may be lost forever. The fallback productions memory is a first-in first-out memory holding a maximum of 5 fallback productions.


Note

Note a fallback production is created each time a production is loaded, updated, deleted or when **NEW** production is used to clear any existing folders.

For example, it may be used if you update a production with the wrong settings, or if you press **NEW** instead of **SAVE** and accidentally clear some snapshot folders by accident. To recover your settings, load the fallback production with the same name as the active production which you accidentally updated or cleared. This will contain all the settings before you pressed **NEW** or **UPDATE**.

Folders

Folders are used to organise snapshots and sequences within a production. Each production may contain any number of folders, and within each folder you may store multiple snapshots and sequences.

For example, you may use folders to organise the snapshots and sequences required for different live broadcast events within a single production.

Note that when using sequences, it's important to consider how you organise data within your folders. A sequence may reference any snapshot contained within the same folder, but not snapshots from a different folder. For example, you can't include a snapshot stored in 'Music' if the sequence is stored in 'Football'.

Tip

If you do wish to use snapshots stored within different folders, then use File Import/Export to copy the snapshots into the required folder. See Page 465 for details.

Note that the **FALLBACK** folder is a special folder used to store the current settings of the console if you change from a Broadcast to Recording DSP configuration. This folder cannot be renamed or deleted. See Page 129 for details.

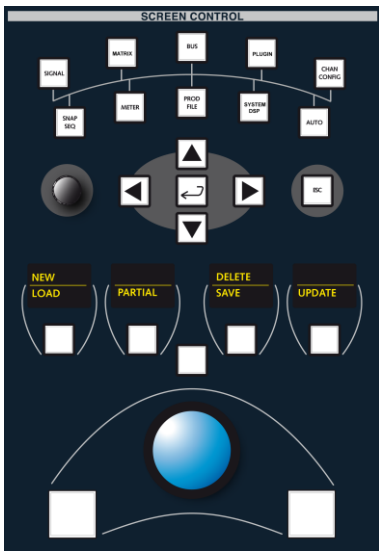
In addition, the **BACKUP** folder is a special folder used to store backup snapshots. This folder appears when backup snapshots are enabled. See Page 402 for details.

Creating a New Folder

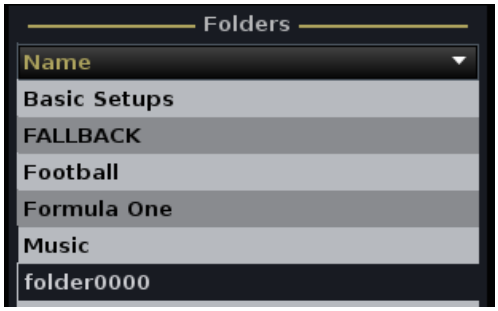
You can create a new folder either from the **Snapshots List** or **Sequences** display. For now, let's work within the **Snapshots List** display.

1. Press the **SNAP/SEQUENCE** button, located on the SCREEN CONTROL panel, to view the **Snapshots List** display:

2. Using the trackball or navigation buttons focus on the list of **Folders** on the left hand side of the display.
3. Press the **NEW** soft key (on the second PAGE) to create a new folder.



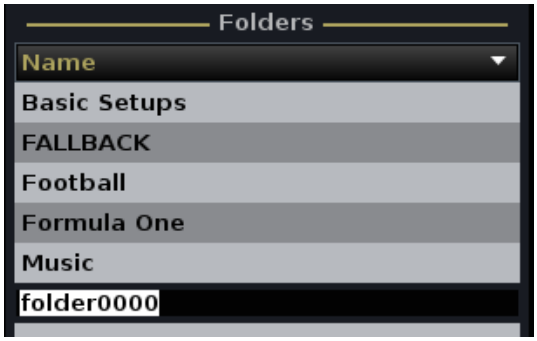
*A new folder appears in the **Folders** column with a default name (e.g. **Folder 0000**):*



Renaming a Folder

To rename the folder:

1. Select the folder name using the trackball:

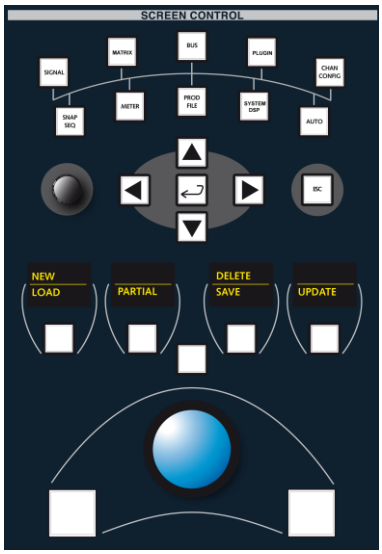


Click once to select all the existing text (white) or twice (black cursor) to modify the existing name.

2. Enter a new name from the keyboard.
3. When you have finished, press the Enter button on the keyboard to confirm the new name.
4. Or, if you make a mistake or want to exit the naming mode without making any changes, press the **Esc** button on the keyboard.

Tip

Deleting a Folder



To prevent accidental deletion of snapshots only empty folders may be deleted. Therefore, first delete any snapshots contained within the folder before attempting this operation.

1. Select the folder you wish to delete from the **Folders** list:
2. Press the **DELETE** soft key (on the second PAGE).

The folder is deleted. Note that only empty folders may be deleted.

Importing and Exporting Folders

A complete folder can be imported and exported to a USB interface, network drive or to an external computer running mxGUI. This allows you to archive or transfer folders between systems. See Page 465 for details on the File Import/Export functions and Chapter 10 for details on mxGUI.

Snapshots

Snapshots provide the ability to store different mixes/setups for recall before or during a live show. For example, you may use snapshots to recall different setups for a series of shows – e.g. Football; or to recall a different mix for each band appearing in a live entertainment show; or to recall scene changes during a live theatre production.

Note that the console offers two types of snapshot:


Note

- **Full snapshots** – one-shot memories which store all the settings of the console (see Page 373).
- **Partial snapshots** – store selected routing crosspoints.

In this section we will be dealing with full snapshots. However, the same principles of load, save, delete, etc. may be applied to partial snapshots. For more details on partial snapshots, see Page 594.

Snapshots are organised within Folders within a production. If you save or update snapshots, remember to also update your production to save the new folders and snapshots to the internal flashcard.


Note

The Snapshots List Display

Snapshots are managed from the **Snapshots List** display.

1. Press the **SNAP/SEQUENCE** button, on the SCREEN CONTROL panel, to view the **Snapshots List** display.
2. Select a folder from the **Folders** list (e.g. **Music**).

You will see all snapshots contained with the selected folder:

If the list of **Folders** or **Snapshots** is longer than the available window space, focus on the list and use the rotary control on the SCREEN CONTROL panel to navigate up and down the list. You can also resize the windows using the trackball and/or use the on-screen scroll bars.

When snapshots are first saved, they are given a default name which gives the snapshot a unique number. You may then rename the snapshots at any time.

The snapshot **Type** indicates whether it is a full or partial snapshot, see Page 373.

Every snapshot also has a date and time stamp in the **Date Time** column. The padlock icon column is used to identify snapshots which have been write-protected, preventing accidental updates or deletion.

The **Channel type** column shows which channel type was active when the snapshot was saved – either Broadcast or Recording. This is important as you cannot load channel DSP settings from a Broadcast snapshot to Recording channels, or vice versa. See Page 131 for more details.

The **Snapshot Memo** boxes may be used to make notes for a particular snapshot.

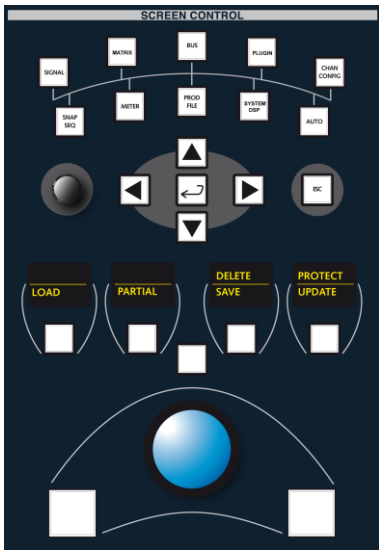
Remember that you will *always* see the name of the last snapshot saved or loaded in the title bar across all displays – in our example, **Act 1 Scene 2**.

Loading a Snapshot

1. Select a folder from the **Folders** list.
2. Then select a snapshot from the **Snapshots** list.

The selected snapshot is highlighted in black.

3. Press **LOAD** to complete the operation.

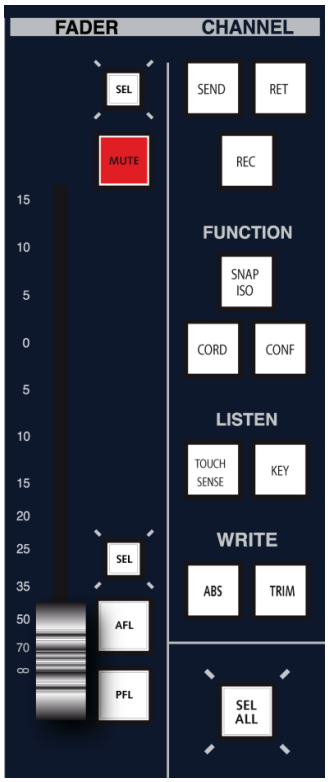


The console instantly updates to the loaded snapshot settings; the name of the loaded snapshot appears in the title bar of the display:

Note that if snapshot offsets are active then the offsets will be applied to the loaded parameters. See Page 447 for more details.

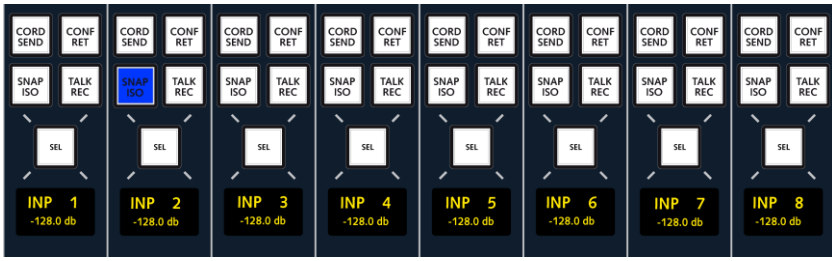
Also note that you can isolate individual fader strips, individual sources and destinations, or complete console elements from the snapshot recall so that you can protect settings on the console.

Let's look at these options.



Isolating Fader Strips from a Snapshot Load

You may isolate a fader strip from the snapshot recall by selecting the **SNAP ISO** button before using the **LOAD** function. This isolates the complete channel from the snapshot recall.



Note that these 4 buttons are user buttons which can be re-configured from the **Custom Functions** display. If **SNAP ISO** is not programmed onto a user button, then it can be accessed from the Central Control Section's CHANNEL controls.

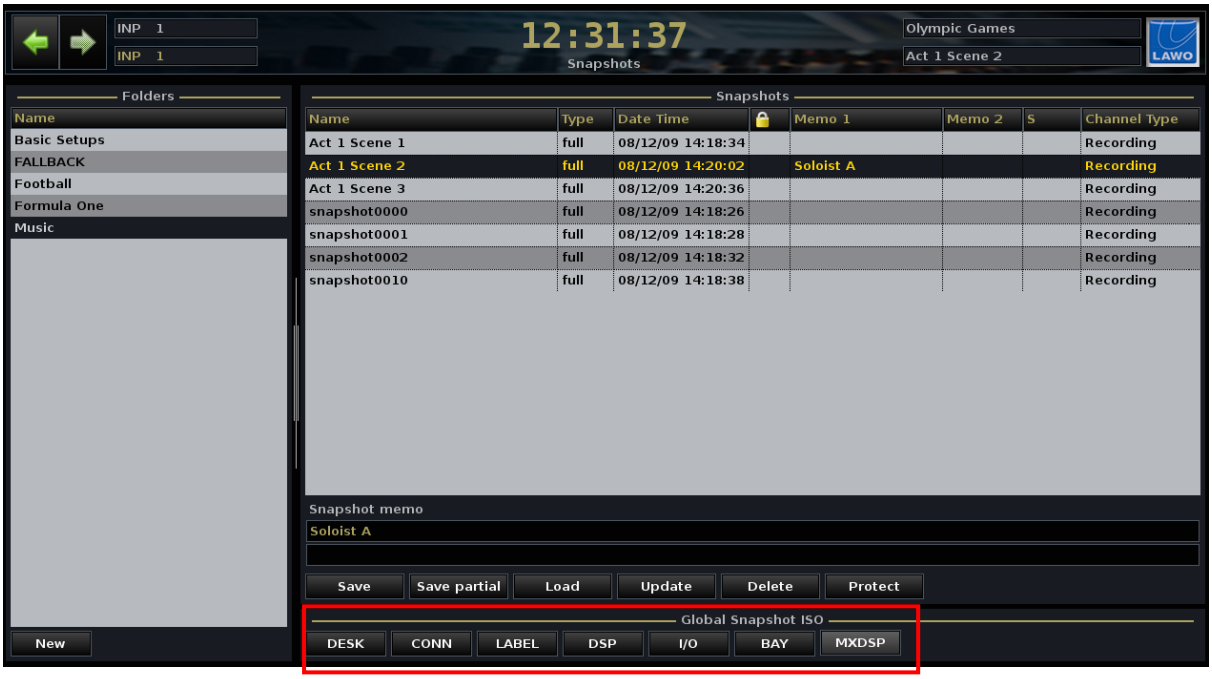
Note also that a system option provides the ability to disable all **SNAP ISO** buttons across the console, see Page 651 for details.

Isolating Sources and Destinations from a Snapshot Load

You may also isolate particular sources and destinations from a snapshot recall by selecting the **Isolate** function from the **Signal List** display. For example, you may wish to protect important signals, such as main sum distribution or monitor feeds, from accidental reset. See Page 579 for details.

Global Snapshot ISO

In addition, the Global Snapshot ISO touch-screen buttons on the **Snapshots List** and **Extra Buttons** displays allow you to isolate different console elements from a snapshot recall:



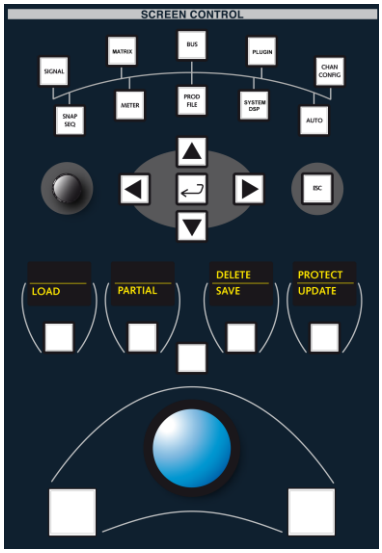
Select these buttons before you load a snapshot to isolate the following elements:

- **DESK**: the Console Configuration for the main desk; the assignment of channels to fader strips across all banks and layers, and the current status of bank and layer switching.
- **DSP**: DSP Settings; all channel DSP settings including analogue input control.
- **CONN**: signal routing connections for all sources and destinations using the **Signal List** display.
- **I/O**: remote mic preamp and router I/O settings such as router level and word length.
- **LABEL**: User Labels; the source and destination labels as made from the **Signal List** display.
- **BAY**: the Console Configuration for any isolated (ISO) bays; 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 all mxDSP card signals.

Select the button or buttons for the elements you do *NOT* want to recall and then load the snapshot. Note that you may select all buttons except one to load only a single element, for example signal routing.

Saving a Snapshot

1. Select the folder you wish to save into on the left of the display.
2. Then focus on the **Snapshots** list on the right of the display.
3. Press the **SAVE** soft key to save all the current settings into a new snapshot (full snapshot).



*A new snapshot appears at the bottom of the list. It is given a default name (e.g. **snapshot0011**), and date and time stamped:*

Snapshots

Name	Type	Date Time		Memo 1	Memo 2	S	Channel Type
Act 1 Scene 1	full	08/12/09 14:18:34					Recording
Act 1 Scene 2	full	08/12/09 14:20:02		Soloist A			Recording
Act 1 Scene 3	full	08/12/09 14:20:36					Recording
snapshot0000	full	08/12/09 14:18:26					Recording
snapshot0001	full	08/12/09 14:18:28					Recording
snapshot 002	full	08/12/09 14:18:38		Update for Soloist B later			Recording
snapshot0010	full	04/29/10 12:41:15					Recording
snapshot0011	full	04/29/10 12:48:53					Recording

Note that *all* settings are always saved into a snapshot regardless of **SNAP ISO** or **Global Snapshot ISO** selections.

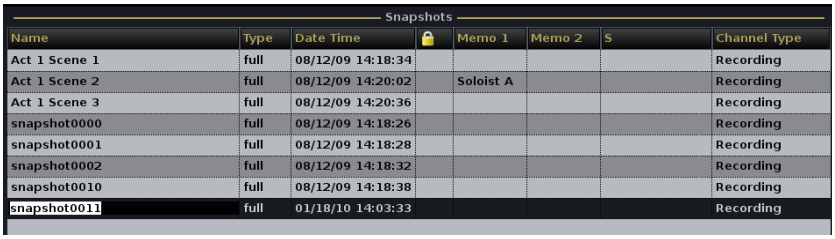
Note

Note that the **PARTIAL** soft key or touch-screen button saves a partial snapshot. Partial snapshots store selected routing crosspoints which are prepared from the **mx Routing** display. See Page 594 for more details on partial snapshots.

Renaming a Snapshot

To rename the snapshot:

1. Select the snapshot to rename from the **Snapshots** list using the trackball:

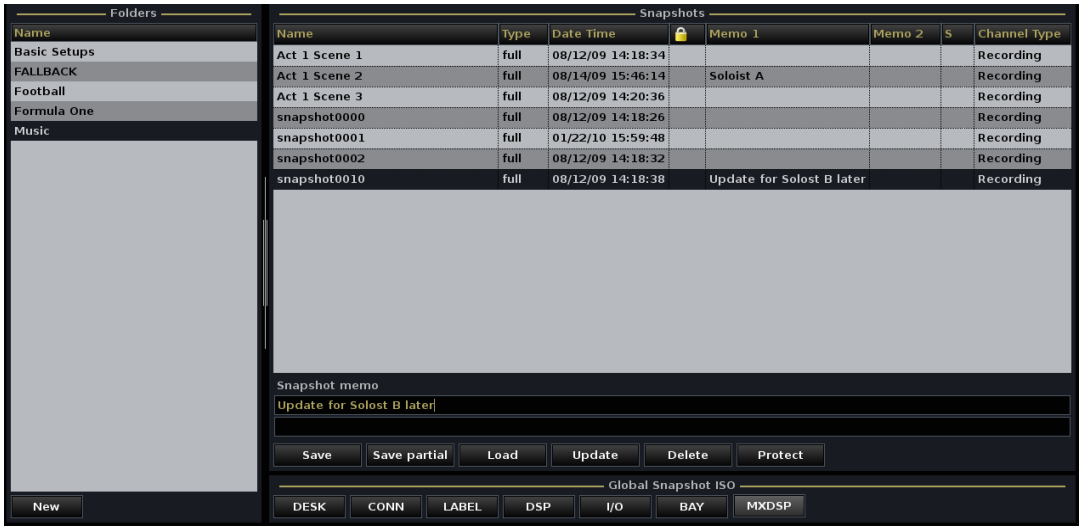


Click once to select all the existing text (white) or twice (black cursor) to modify the existing name.

2. Enter a new name from the keyboard.
3. When you have finished, press the Enter button on the keyboard to confirm the new name.
4. Or, if you make a mistake or want to exit the naming mode without making any changes, press the **Esc** button on the keyboard.

Adding a Memo

You may 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** box.

A black cursor appears.

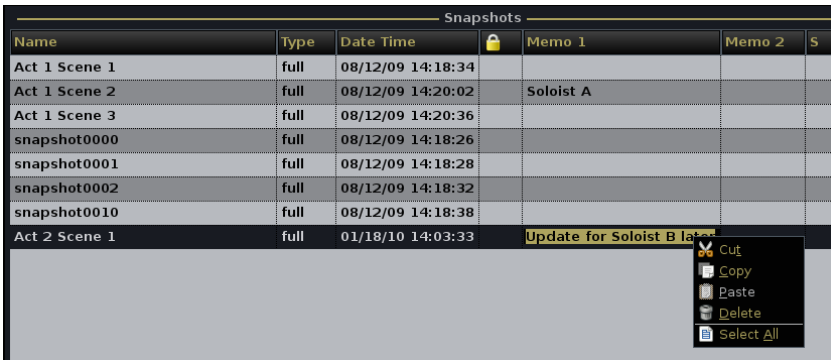
2. You may now type to enter your information from the console keyboard.

*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.

If you right-click the snapshot memo, using the trackball and right select button, then you can use the **Copy** and **Paste** options to copy memo text to another snapshot:

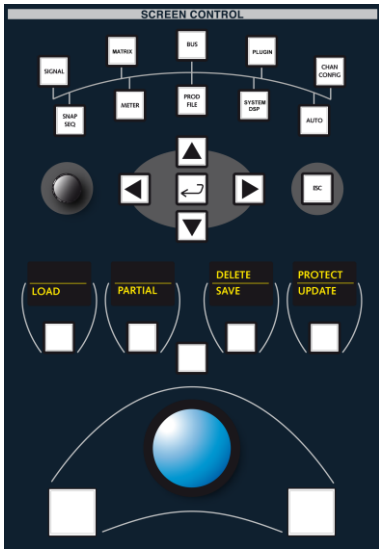
Tip



You can also drag and drop the Memo columns using the trackball to change their position on the display.

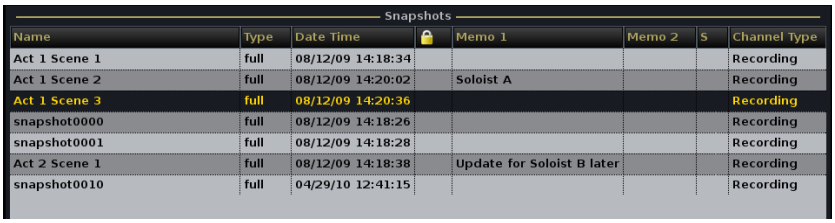
Updating an Existing Snapshot

Updating a snapshot overwrites the settings within the snapshot memory, so take care to select the correct snapshot when using this function.



1. Select the folder and snapshot you wish to update

The selected snapshot is highlighted in black:



2. Press the **UPDATE** soft key to update the snapshot with the current console settings.

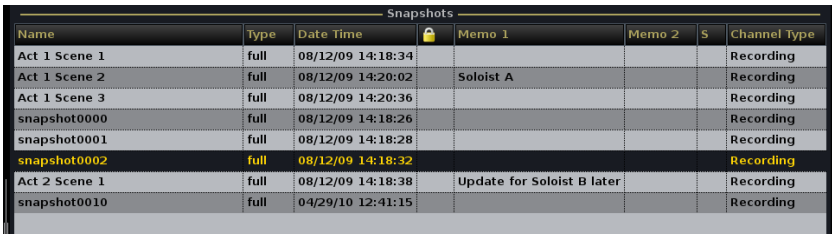
*Pressing **UPDATE** overwrites the selected snapshot as indicated by the new date and time stamp.*

Deleting a Snapshot

Deleting a snapshot removes the snapshot from the internal memory, so take care to select the correct snapshot when using this function.

1. Select the folder and snapshot you wish to delete.

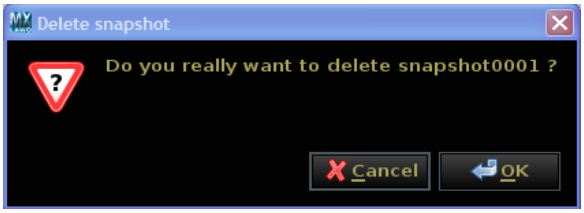
The selected snapshot is highlighted in black:



2. To delete the snapshot, press the **DELETE** soft key.

Note that you can also **Update** or **Delete** by selecting the snapshot and then the right select trackball button. If you use this method, an additional confirmation box appears; select **OK** to confirm the operation:

Note



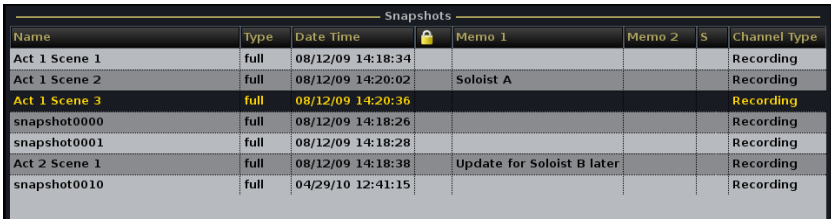
Protecting a Snapshot

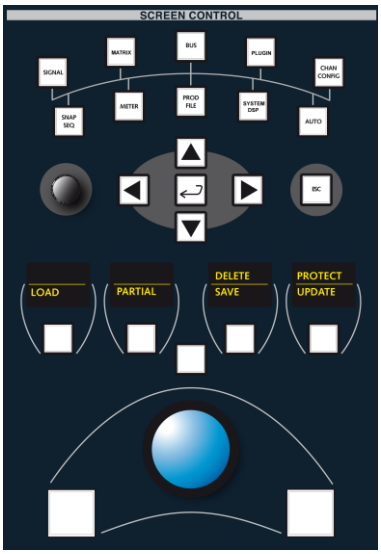
A protected snapshot cannot be updated or deleted. Always protect important snapshots as this will prevent accidentally overwriting a snapshot using **UPDATE** or deleting the snapshot using **DELETE**.

Tip

1. Select the snapshot you wish to protect.

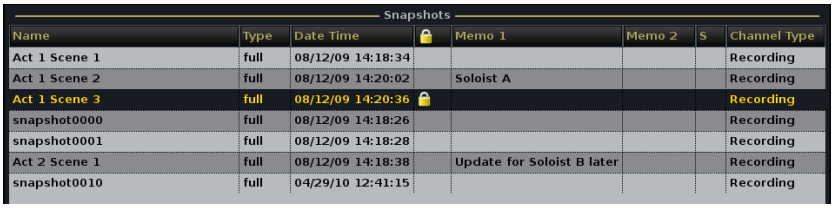
The selected snapshot is highlighted in black:





2. Press the **PROTECT** soft key.

A padlock icon appears to show that the snapshot is now write protected:



Importing and Exporting Snapshots

Individual snapshots can be imported and exported to a USB interface, network drive or to an external computer running mxGUI. This allows you to archive or transfer snapshots between systems.

Take care when working with systems using different channel types. Because Recording and Broadcast channels offer significantly different signal processing, you cannot load channel DSP settings from a Broadcast snapshot to a console running Recording channels, or vice versa. See Page 131 for further details.

See Page 465 for details on the File Import/Export functions and Chapter 10 for details on mxGUI.

Backup Snapshots

Backup snapshots may be used to provide levels of undo when setting up the console.

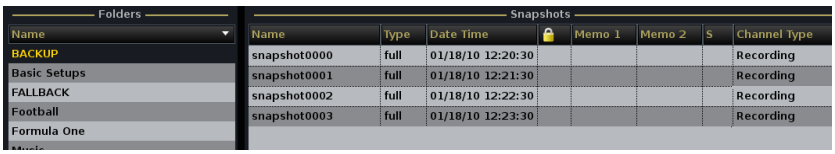
A backup snapshot is automatically stored by the console every n seconds. You can set how often the backup snapshots are stored from the **System Settings** display, see Page 653. For example, you may set the backup snapshot interval to every 5 minutes. You can also set how many backup snapshots are stored before the first is overwritten. For example, you might limit the number to 12 backup snapshots giving yourself a 1 hour 'undo' window.

All the backup snapshots for a particular production are stored within a special folder named 'BACKUP FOLDER'; 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 point during the operation of the console, you can use the backup snapshot system to revert to an earlier configuration. For example, while laying out the console, you make a mistake and deleted the fader strip assignments for Bank 1.

To revert to the latest backup snapshot:

1. Select the **BACKUP** folder on the left of the display either using the trackball or navigation controls:



*The **Snapshots** list now shows all the backup snapshots, each one time and date stamped.*

2. Select the latest backup snapshot from the list.
3. Press the **LOAD** soft key to complete the operation.

The console updates to the backup snapshot settings.

If your mistake was made longer than 5 minutes ago, then you may need to load an earlier backup snapshot to undo your error.

Note

Note that the backup snapshot time interval and the number of backup snapshots are set from the **System Settings** display, see page 653 for details. To disable the backup snapshot system, set the number of backup snapshots to 0. You may wish to do this during a live show as each automatic save causes a brief interruption to console control.

Sequences

For convenient recall of snapshots during a live broadcast or theatre production, the **mc²66** provides real time sequence automation. A sequence is a list of snapshots which can be loaded in sequence during a live show. Note that the sequence itself does not store any settings, but simply creates a list of pointers to snapshots stored within the production folder.

Multiple sequences may be created within each folder to deal with different versions of the show. For example, when rehearsing a live theatre production, the running order may vary. By creating multiple sequences, you have the option to play out any variation.

You may also reference a single snapshot several times within each sequence. For example, in an entertainment show you may reference the same snapshot to return to presenter links between each music act. This means that any updates to the snapshot are carried through all occurrences within the sequence.

Note that a sequence may reference any snapshot contained within the same folder, but not snapshots from a different folder. For example, you can't add a snapshot stored in a folder called 'Music' to a sequence stored in 'Football'.


Note

The **Sequences** display is used to create, edit and play out sequence automation. Sequences may also be played out from the SNAPSHOT/SEQUENCE front panel controls:

- You can create a sequence and save or update snapshots 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 snapshots and add them to the sequence in one operation.
- Or you can add existing snapshots into a sequence offline. For example, if the rehearsal is unlikely to follow the same running order as the show, then it's best to save your snapshots into the production folder from the **Snapshots List** display, and create the sequence at a later time.
- During playout, you may load sequence snapshots and choose to skip snapshots or revert back to the previous snapshot at the touch of a button. In addition, you can cross fade between snapshots to fade automatically from one scene to the next.

Note that you may also apply offsets to snapshots replayed from a sequence using the **Snapshot Trim Sets** display. This is great if there are last minute changes you wish to make to the whole show. Snapshot offsets are covered later in this chapter, see Page 441 for details.

The Sequence Display

The **Sequences** display is used to create, edit and play out sequences.

1. Access the display by pressing the **SNAP/SEQUENCE** button, located on the SCREEN CONTROL panel, now:

Note

Note that each time you press the **SNAP/SEQUENCE** button you cycle through three pages – **Snapshots List**, **Sequences** and **Snapshot Trim Sets** – so keep pressing until you see the **Sequences** display.

The display is divided into five areas:

- **Folders** – lists the folders stored within the current production; one will be selected, in our example, **Mozart.**
- **Sequences** - lists the sequences contained within the selected folder. In our example, we have four sequences contained within the folder called **Mozart**. The **active** status flag shows that **Don Giovanni** is the sequence activated for play out.
- **ACTIVE SEQUENCE** – shows the name and file path of the active sequence, e.g. **Mozart/Don Giovanni**. This is the sequence which will play out when you enable sequence automation.

- **Sequence Snapshots** – for example, **Mozart/Don Giovanni (Active)** – shows the snapshots contained within the selected sequence. In our example, this happens to be the active sequence.

Snapshots will play out in the order shown; the **State** column is used when playing out sequences and indicates the following:

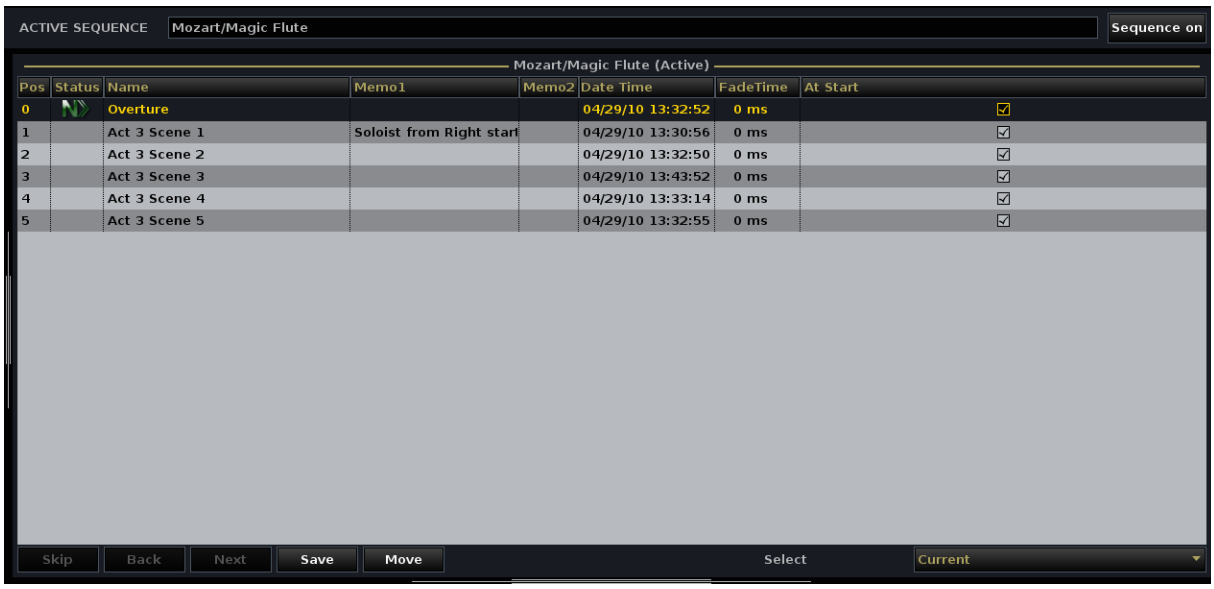
- **N** - the Next snapshot to be loaded.
- **C** - the Current snapshot (i.e. the last snapshot loaded).
- **B** - the 'Back' snapshot. This is the last snapshot loaded before the current one.

Beside the name of each snapshot you will see any memo information, the date and time when the snapshot was saved (or updated), and details of the X-fade parameters (fade time and switch mode) which will be used if you enable cross fades during play out.

- **Snapshots** - lists *all* the snapshots contained within the selected folder. Snapshots which are used within a sequence are marked with an **S**. You can add any of these snapshots into the sequence using the add function.

You can resize any of these areas by clicking and dragging the grey separator bars - for example, once a sequence is ready for playout, you could resize the display to only show the active sequence for playout:

Tip



If information within an area is hidden, then click on the left/right or up/down scroll bars and the additional columns will appear.

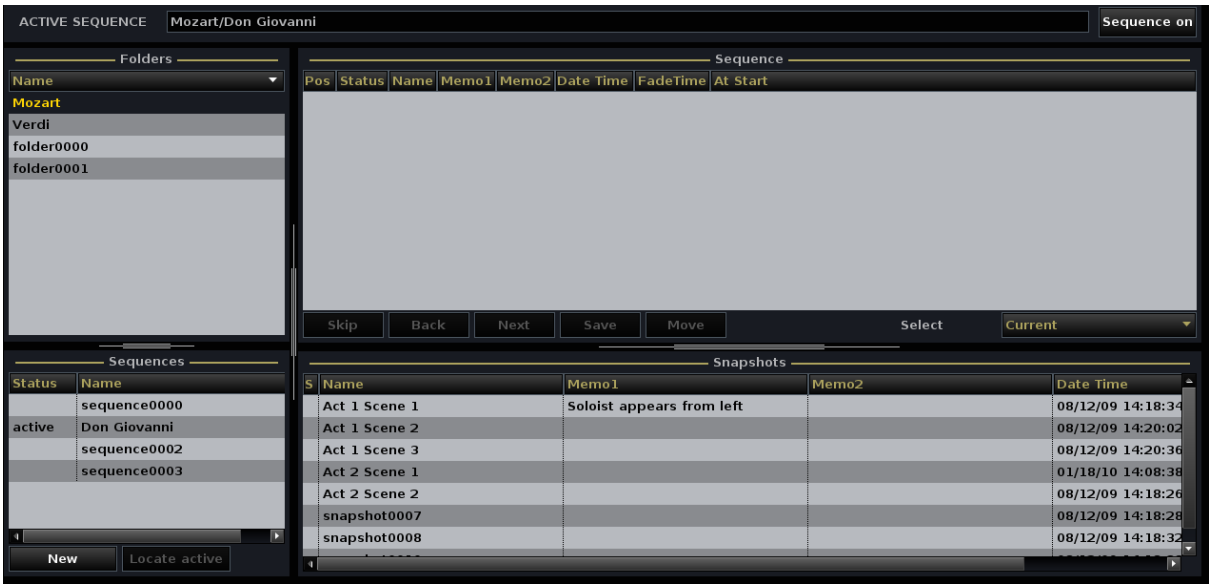
Sequences and Folders

Let's start with the basics of managing and creating sequences. Sequences are stored within folders within your current production. Use the **Folders** and **Sequences** lists on the left of the display to manage these areas as follows:

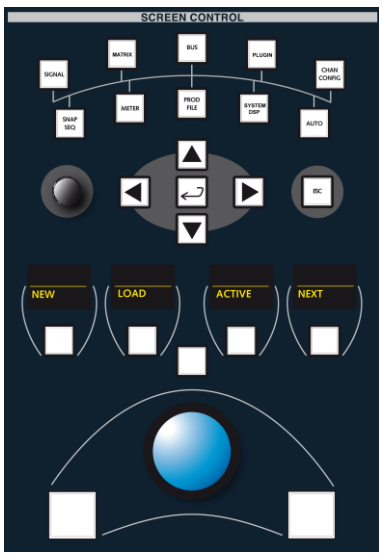
To change to a different sequence:

1. First select a folder from the **Folders** list.

*The selected folder is highlighted, and the **Sequences** and **Snapshots** lists update to show sequences and snapshots contained with the folder:*



Note that while you are focused on the **Folders** list you can create a new folder by pressing the **NEW** soft key, and edit the folder name in the usual manner.



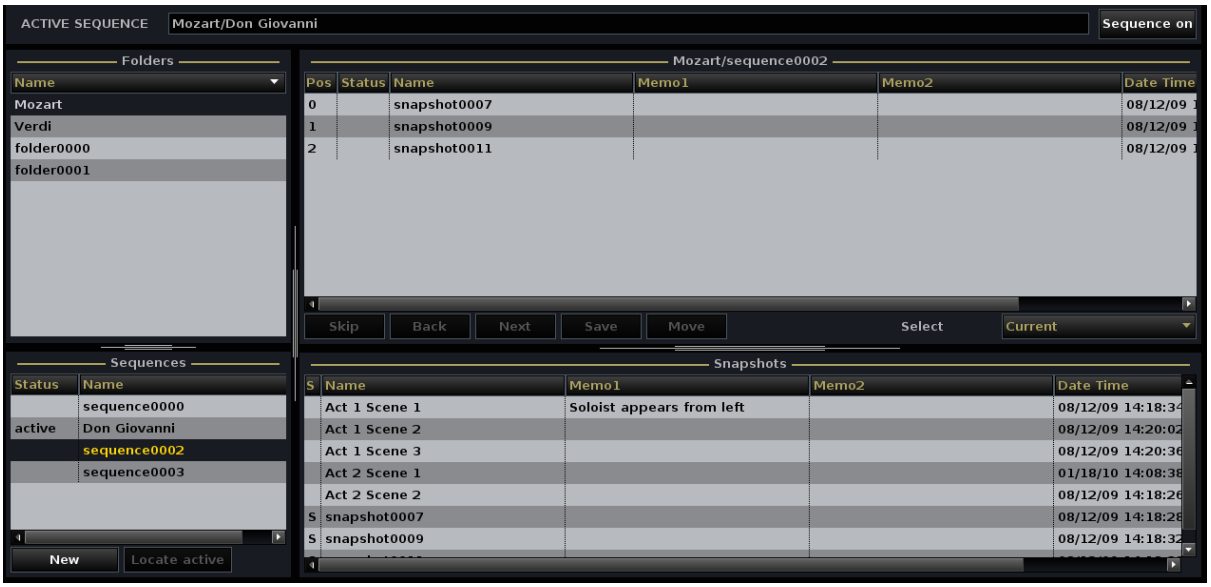
Note that you cannot delete folders from the **Folders** list. To delete a folder return to the **Snaphots** display, empty the folder of its snapshots and use the delete function as described on Page 390.

The other soft key functions are as follows:

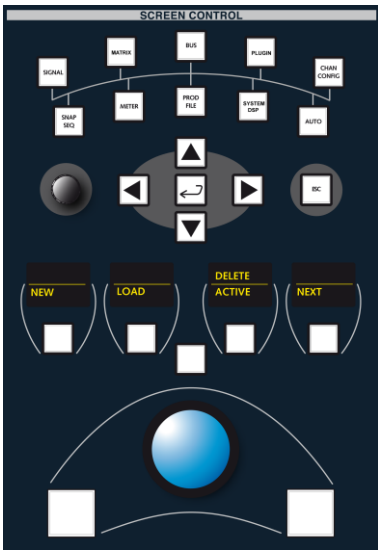
- **NEW** – creates a new folder.
- **LOAD** – sets the selected sequence to active.
- **ACTIVE** – switches the display back to the active sequence if you have navigated to a different folder or different sequence.
- **NEXT** – loads the **N**ext snapshot in the sequence.

2. Now select a sequence from the **Sequences** list, for example – **sequence0002**.

*The selected sequence is highlighted and you will see its contents and file path in the sequence snapshots area – for example, **Mozart/sequence0002***



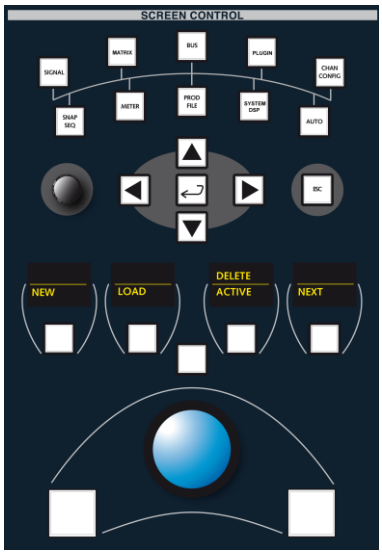
Note that while you are focused on the **Sequences** list, a series of functions for managing sequences become available on the soft keys located above the trackball:



- **NEW** – creates a new sequence.
- **LOAD** – sets the selected sequence to active.
- **ACTIVE** – switches the display back to the active sequence if you have navigated to a different folder or different sequence.
- **NEXT** – loads the **N**ext snapshot in the sequence.
- **DELETE** – (on the second PAGE) deletes the sequence from the folder.

Let's look at each of these functions in turn.

Creating a New Sequence



1. Using the trackball or navigation buttons focus the display on the **Sequences** list.
2. Press the **NEW** soft key, or screen button, to create a new sequence:

*The sequence is added to the sequence list and is given a default name – for example, **Sequence0004**.*

Renaming a Sequence

To rename the sequence:

1. Select the sequence name from the **Sequences** list.
2. Click on the name using the trackball:

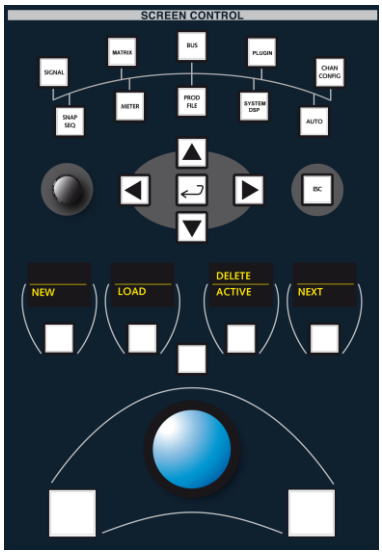
Click once to select all the existing text (white) or twice (black cursor) to modify the existing name.

3. Enter a new name from the keyboard.
4. When you have finished, press the Enter button on the keyboard to confirm the new name (e.g. **Magic Flute**):

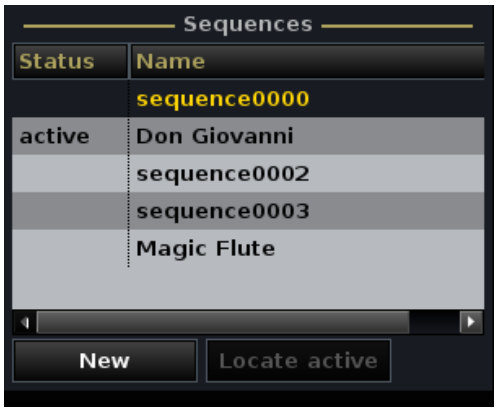
5. Or, if you make a mistake or want to exit the naming mode without making any changes, press the **Esc** button on the keyboard.

Deleting a Sequence

1. Select the sequence you wish to delete from the **Sequences** list.



The selected sequence is highlighted in black:



2. To delete the sequence, press the **DELETE** soft key (on the second PAGE), or press the right select trackball button and choose **Delete** from the drop-down menu options.

Note that if you use the trackball and drop-down menus to select, you will be presented with an additional confirmation box; select **OK** to confirm the Delete.


Warning

Warning

This operation will delete the sequence so be careful!

Note that deleting the sequence does just that, and does not delete any snapshots contained within it.

Setting the Sequence to Active

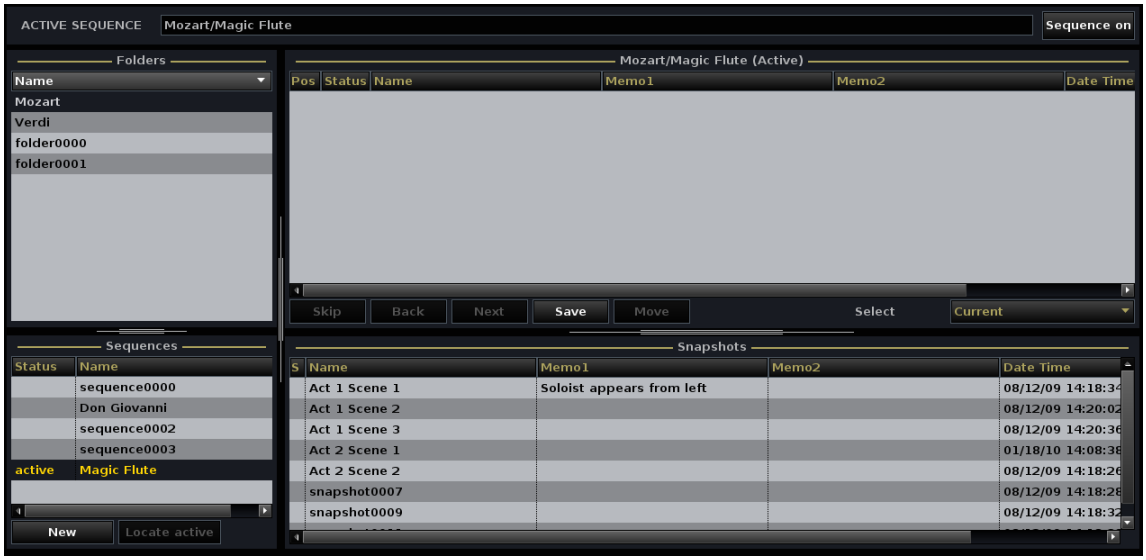
Before snapshots can be added to a sequence or the sequence played out in real time, it must be set to active:

1. Select the sequence you wish to make active from the **Sequences** list (e.g. **Magic Flute**).

The selected sequence is highlighted in black.

2. Now press the **LOAD** soft key to set the sequence to active.

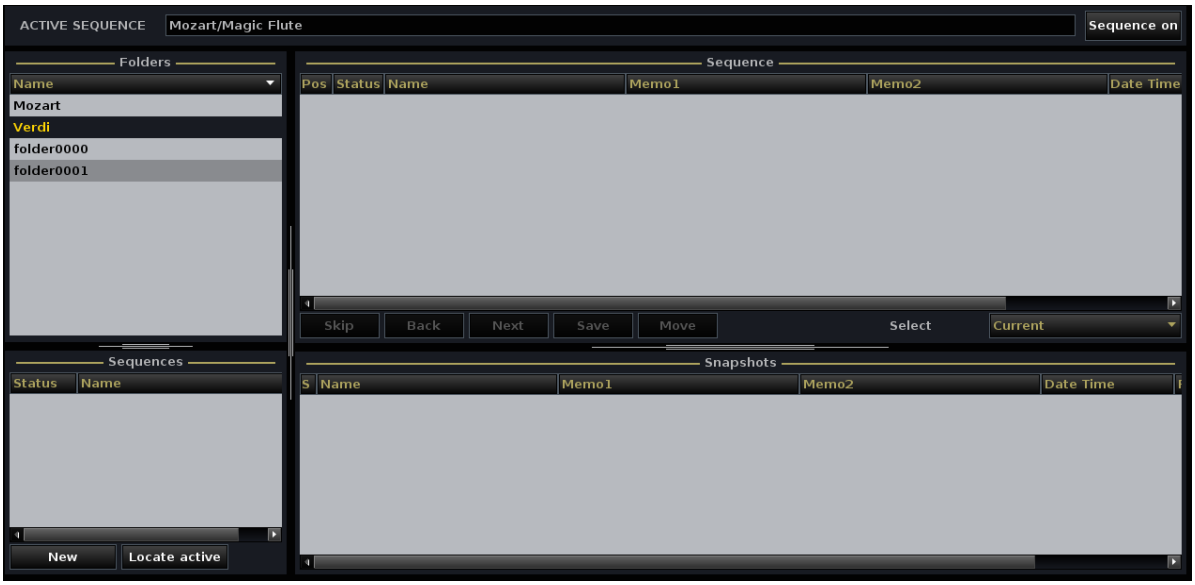
The sequence status updates to active, and its name appears in the ACTIVE SEQUENCE box at the top of the display:

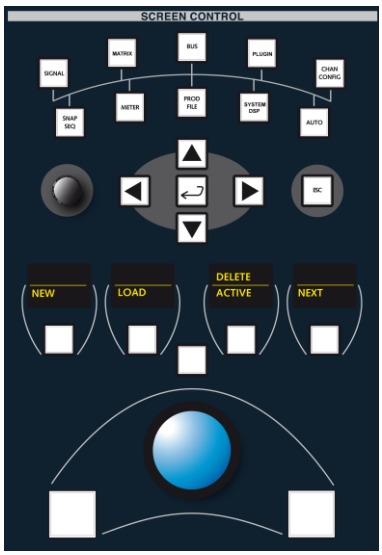


The sequence is now ready for preparation or play out.

Navigating to the Active Sequence

If you have been viewing a different folder, then the active sequence may not be visible within the **Sequences** list:





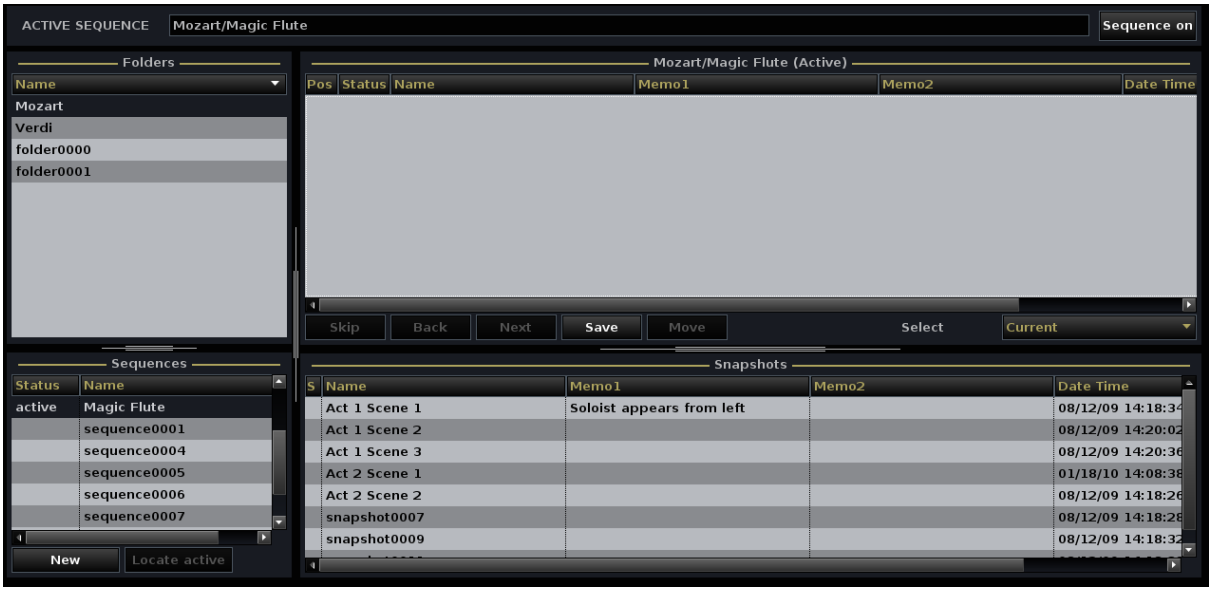
You can quickly navigate to the active sequence as follows:

1. Focus on the **Sequences** list and press the **ACTIVE** soft key, or select the **locate active** screen button.

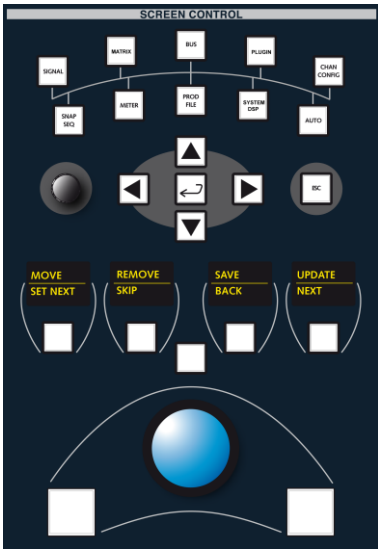
*The **Sequences** list automatically updates to show the active sequence.*

The Sequence List

Now change the focus of the display to the **Sequence** area – this lists all the snapshots contained within the sequence. If this is a new sequence, then the list will be empty:



A series of functions for saving, editing and playing out sequence snapshots become available on the soft keys located above the trackball:



- **SET NEXT** – sets the selected snapshot to be the Next snapshot to be loaded in the sequence.
- **SKIP** – skips a snapshot.
- **BACK –** loads the '**B**ack' snapshot.
- **NEXT** – loads the **N**ext snapshot.

On the second PAGE of soft keys:

- **MOVE** – moves the selected snapshot position.
- **REMOVE** – removes the selected snapshot from the sequence.
- **SAVE** – saves a new snapshot and enters it in the sequence.
- **UPDATE** – updates the selected snapshot.

Here we will deal with sequence preparation functions. For more details on playing out a sequence, see Page 426.

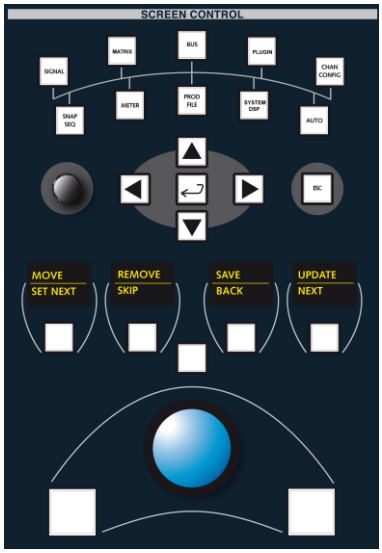
Saving Snapshots from the Sequence Display

If the rehearsal is running more or less in the same order as the show, it makes sense to save snapshots directly from the **Sequences** display as this allows you to save snapshots and add them to the sequence in one operation.

Note

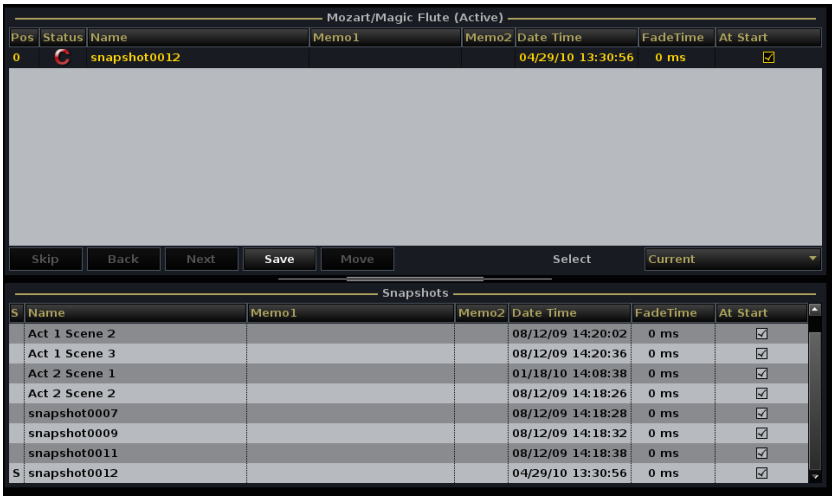
Note that you cannot save snapshots into a sequence unless the sequence is active:

1. Check that your sequence is set to active.



*The name and file path should appear in the **ACTIVE SEQUENCE** box at the top of the display.*

2. Focus the display to the **Sequence** area which will contain your list of snapshots.
3. Press the **SAVE** soft key, or screen button, to save a new snapshot:



A new snapshot appears below the current selection. If this is the first snapshot to be added to the sequence, then it will appear at the top of the list!

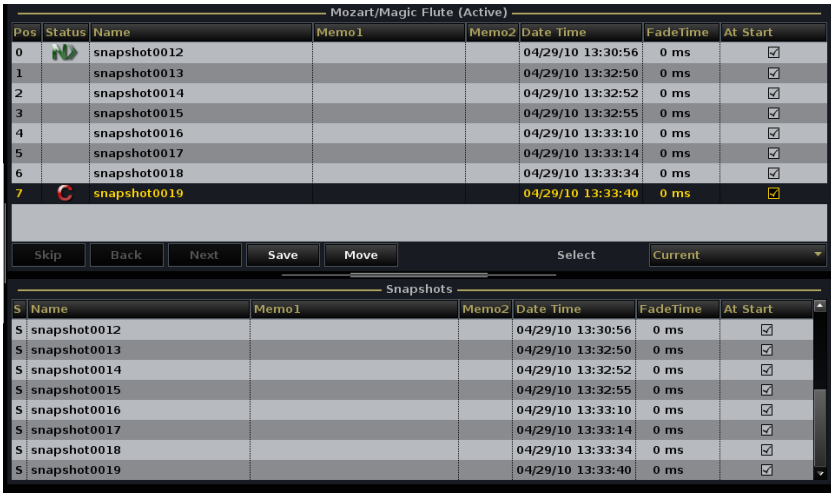
Just as when saving snapshots from the **Snapshots List** display, the snapshot is automatically given a default name, and date and time stamped.

Note

Note that this action performs two operations: firstly, the snapshot is stored within the production folder and, secondly, it is added to the sequence list.

4. Press **SAVE** a few times to save a number of snapshots within the active sequence.

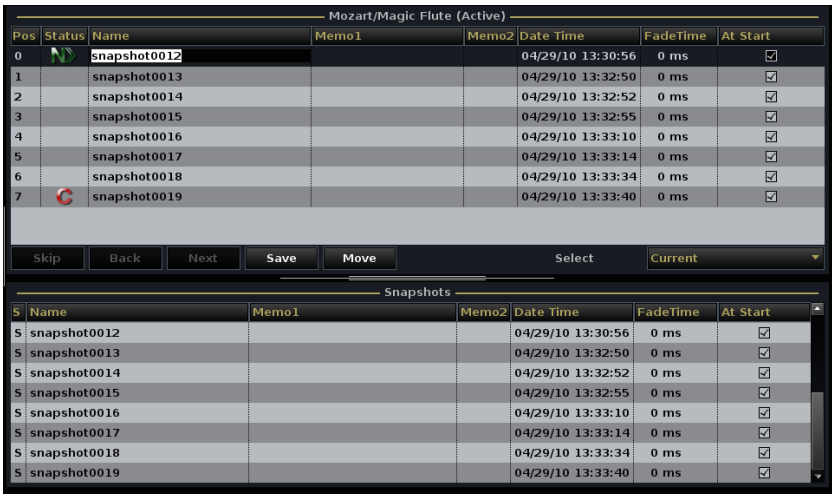
Each time, a new snapshot appears occupying the next position in the list:



Naming Snapshots from the Sequence Display

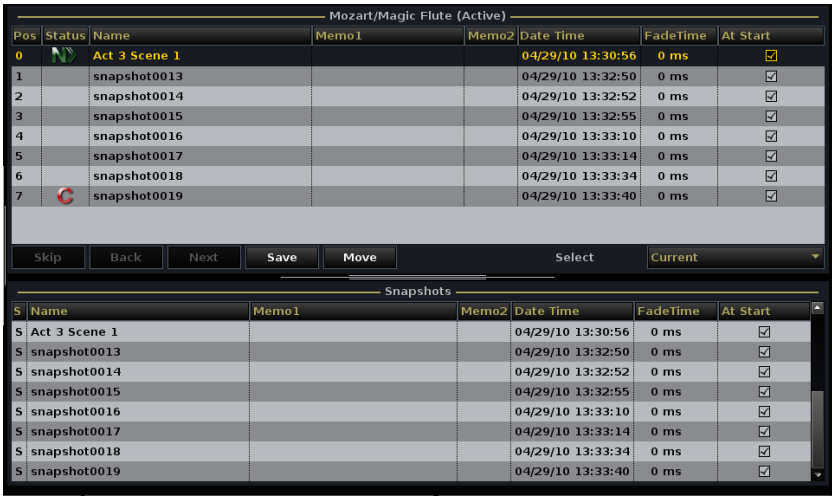
For convenience, you can rename a snapshot within the active sequence from the **Sequences** display. Note that this operation renames the snapshot. Therefore, the name is updated in both the **Sequence** and **Snapshot** displays.

1. Click on the snapshot name using the trackball:



Click once to select all the existing text (white) or twice (black cursor) to modify the existing name.

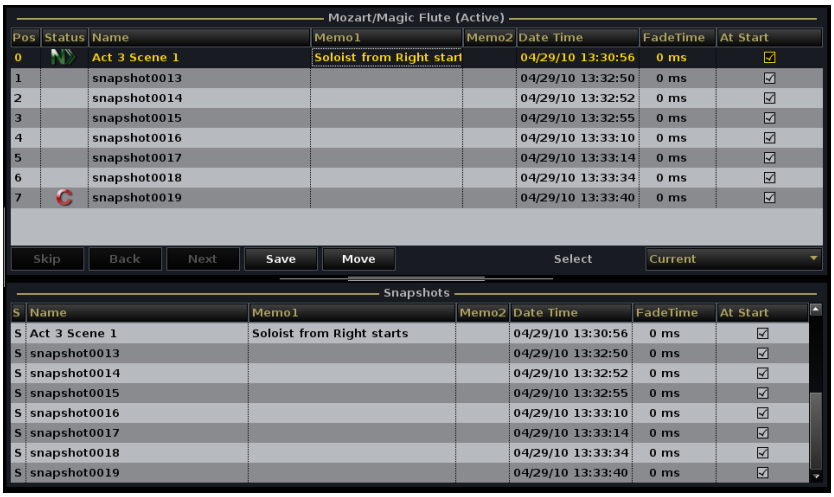
2. Enter a new name from the keyboard.
3. When you have finished, press the Enter button on the keyboard to confirm the new name (e.g. **Act 3 Scene 1**):



4. Or, if you make a mistake or want to exit the naming mode without making any changes, press the **Esc** button on the keyboard.

Adding a Memo

You may use the **Memo1** and **Memo2** columns 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 click on either of the **Memo** columns.

Click once to select all the existing text (white) or twice (black cursor) to modify the existing memo text.

2. You may now type to enter your information from the console keyboard.

*The first and second memo lines appear beside the snapshot name in the **Sequence** and **Snapshots** list. You can enter as many characters as you wish in each line; the list will automatically resize to fit.*

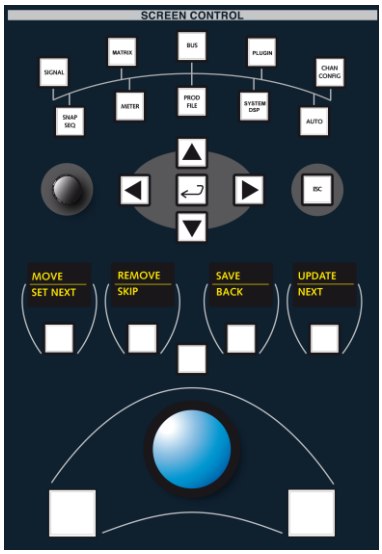
If you cannot enter any memo text, check that the snapshot is not protected.

If you right-click the snapshot memo, using the trackball and right select button, then you can use the **Copy** and **Paste** options to copy memo text to another snapshot.

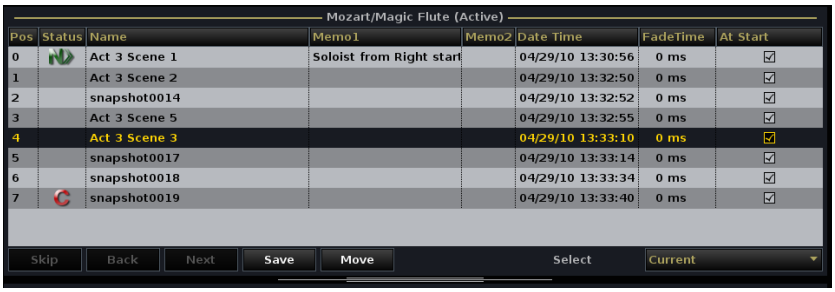

Tip

Changing the Sequence Order

Having added some snapshots to the sequence, you can change their order as follows:

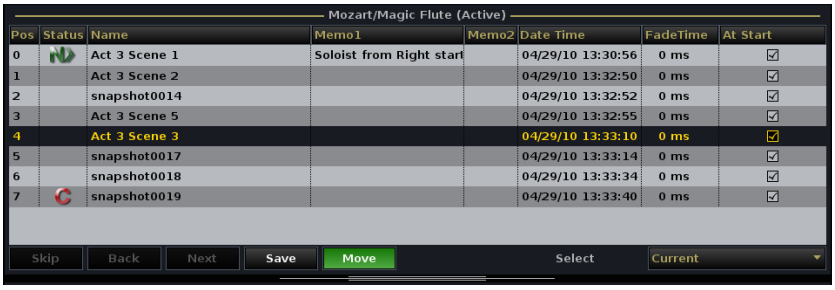


1. Select the snapshot you wish to move:

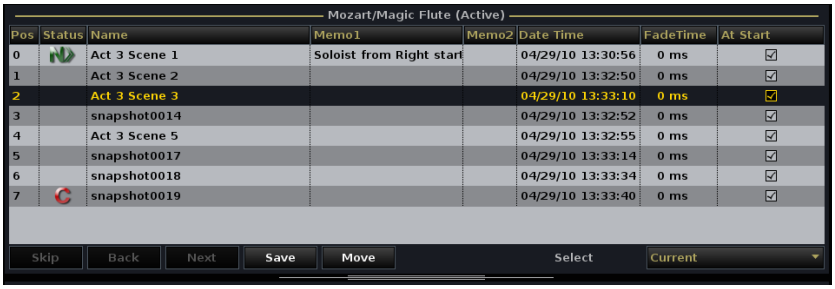


2. Press the **MOVE** soft key or on-screen button.

The Move button turns green:



3. With **MOVE** selected, use the navigation buttons or rotary control to nudge the position of the snapshot up or down the list.
4. When you are finished, deselect **MOVE**:



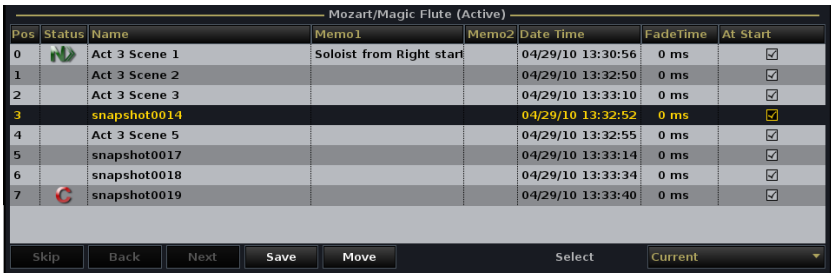
Removing Snapshots

You can remove a snapshot from the sequence as follows.

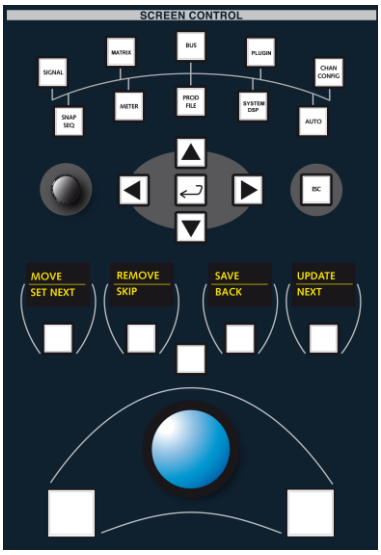
Note that this operation only removes the snapshot from the sequence, and does not delete the snapshot from the **Snapshots List** display. To delete a snapshot from the system completely, delete it from the **Snapshots List** display.

Note

1. Select the snapshot you wish to remove:



2. Press the **REMOVE** soft key.



The snapshot is now removed from the sequence list. Note that it is not deleted from the snapshots folder, and therefore may be added back into the sequence at any time.

Updating Snapshots

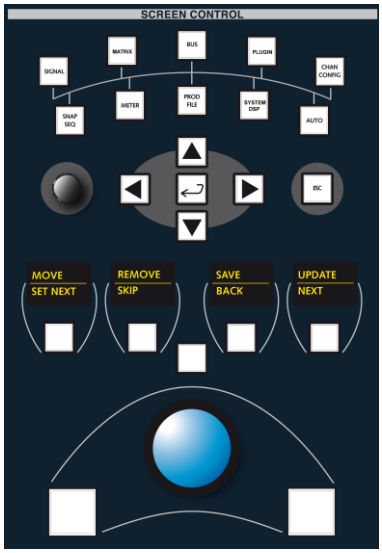
To avoid having to revert to the **Snapshots List** display during a rehearsal, you may update a snapshot within the active sequence from the **Sequences** display. This operation will update the snapshot contents with the current console settings.

Tip

If the snapshot is used multiple times, either within the same sequence or different sequences, then all occurrences are updated. If you wish to use the same snapshot within a sequence, but keep all occurrences independent, then use the duplicate function to copy the snapshot, see Page 421.

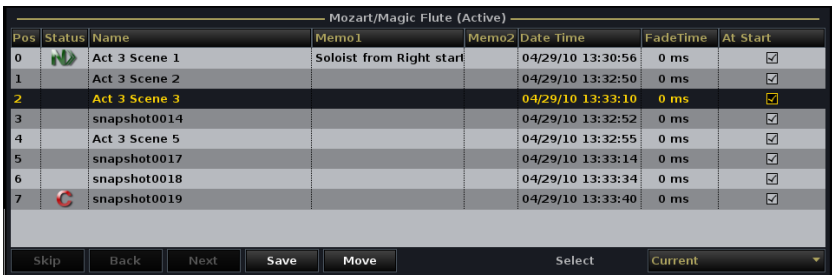
Note

Note that if the snapshot is protected then it cannot be updated.



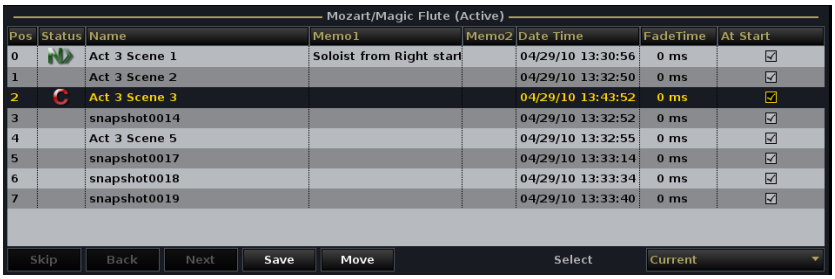
To update a snapshot:

1. Select the snapshot from the **Sequence** list:



2. Press the **UPDATE** soft key.

The new settings are stored within the snapshot and its date and time stamp are also updated:



You can also update the current snapshot directly from SNAPSHOT/SEQUENCE front panel, see Page 440 for details.

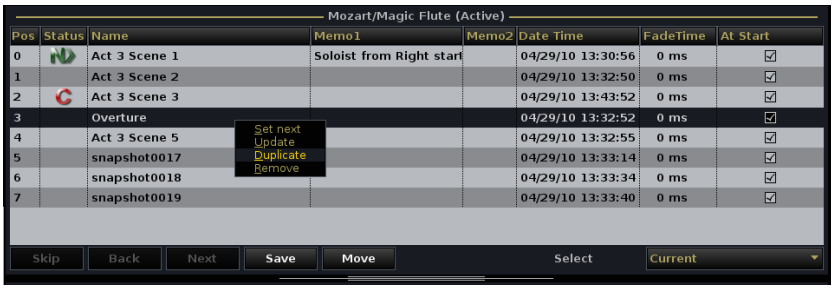
Duplicating Snapshots in a Sequence

The console provides the ability to either reference the same snapshot multiple times throughout a sequence, or duplicate a snapshot to keep each occurrence independent.

Note that this function is only available on-screen.

Note

1. Select the snapshot you wish to duplicate from the **Sequence Snapshots** list.
2. Then right-click and select **Duplicate** from the drop-down options:



3. Select **Duplicate** and the selected snapshot is duplicated.

Note that this creates a copy of the snapshot with a new name. The name given is taken from the original snapshot name. For example, duplicating a snapshot named **Overture** will create a new snapshot called **Overture(1)**.

The Snapshots List

Now change the focus of the display to the **Snapshots** list – this lists all the snapshots contained within the selected folder. Any snapshots already used in a Sequence are marked in the **S** column.

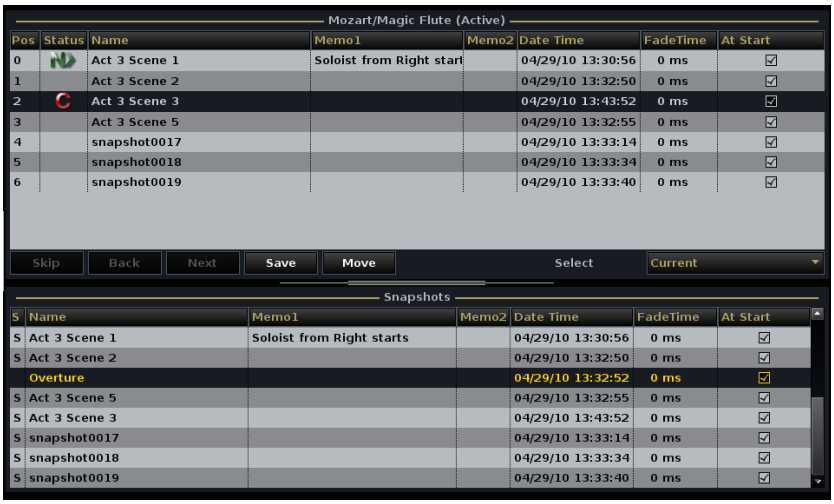
Adding Existing Snapshots to a Sequence

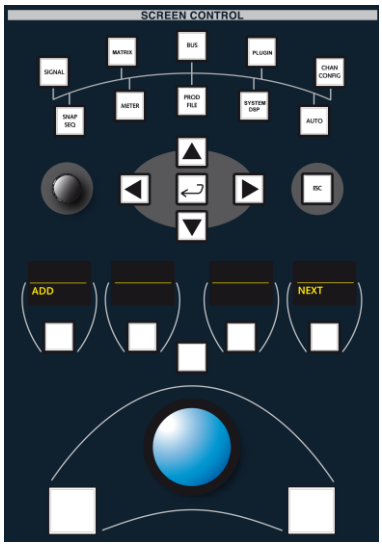
You can add any snapshot contained within your production folder to the active sequence.

Note that you cannot add snapshots located in a different folder. Although you could always load the snapshot to the console, change folders and then resave the snapshot to achieve the same result.

Note

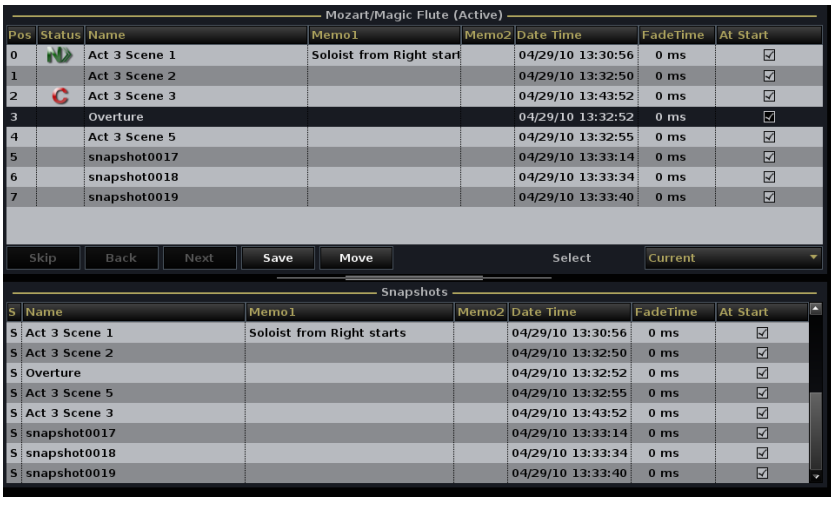
1. Select the snapshot you wish to add to the sequence from the **Snapshots** list – for example, **Overture**:





2. Press the **ADD** soft key, or right-click and select **add**.

*The snapshot is added to the sequence, below the selected snapshot – in our example, below **Act 3 Scene 3**:*



You can add the same snapshot multiple times if you wish. This will create several pointers to a single snapshot. Therefore, if you update the snapshot at a later date, all occurrences within the sequence are updated. If you don't wish this to be the case, then you can use the duplicate function to create independent occurrences of the same snapshot. See Page 421.

Tip

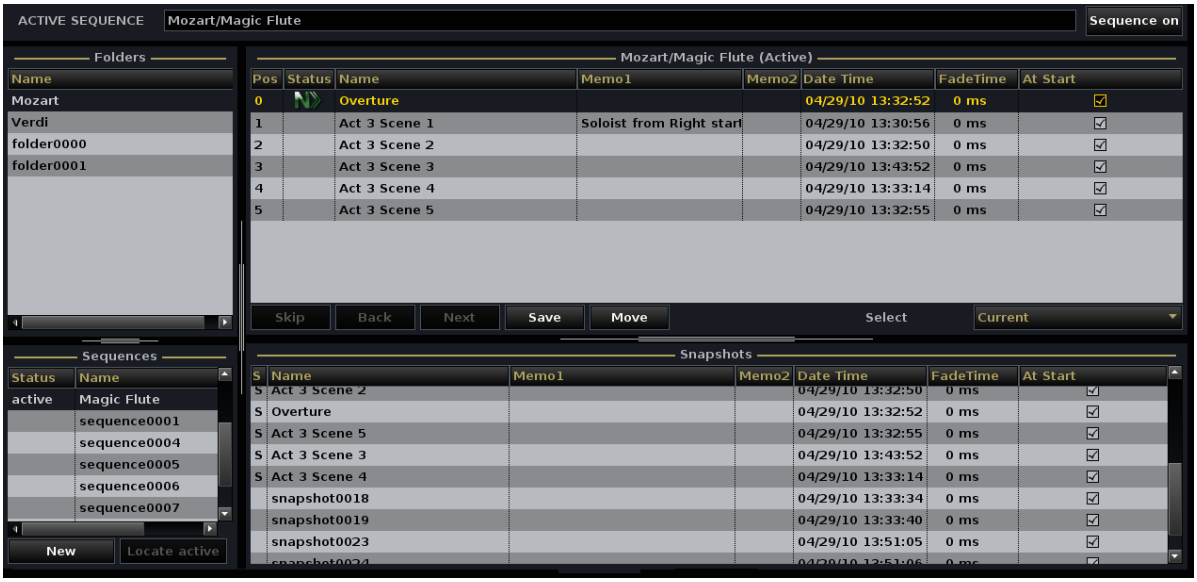
Running a Sequence

So far we have created and edited a sequence from the **Sequences** display. Now let's look at how to run a sequence in real time.

Preparing for Sequence Play Out

1. The sequence which will play out will be the active sequence so first check that you have the correct sequence activated!

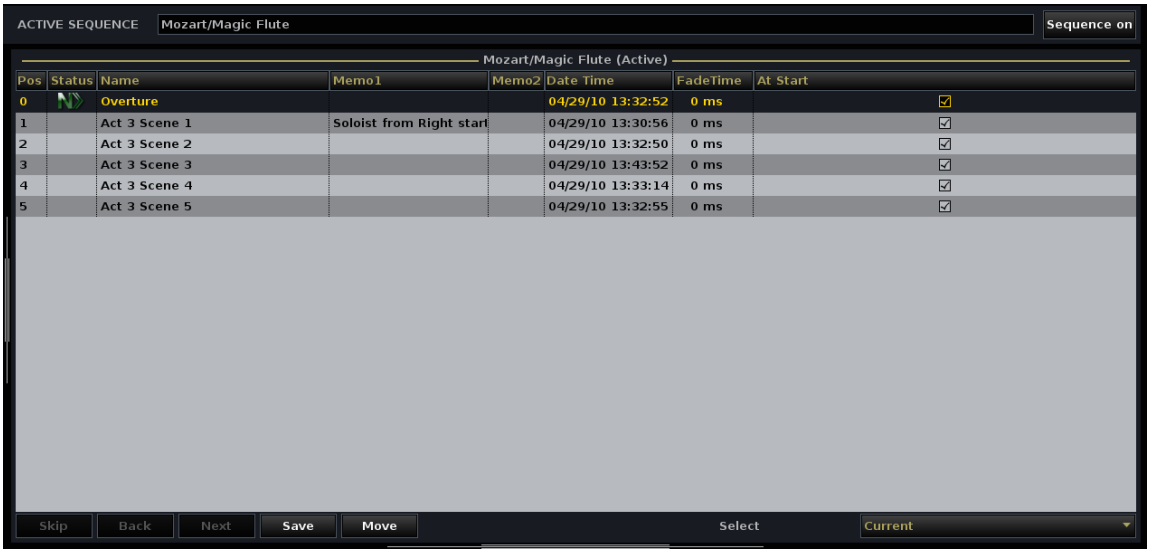
The name and file path should appear in the **ACTIVE SEQUENCE** box at the top of the **Sequences** display:



Tip

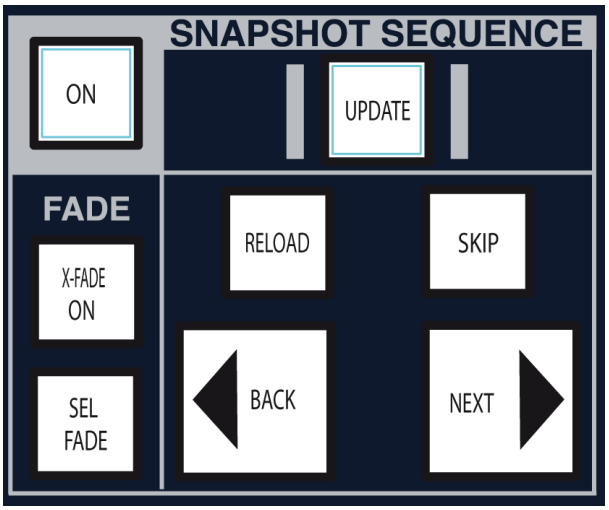
If you have been viewing a different sequence you can use the **ACTIVE** soft key to navigate back to the active sequence. See Page 411 for details on changing the active sequence.

You can also resize the display so that only the active sequence is visible:



2. Before any snapshots may be loaded, sequence automation must also be enabled.

Select the SEQUENCE **ON** button, located on the SNAPSHOT/SEQUENCE panel to enable sequence automation:

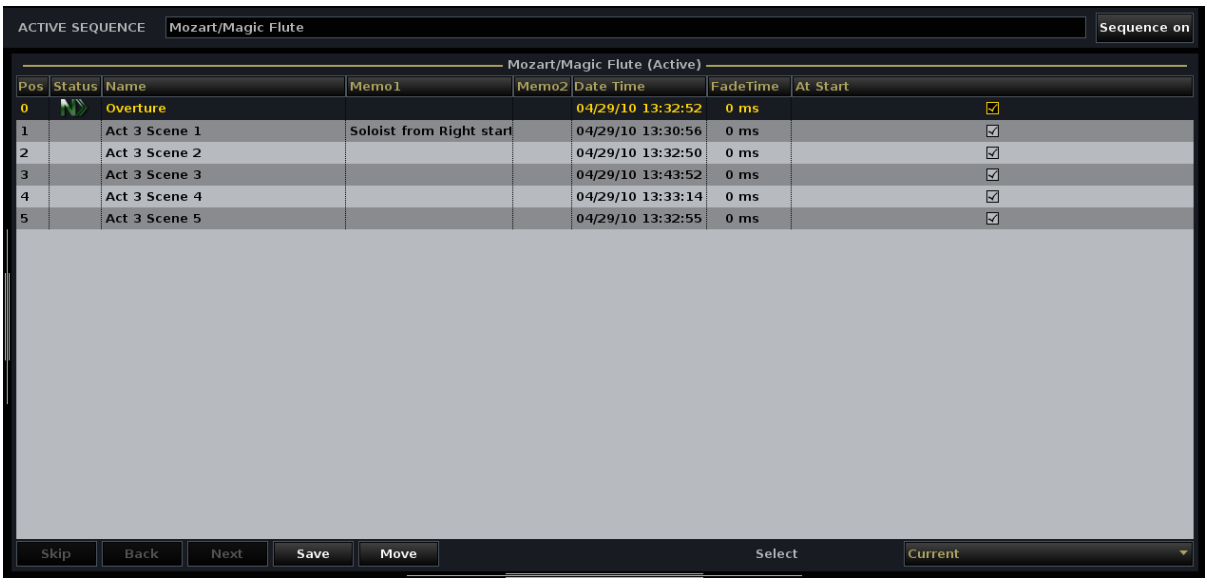


You are now ready to run the active sequence.

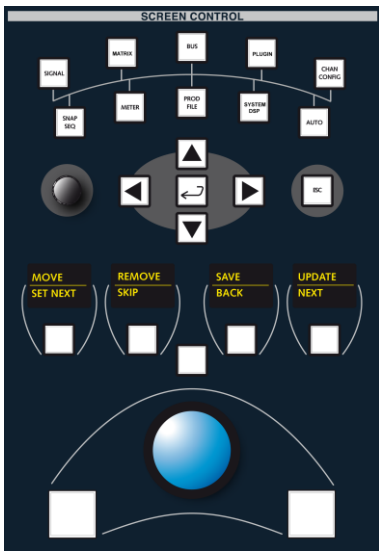
Running the Sequence in Order

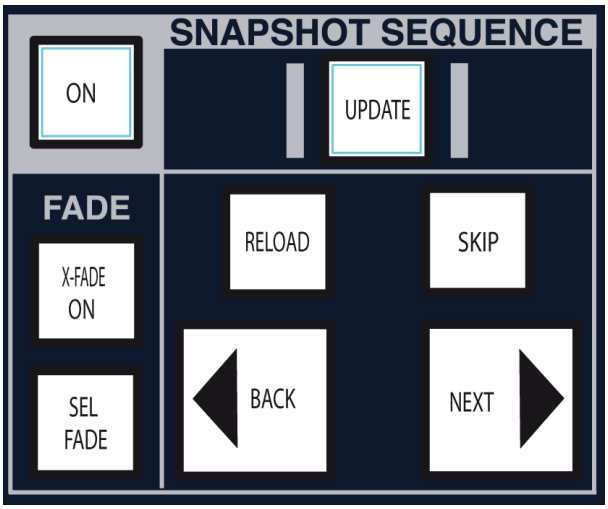
When you run a sequence, normally you will want to play out the snapshots from the **Sequence** list in order – i.e. from top to bottom.

If this is the first time you've played out the sequence then the **N** flag will appear against the snapshot located at the top of the list. This tells you that this snapshot will be the next to play out when you press the **NEXT** button:



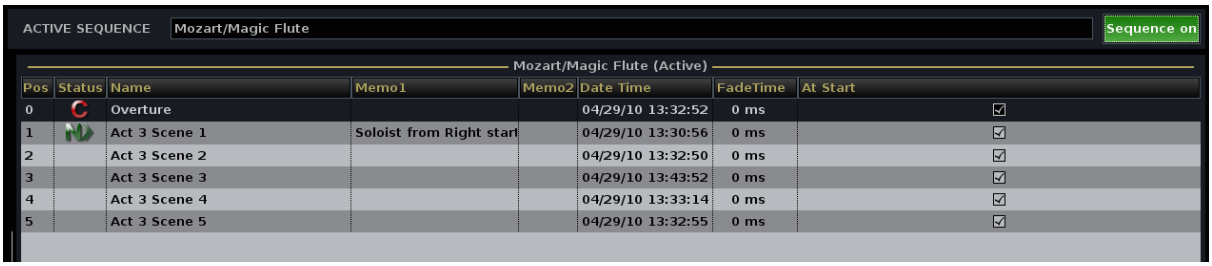
You can use soft keys, on-screen buttons or the SNAPSHOT/SEQUENCE front panel to play out the sequence. If you want to use the soft keys, then focus on the **Sequence** list to update the soft key functions.





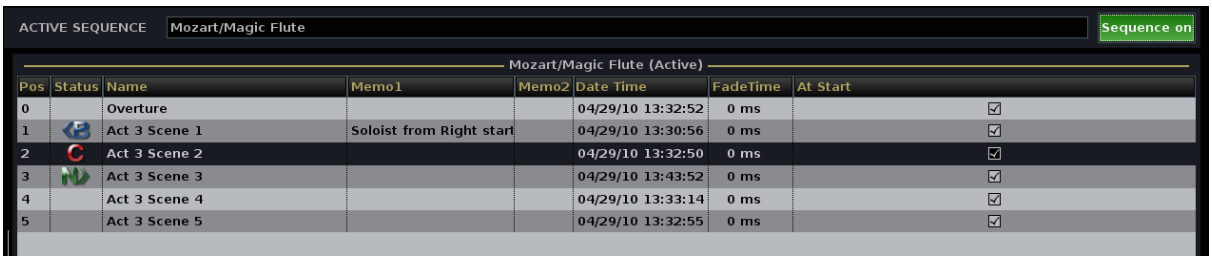
1. Press the **NEXT** soft key to start the play out:

*The stored snapshot settings are recalled to the console according to any filter or **SNAP ISO** selections which you may have applied. In addition, the loaded snapshot is marked with a **C** for Current:*



Note that if snapshot offsets are active on the **Snapshot Trim Sets** display, then the offsets will be applied to the loaded snapshot parameters. See Page 447 for more details.

2. Keep pressing **NEXT** to step down through the sequence, loading each snapshot in turn:



Notice how the **N**, **C** and **B** indicators update:

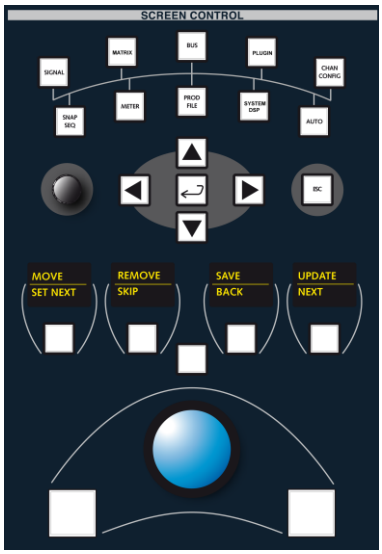
- **N** indicates the **N**ext snapshot to be loaded and therefore shows you exactly which snapshot you will recall when you press the **NEXT** button.
- **C** marks the Current snapshot. This is always the last snapshot loaded.
- **B** indicates the 'Back' snapshot. This is snapshot loaded before the current one.

3. If you want to play out the sequence from beginning to end, then pressing **NEXT** repeatedly causes the three indicators to move down the sequence snapshot list in turn.

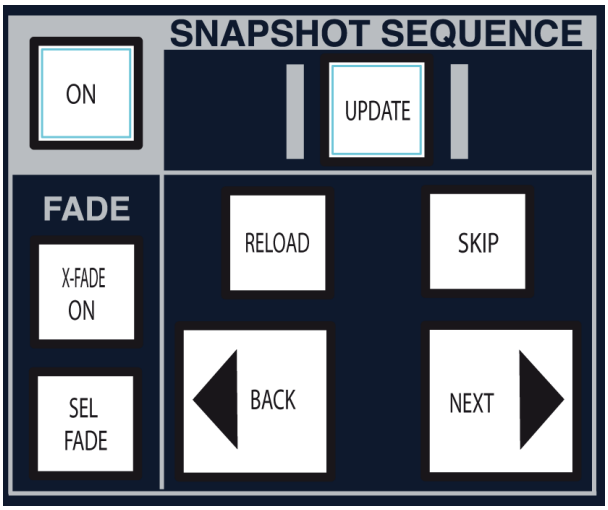
When you reach the last snapshot in the list, the sequence ends and the **NEXT** button performs no further function.

Loading the Back Snapshot

At any time, you can load the back snapshot to return to the previous snapshot's settings. For example, if an artist misses their cue you may need to quickly revert to the previous snapshot.

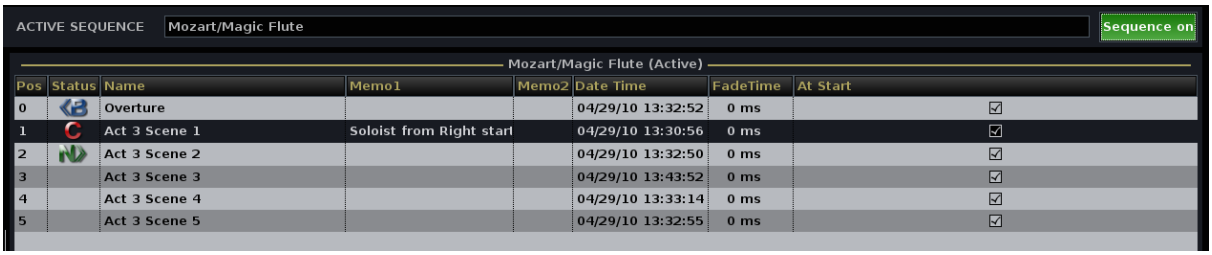


1. Press the **BACK** button on the SNAPSHOT/SEQUENCE front panel to load the **B**ack snapshot:



2. Alternatively, focus on the snapshots list within the **Sequence** display and use the **BACK** soft key or on-screen button.

*The Back snapshot loads and the **N**ext, **C**urrent and **B**ack indicators update accordingly:*

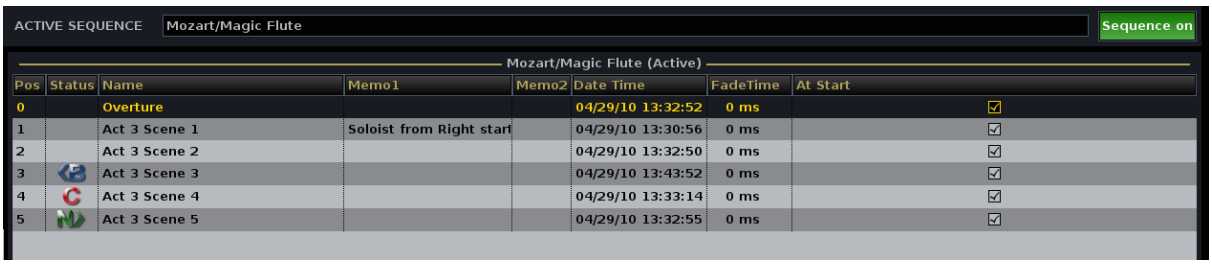


Pos	Status	Name	Memo1	Memo2	Date Time	FadeTime	At Start
0	B	Overture			04/29/10 13:32:52	0 ms	☑
1	C	Act 3 Scene 1	Soloist from Right start		04/29/10 13:30:56	0 ms	☑
2	N	Act 3 Scene 2			04/29/10 13:32:50	0 ms	☑
3		Act 3 Scene 3			04/29/10 13:43:52	0 ms	☑
4		Act 3 Scene 4			04/29/10 13:33:14	0 ms	☑
5		Act 3 Scene 5			04/29/10 13:32:55	0 ms	☑

Resetting the Sequence

To reset the sequence, or start from a different snapshot position:

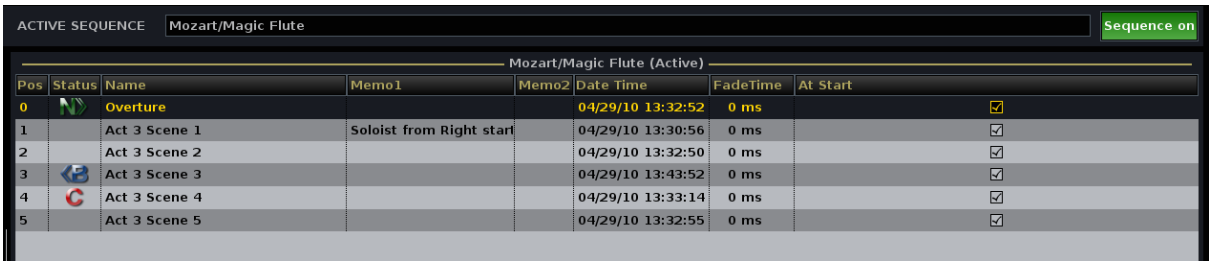
1. Select the snapshot you wish to return to, from the **Sequence** list:



Pos	Status	Name	Memo1	Memo2	Date Time	FadeTime	At Start
0		Overture			04/29/10 13:32:52	0 ms	☑
1		Act 3 Scene 1	Soloist from Right start		04/29/10 13:30:56	0 ms	☑
2		Act 3 Scene 2			04/29/10 13:32:50	0 ms	☑
3		Act 3 Scene 3			04/29/10 13:43:52	0 ms	☑
4		Act 3 Scene 4			04/29/10 13:33:14	0 ms	☑
5		Act 3 Scene 5			04/29/10 13:32:55	0 ms	☑

2. Press the **SET NEXT** soft key to set the snapshot as the **N**ext snapshot.

The display updates accordingly:

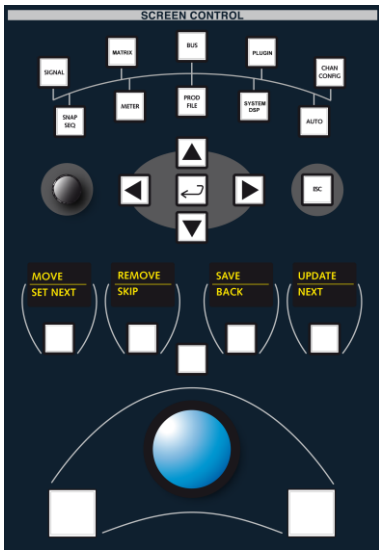


Pos	Status	Name	Memo1	Memo2	Date Time	FadeTime	At Start
0		Overture			04/29/10 13:32:52	0 ms	☑
1		Act 3 Scene 1	Soloist from Right start		04/29/10 13:30:56	0 ms	☑
2		Act 3 Scene 2			04/29/10 13:32:50	0 ms	☑
3		Act 3 Scene 3			04/29/10 13:43:52	0 ms	☑
4		Act 3 Scene 4			04/29/10 13:33:14	0 ms	☑
5		Act 3 Scene 5			04/29/10 13:32:55	0 ms	☑

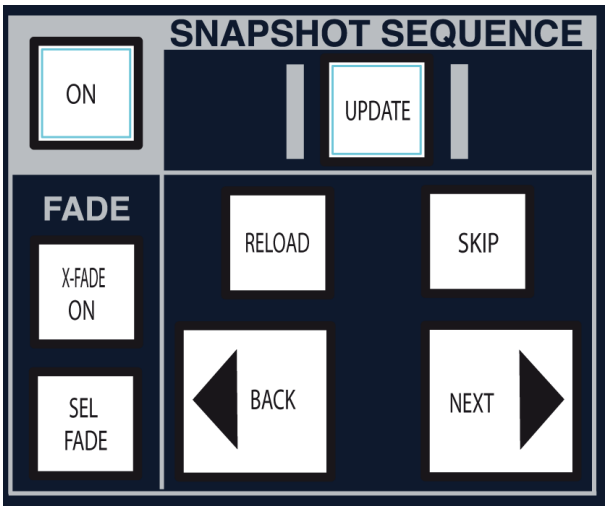
The sequence will restart from this position when the **NEXT** button is actioned.

Skipping a Snapshot or Snapshots

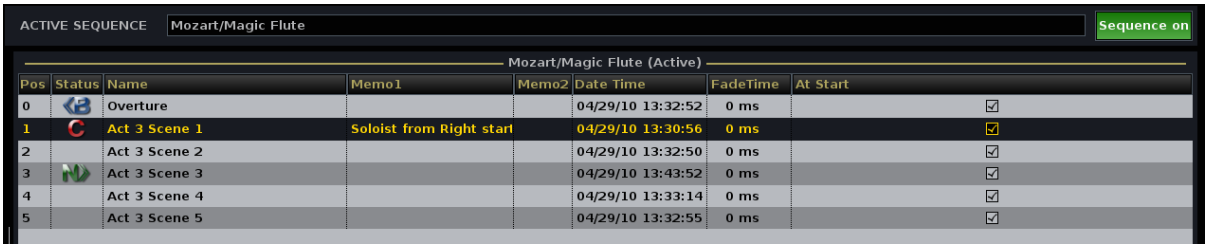
You can skip a single snapshot or multiple snapshots in the sequence if, for example, an act is cut from the performance.



1. Press the **SKIP** front panel button, soft key or screen button to skip the next snapshot in the sequence list:



*The **N**ext indicator moves one position down the list:*



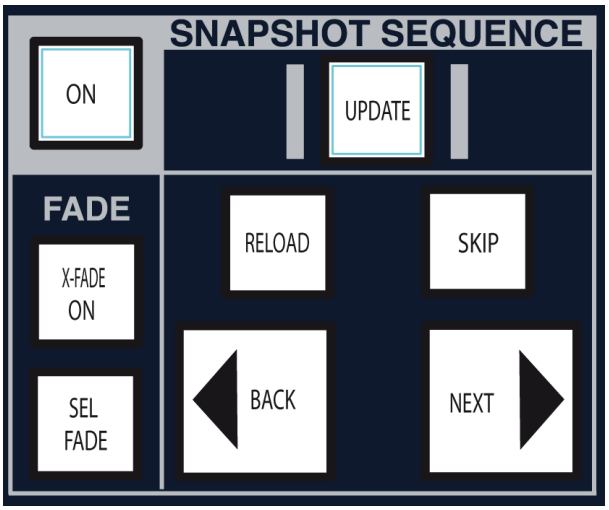
By pressing **SKIP** multiple times, you can skip more than one snapshot.

2. Now press **NEXT** to load the **N**ext snapshot in the sequence.

Reloading the Current Snapshot

You can reload the current snapshot, if for example during the performance you have made some manual changes to the console settings and now want to recall the **C**urrent snapshot settings.

1. Press the **RELOAD** button on the SNAPSHOT/SEQUENCE front panel:



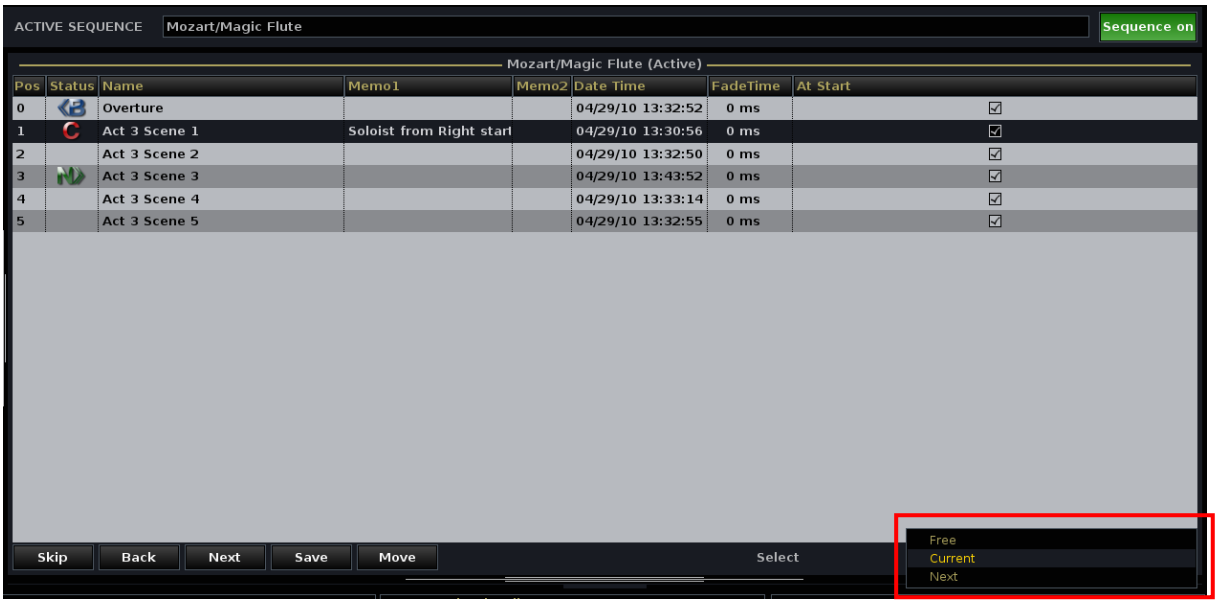
*The **C**urrent snapshot is loaded.*

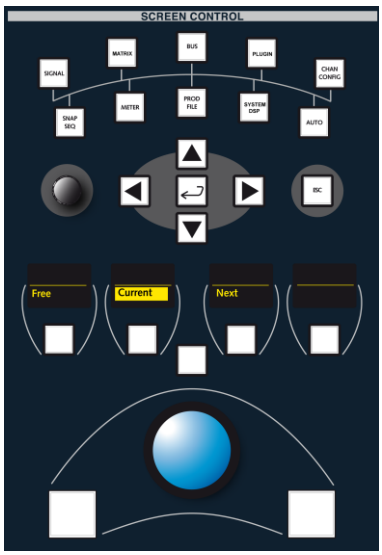
Note that this function is only available from the front panel controls.

Selecting Snapshots in the Sequence List

The **Select** option determines how snapshot selections within the **Sequence** list behave and how the list scrolls. For example, during a dress rehearsal, you may always want the selected snapshot to be your current snapshot so that it is easy to update. While at other times, you want to select snapshots independently of the **NEXT** playout button.

1. Click on the drop-down options beside **Select** at the bottom right hand corner of the **Sequence** list. You can choose from:





- **Free** – allows free selection of snapshots from the **Sequence** list. Choose this mode so that the display will stay fixed on the selected snapshot and not revert to the Current or Next snapshot after pressing **NEXT**.
- **Current** – sets the **Select** mode to follow the **Current** snapshot. This forces the selected snapshot to revert to the current snapshot each time you press the **NEXT** button.
- **Next** - sets the **Select** mode to follow the **Next** snapshot. This forces the selected snapshot to revert to the next snapshot each time you press the **NEXT** button.

Snapshot Cross Fade (X-Fade)

When playing out snapshots from a sequence, you may choose to cross fade from one snapshot to another.

For each snapshot, you can decide which modules will cross fade (e.g. faders, mutes, EQ, etc.), what the cross fade time will be, and whether switched functions, such as mutes, change state at the start or the end of the cross fade. These parameters are saved with each snapshot whenever it is saved or updated.

When the sequence is played out, with X-Fade enabled, then the cross fade parameters for the snapshot you are fading to are applied. For example, if Snapshot 0001 has a cross fade time of 1 second and Snapshot 0002 a cross fade time of 2 seconds, and you step from the Snapshot 0001 to 0002 using the **NEXT** button, then a cross fade time of 2 seconds is applied. If, you then step back from Snapshot 0002 to Snapshot 0001 using the **BACK** button, then a cross fade time of 1 second is applied.

Note that cross fade parameters may only be applied when you play out snapshots from a sequence, and not when recalling snapshots from the **Snapshots List** display.


Note

Preparing a Sequence/Default X-Fade Parameters

The fastest way to set a show, where you wish to use cross fades, is to proceed as follows:

1. First, create a new sequence for the show from the **Sequences** display as described on Page 408:
2. Make this sequence active, as described on Page 411:
3. BEFORE you save any snapshots, set the default cross fade parameters you want from the **System Settings** display as described on Page 685:

You can set the default switch mode so that switched functions, such as mutes, will change state at the start or end of the cross fade. You can also set the default fade time in 100ms steps.

If you set these defaults *before* you save your snapshots, then you will save editing time later.


Tip

4. Now set up the console for the show. When you are ready, save a snapshot for each new console setting.

Each snapshot is saved with the default cross fade parameters you set in step 3.

Note that you can save your snapshots from either the **Snapshots List** or **Sequences** display, as cross fade parameters are always stored with each snapshot. For details on adding existing snapshots to a sequence, see Page 423.

If you haven't been able to save the snapshots in the correct order for play out, then re-order them now so that they are listed in play out order. See Page 418 for details.


Note

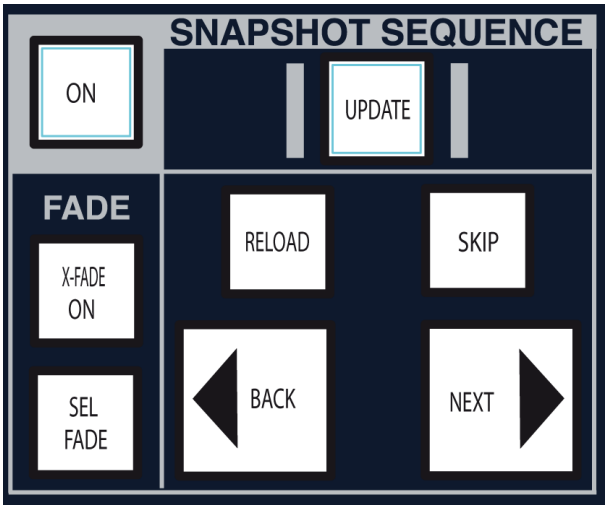
Note that you can edit the cross fade switch mode and time for each individual snapshot. However, first we are going to set which modules we want to cross fade when the snapshot plays out.

Selecting Modules to Cross Fade

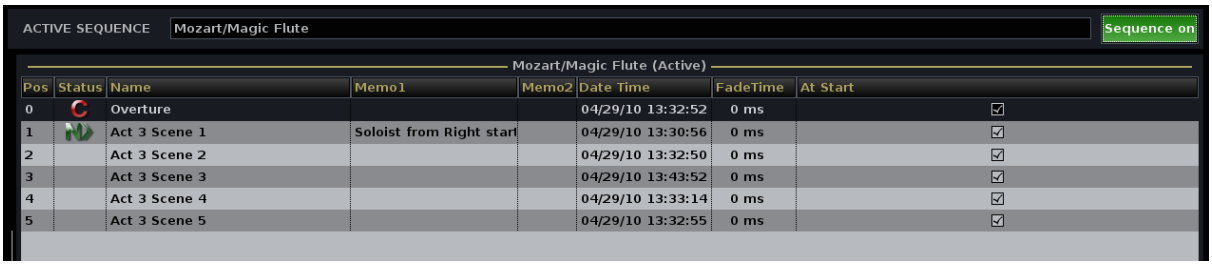
By default, when snapshots are saved or updated, they are set so that no modules will cross fade. Therefore, the next step is to select, for each snapshot, which modules you wish to fade.

To do this, you will need to select the modules to fade, and then store these settings with the snapshot by updating it. Therefore, before you begin, make sure that the snapshot you want to edit is loaded into the console surface. The quickest way is like this:

1. Select the **Sequences** display so that you are viewing your active sequence.
2. Turn on **SEQ ON** from the SNAPSHOT/SEQUENCE panel to play out the snapshots:



3. Press the **NEXT** soft key to load the next snapshot:

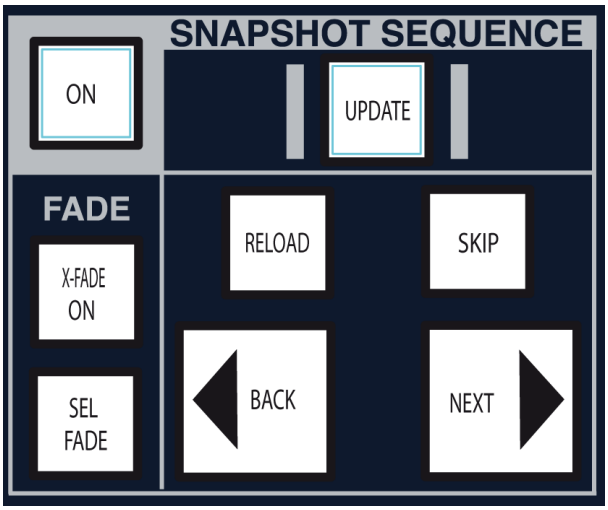


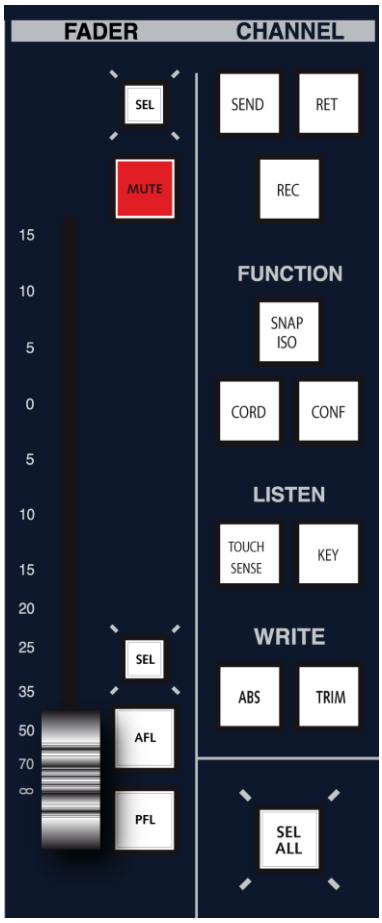
The next snapshot in the sequence is loaded into the console; the console should update; and the snapshot is marked as Current.

If the snapshot does not load, check your isolate and filter settings, see Pages 394 and 395.

4. Now turn on the **SEL FADE** button on the SNAPSHOT/SEQUENCE panel:

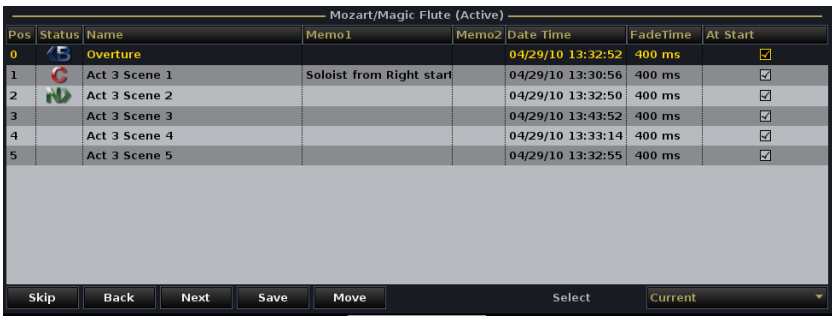
***SEL FADE** flashes (red) when active.*





5. And select the modules you wish to cross fade using the **SEL** buttons on the Central Control Module. For example, to cross fade the fader and mute, press **SEL** beside the fader, and mute sections:
6. Remember if you wish to select several modules, it is quickest to press **SEL ALL** and then turn off **SEL** buttons to deselect modules.
7. When you have made your selections, turn off the FADE **SEL** button.
8. Finally, store your selections by updating the snapshot.

You can do this by selecting the snapshot in the **Sequences** display and pressing the **UPDATE** soft key (on the second PAGE):



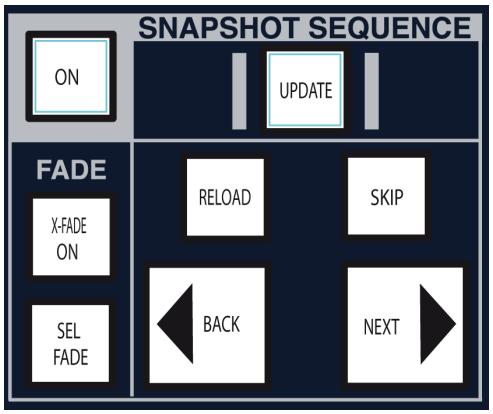
The X-Fade module selections are stored with the snapshot.

9. Repeat for each of the snapshots in the sequence.

Running the Sequence with Cross Fades

To play out the sequence with cross fades enabled:

1. Turn on the **X-FADE ON** button on the SNAPSHOT/SEQUENCE panel:

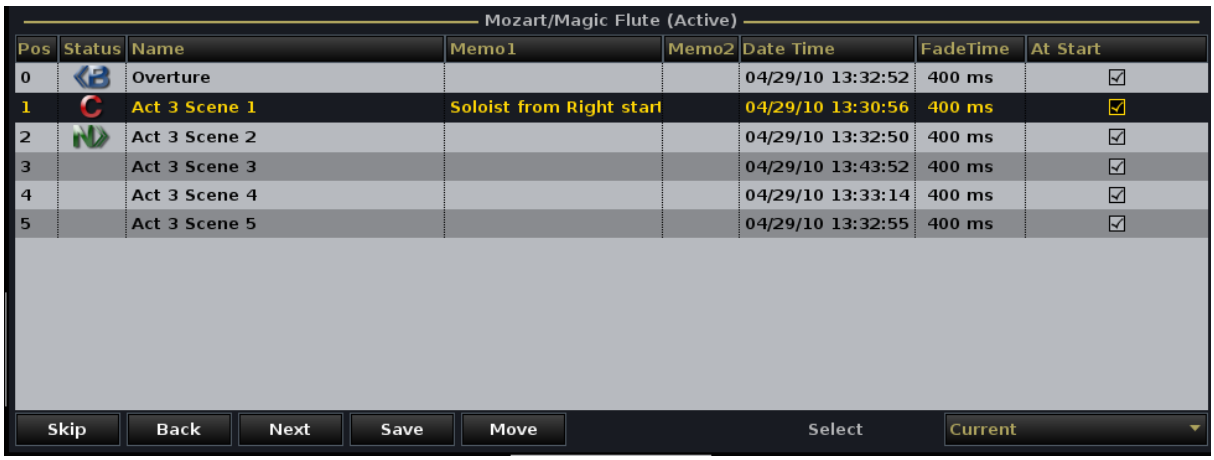


***X-FADE ON** illuminates when active.*

Note that you cannot enable this button unless **SEQUENCE ON** is already active.

Note

2. Now run the sequence as you would normally. In our example, press **NEXT** and the console will cross fade from **Act 3 Scene 1** to **Act 3 Scene 2**:



Continuous parameters (e.g. fader level) fade from one setting to the other over the Fadetime – in our example, 400 ms.

Switched parameters (e.g. mute) will change state either at the start or end of the fade – in our example, at the start of the fade.

The snapshots will fade using the parameters set within the snapshot you are fading to.

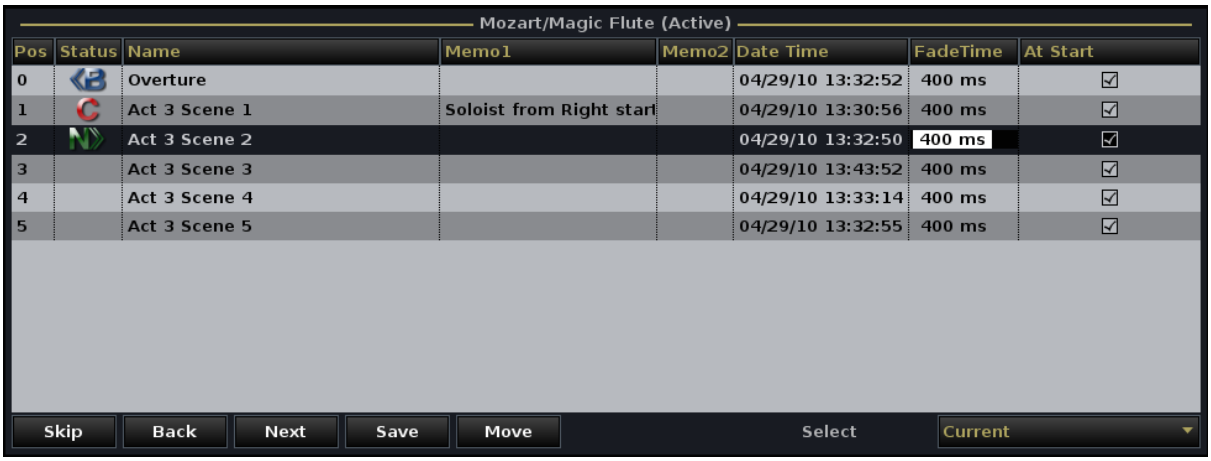
If nothing happens when you recall your snapshot, check the following:

- Have you selected and stored the modules to cross fade using **SEL XFADE**?
- Are those modules protected from snapshot recall, either using isolate or filter settings?
- Have you entered a cross fade time greater than 0ms?!
- Make sure that you're not cross fading between snapshots with the same parameters!

Editing Snapshot Cross Fade Parameters

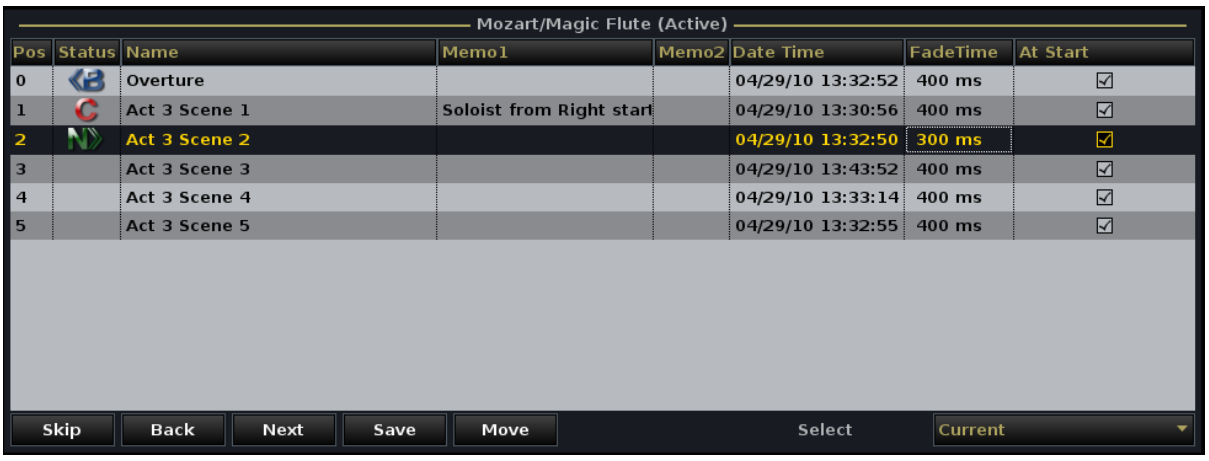
You may wish to edit the X-Fade Switch Mode and/or Fade Time parameters for an individual snapshot. This may be because it needs different settings from the default, or because you have imported an existing snapshot which was saved before you set your default parameters. To edit parameters for an individual snapshot, then proceed as follows:

1. From the **Sequences** display, focus on the snapshot you wish to edit and click on the **Fade Time (ms)**:



Click once to select all the existing text (white) or twice (black cursor) to modify the existing name.

2. Enter the new fade time in ms and press Enter:



3. To change the switch mode, check or uncheck the **At Start** column:

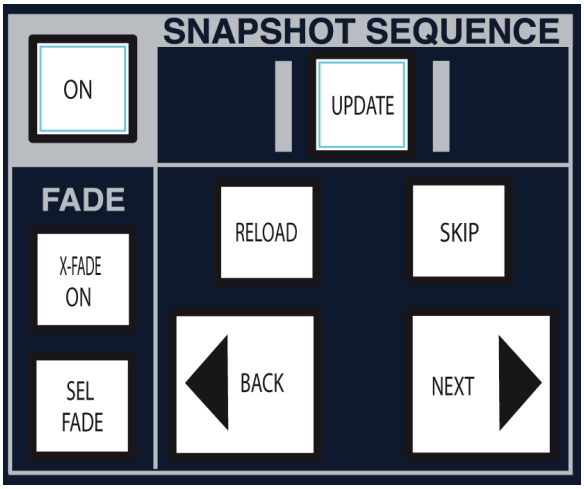
When unchecked, switched functions will change at the end of the cross fade.

Front Panel Control Summary

The SNAPSHOT/SEQUENCE control panel provides access to the following functions:

Note

Note that you must have enabled an active sequence as described on Page 411 before the sequence controls can be used.



- SEQUENCE **ON** – enables the active sequence for play out.
- **UPDATE** – updates the current snapshot.
- **X-FADE ON** – press to enable cross fade parameters when snapshots are loaded from a sequence.
- **SEL FADE** – press to select the modules you wish to cross fade.
- **RELOAD** – press to load the **C**urrent snapshot. This is useful if you have made manual updates to the console's settings and want to reload the current snapshot.
- **SKIP** – press to skip a snapshot in the sequence list.
- **BACK** – press to load the **B**ack snapshot. i.e. the previous snapshot. This is useful if you make a mistake and load the next snapshot too early!
- **NEXT** – press to load the **N**ext snapshot. This is quickest way of stepping through snapshots in the sequence.

Note

Note that snapshots will be recalled according to your snapshot isolate (**SNAP ISO**) and **Global Snapshot ISO** settings (**Extra Buttons** display).

Snapshot Trim Sets and Oversnaps

Whenever a snapshot is recalled, either from the **Snapshots List** or **Sequences** display, it may 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 may be applied, and may include a mixture of absolute and trim values:

- Use an absolute offset when you want a new static value throughout the sequence – 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 sequence – for example, to make soloist B's fader level +3dB louder throughout the show.

Note that whilst snapshot offsets are designed for sequence automation play out, active offsets are applied to any snapshot load.


Note

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 may 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 may 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.

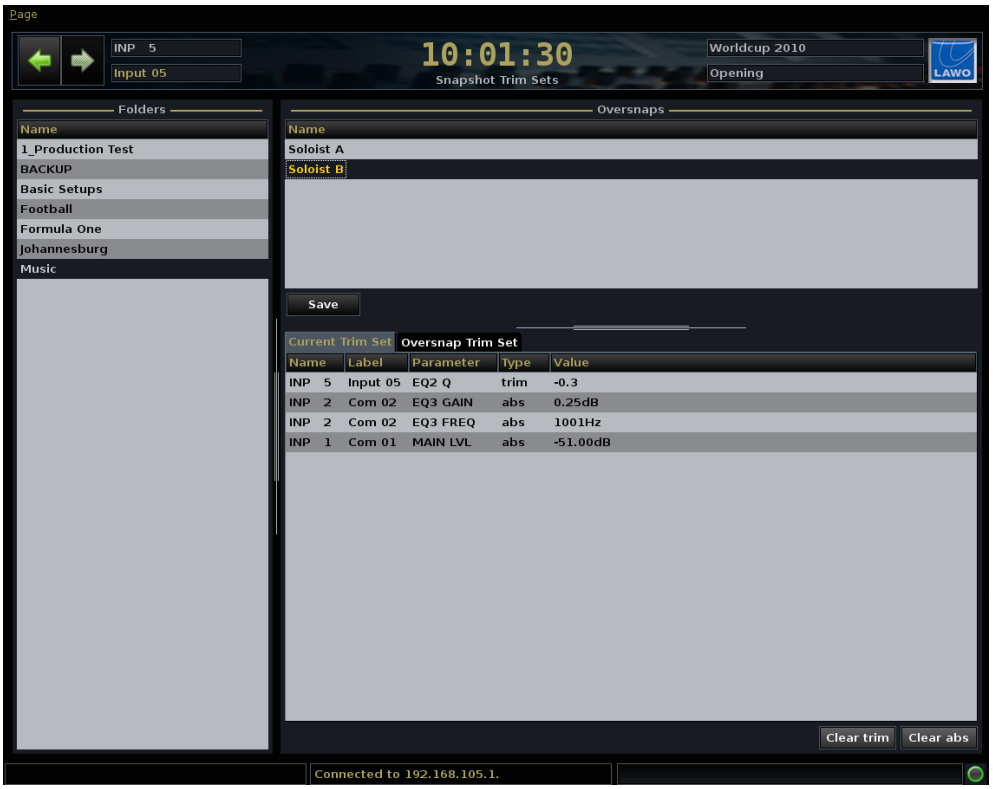
Oversnaps are stored separately from snapshots within your production folder; you may save up to 999 oversnaps per folder.

Note that when trimming input GAIN, you may only trim the SOURCE gain for mic/line inputs, and not for fixed gain or digital sources. In other words, you cannot trim the I/O DSP gain (Volume). For any type of input, you can apply trim to the INMIX channel input gain.

The Snapshot Trim Sets Display

Snapshot offsets are managed from the **Snapshot Trim Sets** display.

1. Press the **SNAP/SEQUENCE** button to page to view this display:



On the left, you will see a list of the **Folders** within the current production.

The upper part of the display shows the names of any **Oversnaps** stored within the selected folder.

The lower part of the display 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 (see Page 443), or by loading a stored oversnap (see Page 454).
- **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.


Tip

During a live show, keep the lower part of the display on **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.

Adding Snapshot Offsets to the Current Trim Set

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. For details on loading oversnaps, please see Page 454. Here we will look at adding offsets to the **Current Trim Set** from the console.

We are going to assume that you are offsetting snapshots within a prepared sequence. However, note that the contents of the **Current Trim Set** are applied to all snapshot loads, not just those from a sequence play out.

Note

Also note that when adding offsets, the console compares the current desk position with 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. (If you are working live during the show, then this will be the last snapshot played out from the sequence.)

To add offsets to the **Current Trim Set***:*

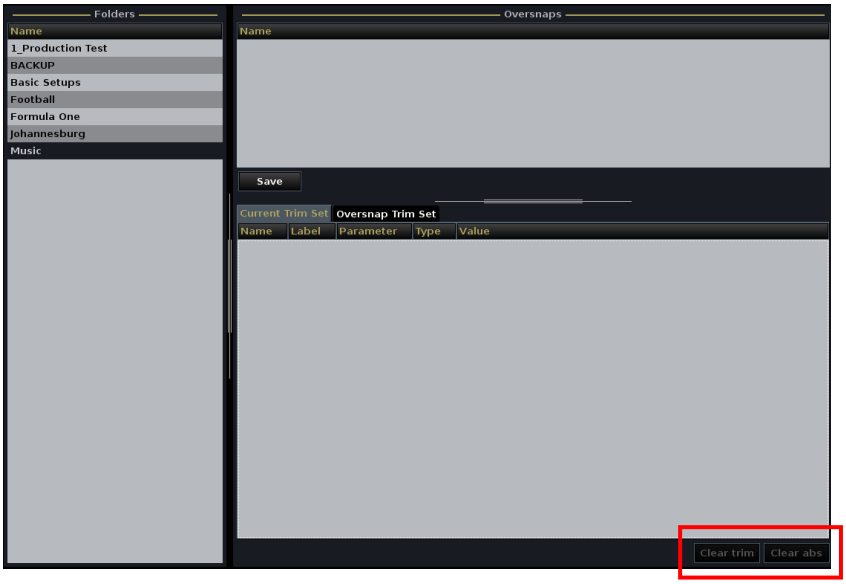
1. Load a snapshot from your sequence.

The console updates to the stored positions.

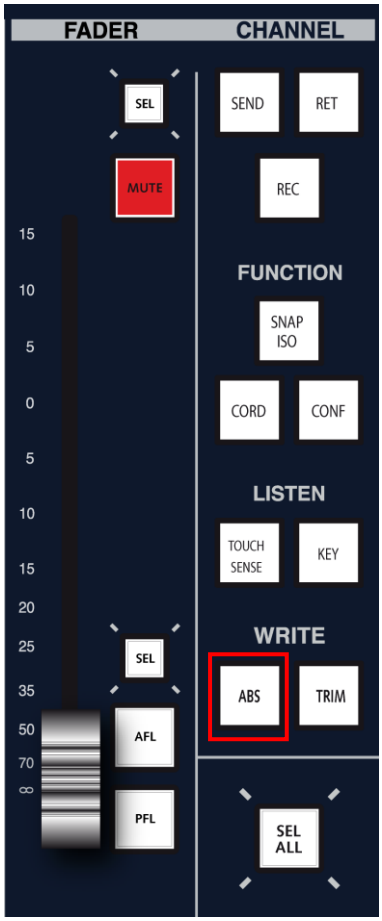
2. Press the **SNAP/SEQUENCE** button to page to the **Snapshot Trim Sets** display.
3. Click on **Current Trim Set** to view any active snapshot offsets.

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:



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).

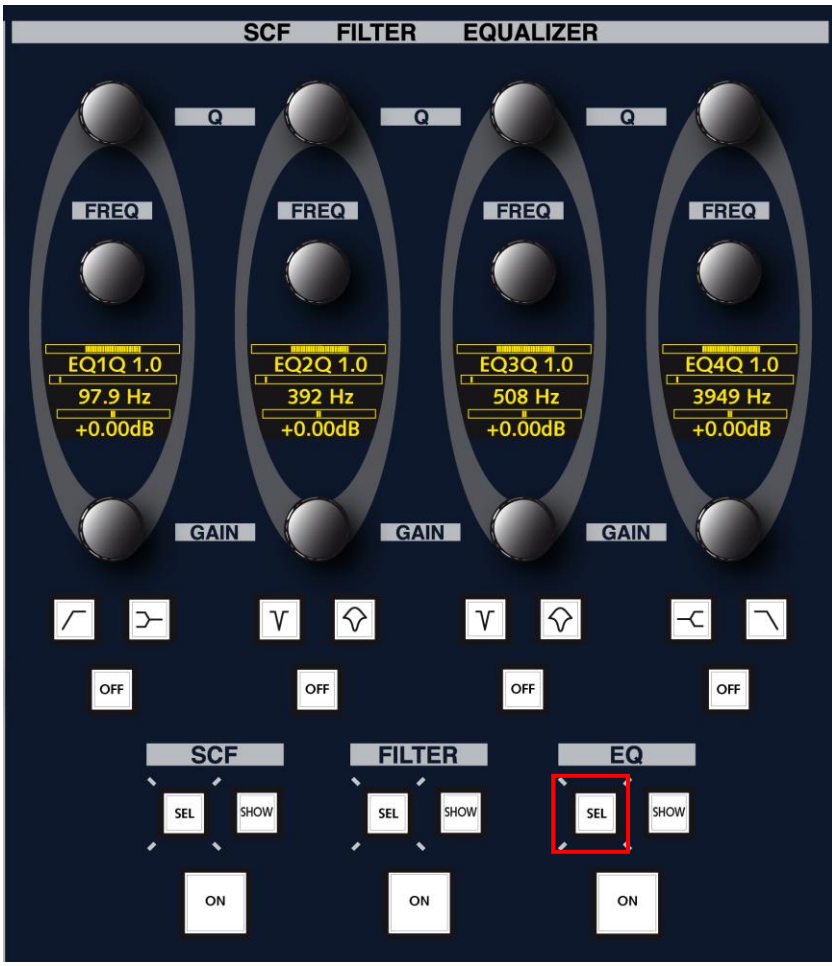
6. Press the WRITE **ABS** button, above **SEL ALL**, to activate the absolute offset parameter selection.

*The **ABS** button flashes.*

On the classic mc²66, the **ABS** button is located on the SNAP/SEQUENCE panel (below COMPARE).

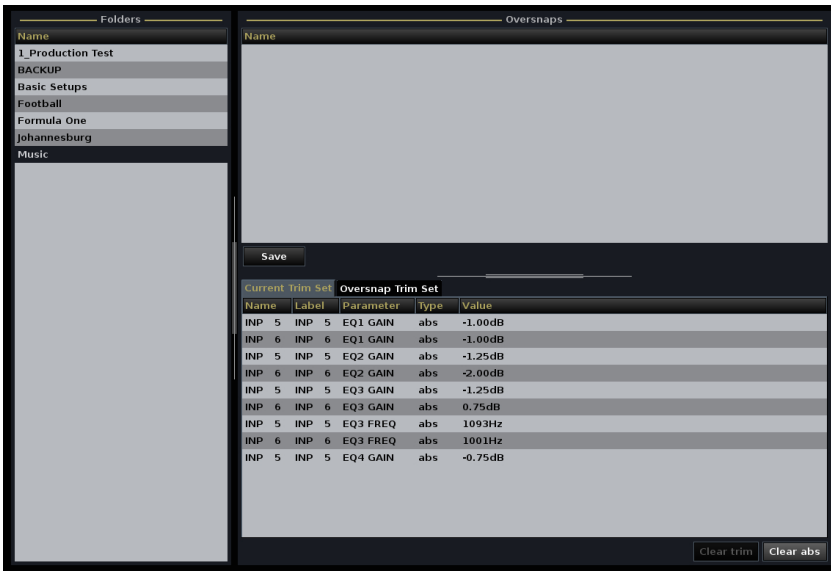
7. Assign the channel with the EQ setting to the Central Control Section, by pressing its fader **SEL** button.

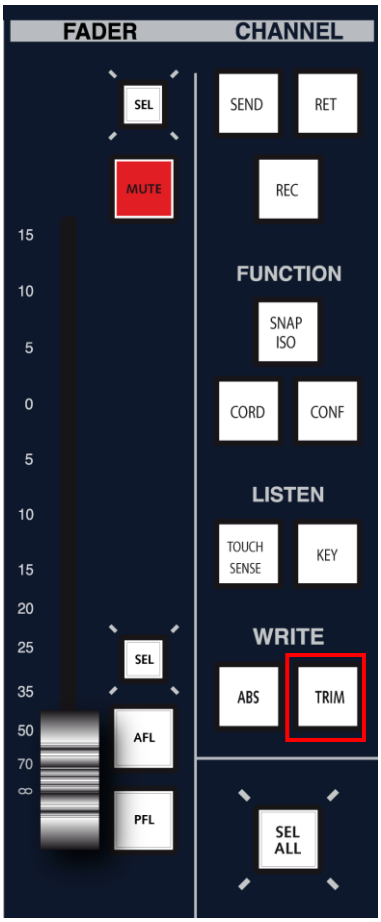
*Any audio modules which have a different setting to that stored in the last loaded snapshot are displayed with green **SEL** buttons – in our example, the **SEL** button on the EQ section:*



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:*





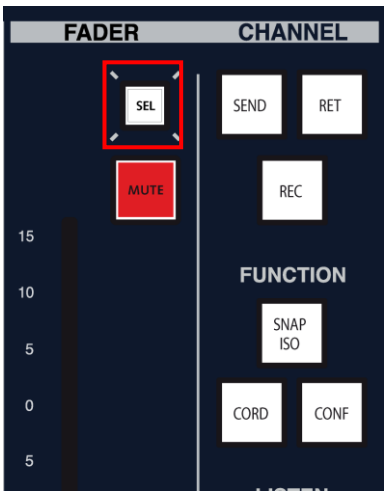
9. Now repeat the last three steps, but select the WRITE **TRIM** button.

*The **TRIM** button flashes to show that you are now selecting trim offset parameters.*

Note that on the classic mc²66, the **TRIM** button is located on the SNAP/SEQUENCE panel (below COMPARE).

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:*

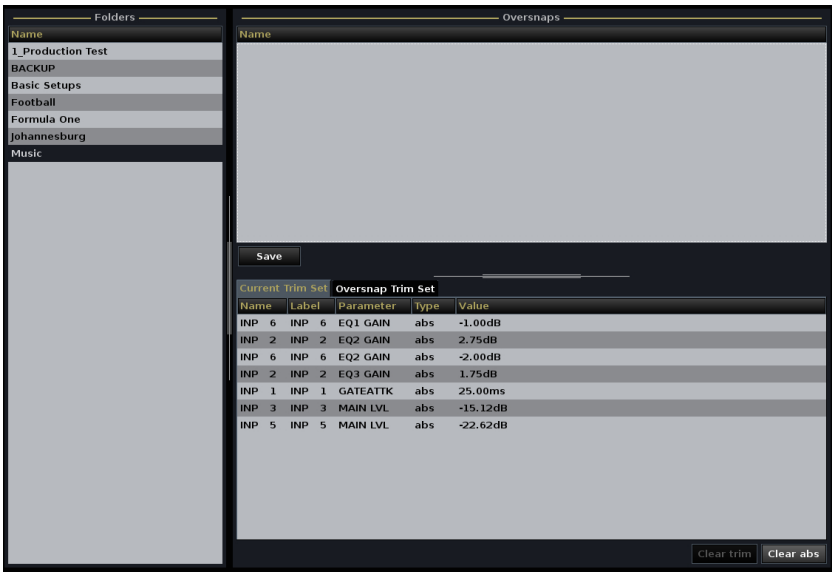


11. Press the green **SEL** button to add the trimmed fader level to the **Current Trim Set**.

*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 fader **SEL** button.

*As each offset parameter is selected, it is added to the **Current Trim Set** on the **Snapshot Trim Sets** display:*



Note

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.

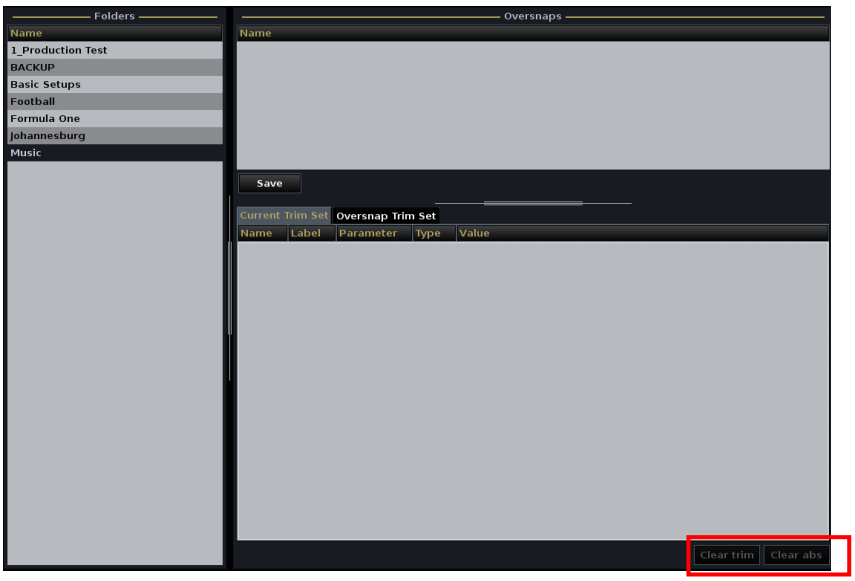
Recalling Snapshots with Offsets

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 sequence or from a snapshot load, will have the **Current Trim Set** offsets applied:

Clearing Snapshot Offsets

To disable snapshot offsets, you must clear the **Current Trim Set**.

1. Click on the **clear abs** button to clear any absolute snapshot offsets.
2. And click on **clear trim** to clear any trim offsets:



Once the **Current Trim Set** list is empty, snapshots will be loaded with their original values.

Note that these two buttons clear *all* the absolute and *all* the trim offset parameters. For details on how to update an individual offset, please see the next page.

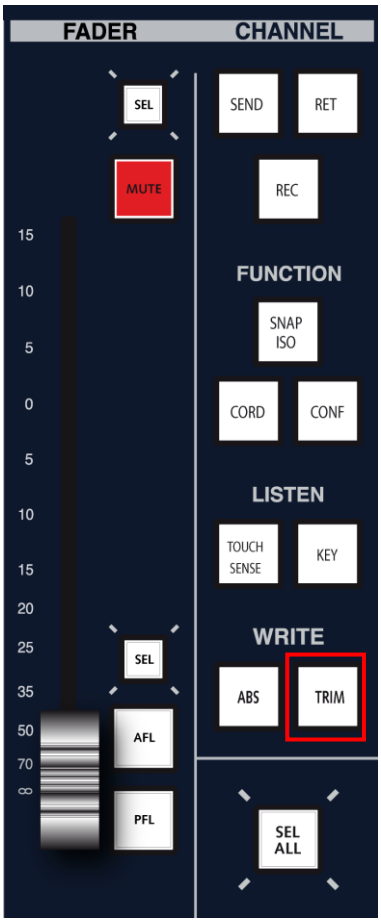
Note

Also 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. Therefore, before you clear the list, you may want to save your offsets into an Oversnap. This will allow you to recall the offsets at a later date. See Page 451 for details on saving an oversnap.

Updating Snapshot Offsets

Having added offsets to the **Current Trim Set** you may wish to update them – for example, if during the performance Soloist B sings louder than in rehearsal you may want to change the trim offset for their fader level.

To do this, return to the offset parameter selection mode and adjust the fader level as follows:

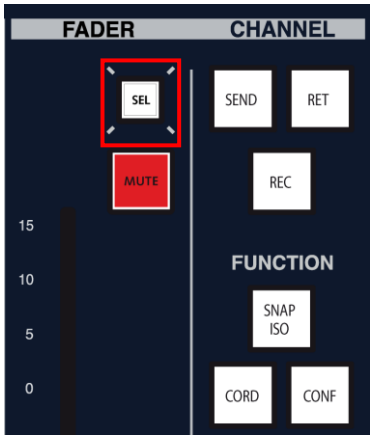


1. Select the WRITE **TRIM** button.

On the classic mc²66, the **TRIM** button is located on the SNAP/SEQUENCE panel (below COMPARE).

2. Assign the Soloist B channel to the Central Control Section.

*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 fader **SEL** button turns orange.*

4. Press the fader **SEL** button to confirm the new setting.

*The **SEL** button turns red and the trim offset updates within the **Current Trim Set**:*

Current Trim Set | **Oversnap Trim Set**

Name	Label	Parameter	Type	Value
INP 2	INP 2	EQ2 GAIN	trim	2.75dB
INP 2	INP 2	EQ3 GAIN	trim	1.75dB
INP 1	INP 1	EQ4 GAIN	trim	0.50dB
INP 2	INP 2	MAIN LVL	trim	101.12dB
INP 4	INP 4	MAIN LVL	trim	88.25dB
INP 5	INP 5	MAIN LVL	trim	63.00dB
INP 5	INP 5	EQ1 GAIN	abs	-1.00dB
INP 6	INP 6	EQ1 GAIN	abs	-1.00dB
INP 5	INP 5	EQ2 GAIN	abs	-1.25dB
INP 6	INP 6	EQ2 GAIN	abs	-2.00dB
INP 5	INP 5	EQ3 GAIN	abs	-1.25dB
INP 6	INP 6	EQ3 GAIN	abs	0.75dB
INP 5	INP 5	EQ3 FREQ	abs	1093Hz
INP 6	INP 6	EQ3 FREQ	abs	1001Hz
INP 5	INP 5	EQ4 GAIN	abs	-0.75dB

5. Alternatively, to remove the trim offset altogether, press the red fader **SEL** button to deselect the parameter.

*The fader **SEL** button returns to green and the Main LVL offset is removed from the **Current Trim Set**.*

6. Remember to deselect WRITE **ABS** and **TRIM**.

If you don't, and adjust a parameter with an active offset, then you will update the offset.

Working with 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 may 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.

Tip

Oversnaps are stored within your production folder; you may save up to 999 oversnaps per folder.

Note that oversnaps are the only way to store snapshot offsets permanently. 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, your active snapshot offsets will be lost.

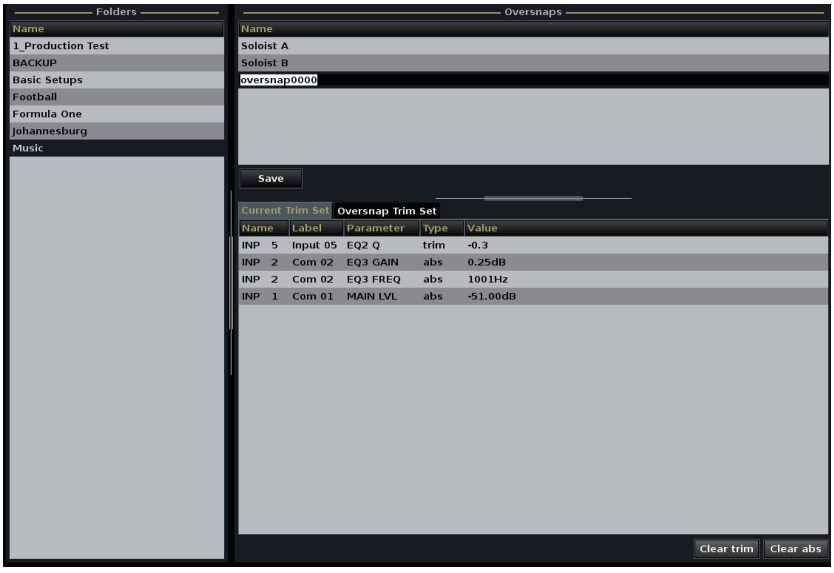
Note

Saving an Oversnap

To save the contents of the **Current Trim Set**:

1. Click on the **save** button at the bottom of the **Oversnaps** list.

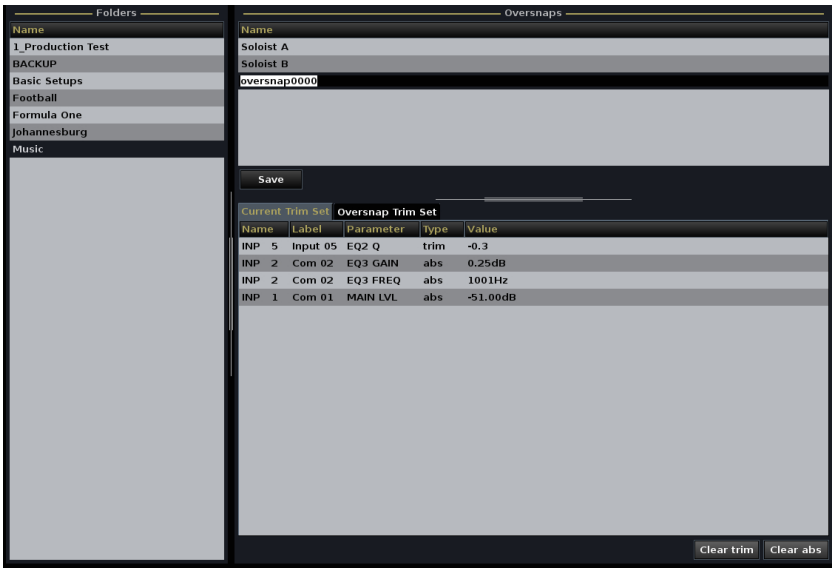
*A new oversnap is saved into the current Folder and appears at the bottom of the list with a default name (e.g. **oversnap0000**):*



Renaming an Oversnap

To rename the oversnap:

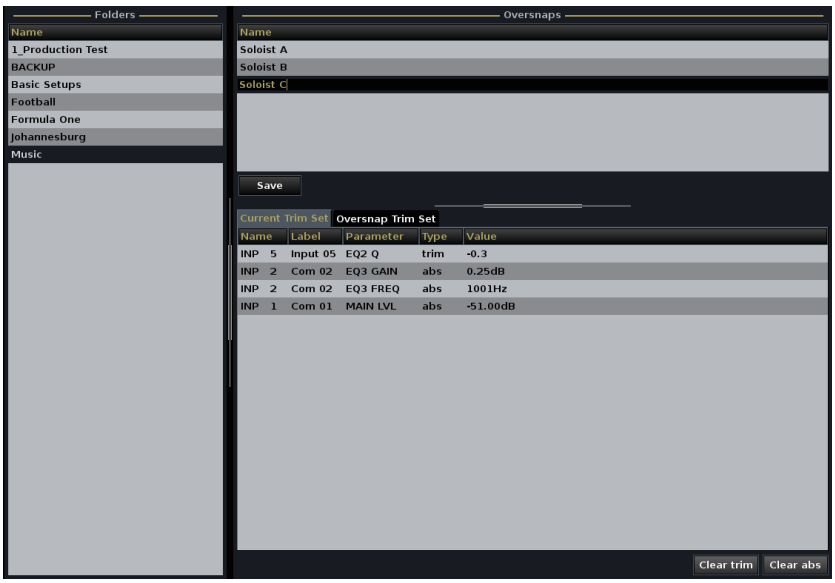
1. Click on the oversnap name from the **Oversnaps** list:



Tip

Click once to select all the existing text (white) or twice (black cursor) to modify the existing name.

2. Enter a new name from the keyboard.
3. When you have finished, press the Enter button on the keyboard to confirm the new name (e.g. **Soloist A**):



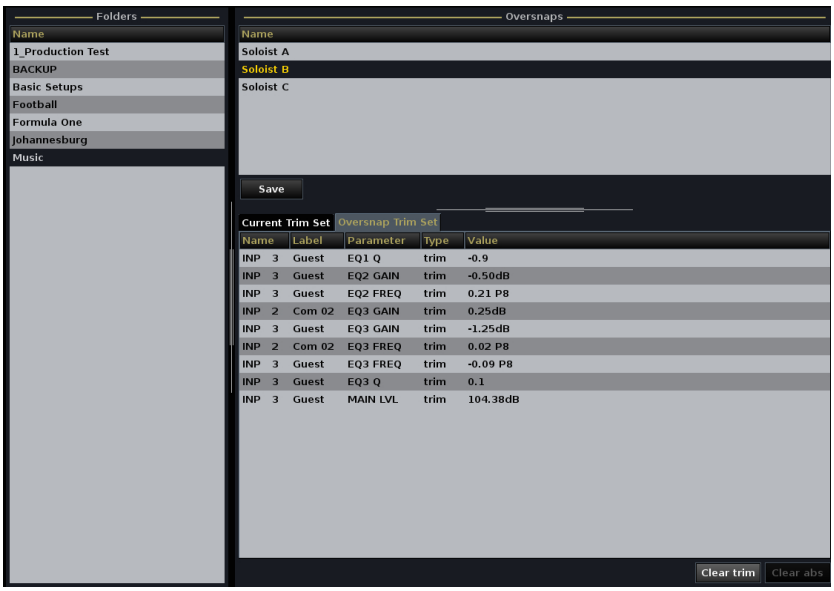
4. Or, if you make a mistake or want to exit the naming mode without making any changes, press the **Esc** button on the keyboard.

Checking the Contents of an Oversnap

At any time you can check what offsets are stored in an oversnap as follows:

1. Select the oversnap you wish to interrogate.
2. And then 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.


Tip

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.

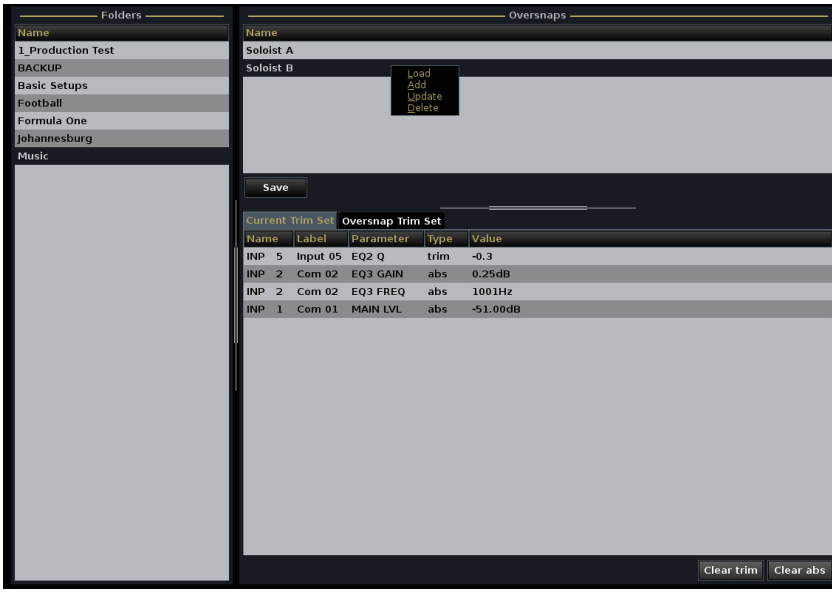
Note

- **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**. This method is great if you want to combine the contents of multiple oversnaps – for example, to combine the offsets for soloist A and trombonist B.

To load an oversnap to the **Current Trim Set***:*

1. Select the oversnap you wish to load.
2. And click on the **load** button.

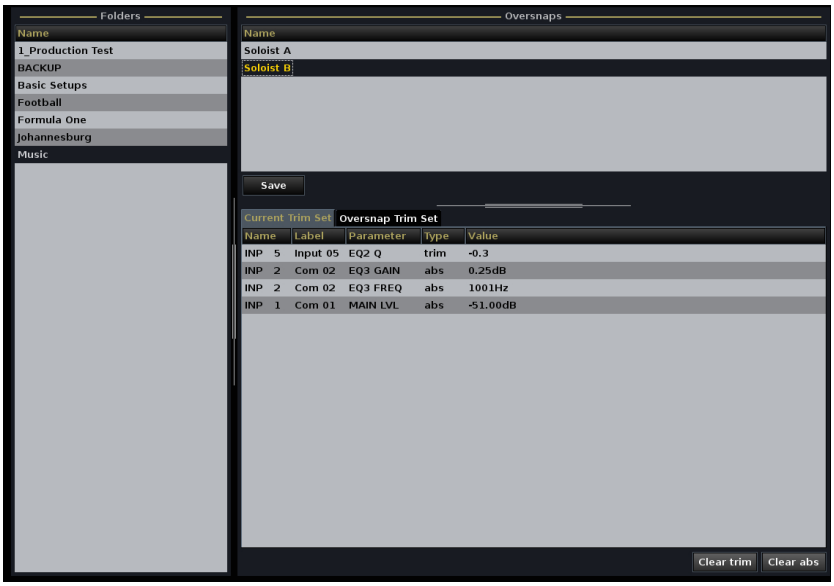
*The contents of the **Current Trim Set** are replaced with the stored oversnap offsets:*



To add an oversnap to the **Current Trim Set***:*

1. Select the oversnap you wish to add.
2. And click on the **add** button.

The stored oversnap offsets are added to the existing Current Trim Set:



Note that if the 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.

Note

By adding multiple oversnaps to the **Current Trim Set**, you can combine snapshot offset parameters saved for different artists.

Updating an Oversnap

You can overwrite the contents of any oversnap with the **Current Trim Set** by using the **update** button:

1. Select the oversnap you wish to update.
2. Add the offset parameters you wish to store to the **Current Trim Set.**
3. Then click on **update**.

The oversnap is overwritten with the new offset parameters.


Note

Note that you can edit the contents of an existing oversnap, by loading the oversnap first, adjusting the snapshot offset on the console, and then using update to overwrite the oversnap contents.

Deleting an Oversnap

You can delete any unwanted oversnaps from the production folder as follows:

1. Select the oversnap you wish to delete.
2. And click on the **delete** button.

The oversnap is deleted from the folder.

Exporting Oversnaps

Oversnaps are stored separately from snapshots within the production folder. While oversnaps cannot be exported individually, you can export oversnaps as part of the complete folder.

1. Copy the folder 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 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 can access the oversnaps.

Presets

Presets provide a way of saving and loading settings for individual modules – EQ, Gate, Compressor, Panning, etc. – or for a complete channel. For example, you may wish 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 between consoles, allowing you to recall processing prepared on say a mc²56 to a mc²66 or mc²90.

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, this may exclude other important parameters, and 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.

Module presets cannot be stored for the input mixer, digamp, delay, insert, direct out or fader level. AMBIT module presets may only be saved and loaded to/from surround VCAs.


Note

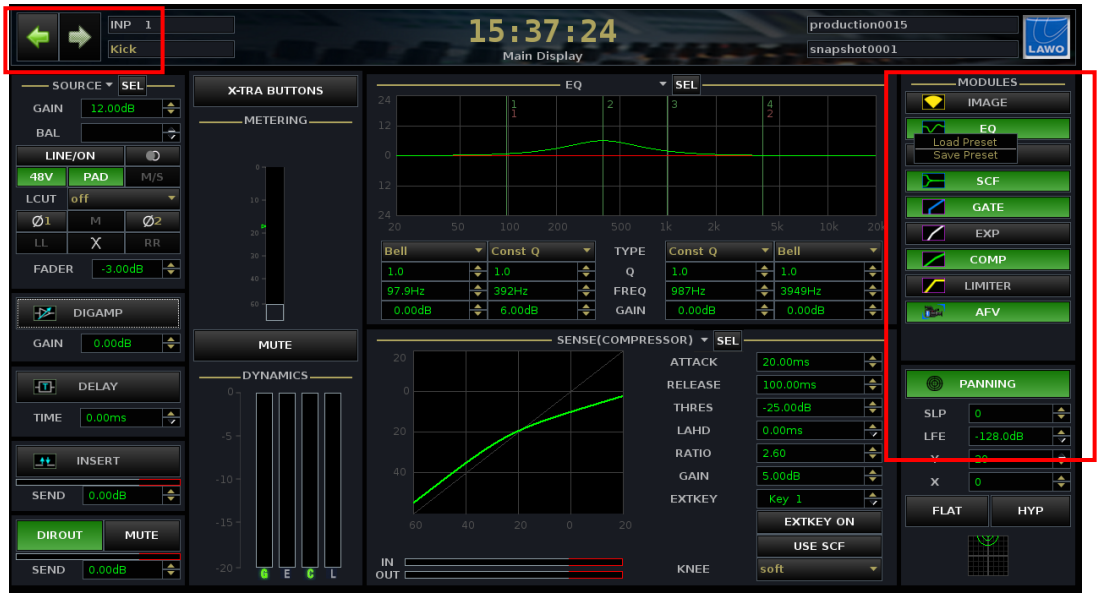
- **Channel presets** – store settings for the complete channel. This includes all the processing modules listed above plus the input mixer, digamp, delay, insert, direct out and fader level. The only settings NOT stored by a channel preset are bus routing assignments.

Both types of preset are saved and loaded from the **Main** display.

Saving a Preset

1. Press the SCREEN CONTROL **CHANNEL** button to open the **Main Display**.

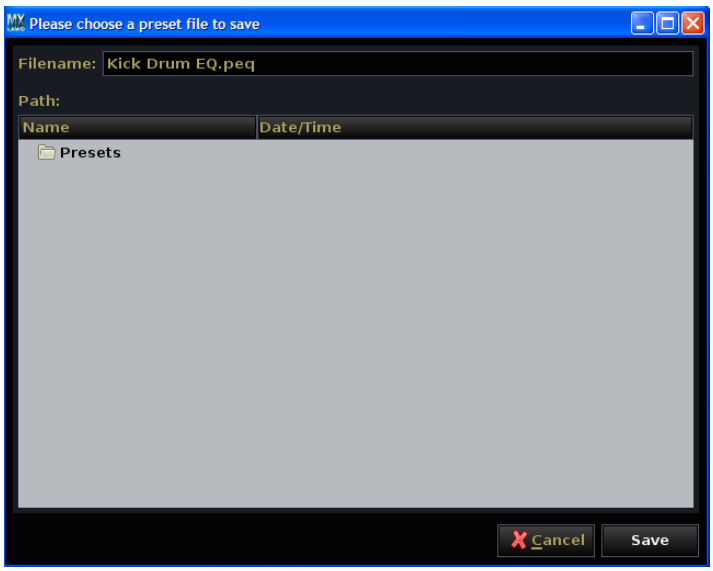
Presets are saved and loaded from the module on/off buttons on the right of the display. You are always saving from and loading to the channel in access – in our example, INP 1:



2. Using the trackball and right select button, right-click on the module you wish to save – for example, **EQ**.
3. And select **Save Preset**.

The Preset File window appears.

4. Type in a filename:



5. And select **Save**.

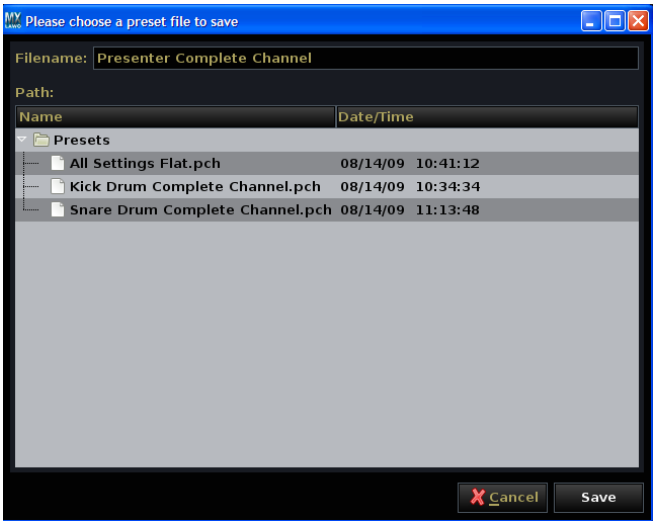
The EQ module is saved as an EQ preset onto the console's internal flashcard.

6. 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. Note that you cannot save a module preset for the input mixer, digamp, delay, insert, direct out or fader level.

7. To save a preset for the complete channel, right-click on the word **MODULES**.

8. And select **Save Preset**.



9. Type in a filename and select **Save**.

The complete channel settings are stored.

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.

Note that presets are stored as different file types to help distinguish EQ presets (.peq) from Channel presets (.pch) and so on.

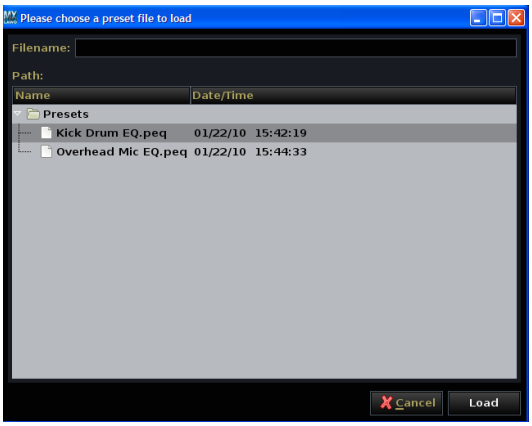
Note

Loading a Preset

Presets are stored separately from productions, and can be loaded to any channel within any production.

1. Put the channel you wish to load to into access, either by pressing the **SEL** button on the fader strip or using the ACCESS CHANNEL/ASSIGN control panel.
2. Using the trackball and right select button, right-click on a module – for example, right-click on **EQ**.
3. And select **Load Preset**.

The Preset File window lists all EQ presets (.peq files) on the internal data card:



4. Select a preset and then select **Load**.

The preset is loaded to the EQ module.

Note

Note that presets load the on/off state of the module as well as the module settings.

5. Repeat these steps to load presets for other modules by right-clicking on the appropriate module on/off button.

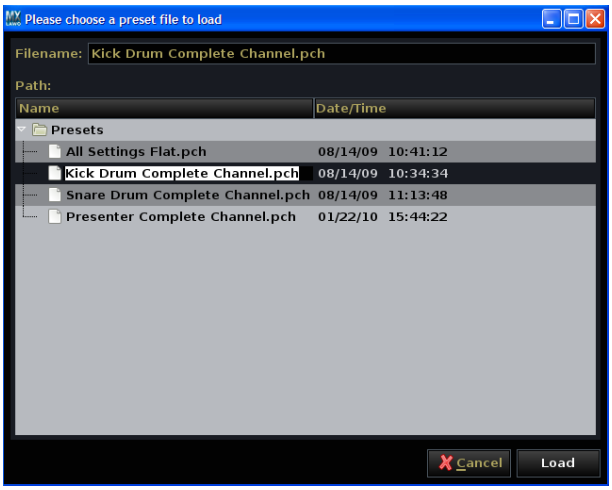
Note that the Preset File window only lists presets applicable to the selected module. This avoids you accidentally loading say a compressor preset to an EQ module!

6. To load a channel preset, right-click on the word **MODULES** and select **Load Preset**.
7. Select a preset file and **Load** to load the settings.

Renaming a Preset

1. Open the Preset File window by selecting **Load Preset**.
2. Select the preset you wish to rename:

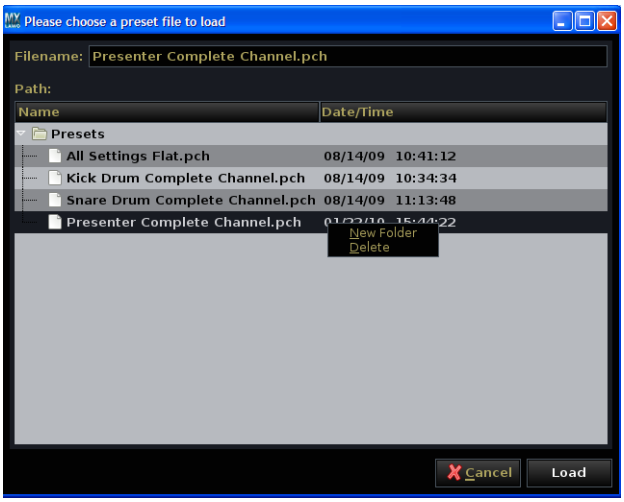
- Click once – *all* existing text is selected (white) so that when you type you will automatically overwrite the existing name.
- Or, click twice to edit the existing name – a cursor appears at the end of the text (black) allowing you to easily append or modify the old name.



3. Press Enter to confirm the name change.

Deleting a Preset

1. Open the Preset File window by selecting **Load Preset**.
2. Right-click on the preset and select **Delete**:



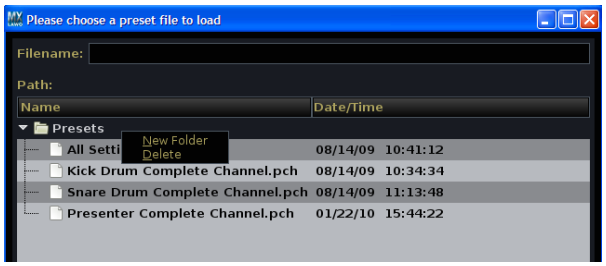
3. Select **OK** to confirm.

The preset is deleted from the user data card.

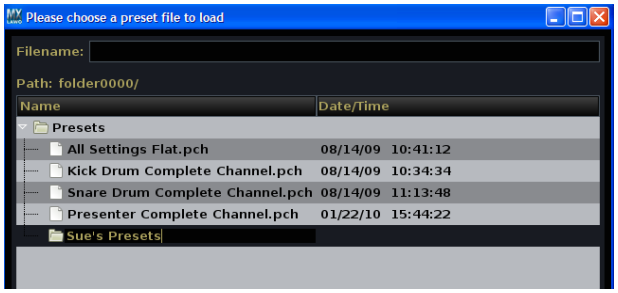
Organising Presets

Folders can be used to help organise presets on the system:

1. Open the Preset File window by selecting **Load Preset**.
2. Right-click on the **Presets** directory and select **New Folder**:



3. Type in a name for the folder:

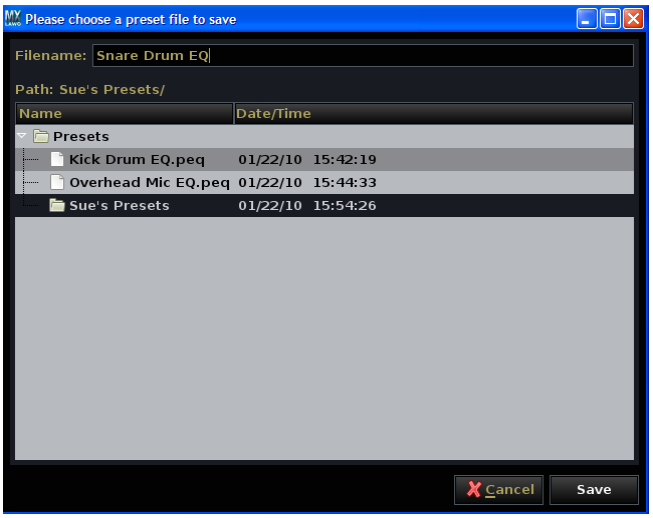


4. Press Enter to confirm the new name.

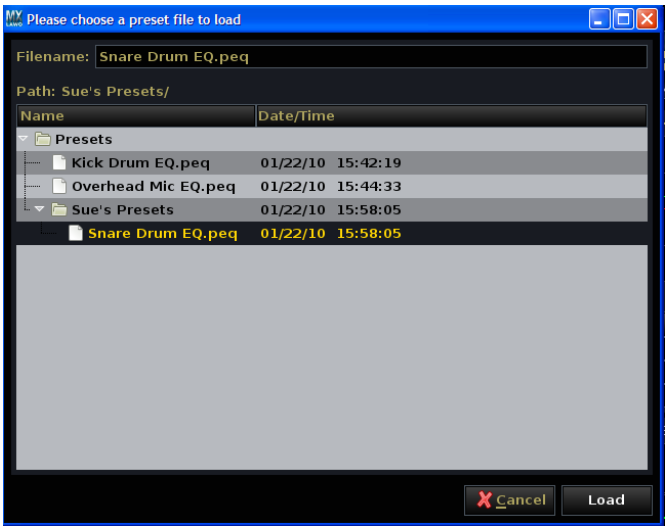
The new folder is created.

5. Select **Cancel** to exit the Preset File window.

Now when you save a preset, you have the option to save into the new folder:



To load back from the folder, use the arrows beside the folder name to open the directory:



Note that you can create folders within folders if you wish.

Note

Note that you cannot move presets between folders from the Preset File window. If you wish to move the locations of existing presets, then use the **File** display (on the console) or **File Transfer** display (on mxGUI) to copy presets to/from folders.

Importing and Exporting Presets

Presets can be imported and exported using the console's **File** display. This allows you to copy presets to USB, to a network drive, or to copy presets between folders on the system. Please see Page 465 for details on these functions.

In addition, presets can be copied to or from an external computer running mxGUI. See Chapter 10 for more details on mxGUI.

If transferred to another console, a preset can be loaded to any DSP module or channel provided it is a full processing channel (not a tiny channel). However, take care when loading presets saved on a different channel type.

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, this may exclude other important parameters, and 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.

Each preset has a file type associated with it: EQ presets are stored as .peq files; channel presets as .pch files; etc.

File Import/Export

The console's 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 log files for servicing purposes.
- To copy elements within the console's data flashcard. For example, to copy a snapshot to a different production folder.

User data includes complete productions or elements of a production (such as a folder, snapshot or automation mix) and presets.

From the console you can use the **File** display to transfer data to/from a USB interface or network drive (configured by AdminHD).


Note

Lawo cannot guarantee compatibility with all available USB interfaces. Therefore, please check the compatibility of your USB interface on your system.


Tip

User data is fully compatible with any **mc²** console, regardless of the hardware configuration. For example, you can load a snapshot saved on smaller console to a larger console in order to recall a setup in another studio. You can even load a **mc²66** production onto a **mc²56** and **mc²90** or vice versa!

You may need to take care when moving productions to a system with fewer DSP cards. And, be aware that the channel DSP settings saved in snapshots from Recording channels cannot be loaded to Broadcast channels. You can find more details on these rules of operation on Page 131.

Note that configuration files and custom function templates cannot be imported and exported from the console's **File** display. However, these files can be imported and exported to or from an external computer running mxGUI. Please see Chapter 10 for more details on mxGUI.

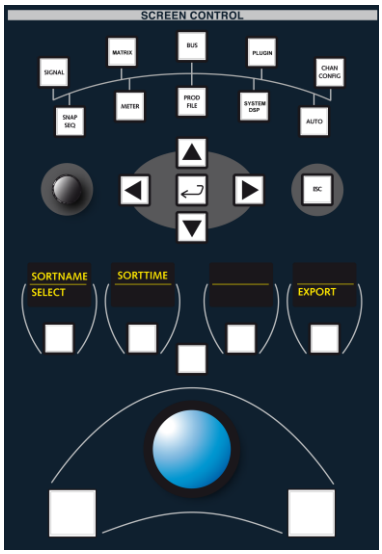
The File Display

The console's **File** display allows you to transfer data to/from a USB interface or network drive (configured by AdminHD).

Note

For details on using mxGUI to transfer data to an external computer see Chapter 10.

1. Press the **PROD FILE** button, located on the SCREEN CONTROL panel, to view this display:



Note

Note that each time you press the **PROD FILE** button you toggle between two pages – **Productions** and **File** – so keep pressing until you see the **File** display.

The display is divided into two halves:

- **Production files** - on the left you are *always* viewing files or directories on the console's internal data card.
- **File Browser** - on the right you can view files or directories on one of the following storage devices:
  - **Internal** - the internal data card.
  - **USB** - a mounted USB device (connected to the USB port in the arm rest of the console).
  - **Net** - a network drive (pre-configured by AdminHD).

At the bottom of the display you will the amount of free space (in MB) on your selected device.

Using the **EXP** soft key function, a file or directory is exported from left to right – i.e. from the internal flashcard to the internal flashcard, USB or network drive.

Using the **IMP** soft key function, a file or directory is imported from right to left – i.e. from the internal flashcard, USB or network drive to the internal flashcard.

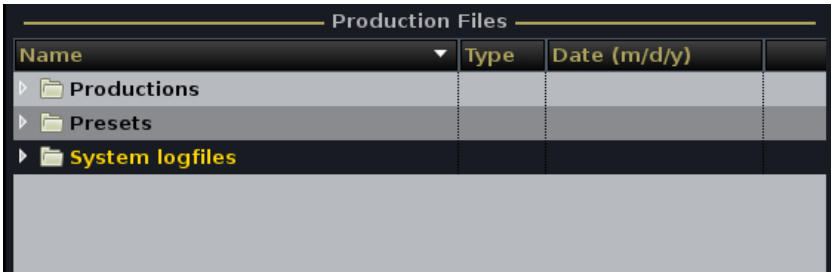
File Selection and Navigation

The Production Files List

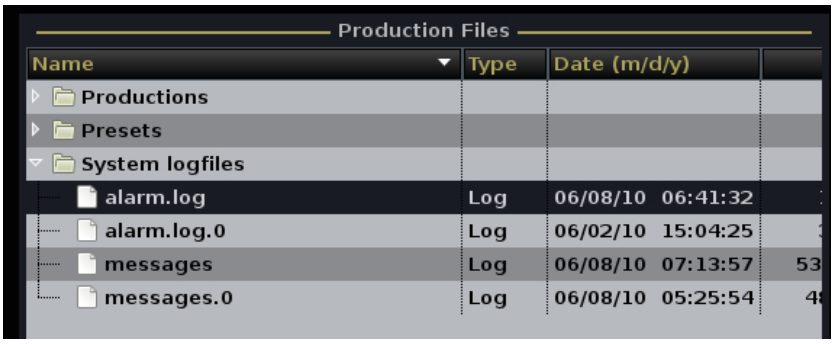
Within the **Production files** list, you can open or close directories by double-clicking on the directory name (or click on the arrow beside the directory name):

1. Close the directories in the **Production files** list until you reach the top level of the internal data card.

*You should see three directories – **Productions**, **Presets** and **System logfiles**:*

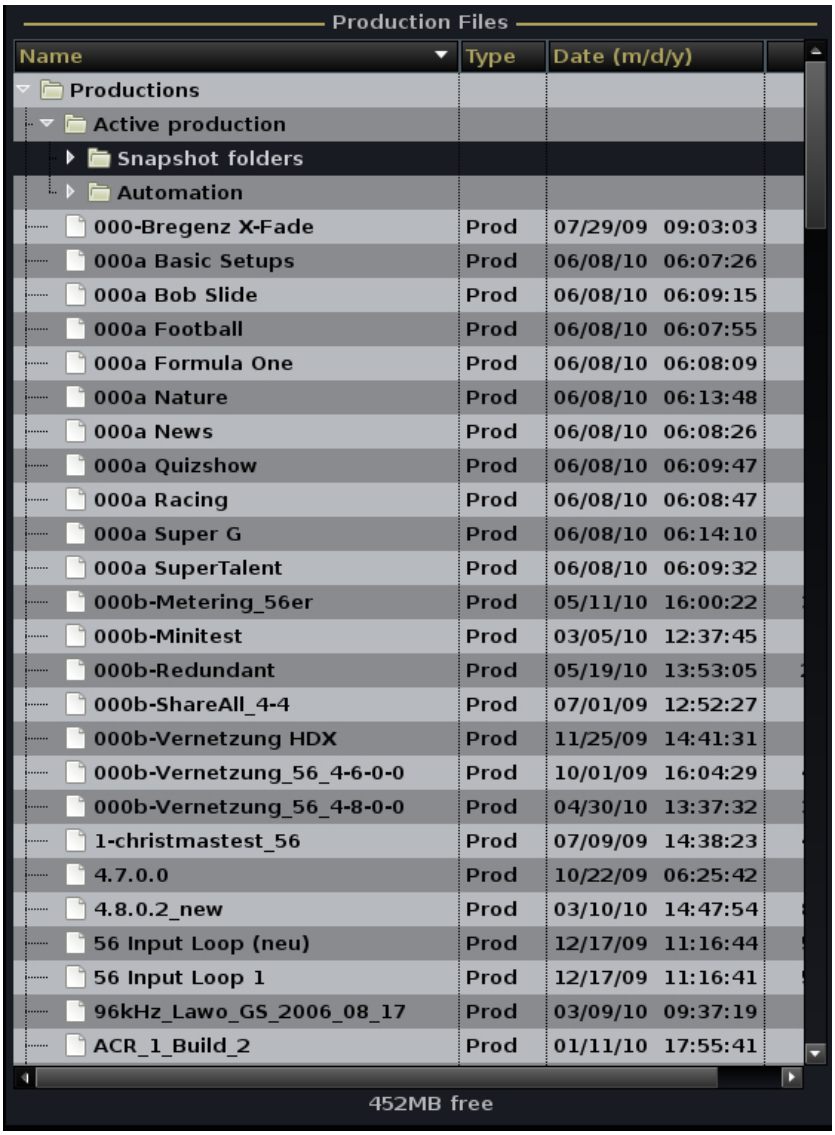


You can open the **System logfiles** directory if you need to access message files or the alarm logfile - these are diagnostics files which you may need to copy to USB and email to your service engineer should you encounter a system problem:



More commonly, you will be dealing with the **Productions** directory in order to copy or export a production, folder or snapshot:

2. Open the **Productions** directory 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.

The display shows two further directories: ***Snapshot folders*** *and* ***Automation****.*

4. Open Snapshot folders.

You can now access any Folders stored within the Active Production:

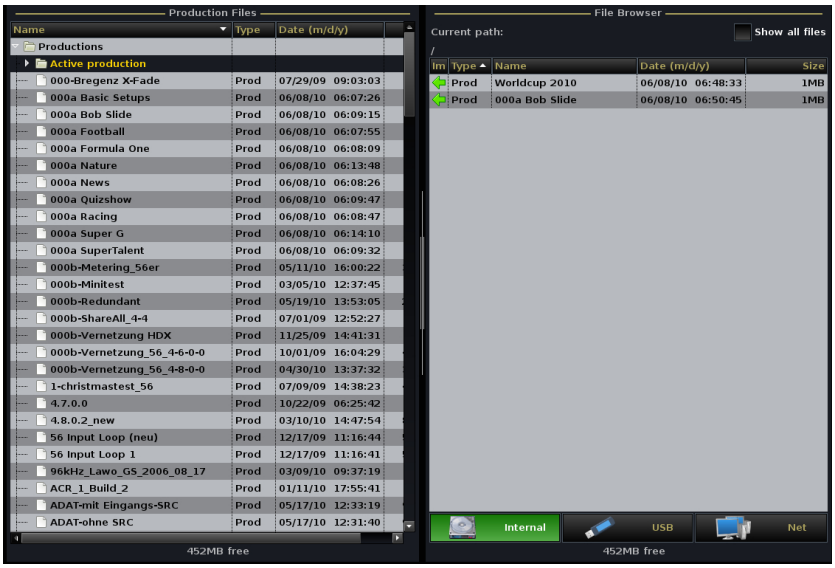
5. Finally, open a Folder to access the individual snapshot files.
6. Remember that at any time, you can go back one level by closing the directory – double-click on the directory name, or click on the arrow beside the directory name.

The File Browser

Selecting and navigating within the **File Browser** varies slightly from the **Productions list**.

Note

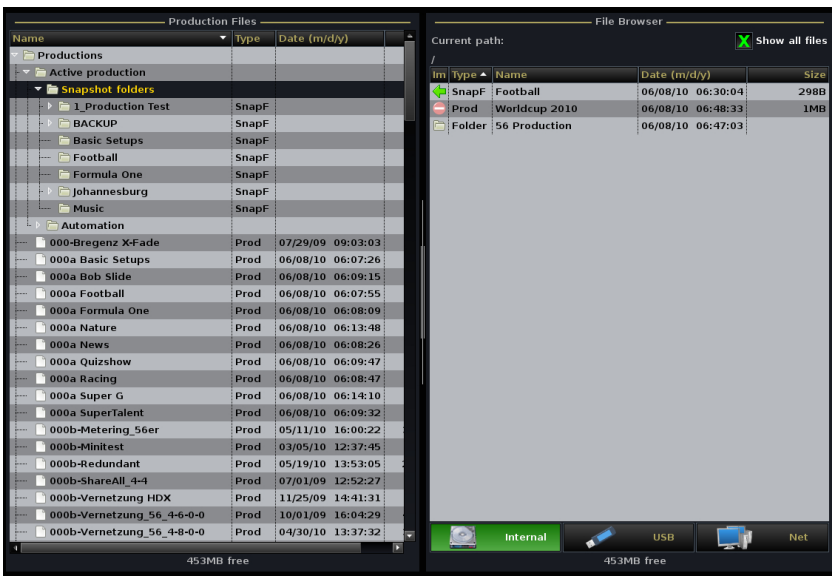
This is because the files you see within the **File Browser** are dependent on the directory level of the **Productions list**. For example, if you are viewing zipped productions within the **Productions list**, then you will only see zipped productions in the **File Browser**. This prevents you from copying files to 'illegal' locations:



1. To see all files from the **File Browser** regardless of their compatibility, select the **show all files** option.

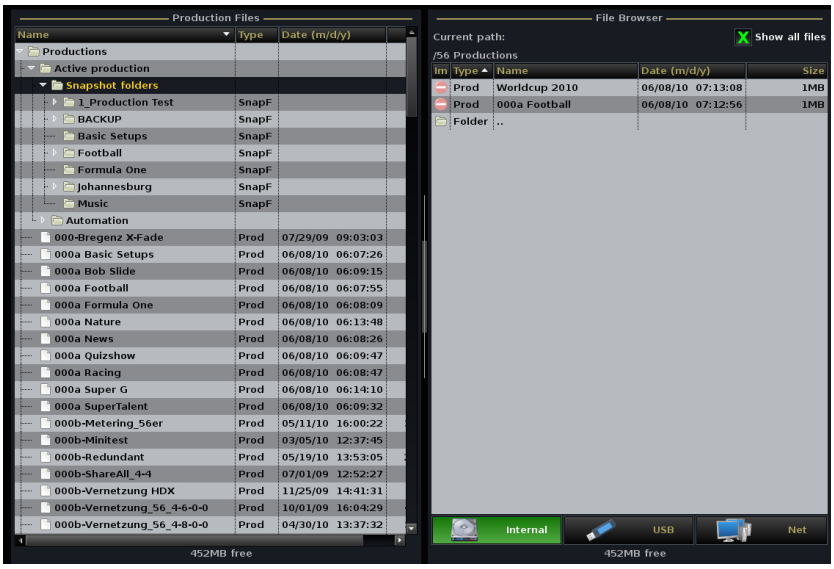
*The **File Browser** updates to list all files on the selected device; the type column shows whether they are compatible for import to the current **Production files** directory.*

In our example, only the Snapshot folder called **Football** is compatible for import:



2. If your selected storage device contains folders, then you can open a folder by selecting it and pressing the **SELECT** soft key, or double-clicking the folder name.

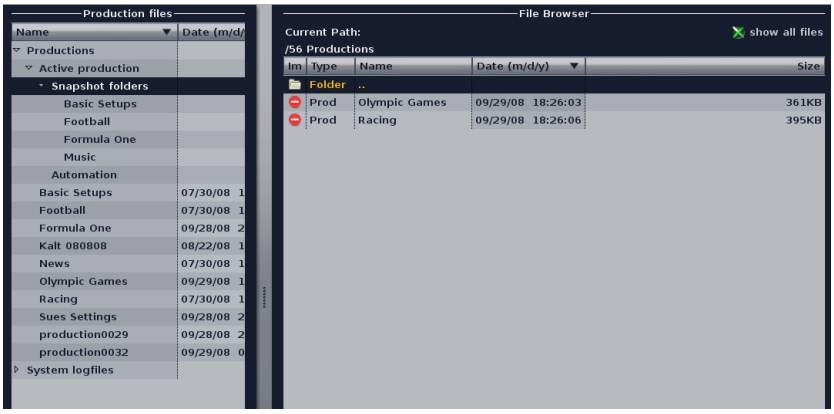
*The file path is shown at the top of the **File Browser** – in our example, **/56 Productions**:*

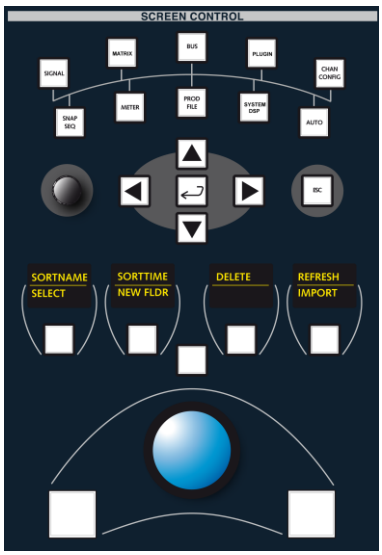


3. To close the folder and move back to the top level directory, select the **Folder…** entry and press **SELECT** (or double-click on **Folder…**).

Resizing and Sorting

1. You can resize the **Production files** and **File Browser** areas by clicking and dragging on the grey separator bar:





For each file, you can see its name, the date and time when the file was last updated and the file size in Kb.

2. You can sort files by name, date, size, type, etc. by clicking on the column headers.

Or press the **SORTNAME** or **SORTTIME** soft keys (on the second PAGE) to sort by name or date/time.

Which Files Can Your Export?

You can export 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 configuration files and custom function templates cannot be imported and exported from the console's **File** display. However, these files can be imported and exported to or from an external computer running mxGUI. Please see Chapter 10 for more details on mxGUI.

Warning

Having exported files to a USB interface or Network drive, you can view and rename them on a computer. However, if you edit the content of the file, or modify its file extension, you may corrupt the file and lose data!

The following file extensions must be intact for the file to be imported successfully:

- **.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)

Exporting a File

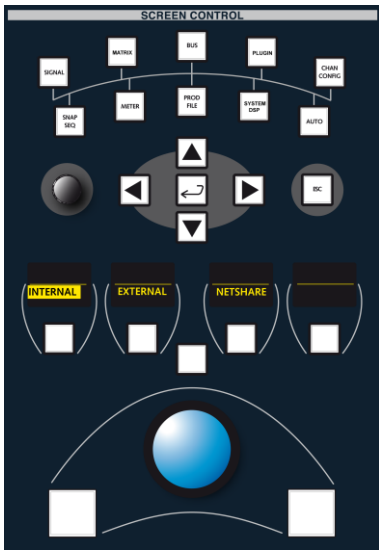
You can export any of the file types described to either USB or a networked drive. This allows you to export a complete production, as a zipped file, or an element of a production such as folder, snapshot or mix.

Note that zipped production files cannot be opened. Therefore, if you wish to copy or export an individual production element, such as a snapshot, mix or folder, then you must first make the production active by loading it. See Page 376 for details.

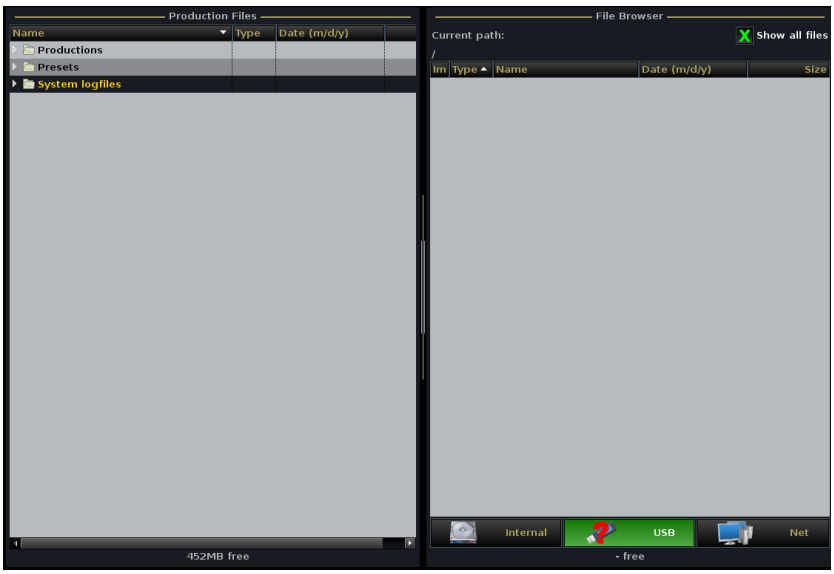
Note

All operations are performed in a similar manner. Let's start by exporting a zipped Production to USB.

1. First, connect your USB interface to the USB port.
2. Click on the USB interface icon at the bottom right of the display:



- If the USB interface is mounted, then its icon will turn green and the **File Browser** will show any files or directories already stored on the device.
- If the USB interface is not mounted, then you will see the following:



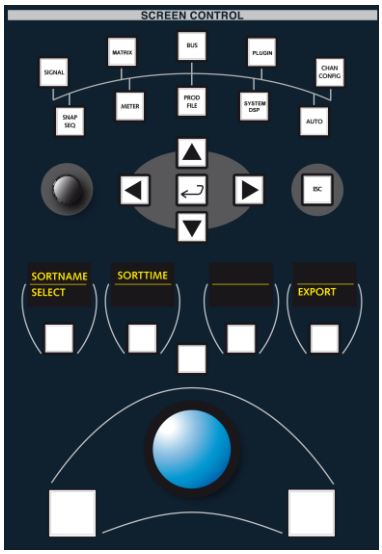
3. Press the **EXTERNAL** soft key to mount the USB interface.

The device should now show as ready. If not, check your connection or try a different USB device.

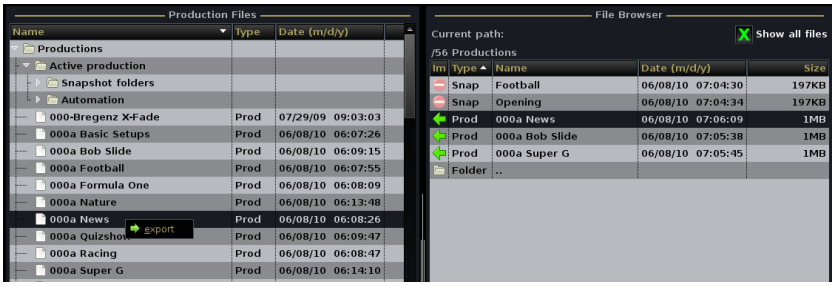
4. Next select the file you wish to export from the **Production files** list – in our example, **News**.
5. And the destination for the file from the **File Browser**.

You can create a new folder on the USB interface to help organise your files. See Page 479 for details.

6. Now make sure the display is focused on the **Production files** list and press the **EXPORT** soft key (or right-click with the trackball and select **Export**).



The file is copied from the internal data card onto your storage device:

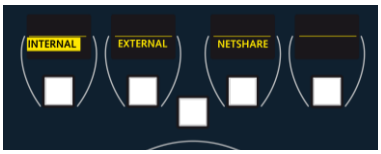


7. Once the data has finished transferring, you can unplug the USB device.

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.

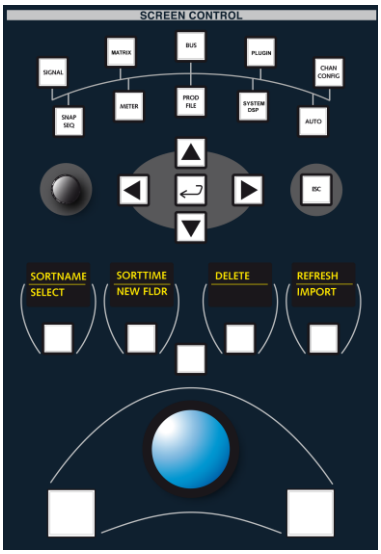
Exporting to a Network Drive

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 to be available.



1. Once configured, you can mount the drive by pressing the **NETSHARE** soft key.

Note that if files on the network drive are modified from another console, or from an external computer, then to see these changes you may need to refresh the **File** display as follows:



2. Click on the **File Browser** list on the right of the display.

The soft key functions update.

3. Press the **REFRESH** soft key (on the second PAGE) to refresh the display.

Importing a File

You can import files from a USB interface or networked drive in a very similar manner. Let's take the example of importing a folder from USB into the Active Production.

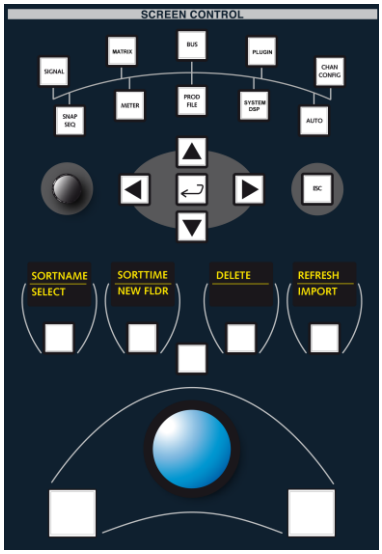
1. First, connect your USB interface to the USB port located in the console arm rest.
2. Select the **Production files** destination directory on the left of the display – in our example, **Snapshot folders**.
3. Then click on the USB interface icon at the bottom right of the display.

The soft key functions update.

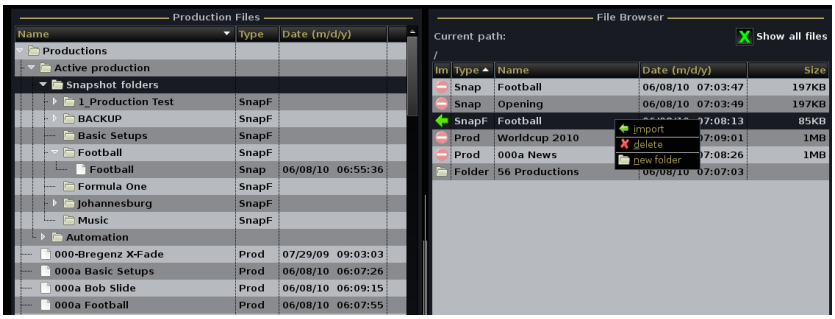
4. Press the **EXTERNAL** soft key to mount the USB interface.

The device should now show as ready.

5. Now select the file you wish to import from the **File Browser** list – in our example, the snapshot folder called **Football**.

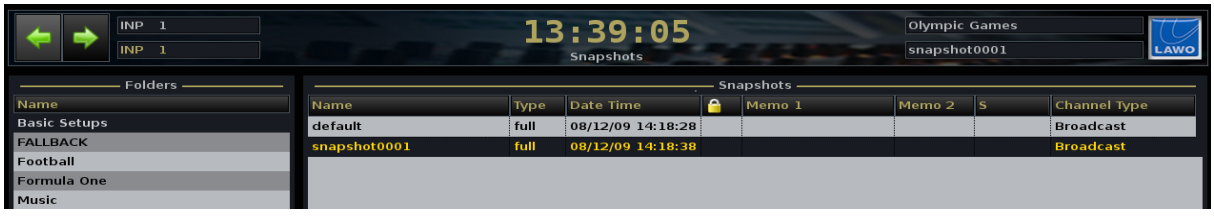


6. Make sure the display is focused on the **File Browser** and press the **IMPORT** soft key to import the file:



Note that if a file of the same name already exists, then the file will be copied with an appended name – for example, **Football (0001)**:

7. Once the data has finished transferring, you can safely unplug your USB device.
8. If you now select the **Snapshots List** display, you will find the imported Folder in the Folders list on the left of the display:



Copying Files Internally within the System

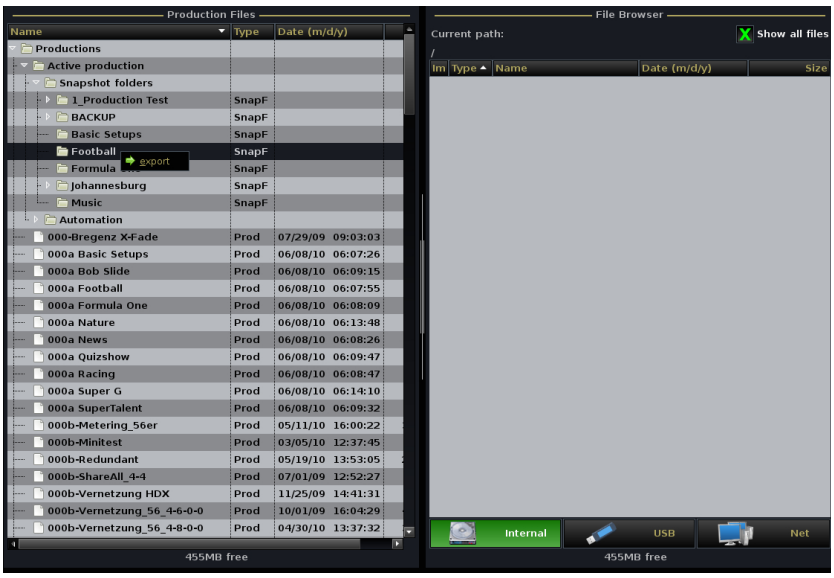
You can also use the file export and import functions to copy files internally within the system. For example, if you wish to copy a snapshot or folder from one production to another.

As you cannot open up a zipped production to select individual elements, you will need to perform this operation in several stages:

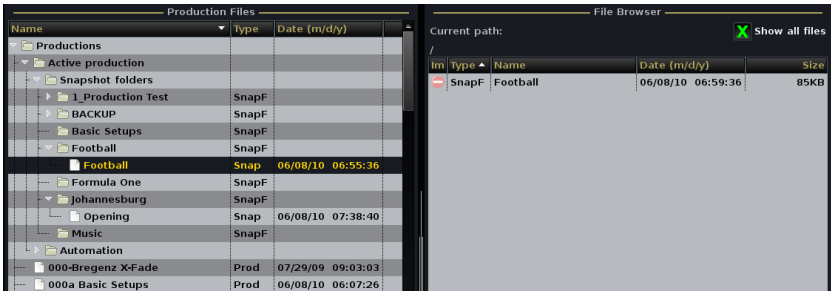
1. First, load the production which contains the snapshot you wish to copy from the **Productions** display. See Page 376 for details.
2. Now, go to the **File** display and within the **File Browse**r, click the internal drive icon.

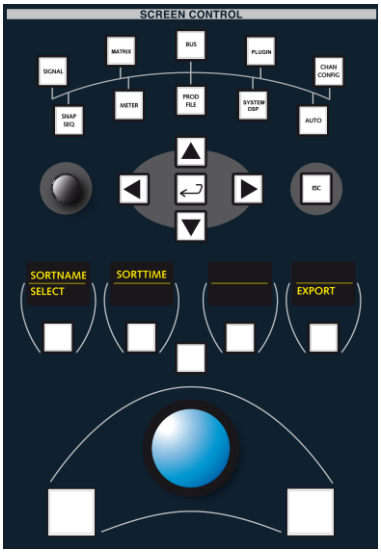
You will see the contents of a temporary directory within the internal drive as your destination. This directory may be empty, or it may contain previously copied files.

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**:

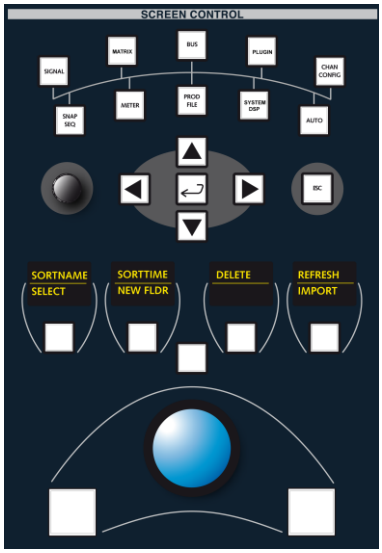


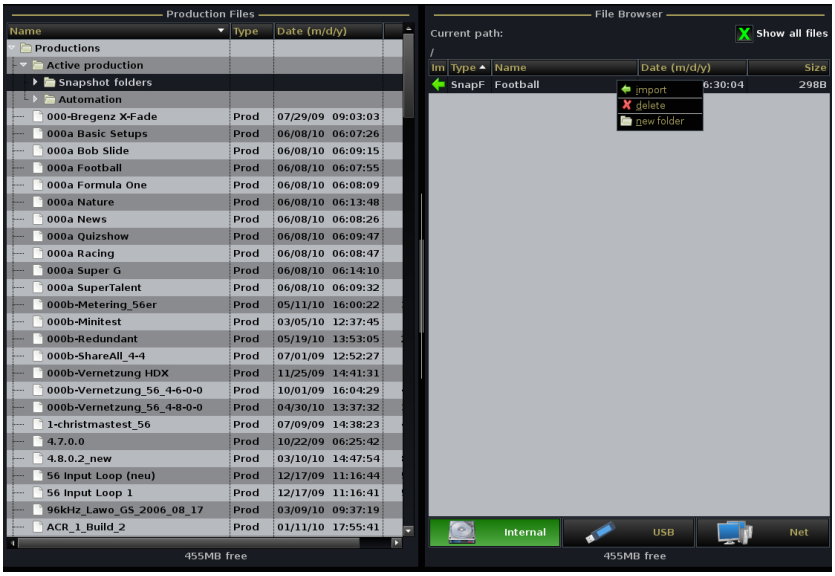
4. Press the **EXPORT** soft key to export the folder to the temporary directory:





5. Next, return to the **Productions** display and make the production which you wish to copy to active.
6. Now go back to 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. Press the **IMPORT** soft key to import the snapshot to the Active Production Folder.
10. If you now select the **Snapshots List** display, you will find the imported Folder.

Tip

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. See Page 480 for details.

Note

Note that the **File Browser** normally only shows 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. You will then see all files; those with a green arrow may be imported to your selected destination.

File Management

In order 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 on the right hand side of the display.

Note that these functions are designed to give you the basic tools to manage your export data:

Note

- You cannot create new directories or delete files within the internal data card on the left side of the display. To perform these data management functions, go to the **Snapshots List**, **Automation** or **Productions** displays.
- New folders are automatically named as **New Folder**. You can rename the folder by clicking on the name. To reorganise the data structure on your storage device, connect it to your computer!

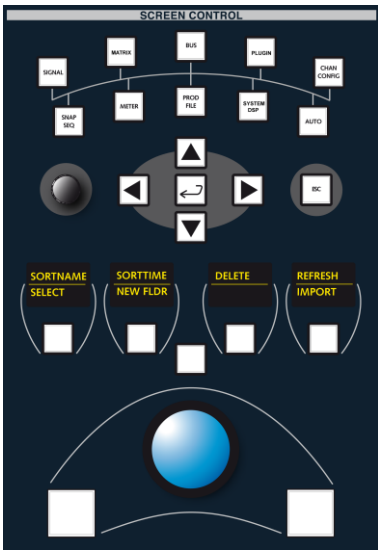
Creating a New Directory (Folder)

You can create a new folder on the internal drive, or on your external USB interface or network drive.

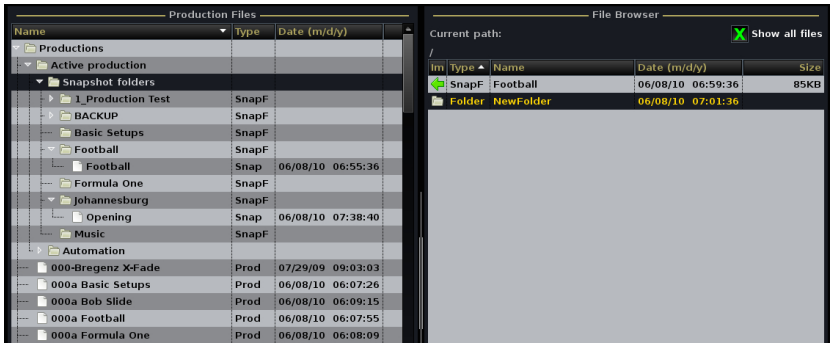
1. Focus on the **File Browser** list on the right of the display.

The soft key functions update.

2. Press **NEW FLDR**.

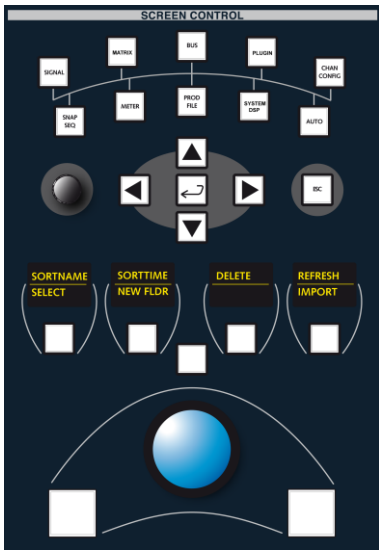


*A new folder is created with a default name – e.g. **NewFolder**:*



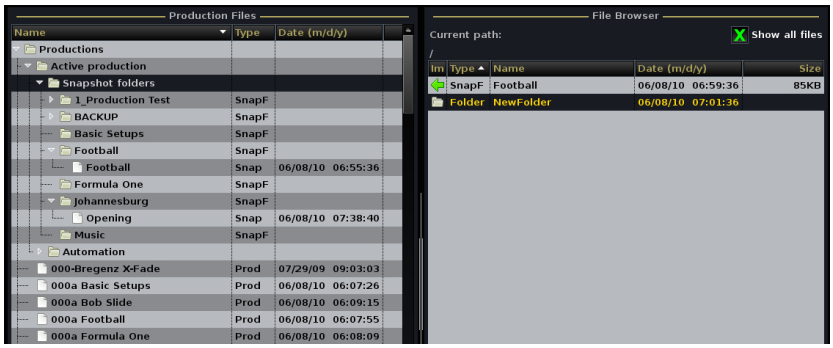
3. You can rename the folder by clicking on the folder name and using the console keyboard.

Deleting a File or Folder



You can delete files or directories within the temporary folder on the internal drive, or on your external USB interface or network drive.

1. Select the file or directory you wish to delete from the **File Browser**:



The soft key functions update.

2. Press **DELETE** (on the second PAGE) to delete the selected file or folder.

Note

Note that you cannot delete files or directories from the **Production files** list. To manage your productions, folders, snapshots and mixes, use the **Snapshots List**, **Productions** or **Mixes** displays.

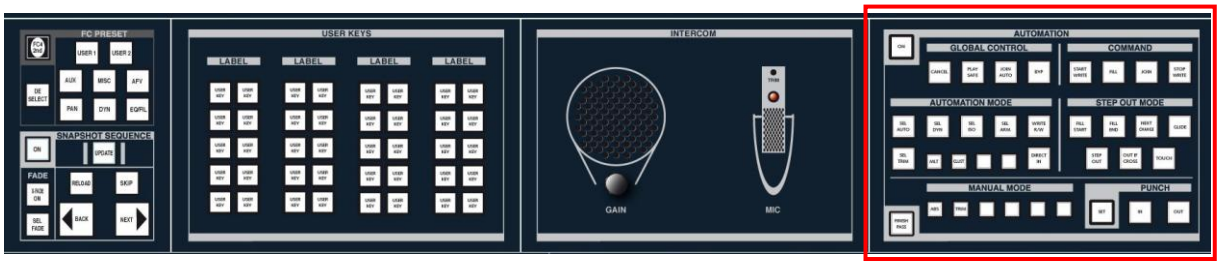
Chapter 7: Timecode Automation

Introduction

This chapter explains the operation of the console's timecode automation system.

To operate the timecode automation system your console must be fitted with the optional AUTOMATION control panel, available as a user panel within the centre section:

Note



AUTOMATION controls are a standard part of the centre section on the classic mc²66.

The **mc²66**'s automation system automates console settings referenced to timecode. In addition to automating channel parameters such as faders, mutes, aux sends, EQ, etc., the system can automate other settings such as bus routing, channel signal flow, etc. The channels you automate may be any channel type – inputs, groups, sums, auxes, VCA masters, Surround masters, GPCs. And you may recall snapshots to record a complete scene/section change against timecode.

The automation system acts as a timecode slave and may lock to external Linear Timecode (LTC) or Midi Timecode (MTC). Control of the replay machine(s) is handled from the external machine, or from the optional MACHINE REMOTE CONTROL panel described on Page 558.

Data can be written with timecode rolling forwards, backwards and at any speed, providing fast and efficient mixing. A normal automation day starts at 00:00:00:00 and ends at 23:59:59:xx and you can choose to work with a timecode offset.

The way in which data is written is governed by modes, allowing you to write dynamic or static automation; step in or step out of write to make updates; protect channels with existing moves; and isolate channels to remove them from the automation system completely. Data can also be written in Absolute or in Trim allowing you to offset existing values.

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 may be created for each production and are stored permanently on the system when you update the production.

Before You Mix

Let's assume that you have created a new production and have a basic setup with levels, panning, EQs, etc. Before enabling the automation system, there are a few basic checks to perform:

1. Select the timecode reference for the automation system – the console may run as a master using its own internal timecode generator, or slave to external timecode (LTC or MTC). This option is set from the **System Settings** display, see Page 681.
2. Change the central GUI to display timecode rather than local time. This option can be set from the **System Settings** display, see Page 677, or by clicking on the time at the top of the title bar and selecting **Timecode**:

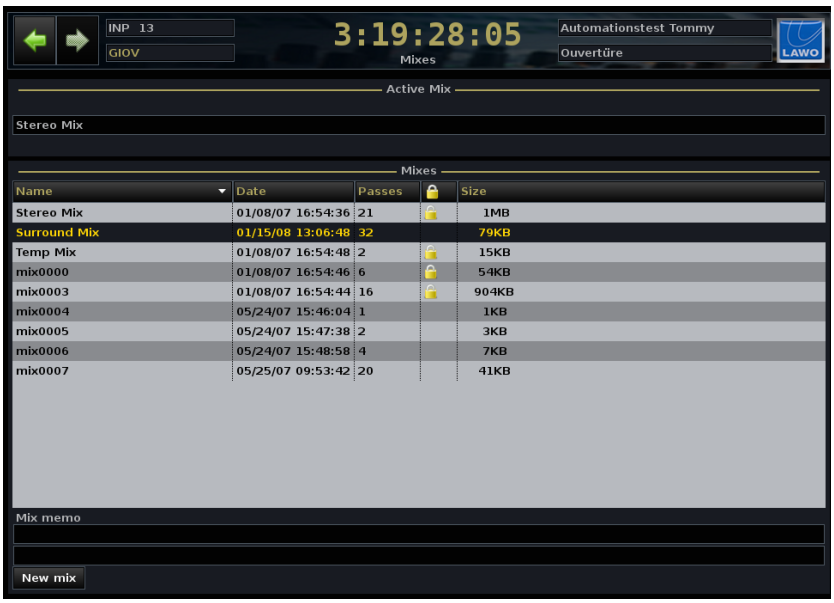
Press PLAY on your machine and check that the timecode on the display follows. If required, you can set a timecode offset and view this on the time display, see Page 542.

3. If required, set a pre-roll tolerance for your playback machine. This option is set by the **Pre-roll window** in the **Passes** display. See Page 543.
4. Check the **Mixes** display and, if necessary, create a new mix to store automation. See next page.
5. Select the channels/parameters you want to automate. See Page 485.

The Mixes Display

When you enable automation, data from the **Active Mix** is loaded to the console. Therefore, to make sure you don't lose your settings, by loading automation already stored within the production, check the **Mixes** display.

1. Press the **AUTO** SCREEN CONTROL button to access the **Mixes** display:



Note that each time you press the **AUTO** button you toggle between two pages – **Mixes** and **Passes** – so keep pressing until you see correct page.

Note

The **Mixes** list shows all the mixes stored within the current production. The columns beside each mix name show the date and time stamp for the mix, the number of passes it contains, whether it is protected (padlock icon) and the size of the mix.

At the bottom of the display, the **Mix Memo** box may be used to make notes for a particular mix.

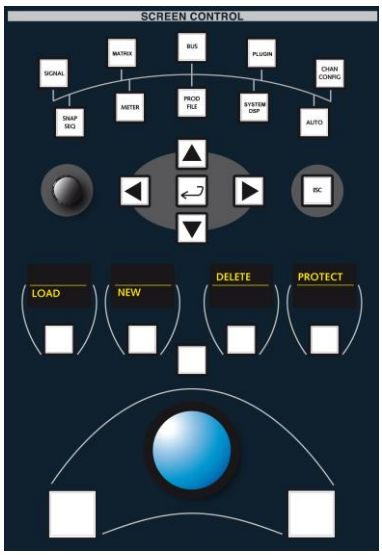
The name of the **Active Mix** is shown at the top of the display. This is the mix data which will load when you press the automation **ON** button. If this box is empty, you can skip straight onto selecting the channels and parameters you want to automate. The first time you enable the automation, a new mix is created automatically. However, if an **Active Mix** has already been loaded, you will need to create a new mix before proceeding. Otherwise, when you press the automation **ON** button, the system will load the **Active Mix** data to the console.

Tip

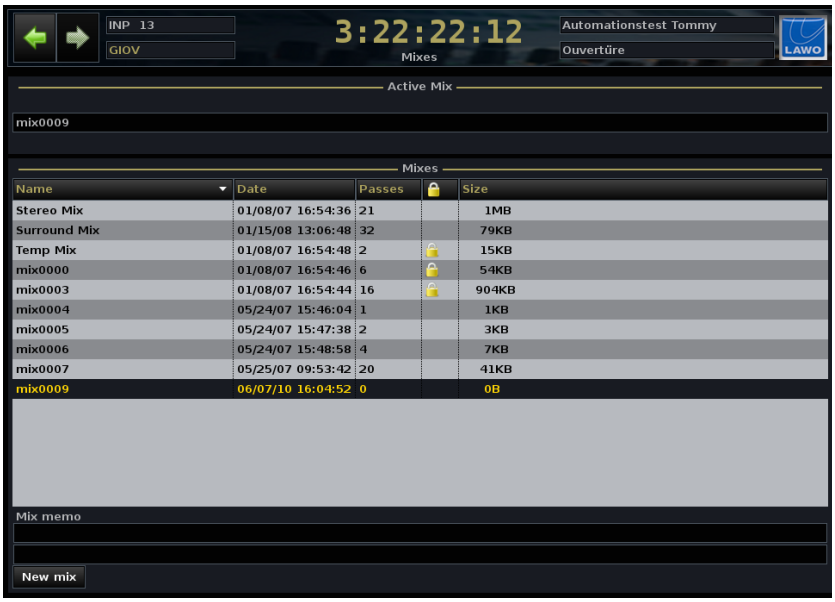
If the list of **Mixes** is longer than the available window space, focus on the list and use the rotary control on the SCREEN CONTROL panel to navigate up and down the list. You can also resize the windows using the trackball and/or use the on-screen scroll bars.

Creating a New Mix

1. Press the **NEW** soft key or on-screen 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:*

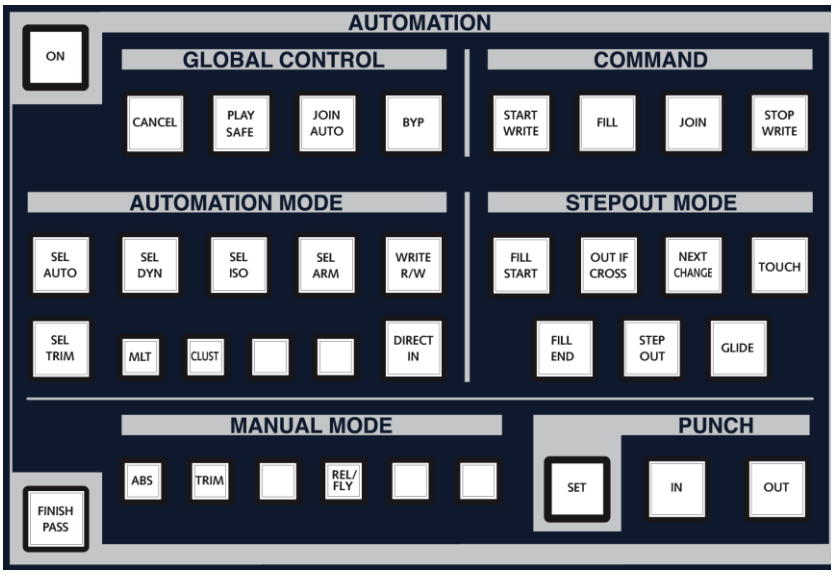


Selecting Faders/Parameters for Automation

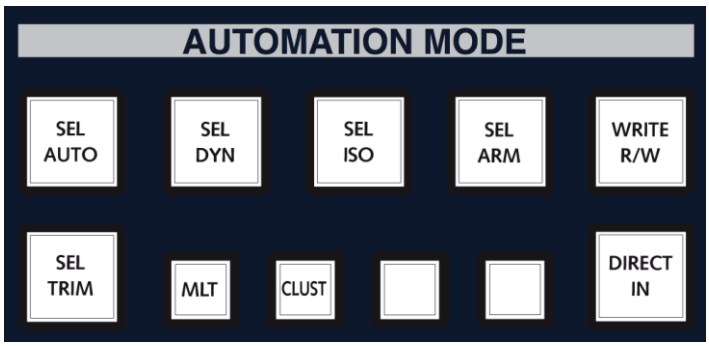
You can select which channels, and parameters within those channels, you wish to automate at any time during the mix. However, it's a good idea to think about your initial selections before enabling the automation.

Note that the first time you select a fader or module for automation, it will default to dynamic automation mode and be armed (ready to read and write automation). For more details on changing to static automation or disarming a fader/module, please refer to Pages 507 and 530.

To keep things simple, let's select the faders across all fader strips on the current bank/layer for automation. This operation is performed from the AUTOMATION front panel controls:

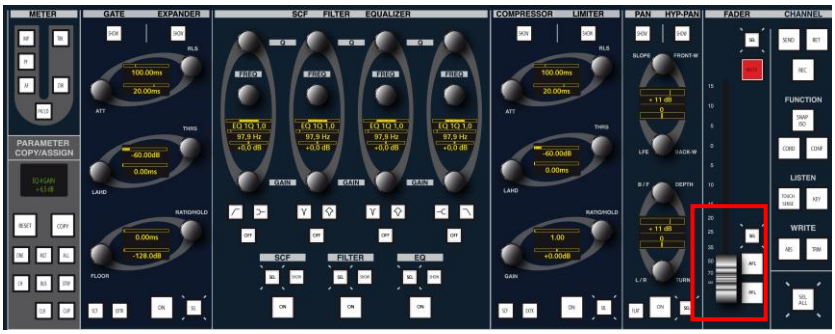


1. Assign one of the channels you want to automate to the Central Control Section, either by pressing its fader **SEL** button or entering the channel type and number from the ACCESS CHANNEL/ASSIGN control panel.
2. Press the **SEL AUTO** button, located in the AUTOMATION MODE section of controls:



The button flashes red to show it is active.

3. On the Central Control Section, select the audio module(s) you wish to automate, in our example, press **SEL** beside the fader:



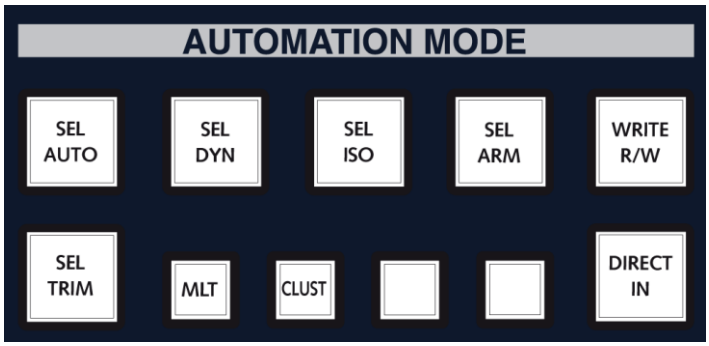
*The **SEL** button turns orange showing that the fader is selected for automation.*

Tip

4. To make sure that no other modules are selected other than the fader, first press **SEL ALL** twice – this will clear any existing selections. Now press the fader **SEL** button to select only this one module.

So far we have selected the fader on the channel in access for automation. To select the faders across the rest of the console:

5. Press the **MLT** button, located in the AUTOMATION MODE section of controls:



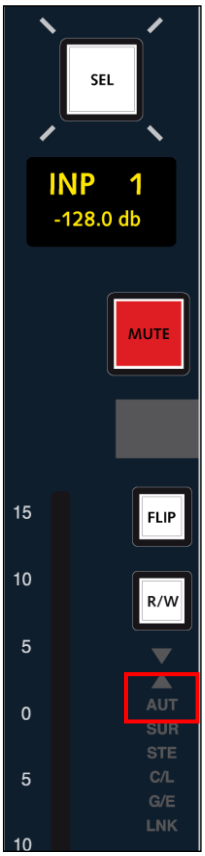
*This activates the multiple **SEL AUTO** mode and all the fader **SEL** buttons across the console flash, in green:*

6. Press the **SEL** buttons on the fader strips you wish to automate.

The buttons change from green to red when selected.

7. When you have finished, deselect **SEL AUTO** or press **ESC** to complete the operation.

Multiple faders across the console are now selected for automation. You can check which faders by looking at the **AUT** status LEDs on the fader strips.



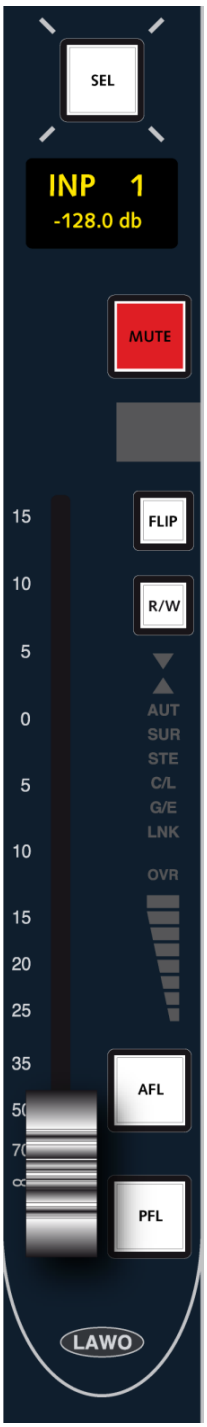
If you wish to select faders on hidden banks or layers, then bring each bank or layer to the surface and press the fader **SEL** buttons during step 6.

Note that if this is the first time you have selected the fader to be automated, it will default to dynamic automation mode and be armed (ready to read and write automation). For more details on these functions, please refer to Pages 507 and 530.

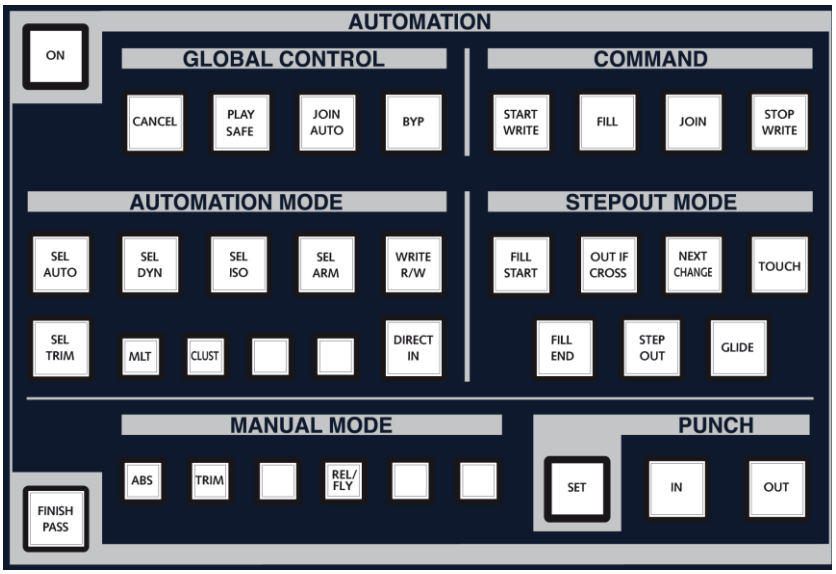
Turning On the Automation

Having selected the channels and parameters you wish to automate, you are now ready to turn on the automation and write your first pass.

Writing Your First Mix Pass



1. Press the **ON** button located at the top left of the AUTOMATION panel:

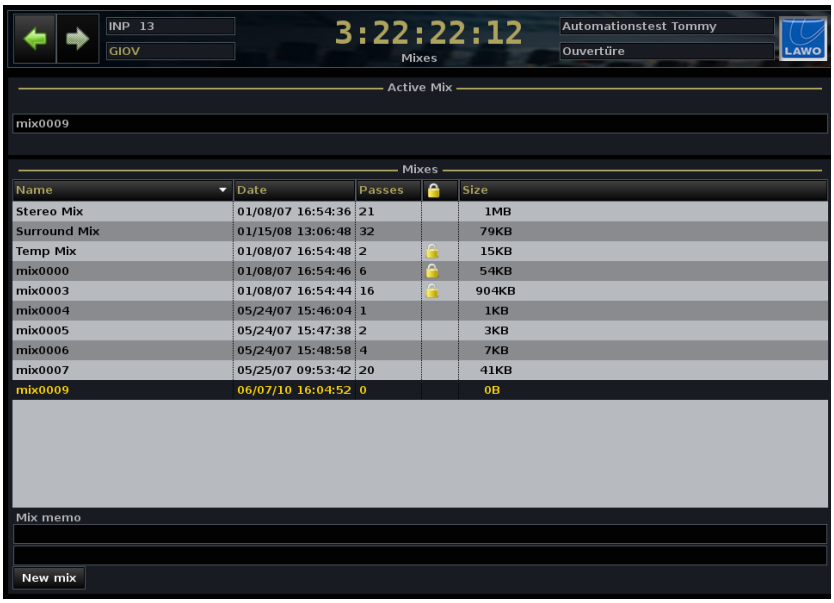


The **R/W** buttons beside each fader will turn green. If they don't, then the fader is not selected for automation. See Page 498 for details on selecting channels and parameters for automation.

2. Check that the **FILL END** button is selected from the STEPOUT MODE section of controls:

The **FILL END** automation 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. For details on alternative step out modes, see page 495.

3. If not already selected, press the **AUTO** SCREEN CONTROL button to view the **Mixes** display:



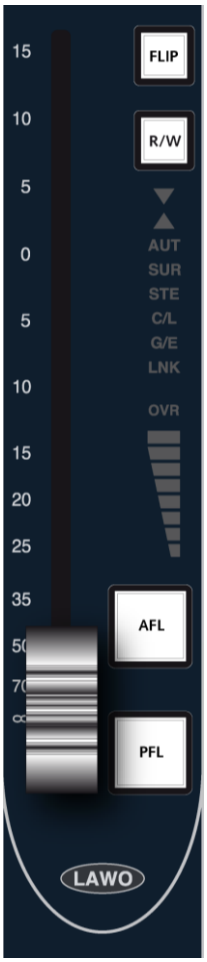
In our example above, a new mix (**mix0009**) was created manually using the new mix function, see Page 484. However, if this is a brand new production, then the system automatically creates a new mix when you turn automation **ON** - **mix0000.**

In either case, the **Active Mix** is shown at the top of the display.

4. Now press the **AUTO** SCREEN CONTROL button to page to the **Passes** display

The **Pass tree** should be empty as we have not yet written any data.

5. 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 now writing new data.

You will also see that a **Record pass** is created in the **Pass Tree** – as this is the first pass, it is named **pass0000**:

Note that you cannot create a new Record pass if the mix is protected.

6. When you are ready, you can 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 the **FINISH PASS** button located at the bottom left of the AUTOMATION control panel to manually finish the pass.

In either case, the stream of automation data is now 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.

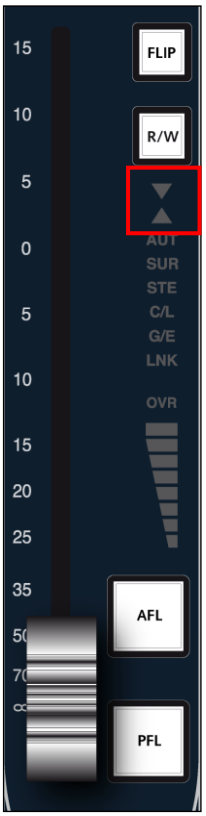
Watch your recorded moves play back against timecode!

Updating a Pass

To update the moves in **pass0000**:

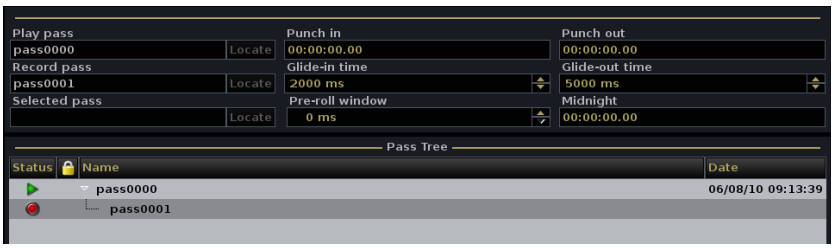
1. Press play and touch the faders you want to update.

The **R/W** buttons on the faders turn red to show that they are back in write. Other fader **R/W** buttons remain green and play back the moves from **pass0000**.



Note that the up and down arrows on the fader strip indicate the direction of the level stored within the Play pass. This is particularly useful when you using modes such as **OUT IF CROSS**, see Page 509.

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:

Note that as you selected the **FILL END** automation mode earlier, any levels in write when you finish the pass are written through to the end of the mix. See Page 495 for more details on alternative step out modes.

Note

3. Continue updating the mix as above.

Note that 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.

Tip

You can view the list of passes either by name or by date/time stamp, and rename or delete passes. See Page 539 for details.

Cancelling a Pass

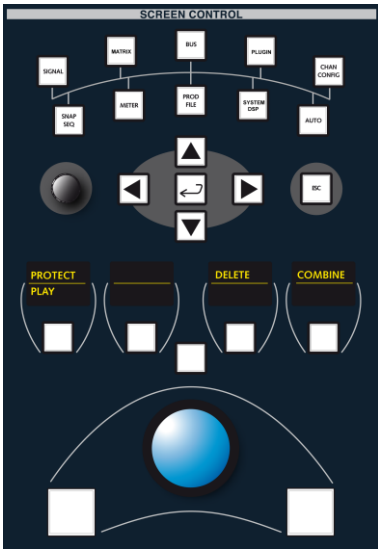
If you start a new **Record pass** and make a mistake, you can throw away the data before finishing the pass:

1. Press the **CANCEL** button located in the GLOBAL CONTROL section:

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**.

Reverting to an Earlier Pass

If you've made a mistake and have already finished the pass, then you can go back to an earlier play pass using the **Pass tree**.



1. Using the trackball or navigation controls, select the pass to revert to, for example **pass0002**.

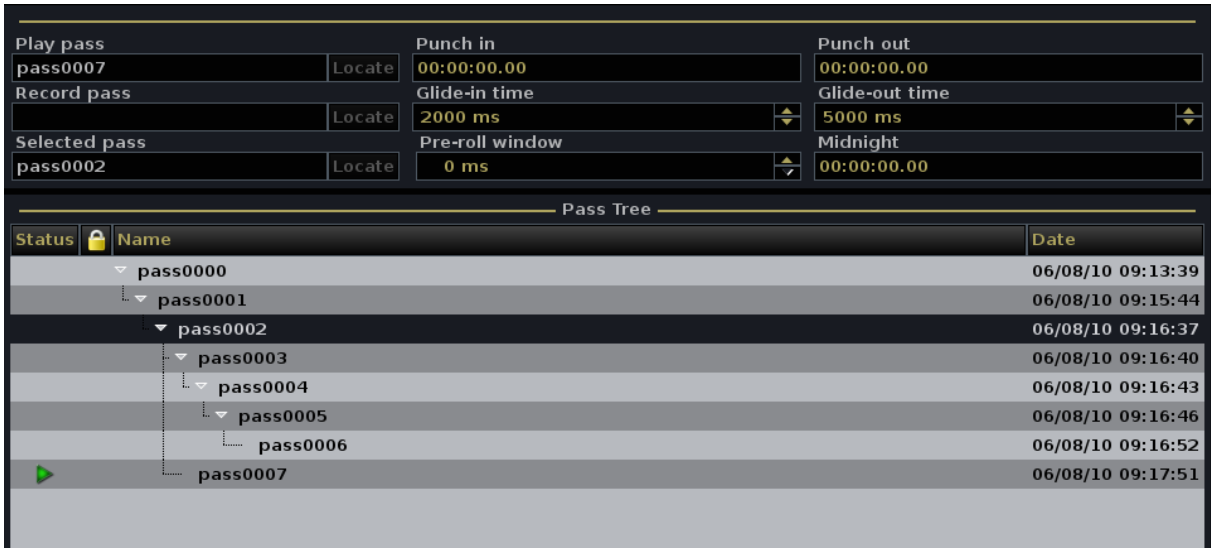
*The name of the pass is shown in the **Selected pass** box.*

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.*

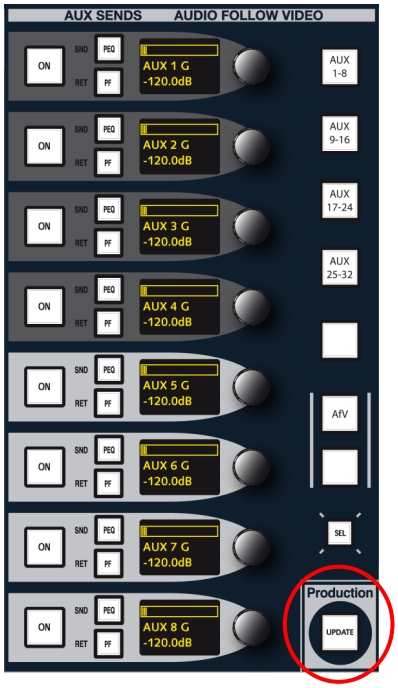
3. Now go into play and write some fader updates.
4. Finish the pass by locating backwards or pressing the **FINISH PASS** button.

Note that 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**:



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 may be loaded, renamed, deleted and edited. Please refer to Page 539 for more details on using the **Passes** display.

Saving Your Mix Data



Every time you finish a pass you create a new temporary pass stored within the active mix. To store all the finished passes for a mix permanently, you *must* update the production.

When a production is updated, all passes within each mix are stored permanently onto the system's user data flash card. Any number of passes may be stored within the mix, and any number of mixes within each production. You can use the File Import/Export functions to copy mixes onto USB or a network drive for archiving purposes.

Please refer to Chapter 6 for more details on productions and data storage.

Updating Fader Moves

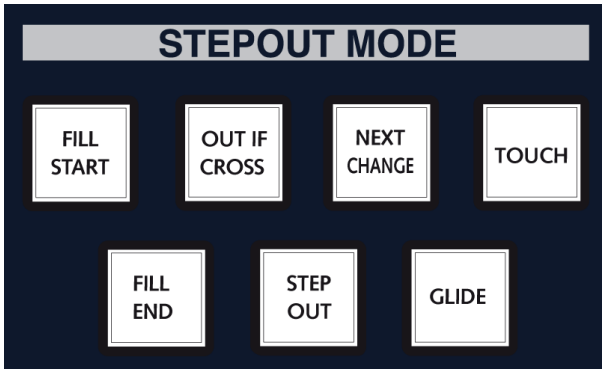
So far we have updated fader moves by touching the faders to step into write, and finishing the pass to step out of write. By using the **FILL END** automation mode, any levels in write when the pass is finished are written through to the end of the mix.

To go back and correct moves earlier in the song or production, we need to change to **STEP OUT** mode. In addition, you can make mixing more efficient by using the fader **R/W** buttons, or touch sense, to step out of write while in play.

Step Out Automation Mode

Writing in **STEP OUT** mode means that any parameter in write reverts to the Play pass data when you step out of write. This allows you to write a new move early on in the song or production, step out of write and keep all your following moves from the previous Play pass.

1. Press the **STEP OUT** button, located in the STEPOUT MODE section of controls, to change from 'fill to end' to 'step out' automation.



2. Press Play and touch the faders you want to update.

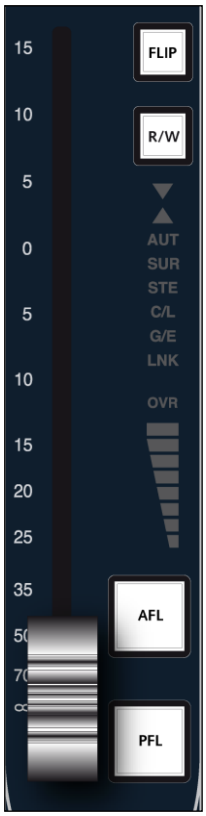
*The **R/W** buttons on these faders turn red to show that they are in write.*

3. Finish the pass either by pressing **FINISH PASS** or locating backwards.

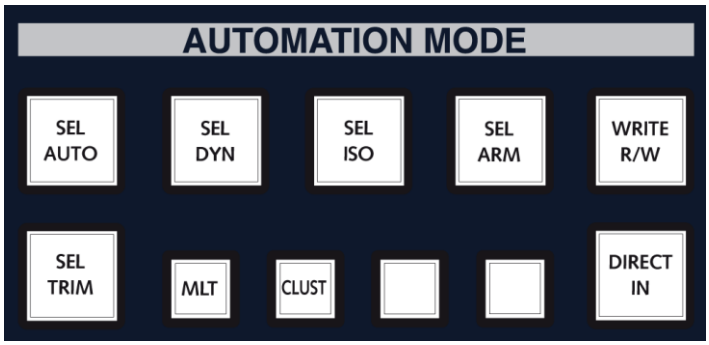
Now play back the pass and you should see your new fader moves followed by moves from the previous play pass.

Using the 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. To work in this way, first select the **WRITE R/W** button located in the AUTOMATION MODE section of controls:



The **R/W** buttons beside each fader now allow you to step in and step out of write for that fader.

Note that when **WRITE R/W** is not selected, the **R/W** button disarms the fader. This means that the fader is write-protected and you won't be able to write new automation data for it. See Page 530 for more details on arming and disarming.

2. To step in to write you can now either touch the fader or press the **R/W** button beside the fader.

*The **R/W** button turns red to show that the fader is in write.*

3. To step out of write, press the **R/W** button again.

*The fader jumps back to its previous pass position and the **R/W** button turns green to indicate that the fader is now reading back the Play pass.*

4. Continue stepping in and out of write on as many faders as you wish as you roll forwards in play.
5. When you finish the pass all the updates you have made are recorded in the new Play pass.

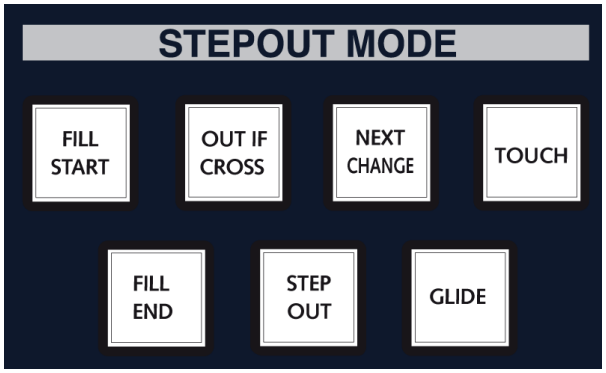
You can combine **STEP OUT** and **WRITE R/W** with other modes such as **GLIDE**, **OUT IF CROSS** or **NEXT CHANGE**. For more details on stepout modes, please refer to Page 509.


Tip

You can also step in and out of write globally (for all parameters selected for automation) using the **START WRITE** or **STOP WRITE** buttons. Or step in and out for a cluster of channels (for example, to update your brass section!) using the **CLUST** button. See Page 520 for more details on global or cluster operations.

Touch

If you would like the faders to step out of write when you release them, then turn on the **TOUCH** button located in the STEPOUT MODE section of controls:



1. Step into write by touching the fader.

*The **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 the **R/W** button turns green to indicate that the fader is now reading back the Play pass.*


Tip

You can combine **TOUCH** with **GLIDE** if you wish the faders to glide back to the Play pass on release. For more details on automation modes, please refer to Page 509.

Note that **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 as described on Page 512.

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 bus routing.

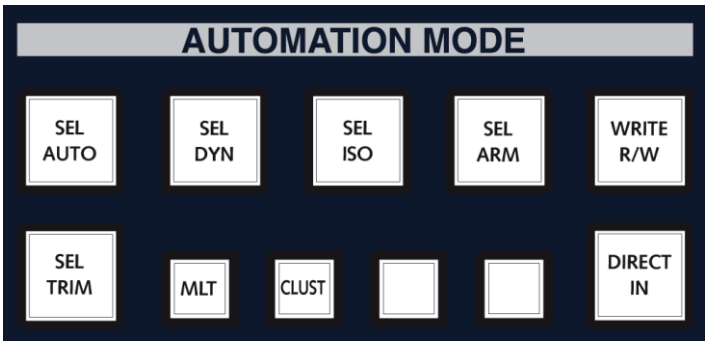
Faders and rotary controls are touch sensitive which allows them to step into write whenever you touch a fader or control. Switches step into write whenever you change the state of the switch or force a step in using the **WRITE R/W** mode.

Let's look at a couple of examples - writing automated mutes and writing a dynamic pan move.

Selecting Channel Parameters for Automation

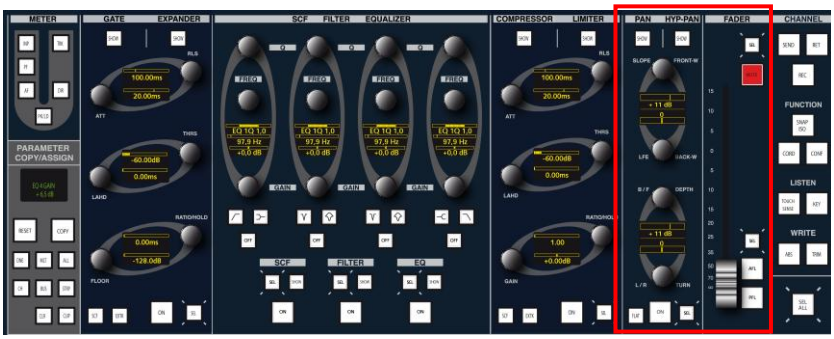
First, you need to select the parameters you wish to automate using the **SEL AUTO** function and the Central Control Section.

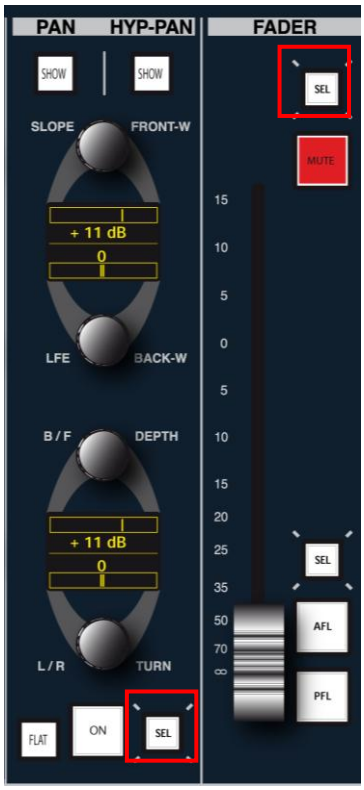
1. Assign one of the channels you want to automate to the Central Control Section, either by pressing its fader **SEL** button or entering the channel type and number from the ACCESS CHANNEL/ASSIGN control panel.
2. Press the **SEL AUTO** button, located in the AUTOMATION MODE section of controls.



The button flashes red to show it is active.

3. On the Central Control Section, select the audio module(s) you wish to automate, in this example mute and pan, by pressing the **SEL** buttons:



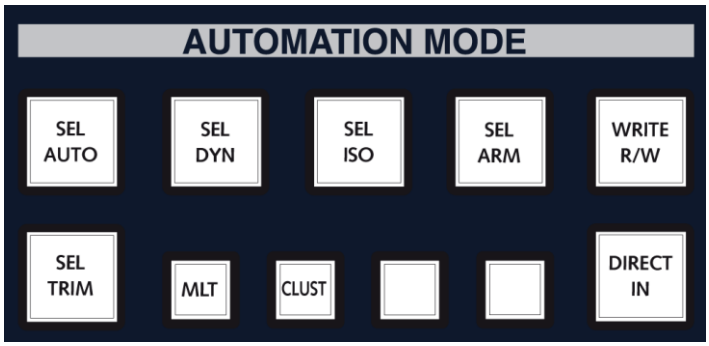


*The **SEL** buttons turn orange showing that the modules are selected for automation.*

Note that the fader **SEL** will also be lit if you have been writing fader automation on that channel.

To make the selections across multiple channels:

4. Press the **MLT** button located AUTOMATION MODE section of controls:



*This activates the multiple **SEL AUTO** mode and all the fader **SEL** buttons across the console flash, in green:*

5. Press the **SEL** buttons for the channels you wish to automate.

The buttons change from green to red when selected.

6. When you have finished, deselect **SEL AUTO** or press **ESC** to complete the operation.

The three parameters – fader, mute and pan – are now selected for automaton across multiple channels.

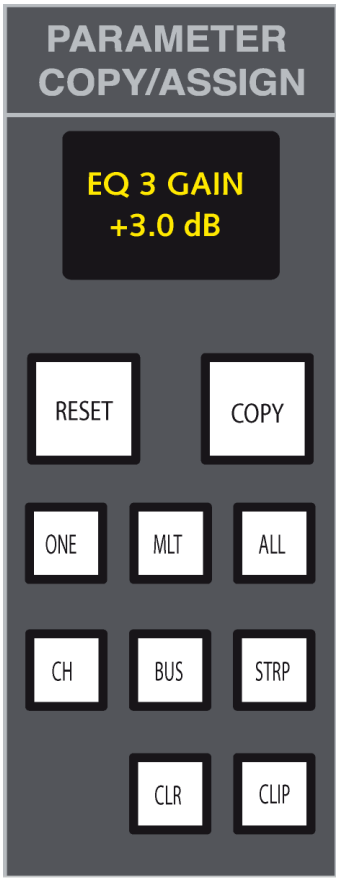
Note that if this is the first time you have selected parameters to be automated, they will default to dynamic automation mode and be armed (ready to read and write automation). For more details on these functions, please refer to Pages 507 and 530.

Note

If you wish to select automation for channels on hidden banks or layers, then bring each bank or layer to the surface and press the fader **SEL** buttons during step 5 above.

If you wish to select other parameters for automation, then use the corresponding **SEL** buttons from the Central Control Panel during step 3. Parameters are selected as follows:

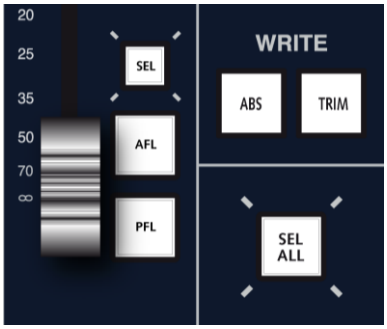
- INPUT MIXER – SOURCE or INMIX parameters depending on the INPUT MIXER mode, see Page 187.
- IMAGE – stereo image and position.
- DIG AMP - digital amplifier gain.
- DELAY– channel delay.
- INSERT – channel insert.
- DIROUT – direct output.
- GATE – gate.
- EXPANDER – expander.
- SCF – sidechain filter settings.
- FILTER – 2-band filter settings
- EQ – 4-band EQ settings.
- COMPRESSOR – compressor.
- LIMITER – limiter.
- PANNING – surround panning.
- MUTE **SEL** – status of the mute button.
- Fader **SEL** – the main channel level.



You can also automate other channel parameters using the following buttons on the PARAMETER COPY/ASSIGN panel:

- **CH** - selects the channel signal processing order as set on the **Channel Config** display.
- **BUS** - selects the channel's bus assignments.
- **STRP** - selects the fader strip's Free Control assignments!

To select *all* parameters for a channel, press the **SEL ALL** button:



By deselecting **SEL** buttons, you may then edit the selection to copy a subset of parameters.

To clear down all the selections:

1. Press the **SEL ALL** button above the Central Control Section Fader to select all audio modules.
2. Then deselect **SEL ALL**.

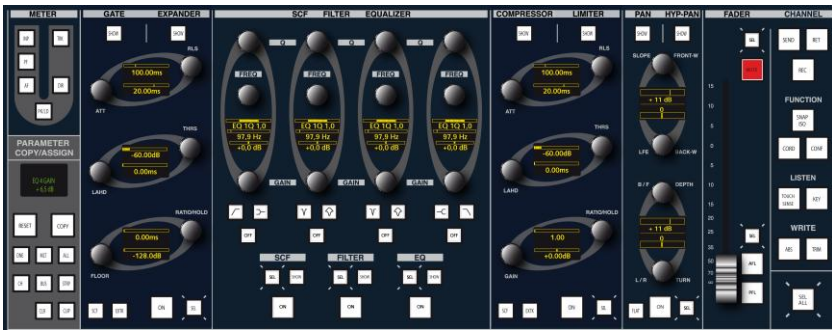
Writing Switch Automation

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 selected the mute buttons for automation, as described in the previous section, you should be ready to go.

Note

However, note that you will not be able to write automation if the mute buttons have been disarmed (see Page 530), and you will not be able to write dynamic changes if the mute buttons are running in static automation mode (see Page 507).

1. With automation on, 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:



*The mute **SEL** button turns orange when the mute is in write.*

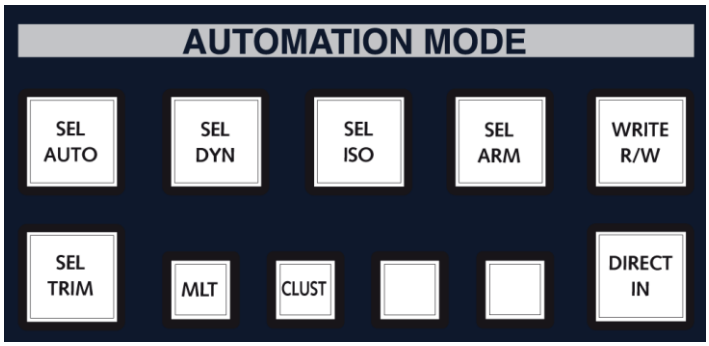
3. Finish the pass by locating backwards or pressing the **FINISH PASS** button and play back the automation.

*The mute **SEL** button turns green when the mute is in replay.*

Updating Switch Automation

You can update switch automation by rewinding and rewriting the switch change. However, if you want to remove a switch change you will want to step in and out of write while in play.

1. To work in this way, assign the channel you want to automate to the Central Control Section.
2. Next press the **WRITE R/W** and **SEL ARM** buttons located in the AUTOMATION MODE section of controls:



The **SEL** buttons beside each Central Control Section module now allow you to step in and step out of write for that module.

For example, to overwrite a mute which is in the wrong position, we want to step into write when the mute is off and then step out again past the mute on point from the previous pass. To do this:

3. Rewind before the mute you want to remove.
4. Step in to write by pressing the **SEL** button beside the mute on the Central Control Section.

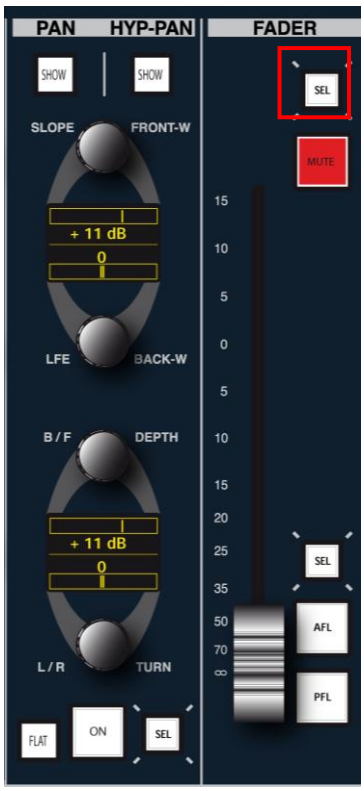
*The mute goes into write in its current state – i.e. mute off. The **SEL** button turns orange to show that the switch is in write.*

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. In our example, the status of the mute doesn't change.*

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**. For more details on automation modes, please refer to Page 509.

Tip

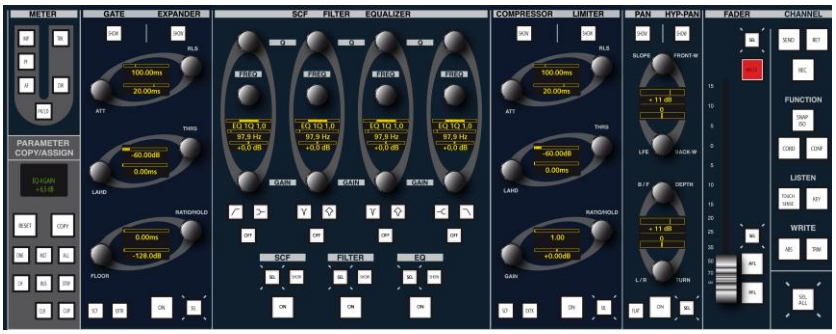
Writing Rotary Control Automation

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. Let's write a dynamic pan left/right pan move. Assuming that you have selected the pan module for automation, as described earlier, you should be ready to go.

Note

However, note that you will not be able to write automation if the pan module has been disarmed (see Page 530), and you will not be able to write dynamic changes if the pan module is running in static automation mode (see Page 507).

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:



*The panning **SEL** button turns orange when in write.*

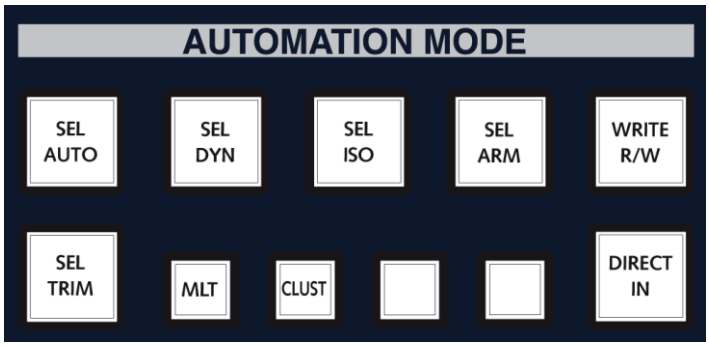
3. Finish the pass by locating backwards or pressing the **FINISH PASS** button and play back the automation.

*The panning **SEL** button turns green when in replay.*

Updating Rotary Control Automation

You can update the pan move by rewinding and rewriting the move. However, if the move starts too early or you want to write other automation on other parameters you will want to step in and out of write while in play.

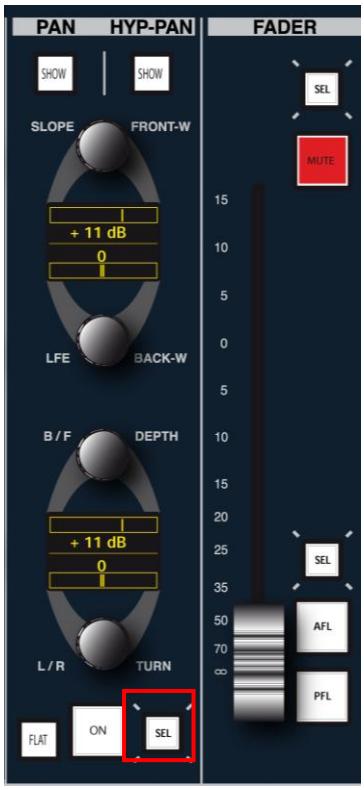
1. First, assign the channel you want to automate to the Central Control Section.
2. Next press the **WRITE R/W** and **SEL ARM** buttons located in the AUTOMATION MODE section of controls:



The **SEL** buttons beside each Central Control Section module now allow you to step in and step out of write for that 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 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**. For more details on automation modes, please refer to Page 509.

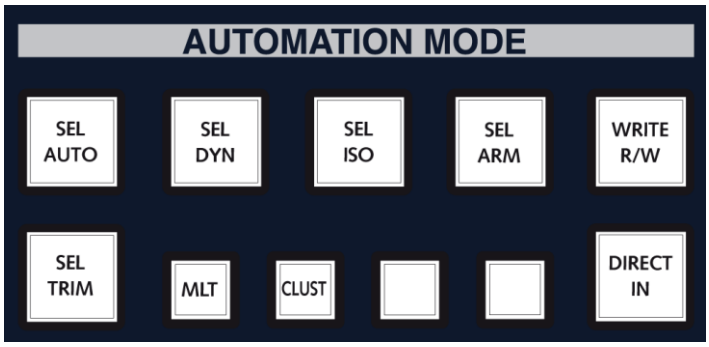
If you would like the controls to step out of write when you release them, then turn on the **TOUCH** button located in the STEPOUT MODE section of controls.

Tip

Updating Automation on Individual Controls

Note that you have the option to step in either on the complete audio module, or on an individual control as follows:

1. Select the **WRITE R/W** and **SEL ARM** buttons located in the AUTOMATION MODE section of controls:



2. Assign the channel you are automating to the Central Control Section.
3. With automation on, go into play.

The distinction between whether you write an individual control, for example EQ1 Gain, or the complete module is made as follows:

4. Move the EQ1 Gain rotary control to step in to write just on the one control.

*The EQ **SEL** button turns orange indicating that only part of the module is in write.*

5. Alternatively, press the EQ **SEL** button to force the 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.*

6. Make your changes and step out either by pressing the EQ **SEL** button or finishing the pass in the usual manner.

Automation Modes

The way in which automation is written is governed by three primary modes:

- Dynamic or Static automation
- The STEP OUT mode
- The MANUAL mode - Absolute or Trim

Dynamic or Static Automation

You can choose whether modules write dynamic or static automation – for example, you may wish to emulate an analogue 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.

In theory, it is not strictly necessary to select static automation if you want to save a single EQ setting for an entire mix. If you select only faders and mutes for automation, then all other modules remain at their current settings while running automation.

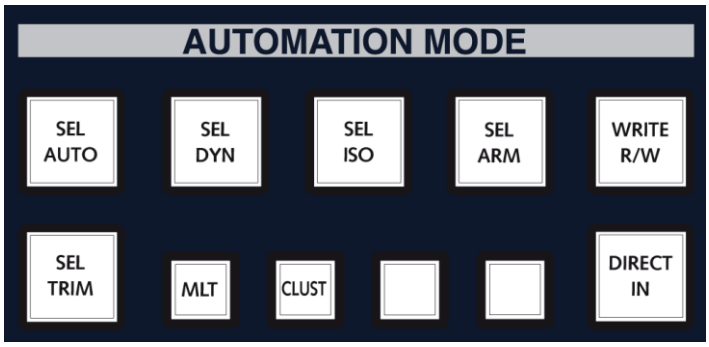
However, if for example, you then disable automation, load a different snapshot and re-enable automation. Because the EQ and other settings were not stored in the mix pass, you will not get back those settings simply by enabling the automation. To work in this way, you will need to make sure that you have saved a snapshot for all settings outside of the automation pass.

For this reason, we recommend selecting all modules for automation. You can then use static or dynamic automation modes to control whether settings are written dynamically or not.

When modules are selected for automation, they default to dynamic automation mode. To select static mode:

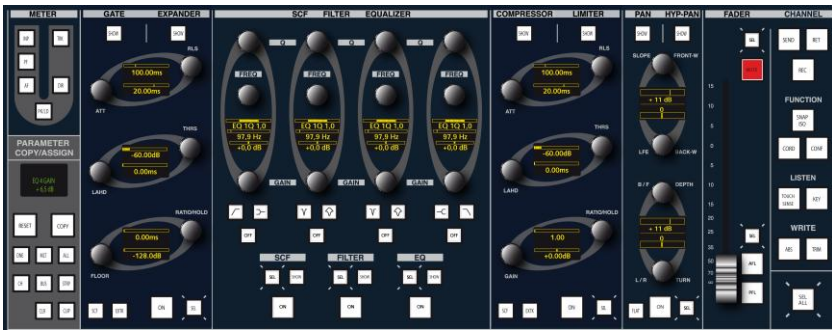
1. Assign one of the channels you want to change to the Central Control Section, either by pressing its fader **SEL** button or entering the channel type and number from the ACCESS CHANNEL/ASSIGN control panel.

2. Press the **SEL DYN** button, located in the AUTOMATION MODE section of controls.



The button flashes red to show it is active.

3. On the Central Control Section, select the audio module(s) you wish to automate by pressing the **SEL** buttons beside the modules.



*The **SEL** buttons turn orange showing that the modules are selected for automation on that particular channel.*

4. To make the selections across multiple channels, use the **MLT** button and fader **SEL**ects as you did to enable channels for automation.

5. When you have finished, deselect **SEL DYN** or press **ESC** to complete the operation.

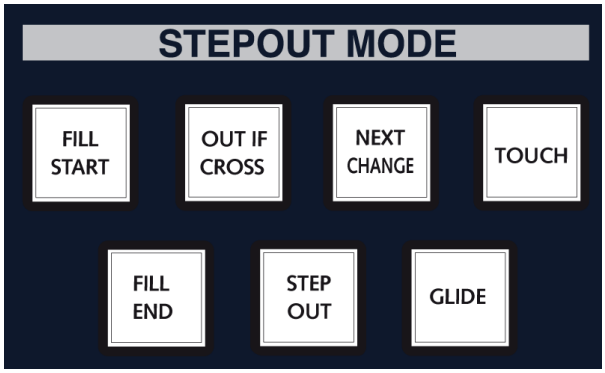
The selected parameters across the selected channels are now set for static automation.

Note

This means that when you make changes to these parameters, the last value is written for the entire mix, providing a great way to write one EQ or one Compressor setting across the whole song or production.

Step Out Automation Modes

These modes affect what happens when you step out of write, and are selected from the STEPOUT MODE buttons on the AUTOMATION control panel:



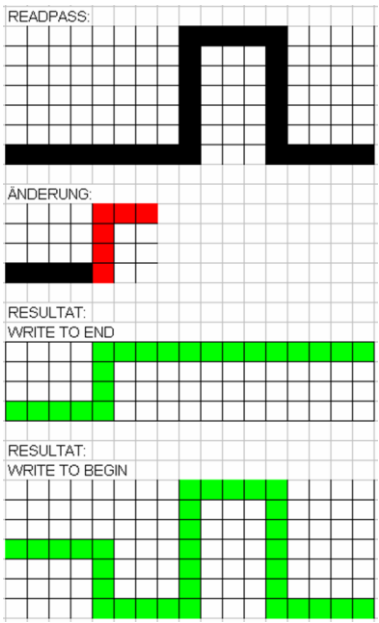
There is a choice of several modes, many of which can be used in combination with each other to achieve different results.

Note that it is the mode selected when you finish the pass which will be applied. For example, if you are in **STEP OUT** mode while playing through the chorus but then decide you wish to write the updated values to the beginning of the mix, you can stop, change to **FILL START** and then press **FINISH PASS** to finish the pass.

Note

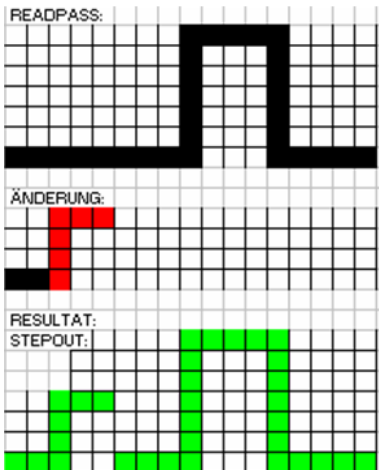
FILL START and FILL END

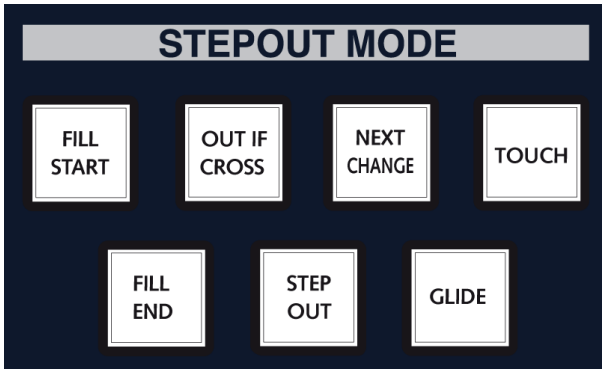
- **FILL END** – this automation mode is great for writing your first passes where you are working through the song or production chronologically. Each time you stop and finish a pass, any values in write are written through to the end of the mix. This means that you don't have to play through the whole song just to write a fader level to the end of the mix.
- **FILL START** – using this mode, any values in write are written back to the start of the mix.
- **FILL END** plus **FILL START** – with both modes selected, any values in write are written as a static value for the whole mix.



Note that you can also write static values between specific timecode points using the Punch In and Punch Out times in conjunction with the COMMAND **FILL** button. See Page 526 for details.

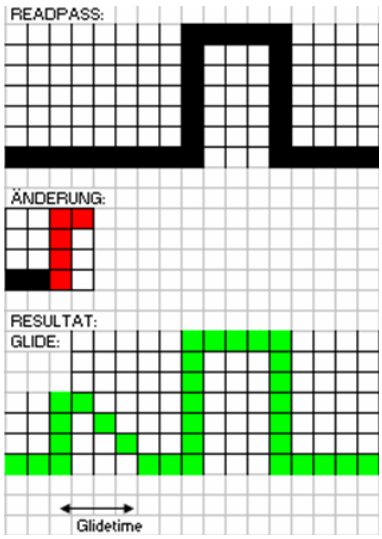
STEP OUT





Writing in **STEP OUT** mode means that any parameter in write reverts to the Play pass data when you step out of write. This allows you to write a new move early on in the song or production, step out of write and keep all your following moves from the previous Play pass.

GLIDE



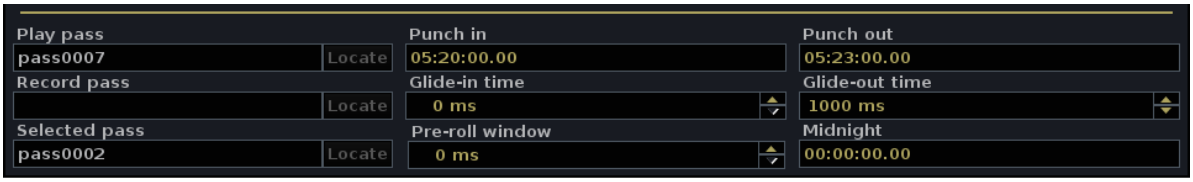
Combine **STEP OUT** with **GLIDE** to create a glide back to the Play pass when you step out of write:

GLIDE is applied to all variable parameters – fader levels, panning, aux send levels, etc. – and can be used in conjunction with **TOUCH** such that controls will step out of write on release and glide back to the Play pass.

The glide time is set by the **Glide-out time** at the top of the **Passes** display:

1. Press the **AUTO** SCREEN CONTROL button to access the **Passes** display.
2. Either click within the **Glide-out time** box and type in a value from the console keyboard.
3. Or use the up/down arrows to adjust the time in 100 ms steps.

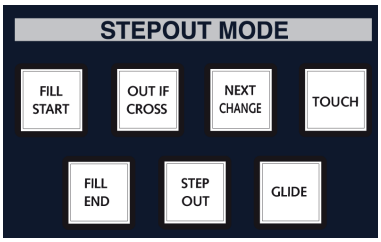
The glide-out time may be adjusted from 0 to 60000ms (60 seconds):



Note that the **Glide-in time** is used in conjunction with mix pass edits, see Page 544 for details.

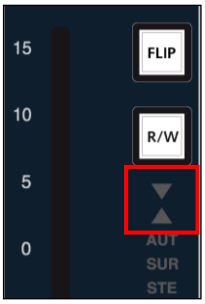
OUT IF CROSS

This mode can be combined with **STEP OUT**, **FILL END** or **FILL START** and is a great mode for updating variable parameters such as fader levels.



When selected, any values in write will automatically step out when their value crosses the read pass.

For example, you may use this mode if you wish to update a fader level before a fantastic move you have just written! Go back and update your level; when the read pass crosses the new level, the automation automatically steps out and replays your fantastic move from earlier!



Use the up/down arrow LEDs beside the fader to show whether you need to move your fader up or down to cross the read pass.

NEXT CHANGE

This mode can be combined with **STEP OUT**, **FILL END** or **FILL START** and is great mode for updating switched parameters such as mutes.

When selected, any values in write will automatically step out when a parameter change occurs in the read pass:

For example, let's say that you have written some mute automation and now wish to update a section earlier in the mix. Go back and update your mute automation and leave your mute switch in write. When the next change of mute position occurs in the read pass, then the mute will automatically step out of write.

TOUCH

If you would like faders or rotary controls to step out of write when you release them, then turn on the **TOUCH** button.

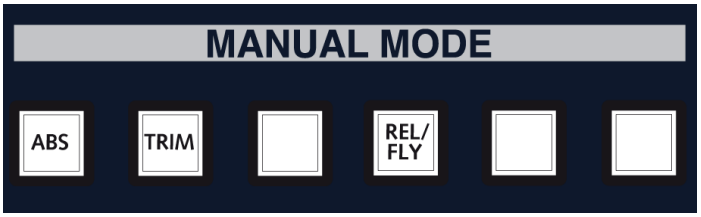
Tip

You can combine **TOUCH** with **GLIDE** if you wish the faders or controls to glide back to the Play pass on release. For more details on automation modes, please refer to Page 509.

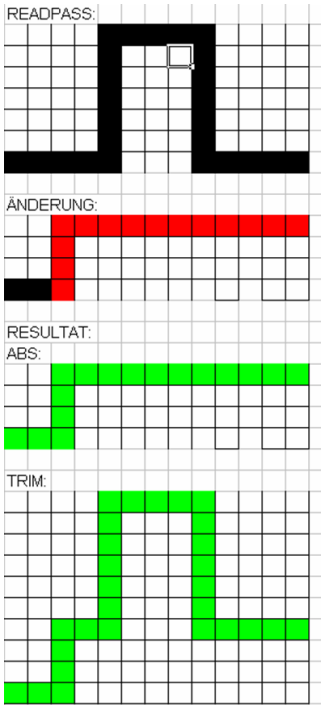
Note that **TOUCH** applies to any variable control so you can use it on touch sensitive rotary controls such as panning and aux sends as well as faders!

Absolute and Trim

The **ABS** and **TRIM** buttons on the MANUAL MODE panel 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 may 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 opposite show the affect of an update (ANDERUNG) to the Play Pass (READPASS) when written in absolute and when written in trim.

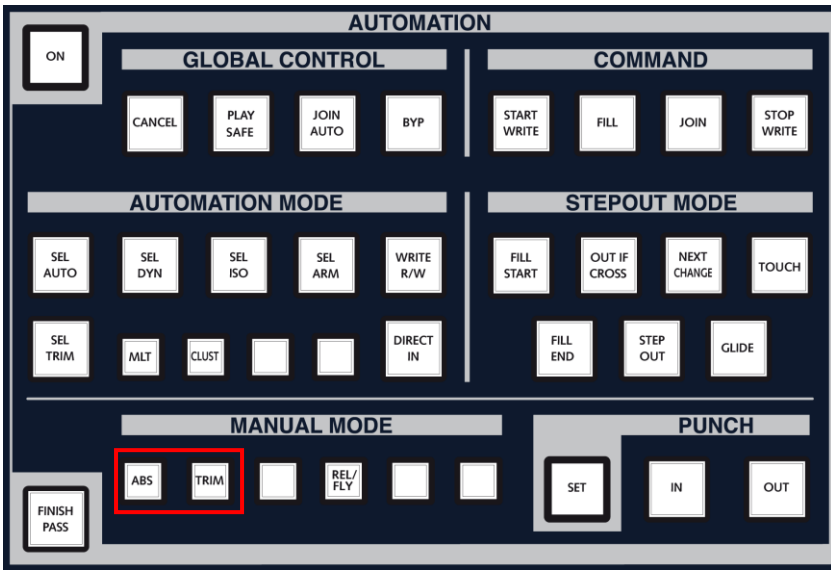
Note that Trim can be used to offset dB parameters such as fader level and EQ gain, or ranges such as Pan L/R. Other parameters, such as EQ frequency, cannot be trimmed and will always update in absolute.

Also note that Trim can be selected either globally across the console or selectively for specific controls or channels.

Selecting Absolute or 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 on AUTOMATION panel:



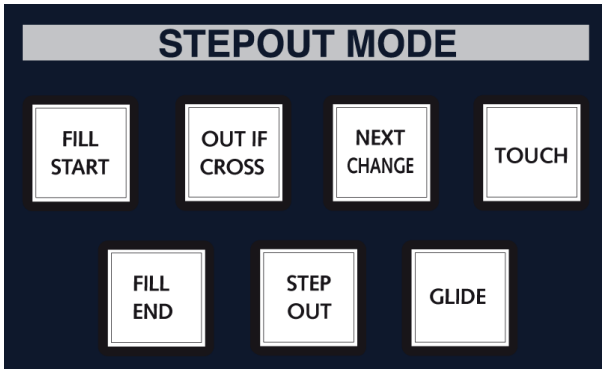
1. Select **TRIM** to activate trim.
2. Select **ABS** to return to absolute.

Note that if both buttons are off (unlit), then some controls are selected for trim while others remain in absolute. See Page 517 for more details.

Note also that certain parameters, such as frequency, cannot be trimmed, and will always update in absolute regardless of the **ABS**/**TRIM** mode.

Step Out Modes

Trim is applied according to the STEPOUT MODE, so check the status of these buttons before performing your update:



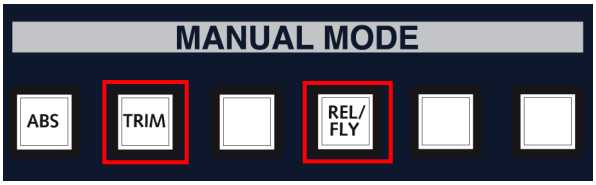
For example:

- 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).

For full details on step out modes, please see Page 509.

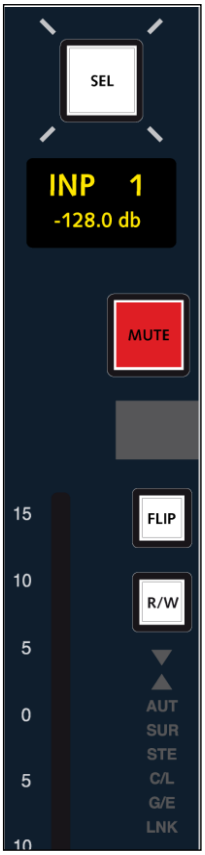
Trim Modes

Once **TRIM** is enabled, you have the choice of two different Trim modes. These are selected by the **REL/FLY** button:



Let's use the example of trimming a fader to explain the modes:

Trim On the Fly



1. Select **TRIM** and **REL/FLY** (lit)
2. Select the STEPOUT MODE, for example, **TOUCH**.
3. While automation is playing back, touch the fader to update its position.

*The **R/W** button turns red to show that the fader is in write, and 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 (**-128.0dB)** shown opposite.

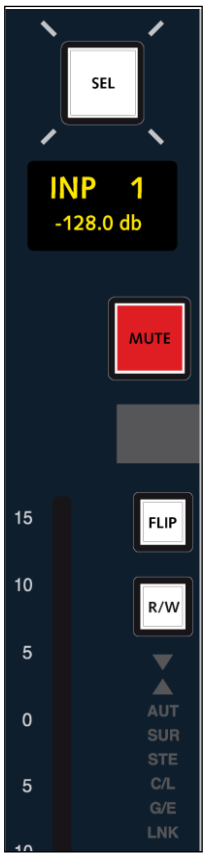
4. Let go of the fader to step out of write.

*As soon as you let go, the fader returns to replay; the **R/W** button turns green. Fader moves from the current Play Pass are replayed and the Fader Label Display returns to the Play Pass value.*

Note:

- 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 from the Play Pass play out; the **R/W** button stays red as the fader is still in write (trim). The fader remains in write until you deselect the **R/W** button or 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.

So, **Trim On the Fly** is great if you wish to keep a sense of the underlying Play Pass from the fader positions; faders only stop moving when you touch them to adjust the trim offset.



Trim Relative

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 STEPOUT 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 from the Play Pass.

4. Touch the fader to step into write.

*The **R/W** button turns red to show that the fader is in 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 (**-128.0dB)**.

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; the **R/W** button turns green.*

So, **Trim Relative** is great if you wish to use the physical position of the fader to show the trim offset. This can be a good way of getting a quick overview of how much trim you applying by looking at how far each fader has moved from its 0dB position.

Note

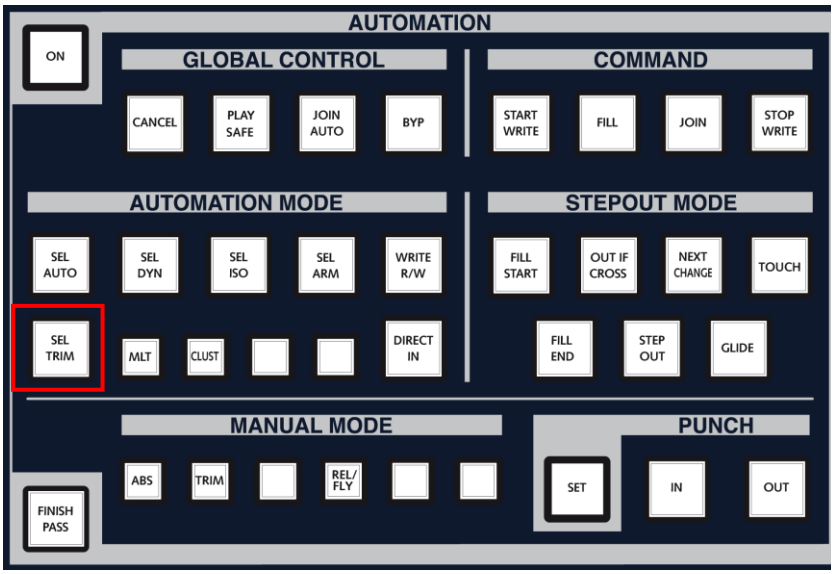
Note that both **Trim On the Fly** and **Trim Relative** can be used for any trimmable parameter.

Note also that the **R/W** button colours beside controls indicate the read/write status as follows:

- **Red** – the control is in write (either in Trim or Absolute).
- **Green** – the control is in read (replay).
- **Orange** – the control has new data written but the pass has not yet been finished. For example, if you have trimmed a fader and then switched back to **ABS** automation mode, the fader's **R/W** button turns orange to indicate there is unfinished trim data in the Record Pass.

Selective Trim

If you wish to update some controls or channels in Trim while others update in Absolute, then you can use the **SEL TRIM** function:



Note that the first time you select a fader or module for automation, it will default to Absolute.

Note

The **SEL TRIM** function allows you to select Trim for single or multiple controls across one or more channels.

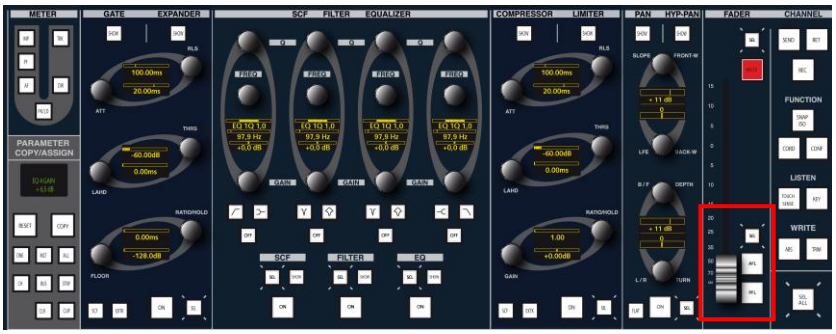
To use this function, automation must be enabled (AUTOMATION **ON** lit). Note that any selections you make are temporary. So, if you turn automation off and back on, all parameters are reset to **ABS**.

The selection process work in a similar fashion to the **SEL AUTO** and **SEL DYN** buttons. So, to put all faders into Trim, while other controls remain in Absolute:

1. Assign one of the channels you want to trim to the Central Control Section, either by pressing its fader **SEL** button or entering the channel type and number from the ACCESS CHANNEL/ASSIGN control panel.
2. Press the **SEL TRIM** button, located in the AUTOMATION MODE section of automation controls.

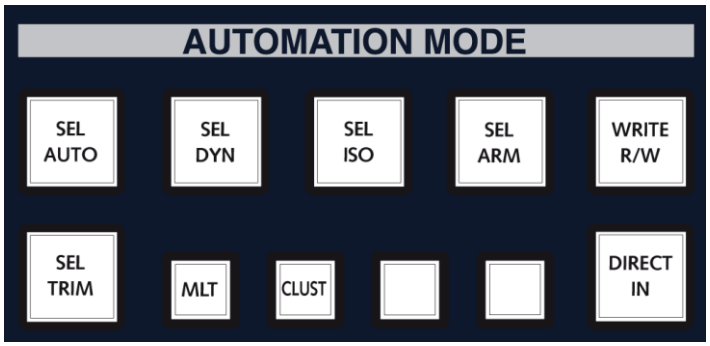
The button flashes red to show it is active.

3. On the Central Control Section, select the audio module(s) you wish to place in trim using the **SEL** buttons – in our example, press **SEL** beside the fader:



So far we have selected Trim for the fader in access. To select Trim for all the faders across the rest of the console:

4. Press the **MLT** button located, in the AUTOMATION MODE section of automation controls:



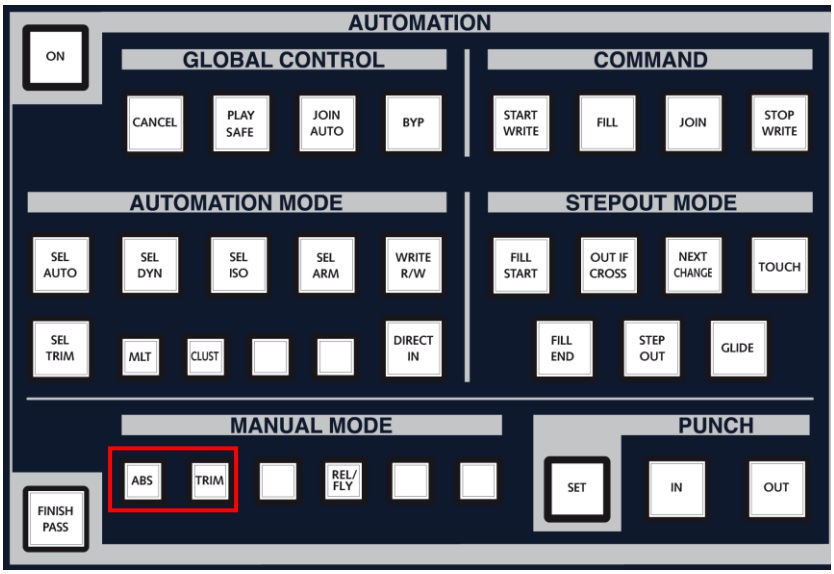
*All the fader **SEL** buttons across the console flash, in green:*

5. Press the **SEL** buttons on the fader strips you wish to switch to Trim

The buttons change from green to red when selected.

6. When you have finished, deselect **SEL TRIM** or press **ESC** to complete the operation.

Multiple faders across the console have now been switched to Trim, while other controls remain in Absolute. This is indicated on the MANUAL MODE panel where you will see both **ABS** and **TRIM** buttons are off (unlit).



7. To reset all controls and channels to Absolute, press the **ABS** button.
8. Or, to reset all controls and channels to Trim, press **TRIM**.

Note that not all controls can be trimmed.

Note

Note that you can also use the **CLUST** button during **SEL TRIM** to define a cluster of channels. See Page 521 for more details.

Command Functions

Earlier we used the **R/W** and **SEL** buttons to step in and out of write on individual channels. However, there are a number of COMMAND functions which you can use to step in or out of write across multiple channels, or to set an automatic step in/step out between two timecode values (Punch In/Punch Out):

Note

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 you use **START WRITE** in combination with **FILL END**:

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. What happens next depends on your choice of operation:

- If you locate backwards to finish the pass, then the selected mode will be applied - **FILL END**. In other words, the values in write will be written to the end of the mix.
- However, if instead of finishing the pass, you 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.

For more details on automation modes, please see Page 509.

Global Step In/Step Out

The **START WRITE** and **STOP WRITE** buttons allow you to step in and out of write globally across all automated parameters on the console.

1. Press the **START WRITE** button to step into write across the console:

*All parameters and modules which have been selected for automation step into write. The **R/W** buttons beside each fader will turn red when in write.*

2. Press the **STOP WRITE** button 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.


Tip

Cluster Step In/Step Out

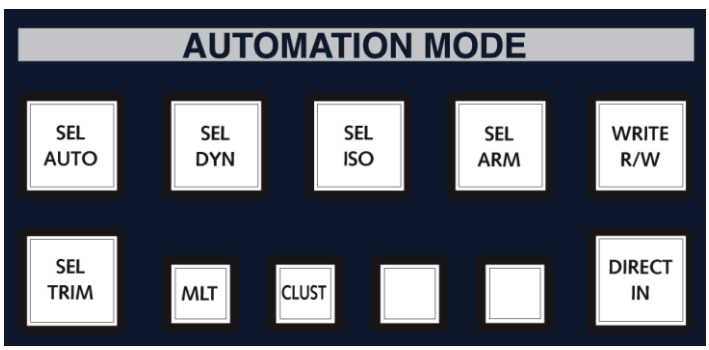
You can use the Cluster function to step in or out of write across a cluster of channels. The cluster works like a group but just for automation parameters. First define which channels you wish to cluster. Then when you step into write on say the EQ on one channel, all EQ sections within the cluster also step into write.

Note that the **CLUST** button can be used to step in and out of write, or to arm and disarm clustered parameters. See Page 531 for details on **SEL ARM**.


Note

First, define the clustered channels as follows:

1. Press the **CLUST** button located in the AUTOMATION MODE section of controls:



*The button flashes to show that it is active, and all the fader **SEL** buttons across the console flash, in green.*

2. Press the flashing fader **SEL** buttons to add channels to the cluster.

*The fader **SEL** buttons change from green to red.*

3. Deselect the **CLUST** button to complete this part of the operation.

The cluster is now defined.

You can now step in and out of write across a group of parameters within the cluster.

Note that you must step into write using the **SEL** buttons within the Central Control Section to action the cluster function.

For example:

4. Assign a channel within the cluster to the Central Control, Section and step into write on the EQ module using the **SEL** button.

Note

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.

You can also use the Cluster function to arm or disarm the cluster of parameters, see Page 531, or to select a cluster of parameters for trim, see Page 517.

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 the **JOIN AUTO** button, located in the GLOBAL CONTROL section of automation controls:

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 **R/W** fader strip buttons and/or **SEL** buttons on the Central Control Section.*

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.


Tip

JOIN AUTO also provides a useful tool for checking which controls you updated on your last pass. For example, if you accidentally touched a fader on your last record pass, then when you play back the pass and reach the join timecode, the fader's **R/W** button turns red as it joins.

COMMAND JOIN

The COMMAND **JOIN** button is very similar to **JOIN AUTO** but allows you to join (step controls into write) 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.

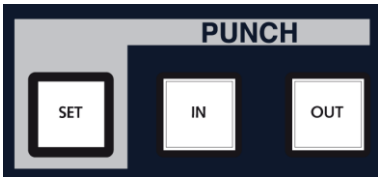
Punch In/Punch Out Automation

The Punch In and Punch Out times can be used for two applications:

- To automatically set the timecode positions where controls will step in and step out of write so that you do not accidentally update automation outside of this timecode window.
- Or, 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. Press the **AUTO** SCREEN CONTROL button to access the **Passes** display.
2. Play or locate your timecode to the punch in time.
3. Then on the AUTOMATION front panel, locate the PUNCH buttons.
4. Press **SET** (it will flash) followed by **IN**:



*The current timecode position is entered in the **Punch in** time box on the **Passes** display.*

5. Now play or locate your machine to the punch out time, and press **SET** followed by **OUT**.

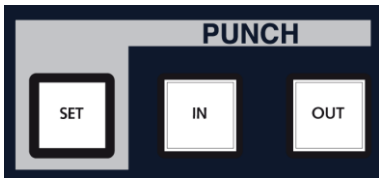
*The current timecode position is entered in the **Punch out** time box on the **Passes** display.*

6. Deselect the flashing **SET** button to complete this part of the operation.

You can also select the **Punch in** or **Punch out** boxes using the trackball or keyboard TAB button, and enter a timecode value from the console keyboard:

Tip

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 the **IN** and **OUT** buttons to make the punch in and punch out times active.

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. The **R/W** buttons beside each fader will turn red when in write.*

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. The **R/W** buttons beside each fader will turn green.*

Note

You can select the **IN** and **OUT** buttons independently if you wish to only step in or step out automatically.

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 to define the start and end of the region as described earlier.
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.*

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** – when running in 'Play Safe', all channels will read automation data from the Play pass but cannot write new data. In addition, if you move the position of a control, you will *NOT* hear any change in the audio. This mode applies globally to all channels and parameters, and is a great mode to use when laying back your mix.
- **BYP** – this mode is very similar to 'Play Safe'. When running in 'Bypass', all channels will read automation data from the Play pass but cannot write new data. The difference to 'Play Safe' is that if you move the position of a control you *WILL* hear the change in audio.

Tip

While running in 'Bypass', if you adjust a control and like the new value, you can step the control into write using **DIRECT IN**, see Page 529.

- **SEL ARM** – alternatively, you may wish to protect the mix data on individual controls while you write new moves on others. To do this use the **SEL ARM** function. Armed controls are armed for reading and writing automation data. Disarmed controls will read automation but cannot write new data.

Let's look at these functions in more detail.

Play Safe

This mode applies globally to all parameters of the console:

1. To enable this mode, press the **PLAY SAFE** button located on the GLOBAL CONTROL panel:

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 move the position of a control, you will NOT hear any change in the audio, and when you let go the control will step back to its Play pass position.

Bypass

This mode applies globally to all parameters of the console:

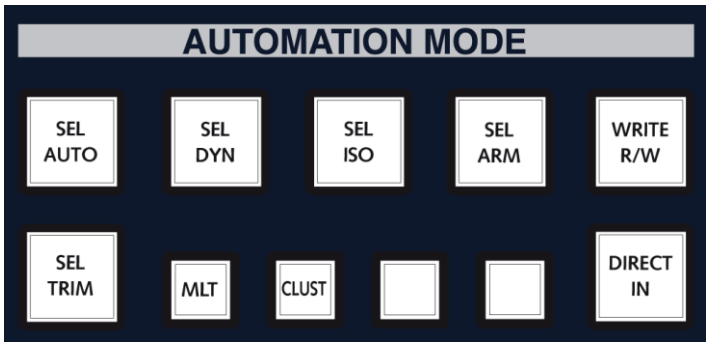
1. To enable this mode, press the **BYP** button located on the GLOBAL CONTROL panel:

Once selected, all channels enabled for automation will read data from the Play pass but not write new data.

2. If you move the position of a control, you will hear the change. You now have two options:

- If you Stop, Rewind and Press Play, the control will revert to its Play pass position.
- However, if you like the new position of the control, you can step it into write at the new value using the **DIRECT IN** button:

3. Press **DIRECT IN** located on the AUTOMATION MODE panel:



Any parameters which have been altered from their Play pass positions will step into write at their current values. If you now finish the pass, then automation will be written according to your choice of STEP OUT mode.

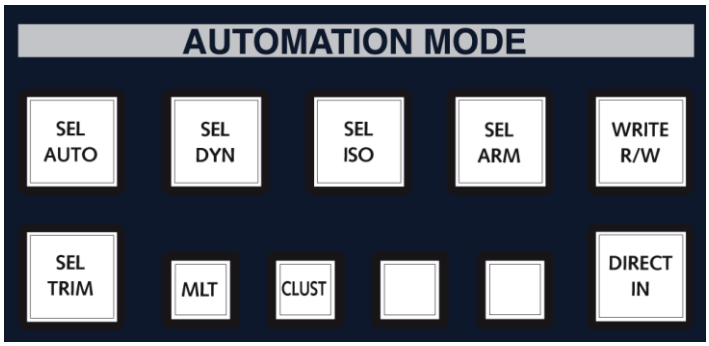
Note that the **DIRECT IN** button is only active when running in Bypass mode.

Note

Arm and Disarm

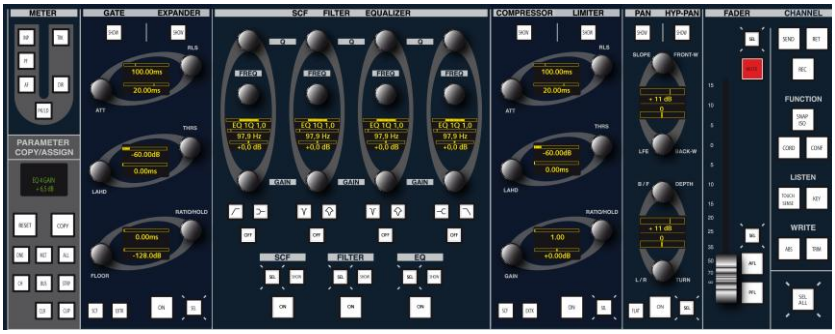
The **SEL ARM** function allows you to protect the mix data on individual channels or controls. You can choose to arm or disarm any number of parameters on any number of channels. For example, you may wish to protect the mute automation on a channel:

1. Assign the channel you want to protect to the Central Control Section, either by pressing its fader **SEL** button or entering the channel type and number from the ACCESS CHANNEL/ASSIGN control panel.
2. Press the **SEL ARM** button, located in the AUTOMATION MODE section of controls.



The button flashes green to show it is active.

On the Central Control Section the current status of all modules are shown as follows:



- **SEL** button lit (green) = module is armed (read and write)
- **SEL** button off = module is disarmed (read only)

3. Select the audio module(s) you wish to disarm, in this example the mute, by deselecting its **SEL** button.

*The **SEL** button LED turns off showing that the module is now disarmed on that particular channel.*

This means that the Play pass mute automation will play out when automation is on, but you cannot write new automation data. In the example of mute automation you will not be able to change the status of the mute switch as it is now locked into automation replay.

4. Deselect **SEL ARM** or press **ESC** to complete the operation.
5. To re-arm mute automation, repeat the operation and reselect the mute **SEL** button during step 3.


Tip

You can arm or disarm parameters across multiple channels, using the **MLT** button, as described for selecting parameter automation on Page 499.

Or, you can arm or disarm parameters within a cluster of channels as follows:

1. Define the cluster of channels as described on Page 521.
2. Make sure that one of the channels in the cluster is 'in access' by selecting its fader **SEL** button.
3. Then press **SEL ARM**.

The button flashes green to show it is active.

4. On the Central Control Section, select the audio module(s) you wish to arm or disarm as described above.

All modules within your cluster of channels will be armed or disarmed accordingly.

Recalling a Snapshot or Sequence

You may recall snapshots or play out a sequence, with or without crossfades, while running the automation system. For example, to record a complete scene/section change against timecode.

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 ISO in the usual way.


Note

Note that 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.

Mixes and Passes

Within the current production, you can create multiple mixes and within each mix store multiple passes. This system is designed so that, for example, your production may store all the low level console settings for a particular client or album. Within the production, you can then create multiple mixes for different jobs or songs which you are working on. The pass history then provides a mechanism for managing subtle variations of the mix, for example vocals higher, rhythm section lower, etc.

Remember that every time you finish a pass you create a temporary pass. To store all the passes for the mix permanently, you *must* update the production. See Page 379 for details on how to do this now.

If you forget to update the production, you can use the fallback production memory to recover lost data, see Page 384 for details. However, it is strongly recommended that you update your production regularly. This ensures that all passes are stored for all mixes on a regular basis, and guarantees that you will be able to recall this mix at a later date.

Changing Productions

A single production may store multiple mixes for, say, all the songs on an album. When you load a different production you are loading a new set of mixes into the console. Therefore, always update or save your production before loading a new one. Please see Chapter 6 for more details on working with productions.


Note

Note that when a production is saved or updated, 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 different production, you will always get back to the last mix and pass you were working on.

To load back a mix from a different production, first load the production as described on Page 376.

The Mixes Display

Mixes are loaded, renamed, deleted and protected from the **Mixes** display. We also covered creating a New Mix earlier in this section, see Page 484.

1. Press the **AUTO** SCREEN CONTROL button to access the **Mixes** display:

Note that each time you press the **AUTO** button you toggle between two pages – **Mixes** and **Passes** – so keep pressing until you see correct page.

The **Mixes** list shows all the mixes stored within the current production. The columns beside each mix name show the date and time stamp for the mix, the number of passes it contains, whether it is protected (padlock icon) and the size of the mix. You can drag and drop the columns if you wish to reorder them.

At the bottom of the display, the **Mix Memo** box may be used to make notes for a particular mix.

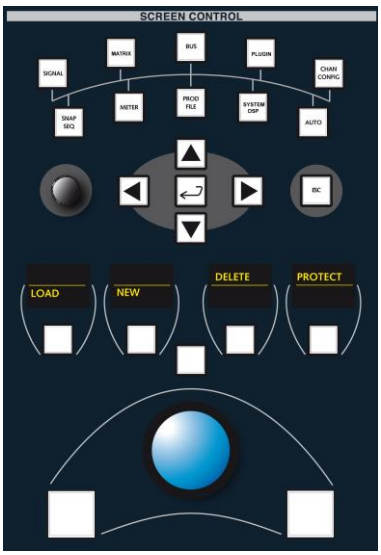
The name of the **Active Mix** is shown at the top of the display. This is the mix data which will load when you press the automation **ON** button.


Tip

If the list of **Mixes** is longer than the available window space, focus on the list and use the rotary control on the SCREEN CONTROL panel to navigate up and down the list.

Loading a Mix

The active mix stores all the Play passes created while automation is enabled. At any time you can load a different mix within the production from the **Mixes** display. This provides quick access to different songs or jobs for a particular client.



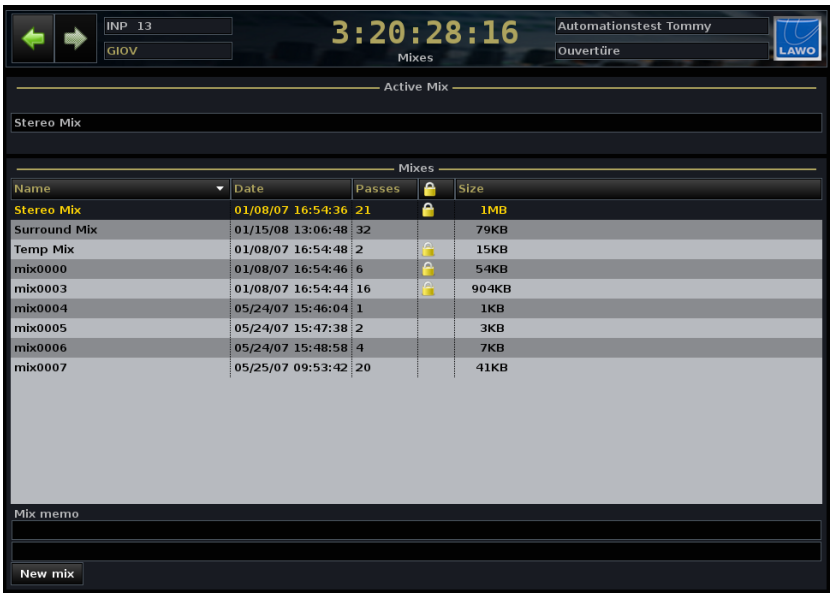
Note that when you change to a different mix, any passes created within the previous mix are held in temporary memory. This allows you to change quickly between mixes and passes within the same production. However, remember that if you change to a different production, the temporary memory is cleared. Therefore, always update your production to save mixes permanently.

1. Using the trackball or navigation buttons, select the mix you want to load.

The selected mix name is highlighted in black.

2. Press the **LOAD** soft key, or right-click and select **Load,** to load the mix.

*The loaded mix becomes the **Active Mix** as shown at the top of the display:*



If automation is enabled, then the settings on the console will update to reflect the automation positions for the Play pass loaded from the mix.

If automation is not enabled, press the **ON** button located on the AUTOMATION control panel to load in the mix settings.

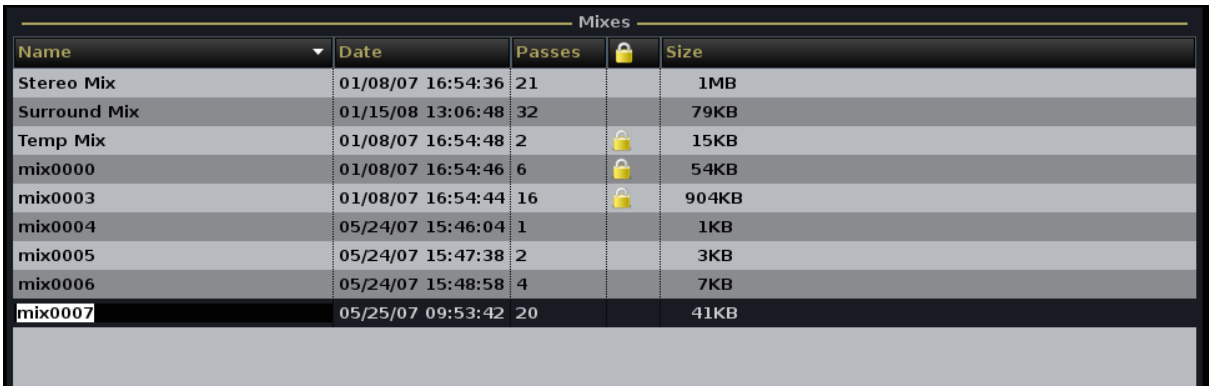
Note that when the production is updated, the system stores the current Play pass for each mix. This means that when you load back a different mix, you will always get back to the last pass you were working on.

Note

Renaming a Mix

To rename a mix:

1. Select the mix to rename from the **Mixes** list using the trackball:



Click once to select all the existing text (white) or twice (black cursor) to modify the existing name.

2. Enter a new name from the keyboard.
3. When you have finished, press the Enter button on the keyboard to confirm the new name.
4. Or, if you make a mistake or want to exit the naming mode without making any changes, press the **Esc** button on the keyboard.

Adding a Memo

You may 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** box.

A black cursor appears.

2. You may now type to enter your information from the console keyboard.

You can enter as many characters as you wish in each line.

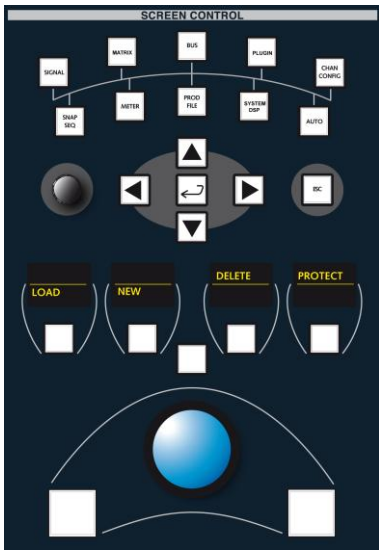
If you cannot enter any memo text, check that the mix is not protected.

If you right-click the mix memo, using the trackball and right select button, then you can use the **Copy** and **Paste** options to copy memo text to another mix.


Tip

Protecting a Mix

You can protect important mixes so that they cannot be deleted or accidentally updated:

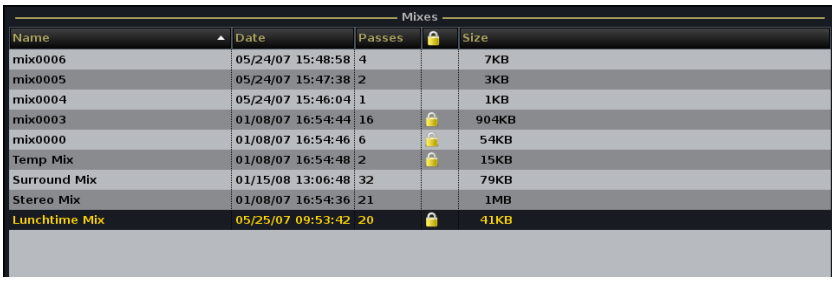


1. Select the mix you wish to protect.

The selected mix is highlighted in black.

2. Press the **PROTECT** soft key (on the second PAGE), or right-click and select **Protect**.

A Padlock icon appears next to the mix to show that it is protected:



A protected mix cannot be deleted. And you cannot create a new Record pass within a protected mix.

Deleting a Mix

Deleting a mix removes it from the internal memory. Therefore, take care when using this feature. Note that you cannot delete a protected mix.

1. Select the mix you wish to delete.

The selected mix is highlighted in black.

2. To delete the mix, press the **DELETE** soft key (on the second PAGE) or right-click and select **Delete**.

You cannot delete a protected mix.

The Passes Display

The system keeps all finished passes for the active mix in the **Passes** display. This means that you can revert to an earlier pass at any time, even while in play. For example, you may want to A/B between two different passes, or write two different versions of automation for a chorus or scene. See Page 493 for details on how to revert to an earlier pass.

You can also edit mix passes from the **Passes** display in order to combine, delete, copy, shift, insert or paste sections from different passes, see Page 544.

Working with the Passes Display

Each time you revert to an earlier pass and then make updates, you start a new branch within the tree.

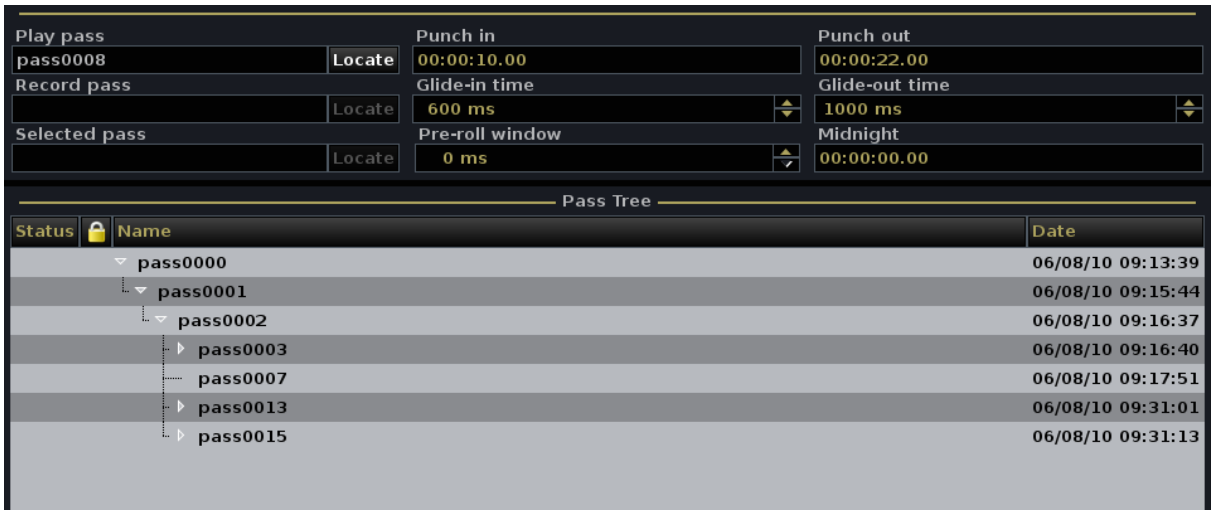
To avoid mixes become too large, a maximum of 10 passes are stored within each branch of the **Pass tree**; after the tenth pass, the first pass is deleted to make space for new data, and so on. To keep a specific pass indefinitely you should protect it as described on Page 541; it will then be retained as one of the 10 passes with the branch.

Note

With lots of reverts, you can end up with a complex tree, for example:

If the tree becomes longer or wider than the area of the **Pass tree**, then scroll bars automatically appear.

1. You can click on the arrow beside a pass to open or close a branch of the tree. This can make a complex tree much more manageable:



2. If you have hidden the Play pass by closing a branch, as in our example above, then select the **locate** screen button beside the **Play pass** box.

The tree will automatically open to reveal the Play pass:

3. If you want to open up all the branches of the **Pass tree**, then select the **Expand all** screen button.

As with other displays, you can drag and drop the columns within the **Pass Tree** if you wish to exchange **Date** with **Status**.

Renaming a Pass

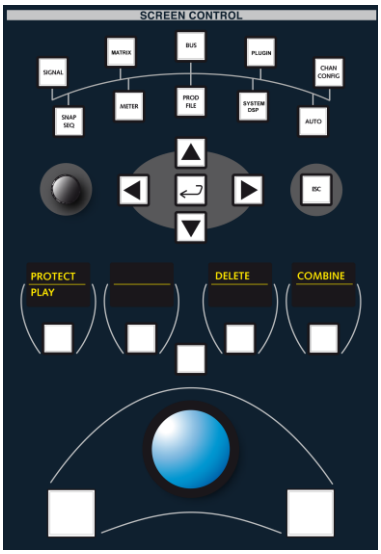
To rename a pass:

1. Select the pass to rename from the **Pass tree** using the trackball:

Click once to select all the existing text (white) or twice (black cursor) to modify the existing name.

2. Enter a new name from the keyboard.
3. When you have finished, press the Enter button on the keyboard to confirm the new name.
4. Or, if you make a mistake or want to exit the naming mode without making any changes, press the **Esc** button on the keyboard.

Deleting a Pass



Having created several passes, you can delete any which you no longer require.

Note that you cannot delete the current **Play pass**.

Deleting a pass removes it from the internal memory. Therefore, take care when using this feature.

1. Select the pass you wish to delete.

The selected pass is highlighted in black.

2. To delete the pass, press the **DELETE** soft key (on the second PAGE) or right-click and select **Delete**.

Protecting a Pass

You can protect a pass so that it cannot be deleted as follows:

1. Select the pass you wish to protect.

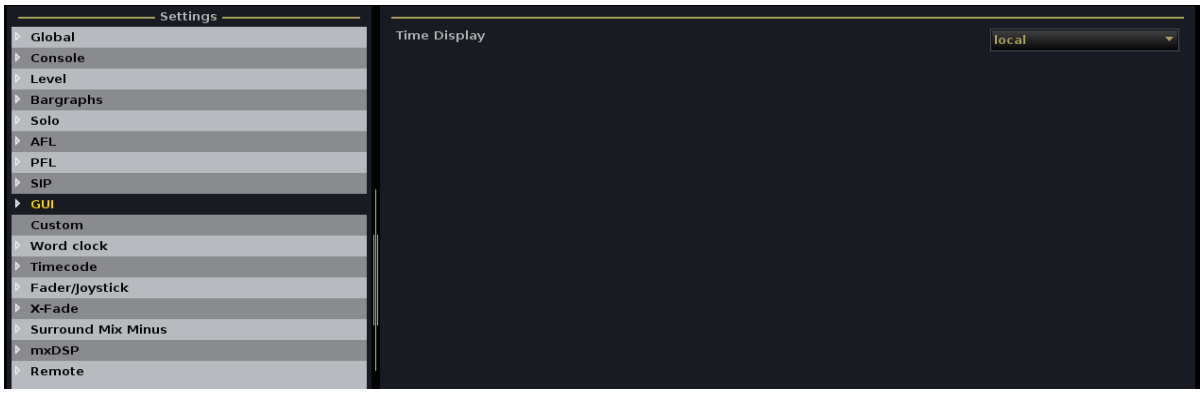
The selected pass is highlighted in black.

2. Press the **PROTECT** soft key (on the second PAGE) or right-click and select **Protect**.

Setting an Offset Timecode

The **Midnight** box at the top of the **Passes** display can be 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, select the **System Settings** display and **GUI** topic.



2. Change the **Time display** parameter to **Offset TC**.

The timecode shown at the top of each display will now show offset timecode.

Note that you can also perform this operation by clicking on the time at the top of the title bar and selecting **Offset Timecode**:

3. Now press the **AUTO** SCREEN CONTROL button to return to the **Passes** display:

4. Use the console keyboard to enter the timecode which you wish to correspond to midnight (00:00:00:00) in the **Midnight** box.

For example, you could locate to the beginning of your mix (e.g. 21:00:20:15) and enter this value as midnight.

5. Press Enter and you will see the start of your mix as 00:00:00:00.

Setting Pre-roll

The **Pre-roll window** at the top of the **Passes** display can be used to set a pre-roll tolerance time for machines which pre-roll slightly when going into Play – for example, a tape machine.

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 the machine's pre-roll when entering Play.

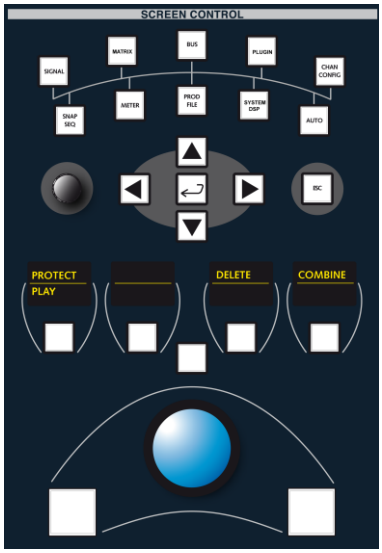
2. Test your entry by putting some controls into write while in Stop and pressing Play.

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.

Mix Pass Editing



The **Passes** display provides a number of functions for mix pass editing including combine, delete, copy, shift, insert and paste.

Combine

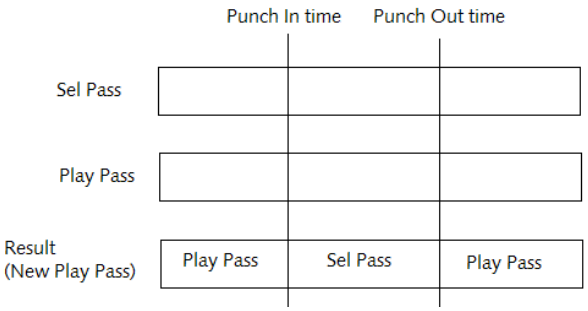
This function combines the automation data from the Selected pass into the Play pass, between the **Punch in** and **Punch out** times.

1. First, set the punch in and out times as described on Page 525.
2. Make the pass you wish to add data into the current Play pass; select it and press the **PLAY** soft key.
3. Then select the pass you wish to combine from.

*In our example, we are combining from **Chorus 2 Better Vocals** into **Good Vocals**:*

4. Press the **COMBINE** soft key (on the second PAGE), or right-click and select **Combine with play pass**.

A new pass is created as shown below:



Edit Functions

All other edits are applied to the current Play Pass and are performed as follows:

1. Using the trackball, right-click on the Play Pass and select **Edit** -> **Pass**:

A range of mix pass editing operations are revealed:

If any of the options are greyed out, then check the following:

- To perform an edit, timecode automation must be enabled so make sure Automation **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**. Type in a value, or use the PUNCH buttons to enter a value on the fly.

Note that the above edits can only be performed on the Play Pass, so if you wish to edit an earlier mix pass, change it to the Play Pass first.

2. Now select an operation from the drop-down menu – for example, **Delete**.

The edit is performed and a new Play Pass is created.

3. To undo the edit, revert to the previous Play Pass.

Editing All Channels or the Channel in Access

When you right-click on the Play Pass, note that two options are available from the **Edit** menu:

- **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.

The same editing operations (**Delete**, **Cut**, **Copy**, etc.) can be selected for either option.

Setting Glide In and Glide Out times

In addition to setting the in and out point for each edit, you can also apply glide in and glide out times. The result of the glide is specific to each edit operation.

Glide times are set by entering a value into the **Glide-in time** and **Glide-out time** boxes at the top of the **Passes** display:

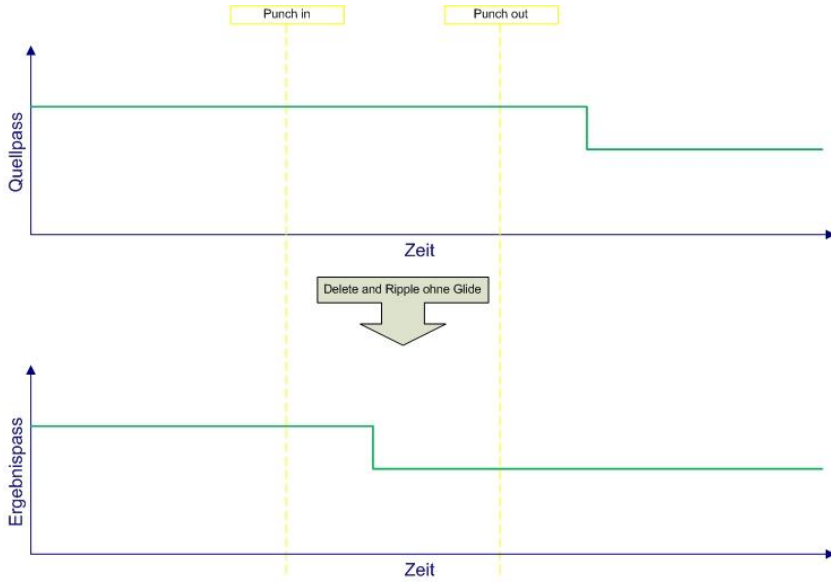
Take care when setting the **Glide-in** and **Glide-out** times. You may get some strange results if you enter glide times longer than the **Punch in** to **Punch out** timecode window!

The Edit Operations

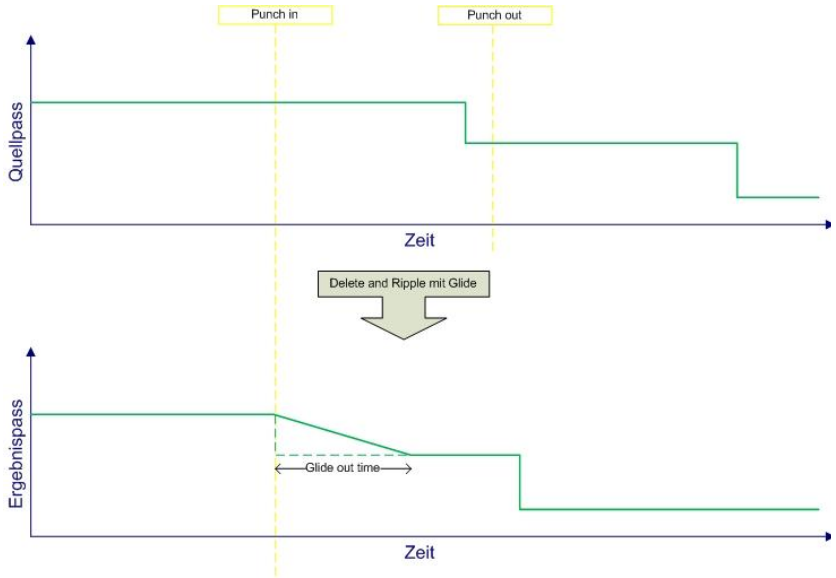
Delete

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:



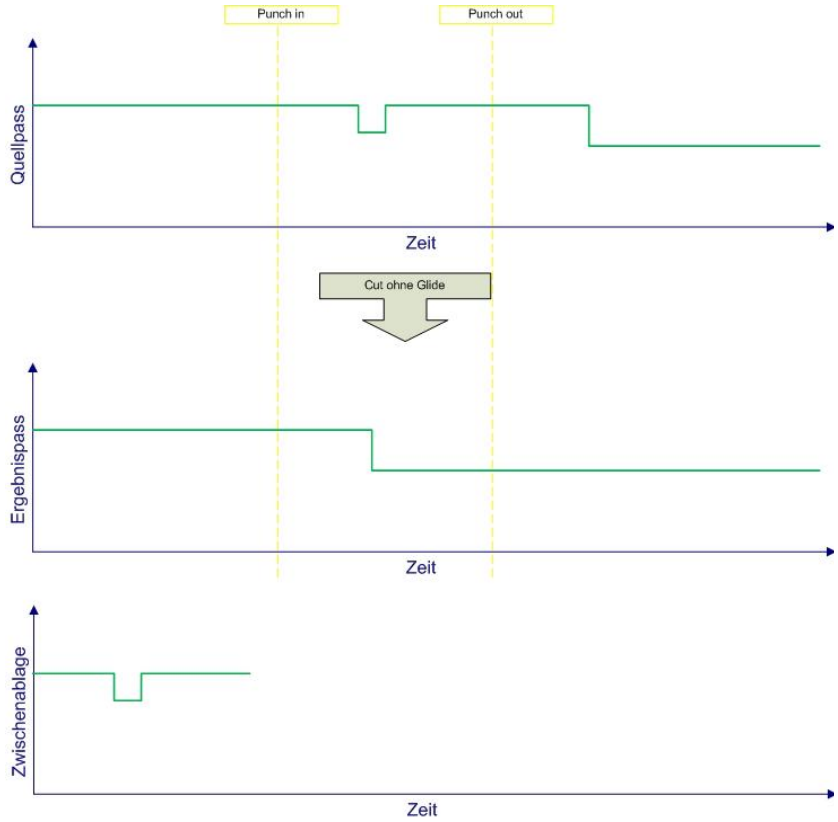
The **Glide-out time** is applied at the Punch in point; **Glide-in time** has no affect on this edit:



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:

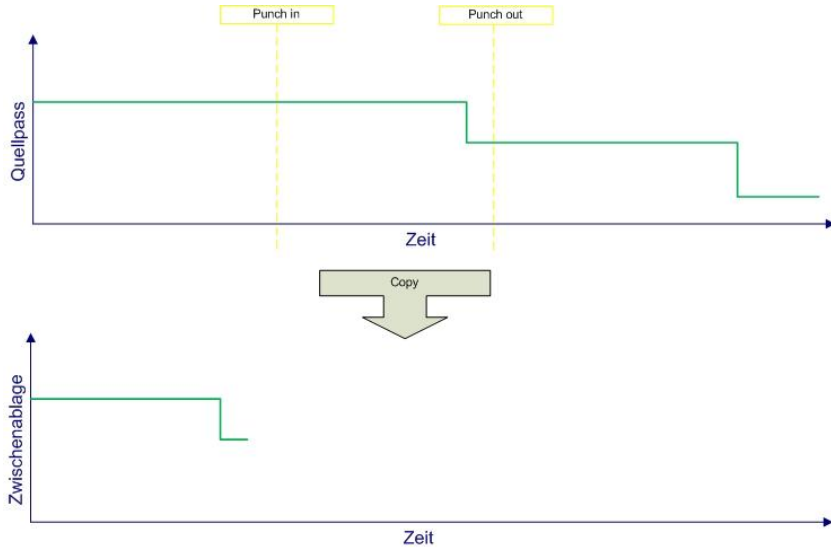


The affect of **Glide-in** and **Glide-out** times is identical to a **Delete**.

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):

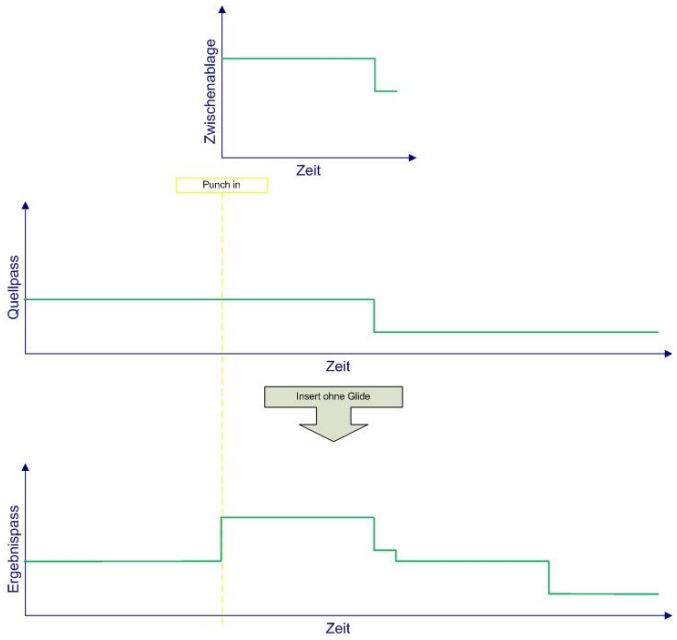


The **Glide-in** and **Glide-out times** have no affect on this edit.

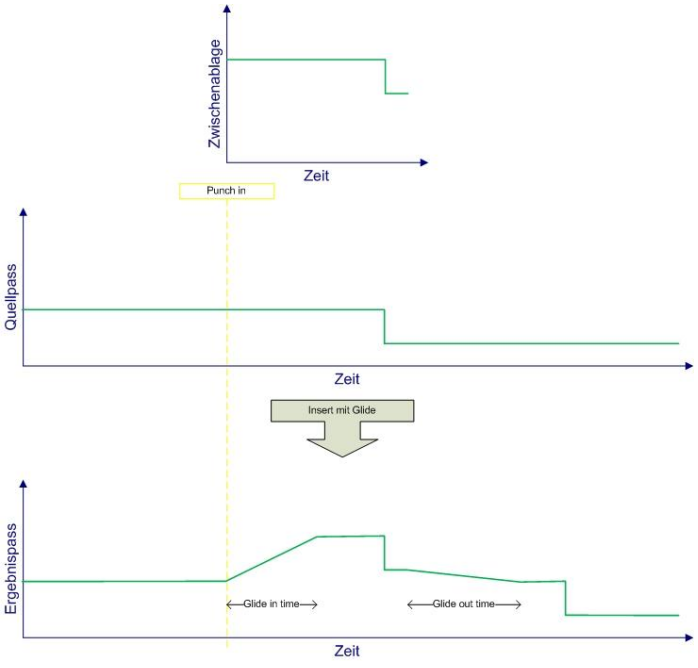
Insert

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.



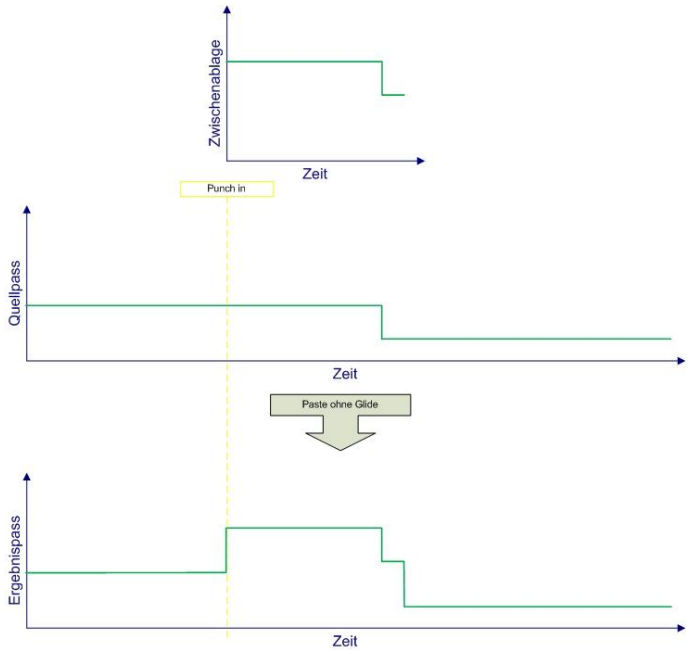
The **Glide-in time** is applied at the **Punch in** point; the **Glide-out time** is applied at the end of inserted clipboard:



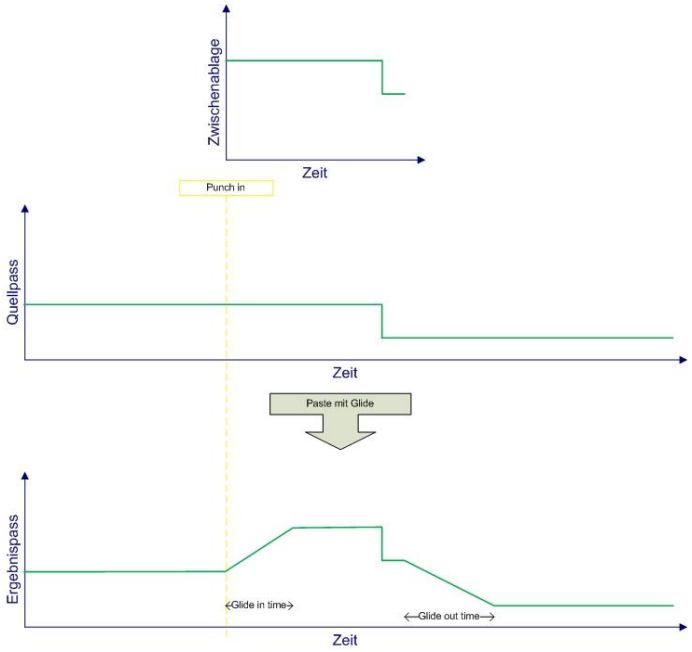
Paste

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 affect on this edit.



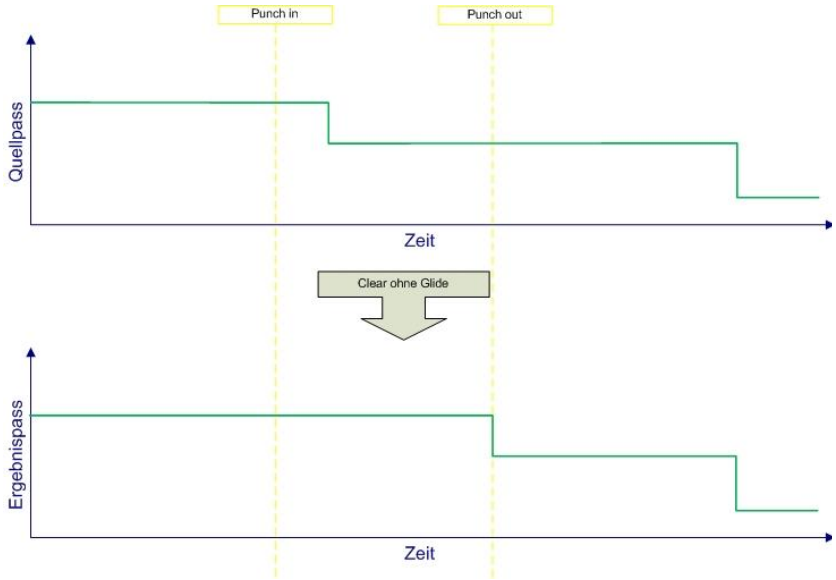
The **Glide-in time** is applied at the **Punch in** point; the **Glide-out time** is applied at the end of pasted clipboard:



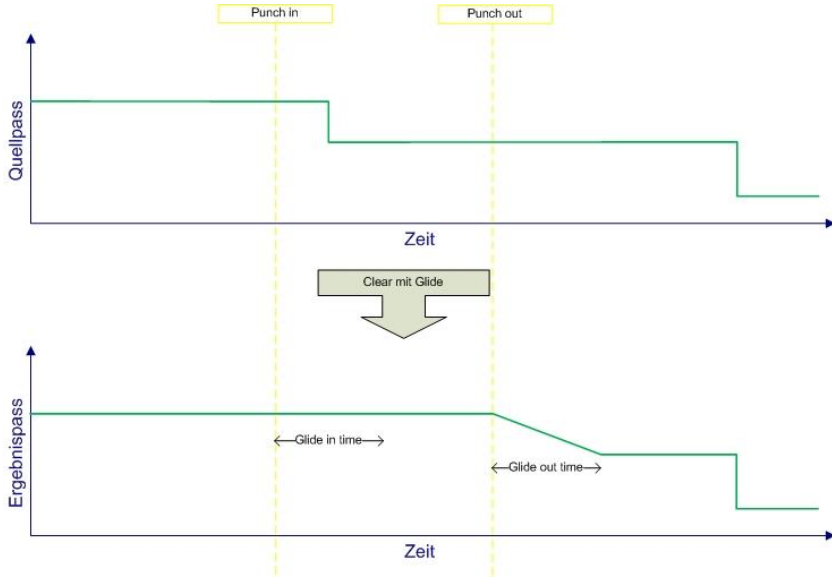
Clear

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:



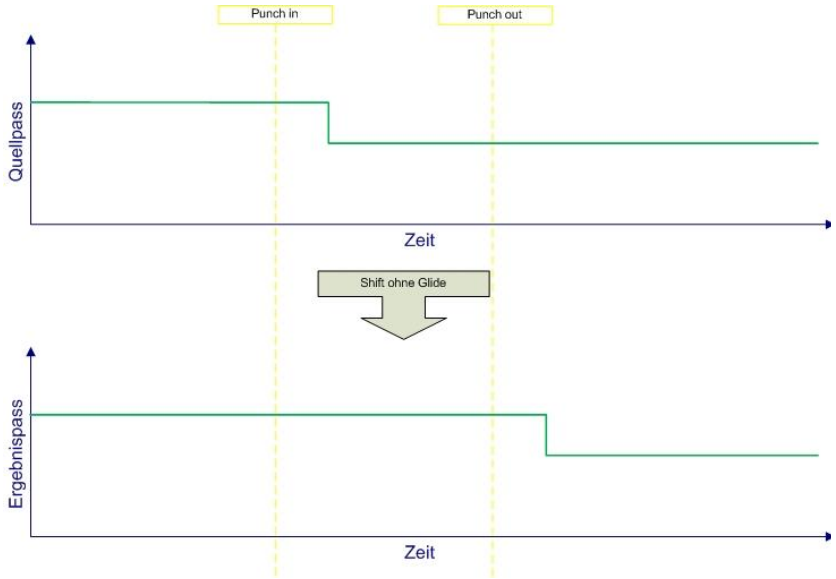
The **Glide-in time** is applied at the **Punch in** point; the **Glide-out time** is applied at the **Punch in** point:



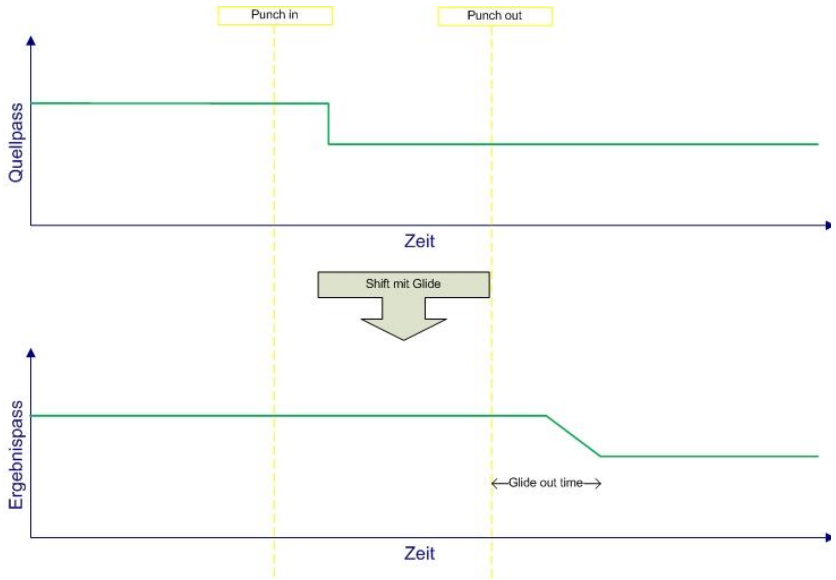
Shift

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:



Combining Pass and Access Channel Edits

The same editing operations (**Delete**, **Cut**, **Copy**, etc.) can be applied either to the complete mix pass (all channels) or to the channel in access by selecting **Edit** -> **Pass** or **Edit** -> **Access**.

Note that it is possible to copy data from a complete mix pass and insert or paste it into the channel in access. However, the reverse is not possible.

Advanced Editing Options

When performing mix pass edits, only controls selected 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.

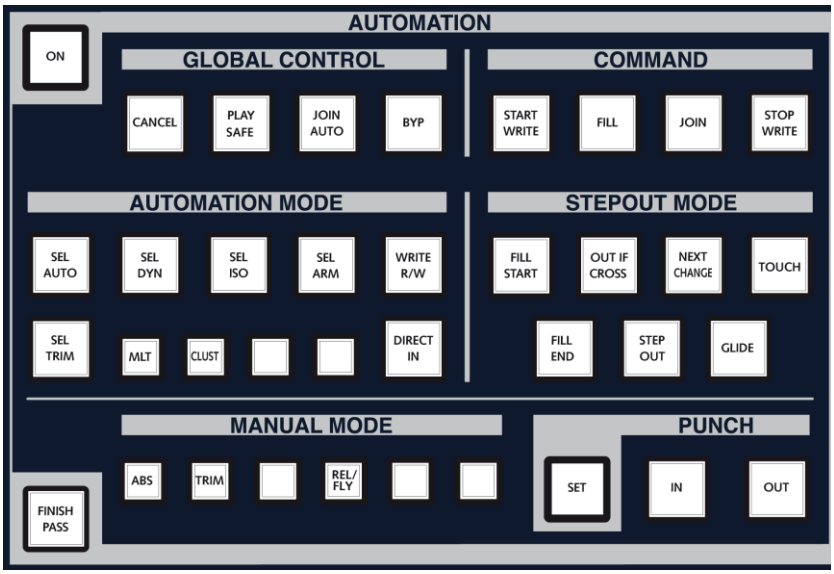
2. BEFORE performing the Paste, deselect any channels or controls which you do not want to include in the paste by disarming them – in our example, use the **SEL ARM** function to disarm all channels except the main and backing vocals.
3. Now perform the Paste.

The Paste is applied only to the armed channels.

4. Use **SEL ARM** to put all channels back into automation (replay).
5. Press **PLAY** to play back your edited mix pass!

Front Panel Control Summary

The AUTOMATION control panel provides access to the following functions:



GLOBAL CONTROL

- **ON** – turns the automation system on or off. When on, automation replays from the Play pass within the Active Mix.
- **CANCEL** – cancels the Record pass, see Page 492. Use this button to discard moves which you have just written.
- **PLAY SAFE** – use this mode to protect your mix. When running in 'Play Safe', all parameters will read automation data from the Play pass but cannot write new data. In addition, if you move the position of a control, you will *NOT* hear any change in the audio.
- **JOIN AUTO** – use this button if you are going to be reviewing and updating a section of the mix. See Page 523.
- **BYP** – identical to 'Play Safe'; all parameters will read automation data from the Play pass but cannot write new data. However, if you move the position of a control, 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 any parameter values in write 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. See Page 523.
- **STOP WRITE** – press this button to step all parameters out of write.

AUTOMATION MODE

- **SEL AUTO** – flashes red when selected. Use the Central Control Section **SEL** buttons (they turn orange) to choose the audio modules you want to automate, see Page 498.
- **SEL DYN** – flashes red when selected. Use the Central Control Section **SEL** buttons to choose dynamic or static automation for each audio module, see Page 507.
- **SEL ISO** – reserved for future implementation.
- **SEL ARM** – flashes green when selected. Use the Central Control Section **SEL** buttons to arm or disarm (write protect) each audio module, see Page 530.
- **WRITE R/W** – flashes red when selected. Turns the fader strip **R/W** buttons and the Central Control Section **SEL** buttons into step in and step out of write controls, see Page 496.
- **SEL TRIM** – flashes red when selected. User the Central Control Section **SEL** buttons to select Trim for each audio module, see Page 517. Selections are cleared by pressing either the **ABS** or **TRIM** MANUAL MODE button.
- **MLT** – allows you to set the automation selections, modes and arming across multiple channels, see Page 499.
- **CLUST** – allows you step in and out of write on a cluster of channels, see Page 521.
- **DIRECT IN** – allows you to step a control into write when running in Bypass, see Page 529.

STEPOUT MODE

- **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). See Page 512.
- **FINISH PASS** – press to finish a mix pass manually, see Page 490.

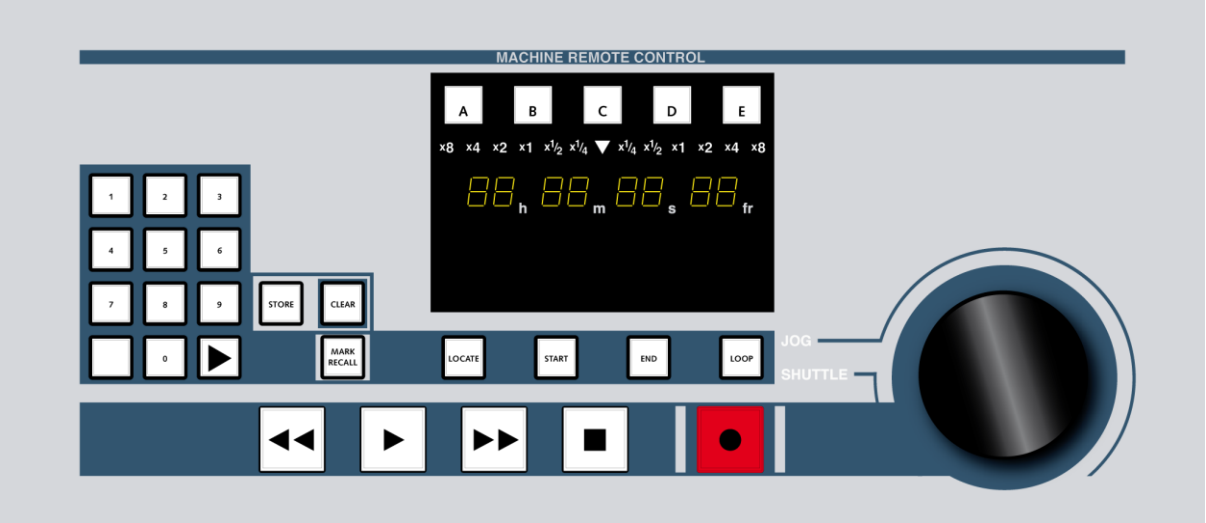
PUNCH

- **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.)

Machine Control

The optional MACHINE REMOTE CONTROL panel may be fitted into the User Panels area of the centre section. Note that this panel occupies two user panel slots.

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. For connections, please refer to the "mc²66 Technical Manual".



mc²90 Panel Shown

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).*

Note

Note that the temporary buffer is used when storing and recall marks or setting up a loop.

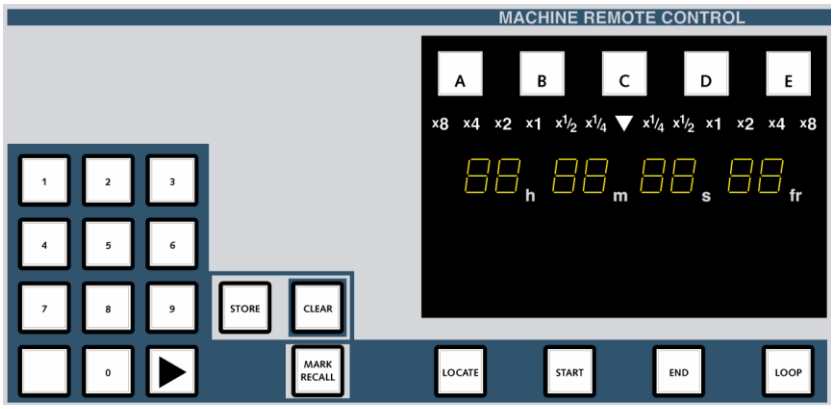
If there is no connection between the console and the machine, then the display shows NO MACHINE. If there is no tape in the machine, then the display shows NO TAPE.

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).

Locating

You can locate the machine to a particular timecode either by manually typing in a timecode position, or recalling a stored mark (see next page):



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.

Note

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:

Tip

- 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**.

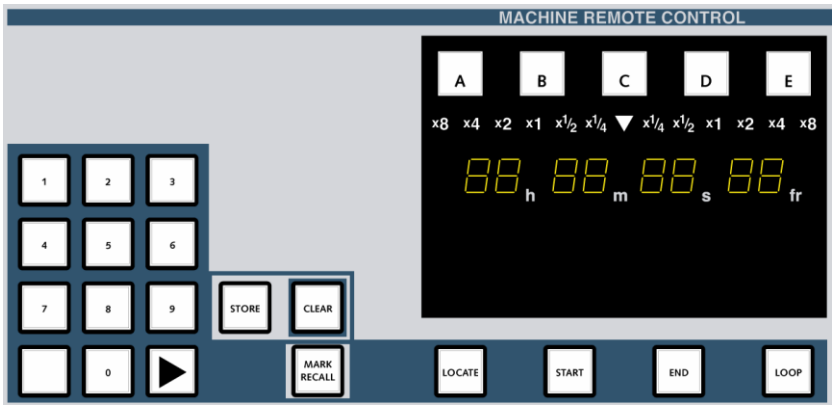
The machine locates to the temporary buffer timecode position; once the locate point has been reached, the machine goes into Play.

If you make a mistake and want to stop the machine locating, press **CLEAR**.

Tip

Storing and Recalling Marks

Marks can be used to store and recall up to 10 timecode positions so that you may use them as locate points.



To store a mark:

1. Press the **STORE** button:

*The current timecode position is stored into the temporary buffer and the buttons – **0** to **9** – start to flash in green.*

Note

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.

Tip

If you wish to store a particular timecode, for example, 01:00:00:

3. Press the **STORE** button.
4. Type in the timecode position using the **0** to **9** buttons:

The timecode in the temporary buffer updates.

5. Then press one of the **0** to **9** buttons to select a location.

To recall a mark:

1. Press the **MARK RECALL** button.

*Any buttons – **0** to **9** – 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 may now be used with the LOCATE or START/END functions.

To clear a mark so that the memory becomes inactive:

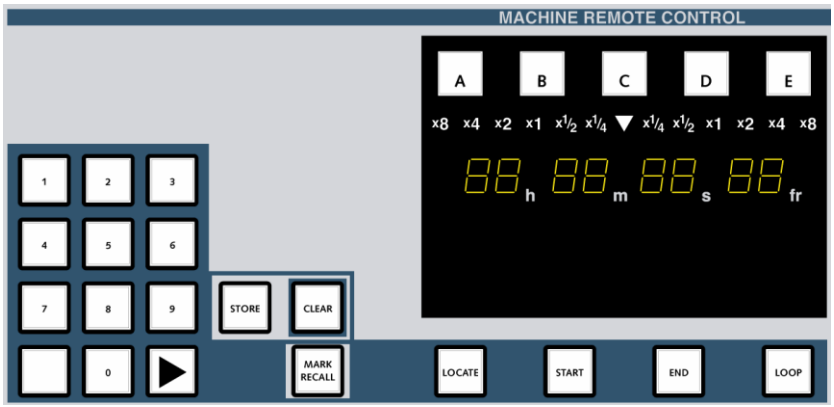
1. Press the **CLEAR** button.

*Any buttons – **0** to **9** – which contain a mark start to flash.*

2. Press the mark or marks you wish to clear - **0** to **9.**

Setting Up a Loop (Cycle)

You can set up a loop so that the machine will cycle between a start and end timecode as follows:



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.

Chapter 8: Signal Routing/Settings

Introduction

In this chapter we will cover the operation of the **Signal List**, **mx Routing**, **Signal Settings**, **mxDSP Settings** and **Downmix** displays.

Input and Output routing on the **mc²66** can be handled from either the **Signal List** or **mx Routing** (Matrix) displays. The console's integrated digital routing matrix allows you to route any source to any channel, and any output mix or send to any destination. Or, you may route sources directly to destinations, for example to feed a Mic/Line input to an AES output for archive recording purposes.

The **Signal List** presents lists of Sources and Destinations, whereas the **mx Routing** display provides a crosspoint overview. You can use either display to view or change signal routing. In addition, the **mx Routing** display can be used to create partial snapshots for recalling selective routes.

Input and output parameters such as gain, sample rate conversion, etc. are handled from the **Signal Settings** display. In addition, the **Signal Settings** display provides graphical feedback on system components, and serves as a system diagnostics tool.

If your system is fitted with one or more mxDSP cards (optional), then settings within each DSP chain can be controlled from the **mxDSP Settings** display.

If your system is configured with downmix DSP resources (optional), then the matrix can be controlled from the **Downmix** display.

The Signal List Display

Signal routing is handled by the **Signal List** display.

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

Note that each time you press the **SIGNAL** button you toggle between two pages – **Signal List** and **Signal Settings** – so keep pressing until you see the **Signal List**.

The **Signal List** is used to view and make 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**.**

Use the trackball to select a **Directory**, **Subdirectory** and a **Source** (or **Destination**). Or use the navigation buttons and rotary scroller to focus on different areas of the display and scroll up/down the **Directory**, **Subdirectory** and **Signal List**s:

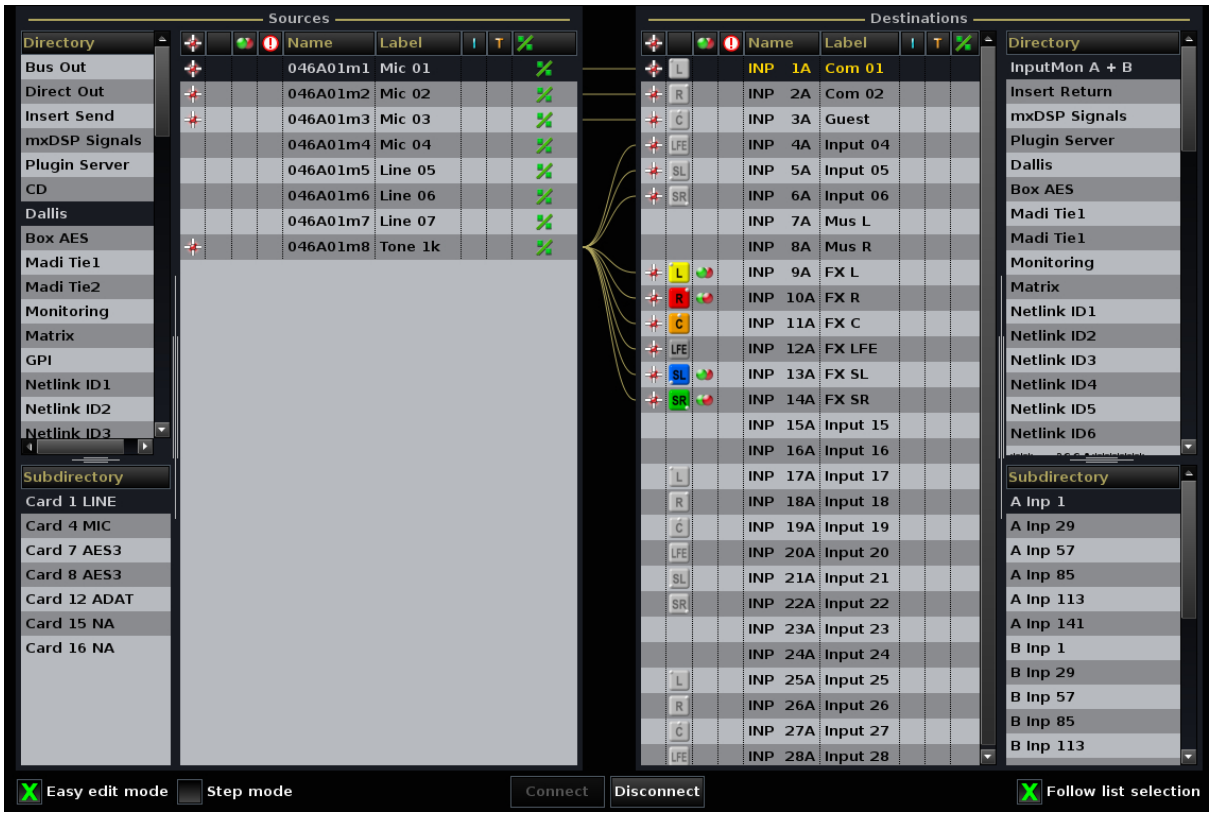
Depending on the AdminHD configuration of your system, you may have different directory and subdirectory names from our example.

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 link appears to show the connection. In our example, we can see that INP 1 to INP 3 are routed from Mics 1 to 3.


Tip

You can interrogate all the routes to or from a particular source or destination using the **Locate source** or **Show destinations of source** functions, see Page 570.

The columns beside each signal display the following information:



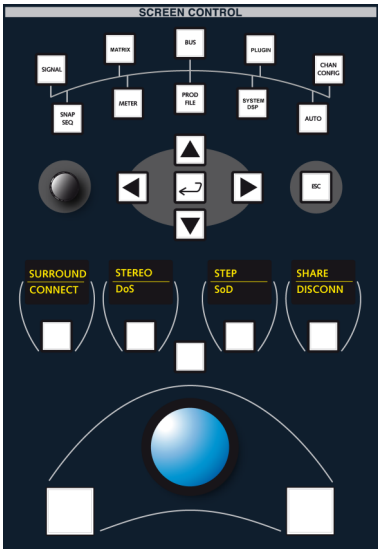
- **Connection** – a red and white cross appears when a source or destination is connected. If a destination is protected (see Page 580), then you will see a padlock icon.
- **Surround** – you will see colour coded channel definitions if a source or destination is surround.
- **Stereo** – interlocking red and green circles appear when a source or destination is stereo.
- **Unavailable** – a warning symbol appears beside signals which are not available, see Page 578.
- **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, see Page 573.
- **I** – indicates if a signal is Isolated from snapshot recall, see Page 579.
- **T** - indicates a Tiny (reduced processing) channel.
- **S/I** - indicates 'Shared' or 'Imported' sources within a networked installation.

If information within a window is hidden, then left/right or up/down scroll bars will automatically appear. Note that you can resize the **Directory**, **Subdirectory** and **Signal List** windows or exchange columns to help view important columns.

Routing a Source to a Destination

To make a route using the **Signal List** display, for example, to route a microphone to channel 1 (INP1):

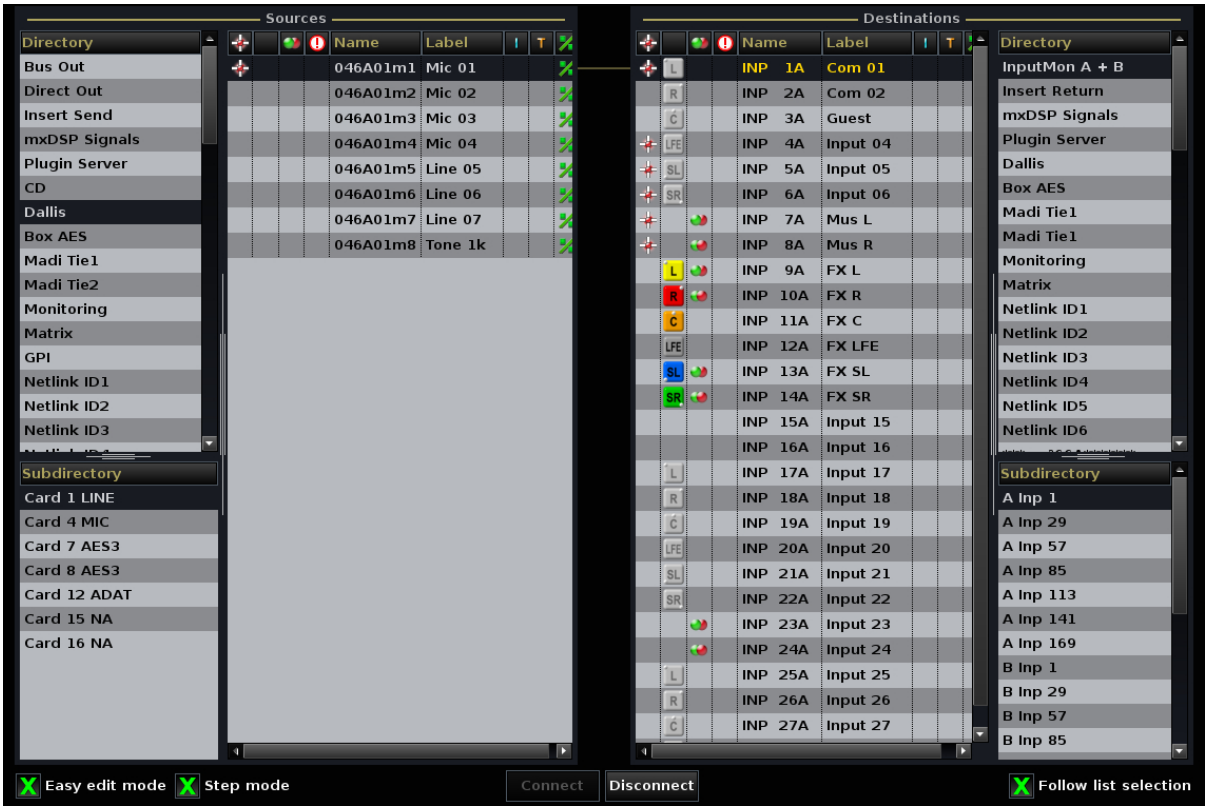
1. Select the source you wish to connect – in our example, the source directory called **DALLIS**, subdirectory called **CARD 1 LINE** and the source named **Mic 01**.
2. Next, select the destination in a similar fashion – in our example, the directory called **Input/Mon A + B**, subdirectory called **A Inp 1-28** and destination signal called **INP 1A**.



Note that input and monitor channels are always found in the Directory called **Input/Mon A + B**. The **A** or **B** provides access to either the A or B input of the channel. For now, assign your sources to input A (e.g. **INP 1A**). The B input is provided to assign a back up source, see Page 567.

3. Having selected your source and destination signals, press the **CONNECT** soft key to make the route.

*The **Signal List** updates with a line between the source and destination showing the connection:*



If the input channel is allocated to a fader strip on the control surface, and the **INHERIT SOURCE** button is active (see Page 573) you will see the source name in the Fader Label display update. Note that you don't need to have the channel assigned to the surface in order to assign a source. For help on assigning input channels to fader strips, please see Page 147.

If you want to undo an existing route:

4. Select the destination (e.g. **INP 1A**), and press the **DISCONNECT** soft key to undo the route.

*The line between the source and destination disappears from the **Signal List** display.*

Note

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.

A/ B Input Sources

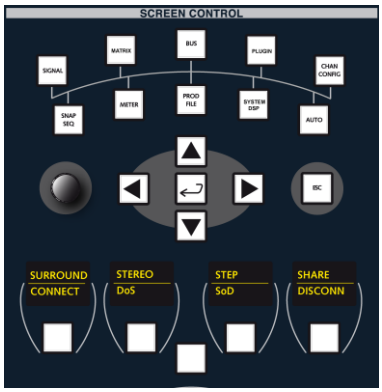
For any input or monitor DSP channel, you may assign a main source (A) and back up source (B). For example, you may assign the main wireless mic for your presenter to INP 1 source A, and a spare mic to INP 1 source B. You can then switch quickly from A to B during the show if the first mic fails.

Therefore, you will find two **Destination** options when assigning sources to input and monitor DSP channels from the **Signal List** display:

- Select the **A Inp** or **A Mon** signal to assign a source to an A input.
- Select the **B Inp** or **B Mon** signal to assign a source to a B input.

For more details on switching between A and B sources, see Page 195.

Routing to Multiple Destinations



To route a range of sources to a range of destinations (e.g. input channels), use the 'step forward' mode as follows:

1. Select the first source you wish to assign – for example, **Mic 1** – and the first destination – for example, **INP 1A**.

Your selected source and destination are highlighted in black.

2. *BEFORE* you press **CONNECT**, enable the **STEP** soft key to activate the step mode (on the second Page of soft keys).
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.

As you step down through the list, note the red and white crosses which appear in the Connection column. The cross indicates a connection to or from the source or destination.


Note

If the list of sources is shorter than the list of destinations, then when you reach the last source in the list, the 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.

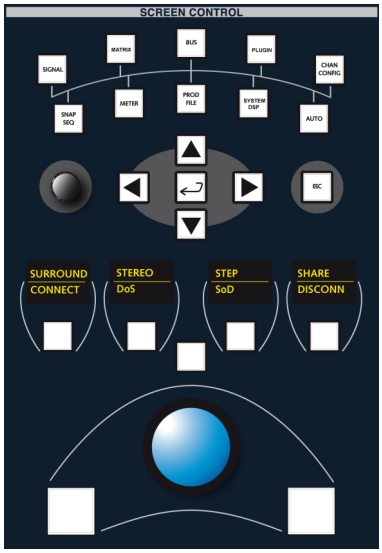

Tip

The step function can 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**.

At any time you can remove a series of routes by selecting the first destination and pressing **DISCONNECT**. If **STEP** is active, then the list will step down to the next entry allowing you to disconnect a range of destinations quickly and easily.

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.

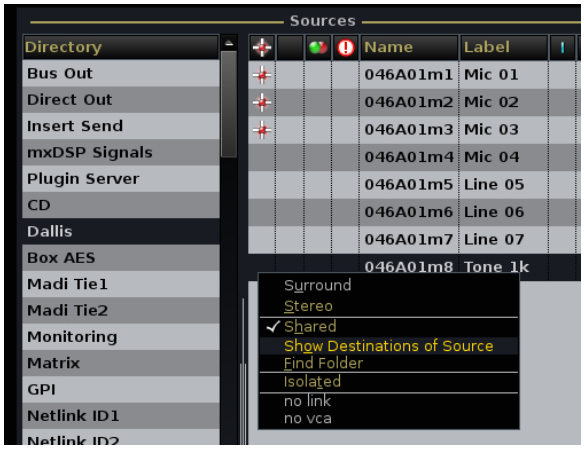


To view all the destinations fed from a source:

1. Select the source you wish to interrogate – e.g. **Tone1** – on the left hand side of the **Signal List** display:

The selected source is highlighted in black.

2. Then right-click, using the trackball and right select button, and select **Show Destinations of source**. Or press the **DoS** (Destinations of Source) soft key:



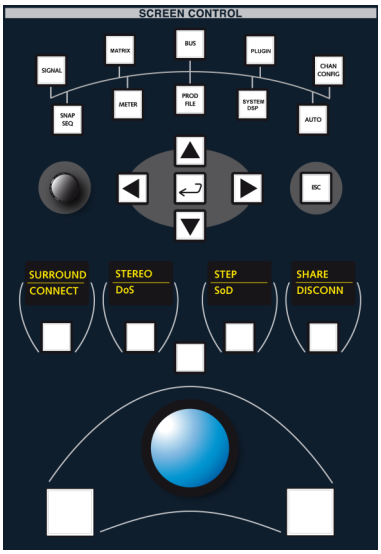
*A list of all current destinations for the selected source appears in the **Destinations** list:*

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 hand side of the **Signal List** display:



The selected destination is highlighted in black.

2. Then right-click, using the trackball and right select button, and select **Show Source of Destination**. Or press the **SoD** (Source of Destination) soft key.

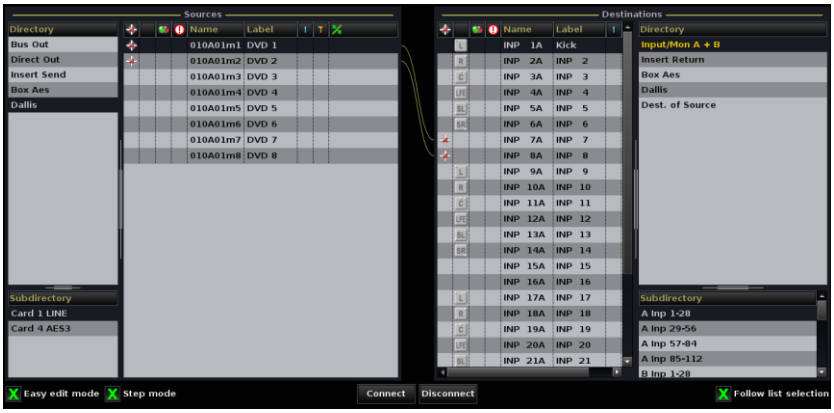
*The source assigned to the selected destination appears in the **Sources** list.*

Find Folder

If you are unsure which directory or sub directory this source (or destination) belongs to, then you can use **Find folder** as follows:

1. Right-click on the source (or destination) using the track ball and right select button, and select **Find folder**.

The Directory and Subdirectory update to reveal the correct folder for the selected source:



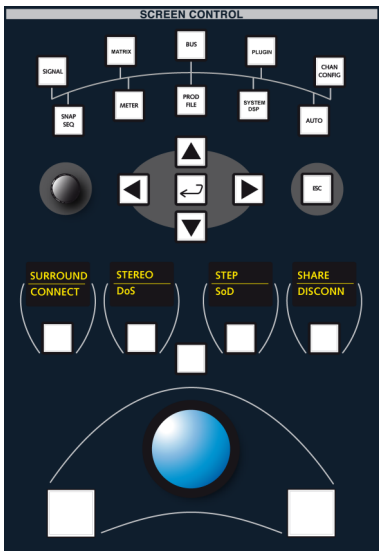
Creating Stereo or Surround Channels/Busses

While making routes from the **Signal List** display, you may also want to configure whether your busses and channels are mono, stereo or surround.

For example, to create a stereo input channel from the **Signal List** display:

1. Select the odd numbered channel (e.g. **INP 7**) from the **Destinations** list

Your selection is highlighted in black.



2. Press the **STEREO** soft key (on the second PAGE) to create the stereo link, or right-click, using the trackball and right select button, and select the **stereo** option.

This links the selected channel to its adjacent DSP path.

To create a surround sum:

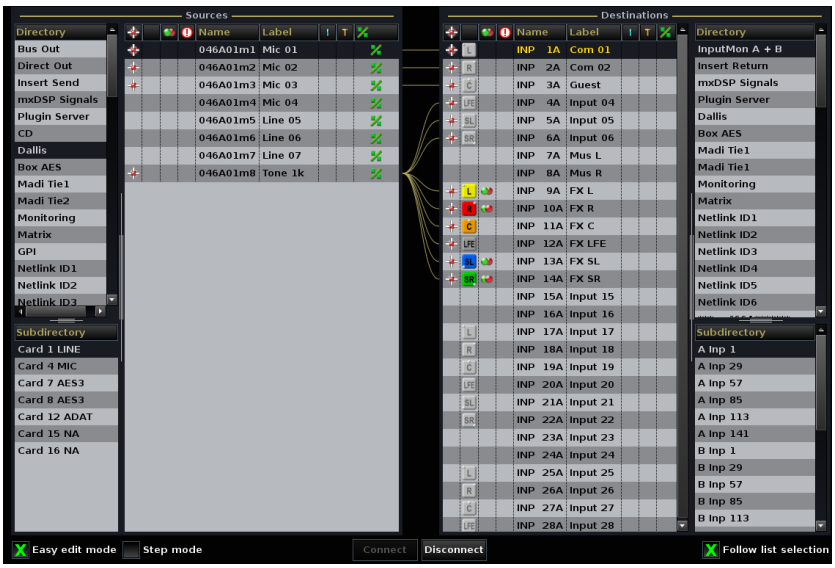
1. Select the first sum of the surround output (e.g. **SUM 1**) from the **Sources** list

Your selection is highlighted in black.

2. Press the **SURROUND** soft key (on the second PAGE), or right-click, and select the **surround** option.

This links consecutive sums according to your chosen surround format.

The Stereo and Surround columns reflect the status of any stereo or surround channels:



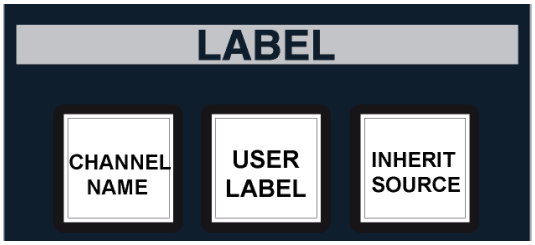
Note that even if channels are stereo or surround, signal routing is still handled individually. This allows you to route non-consecutive sources to a stereo or surround channel.

Note that you can also link input and output signals as stereo from the display. This affects the behavior of the signal's I/O DSP, see Page 618 for details.

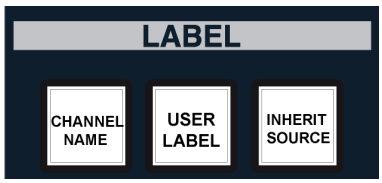
Names and Labels

Every individual source and destination is displayed with a fixed channel name and a user programmable label. Due to the way in which you can view user labels on the control surface, it's worth taking a little time to understand the best way of using these labels.

The fader label display will show one of three options as selected from the LABEL buttons in the centre section of the console:



- **Channel Name** – this is the fixed name for the DSP channel assigned to the fader strip. For example, **INP 1** for input channel 1, **MON 8** for monitor return channel 8, **GRP 4** for group master channel 4, etc This is the same as the **Destination Name** on the **Signal List** display.
- **User Label** – this is a programmable user label given to the DSP channel. For example, **Com1**, **Guest**, etc. This is the same as the **Destination Label** on the **Signal List** display.
- **Source Label** – this is a programmable user label given to the Source which is routed to the DSP channel. For example, **Mic1**, **Mic2**, etc. This is the same as the **Source Label** on the **Signal List** display.



We recommend using the LABEL buttons to change modes as follows:

1. Press **CHANNEL NAME** to view the channel names, e.g. **INP 1**.

Use this mode when you preparing a console configuration. This enables you to easily view where you are assigning your input channels, monitor returns, group masters, auxiliary masters, etc.

2. Press **USER LABEL** to view the channel label, e.g. **Com1**.
3. Press **INHERIT SOURCE** to view the source label of the source assigned to the DSP channel, e.g. **Mic1**.

Inherit is a great mode to use once your console fader strips are configured and you are making routes for a show. If no source is assigned to a channel, the fader label continues to display the channel label until a source is assigned. For example, if you have used the names **Com1**, **Com2** and **Guest** as channel labels, and **Mic1**, **Mic2** and **Mic3** as source labels for microphone inputs, when you begin to route sources to channels, the fader labels will display **Com1**, **Com2** and **Guest** until a source is assigned. Therefore, if you look across the console and see **Mic1**, **Mic2** and then **Guest**, you know that the **Guest** channel does not have a source assigned.

Tip

This also provides an overview of source to channel routes without needing to view the **Signal List** display. For example, with **INHERIT SOURCE** selected, if your fader label displays show channel labels then you know there are no sources assigned. Or, if an external controller is making connects within the router, you will be able to see the names of the sources as they are assigned remotely.

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

Editing Source and Destination User Labels

Single Label Edit

You can edit a source or destination user label from the **Signal List** display as follows:

1. Select the source or destination label you wish to edit using the trackball:

Click once to select all the existing text (white) or twice (black cursor) to modify the existing name.

2. Enter a new name from the keyboard.
3. When you have finished, press the Enter button on the keyboard to confirm the new name.
4. Or, if you make a mistake or want to exit the naming mode without making any changes, press the **Esc** button on the keyboard.

Note that user labels are stored in snapshots so that you can easily recall new labels for a different part of a show.

Note

5. Remember to save your snapshot and/or production after editing user labels.

While editing a label, you can right-click using the trackball and right select button, and then **Copy** and **Paste** text to another signal.

Tip

You can also edit the label of the channel “in access” from the title bar of any page by double-clicking in the label field:

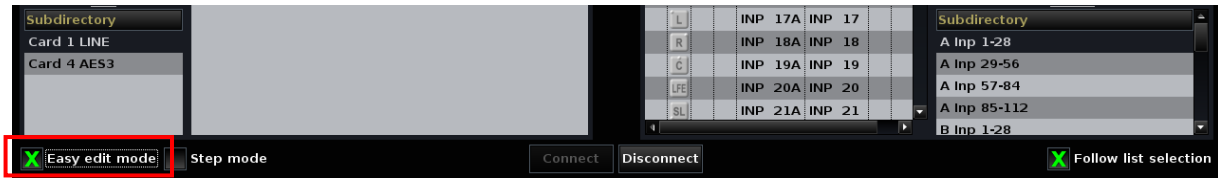
To edit labels for consecutive sources, use the **Easy edit mode** as described on the next page.

Easy Edit Mode

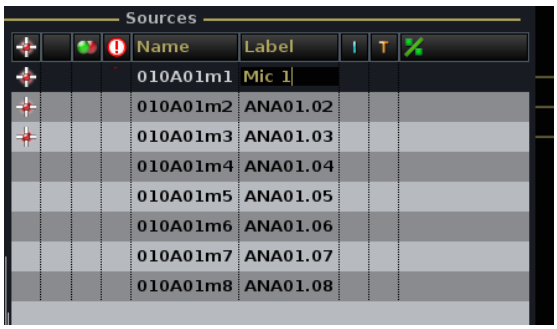
Tip

This mode edits user labels for consecutive signals:

1. Enable the **Easy edit mode** at the bottom left of the **Signal List** display:

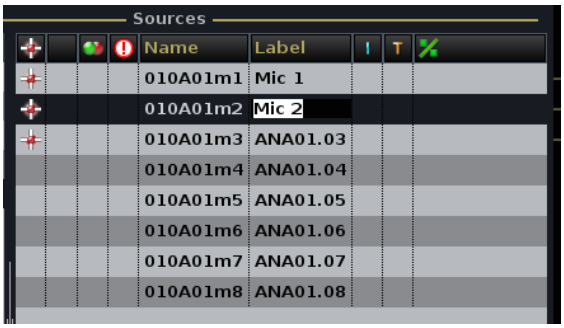


2. Select the first source or destination label you wish to edit and enter a label in the usual manner.

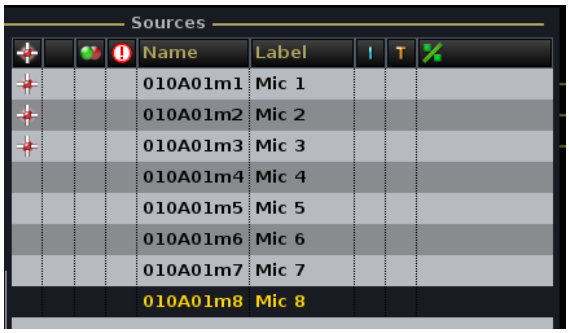


3. Press **Enter** to confirm.

*With **Easy edit mode** enabled, the system automatically steps down to the next signal in the list. The text label is copied, and if the text ends with a number, then the number increments:*



4. Keep pressing Enter to label all the signals in the list:

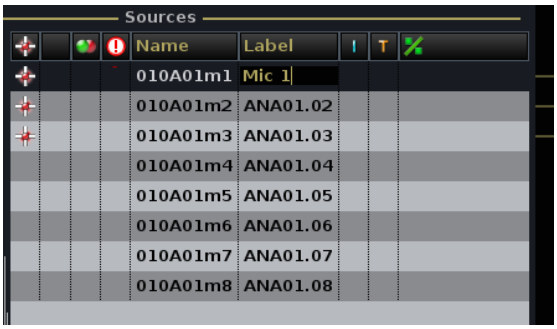


5. Press **Esc** to exit the naming mode.

Note that you can also enable Easy edit mode temporarily by using the **SHIFT** button on the console keyboard.

With the **Easy edit mode** option unchecked:

1. Select the first signal label you wish to edit and enter a label in the usual manner.



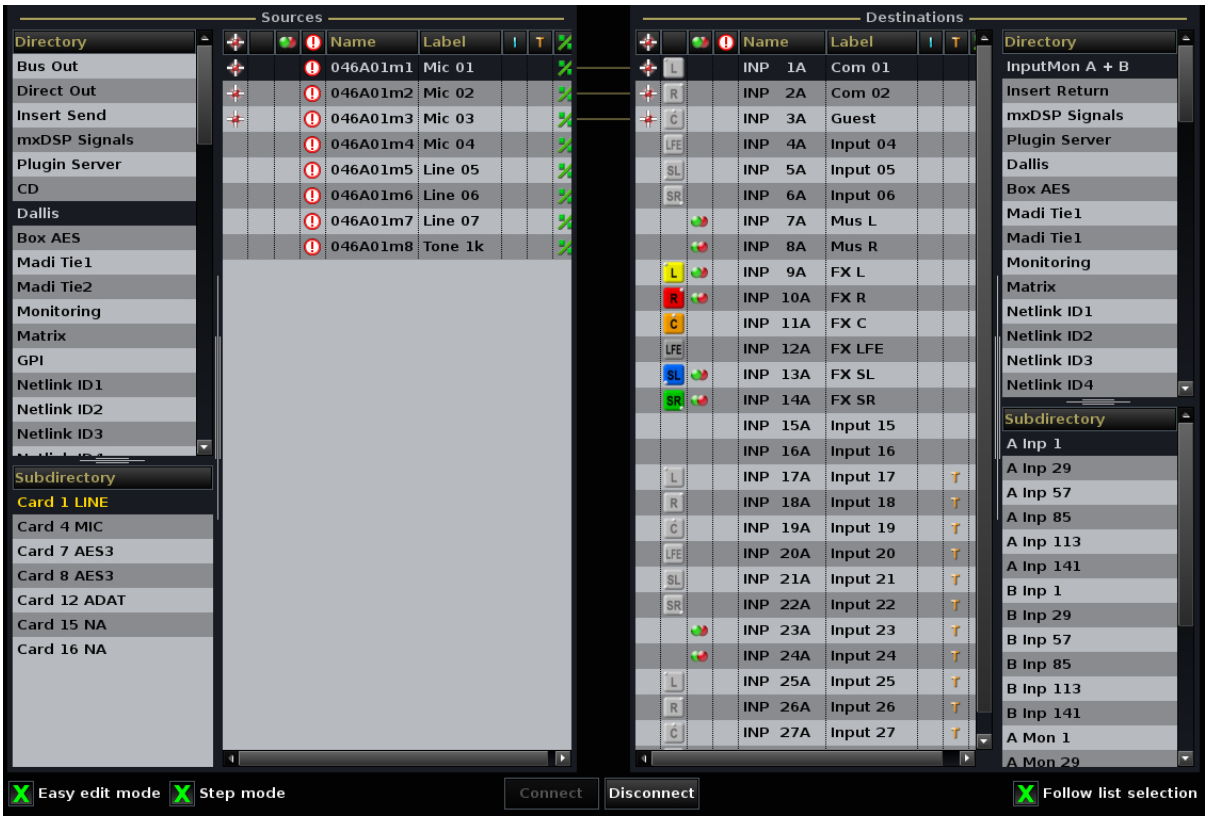
2. Press and hold **SHIFT** and then press **Enter**.

*Holding down **SHIFT** temporarily enables **Easy edit mode**, so the system automatically steps down to the next signal in the list. The text label is copied, and if the text ends with a number, then the number increments.*

3. Press **Esc** to exit the naming mode.

Not Available Signals

If a warning flag is present within the unavailable column, then a signal which should be present in the system is currently unavailable. This can be useful for fault finding and reassurance.



For example, in an outside broadcast vehicle, you may have a number of remote 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. When the Stagebox is connected to the system this column updates accordingly and the warning flag disappears.

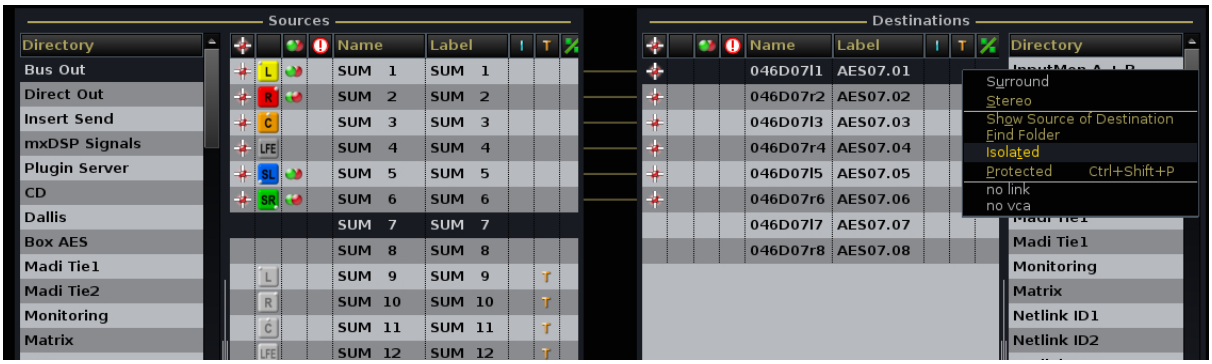
If you need further help diagnosing system connections, see Page 597 for details.

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.

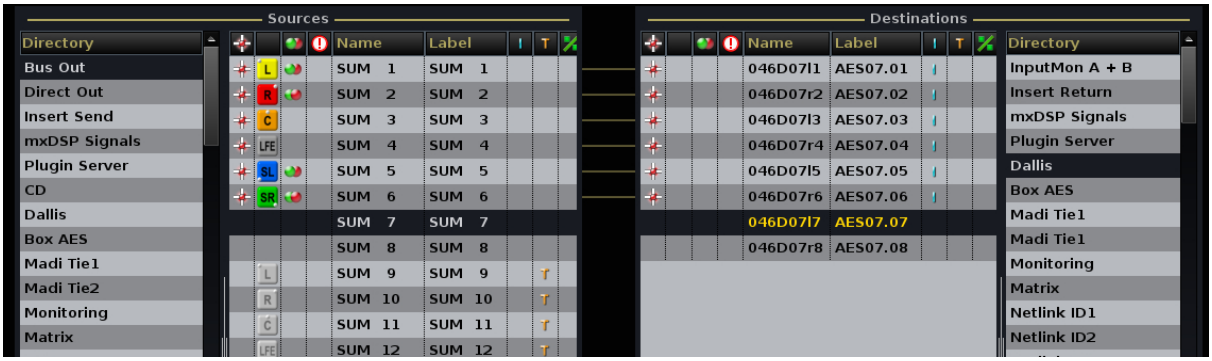
To isolate a signal:

1. Select the source or destination you wish to isolate, and right-click using the trackball and right select button.



2. Select the **Isolated** option.

*The **I** column updates to show the isolated signal status:*



When a snapshot is loaded, any routes made from an isolated source or to an isolated destination are not loaded.

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.

Note

Protected Signals

If you wish to apply more comprehensive protection to a matrix destination, then it can be protected so that nothing can alter its connection.

To protect a signal:

1. Select the destination you wish to protect, and right-click using the trackball and right select button:

2. Select the **Protected** option.

Protected destinations are displayed with a padlock icon in the connection column.

From hereon, nothing can alter the connection – 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.

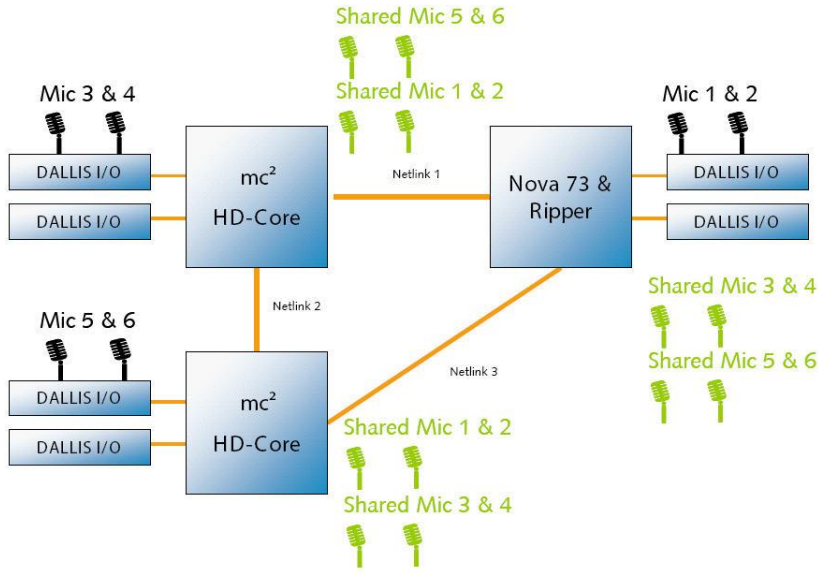
3. To change the route to a protected destination, you must first turn off the **Protected** option.

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 will affect all users.

Networking I/O Resources

Two or more **mc²** consoles may be networked to distribute I/O resources. For example, to share the same microphone source between two consoles:



In the above example, mics are physically connected, via a DALLIS I/O unit, to each system. Signals are transferred between systems via 'Netlinks', providing the ability to route any mic to console A and/or console B.

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

Any number of sources may be distributed depending on the physical limitations of your network. Please consult your technical representative for further details on your installation's configuration.

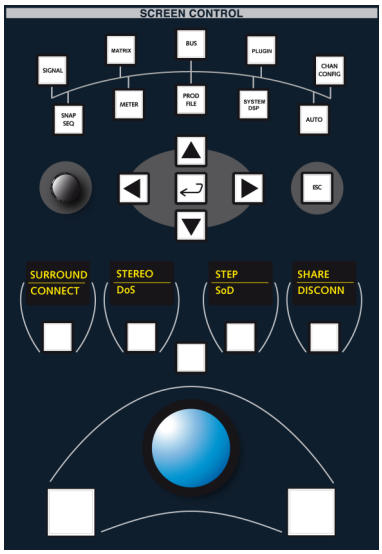
On any console within the network, you can view which sources are distributed from the **S/I** column on the **Signal List** display:

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


Note

To easily recognize compatibility between different software versions, all Lawo products have adopted a consistent numbering system: the first three digits of the software revision number must be identical to ensure networking compatibility. For example, a Nova73 running Version 4.6.0.0 can be networked to a mc²66 running Version 4.6.0.2. However, if the mc²66 is running V4.6.2.0, then they are not network compatible.

On the console 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**).

Your selection is highlighted in black.

2. Press the **SHARE** soft key (on the second PAGE) to share the source, or right-click and select the **share** option.

*The **S/I** column updates to show that the source is now shared.*

3. Press **SHARE** again to unshare the source.

Note that 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 you can use the **STEP** function to step through and **SHARE** a number of sources.

Once the source has been shared from console A, then other consoles within the network may access this source (shown as imported) from the **Signal List** display.

Note

Note that console B will only be able to access the source if its I/O configuration has been programmed to do so – i.e. a location for the imported source must have been created within an I/O directory and subdirectory. Please consult your technical representative 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.

Note

Note that 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 may change parameters like SRC, etc. In addition, SDI card parameters may be adjusted for a remote system. For more details on signal parameters, see Page 602.

This operation 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 I/O snapshot filter to prevent recall of I/O settings, see Page 395.

The mx Routing Display

The **mx Routing** display provides a crosspoint overview of signal routing, ideal if you want to make a large number of routes very quickly. Any routing changes made by the **mx Routing** display are reflected in the **Signal List** and vice versa.

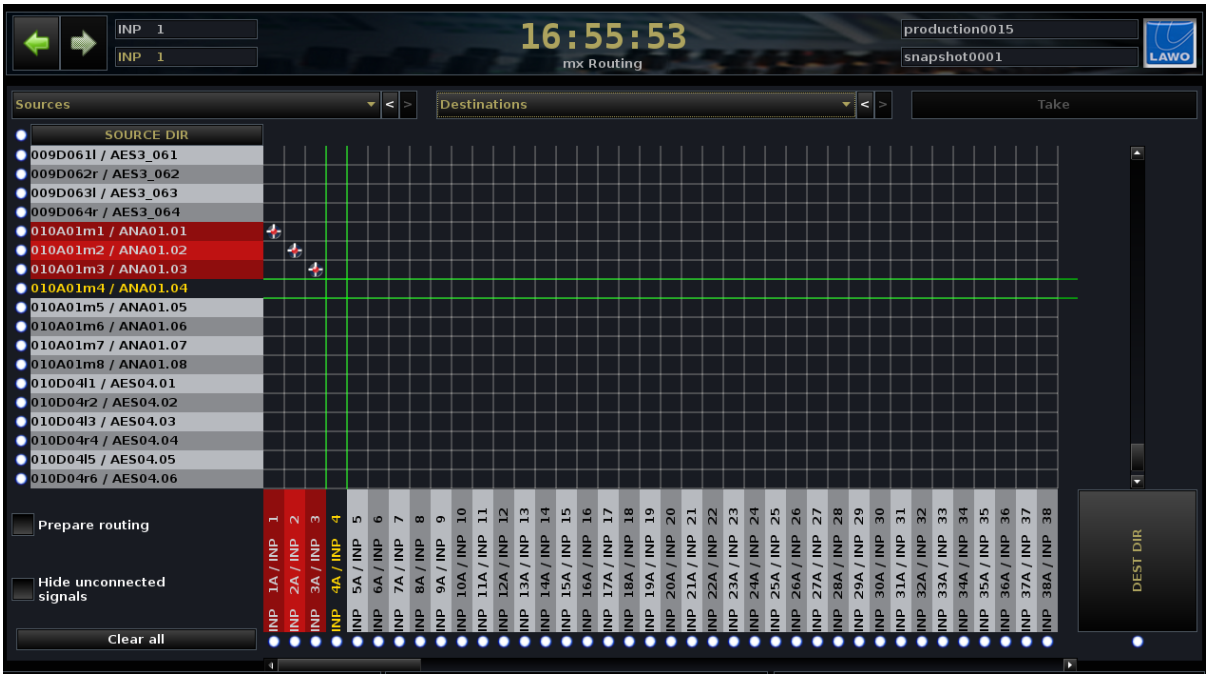
The display can be used to view or change signal routing, adjust signal settings or create partial snapshots.

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.

In addition, 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.

Signal Routing from the mx Routing Display

1. Press the SCREEN CONTROL **MATRIX** button to open the **mx Routing** display:



Note

Note that each time you press the **MATRIX** button you cycle through three pages so keep pressing until you see the **mx Routing** display.

The display shows a grid 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. In addition, 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.

Note that if a destination is protected, then you will see a padlock icon.

2. Position the cursor to select a source and a destination.

The selections are highlighted in green.

3. Now press the left select button to make (or unmake) the connection.

The route is made as indicated by a red and white cross.

Tip

4. You can choose to display only connected signals by selecting the **Hide Unconnected Signals** checkbox.

Selecting Directories and Subdirectories

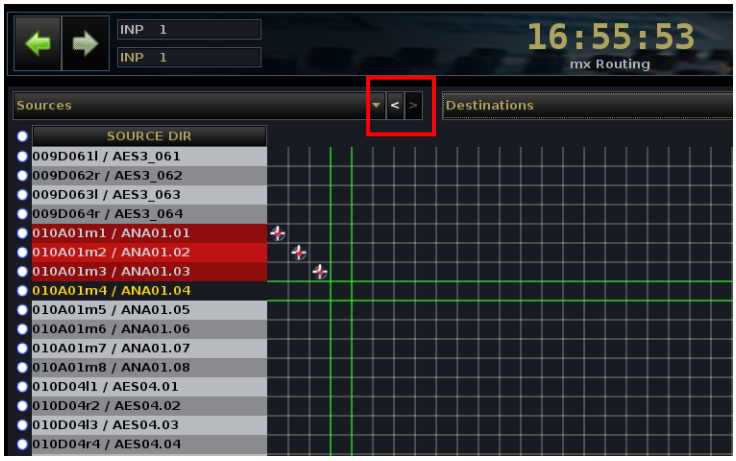
Just as on the **Signal List** display, signals are divided into Directories and Subdirectories. You can choose to view all Sources and all Destinations as in our previous example. Or, you can select a particular directory as follows:

1. Using the trackball, select a directory and subdirectory from the drop-down **Sources** (or **Destinations**) list:

The organisation of signals into directories and subdirectories is defined by the AdminHD configuration of your system. In our example, we have selected **DALLIS** -> **Card 4 AES3**:

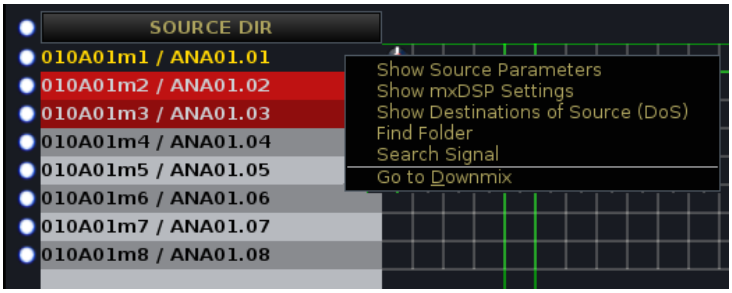

Tip

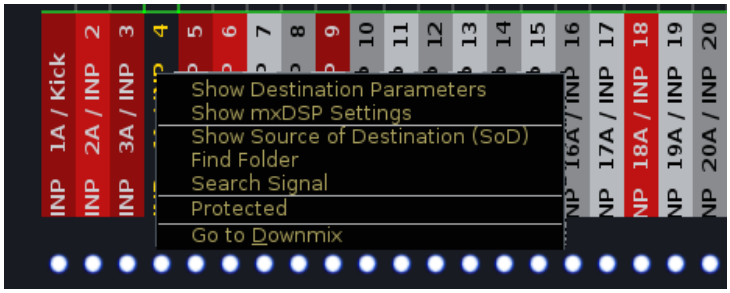
You can use the on-screen next and previous directory buttons to quickly navigate through recent selections – in our example, selecting the back button takes the view back to all **Sources**:



Right-click Operations

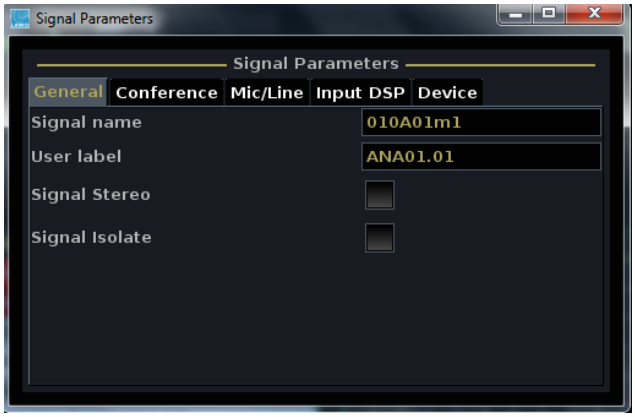
1. Using the trackball and right select button, right-click on a signal to reveal a number of additional operations:





Signal Parameters

Select the **Show Source Parameters** (or **Show Destination Parameters**) option to access a pop-up window where you can adjust parameters for the selected signal. In our example, we can adjust the user label and other input parameters for an analogue source:



These signal options are identical to those found on the **Signal Settings** display, so please refer to Page 602 for more details.

Show mxDSP Parameters

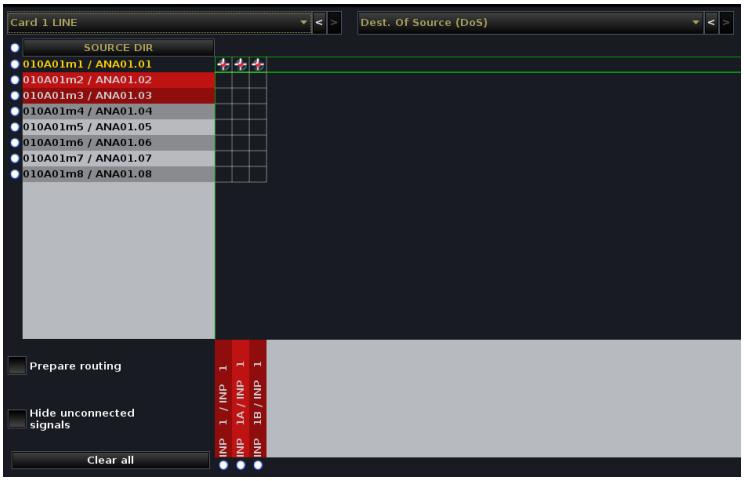
For a source from an mxDSP card, select **Show mxDSP Parameters**. The options are identical to those found on the **mxDSP Settings** display, so please refer to Page 622 for more details.

⏩ Show Destinations of Source (DoS) or Show Source of Destination (SoD)

This option can be used to reverse interrogate the connections made from the selected source or to the selected destination. It works in the same way as on the **Signal List** display.

1. Select the source you wish to interrogate.
2. Then right-click and choose **Show Destinations of Source**.

The destinations update to show only those routed from the selected source – in our example, the A and B inputs of INP 1:



Note that the destination directory has updated to **Dest. Of Source (DoS)**. This means that if you now select another source, the display will show its destinations.

3. To cancel the Destinations of Source view, either click on the previous directory button or select a different Destinations directory.

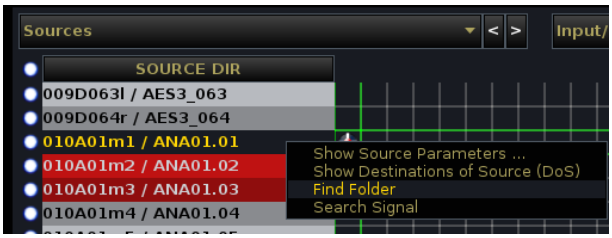
You can also double-click on a source, or a destination, to activate the Destinations of Source or Sources of Destination function.


Tip

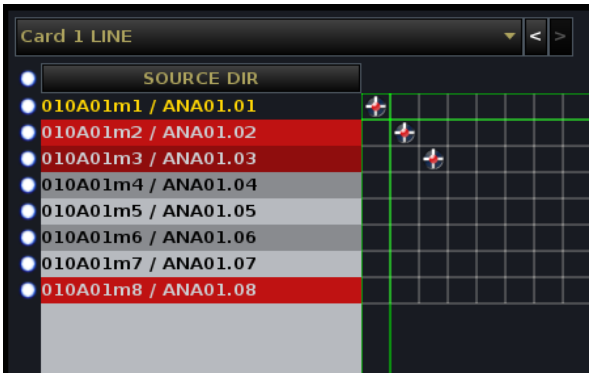
Find Folder

If you are unsure which directory or sub directory a source (or destination) belongs to, then you can use **Find folder** to locate it. This feature works in the same way as on the **Signal List** display.

1. Select the source (or destination).
2. Then right-click and choose **Find Folder**:



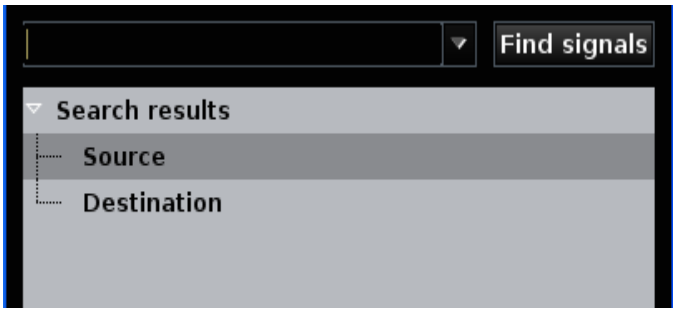
The Source (or Destination) directory updates to reveal the location of the source folder:



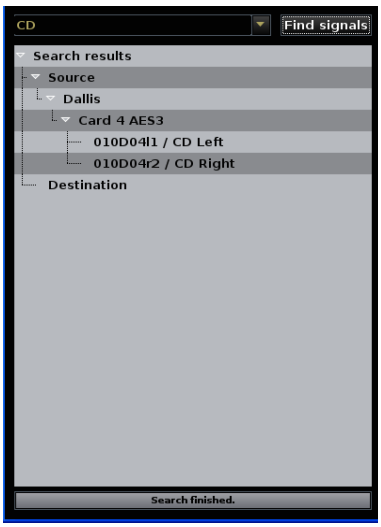
Search Signal

This option is only available from the **mx Routing** display (it is not available from the **Signal List**) and allows you to search for a signal. For example, you may suspect that a CD player is defined within the signals list but do not know its directory:

1. Right-click and select **Search Signal** to open the **Signal find** pop-up window:

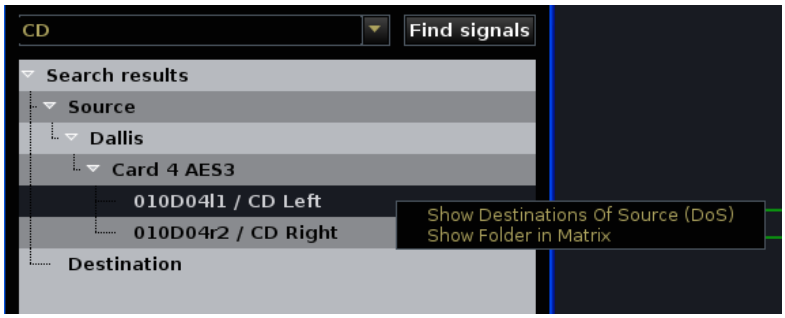


2. Type in the name or user label of the source (or destination) you wish to locate – in our example, **CD**.
3. Then select **find signals**.



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:

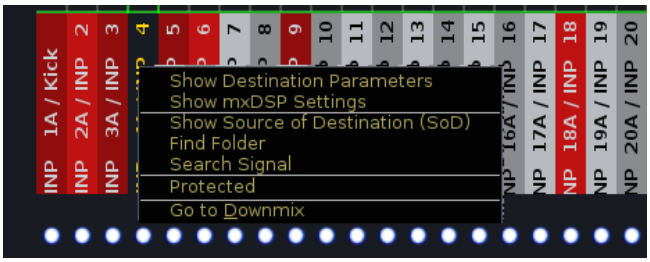


- Use **Show Destinations of Source (DoS)** to view all connections made from the source.
- Or, **Show Folder in Matrix** to open the source directory.

Protected Signals (Destinations only)

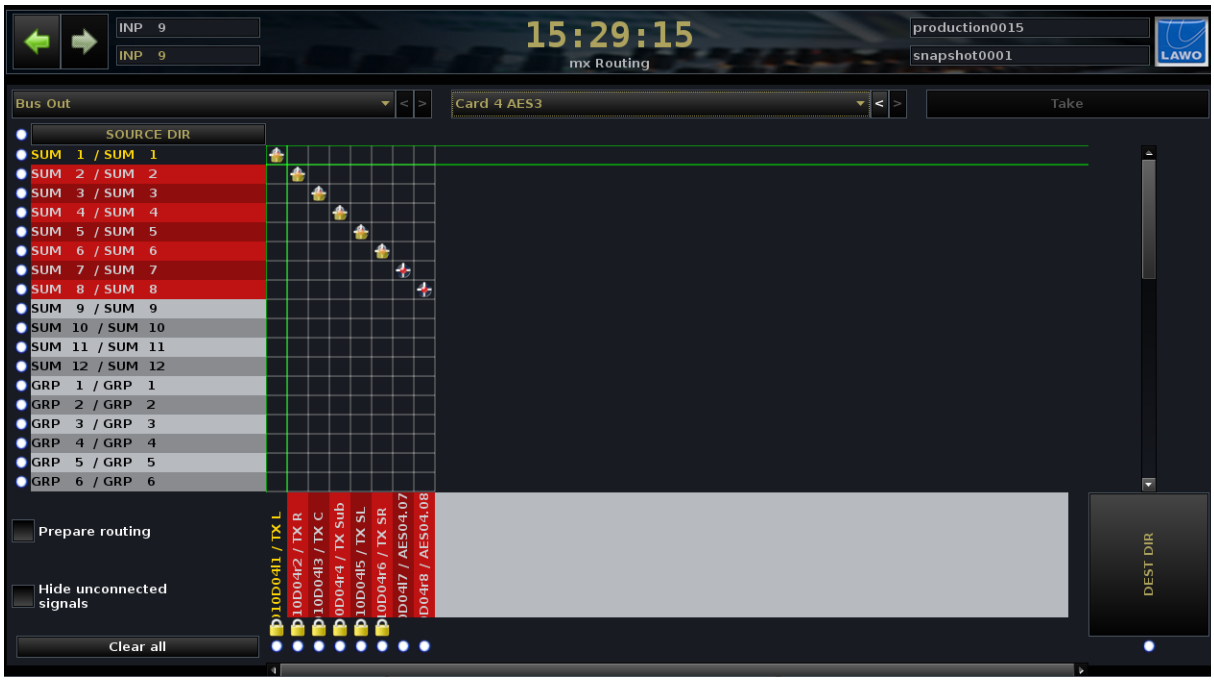
This option can be used to protect a destination. It works in the same way as on the **Signal List** display.

1. Select the destination you wish to protect, and right-click:



2. Select the **Protected** option.

Protected destinations are displayed with a padlock icon:



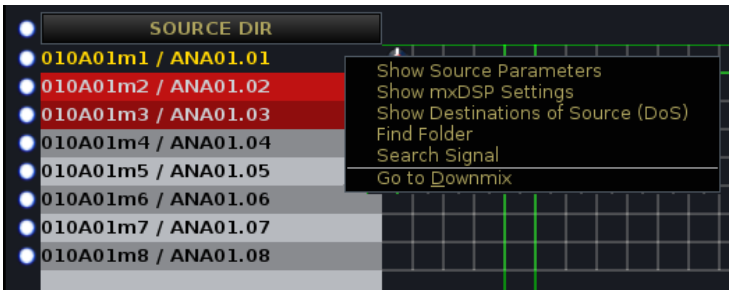
From hereon, nothing can alter the connection – not the **Signal List** or **mx Routing** displays, not snapshots, productions, mxGUI or remote MNOPL. This is ideal for critical signals, such as mains distribution.

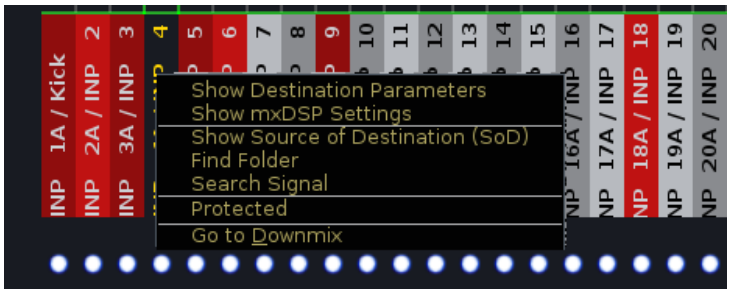
3. To change the route to a protected destination, you must first turn off the **Protected** option.

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 will affect all users.

Go to Downmix





If the selected source or destination is an input or output to a downmix matrix, then this option automatically opens the **Downmix** display. This allows you to control the downmix parameters. See Page 635 for details.

Preparing Signal Routing (the Take Button)

In addition to making routes one by one, 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 **mx Routing** display.

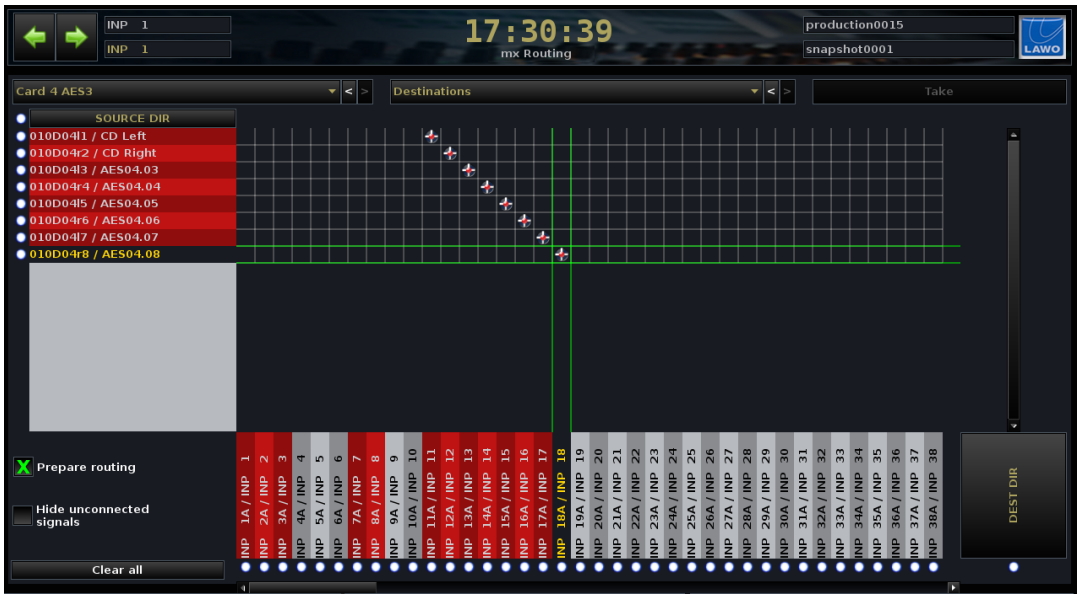
This puts the display into 'prepare' mode.

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.

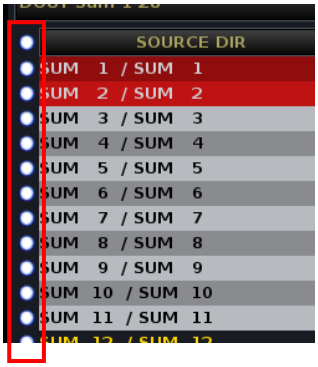
Partial Snapshots

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.

Note

Note that 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 saved and loaded from the **Snapshots List** display.

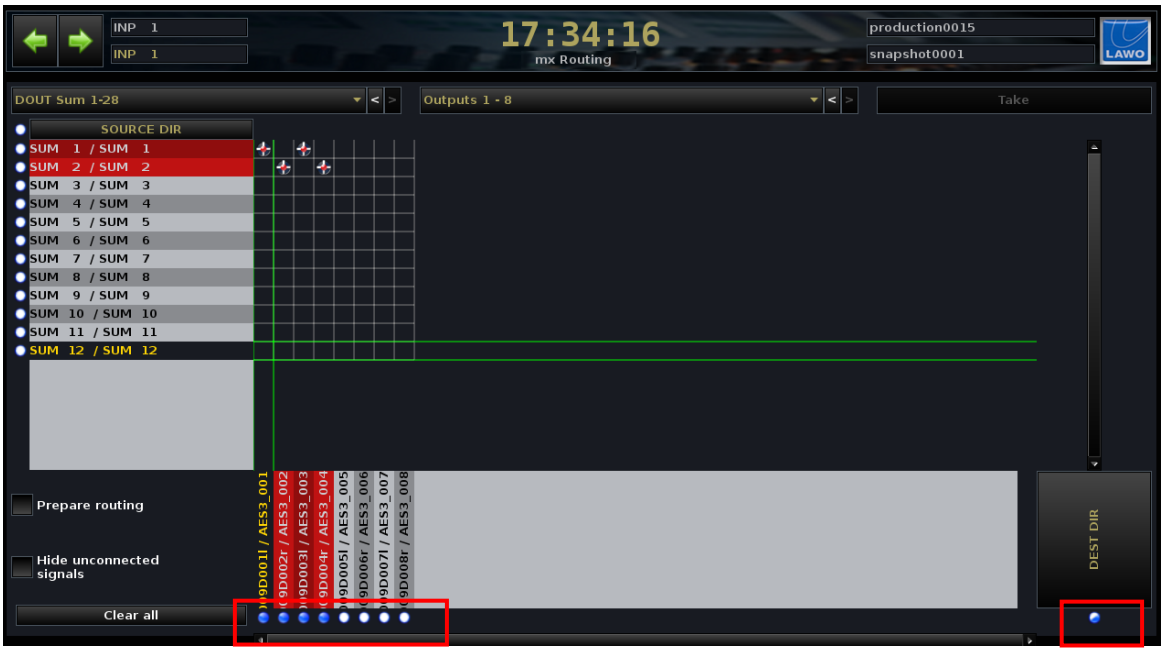


1. Open the **mx Routing** display.
2. Use circles beside each source and destination to select which will be stored within the partial snapshot:

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 I/O parameters.
- If you select a source, the partial snapshot stores only the source I/O parameters.

Therefore, to store crosspoints in a partial snapshot, always select the destinations. In our example, we want to store routes to the AES feeds and so have selected these destinations:



The half blue circle beside **DEST DIR** indicates that some signals within the directory are selected. To select all sources or destinations within a directory, select this circle (full blue).

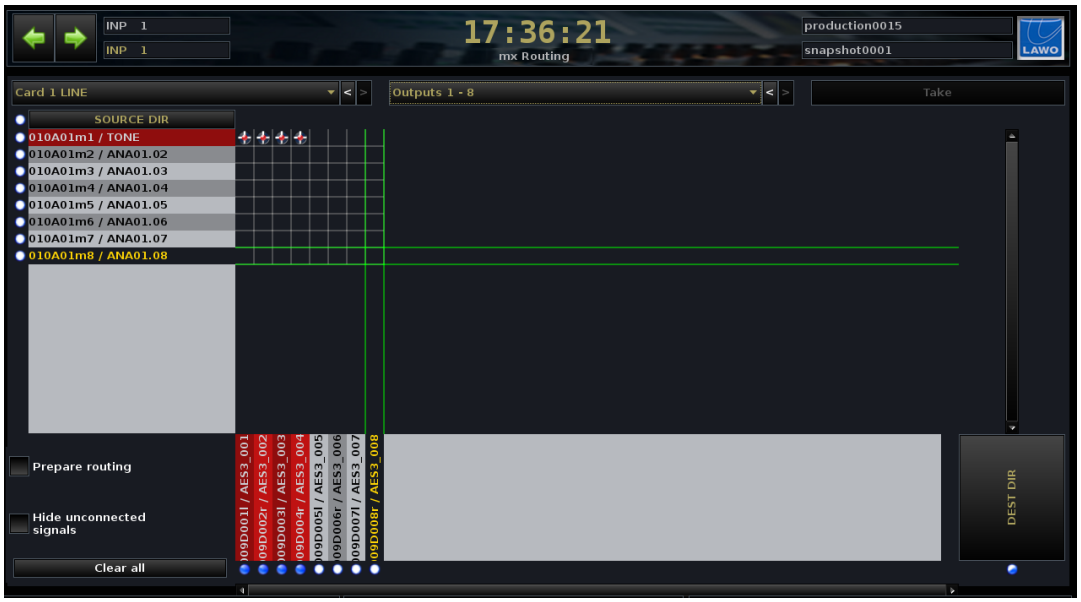
Clear All clears all partial snapshot selections made throughout the entire routing matrix. Use this when you wish to clear down any active selections in preparation for a new partial snapshot.

3. Once you have made your selections, go to the **Snapshots 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.

4. 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 **Snapshots List** display:

6. At any time you can now load the partial snapshots to recall routes made only to the transmission feed destinations.

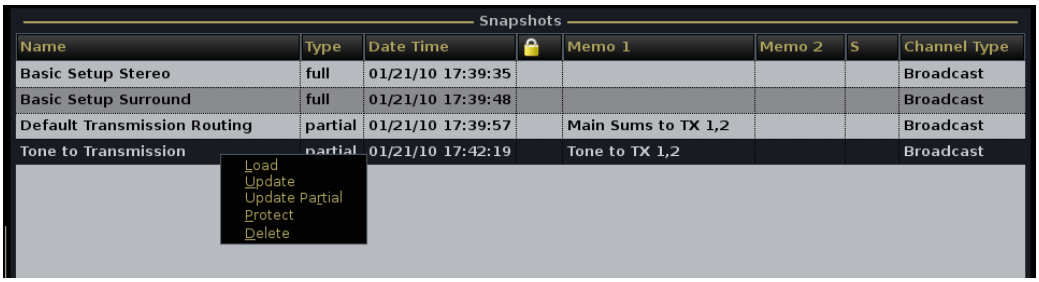
Note

Note that it is the blue circle selections when the partial snapshot is saved which defines which routes and I/O settings are stored. This allows you to save partial snapshots for different subsets of signals.

Note that you can use Isolate from the **Signal List** display or **SNAP ISO** on a fader strip 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 **Snapshots List** display, see Chapter 6 for details.

7. To update an existing partial snapshot, be sure to select **Update Partial**:

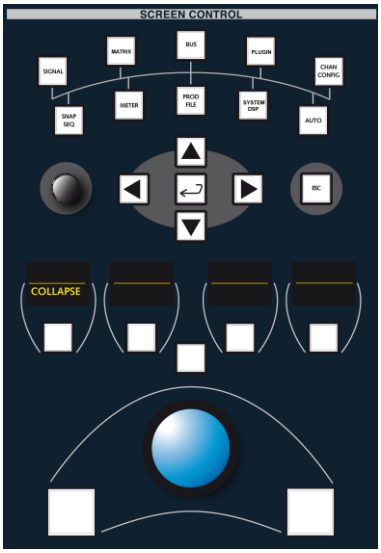


8. Remember to save or update the production in order to save snapshots permanently to the internal flashcard.

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.

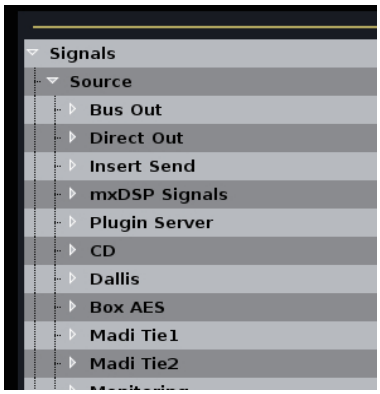
1. Press the **SIGNAL** button, located on the SCREEN CONTROL panel, to view the **Signal Settings** display:



Note that each time you press the **SIGNAL** button you toggle between two pages – **Signal List** and **Signal Settings** – so keep pressing until you see the **Signal Settings**.

Note

The two “trees” on the left of the display show the location of a signal within the **Signal List** (top) and its physical location in the **System** (bottom). Whenever a signal is selected from the **Signal List**, the **System** tree follows, and vice versa.

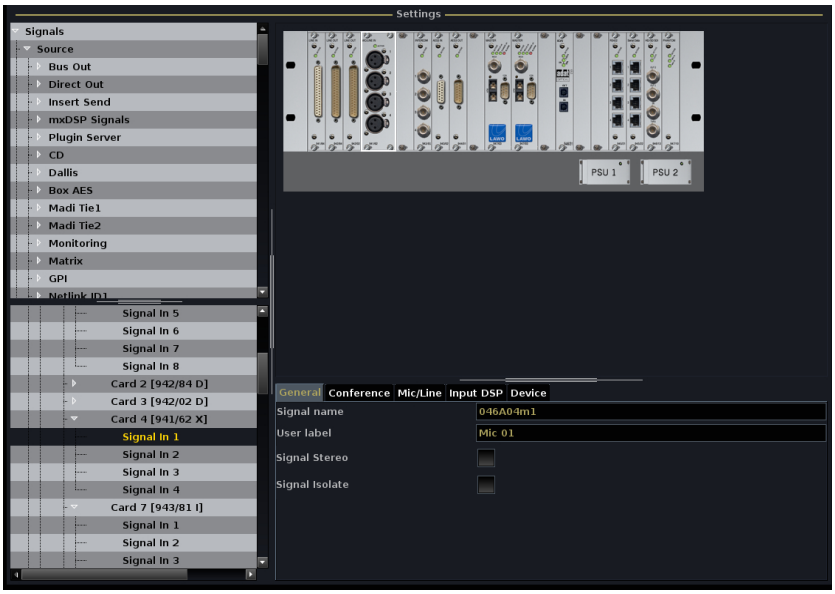


You can open or close branches of the **Signal List** or **System** tree by clicking on the arrows or double-clicking on a directory/component name.

As you select signals, a graphical representation appears in the middle of the display – in our example, we can see the DALLIS where our mic signal is connected.

If all is well with the system hardware, then the components are coloured grey. However, if there is a problem, the component will be highlighted in red, and you will see a red/white cross next to the component name in the system tree.

When you select an individual signal, a number of parameter tabs appear at the bottom of the display – in our example, **General**, **Conference**, **Mic/Line**, **Input DSP** and **Device**:



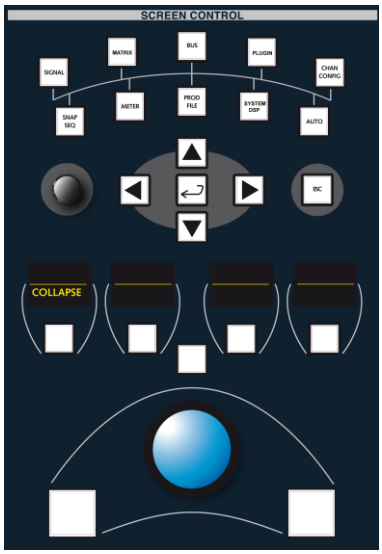
Note

Note that the parameter tabs depend on the type of signal selected.

2. Select a tab to access I/O parameters for the selected signal.

Tip

When working with the **System Settings** display you can resize the different areas by clicking and dragging the grey separator bars - for example, during normal operation you might hide the **System** tree until it is needed. If information within an area is hidden, then left/right or up/down scroll bars will automatically appear.

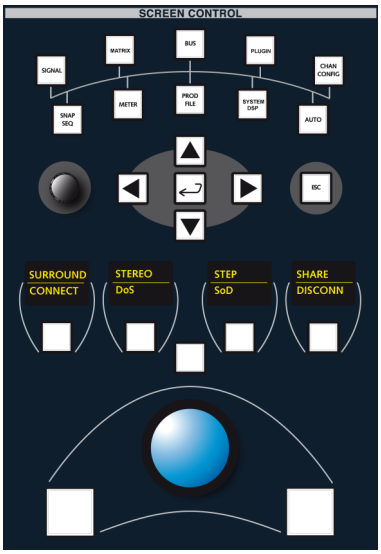


3. Press the **COLLAPSE** soft key to collapse the Signal List in order to get a quick overview of system components.

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. For example:

1. Go back to the **Signal List** display and select a source – in our example, the source named **Mic 01**:



2. Make sure that the **follow list selection** option is checked at the bottom of the display.
3. Then press the SCREEN CONTROL **SIGNAL** button again to switch back to the **Signal Settings** display:

The **Signals** and **System** trees should have automatically opened to reveal your selected source.

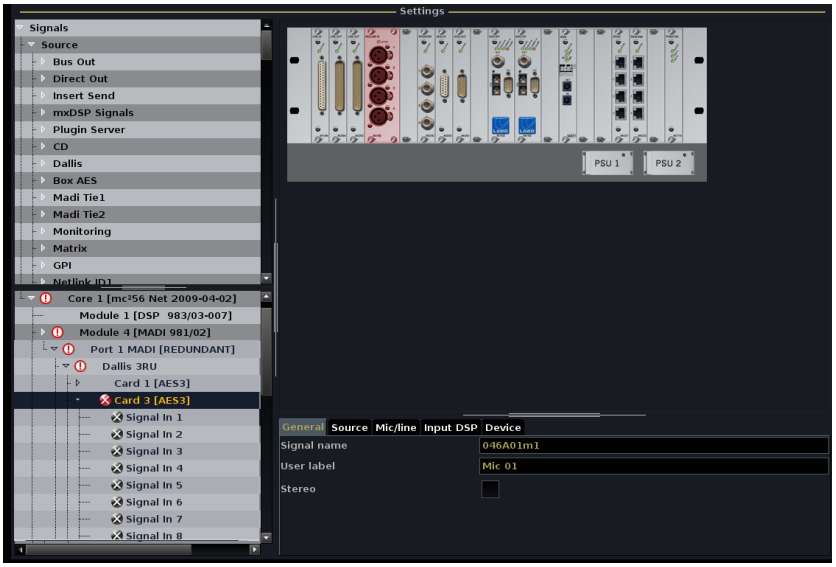
Diagnosing System Errors

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

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

A red/white cross and highlighted card reveal the problem.

2. If the fault is hidden within the **System** tree, follow the red warning flags and open each branch of the tree to find the problem – in our example, a DALLIS card:



If you open the DALLIS card further, you will see grey/white crosses beside **Signal In 1**, **Signal In 2**, etc. These show that the AES signals are no longer available:

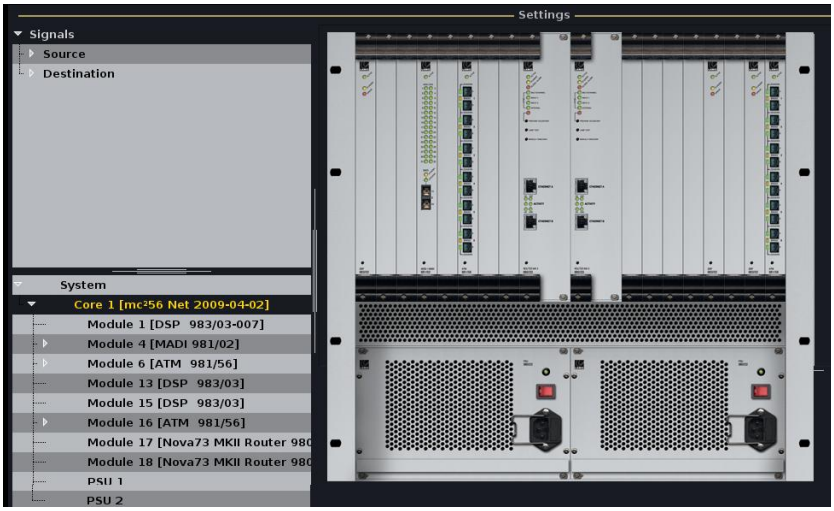
3. Check and replace the card if necessary.

Once all components are connected and working correctly, the red/white crosses disappear from the **System Settings** display and the hazard warning flag is cleared.

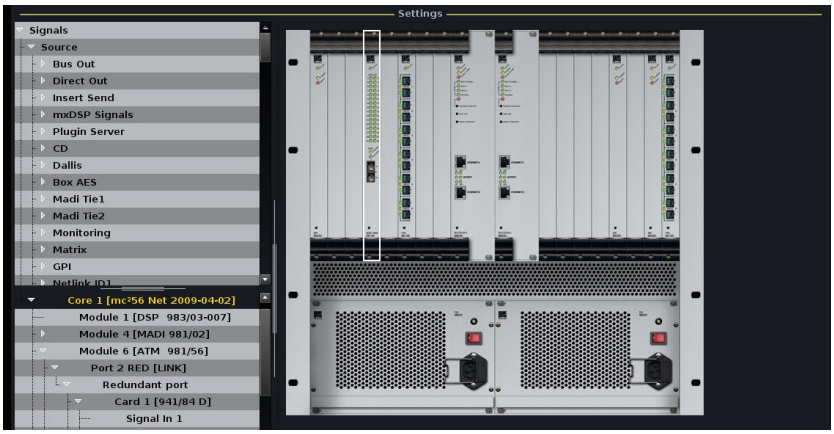
The System Tree

The **System** tree can be opened as follows:

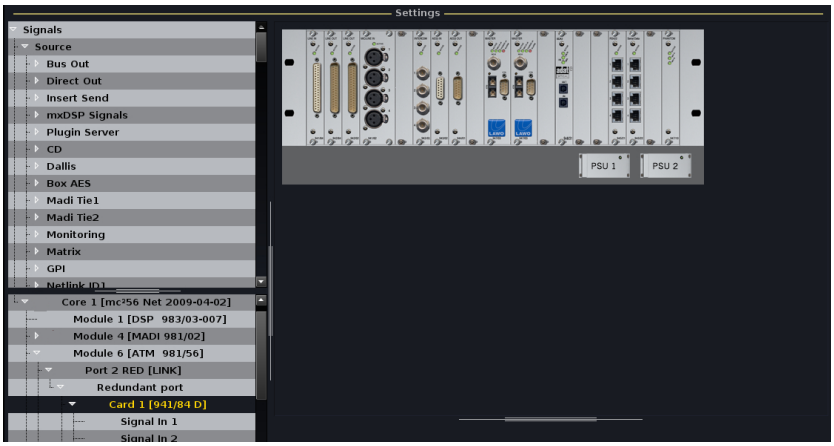
1. Close and then reopen the **System** to see all the **Cores** contained within your system network – e.g. **Core 1**:



2. Open **Core 1** to see all the **Modules** fitted to the core, and its power supplies – **PSU 1** and **PSU 2**:



3. And open a **Module** to view its ports and then any DALLIS units connected to those ports:



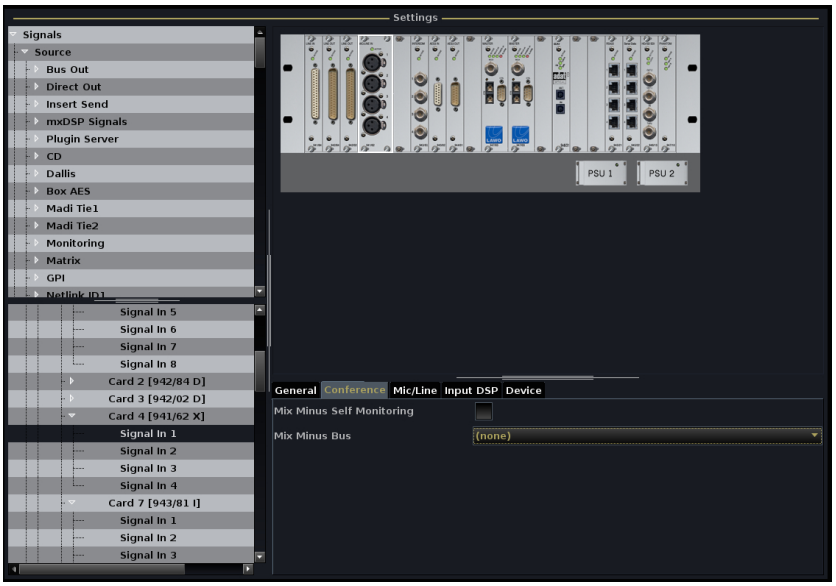
Setting I/O Parameters

Each time you select an individual signal within the **Signal Settings** display, you can adjust its I/O 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 – in our example, **General**, **Conference**, **Mic/Line**, **Input DSP** and **Device**.*

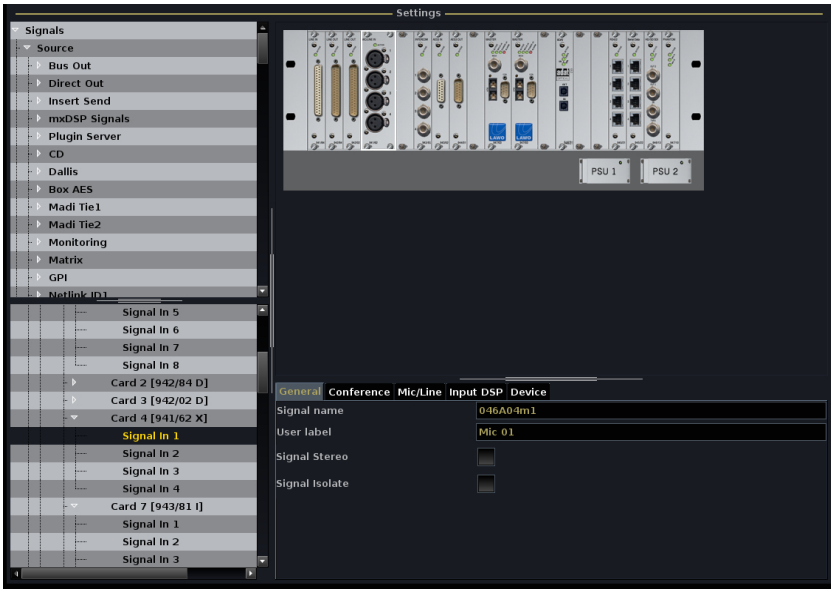
2. Select a tab to access the I/O parameters for the selected signal:



Note

Note that the parameters vary depending on the type of signal – Mic, Line, AES, SDI, etc. – and whether you have selected an input or output. You can find details for all parameters by referring to the datasheet for the card available from the Lawo website. Here we will cover the most common i/o cards.

General Parameters



Signal name

This field displays the signal name as defined by the AdminHD configuration. Note that you cannot edit this name from the console.

User label

This field can be used to edit the user label for the selected signal.

This is the same as the **Source Label** (input signals) or **Destination Label** (output signals) on the **Signal List** display:

1. Click on the existing label to enter a new name from the console keyboard.

A cursor appears within the label field.

2. Enter your new name.

*The new signal label appears on the console surface if the channel is on your current fader bank/layer and in the **Signal List** display.*

For more details on names and labels, see Page 573.

Signal Stereo

Check this option to link an odd/even pair of signals for stereo. The stereo linking affects the behavior of the I/O DSP, see Page 618 for details.

Note that signals can also be stereo linked from the **Signal List** display, see Page 572.

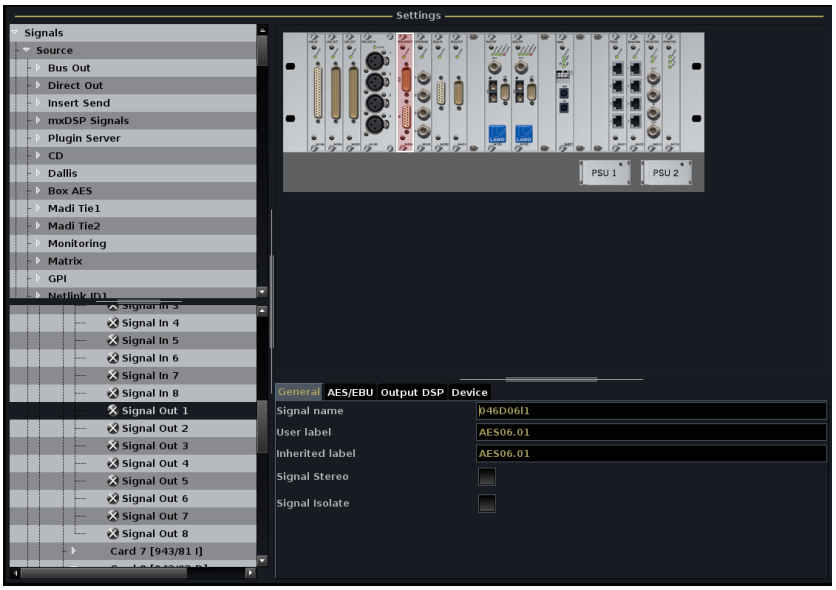
Signal Isolate

Check this option to isolate a signal from a snapshot recall.

Note that signals can also be snapshot isolated from the **Signal List** display, see Page 579.

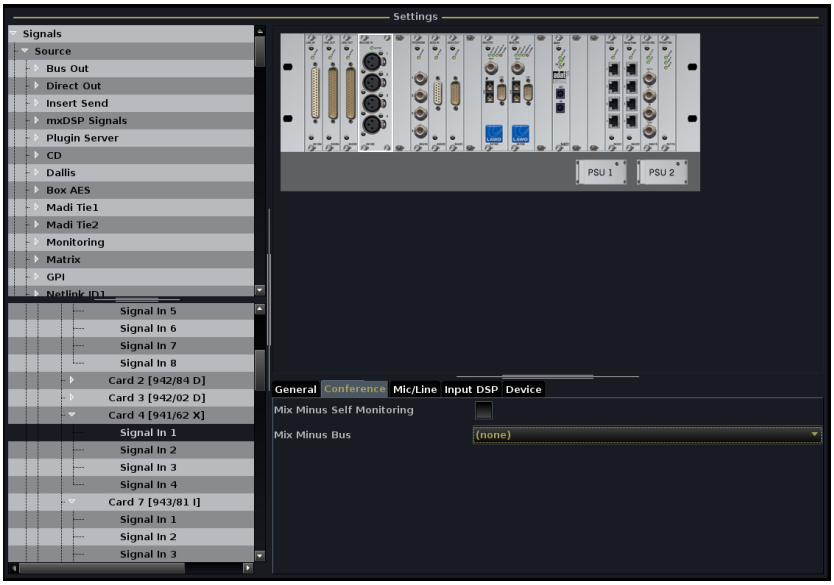
Inherited Label (Output Signals only)

This field only appears when an output signal is selected:



If the selected output is routed from a source, then this field displays the inherited user label and is for information purposes only.

Conference Parameters (Input Signals Only)



These parameters only appear when an input signal is selected.

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.

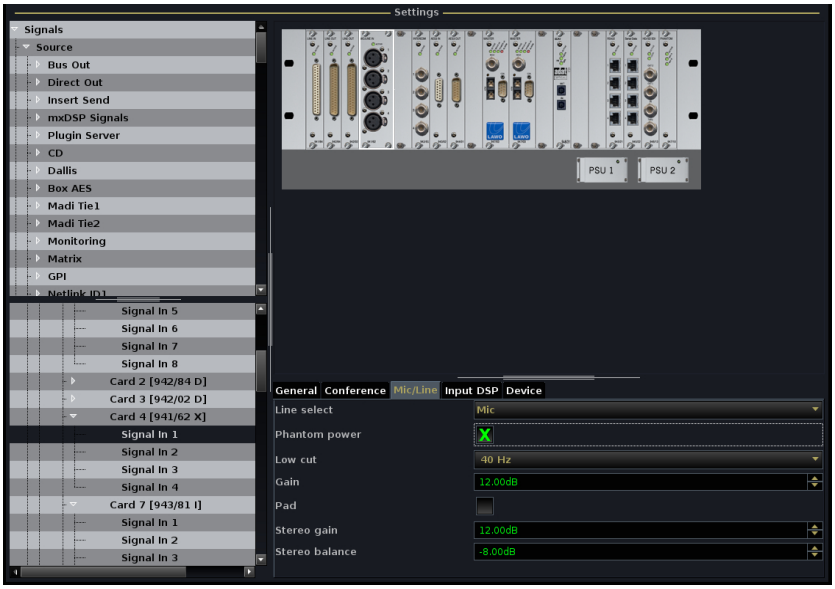
A green cross appears when the option is enabled.

Mix minus Bus

Use this field to assign an auxiliary send or track bus as the mix minus return feed for the selected signal.

See Page 239 for full details on configuring a mix minus.

Mic/Line Parameters (Mic/Line Signals Only)



These parameters only appear when an input signal from a Mic/Line card is selected, and duplicate the parameters available from the Central Control section:

Line select

Click on the drop-down menu to switch the input between mic or line.

Phantom power

Check this option to enable phantom power. Phantom power can only be enable when the input is switched to Mic.

Low cut

Click on the drop-down menu to select a cut-off frequency for the high pass (low cut) filter prior to analogue-to-digital conversion. You may select: off, 40Hz, 80Hz or 140Hz.

Gain

Use this field to adjust the input gain of the signal.

You can either click on the existing entry and type in a value from the console keyboard, or click on the up/down arrows beside the field to increment or decrement the value in 1dB steps.

Pad

Check this option to enable the 20dB Pad prior to analogue-to-digital conversion.

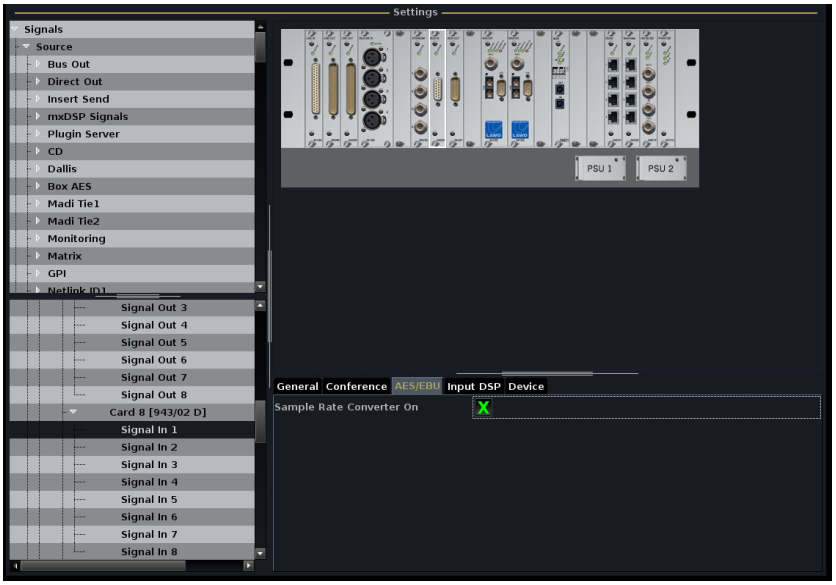
Stereo Gain and Balance

You may use these fields to adjust the gain and balance of both the left and right signals if adjacent mic/line inputs are linked as stereo signals.

Either click on the existing entry and type in a value from the console keyboard, or click on the up/down arrows beside the field to increment or decrement the value in 1dB steps.

See Page 572 for more details on configuring a stereo source.

AES/EBU Inputs (AES/EBU Signals Only)



For an AES/EBU input signal, you can turn sample rate conversion on or off.

Note that not all AES/EBU cards support sample rate conversion so this option may not be available for all signals.

Note

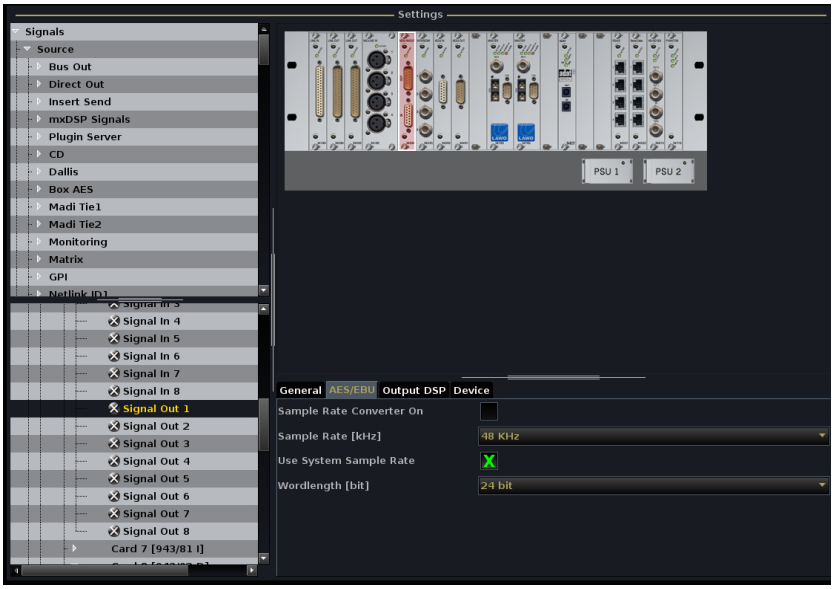
Also note that to make a digital path suitable for Dolby E operation, you should disable any sample rate conversion and I/O DSP.

⏩ Sample Rate Converter On/Off (Sample Rate Conversion)

As a default, this parameter is enabled (checked).

Uncheck this option to disable the sample rate converter for the selected source.

AES/EBU Outputs (AES/EBU Signals Only)



These parameters only appear when an output signal from a AES/EBU card is selected.

For an AES/EBU output signal, you can adjust the sample rate and the wordlength.

Note that both options affect the status of the sample rate converter. Therefore, to disable the SRC to make the output path suitable for Dolby E operation, set these options according to the table in Appendix C.

Note

Sample Rate and Use System Sample Rate

The default state for digital outputs is that they 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.

Note that the **SRC** flag is for display purposes only and when unchecked (as above) shows the sample rate conversion is out of circuit.

On digital outputs with sample rate conversion (SRC), you may alter the clock selection of each output. For example, you may wish to send a 44.1kHz feed to a CDR. Note that, depending on your hardware specification, sample rate conversion may be unavailable on some digital outputs.

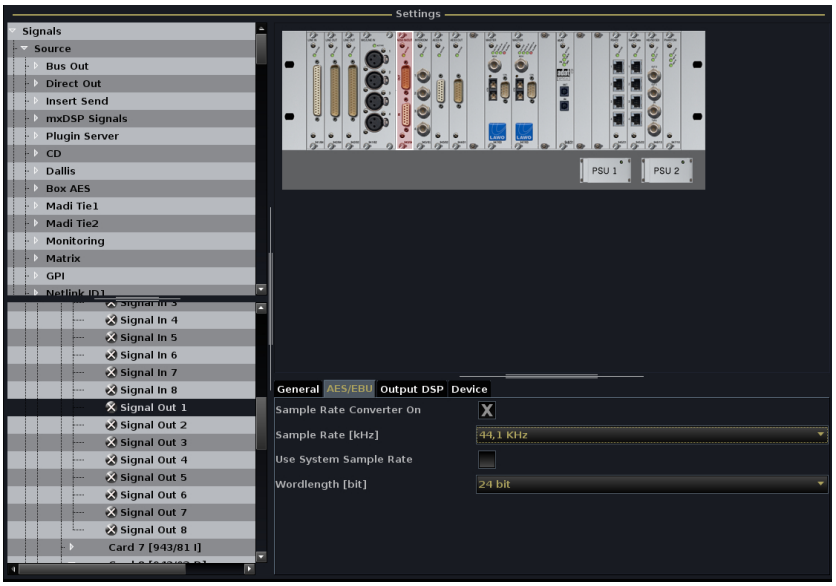
1. To change the sample rate of the digital output, select the **Sample Rate** parameter and choose from the drop-down menu options:

- **follow** – sets the output sample rate to follow the input sample rate from which it is routed.
- **44.1 KHZ** – 44.1kHz.
- **48 KHZ** – 48kHz.

On systems running at higher sample rates, you can also select:

- **88.2 KHZ** – 88.2kHz.
- **96 KHZ** – 96kHz.

*Selecting a different sample rate will automatically uncheck the **Use System Sample Rate** option and check the **SRC** status flag:*



2. To reset the digital output so that it is referenced to system clock, reselect **Use System Sample Rate**.

For details on setting the system sample rate, see Page 678.

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 may change the status of output sample rate conversion; see the table in Appendix C for details.

1. To change the wordlength for a digital output, select the **Wordlength** parameter and choose from the available drop-down menu options:

- **24 bit**
- **20 bit**
- **16 bit**

Note that when 16 or 20-bit are selected, dither is automatically applied.

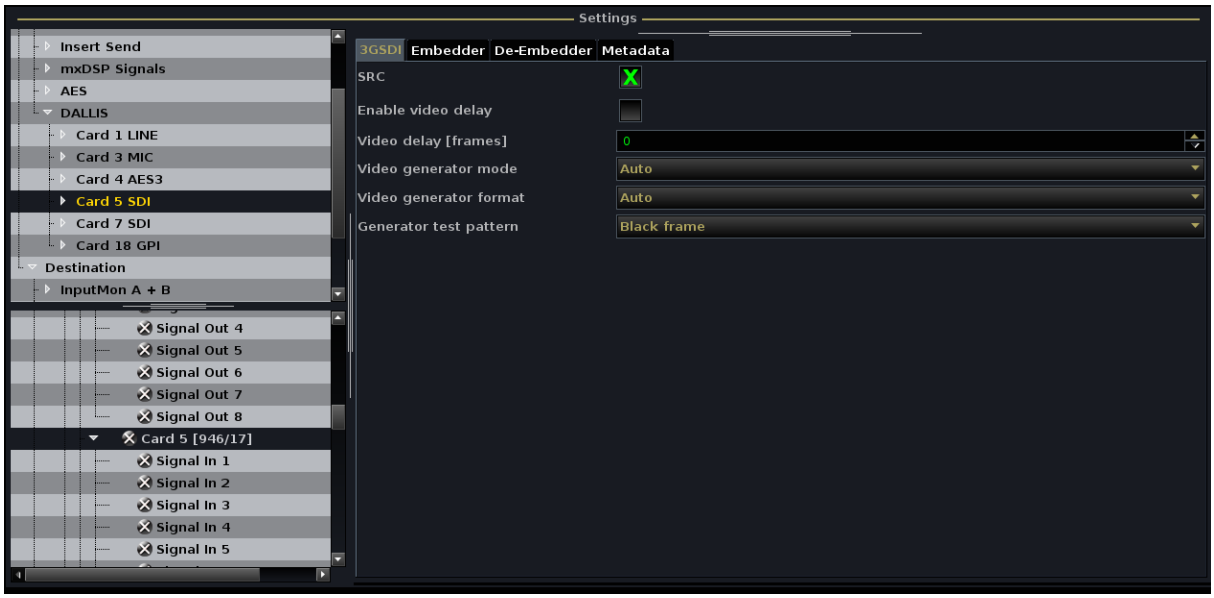
SDI Parameters (DALLIS 3G/HD/SD SDI Card)

The DALLIS 3G/HD/SD SDI card (946/17) is a multi-rate SDI card with BNC input, thru and two outputs. It contains an audio embedder and de-embedder for up to 16 audio channels, and a VANC embedder and de-embedder for two independent Dolby E Metadata streams. There is onboard video and audio delay, and an integrated sample rate converter. It occupies two DALLIS card slots and may be configured to run in a number of different modes using Admin HD.

For more details and block diagrams, please refer to the relevant data sheet available at http://www.lawo.de

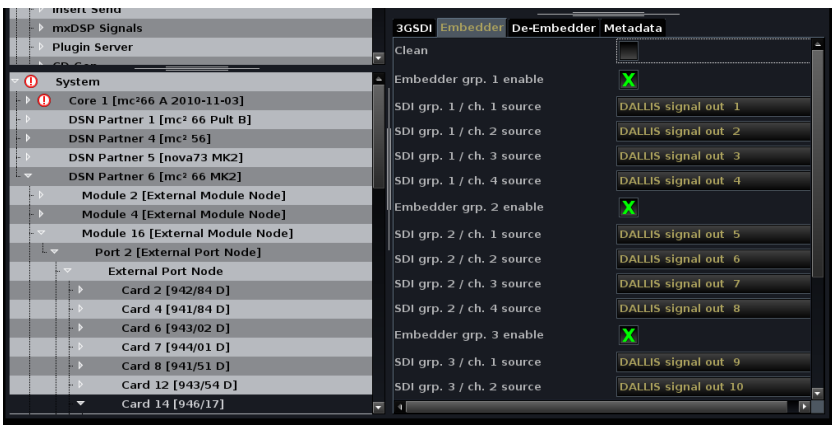
Note that SDI signals have parameters for both the signal and the card. The SDI parameters are adjusted by selecting the card:

1. Select the **946/17** card from the **System** tree.
2. Then select one of the four tabs:

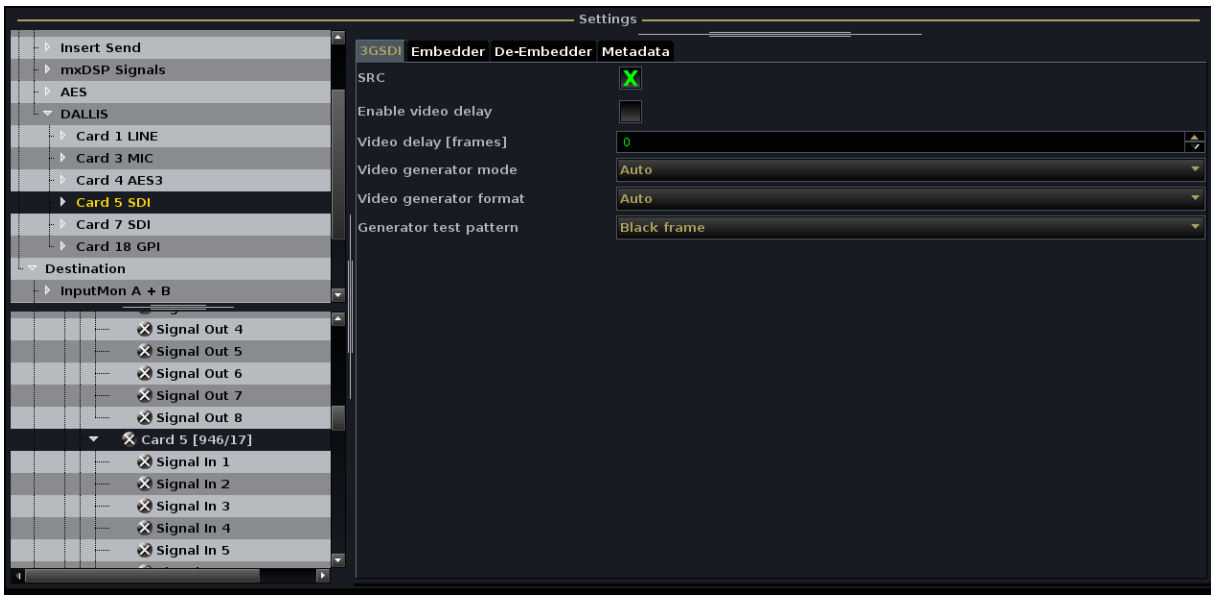


Note that SDI card parameters may be adjusted whether the card is local to the system, or fitted to a remote network partner:

Note



3GSDI



- **SRC** – check this option to enable sample rate conversion. Note that SRC is applied to all channels on the card. Normally, SRC should be enabled. If **SRC** is off (unchecked), then the system *must* be clocked to the same reference as the sending device.
- **Enable video delay** & **Video delay (frames)** – this option applies a delay to the SDI data from the de-embedder to embedder. Video and audio containted in the stream are delayed by the same amount. Set the amount of Video delay in steps of 1 video frame.
- **Video generator mode, format** & **test pattern** – the SDI card is equipped with a free-running video test pattern generator. Set the mode to either:
  - **Auto** – if the input is locked to an incoming video signal, then the output will automatically track the format of the input. If the input fails, then the video test pattern generator transmits the last received video format. When the SDI module is part of a SDI chain, this option is recommended.
  - **Force On** – in this mode it is assumed that the card is used as a video master and that no SDI input signal is applied. The test pattern generator is forced on all the time. Use the **Video generator format** and **Generator test pattern** options to define the video signal. In this mode the embedder sample rate is derived from the generator, and the SDI receiver is switched off. Note that the de-embedder cannot be used.

Embedder

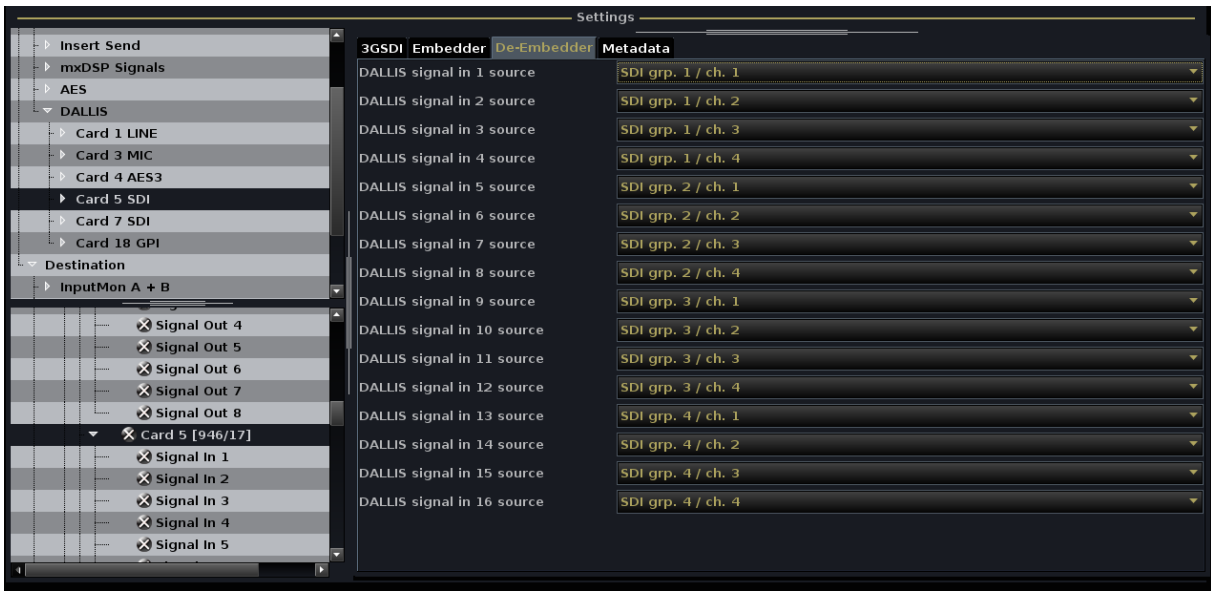
- **Clean** – check this option to set the embedder mode to “Clean”. In this mode the incoming audio stream is deleted and a new data structure generated according to your embedder settings. Note that if you select this mode any existing audio data will be lost.
- **Embedder Group Enable** – audio is embedded in groups of four channels into SDI. There is a total of four groups per SDI, resulting in 16 audio channels. For each group, this checkbox determines whether the incoming SDI stream is replaced:
  - Enable the checkbox to replace the audio group content.
  - Disable the checkbox to leave the audio group untouched.

If there is no audio at the SDI input, then a new audio group will be generated.

Note that in Admin HD modes 16/0 and 8/0, all embedder group enables are turned off as the whole embedder section is bypassed.

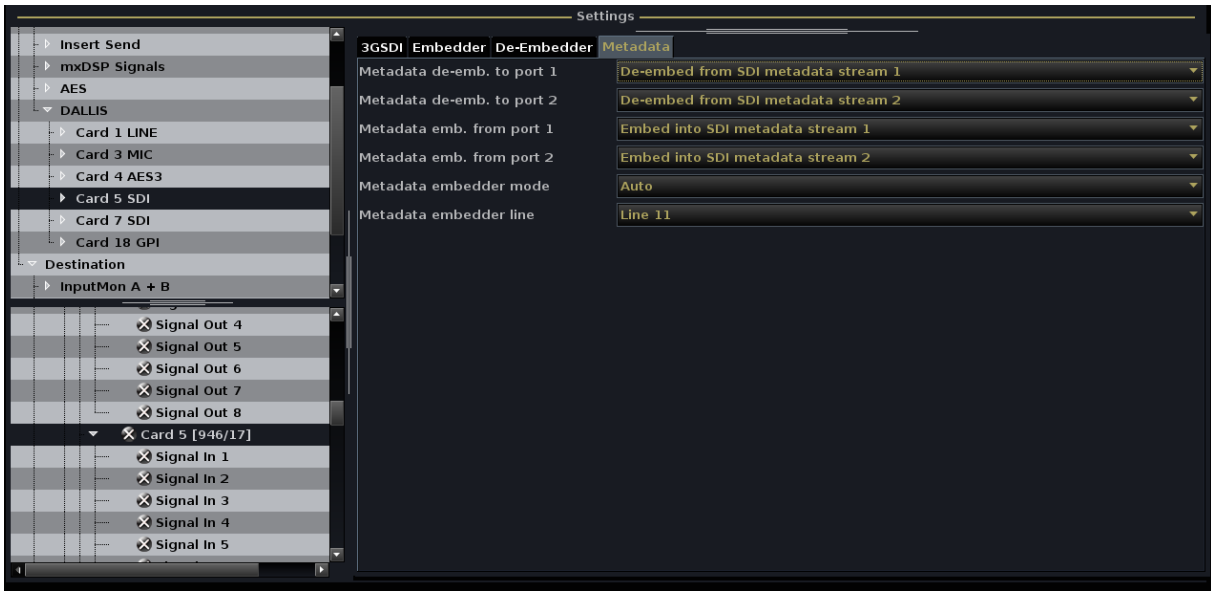
- **Embedder source 1** to **16** – use these options to define the source for each embedder.

De-Embedder



- **DALLIS signal in source 1** to **16** – use these options to define the source for each de-embedder.

Metadata



The SDI module offers 2 metadata ports according to SMPTE RDD-2008. This allows embedding, de-embedding and transport of two independent Dolby metadata streams alongside with the video. The streams can be accessed via two D-Sub connectors at the front panel.

- **Metadata de-emb.** & **emb. to port 1, 2** - use these options to define the streams for the Metadata ports.
- **Metadata embedder mode** & **line** – set the mode to **Auto** to track the input, or select **Pre-selected line** and define a **Metdata embedder line**.

SDI Parameters (DALLIS non 3G SDI Cards)

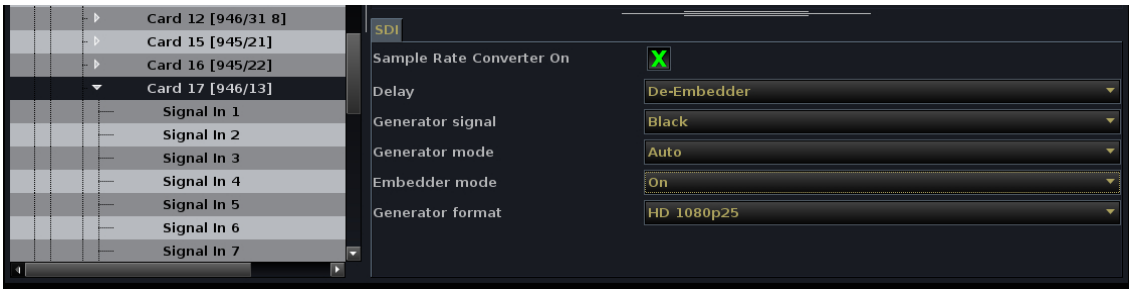
The DALLIS HD or SD SDI cards (946/13, 09, 05, 01) provide the ability to route a maximum of 8 channels to/from the SDI stream. Sample rate conversion may be applied to the whole card (all 8 channels), and delay may be applied to either the embedded or de-embedded signals.

You can find specific details on each card by referring to the datasheet available from the Lawo website.

SDI parameters can be adjusted for the card and for individual signals as follows:

SDI Card

1. Select an SDI card from the **System** tree, and click on **SDI** to adjust the following card parameters:



- **SRC** – check this option to enable sample rate conversion. Note that SRC is applied to all 8 channels on the card. Normally, SRC should be enabled. If **SRC** is off (unchecked), then the system *must* be clocked to the same reference as the sending device.
- **Delay** – select whether delay is enabled for the **Embedded** (SDI output) or **De-embedded** (SDI input) signals; delay cannot be applied to both.
- **Generator signal**, **mode** and **format** – defines the output generator signal for the SDI stream.
- **Embedder mode** – select from:
  - **On** – audio channels will be replaced within the existing SDI data structure according to your SDI output group selections.
  - **Off** – no audio replacement; the SDI stream remains unaltered.
  - **Clean** – deletes the incoming audio stream and generates a new data structure according to your embedder settings. Note that if you select this mode any existing audio data will be lost.

SDI Inputs

Select an SDI input signal from the **System** tree, and click on **SDI** to adjust the following signal parameters:

- **Group select** – this field defines which pair of SDI channels will map to the selected SDI card input. In our example, **Group 2 Channels 3&4** from the SDI stream will be de-embedded to **SDI Signal In 1** and **2**.
- **Delay time** and **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.

Note that the delay will only be applied to SDI inputs if the SDI card **Delay** parameter is set to **De-embedder**.

SDI Outputs

Select an SDI output signal from the **System** tree, and click on **SDI** to adjust the following parameters:

- **Group select** – this field defines which pair of SDI channels will map to the selected SDI card output. In our example, **Group 1 Channels 1&2** from the SDI stream will be embedded to **SDI Signal Out 1** and **2**.

Note that the assignment will only be active if the SDI card **Embedder mode** is set to **On** or **Clean**.

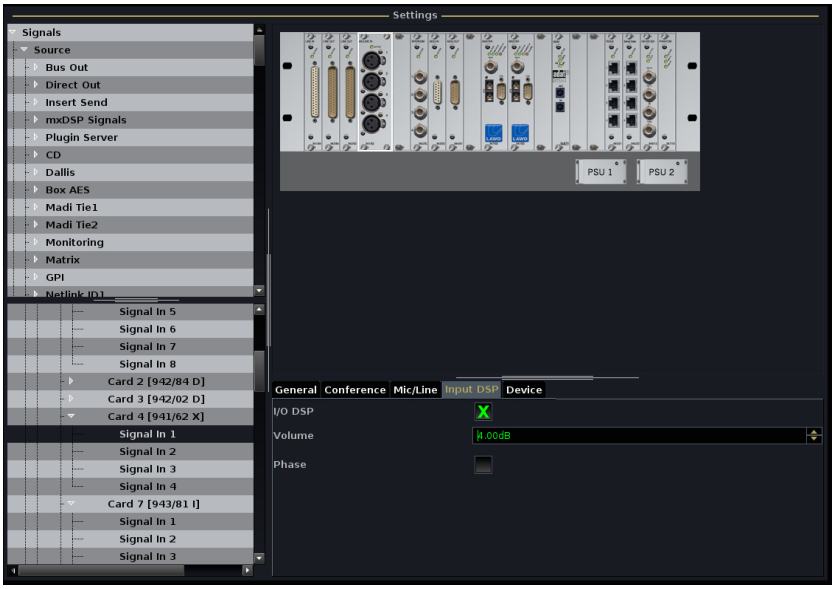
- **Delay time** and **Delay** – check the **Delay** option to enable delay for the stereo output, and set the delay time in ms.

Note that the delay will only be applied to SDI outputs if the SDI card **Delay** parameter is set to **Embedder**.

- **Wordlength** – choose from the available drop-down menu options.

Note that when 16 or 20-bit are selected, dither is automatically applied.

I/O DSP



For any type of input or output signal, a DSP module on the I/O card allows adjustment of the signal gain (volume) and phase.

Note

Note that for fixed gain analogue and digital inputs, the I/O DSP is controlled from the fader strip input controls and INPUT MIXER (in **SOURCE** mode). This means that when you turn the GAIN control, you are controlling the I/O DSP Volume. See Page 186 for more details.

Note that to make a digital path suitable for Dolby E operation, you should turn off the I/O DSP for both the input and output, and disable any sample rate conversion.

I/O DSP On/Off

As a default, I/O DSP is turned on (checked). I/O DSP must be turned on for Volume and Phase to be active.

Disable this parameter to switch the I/O DSP module out of circuit – for example, for Dolby E operation.

For fixed gain analogue and digital inputs, the I/O DSP on/off state is controlled from the fader strip and INPUT MIXER **LINE/ON** button. See Page 186.

Volume (Level Control)

The **Volume** field allows you to set an offset level within the router for the selected source or destination.

For example, if you are providing feeds to broadcast stations requiring different line-up levels, you may apply this level compensation within the router rather than at the main sum or group output.

1. 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.

Levels may be adjusted from -128dB to +15dB.

Phase

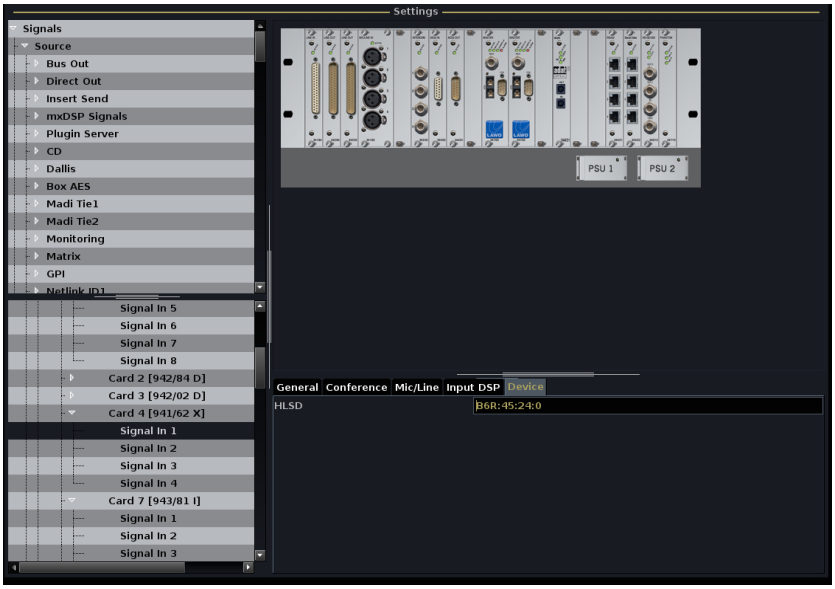
1. Tick the **Phase** box to reverse the phase of the signal.


Note

Note that **Volume** and **Phase** are only applied if **I/O DSP** is switched on.

For fixed gain analogue and digital inputs, the I/O DSP **Volume** and **Phase** are controlled from the fader strip input controls and INPUT MIXER when working in **SOURCE** mode. The **LINE/ON** button must be turned on, for Volume and Phase to be active. See Page 186.

Device Parameters



HLSD

This field describes the HLSD address which is used to identify the signal within the system. This is a unique address which cannot be modified by the user, but may be useful for diagnosing errors within your system or AdminHD configuration.

Please consult the “mc²66 Technical Manual” for further details.

Tone Generator Control (Internal Tone only)

From Version 4.12 onwards, systems fitted with a MkII Router Module support four internal generator sources: two sine wave, one pink noise and one white noise.

If you have updated your software to V4.12, then you must update the gui_config.tcl file using Admin HD and cold start the system to add the generator sources to a directory within the **Signal List** display. You may then make routes from each of the four generator sources in the usual manner.

When an internal generator signal is selected, the **Signal Generator** tab appears in the i/o parameter area of the **Signal Settings** display:

Frequency

For the two sine wave generator sources, you may adjust the frequency. Click on the up/down arrows to step through the following pre-defined 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 console keyboard, or click on the up/down arrows beside the field to increment or decrement the value in 1dB steps.

The level may be adjusted from 0dB to -128 dB.

Note

Note that the MKII Router Module tone generator sources are not available on the classic mc²66. Instead, your system may be specified with one or more tone generators provided by the DALLIS DSP card 947/42. Adjust the **Frequency**, **Level** and **Type** in a similar manner to the above. Note that the sine wave frequency may only be adjusted in predefined steps.

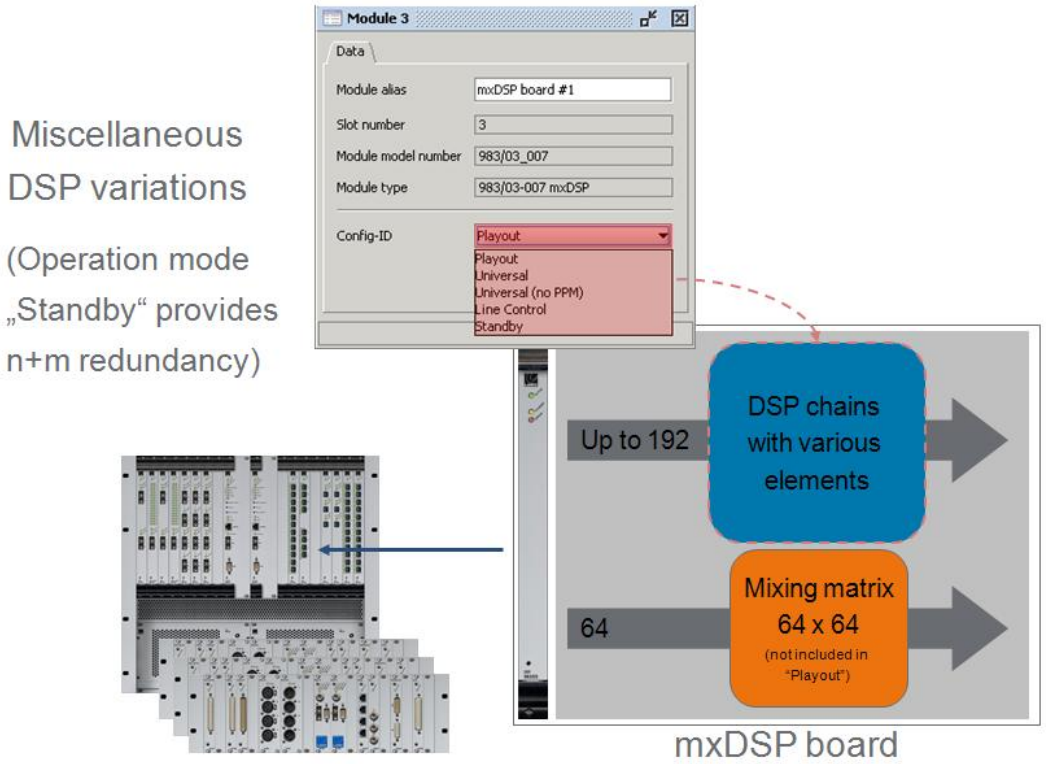
The mxDSP Settings Display

This display can be used to control the DSP settings of any mxDSP cards fitted to your system.

A mxDSP card provides a pool of DSP resource which can be applied to signal paths within the routing matrix. For example, to apply fixed DSP settings to line arrays.

Physically, each mxDSP card is identical to a normal channel DSP card and occupies one slot within the HD Core. However, rather than DSP channels, which can be assigned to the console surface, the mxDSP card 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 card. The DSP chains are configured from various elements including level, mute, delay, EQ, etc. The number of DSP chains, and their signal flow, is determined by the AdminHD configuration:



Note

Note that a 983/03-007 mxDSP must be configured using AdminHD, and new software loaded to the card, before the following features become available. Please refer to the mc²66 Technical Manual.

The **Config-ID** can be changed, using AdminHD, while running online.

Controlling DSP Parameters

1. Press the **MATRIX** button, located on the SCREEN CONTROL panel, to view the **mxDSP Settings** display:

Note that each time you press the **MATRIX** button you cycle through three pages so keep pressing until you see **mxDSP Settings**.

Note

On the left of the display you will see:

- **DSP Chain Type** – this lists all the DSP chain types offered by the card. The types are pre-defined by the card configuration (defined within 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.

2. Select a DSP Chain from the list to view its signal flow.

3. Then click on one of the signal flow blocks – e.g. **Par-EQ** – to display the current parameters:

4. Adjust parameters using the trackball and mouse buttons in the usual manner.

See Page 746 for tips on using the GUI to adjust parameters values.

You can adjust parameter values for any DSP block within any DSP chain.

Note

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.

Controlling the 64x64 Summing Matrix

Depending on the Admin HD configuration, each mxDSP card may support a 64 x 64 summing matrix.

You can control routing to and from the matrix crosspoints using either the **Signal List** or **mx Routing** displays, see Page 632.

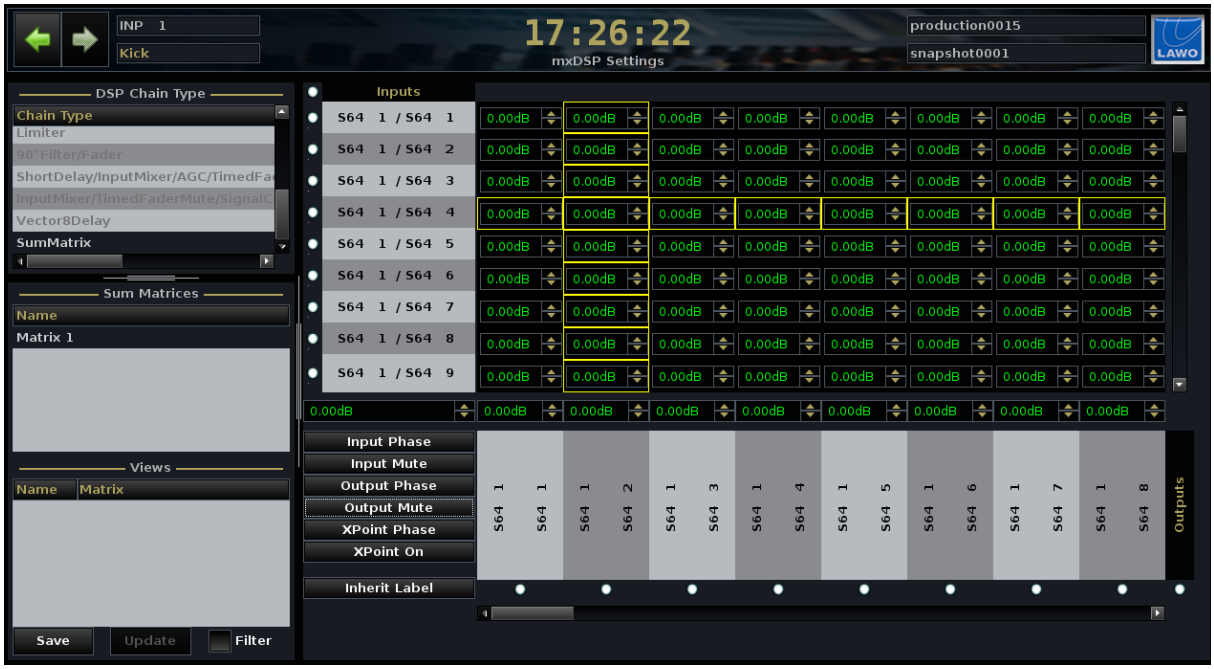
For each of the 64 summing matrix inputs and outputs, you may adjust the following settings from the **mxDSP Settings** display:

- **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.

1. Press the **MATRIX** button, located on the SCREEN CONTROL panel, to open the **mxDSP Settings** display.
2. Scroll through the entries in the **DSP Chain Type** list, on the left, and select **Sum Matrix**.

*The display shows settings for the selected summing matrix – in our example, **Matrix 1**:*



On the left of the display, the **Sum Matrices** area lists all matrices configured within the system. For example, if you have several mxDSP cards, 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, see Page 630.

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, see Page 630.

To Adjust a Matrix Crosspoint

1. Click on the crosspoint you wish to adjust.

The yellow outline updates.

2. Turn the rotary scroller on the SCREEN CONTROL panel to adjust the level. (Or you can click on the up and down arrows or type in a new level.)

The crosspoint level may 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.

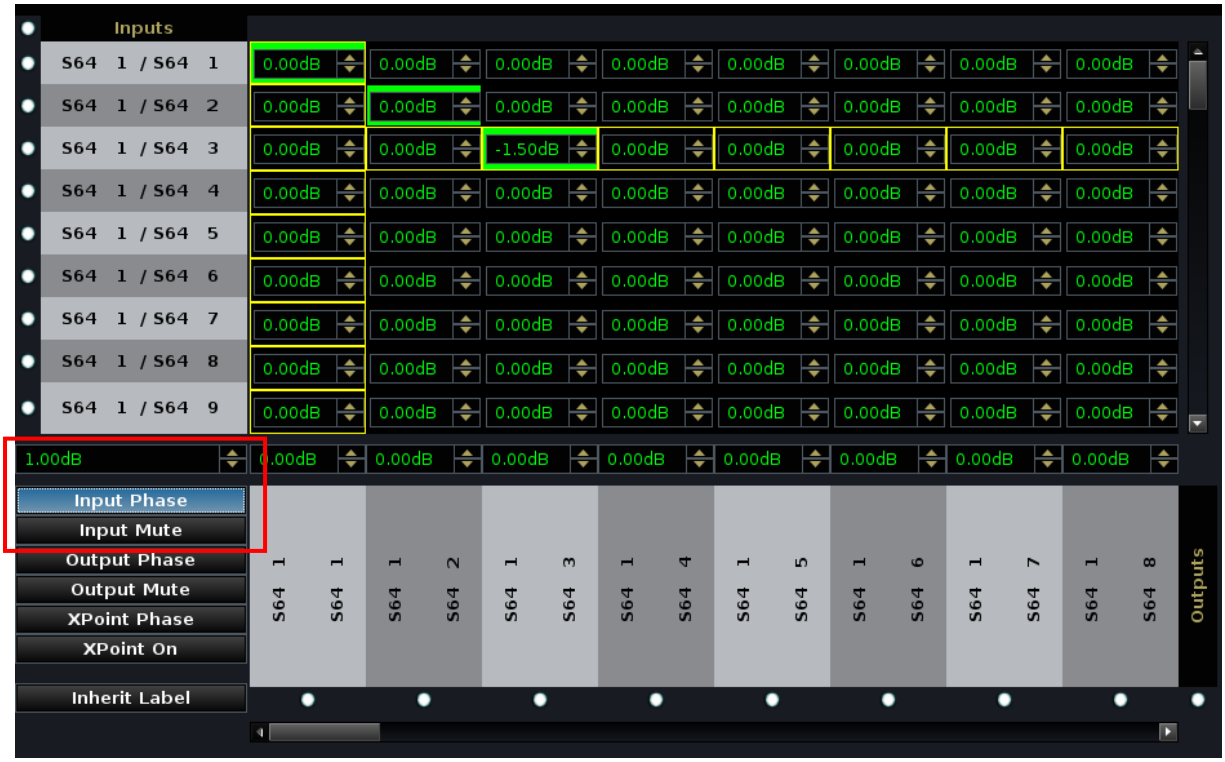
To Adjust a Matrix Input

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 may 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 may 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:

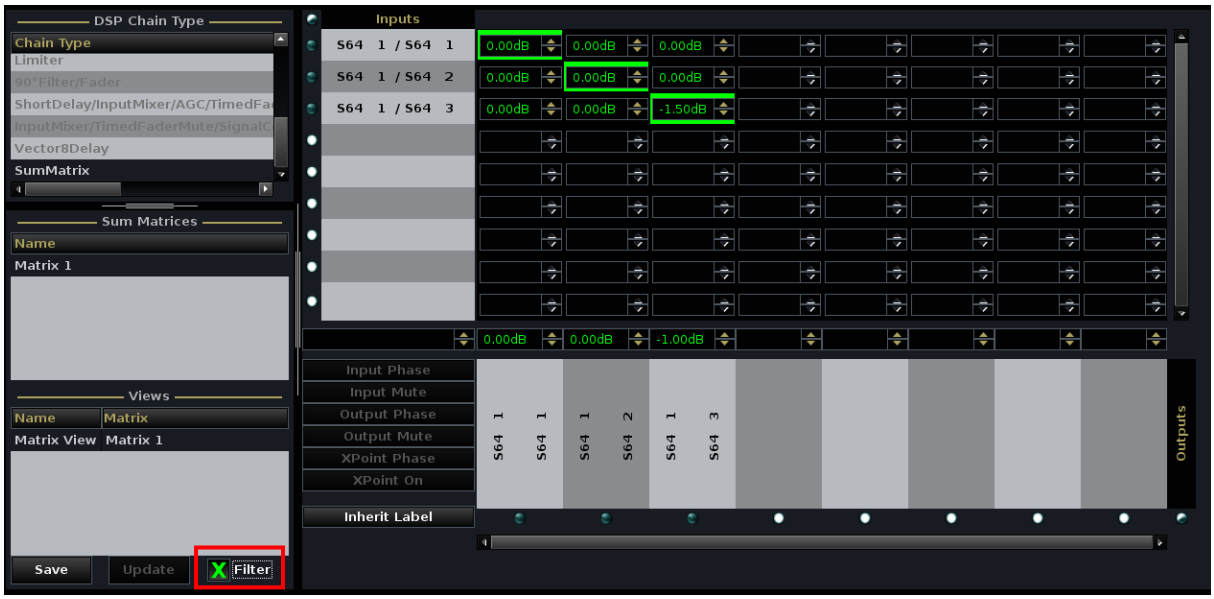
When a signal is selected, its circle turns blue:

2. Now select **Save** at the bottom of the **Views** area.

*The **Views** list updates accordingly:*

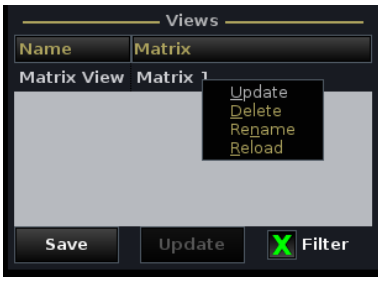
3. To apply the View, select the checkbox beside **Filter**.

*When the **Filter** checkbox is active, the crosspoint grid only shows signals stored within the selected **View**:*



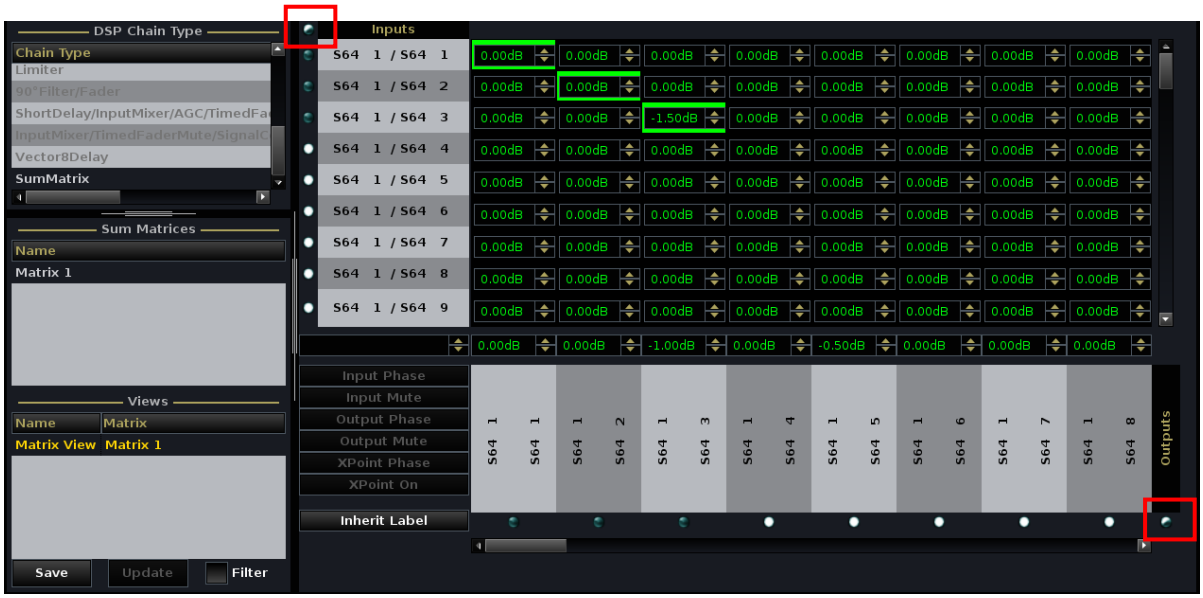
4. To return to all signals, deselect the **Filter** checkbox.

You can store as many Views as you wish, and perform the following operations by right-clicking on a **View**:



- **Update** – select a different set of signals and click on **Update** to update an existing View.
- **Delete** – deletes the selected View.
- **Rename** – renames the selected View.
- **Reload** – reloads the selected View.

Note that the half blue circle beside **Inputs** and **Outputs** indicates that some but not all signals are selected:



- To select all signals, select this circle to make it full blue.
- To deselect all signals, select it again to make it full white.

Routing Signals to/from the mxDSP Card

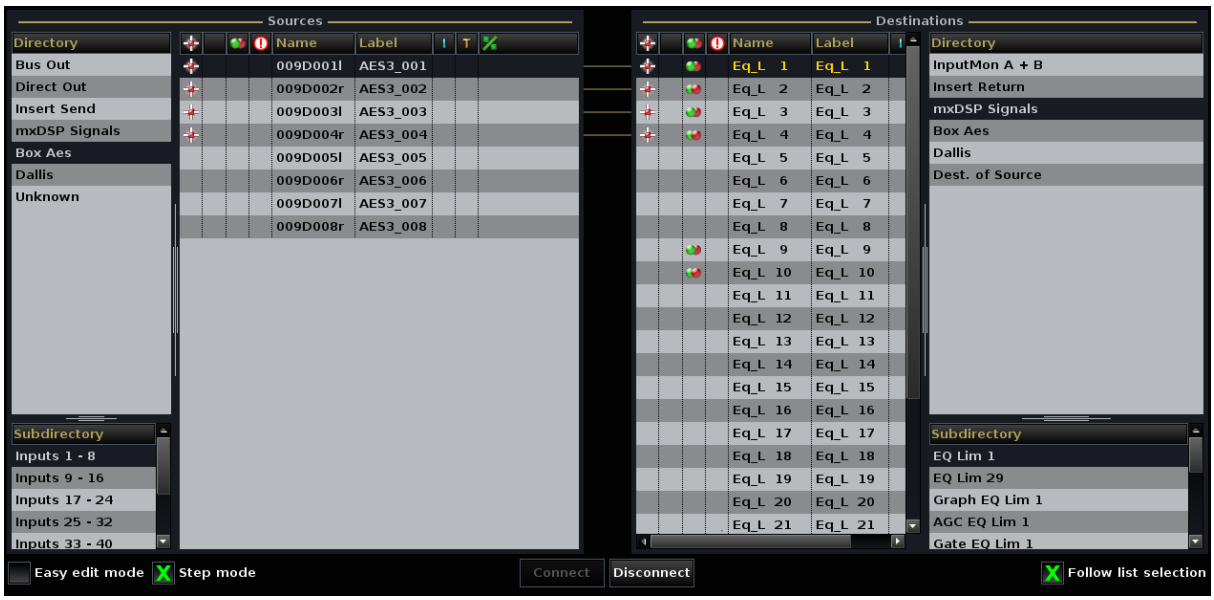
Each DSP Chain or Summing Matrix in/out can be routed from any source and to one or more destinations using either the **Signal List** or **mx Routing** displays. See Pages 563 and 583 respectively.

The **mxDSP Signals** appear within the main Directories.

To route a source to an mxDSP destination:

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. Return to the **mxDSP Settings** display, you will see the Label of the assigned source beside the DSP Chain.

Stereo Configuration

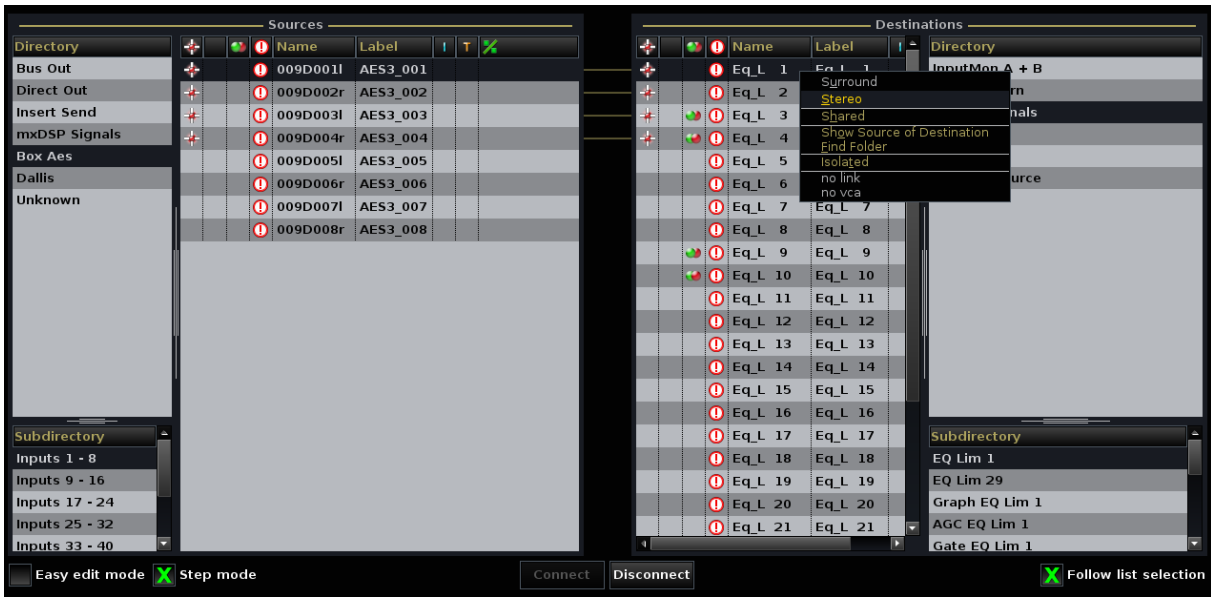
An odd/even pair of DSP Chains can be configured for stereo operation.

Note that surround configuration is not supported.

Note

This operation is performed from the **Signal List** display:

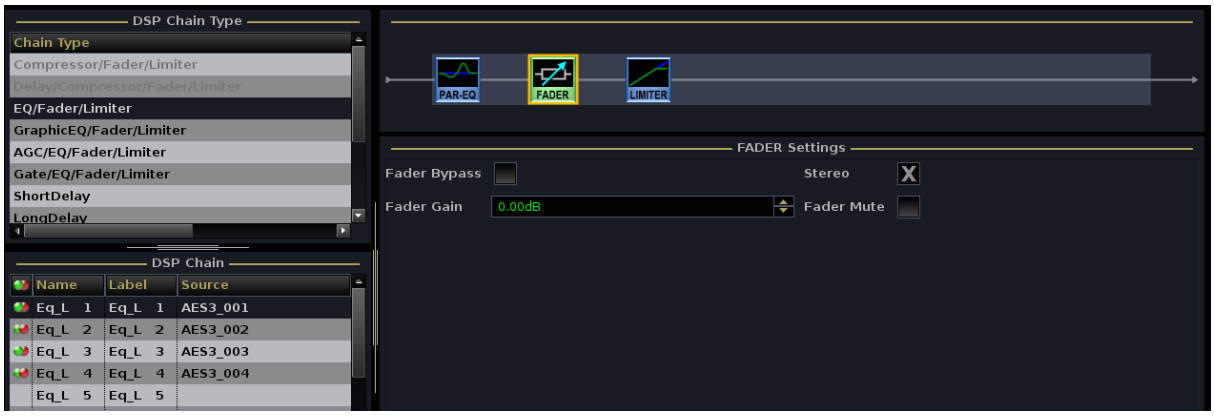
1. Select the DSP chain you wish to make stereo and right-click:



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:



Saving and Loading mxDSP Settings

The settings for each mxDSP card are stored within snapshots and productions, so remember to update a production to save any changes.

Tip

You can isolate all mxDSP signals so that they will not be affected by a snapshot load from the **Extra Buttons**, **Snapshots List** or **System Settings** display, see Pages 369, 395 and 687.

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 may adjust how much level from the front LR, Centre, LFE and rear LR channels feed the stereo output.

Note that to support downmix matrices, the required DSP resources must be fitted to your system's hardware and configured using AdminHD. Please refer to the mc²66 Technical Manual for details.

Note

Controlling Downmix Parameters

1. Press the **MATRIX** button, located on the SCREEN CONTROL panel, to view the **Downmix** display:

Note that each time you press the **MATRIX** button you cycle through three pages so keep pressing until you see **Downmix**.

Note

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**.

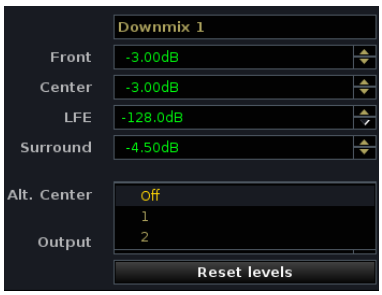
The downmix matrices, and their names, are defined by the console configuration, which can be modified using AdminHD. Please see the mc²66 Technical Manual for details.

2. Enter a name in the **Label** field to apply a user name to the downmix.

*User labels are inherited into the **Signal List** and other routing displays.*

3. Select a downmix from the 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:



4. Using the trackball or console keyboard, you can adjust the following parameters for Downmix 1 to 4:

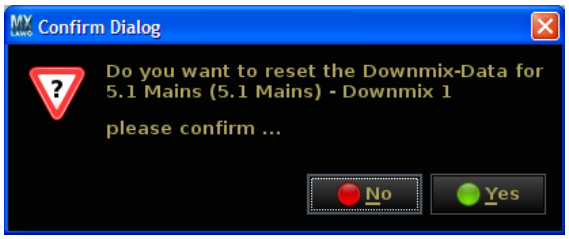
- **Front** level – from inputs 1 (Left) and 2 (Right).
- **Center** level – from input 3 (Centre), unless **Alt Center** is active, see below.
- **LFE** level – from input 4 (LFE).
- **Surround** level – from inputs 5 (Surround Left) and 6 (Surround Right).
- **Alt Center** – use this option to replace 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, Downmix 2 the clean feed, and Downmix 3 an alternate language version.

- **Output** level – adjusts the output level for the stereo downmix.

5. Select **Reset levels** to reset the downmix to its default parameters:

You will be presented with a confirmation pop-up:



6. Select **Yes** to confirm.

All parameters are reset to the default values stored in the console's configuration.

Saving and Loading Downmix Settings

The settings for each Downmix matrix are stored within snapshots and productions, so remember to 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:

Tip

Chapter 9: System Configuration

Introduction

This chapter deals with hardware options such as redundancy, sample rate and system clock, and procedures for system shutdown and restart (see Page 647).

We will also cover the user options provided by the **System Settings** and **Custom Functions** displays.

Options provided by the **System Settings** display (Page 650) include:

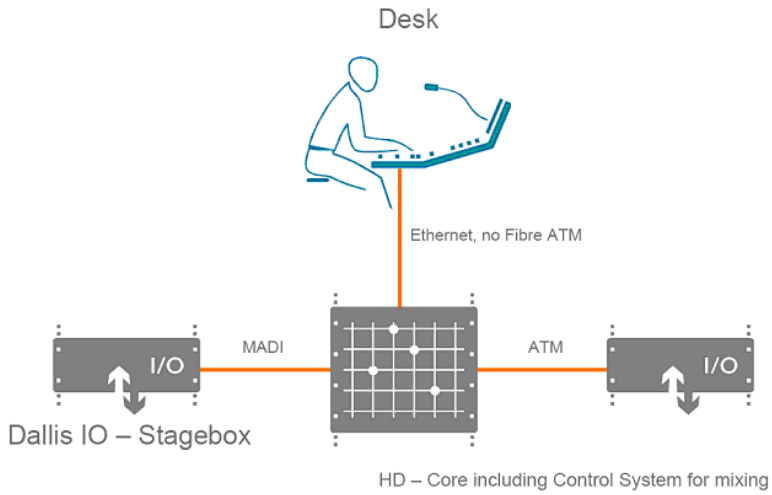
- Global options for snapshot isolate, channel mutes, track self assign, AFV, cue auxes, surround format, software version display, memory usage, backup snapshots, system coldstart, internal clock and control system redundancy.
- Console surface options for setting bulb brightness, testing bulbs and displays, fader display options, fader calibration, fader bay isolate options, reveal bay options and channel colour coding.
- Level options for setting analogue reference levels and headroom, and the overload indicator threshold.
- Bargraph options for peak metering.
- Loudness metering options for bargraphs and integrated loudness measurements.
- Solo button options for latching or momentary operation.
- AFL, PFL and Solo-in place options.
- GUI options for displaying local time or timecode.
- Custom options.
- Wordclock sync and system sample rate options.
- Timecode and frame rate options.
- Fader/Joystick options.
- X-Fade options for snapshot x-fades.
- Mix minus options for surround channels.

The **Custom Functions** display (Page 689) provides access to factory-configured custom functions, such as the mapping of user buttons, so that users can reconfigure functions without assistance from the Lawo team.

Hardware Overview

The **mc²66** consists of three principal system components:

- **Console control surface** – operator interface.
- **HD Core** – DSP and routing matrix core.
- **DALLIS I/O interfaces** – offering a range of input and output cards which may be connected remotely to the system (up to 2km from the core using multimode fibre or 8km using single mode fibre).



The exact hardware specification of your system will define how many analogue and digital connections are available for external equipment, and how much DSP processing is available for input channels, monitor return channels, groups, sums (main mix outputs) and auxiliary sends.

Note that the classic **mc²66** differs from the above in the following respects:

Note

- **MKII mc²66 (shown above)** – incorporates the MKII Router Module (980/33). The control system is integrated within the Router Module, and only Ethernet is required to connect the control surface to the HD Core.
- **Classic mc²66** – incorporates the MKI Router Module (980/31 or 980/32). The control system resides within the console surface and both ATM and Ethernet connections are required to connect the control surface to the HD Core.

The differences affect system wiring, connections and access to the control system. In other respects, systems are identical.

Internal Sample Rate

Depending on the hardware specification of the system, the **mc²66** may operate at a choice of internal sampling rates including 96kHz, 88.2kHz, 48kHz and 44.1kHz.

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

However, within each rate (higher or lower) you may choose between the two sample rate options - for example 48kHz or 44.1kHz, from the **System Settings** display, see Page 678.


Note

Note that higher sample rates use twice as much DSP resource as lower sample rates. Therefore when you select the **DSP Configuration** display, you will see different numbers of channels available for high and low sample rate productions. See Page 122 for more details on DSP configurations.

It is recommended that you mute the Monitor speakers when changing the system sample rate.

System Clock

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

External sync input 1 may be fed by Wordclock, Black & Burst Video (PAL or NTSC), AES 3, ATM or MADI depending on the configuration of the system.

External sync input 2 may be fed by Wordclock, Black & Burst Video (PAL or NTSC) or AES 3.


Note

Note that when running the system referenced to Wordclock, the sync frequency must match the internal operating rate of the system as selected from the **System Settings** display, see Page 678.

Within the system you may define a main clock source (Source Priority 1) and a redundant one (Source Priority 2).

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

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

The selection of sync source priority signals and return mode is made from the Wordclock options covered later in this chapter.

Redundancy

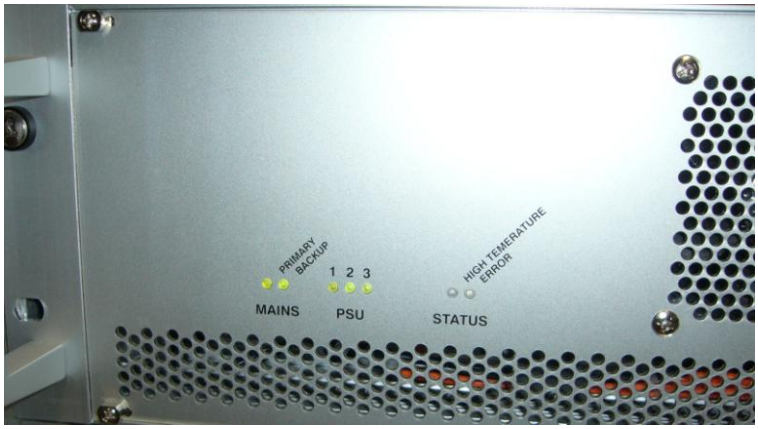
Redundancy may be added to each component of the system to provide fault tolerance in the unlikely event of a hardware failure.

Control Surface Power

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

PSU Status LEDs

LEDs on the front panel show the status of each internal supply and the two mains connections:



- **MAINS PRIMARY and BACKUP** – illuminate in green when the mains power connected to each supply is ok. If a connection fails, then the LED goes out.
- **PSU 1 to 3** – illuminate in green when each internal power supply is ok. If a supply fails then the LED goes out.
- **ERROR** – this LED will flash (red) if:
  - one or more of the mains inputs fail. Only one mains input is required to operate the system.
  - one or more of the internal PSUs fail. For correct operation, only two supplies are required; the third is for redundancy.
- **HIGH TEMPERATURE –** illuminates if the internal temperature exceeds 56° C. The fan is active until the temperature falls below 42° C

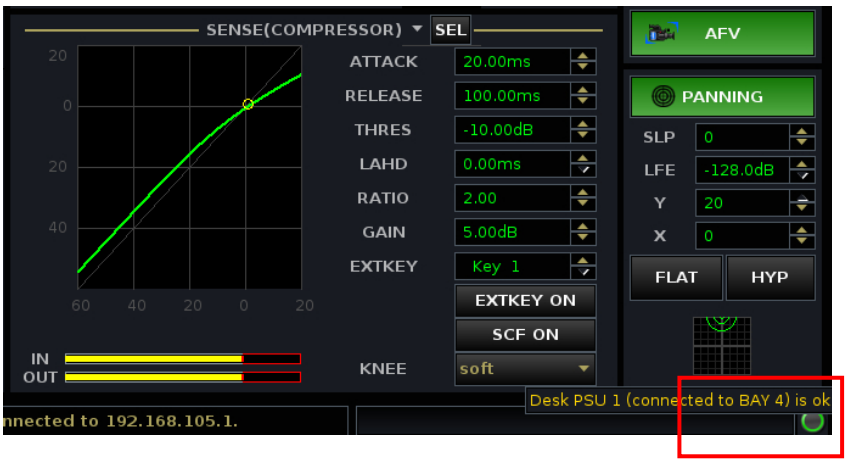
Power Supply Desk Alarm

The console GUI offers status monitoring for the console's external PSU(s).

Note

Note that if you have upgraded from an earlier software release to V4.8, then you will need to modify your hardware in order to support this feature.

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



The symbols indicate:

- **Green Circle** – the PSU is working fine.
- **Yellow triangle with an exclamation mark** – the PSU is working fine, but there was a fault in the past which has now been cleared. Click on the icon to reset it.
- **Red circle with an exclamation mark** – there is a fault.

Hover over a symbol to reveal more information:

In the mc²66, the bay server to the right of the GUI display usually contains the direct connection to the console's external PSU. In our example, this is bay 4 (shown above).

Depending on the frame size, more than one external PSU may be required, and additional symbols will monitor their status.

Note

Note that within the text on the GUI display, bays are counted from BAY 1 upwards. However, internally bays are addressed from 0. This means that BAY 1 on the GUI relates to an internal Bay Server address of 0, BAY 2 to an internal address of 1, and so on.

HD Core Power

The HD Core provides two slots for dual redundant power supplies:

The status of each PSU may be monitored from the **Signal Settings** display, see Page 597.

Redundant DSP

Within the HD Core any number of DSP boards may be reserved to provide redundant processing. In the unlikely event of a failure, the system automatically switches all DSP resources and settings from the faulty board to the spare; the faulty board may then be safely removed and replaced. For more details, please refer to Page 133.

Redundant Router Module

Two Router Modules of the same type (either MKI or MKII) may be fitted to the HD Core to provide router redundancy. When fitted, you will see the status of the redundant Router Module on its front panel. The spare board is shown in Standby.

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

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

Note that a brief interruption to audio will occur while routes are reconfigured. On MKII systems, switching to the redundant module also switches to the redundant Control System (see next page).

Note

Redundant Control System

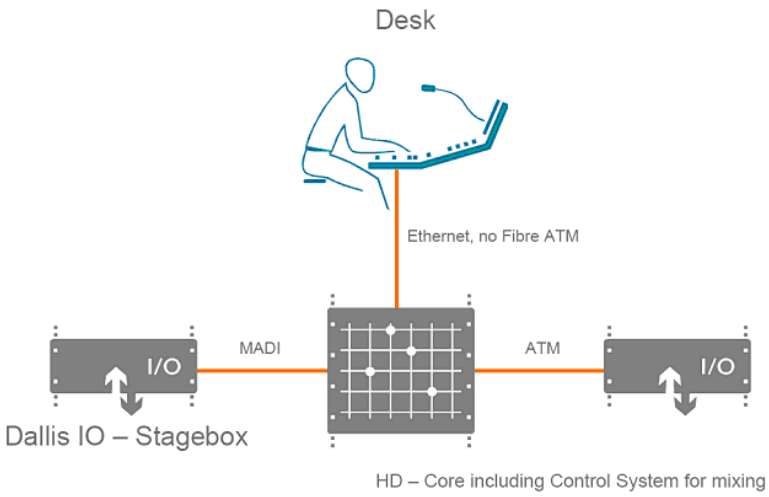
The MKII Router Module contains the HD Core summing matrix AND the console Control System. By fitting a second MKII Router Module, the system can provide redundant signal routing and a redundant control system.

Note

Note that the Control System for a classic mc²66 resides within the console surface. These systems, which connect to a MKI Router Module within the HD Core, cannot support a redundant Control System.

In order to provide redundancy, your HD Core must be fitted with two MKII Router Modules (980/33): one main and one redundant. All system connections are made to and from the Router Module via Ethernet (TCP/IP):

- **Ethernet A** – connects to the mc² control surface:



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

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

Automatic Takeover

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

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

Note

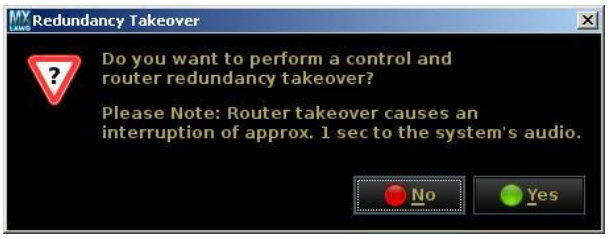
The redundant Control System is automatically activated if, internally, a loss of connection is noticed by the redundant system. This could be due to a software failure, hardware error or reboot of the main Control System.

Note that if the Ethernet connection between the control surface and Router Module fails, then an automatic takeover does not occur, as the failure may be deliberate (e.g. you disconnect the Ethernet cable).

Note

Instead the operator is presented with an error message:

1. Click on the message and a confirmation pop-up appears:



2. Select **Yes** to switch to the redundant control system or **No** to cancel.

Selecting **Yes** causes an interruption to the audio.

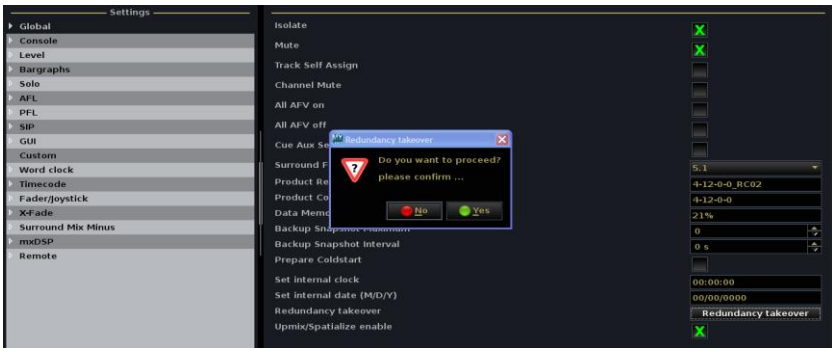
If you select **No**, then you MUST fix the problem with the connection before you can regain control of the audio.

Manual Takeover

You can force a manual takeover at any time from the **System Settings** display:

1. Select the **Global** Topic and then select the **Redundancy takeover** option.

A confirmation dialogue box appears:



2. Select **Yes** to confirm or **No** to cancel the operation.

Selecting **Yes** switches to the redundant Control System.

Alternatively, press the **Module Takeover** button on the front of the redundant Router Module to force a takeover.

System Shutdown and Restart

Shutting down the System

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

- In the MKII **mc²66**, the control system resides within the HD Core, meaning that the system shuts down when you turn off power to the HD Core.
- In the classic **mc²66**, the control system resides within the console surface. This means that the system shuts down when you switch off power to the console's external power supply.

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

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

Starting the System

To start the system, turn on the external PSU unit and HD Core:

- In the MKII **mc²66**, the control system resides within the HD Core, meaning that the system boots when you turn on power to the HD Core.
- In the classic **mc²66**, the control system resides within the console surface. This means that the system boots when you switch on power to the console's external power supply.

In either case, you may power the console and HD Core before other interfaces if desired. This enables you to begin setting up the console before remote I/O interfaces have received power.

During the restart, the Central Control Screen displays the status during boot-up. If the system is set to warm start, then all of your previous settings (the warm start data) are recalled from the system's flash memory ensuring that the console comes back as it was last used. This procedure is called a warm start and ensures fast recovery from a loss of power.

Forcing a Restart

In the MKII mc²66, the system can be restarted by powering off, and then on, the main PSUs of the HD Core.

In the classic mc²66, the system can be restarted by powering off, and then on, the console's external power supply.

In either case:

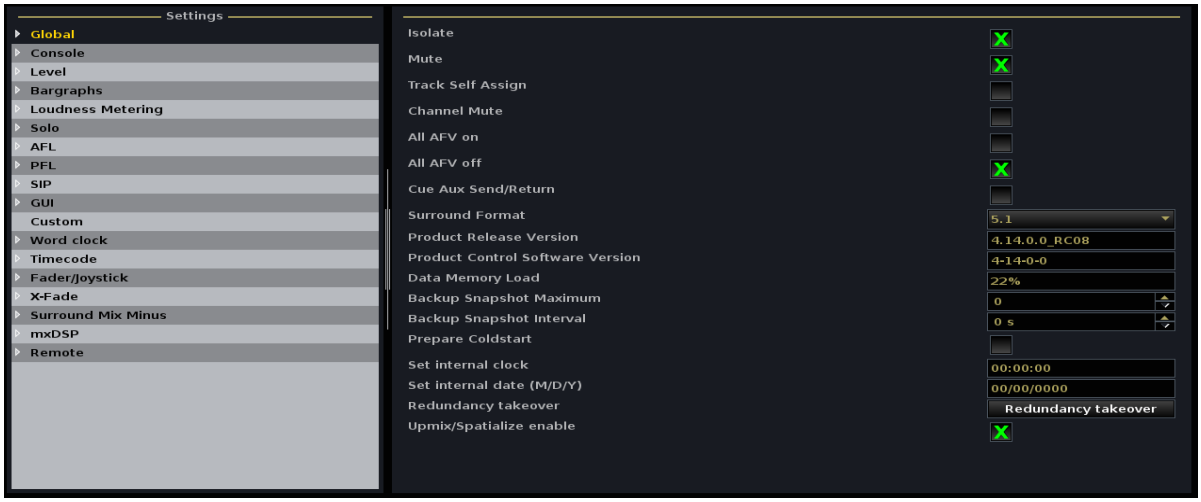
1. Power down and wait until you hear the tones signaling that the shutdown operation has been successfully completed.

The system is shutdown when the blue LED of the trackball is off.

2. Then power on and the Control System will restart.

Note

Note that the system can be set to either warm or cold start from the **System Settings** display:

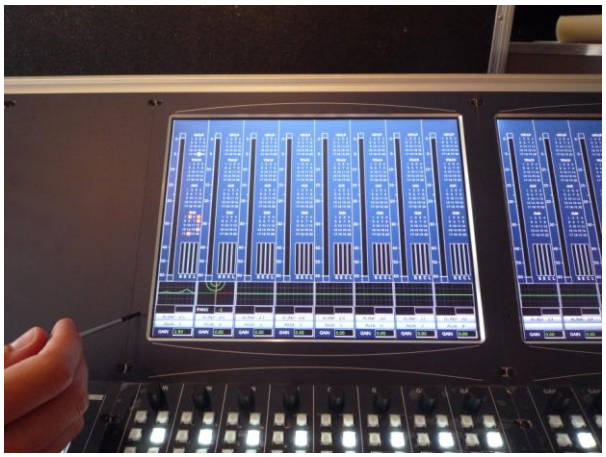


- If the **Prepare Coldstart** option is checked, then the next time the system restarts it will do so without loading any user data. Use this option if there is a problem with your user data, or if you wish to clear all user data from the system.
- If the **Prepare Coldstart** option is unchecked (recommended), then at the end of the next restart the console will load the last valid warm start data ensuring that the console comes back as it was last used.

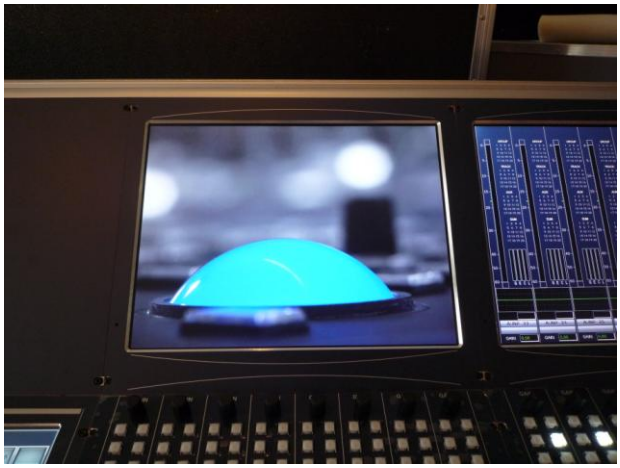
Restarting the TFT display Bay Server

Each TFT display on the mc²66 has its own Ethernet Bay Server which can be restarted from the front panel.

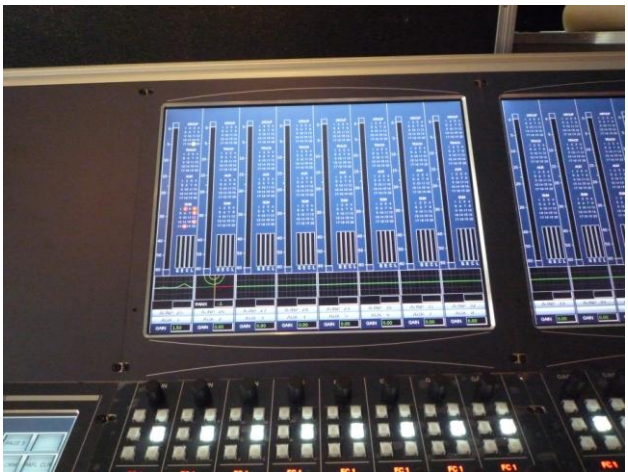
1. Using a pointed object, press the recessed button at the bottom of the display:



The bay server restarts as indicated:



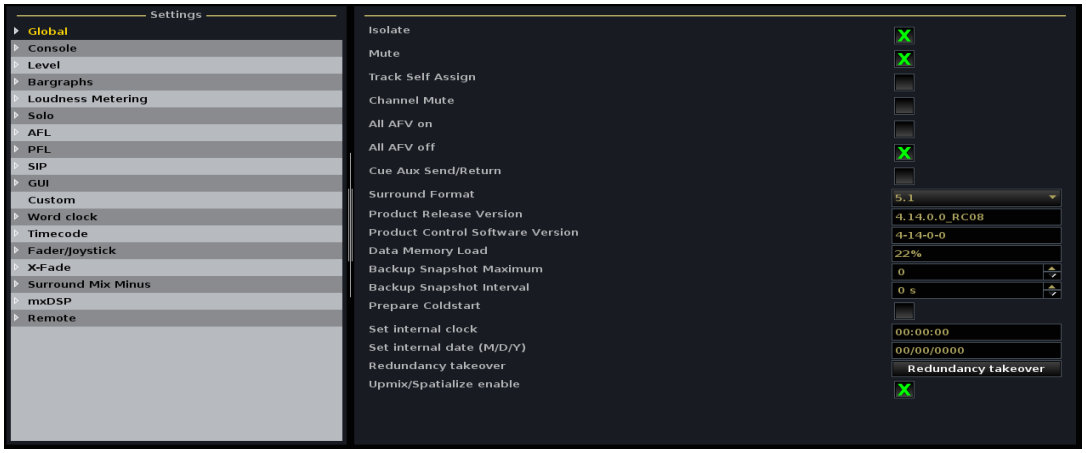
Once the restart is complete, the selected display is reinstated:



The System Settings Display

The **System Settings** display configures a number of user options:

1. Press the **SYSTEM DSP** button, located on the SCREEN CONTROL panel, to view this display:



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 – for example, **Isolate**, **Mute**, **Track self assign**, etc.*

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 green 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 snap max**.) – some options require a number to be entered. You can click on the existing entry and type in a value from the console keyboard; 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 rotary scroller to increment or decrement the value.


Tip

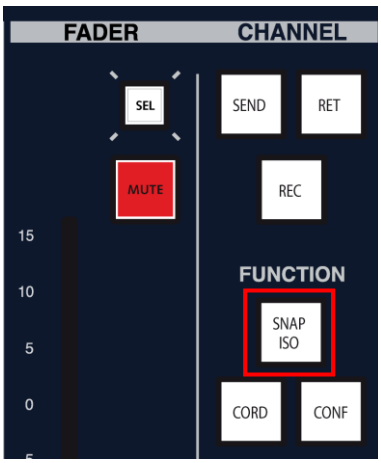
Note that if you hover the trackball above each option name, you will see a 'Tool Tip'. This is a helpful description which acts as a brief reminder of the option's function.

Let's look at the options.

Global Options

Select the **Global** Topic to set the following console options:

Isolate



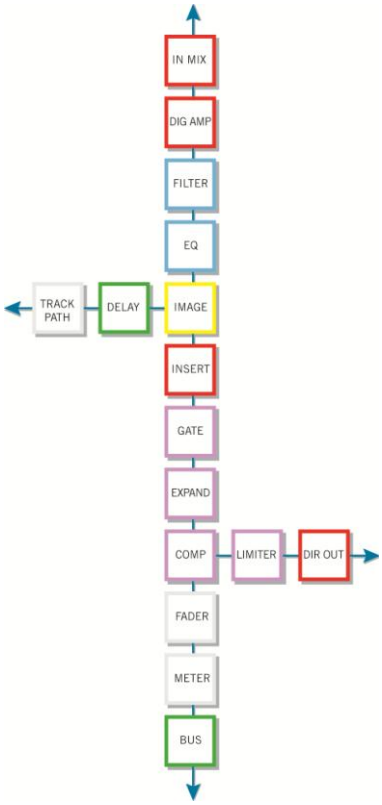
This option enables or disables the **SNAP ISO** (Snapshot Isolate) buttons across the console:

- **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 channel **MUTE** buttons across the console:

- **Mute** (on) – you can select **MUTE** buttons to mute/cut a channel.
- **Mute** (off) – prohibits selection of channel **MUTE** buttons across the console; any existing **MUTE** selections will be cleared. Use this mode to prevent an operator from accidentally muting a channel 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.
- **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.

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.

Surround Format

This option sets the pan and monitoring format for surround channels within the console. For example, having selected a surround format of 5.1, then any surround channels/busses are defined accordingly as L, R, C, LFE, sL, sR. Please refer to Appendix A for details on each of the surround formats.

The surround format can be set to:

- **4.0** – L, R, C, S for Dolby ProLogic.
- **5.1** – L, R, C, LFE, sL, sR for Dolby Digital and DTS.
- **6.1** – L, R, C, LFE, sL, sR, sC for Dolby Digital EX and DTS ES.
- **SDDS 7.1** – L, R, cL, cR, C, LFE, sL, sR for 7.1 SDDS.
- **DTS-HD** – L, R, C, LFE, mL, mR, sL, sR for 7.1 DTS-HD.

Product Release and Control Software Versions

The next 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:

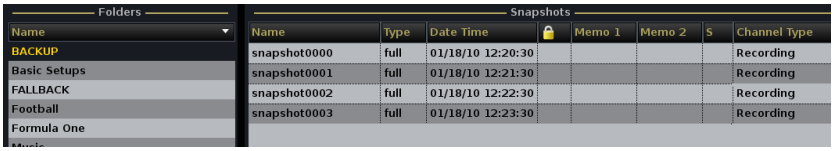
- **Product Release Version** – this is the release version of your product software.
- **Product Control Software Version** – this is the release version of the control system software.

Data Memory Load

This field is for display purposes only, and indicates the amount of used space on the user data card.

Backup Snapshot Maximum

This option sets the number of backup snapshots which will be automatically stored before the first backup snapshot is overwritten. The number may be adjusted from 0 to 1000. Enter 0 to turn off the backup snapshots function.



Backup Snapshot Interval

This option sets the time interval between backup snapshots, and may be adjusted from 60 seconds to 24 hours (86400s).

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.

Set Internal Clock

Using this option you can set the internal clock.

Type in the time you wish to set and then press Enter.

A confirmation pop-up appears.

Select **OK** to confirm.

The new time is set.

Set Internal Date

Using this option you can set the internal date.

Type in the date in the format: Month/Day/Year (e.g. 25/01/2010) and then press Enter.

A confirmation pop-up appears.

Select **OK** to confirm and the date is set.

Redundancy Takeover

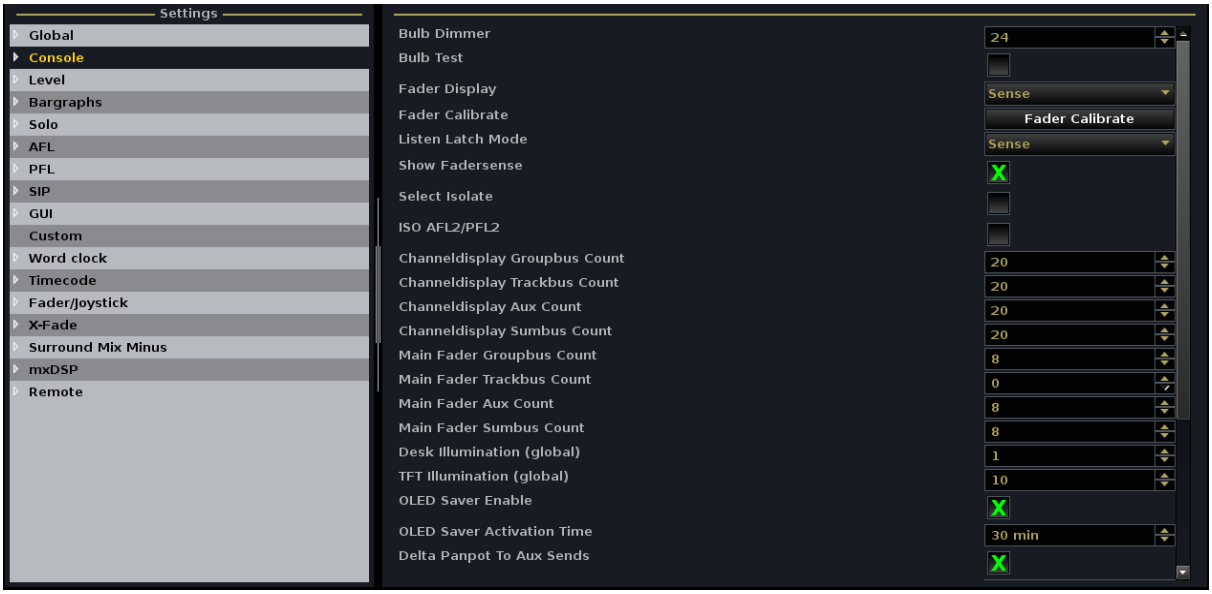
Use this option to force a manual takeover from the redundant control system (if fitted). See Page 643 for details.

Upmix/Spatialize Enable

Use this option to enable or disable the AMBIT upmix and spatialize module for 5.1 surround channels. See Page 290 for details.

Console Options

Select the **Console** Topic to set the following options:



Bulb Dimmer

This option sets the brightness of all LEDs, bulbs and text displays across the console surface.

The brightness may be set from 0 = low to 31 = high.

Bulb Test

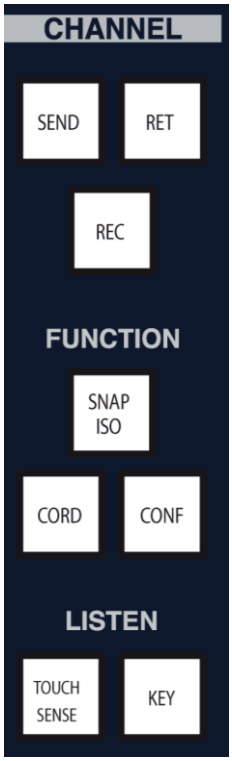
This option lights all LEDs, bulbs and text displays across the console surface in order to check for defects:

- **Bulb Test** (on) - enters the test mode. All LEDs, bulbs and displays will illuminate across the console. Note that all dual coloured 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.

Fader Display

This option determines whether the fader strip displays will show levels when faders are touched:

- Select **Sense** to enable the fader sense mode. The displays show the channel name (e.g. MIC1) until a fader is touched; while the fader is touched the display shows fader level in dB.
- Select **Name** to deselect the fader sense mode. The displays *always* show the channel name and do not display fader values when faders are touched.



Fader Calibrate

This option is used to calibrate the faders on the console.

Select **Fader Calibrate** to calibrate all faders.

Each fader across the console opens and closes to calibrate.

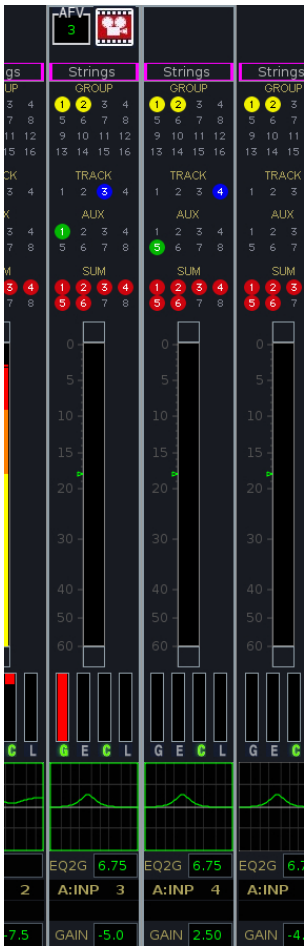
Listen Latch Mode

This option defines whether AFL monitoring actioned from the CHANNEL 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.

Show Fadersense

This option enables or disables the show Fader/encoder sense mode on the **Channel** display:

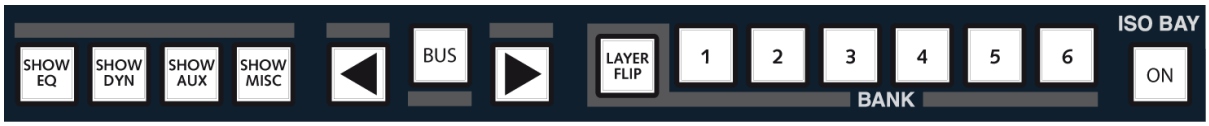


- **Show Fadersense** (on) – touch a fader or encoder and the channel highlights on the **Channel** display. The highlight colour matches the type of input, so white for an input channel, red for a sum, etc.
- **Show Fadersense** (off) – nothing changes on the **Channel** display when you touch a fader or encoder.

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

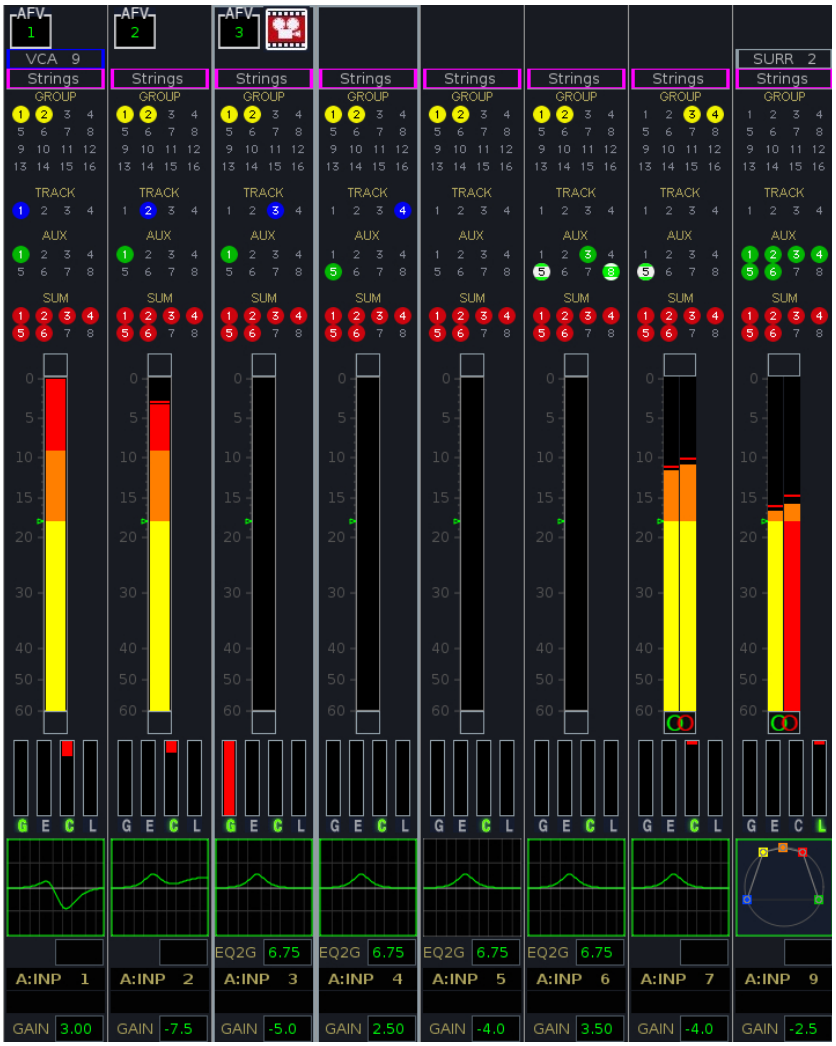
This option is used to route AFL and PFL selections made within isolated fader bays onto a second AFL and PFL bus. For example, to provide a second engineer with independent monitoring in a multi-user situation.

- **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.

Channel display Bus Count

The next four options enable you to change the number of Busses shown on the **Channel** display. For example, you may wish to display different numbers of **Group**, **Track**, **Aux** and **Sum** Busses depending on your production and choice of DSP configuration:

For each entry, you can enter the number of Busses you wish to display; the **Channel** display resizes accordingly:



Main Fader Bus Count

The next four options enable you to change the number of Busses shown on the **Main Fader** metering display. The number of busses is adjusted as for the **Channel** display described above.

The **Main Fader** metering display is switched to the central control screen by pressing the **METER** button, located on the SCREEN CONTROL panel.

Desk Illumination

This option sets the brightness for the console desk light.

The brightness may be set from 0 = off to 15 = high.

TFT Illumination

This option sets the brightness for the TFTs.

The brightness may be set from 0 to 32 = high.

OLED Saver Enable and Activation Time

These options enable the OLED (text displays) screensaver and set the time in minutes before the screensaver is activated. The time may 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).

Delta Panpot to Aux Sends (Aux Panning Link)

This option determines whether aux panning follows channel fader panning, across the console, for stereo and surround aux sends:

- **Delta Panpot to Aux Sends** (on) – aux panning follows channel fader panning.
- **Delta Panpot to Aux Sends** (off) – aux panning may be set independently from channel fader panning.

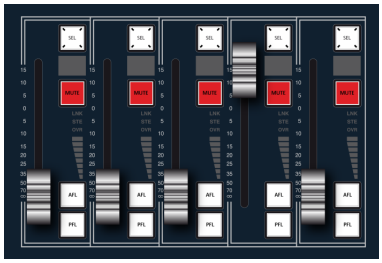
Reveal

The next five options determine where and how VCA slaves will appear on the console's fader strips when the **REVEAL** function is used:

The first two options determine where on the control surface the slaves will appear when **REVEAL** is active:

- **Reveal bay index** – select the fader strip location for the revealed slaves. You can select any bay of channel or main fader strips.
- **Reveal bay count** – select how many fader bays are used when REVEAL is active. For example, select 1 to allocate 8 fader strips, 2 to allocate 16 fader strips, etc.

Tip



The option to use multiple fader bays is 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 of any VCA master.

Set the **Reveal bay count** to **0**, if you wish to disable the **REVEAL** function, OR you have the Reveal Fader Surround User Panel fitted and wish to reveal only to these faders.

- **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.

Note that whenever you put a Surround or VCA master channel into access, its slaves are automatically assigned to the selected bank and layer; the **REVEAL** button then simply flips these fader strips to the current surface.

So, select a bank and layer of fader strips which you do not need for your normal operations.

Reset Colours (default)

This option resets all DSP channels to their default colour codes. See Page 118 for details.

Direct Couple Enable

When this option is enabled (default), a couple can be created by pressing and holding the fader **SEL** buttons as described on Page 361.

Relative Slave Faders

When this option is enabled (default), the slave faders of a VCA group are non-moving, as in an analogue VCA. This allows you to see and update slave positions even if the VCA master is closed.

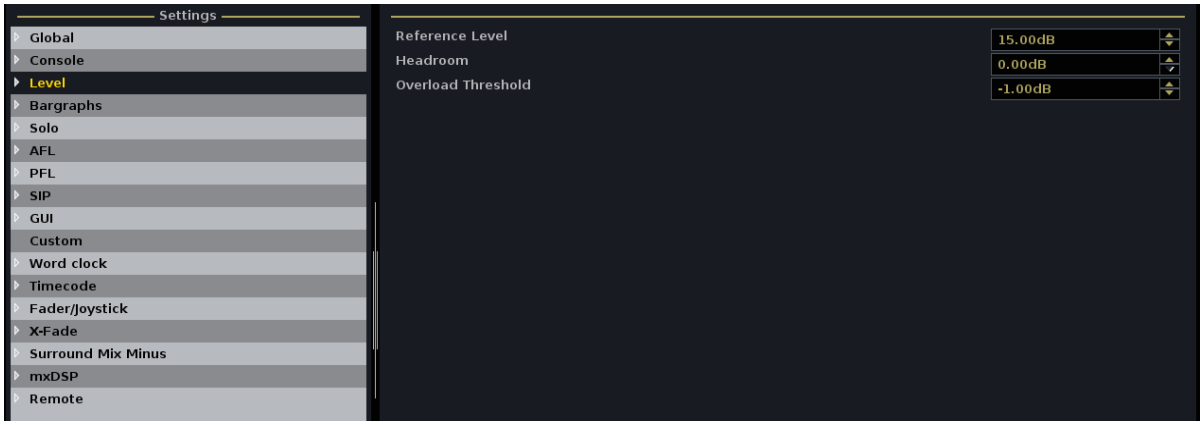
Uncheck the option to turn on the fader motors for VCA slaves; move a VCA master and the slaves will follow.

Note that this option only affects VCA grouping. Surround VCAs, Links and the Couple group always use moving faders.

Note

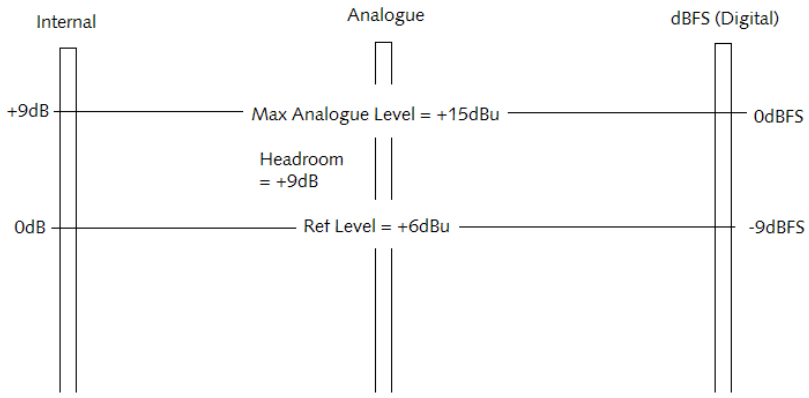
Level Options

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



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

Maximum Analogue Level = Reference Level + Headroom



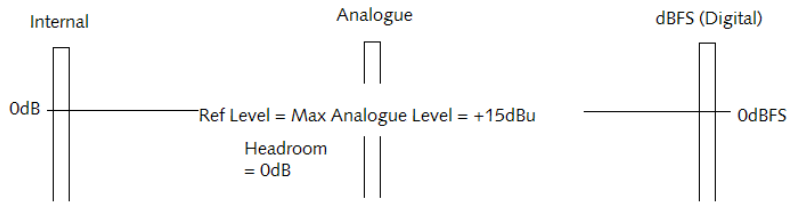
For example, the normal settings for EBU operation are shown above (Reference Level = +6dBu and Headroom = +9dB. Therefore, the maximum analogue level is +15dBu.)

Note

If your system is fitted with fixed level DALLIS analogue I/O boards, then the headroom and reference level cannot be altered independently. For example, with a +15dBu fixed analogue board and +9dB headroom, the reference level must be +6dBu. In a system with a mixture of fixed level and variable analogue I/O boards, then the system headroom and reference levels operate within the range of the analogue board with the lowest maximum level.

The maximum analogue level which the system supports is +24dBu.

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 analogue 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.

Note that using this type of setup, 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.

Note

See Page 665 for more details on the dBFS meter scale option.

Warning

Warning

Note that changing the reference level or headroom moves the internal 0dB operating point for the system and therefore will change the behaviour of any level dependent settings such as dynamics processing and metering. Therefore, it is not advisable to alter these levels once dynamics processing has been set.

Reference level

Sets the reference level of your analogue interfaces in dBu.

Reference level may be set from 0dBu to +24dBu, depending on the Headroom. (Maximum analogue level = +24dB and minimum analogue level = +12dBu).

Headroom

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

Headroom may be set from 0dB to +20dB depending on the Reference level. (Maximum analogue level = +24dB and minimum analogue level = +12dBu).

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

Note

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.

For example, with the overload threshold set to -3.0dB, then the overload indicator OVR on the channel meter and fader strip is activated when signal reaches -3 dBFS.

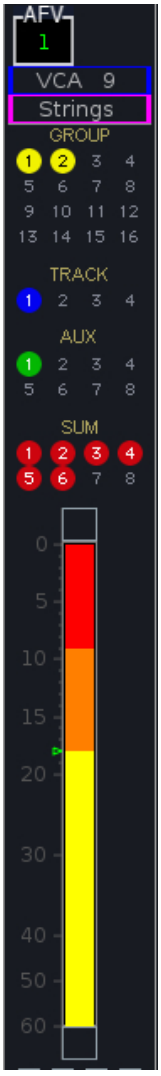

Note

Note that OVR is only indicated if you meter a pickup point from the router to the DSP or from the DSP to the router such as Input, DIROUT, SEND, RETURN. Internally, the system headroom exceeds 380dB!

Bargraph Options

Select the **Bargraphs** Topic to set the following peak meter options:

Full Channel mode



This option defines the peak metering 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, choose **True Peak** and then set the Scale mode (below) to **dBFS**. Then follow the recommendations for **Level** options, see Page 662.

Scale mode

This option defines the peak metering 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.

When using the dBFS meter scale, return to the **Level** options, see Page 662, and set the **Reference Level** equal to your maximum Analogue Level and the **Headroom** to 0dB. This ensures that the dBFS metering across the console matches any external AES metering you may have. You may then use the **Safe Area**, **Operation Range** and **Line Up Level** options to colour code the meter scale and help manage your own headroom, see Page 667.

Peakhold Mode

This option defines the behaviour of the peak hold indicator, which monitors and marks the peak level reached on each meter across the console. Choose from:

- **Auto** – peak hold automatically clears after the Peakhold Time value (see next option).
- **Manual** – peak hold remains set until you select CLEAR.
- **Off** – the peak hold indicator is disabled.

Peakhold Reset

Select this button to clear the peak hold indicators and reset peak level monitoring.

Peakhold Time

This option sets the peak hold time used in the **Auto** peak hold mode above. Set the value in seconds.

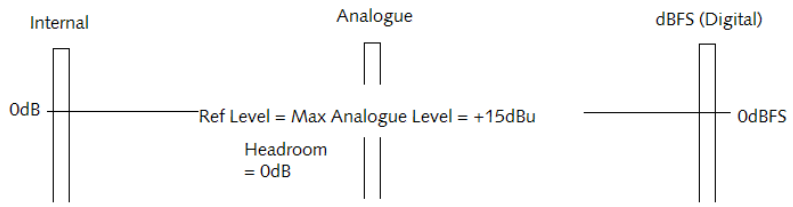
Peakhold Colour

This option sets the colour of the peak hold indicator.

You can choose from a variety of colours.

Safe Area, Operation Level, Line Up Level

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 Analogue Level and the **Headroom** to 0dB. This ensures that the dBFS metering across the console matches any external AES metering you may have:



Note

Note that using this type of setup, the internal 0dB operating level now equals 0dBFS. This means that you are responsible for your own headroom!

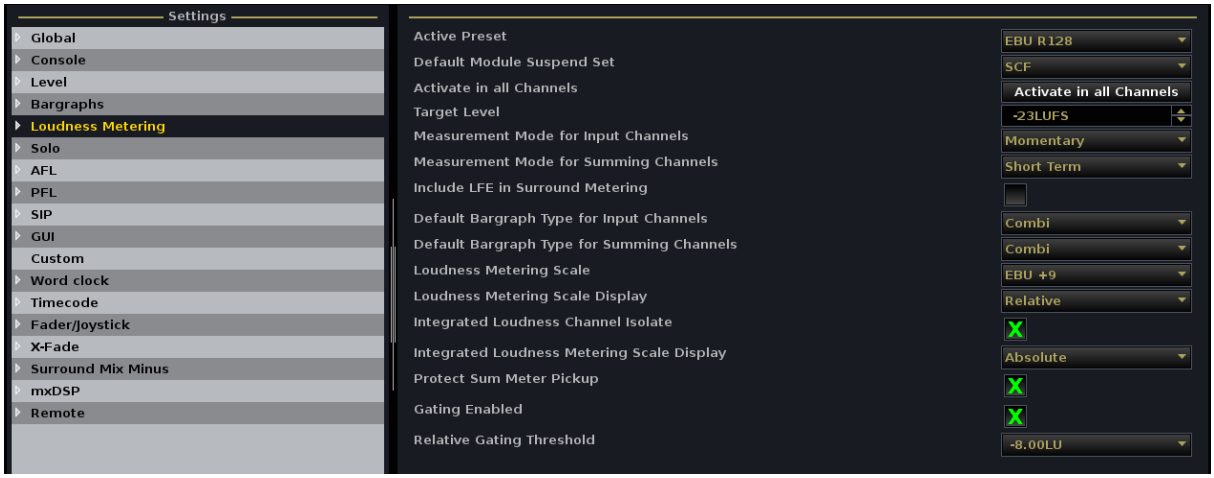
To help manage this headroom, you can adjust three bargraph options which will change the colour coding of meters on the **Channel** display:

- **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.
- **Line Up Level** - this option sets the position of the green 'Line up level' mark.

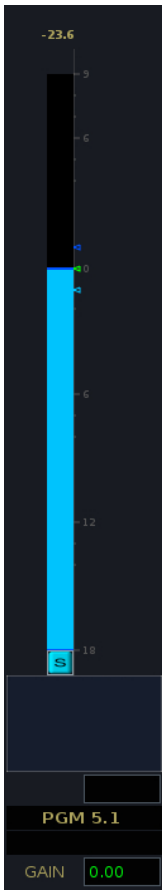
In each case, the levels are adjusted relative to the 0dB meter point.

Loudness Metering Options

Select the **Loudness Metering** Topic to set the following options:



Active Preset



The Active Preset automatically recalls the correct settings to comply with either the **EBU R128** or **ATSC A/85** implementation standards. Each preset resets the following Loudness options:

- **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 recommendations; to indicate this, the Active Preset changes to **Custom**.

Note that you may change the **Loudness Metering Scale** to the extended scale (e.g. from **EBU +9** to **EBU +18**) without affecting compliance.

Default Module Suspend Set

This option defines the default DSP module, or modules, which will be disabled (suspended) when loudness metering is active.

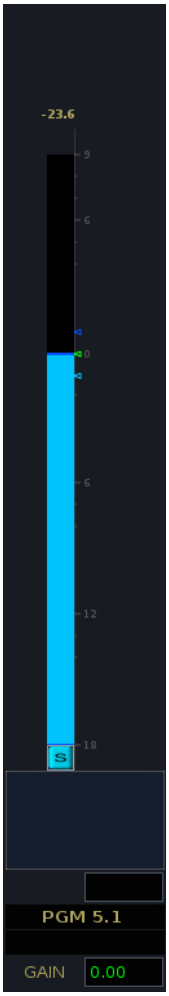
Use the drop-down menu to make a selection.

The default selection can be modified on a channel by channel basis from the **Channel Config** display.

Activate in all Channels

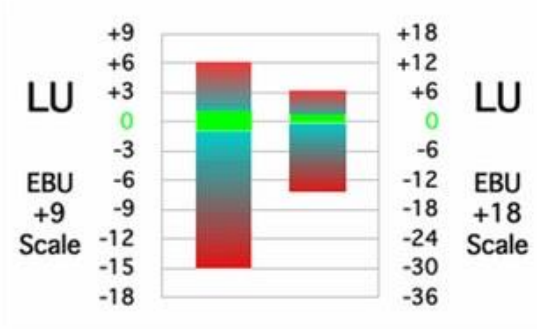
Select this option to turn on loudness metering for all channels which support it. See Page 318 for full details.

Target Level



This option adjusts the target level for programme 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 recommends a target level of **-24 LUFS** +/- 2 LU. Note that LUFS is identical to LKFS defined by the ITU standard (BS 1770).

Note that the **Target Level** may be adjusted from -31 to -14 LUFS. However, any changes will deviate from the EBU or ATSC recommendations.

Measurement Mode for Input/Summing Channels

The next two options adjust the measurement mode for the loudness metering bargraphs. You may 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 may adjust this option separately for input channels and summing channels.

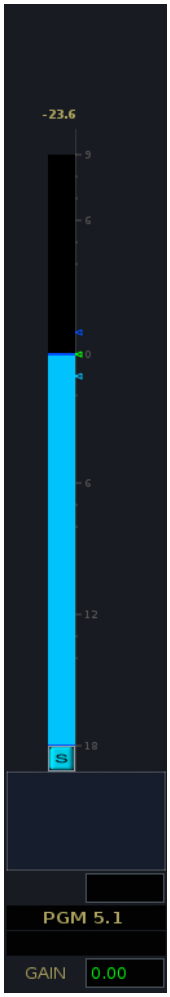
Include LFE in Surround Metering

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. You may choose from:

- **Combi** – peak and loudness metering side by side.
- **Peak** – peak metering only.
- **Loudness** – loudness metering only.

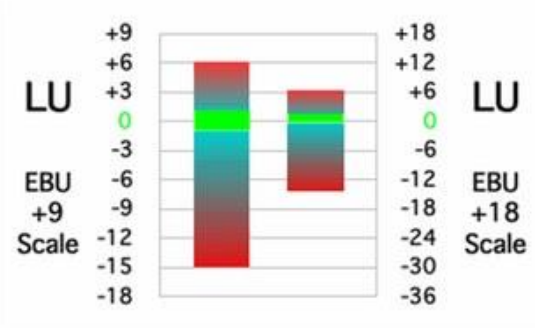


Loudness Metering Scale

This option affects the loudness meter bargraphs.

The mc^2 supports a choice of loudness metering scales which comply with the EBU R128 and ATSC A/85 recommendations. Note that a default scale is recalled by the Active Preset.

- **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 may select:

- **Absolute** – scale values are displayed as absolute values in LUFS.
- **Relative** – scale values are displayed relative to the Target Level (0 LU).

The example opposite shows a **Relative** scale.

Integrated Loudness Channel Isolate

This option affects channels using the integrated loudness measurement, see Page 326.

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.

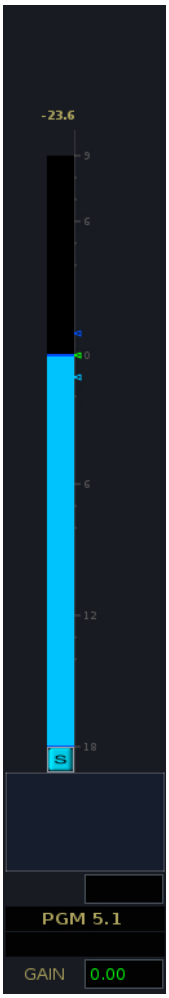
If this option is *not* checked, then a snapshot saved when the **LOUD** DSP module was turned off, will reset the channel's signal flow and therefore destroy any active integrated loudness measurement.

Integrated Loudness Metering Scale Display

This option determines how the integrated loudness value is displayed. You may select:

- **Absolute** – value is displayed as an absolute value in LUFS.
- **Relative** – value is displayed relative to the Target Level.

The example opposite shows an **Absolute** value.



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.

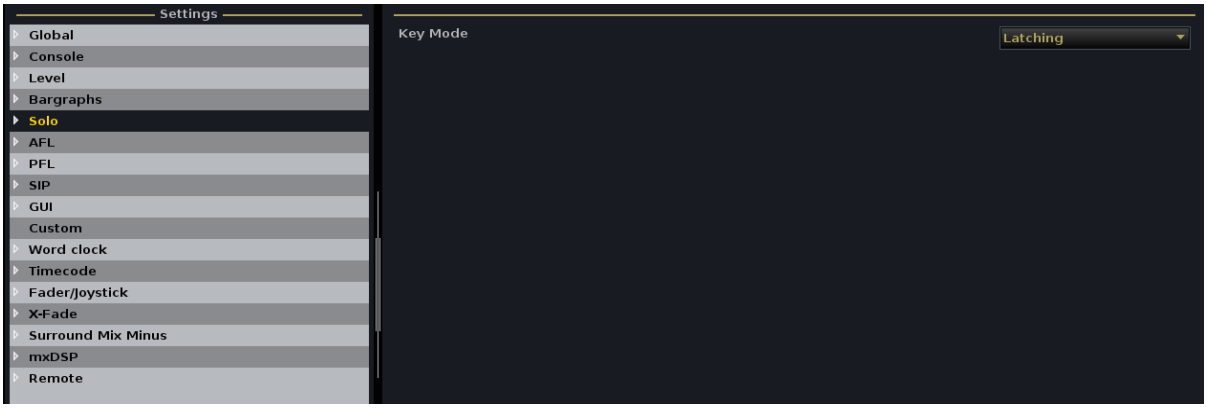
Relative Gating Threshold

This option sets the relative gating threshold to either -8 LUFS or -10 LUFS. 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 recommendations.

Solo Button Options

Select the **Solo** Topic to set the following options:



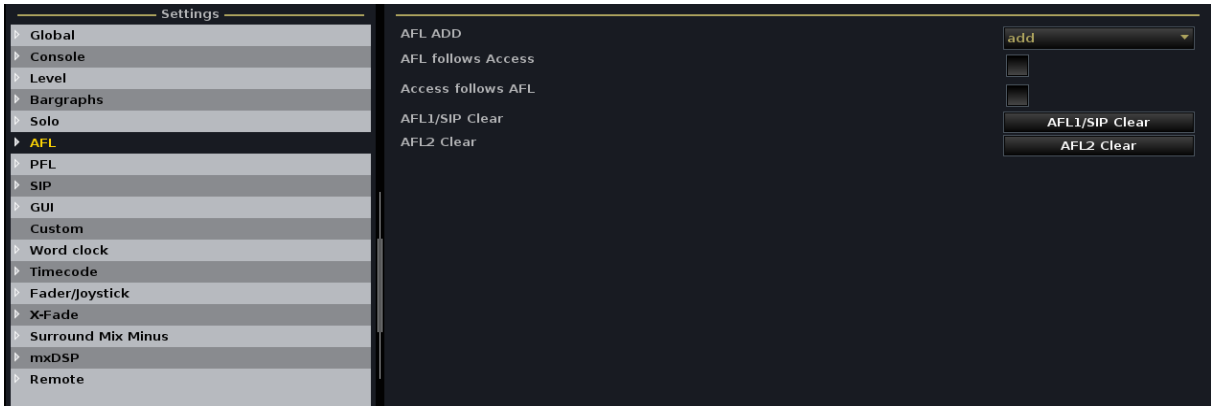
Key Mode

This option defines whether AFL (or Solo-in-Place) and PFL buttons are latching or momentary:

- **Key Mode** (Latching) – AFL and PFL buttons latch on or off when pressed.
- **Key Mode** (Momentary) – AFL and PFL buttons are only active while pressed.

AFL Options

Select the **AFL** Topic to set the following options:



AFL Add

This option defines whether AFL selections are additive or exclusive:

- **EXCL** – only one AFL may be 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

This option 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

This option 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.

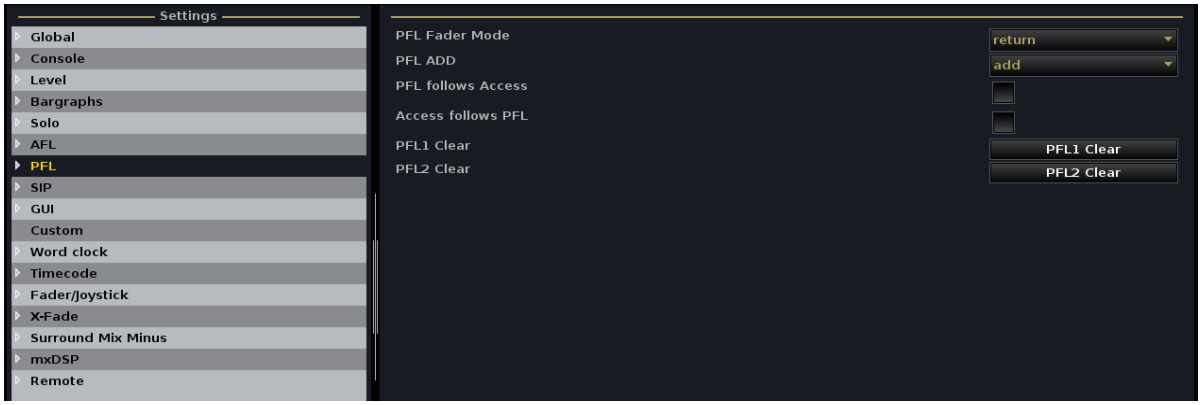
AFL/SIP Clear

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 buttons.

PFL Options

Select the **PFL** Topic to set the following options:



PFL Fader Mode

This option 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.

Note that you can also set PFL to be actioned from the fader backstop, see Page 683.

PFL Add

This option defines whether PFL selections are additive or exclusive:

- **EXCL** – only one PFL may 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

This option 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

This option 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.

PFL1 and 2 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 buttons.

Solo-in-Place Options

Select the **SIP** Topic to set the following options:

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.

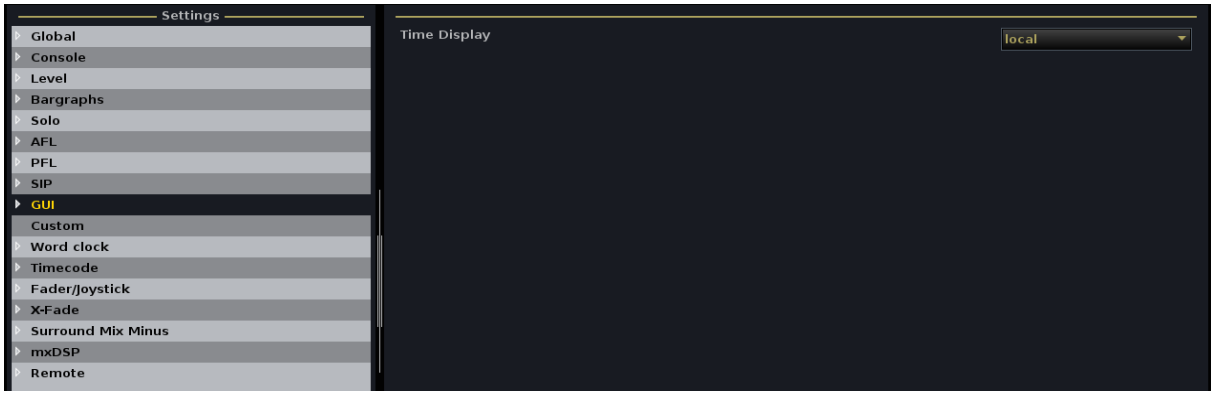
SIP Clear

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 buttons.

GUI Options

Select the **GUI** Topic to set the following Graphical User Interface options:



Time Display

At the top of the GUI_0 central display, a time is displayed. This may be the local time, in 24 hour clock, or timecode:

- **Local** – displays the control system time in 24 hour clock.
- **Timecode** - displays SMPTE timecode from your selected timecode reference.
- **Offset TC** - displays SMPTE timecode + the Midnight offset.

Note that this option applies only to GUI_0.

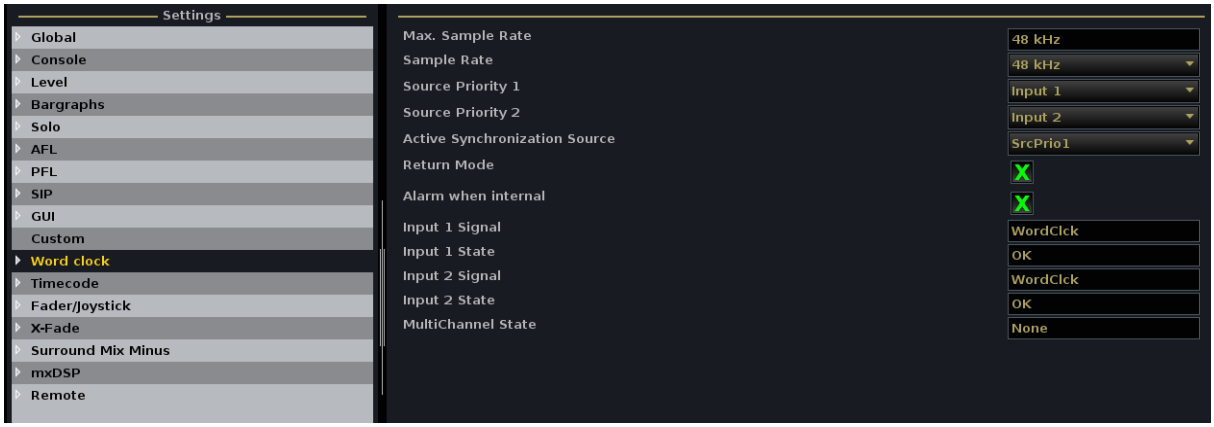
Note

Note that this area can also be used to display the integrated loudness measurement for a summing channel, see Page 326 for details.

Wordclock Options

The Wordclock topic covers a range of options for selecting the internal operating frequency of the console and source priorities for incoming sync signals. For background information on sample rate and sync options, see Page 640.

Select the **Word clock** topic to set the following options:



Max Sample Rate

This field displays the maximum internal sample rate as set by the system configuration.

The maximum rate cannot be changed by the user but can be set to either 48kHz or 96kHz by the AdminHD configuration. Please refer to the "mc²66 Technical Manual" for details on AdminHD.

Note

Note that if the maximum sample rate is 96kHz, then the console may still operate at 48kHz by changing the **Sample Rate** option below.

Sample Rate

This option selects the internal sample rate of the system. Make sure that your clock source matches this selection.

When running at lower sample rates, you may select either 48kHz or 44.1kHz operation; when running at higher sample rates, you may select 96kHz, 88.2kHz, 48kHz or 44.1kHz operation.

Note that the option to run at higher or lower sample rates is made within the AdminHD configuration, and is displayed in the Max Sample Rate field described above.

It is recommended that you mute the Monitor speakers when changing the system sample rate.

Source Priority 1 and 2

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

You can set each of the options to:

- **Input 1 –** from the HD Core rear panel.
- **Input 2 –** from the HD Core rear panel.
- **MultiCh -** Multichannel Sync (this option depends on your system configuration)

Active Synchronization Source

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

- **Src Prio 1** – the input selected as Source Priority 1.
- **Src Prio 2** – the input selected as Source Priority 2.
- Internal.

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

Return Mode

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

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

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


Note

Alarm when internal

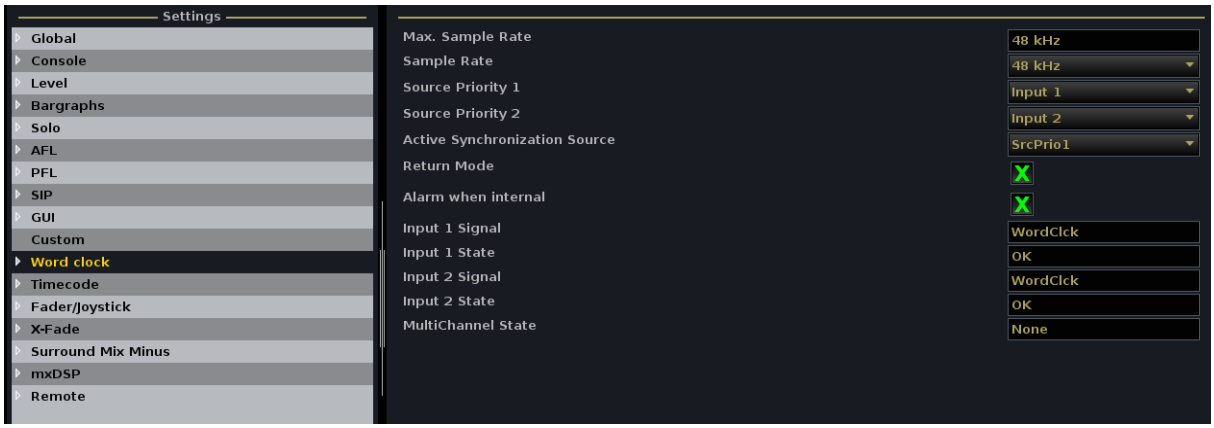
This option activates an alarm when the system is running on internal sync:

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

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

External Sync Input Status

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

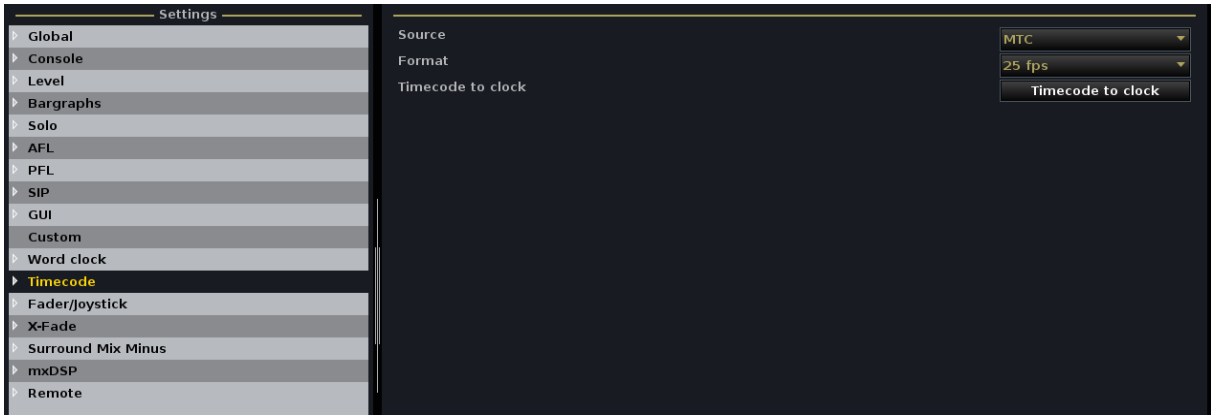


The example above shows that a valid Wordclock signal is connected to external inputs 1 and 2, and the **Active Synchronisation Source** is Src Prio 1 = Input 1.

Timecode/Frame Rate Options

The **Timecode** topic allows you to select the timecode source and frame rate when running timecode automation.

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).



Source

This option sets the timecode source for the console's dynamic automation system. 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; the frame rate defines the delay time for channel delay when adjusting in frames. You can select:

- **24 fps** - 24 frames per second - Film.
- **25 fps** - 25 frames per second - EBU (PAL or SECAM)
- **30d fps** - 30 drop frame timecode - NTSC colour TV.
- **30 fps** - 30 frames per second – monochrome TV.

If you have selected an external timecode source, this field displays the incoming frame rate.

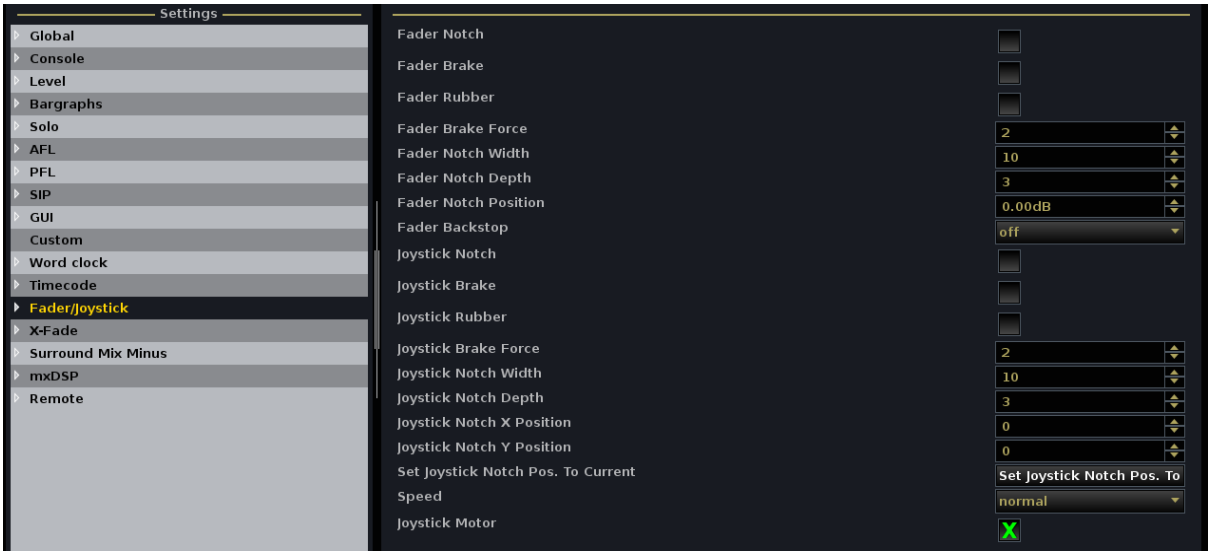
Timecode to clock

Select this button to set the timecode to the local clock time.

Fader/Joystick Options

The Fader/Joystick Topic allows you to customise the feel of your faders and surround panning joystick to suit your workflow. 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 Notch and Brake Resistance

The first seven parameters 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 may be set from -128dB (fader closed) to +15dB (fader open).

You may select multiple options, for example, to activate a fader notch and brake resistance.

Fader Backstop

This option activates the 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.

Joystick Notch and Brake Resistance

The next seven parameters set notches and brake resistance parameters for the console's joystick panner:

- **Joystick Notch** (on) - activates a joystick notch at a certain position (e.g. Front Centre).
- **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 may 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 may 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.

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.

Joystick Motor

This option can be used to enable or disable the motors on the console's joystick panners.

- **Joystick Motor** (on) - enables the joystick motor.
- **Joystick Motor** (off) - disables the joystick motor.


Note

Note that on US systems, the joystick motor may not be enabled.

X-Fade Options

The **X-Fade** Topic allows you to set the default cross fade parameters which are saved with a snapshot when it is saved or updated. These parameters are applied when snapshots are played out from a Sequence, see Page 433 for details.

Note that these parameters can be edited for individual snapshots from the **Sequences** display. However, you will save a lot of time if you remember to set this option before saving lots of snapshots!

Note

Select the **X-Fade** topic to set the following options:

Default Switch Mode

This option affects the default cross fade parameters which are saved with every snapshot and used when snapshots are played out from a Sequence. The Default Switch Mode sets whether switched functions, such as mutes, will change state at the start or at the end of the cross fade. Choose from:

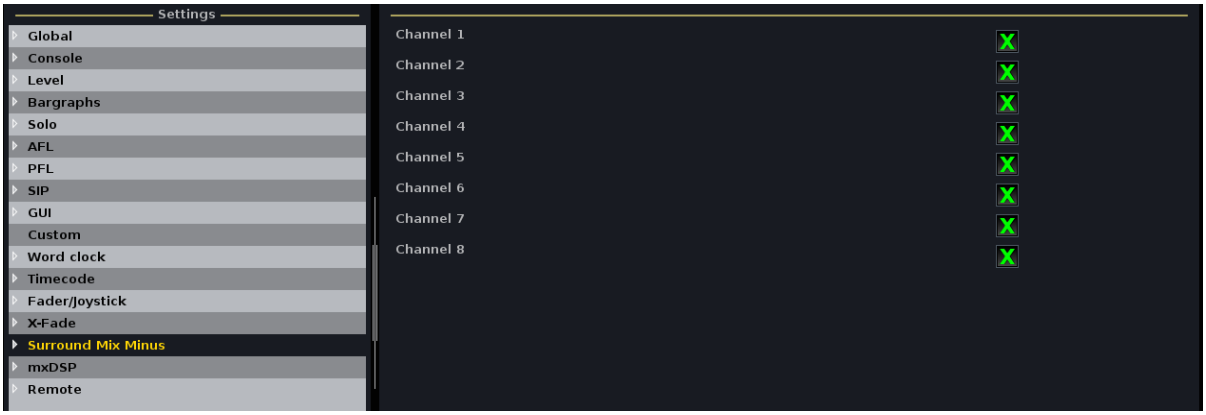
- **at start** – switched functions change state at the start of the cross fade.
- **at end** –switched functions change state at the end of the cross fade.

Default X-Fade Time

This option sets the default cross fade time which is saved with every snapshot and used when snapshots are played out from a Sequence. It is adjusted in ms steps.

Surround Mix Minus Options

The **Surround Mix Minus** Topic allows you to 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).

mxDSP Options

The **mxDSP** Topic provides options for the optional mxDSP card, see Page 622:

The option determines whether mxDSP signals are affected by snapshot loads:

- **Isolate all mxDSP signals** (on) – isolates all mxDSP signals so that they are not affected by a snapshot load. Use this option to protect the current mxDSP card settings.
- **Isolate all mxDSP signals** (off) – settings will be reset by a snapshot load. Use this option if you wish to recall mxDSP settings from snapshots.

Note that the same option can be selected using the Global Snapshot ISO **MXDSP** button on either the **Snapshots List** or **Extra Buttons** display, see Page 395.

Remote Options

The **Remote** Topic provides options for the Lawo Remote App, see Chapter 11:

The option determines whether the console may be controlled from a remote device running the Lawo Remote App:

- **Safe Mode** (on) – access from remote devices is denied. Use this mode to prevent unauthorised control of the console.
- **Safe Mode** (off) – the console may be controlled by a remote device running the Lawo Remote App.

The Custom Functions Display

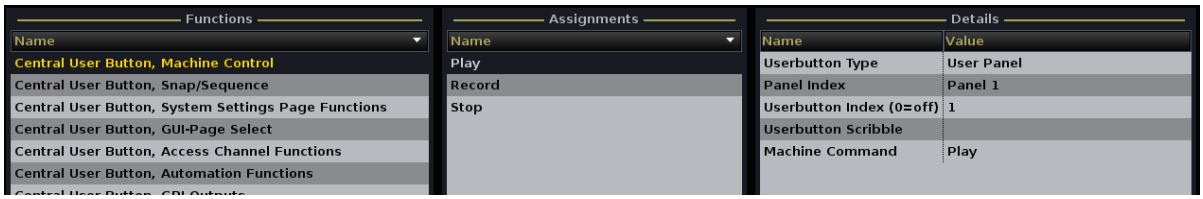
This display provides access to factory-configured custom functions, such as the mapping of user buttons, so that users can reconfigure the console without assistance from Lawo.

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 more information, please refer to the mc²66 Technical Manual.

Note

Note that the **Custom Functions** display may be hidden from the console GUI to protect the current configuration. If this is the case, you may still access the display by running mxGUI, Lawo's offline preparation software. Please contact sales or service for the mxGUI software and for advice on how to show or hide the **Custom Functions** display on your console.

1. Press the SCREEN CONTROL **SYSTEM DSP** button to open the display:



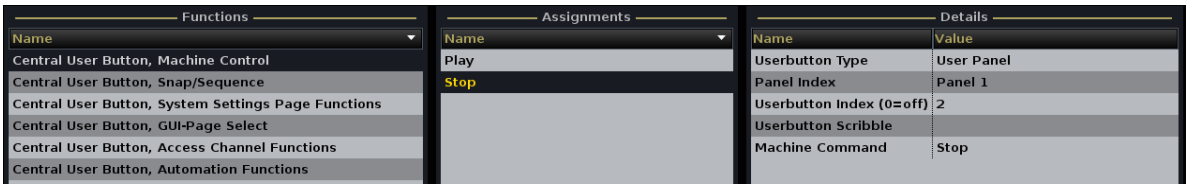
The **Functions** column on the left lists the different types of function which can be configured. A brief description appears when you hover over each title.

2. Select a function – e.g. **Machine Control Userbutton Mapping** – to interrogate any existing assignments.

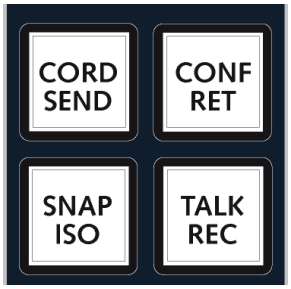
*Each time you select a different function, the **Assignments** column updates – in our example, we have two Machine Control user button assignments named **Play** and **Stop**.*

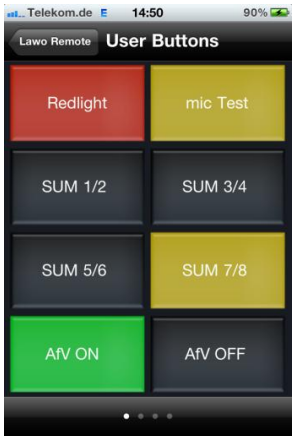
3. Select an Assignment to interrogate its Details.

Above we can see that User Panel 1, button 1 is assigned to the Machine Control Command Play, and below button 2 is assigned to Stop:



The look of your display will depend on the assignments stored within the console configuration.





User Buttons

Most functions listed on the **Custom Functions** display can be assigned to a user button. On the mc²66 user buttons are available on:

- **Channel User Buttons** – below the free controls on each fader strip you will find four programmable channel user buttons.
- **User Panels** (optional) - To the right of the FC PRESET and SNAPSHOT/SEQUENCE controls is an area which may house up to three user panels.
- **Access Panel** – the 9 user buttons on the mc² control panel in the centre section of the console.
- **Monitoring Panel** – the touch-screen buttons on the MONITORING panel.
- **Lawo Remote App buttons** – the user buttons available from an iPhone, iPod or iPad running the Lawo Remote App.

Warning

Before changing the function of a user button, make sure that there is nothing assigned to it. Otherwise, the button will perform multiple operations!

In particular, take care with the Monitoring touch-screen panel. The pages on this panel cannot be accessed from a Custom Function, therefore the button location *MUST* be free across *ALL* pages.

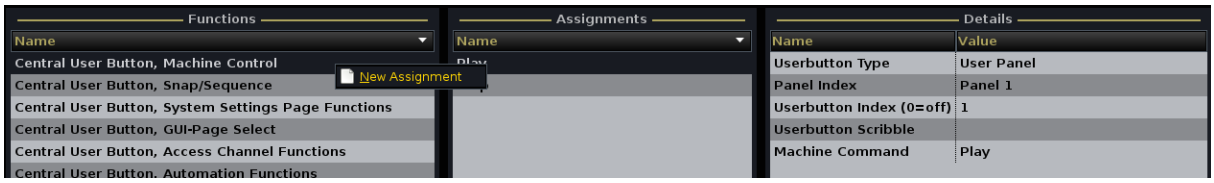
Also be aware that factory-configured user functions do *NOT* appear in the **Custom Functions** list. If you wish to reprogramme these, then you should contact Lawo to remove the factory configuration first.

In Appendix E you can find diagrams showing the button numbering for different user panels. Use these to help customise the console as follows.

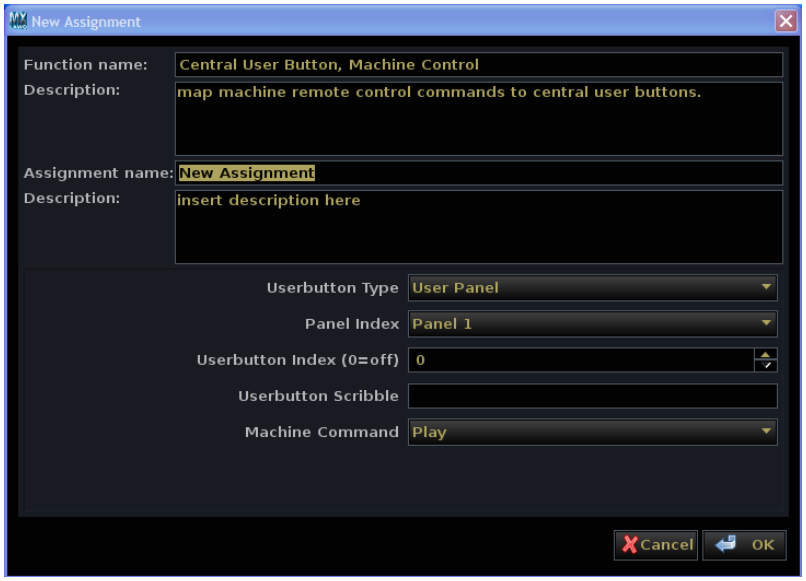
Creating a New Assignment

Let's take the example of mapping an unused button to a machine control command such as Record:

1. Using the trackball and right select button, right-click on a function type and select **New Assignment**.



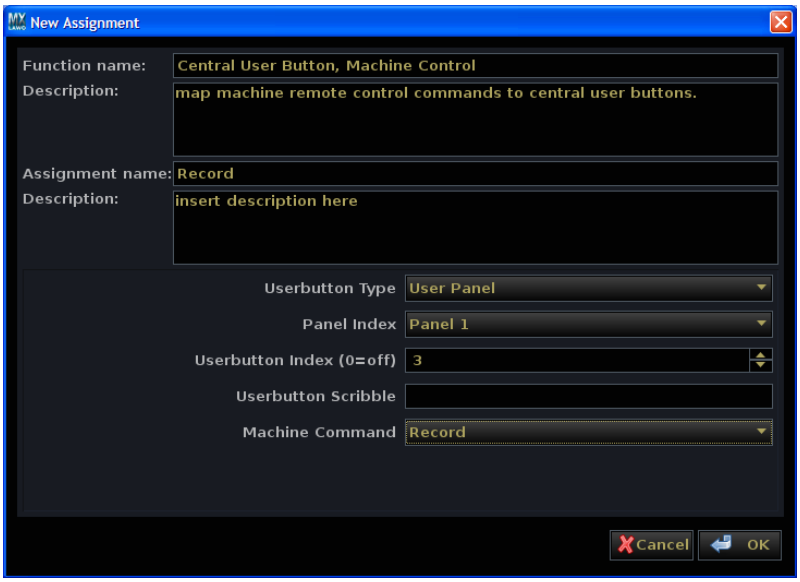
A pop-up window appears listing the assignment details:



2. Edit each field as follows:

- **Function Name** and **Description**: the first two fields are for information purposes only and cannot be edited. They describe what the function does.
- **Assignment Name**: Here you can enter a name for the assignment. In our example, we are going to name the assignment after its function – Record.
- **Description**: Here you can enter a user description for your assignment if you wish.
- **Userbutton Type**: This drop-down menu selects the panel for the button assignment – User Panel, Access Panel, Monitoring Panel, Lawo Remote APP.
- **Panel Index**: This drop-down menu selects the panel number.
- **Userbutton Index**: This field selects the button number you wish to assign.

In our example, we have selected button 3 on User Panel 1:



Appendix E provides information on the button numbering for each panel type.

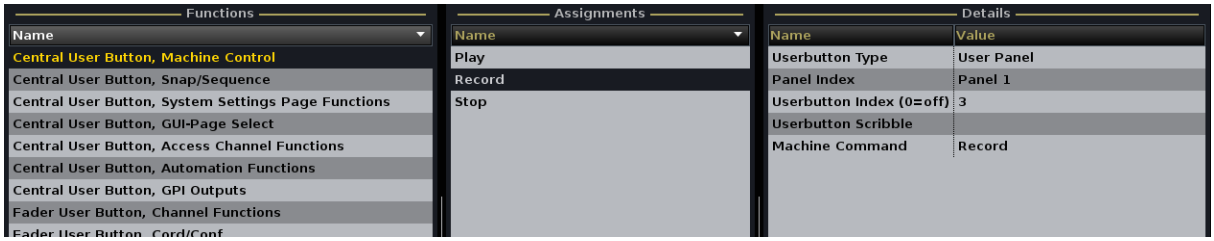
- **Userbutton Scribble**: If the selected user button has an accompanying scribble strip display, then you can enter the text to be displayed in this field. Up to 8 characters.

Text will only be displayed if the button has a scribble strip such as the touch-screen buttons on the Lawo Remote App.

- **Machine Command**: This drop-down menu selects the function to be assigned. In our example, we have selected Record.

3. Once you are happy select **OK**.

*The assignment is made and you will see its name appear in the **Assignments** list:*



4. Repeat these steps to configure other custom functions.

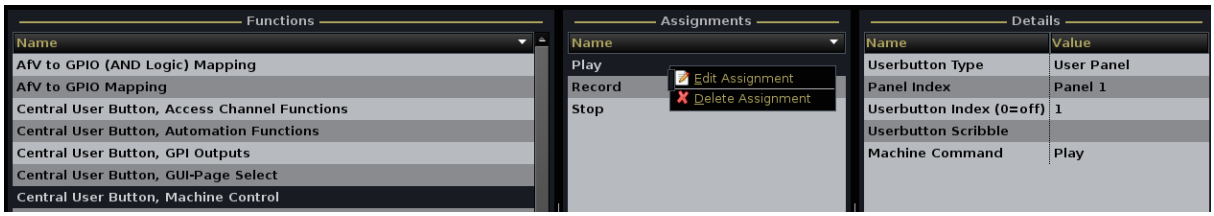
Note

Note that as soon as you make or edit an assignment, the changes are written into the console's configuration data on the control system. Custom Functions are stored as part of the configuration and not in productions, and therefore affect all users of the console.

Editing an Assignment

To edit an existing assignment:

1. Select the **Function** and **Assignment** you wish to edit – for example, **Play**.
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 and select **OK** to confirm the changes.

Deleting an Assignment

To delete an existing assignment:

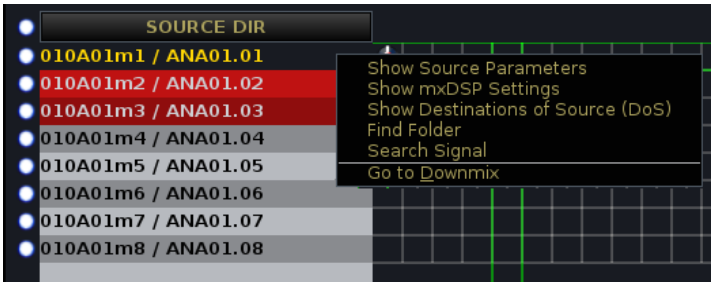
1. Select the **Function** and **Assignment** you wish to delete – for example, **Play**.
2. Right-click and select **Delete Assignment**.
3. Confirm by selecting **OK**.

The assignment is deleted.

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 **mx Routing** display as follows:

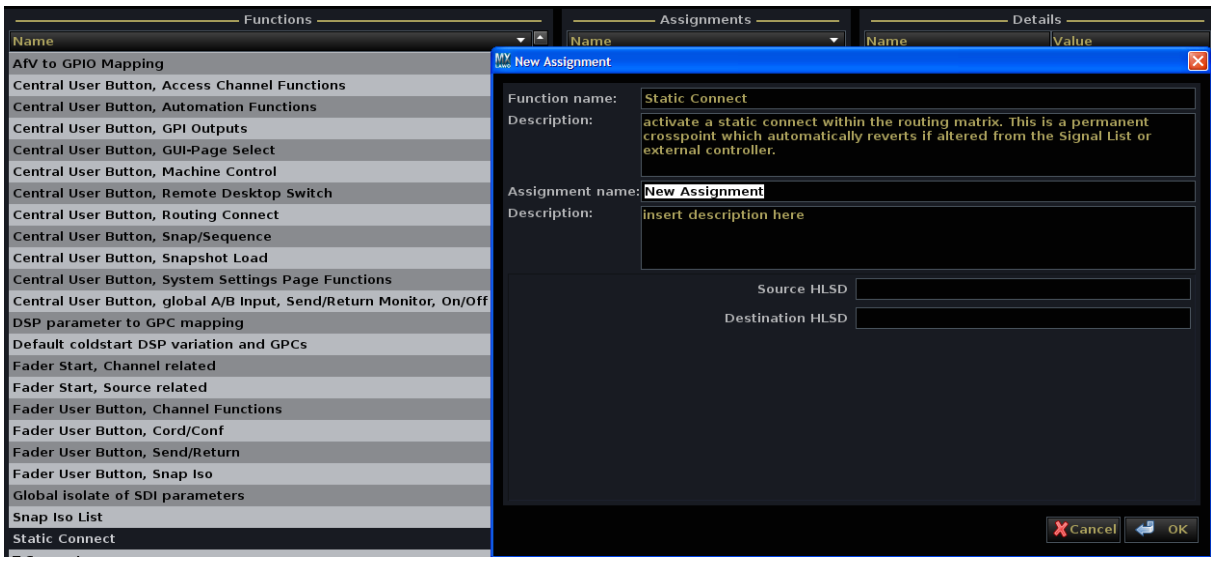
1. Open the **mx Routing** display and locate the signal.
2. Right-click and select **Show Source Parameters** (or **Show Destination Parameters**):



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 to the system clipboard:

5. Now return to the **Custom Functions** display.
6. Create a new function assignment, or edit an existing assignment – for example, a **Static Connect**:



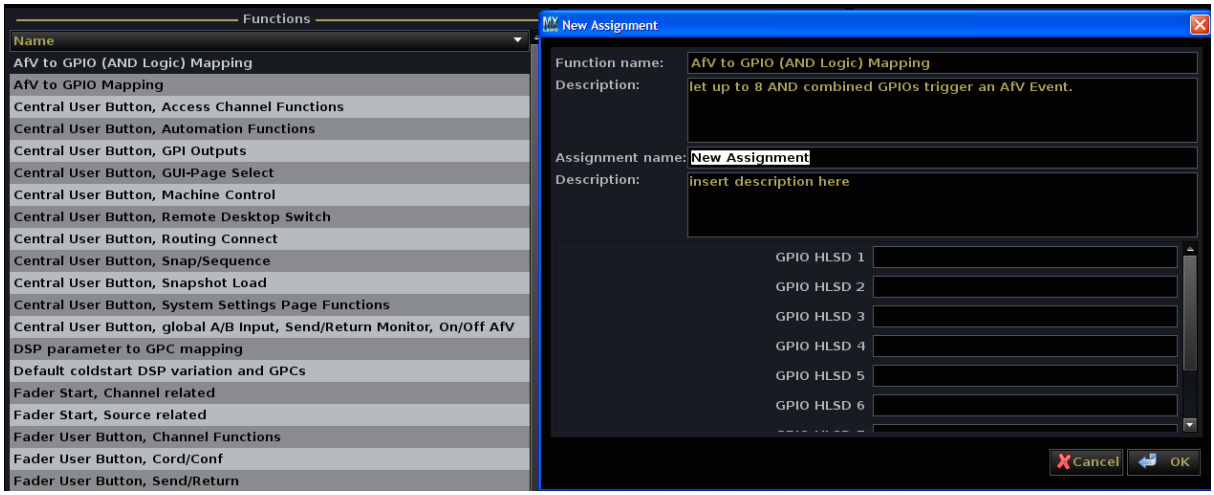
7. Right-click on the HLSD field and select **Paste** to paste the copied address.

Function Commands

Each function type provides access to a different set of commands. Use the drop-down **Command** field at the bottom of the **New/Edit Assignment** window to view the available options. This section describes the functions in alphabetical order:

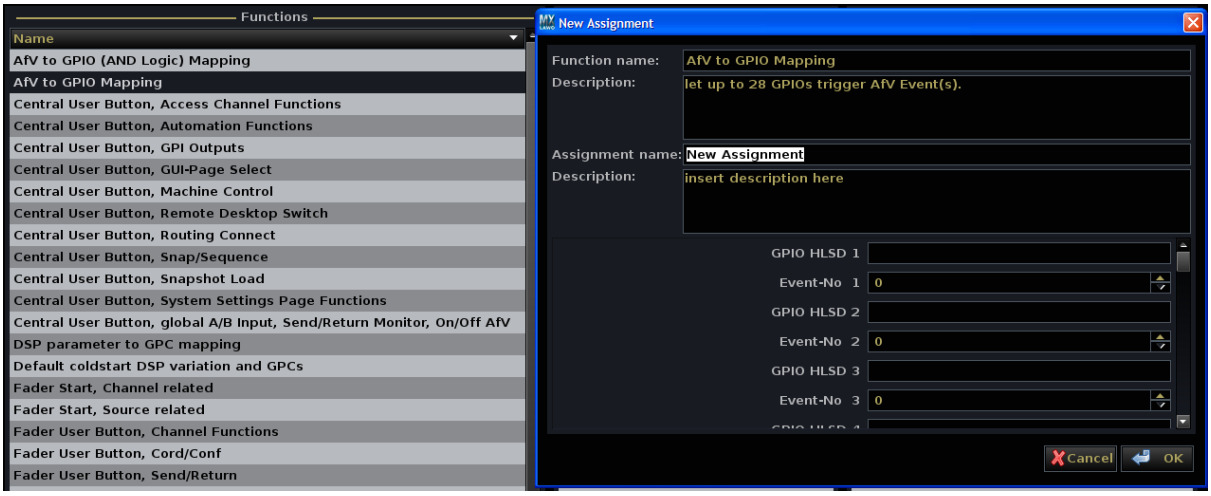
AFV to GPIO (and Logic) Mapping

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. The template can be created several times if you wish to trigger several AFV events with AND combined GPIO logic.



AFV to GPIO Mapping

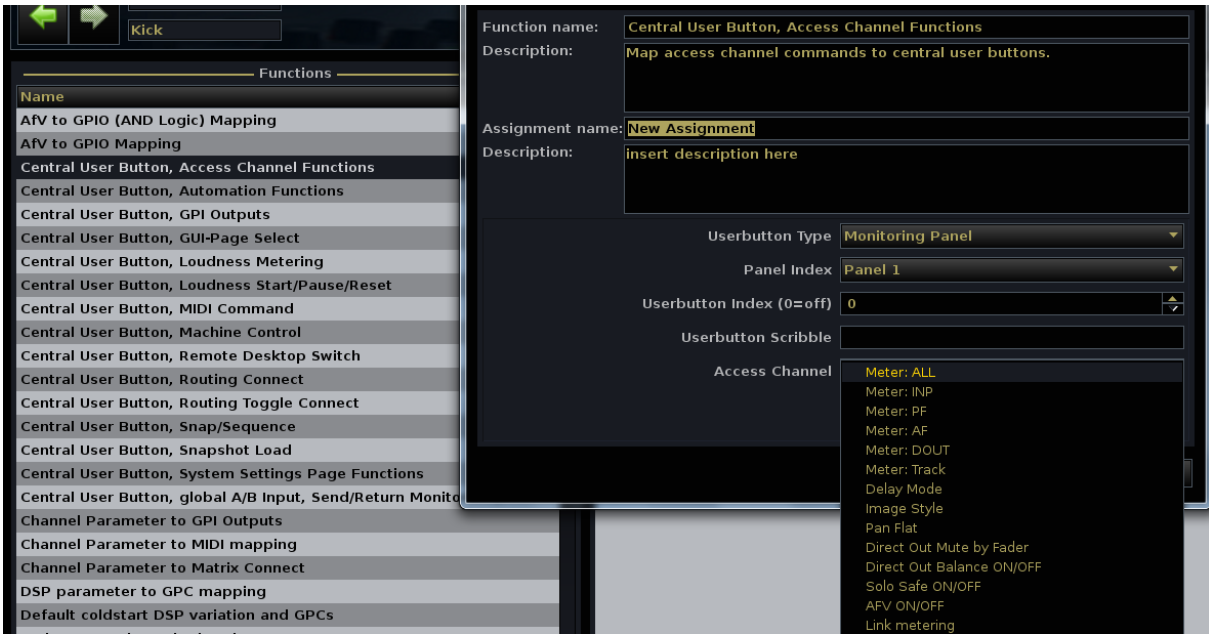
This function triggers Audio Follow Video events from up to 28 GPIOs. You can create an OR combined GPIO by entering the same AFV event for all 28 GPIOs. Alternatively, you can mix OR combines GPIOs with a direct AFV Event assignment. You can create several instances of this template.



Central User Button, Access Channel Functions

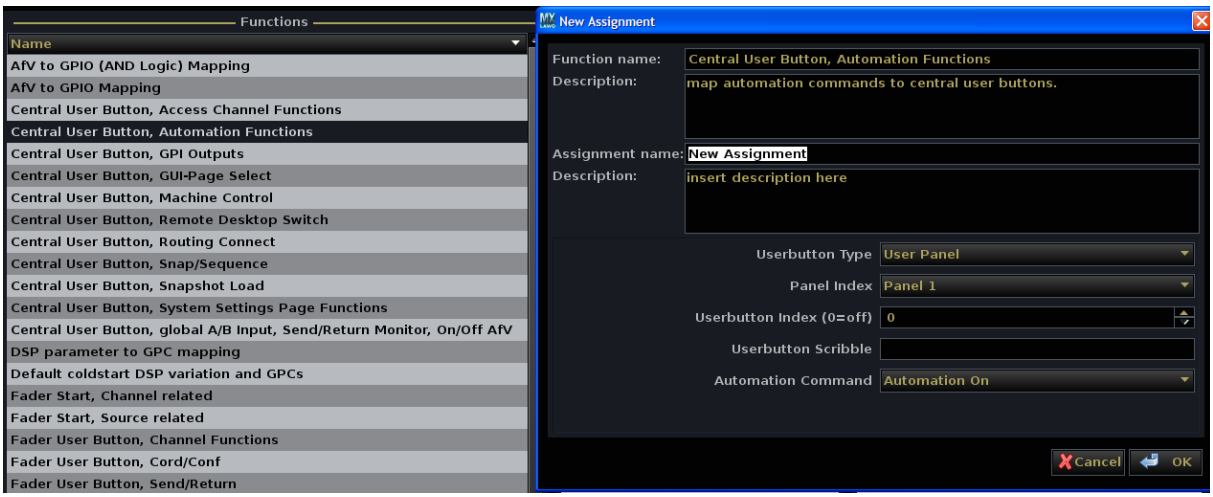
Maps central user buttons to functions which will act on the channel in access. Functions include:

- **Meter** pickup point selection, see Page 332.
- **Delay mode**, **Image style** and **Pan flat** options, see Pages 197, 266 and 224.
- **Direct Out** options, see Page 115.
- **Solo Safe** on/off, see Page 115.
- **AFV** (Audio Follow Video) on/off, see Page 236.
- **Link metering** on/off, see Page 115.



Central User Button, Automation Functions

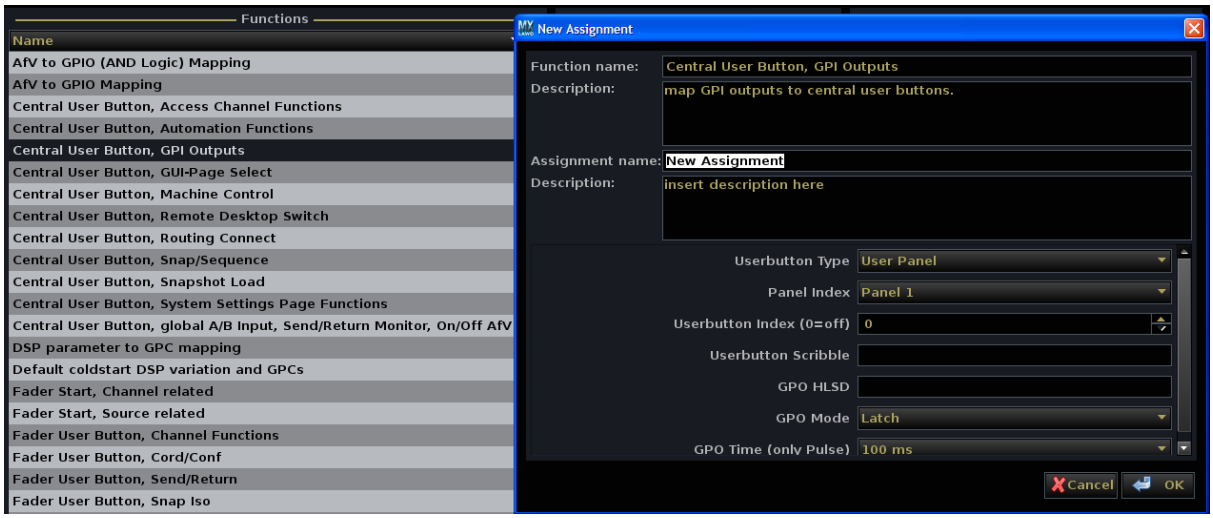
Maps central user buttons to timecode automation functions, see Chapter 7:



Central User Button, GPI Outputs

Maps central user buttons to external relays (GPI Outputs). For each user button define the:

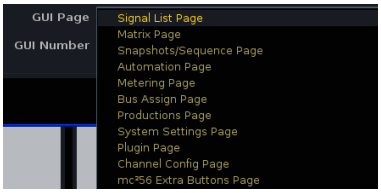
- **GPO HLSD** – this is the Lawo system address of the GPO which will be triggered.
- **GPO Mode** – latching, momentary, pulse, etc.
- **GPO Time** – for a pulsed relay.

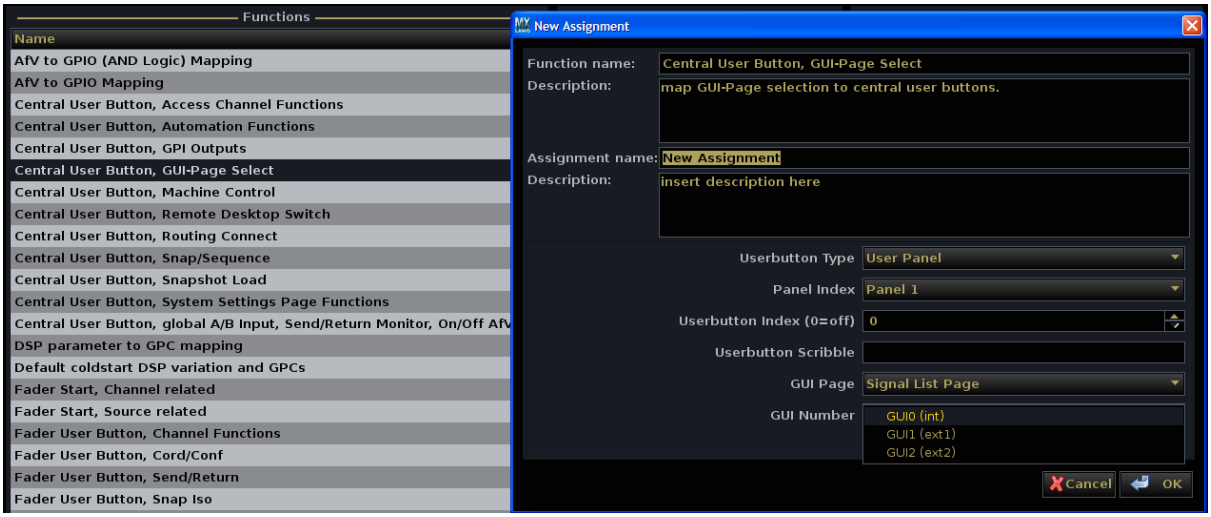


Central User Button, GUI-Page Select

Maps central user buttons to GUI display switches. For example, you could assign user buttons to switch different displays to an external screen. For each user button define the:

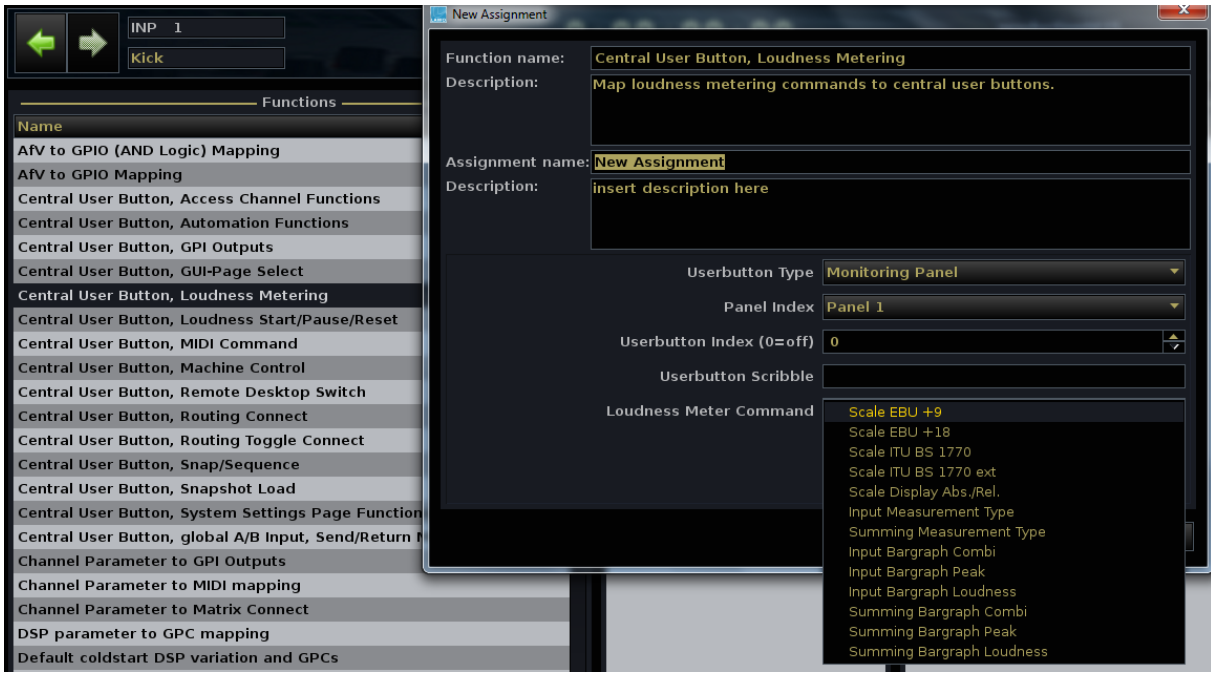
- **GUI Page** which the button will select – Signal List, Matrix, Snapshots/Sequence, etc.
- **GUI Number** (internal, external 1 or external 2) which will be switched:





Central User Button, Loudness Metering

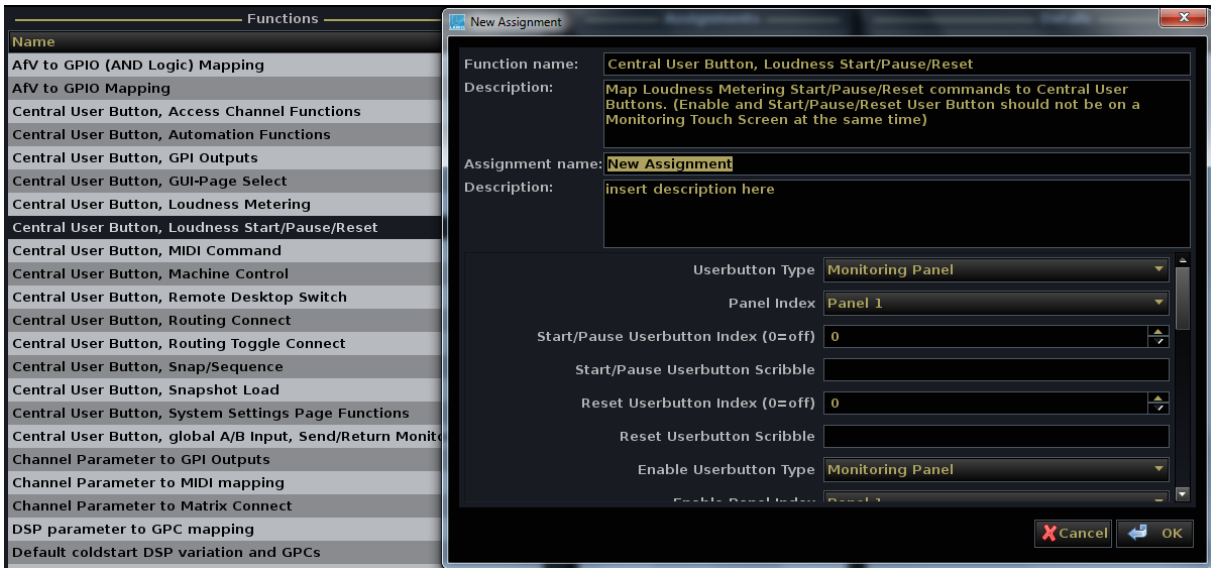
Maps central user buttons to the Loudness Metering options available from the **System Settings** display, see Page 668:



Central User Button, Loudness Start/Pause/Reset

Maps central user buttons to start, or reset, the integrated loudness measurement on up to 8 specific summing channels, see Page 326.

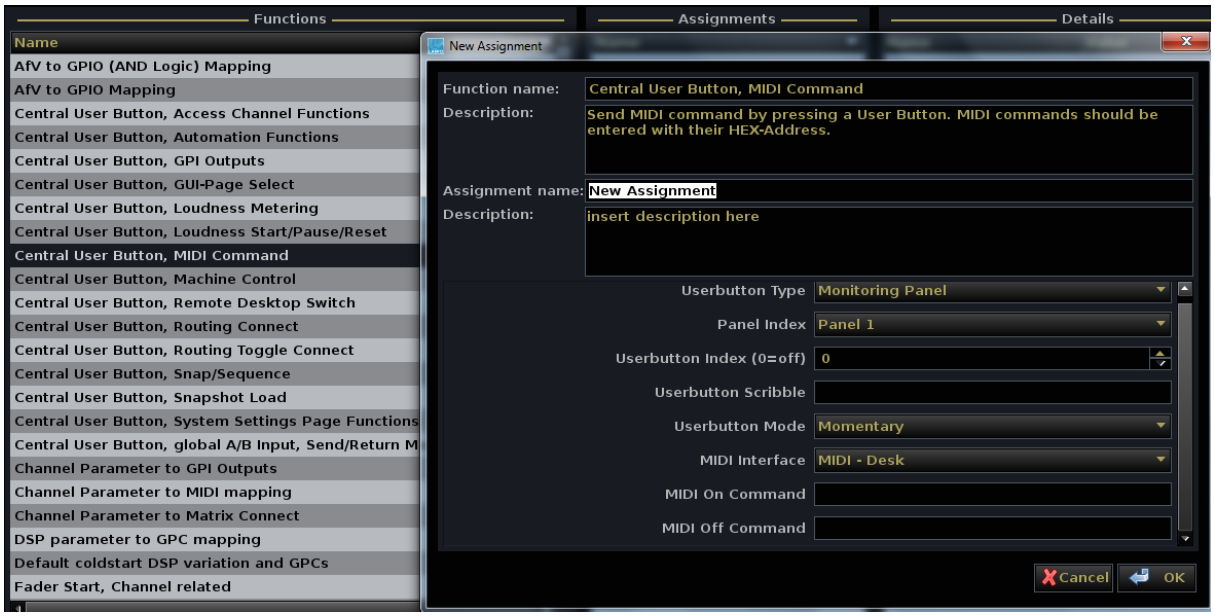
Note that you these functions can also be mapped to fader strip user buttons, see later.



Central User Button, MIDI Command

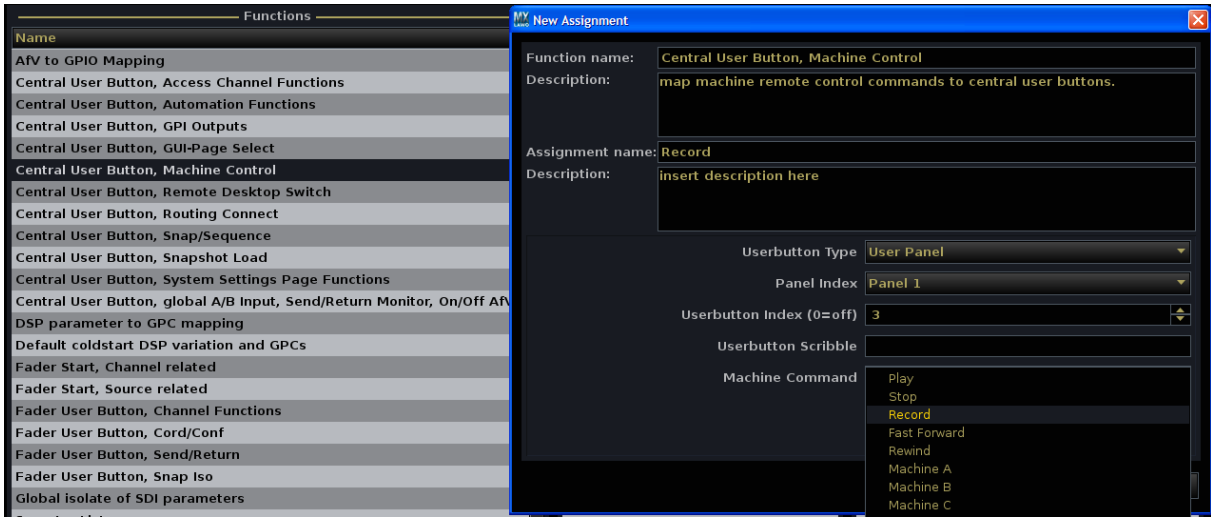
Maps central user buttons to MIDI commands. For each user button define the:

- **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.



Central User Button, Machine Control

Maps user buttons to machine control commands:



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.

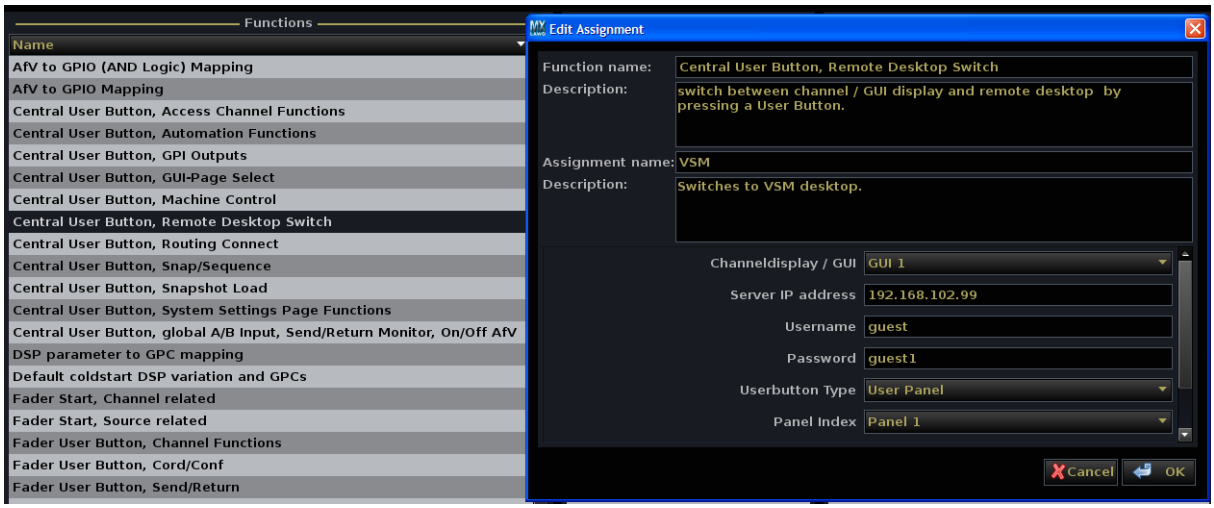
The computer can be running Windows, Linux or MAC, and it must connect to the control system (via ETHERNET B of the MKII Router Module).

The computer's IP address should be set to 192.168.102.xxx. If it is not within the same subnet range as the control system, then the network must be configured with a route through to the system subnet. Please consult the mc^2 Technical Manual and your network administrator for more details.

The computer must have its "Remote Desktop" option enabled (a Windows System settings). And a user and password must be configured to match those entered below.

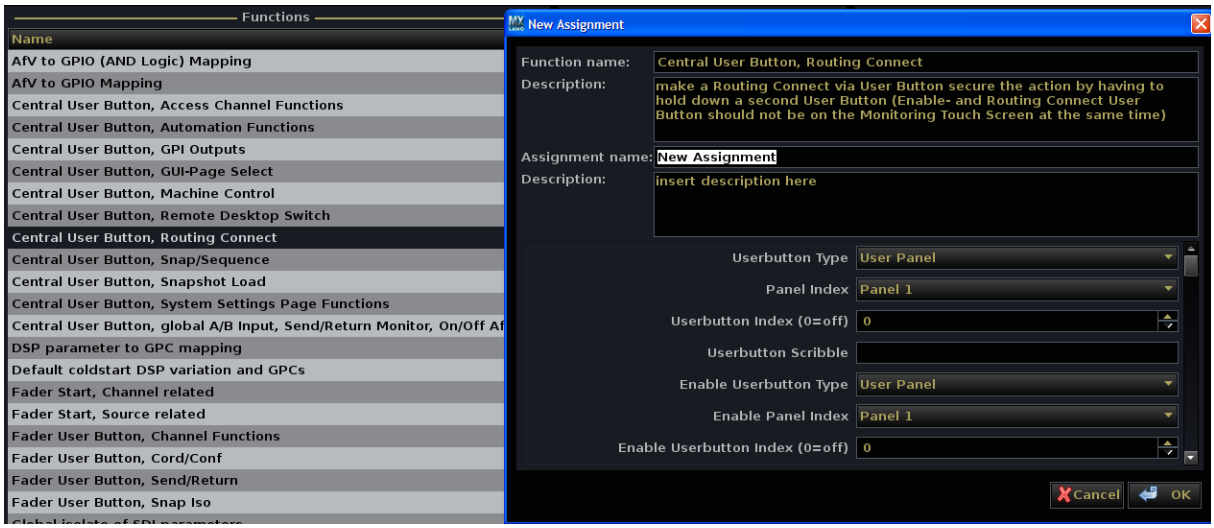
For each remote desktop you wish to connect to, define the:

- **Channeldisplay / GUI** – selects the console display which will display the remote desktop. You may choose any Channel display or Central GUI.
- **Server IP address** – the IP address of the computer.
- **Username** – the Username configured on the compute.
- **Password** – the Password configured on the compute.
- **Userbutton Type**, **Panel Index**, etc. – the user button which will switch to and from the remote desktop.



Central User Button, Routing Connect

This function allows you to perform signal routing from a user button. Up to 28 connects/disconnects can be assigned to one User Button; you can create several instances of this template.



Tip

You can copy the source and destination **HLSD** from the **mx Routing** display, see Page 693. Routes may be made to/from any source or destination including DSP channels.

To create a disconnect, type **DISCONNECT** into the field for the Source HLSD.

To secure the operation, you can 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

Note that the **Enable** and **Routing Connect** user buttons are not multi-touch capable, therefore do not assign them both to a touch-screen.

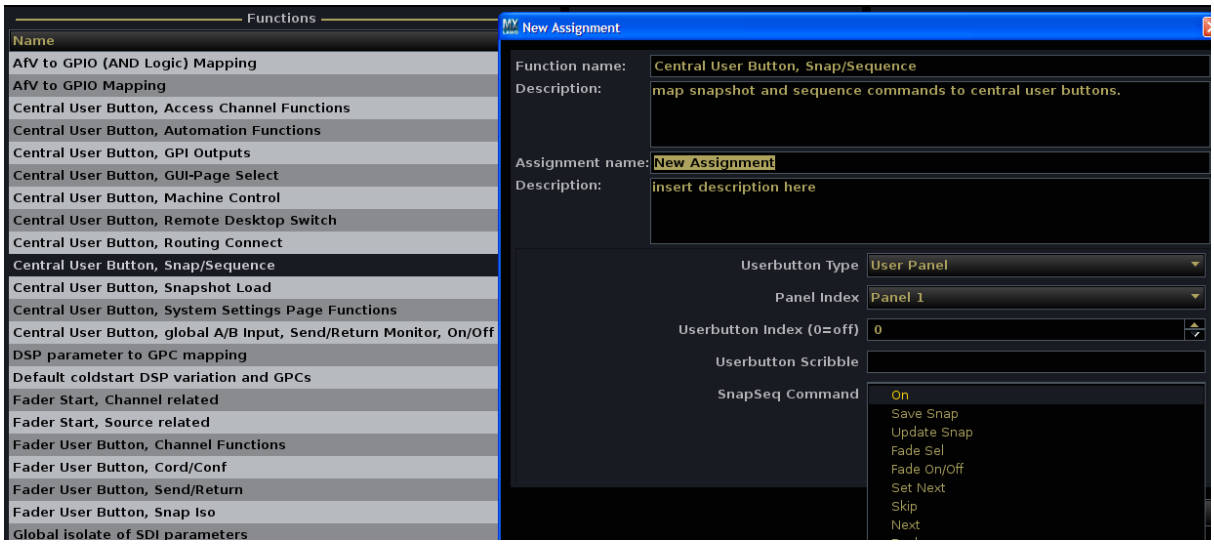
Please ask for advice from Lawo staff if you wish to do so.

Central User Button, Routing Toggle Connect

This function is similar to above, but provides source on and source off states so that routes may toggle. Up to 16 connects/disconnects can be assigned to one User Button; you can create several instances of this template.

Central User Button, Snap/Sequence

Maps user buttons to snapshot and sequence commands, see Chapter 6:



Central User Button, Snapshot Load

This function allows you to load a specific snapshot from a single user button press. 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.

Note that the **Unlock** and **Snapshot Load** user buttons are not multi-touch capable, therefore do not assign them both to a touch-screen.

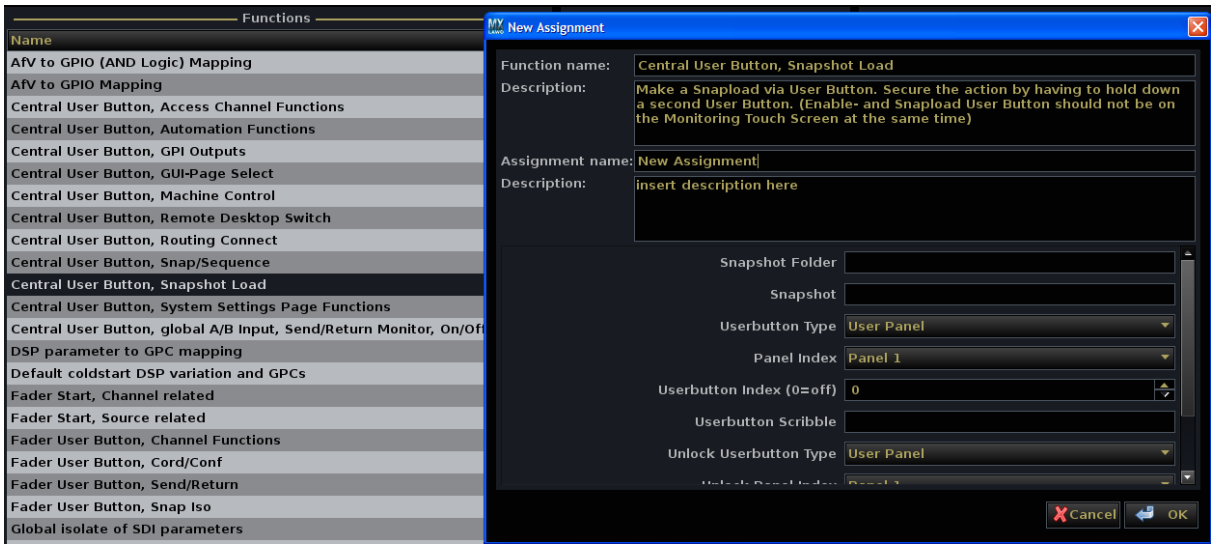
For each function, define the:

- **Snapshot Folder** – the name of the Folder where the snapshot is stored.
- **Snapshot** – the name of the Snapshot you wish to load.

Note that you can define any snapshot from any folder within the active production.

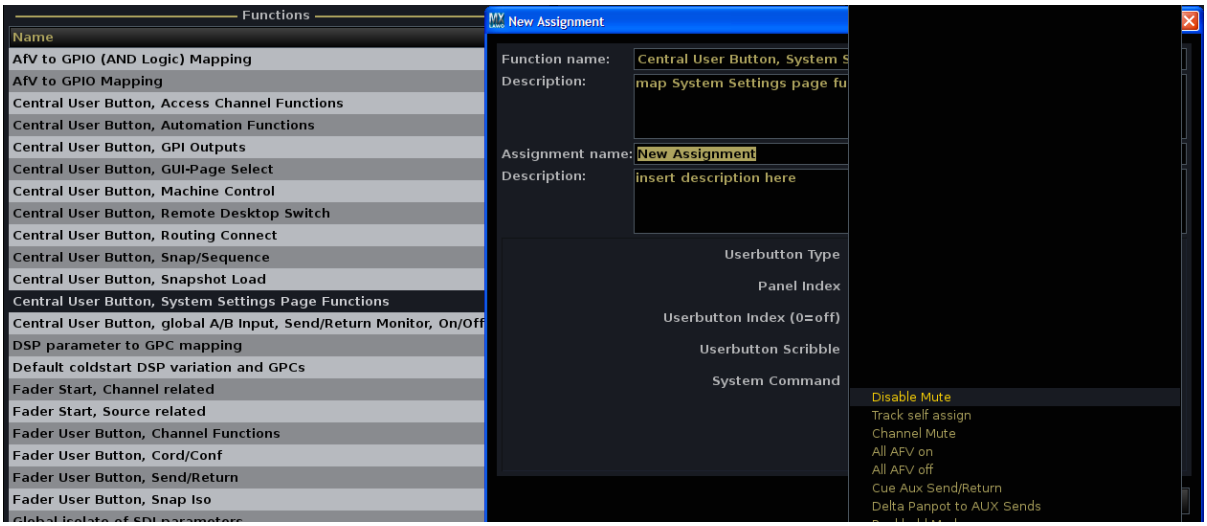
- **Userbutton Type**, **Panel Index**, etc. – the user button which will action the Snapshot Load.
- **Unlock Userbutton Type**, **Panel Index**, etc. – the user button which will action the Unlock function.

Note that if the **Unlock** user button is empty, then the **Snapshot Load** will action on a single press of the first user button.



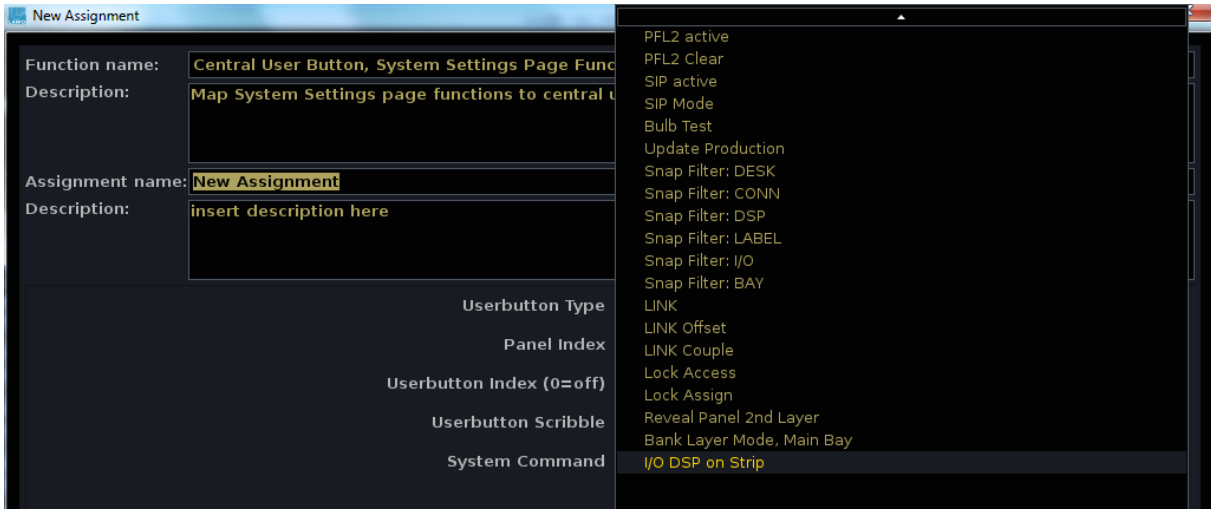
Central User Button, System Settings Page Functions

Maps user buttons to system options allowing them to be changed 'on the fly'.



Most of the options in this list come from the **System Settings** display, see Page 650. Those which do not are:

- **Snap Filter** – mimic the **Global Snapshot ISO** buttons described on Page 395.
- **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, see Page 187.



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 user buttons. You can assign:

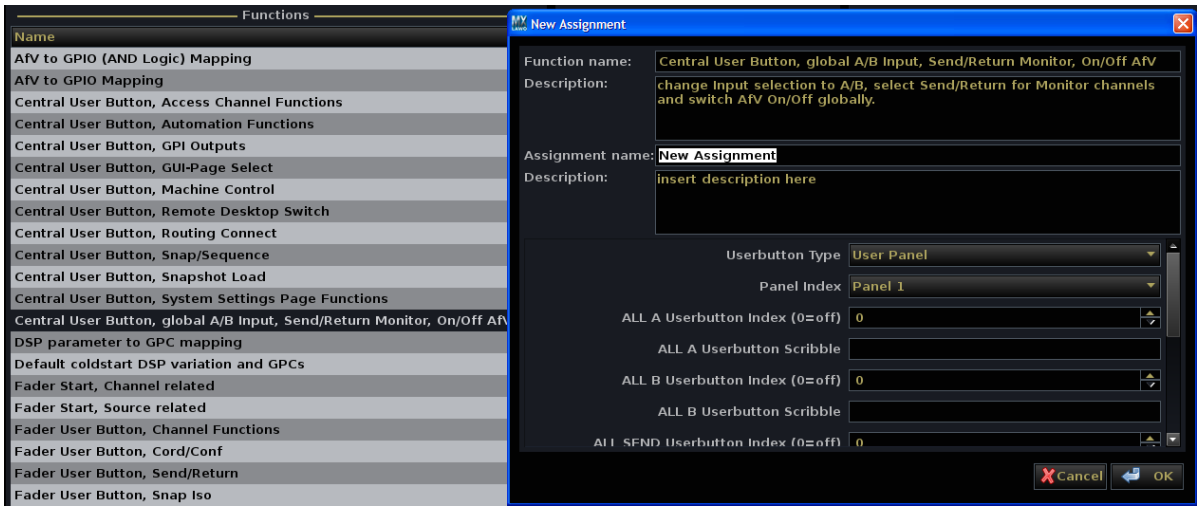
- Global switching for Input A or Input B – use this function to switch all input channels between A and B sources (if assigned).

Note

Note that if not all B Inputs are available in the DSP profile, then the status LED of the “All B” Button will not light. The button will still switch to Input B on all Inputs where a source is assigned.

- Global switching for Send or Return on monitor channels – handy for multitrack recording sessions.
- Global switching for AFV On or Off – handy if cameras are rehearsing (you can switch AFV off).

You can create several instances of this template if you wish to have functions on different User Button Panels.



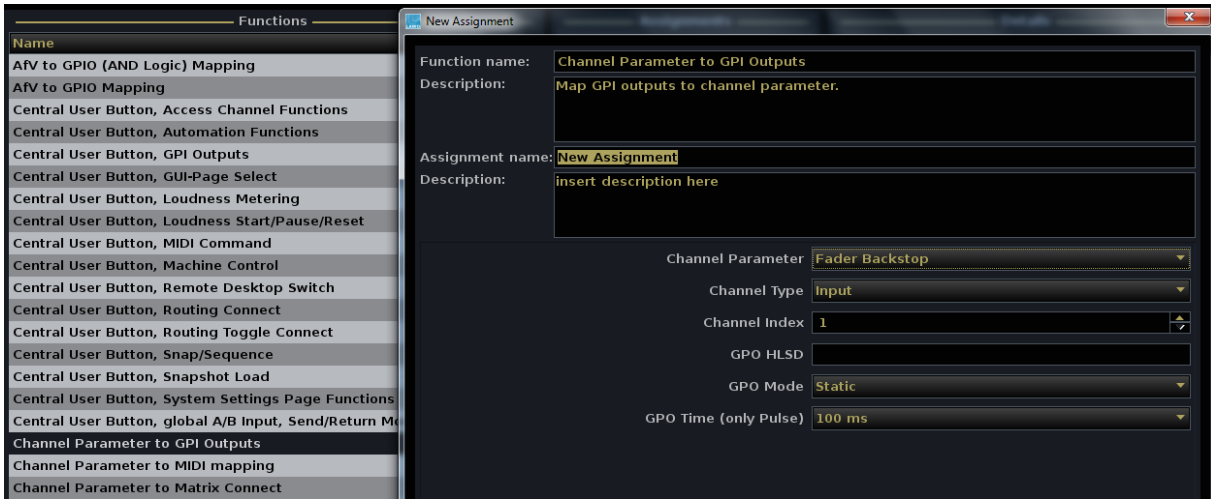
Channel Parameter to GPI Outputs

Maps a channel parameter to a GPI output. Define 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, see Page 683.
- **Fader start** – active whenever the fader is opened.
- **Userbuttons 1 to 4** – active when the channel user buttons are turned on; their numbering is shown opposite.

Note that fader start GPIs may also be programmed using the **Fader Start, Source related** or Fader Start, Channel related functions, see later. These functions allow multiple channels or sources to be assigned to each relay.

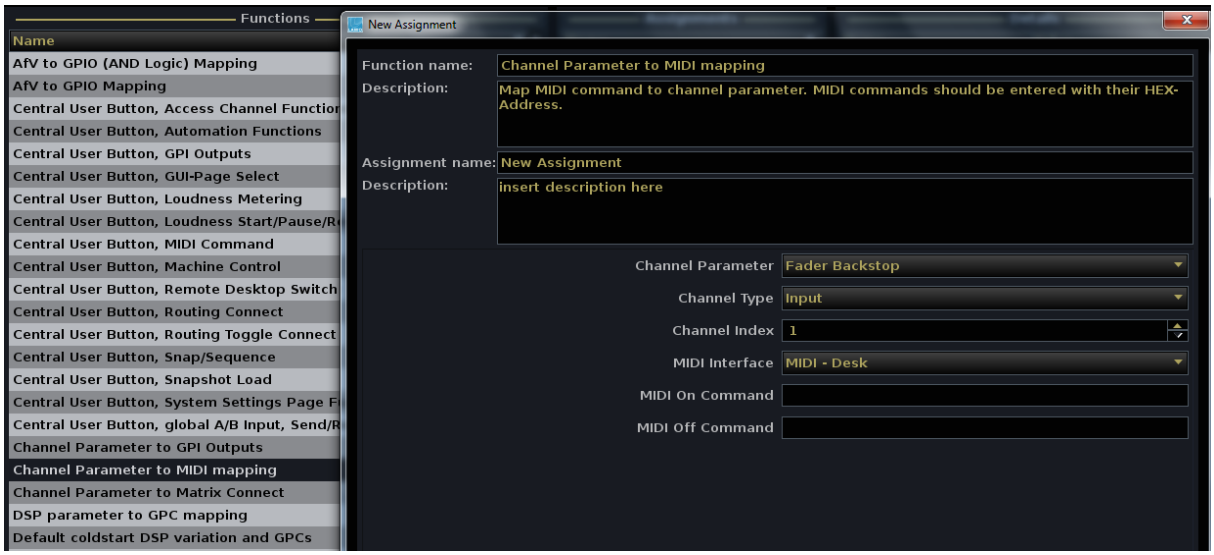


Channel Parameter to MIDI Mapping

Maps a channel parameter to a MIDI Command. The channel parameters are identical to those available for GPI outputs (see previous page).

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.

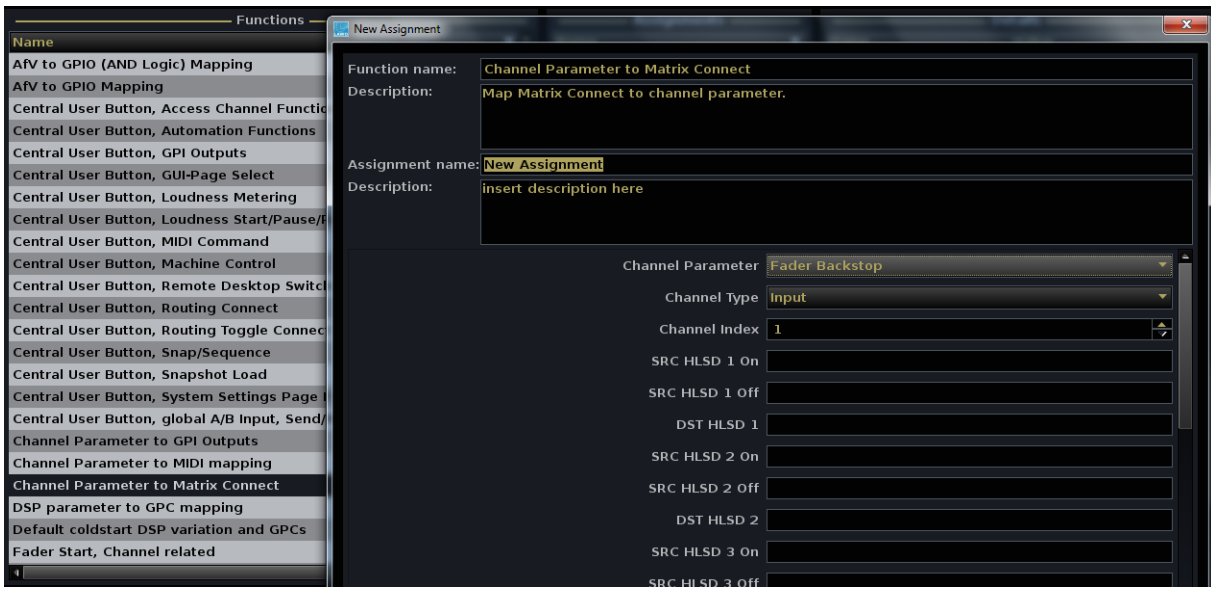


Channel Parameter to Matrix Connect

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.

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, see Page 683.
- **Fader start** – active whenever the fader is opened.
- **Userbuttons 1 to 4** – active when the channel user buttons are turned on; their numbering is shown opposite.
- **Aux 29 to 32 On/Off** – active when the channel Aux on/off button is turned on.




Tip

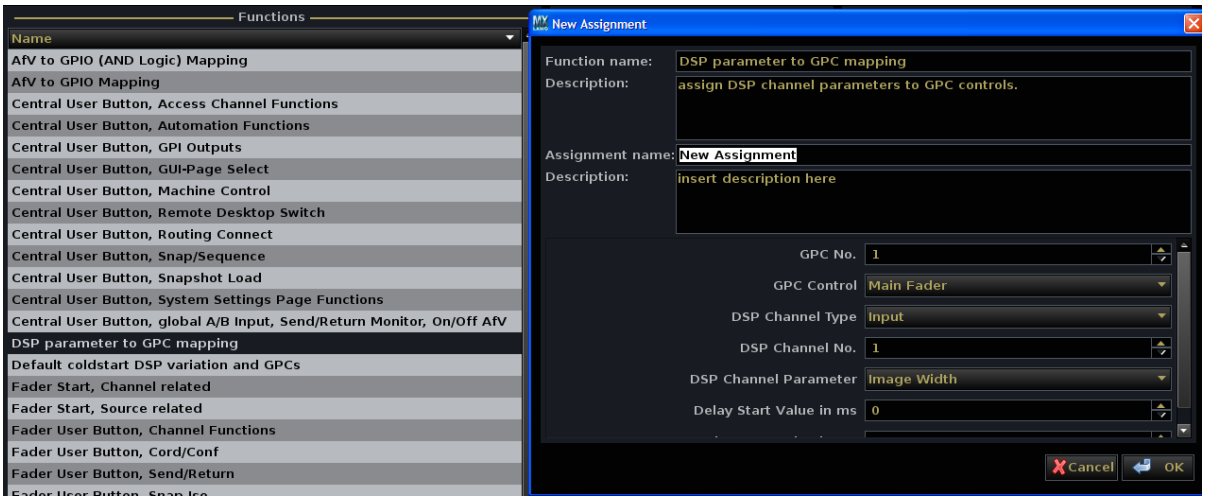
You can copy the source and destination **HLSD** from the **mx Routing** display, see Page 693. Routes may be made to/from any source or destination including DSP channels.

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 several instances of this template.

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 GPC (General Purpose Channel) 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 or Delay.

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.


Tip

By combining this function with the AFV to GPIO template, you can change DSP parameters from an Audio Follow Video event. e.g. To adjust delay for wireless cameras automatically:

1. Create an **AFV to GPIO** Custom Function template where all GPIOs from the wireless cameras OR combine to trigger one AFV event.
2. Then use a **DSP Parameter to GPC Mapping** template 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.

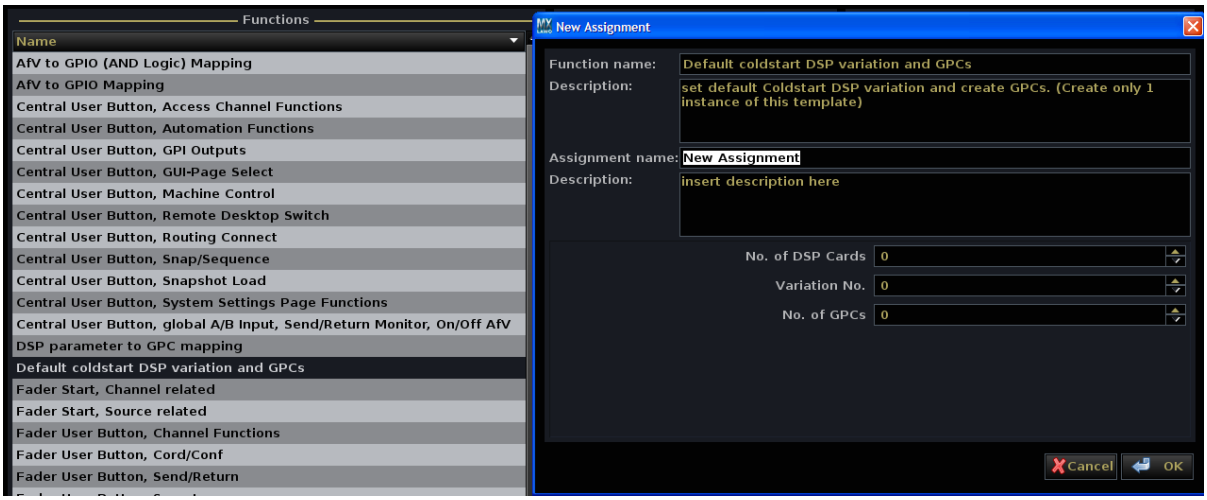

Warning

Warning

Do NOT link GPCs which control the same DSP parameter in a contradictory manner, as the system may react badly.

Default coldstart DSP variation and GPC

This function sets the DSP Configuration (DSP Variation) which will be loaded after a cold start.



Enter the number of DSP cards fitted, and the Variation No. which you wish to load. Although you can create multiple instances of this template, it is not recommended - the last one initialised wins.

Note that the Variation number is NOT the Index number displayed on the **DSP Configuration** display.

Note

To calculate the Variation number, 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.

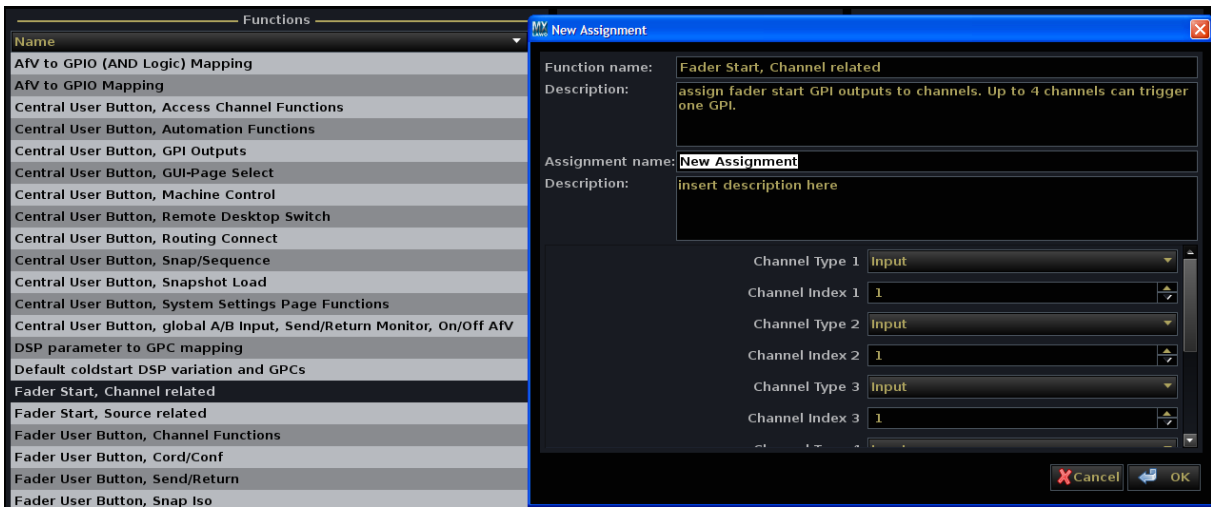
Fader Start, Channel related

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.

In our example, INP 1 will action the fader start:



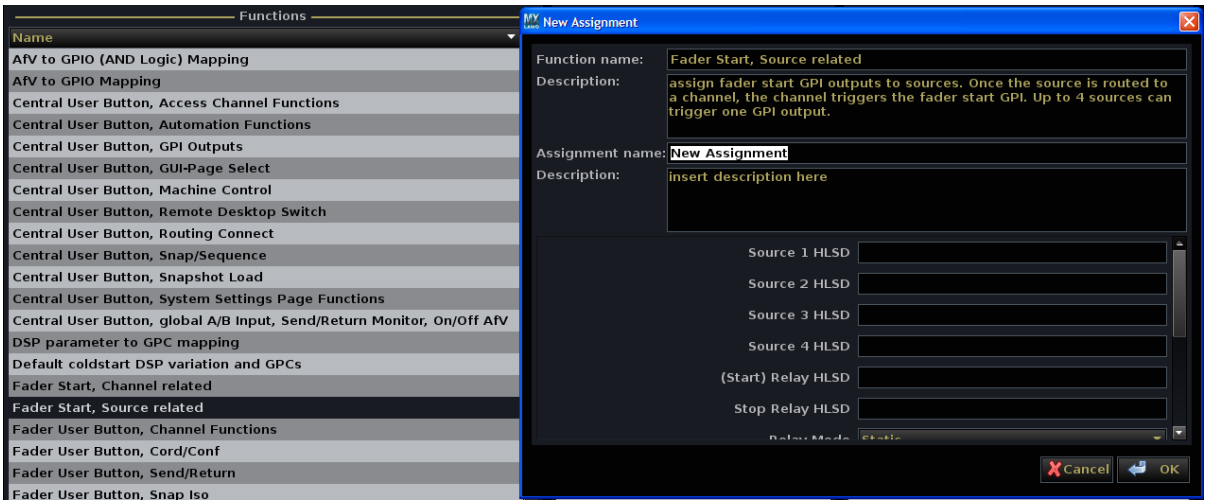
Scroll down the New Assignment window to define options for the relay output:

- **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.

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.

Fader User Button, Aux On/Off, Channel Functions, Cord/Conf, Send/Return, Snap Iso, Talkback

The next six Custom Functions can be used to reprogramme the fader strip user buttons shown opposite.

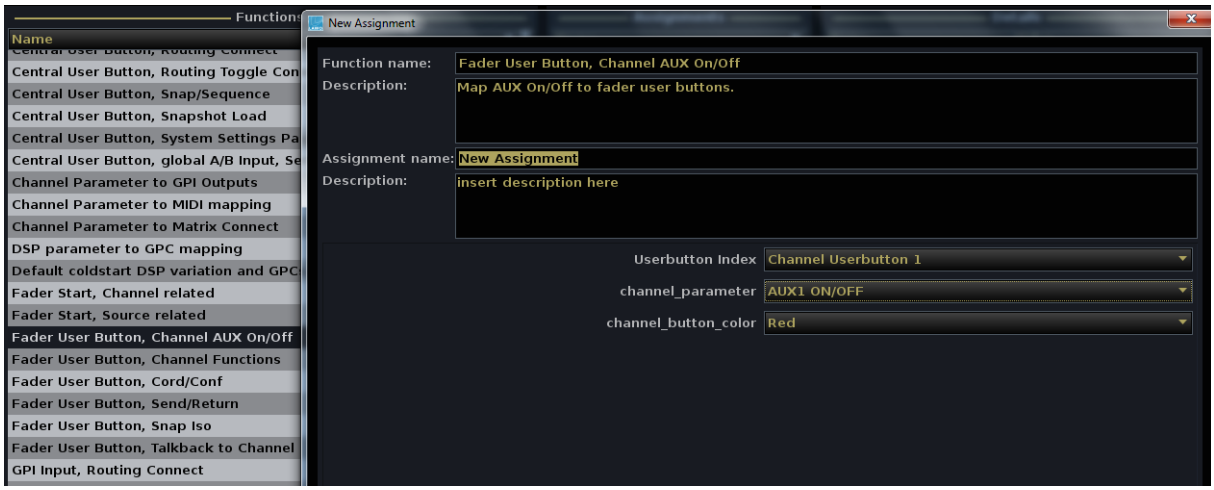
Broadcast consoles normally ship with **CORD**, **CONF** and **SNAP ISO** factory-configured, while recording consoles ship with **SEND**, **RETURN** and **SNAP ISO**. The fourth user button is usually customised. However, any button can perform any of the following functions:

- **Aux on/off**
- **Channel Functions** - such as A/B input control, MS Decode, Delay on/off, EQ on/off, etc.
- **Cord/Conf** – mix minus coordination and conference switching, see Page 243.
- **Send/Return** – multitrack send and return switching for monitor channels, see Page 159.
- **Snap Iso** – snapshot isolate, see Page 258.
- **Talkback to Channel** – see next page.

Be aware that any factory-configured functions do *NOT* appear in the **Custom Functions** display. Therefore, if you wish to reprogramme the fader strip user buttons, you should contact Lawo to remove the factory configuration first. Otherwise, your user button will perform multiple operations!

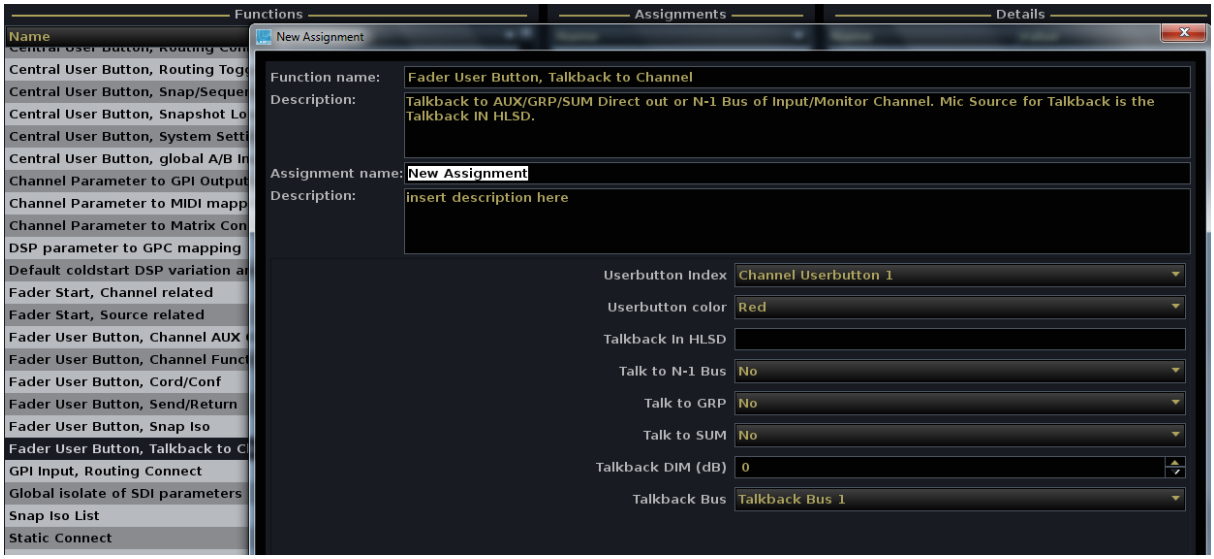
For each function, define the:

- **Userbutton Index** – their numbering is shown above.
- **Channel parameter** – e.g. Aux on/off.
- **Channel Button Color** – select the colour for the user button on state: red, yellow or green.



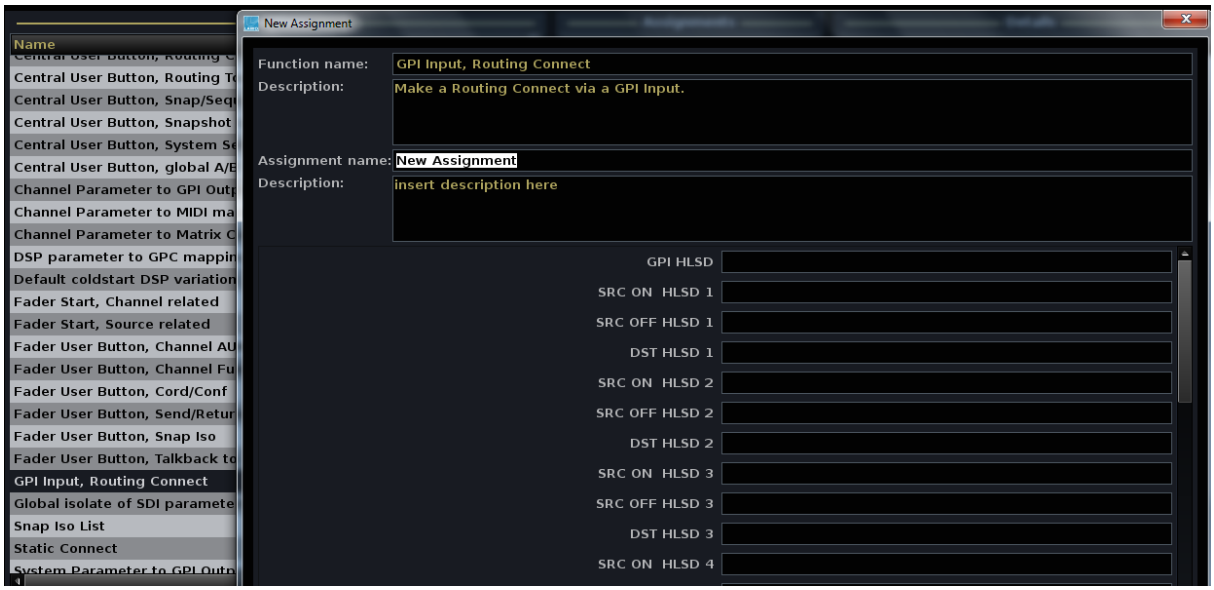
When programming the **Talkback to Channel** custom function, you will need to define:

- **Talkback In HLSD** – enter the **HLSD** (system address) for the talkback source. You can copy the signal HLSD from the **mx Routing** display, see Page 693.
- **Talk to N-1 Bus, GRP, SUM** – these options define where talkback is routed when the user button is active:
    - **Talk to N-1** – applies to input channels; the user button will talk to the mix minus bus assigned to the source.
    - **Talk to GRP** – applies to group channels; the user button will talk to the direct out of the group.
    - **Talk to SUM** – applies to sum channels; the user button will talk to the direct out of the sum.
- **Talkback DIM (dB)** – enter the amount of dim applied to the console's monitoring when the talkback user button is active.
- **Talkback Bus** – select the Talkback Bus used by this custom function. 8 separate Talkback (Command) busses are available.



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 several instances of this template.



Tip

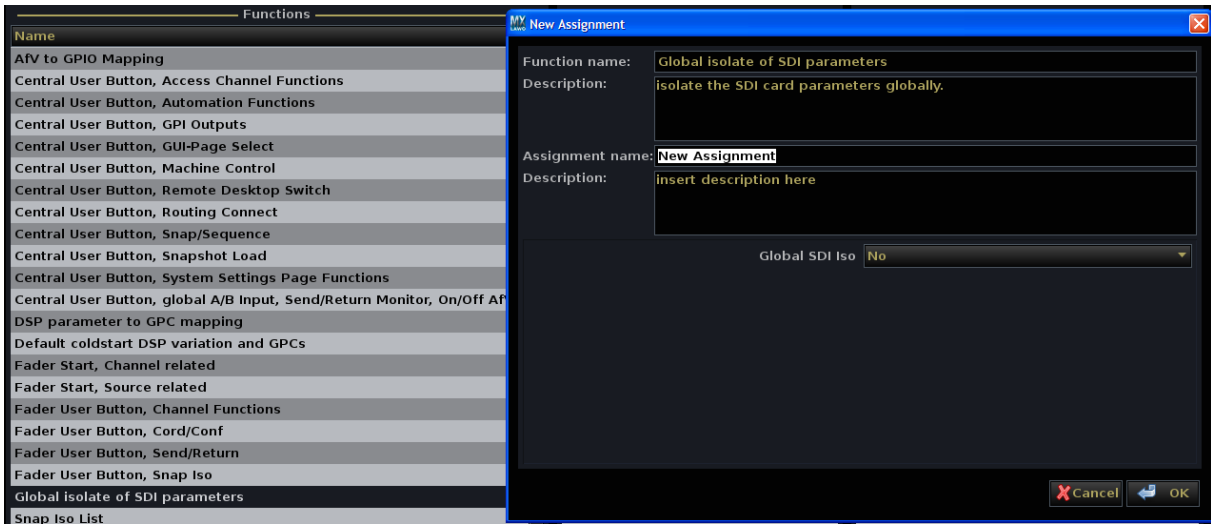
You can copy the source and destination **HLSD** from the **mx Routing** display, see Page 693. Routes may be made to/from any source or destination including DSP channels.

To create a disconnect, type **DISCONNECT** into the field for the Source HLSD.

Global isolate of SDI parameters

SDI parameters are never stored by snapshots. From Version 4.8.0.2 onwards, 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.



Snap Iso List

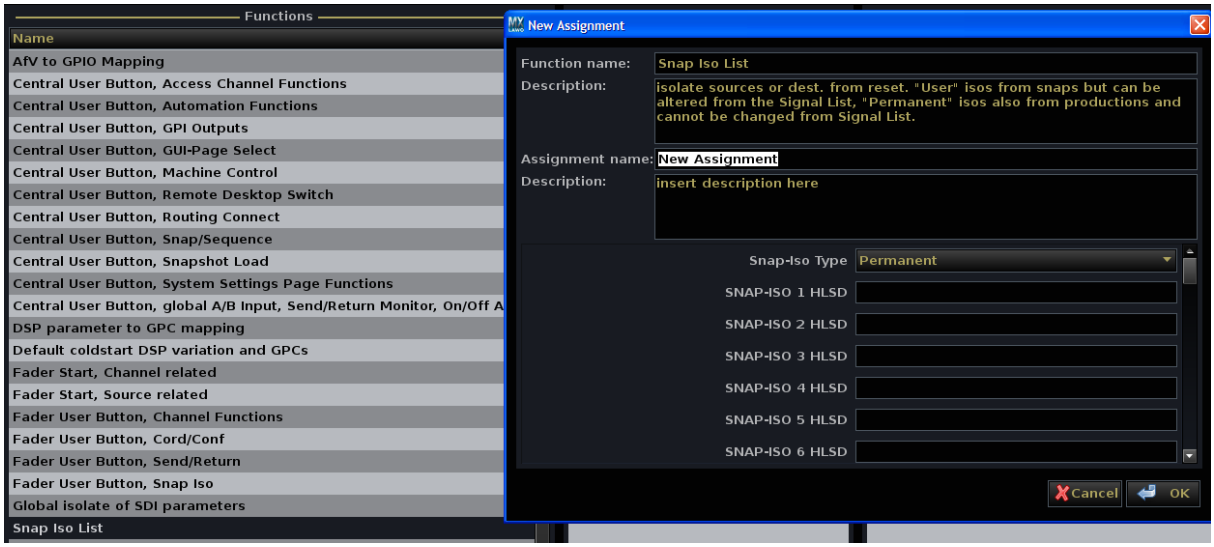
This function allows you to isolate sources or destinations to prevent them being reset by snapshots, and/or from productions or the **Signal List** display.

Up to 48 signals may be defined within each Snap Iso List assignment; you can create multiple assignments to isolate lots of signals.

Within each Snap Iso List 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.

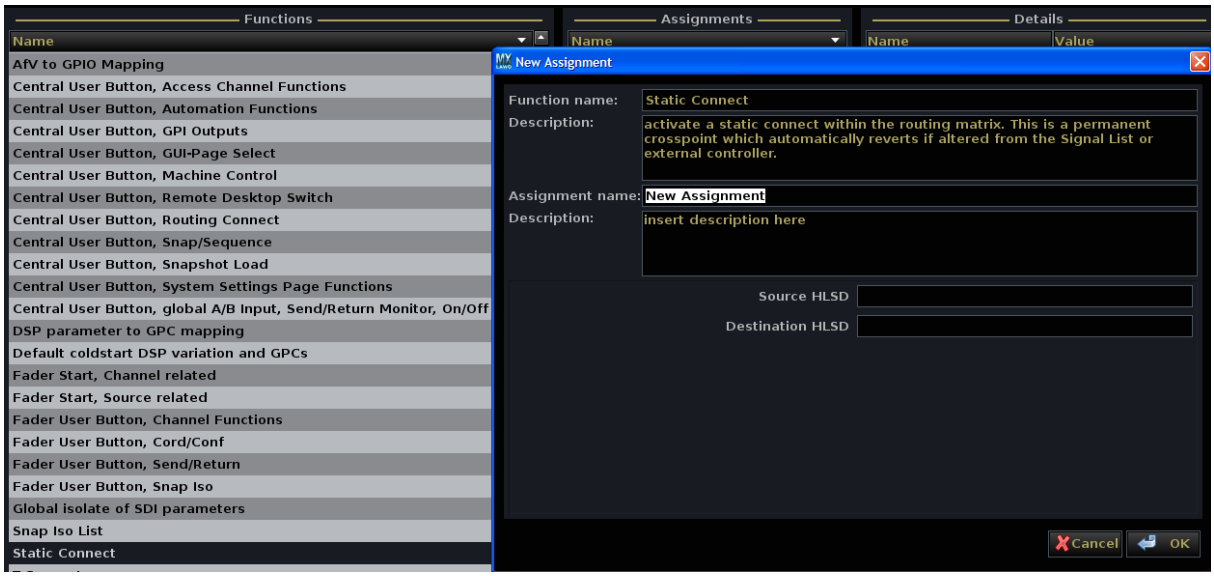


Tip

You can copy the signal HLSD from the **mx Routing** display, see Page 693.

Static Connect

This function allows you to define a Static Connect by entering the **HLSD** (system address) for a Source and a Destination:



Tip

You can copy the signal HLSD from the **mx Routing** display, see Page 693.

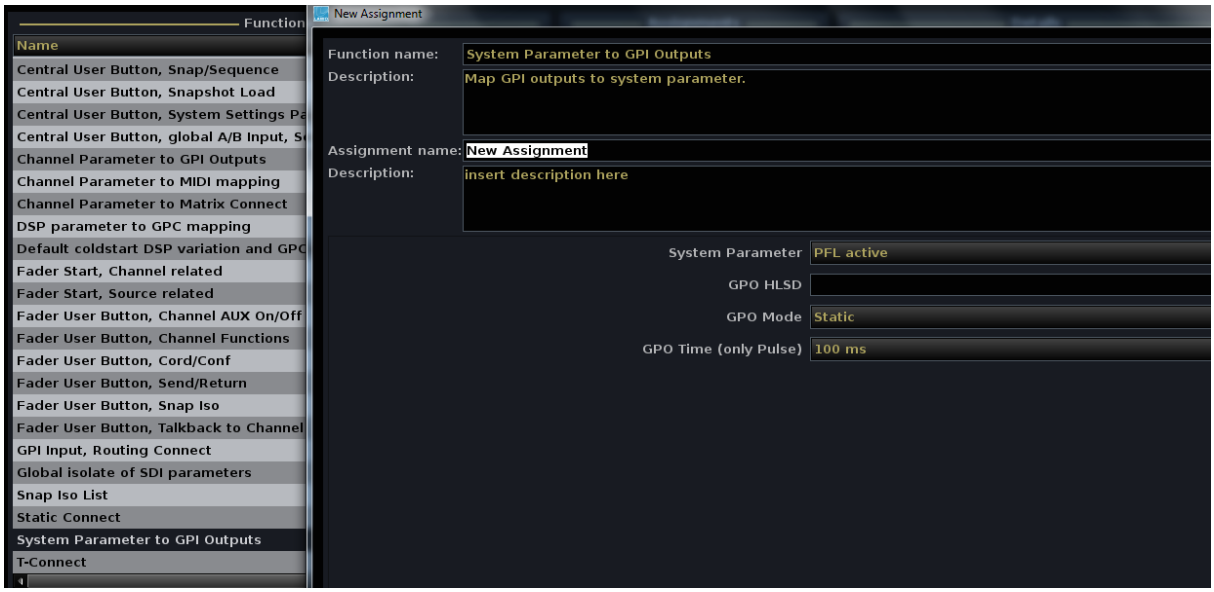
A Static Connect is a routing crosspoint which will always be active. If it is disconnected by any means, for example by the console operator or by an external controller, the crosspoint is automatically remade. You might use this function to prevent vital crosspoints from being accidentally reset.

Note

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.

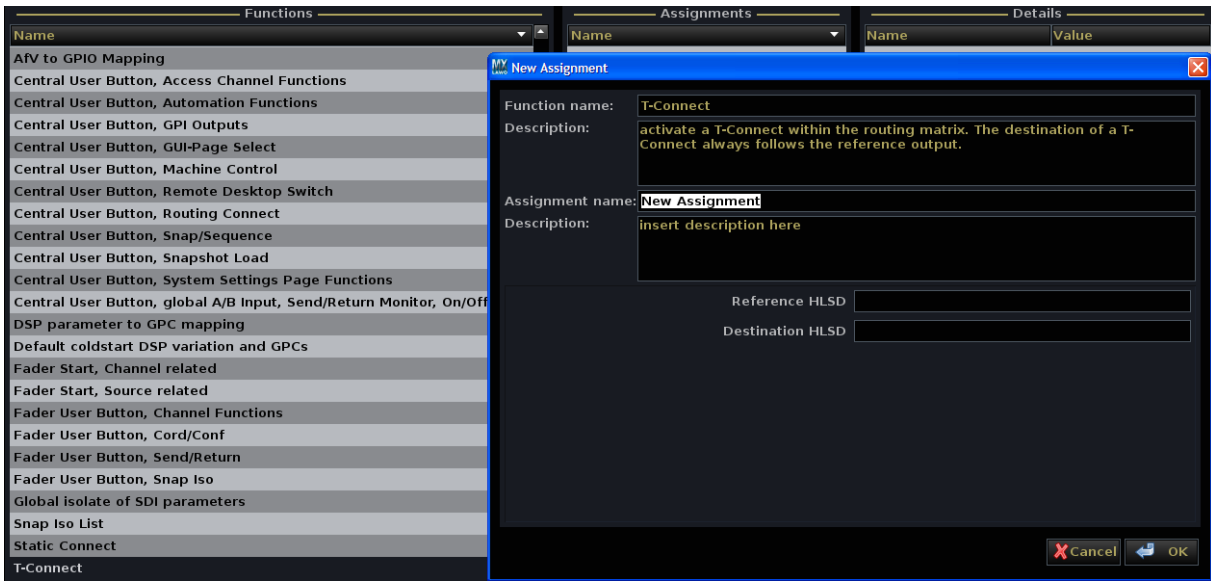
System Parameter to GPI Outputs

Maps system parameters to GPI Outputs. Select the parameter – for example, PFL active – and then enter the **HLSD**, **Mode** and **Time** for the **GPO**:



T-Connect

This function allows you to define a T-Connect by entering the **HLSD** (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.

Chapter 10: mxGUI

Overview

Lawo's **mxGUI** (Matrix GUI) is a software programme which can run the mc^2 graphical user interface on an external computer. The programme may be run with any mc^2 system (**mc^{2}56**, **mc^{2}66**, **mc^{2}90**) or **Nova73** to provide:

- **Offline Setup** - mxGUI allows you to prepare mc^2 settings ahead of an event. Productions, Presets and even Custom Function assignments can be stored on your mxGUI computer and then transferred to the console at a later date; thus saving valuable setup time before a show.
- **Remote Operation** - mxGUI can run online by connecting to the mc^2 Control System via its control network (Ethernet). This may be used to provide additional screen displays, or remote operation for a second engineer.

The mxGUI programme runs identical Screen Control displays to those on your mc^2 console: **Signal List**, **Main** display, **Snapshots**, **Productions**, etc. In addition, two new displays, only available on mxGUI, have been added:

- **Strip Assign** – provides an overview of channel and main fader strip assignments. It may be used with the new **Access/Assign** pop-up window to change fader strip assignments, change bus routing, copy audio parameters, etc. In addition, you can control fader levels and enter user labels from this display.
- **File Transfer** – replaces the console's **File** display, and allows you to transfer Productions, Presets and/or Configuration files between your computer and any mc^2 system.

When you start the mxGUI programme, you are asked to choose which system you wish to emulate – mc^{2}56, mc^{2}66, mc^{2}90 or Nova73. This ensures that only the features relevant to your product are available from the mxGUI displays.

Installation

mxGUI Compatibility

mxGUI may connect to any mc^2 system or **Nova73** running Version 4.6 software or later according to the following table. Note that all systems are supported except a stand alone **Nova73**:

System	Router Version	Control System	Control System Location	mxGUI with RIs ≥ 4.6	mxGUI with RIs < 4.6
Nova73 Standalone	980/31 or 980/32	Motorola	HD Core Board	no	no
Nova 73 Ripper	980/31 or 980/32	Intel	1HE Ripper	yes	no
Nova73 DSHS	980/32	Intel	1HE Ripper	yes	no
Nova73 MKII	980/33	Intel	HD Core Board	yes	no
mc² 56	980/33	Intel	HD Core Board	yes	no
mc² 66 classic	980/31 or 980/32	Intel	inside console	yes	no
mc² 66 top1	980/31 or 980/32	Intel	inside console	yes	no
mc² 66 MKII	980/33	Intel	HD Core Board	yes	no
mc² 90	980/31 or 980/32	Intel	inside console	yes	no
mc² 90	980/33	Intel	HD Core Board	yes	no
mc² 90 star²	980/33	Intel	HD Core Board	yes	no

System Requirements

Warning

Please observe the following system requirements:

To install and run the software, your computer must meet or exceed the following requirements:

- Hardware: 1.5 GHz (required for VirtualBox)
- Operating System: Windows XP/Vista/Windows7 or MAC OS X Snow Leopard
- RAM: for XP, 1.5GB RAM
  for Vista/Windows 7, 2GB RAM
  for OS X, 2GB RAM
  (512 MB for mxGUI; rest for OS)
- Hard Disc: minimum 200 MB free space
- Operation: Keyboard and mouse
- Interface: Ethernet 10/100Mbit

Software

Lawo's mxGUI software runs on a "virtual Linux machine" inside your computer. This provides the same operating platform as on a mc^2 console, and allows mxGUI to operate like a real console. To achieve this, three separate programmes are installed by the mxGUI installer:

- **mxGUI** – Lawo's application software.
- **Oracle VM VirtualBox** – this programme creates the "virtual machine" which runs the Linux operating system.
- **Xming X Server** – this programme deals with the management of TCP/IP ports within the mxGUI computer.

Warning

Having completed the installation process you should not need to open or modify the Oracle VirtualBox or Xming programmes, as all settings are automatically dealt with by the mxGUI installer.

Software Licence

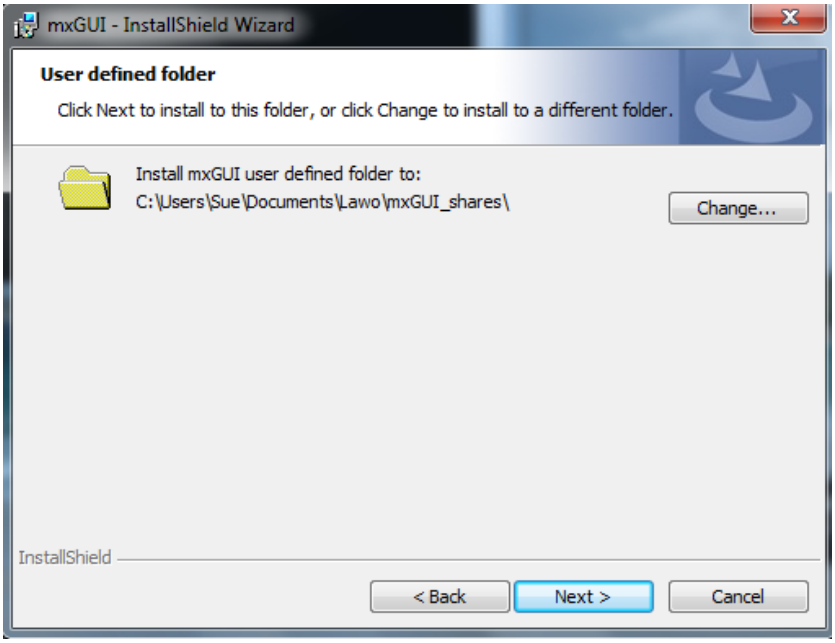
From Version 4.14 onwards, Lawo's mxGUI application is free of charge and does not require a software licence.

Installation

Please refer to the “mxGUI Installation Manual” for details on how to install the software. When installing the mxGUI software, please note:

User defined Folder

The location of the user defined folder is where the **config** and **shared_folder** will be stored. You will need to access these folders if you wish to copy files via your host operating system (e.g. to USB, email, etc.). The default location is shown below:



Depending on your computer’s configuration, this location may be hidden to normal users. Therefore, you may wish to change the folder location so that it can be easily accessed.

Uninstalling the Software

To uninstall mxGUI, use the “Add or Remove Programs” option within the Control Panel of your operating system. Remember to remove all three programmes for a complete uninstall:

- mxGUI
- Oracle VM VirtualBox
- Xming X Server

Updating mxGUI

If you wish to install a new release of mxGUI software, then proceed as follows.

1. Use the “Add or Remove Programs” option within the Control Panel of your operating system to remove mxGUI.

Note that it is not necessary to remove the Oracle VirtualBox or Xming X Server programmes.

2. Run the new mxGUI installer to re-install mxGUI.

At the end of the install, the Oracle VirtualBox installer automatically opens - cancel the VirtualBox installer as it is not necessary to re-install this programme.

3. Following the installation or re-installation of mxGUI, a restart of the computer is advised.

Starting mxGUI

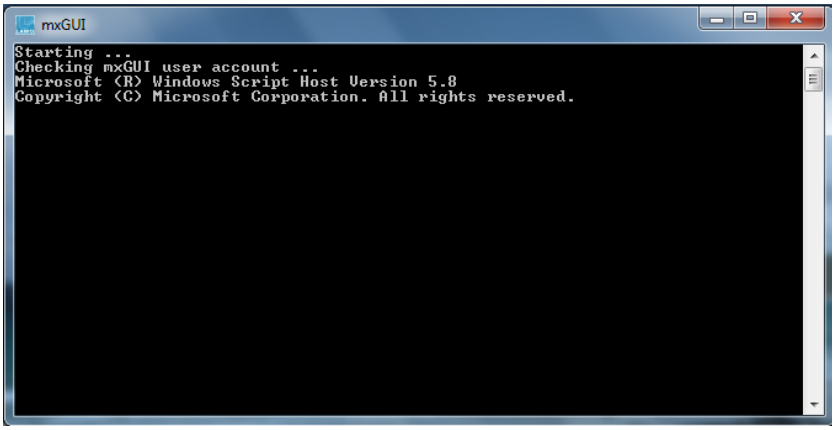
1. Start the programme, by selecting **mxGUI** from the START menu or clicking on the shortcut icon.

Note

Note that this is the default file path created during a standard install. If you chose a different file path, then proceed accordingly.

The programme automatically launches the Xming X server and the Oracle VirtualBox to provide the “virtual Linux machine” which will be the platform for the mxGUI application.

The following window appears while these programmes start up; this may take a few seconds:



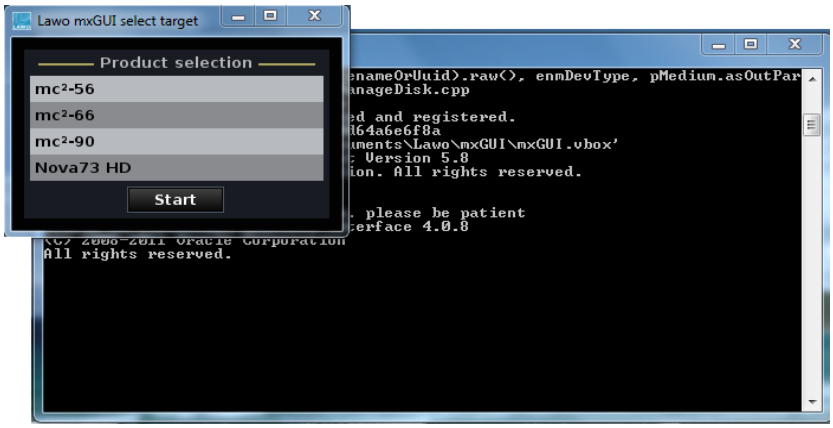
Note

Note that if you have a firewall installed on your computer, you will need to unblock the firewall access for the Xming X Server programme. Once you have authorised the firewall access, you shouldn’t need to deal with this security alert again.

If you running Windows 7, then you may also be prompted to allow changes to your User Account.

2. Select **Yes** on any pop-up windows to authorise these changes and continue.

Once the VirtualBox and Xming have booted, you will see the mxGUI launch window, a small window offering system options:



From here you can choose which system you wish to emulate – mc²56, mc²66, mc²90 or Nova73. This ensures that only the features relevant to your product are available from the mxGUI displays. You will only see the options selected during the installation process. In our example, all four mc² systems are available.

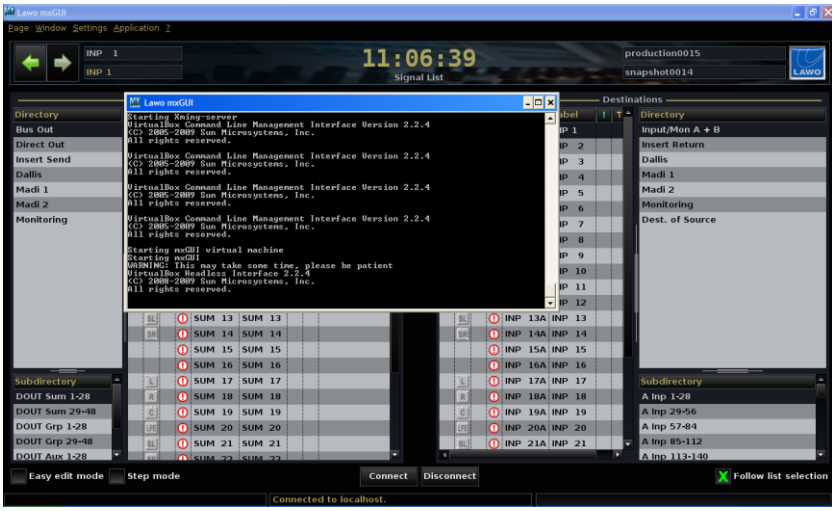
3. Select an option and click **Start** to launch mxGUI.

mxGUI boots up and, unless you prepared a cold start (see Page 767), will load its warm start data. This returns the system to the settings saved when mxGUI was last shutdown.

The programme is ready to use once you see the **Lawo mxGUI** operating window:

Closing mxGUI

Remember that mxGUI runs on a virtual Linux machine inside your computer. Therefore, when running the software, you will notice that two windows are open: the mxGUI operating window and the virtual machine:

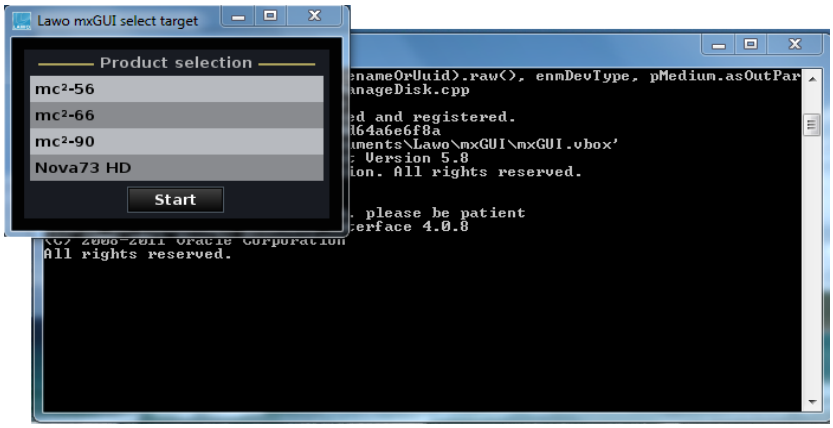


You can maximise or minimise these windows in the usual manner. So, for normal operation, maximise the mxGUI operating window to hide the virtual machine.

To close the mxGUI programme so that the current settings are stored as warm start data:

1. Select **Application** -> **Quit** from the main menu bar, or click on the close icon at the top right of the display:

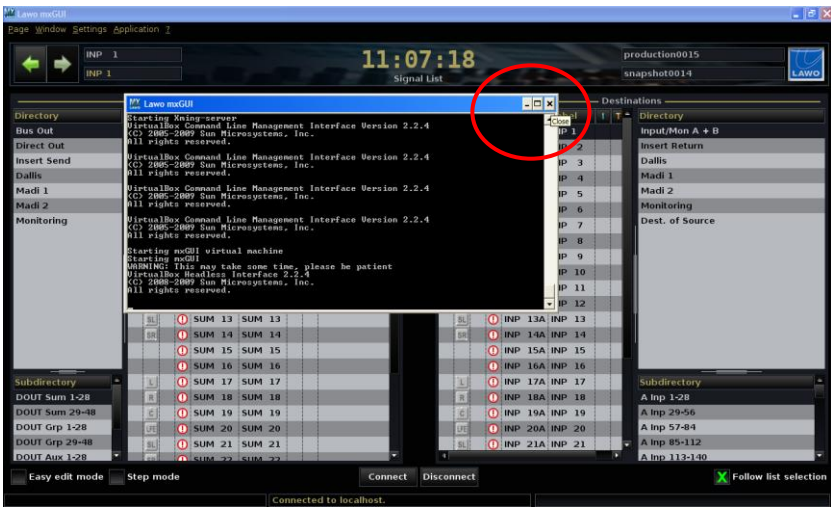
Either operation quits the mxGUI operating window, and exits back to the launch options:



If you wish you can now restart mxGUI for a different mc^2 system.

2. Or, click on the VirtualBox close icon to quit the virtual machine.

Note that if you close the Virtual Box window *BEFORE* closing mxGUI, then the system shuts down without storing any warm start data:



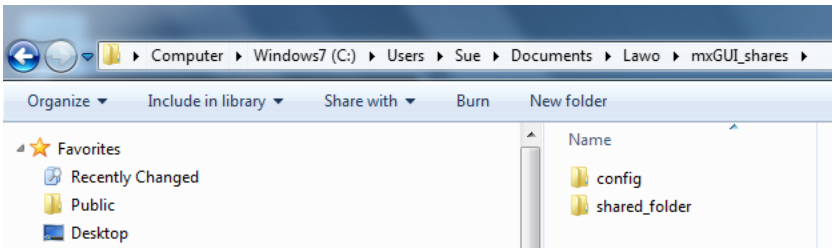
Warm Start and Cold Start Data

Note

Provided you close mxGUI from the main programme window, your latest settings are saved into the warm start data. This means that when you restart mxGUI you will get back to exactly where you were when you last closed the application (just like on a real mc^2 or Nova73 system).

If you wish to cold start mxGUI (to clear out any warm start changes) then follow the procedure described on Page 767, or close the Virtual Box window as shown above.

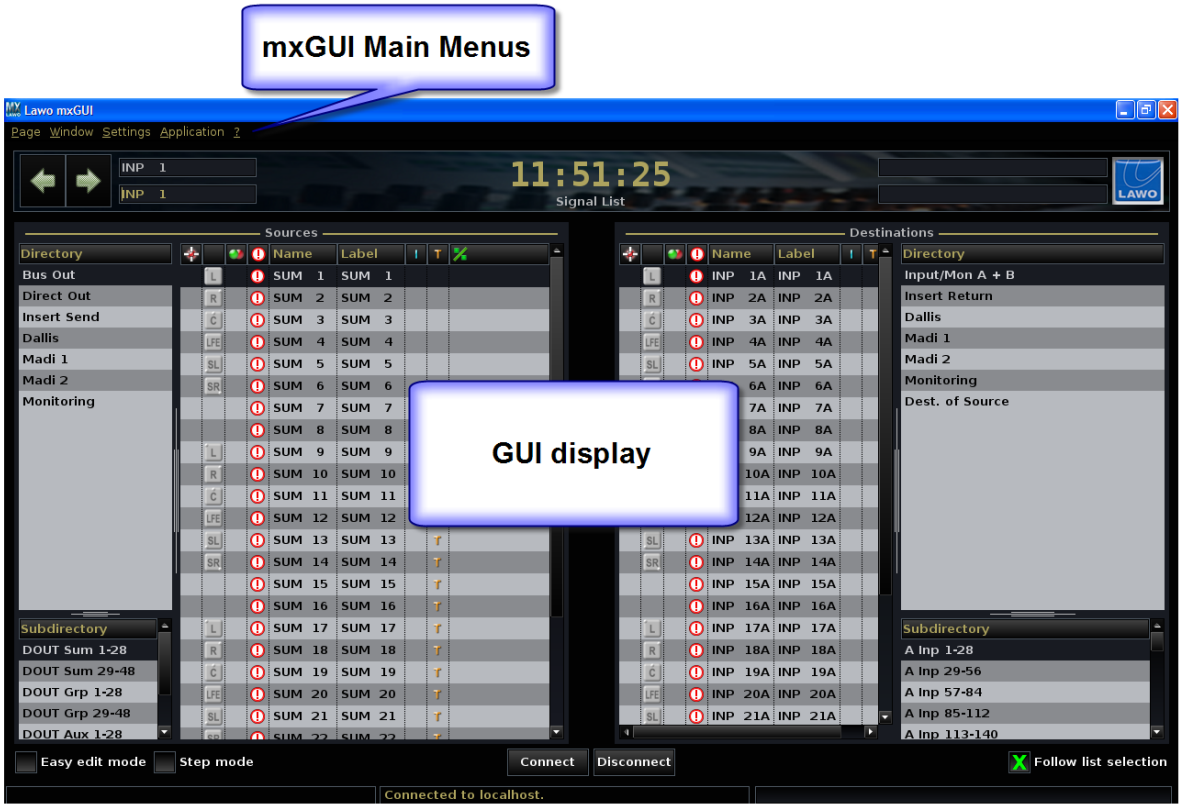
Note also that the complete “Local Control System”, including productions, warm start data, cold start data and so on, is stored within the **config** folder on the mxGUI computer:



You should not need to access this folder, as all files can be transferred using the **File Transfer** display. However, make sure you don’t edit or delete the **config** folder contents, otherwise you may edit or delete the mxGUI control system!

The mxGUI Operating Window

The mxGUI operating window looks identical to the console GUI on mc^2 consoles.



Main Menus

- **Page** – access to the mxGUI displays.
- **Window** -> **Access/Assign** - opens the **Access/Assign** pop-up window which mimics the console's ACCESS/ASSIGN front panel. See Page 750.
- **Settings** -> **Connection** - opens the **Connection** pop-up window which is used to connect to a real mc^2 system in order to work online. See Page 759.
- **Application** -> **Quit** – quits the mxGUI application.
- **?** -> **Info** – opens the info pop-up window opposite and shows the release version of the mxGUI software and Lawo service contact details.

Online/Offline Status

Notice that mxGUI always opens in offline mode. You can see this by looking at the status bar at the bottom of the display:

When offline, mxGUI is connected to the “local host”. This means that data is being stored within the “Local Control System”, i.e. on your computer.

When mxGUI operates online, the status bar shows the IP address of the connected host:

Getting Started

If this is the first time you have started the mxGUI programme, then your **Signal List**, **Main** display, **Productions** list, **Snapshots** list, etc. will all be empty. This is because your "Local Control System" has no data – no productions, etc.

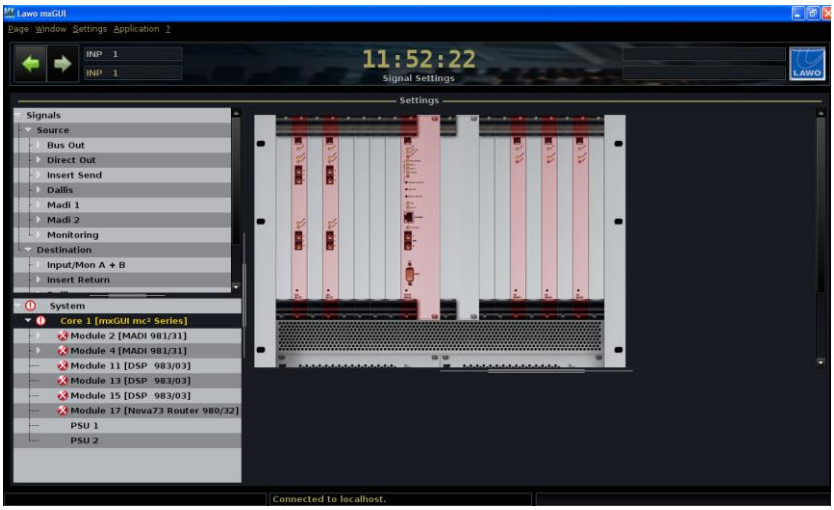
The best method to load something onto your "Local Control System" is to transfer a real configuration and a production from an existing console. See Page 764.

However, if you don't have access to any real configuration data and want to play around with the mxGUI interface, you can build a simple production using the default configuration installed by the mxGUI installer.

Note that the default configuration is very basic.

Note

You can view this HD Core configuration by selecting the **Signal Settings** display from the **Page** menu:



The System and its sub components are marked with red attention flags because we are running mxGUI offline.

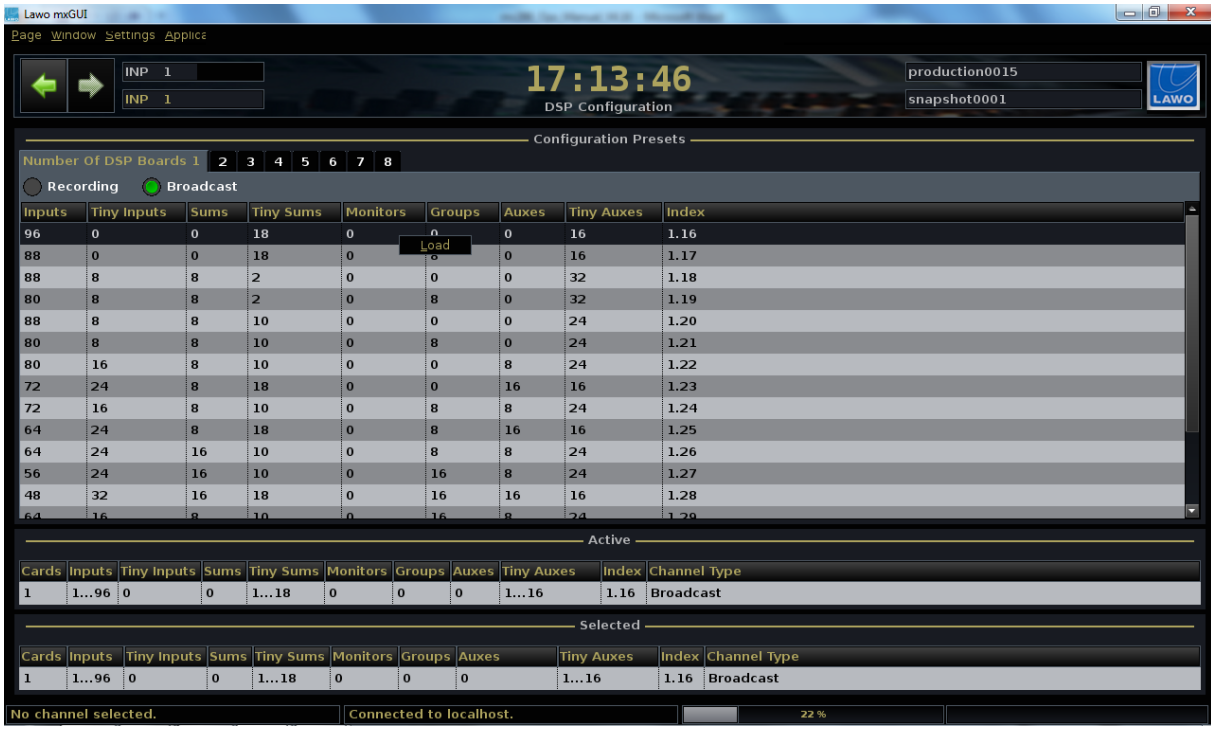
To create a basic setup from this configuration you should use exactly the same approach as when configuring a mc^2 console:

- Select a DSP configuration
- Set up Signal User Labels and Routing
- Assign Channels to Fader Strips
- Save Settings in a Production

So that you have something to work with, let's run through these tasks now.

Select a DSP configuration

1. From the main menus select **Page** -> **System** -> **DSP Configuration**.
2. Click on the Configuration Preset you wish to load.
3. Right-click and select **Load**:



4. Confirm by clicking **Yes** in the confirmation dialog.

*When the configuration preset has loaded you will see the **Active** area update.*

Set up Signal User Labels and Routing

If you now go to the **Signal List** display, you will see that you have DSP channels: Sums, Inputs, etc.

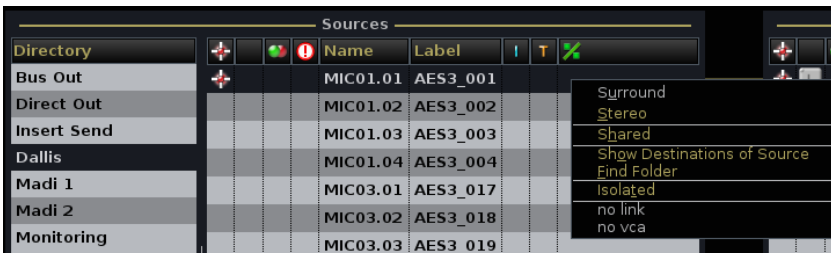
1. Select **Page** -> **Signals** -> **Lists**:

Note that all the signals in this display are marked with a red attention flag because mxGUI is running offline.

Note

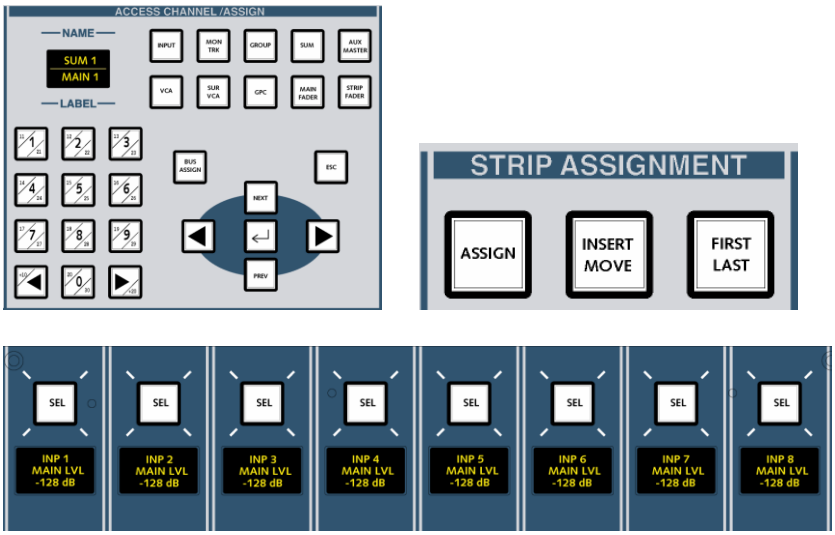
Be careful not to spend too much time on this display – these signals are unlikely to match the exact I/O configuration of a real HD Core, and therefore any naming or routing you make won't be particularly useful on a real system. However, the principles of operation are:

2. Select a source and a destination and click on **Connect** to make a route.
3. Select a destination and click **Disconnect** to unmake a route.
4. Click on a Label to enter a new name.
5. Right-click on a source, or destination, to access options such as **Surround**, **Stereo**, etc:



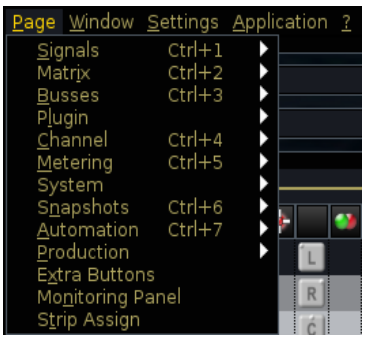
Assign Channels to Fader Strips

On a console this task is performed by using the ACCESS/ASSIGN panel, STRIP ASSIGN buttons and fader strip **SEL**s, as shown on this mc²56:



To make this task possible from mxGUI, two new displays are included: the **Strip Assign** display and the **Access/Assign** pop-up window:

1. Select **Page** -> **Strip Assign** to open the main **Strip Assign** display.



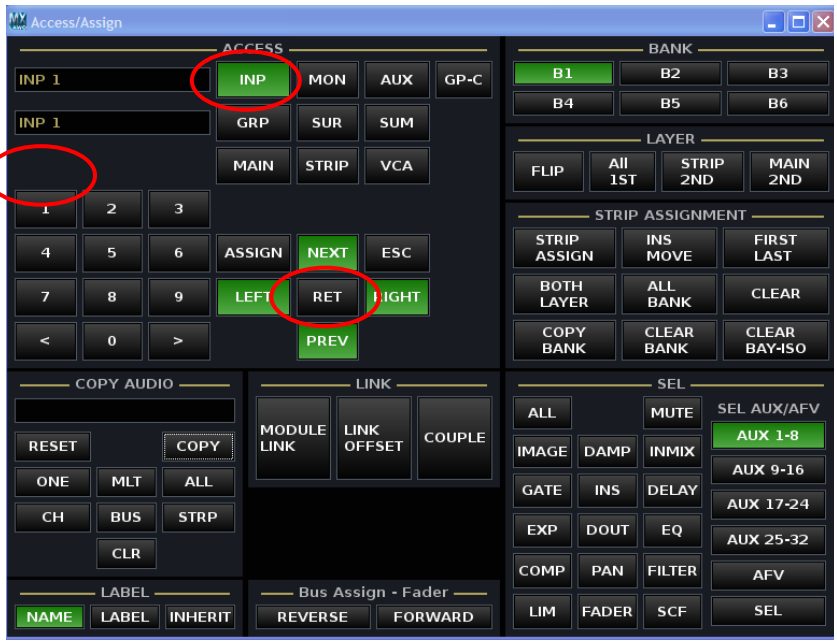
This display represents the physical fader strips on the surface of the console – think of them as virtual fader strips.

2. Select **Window** -> **Access/Assign** to open the **Access Assign** window:

The **Access Assign** window can be moved anywhere and minimised when it's not needed. Move it so that you can view the layer 1 fader strips on the **Strip Assign** display.

To make a fader strip assignment, follow the same operations as you would on a console:

3. Using the **Access/Assign** pop-up window select the DSP channel you wish to assign. For example, click on **INP**, then the number **1** and then the Enter button (**RET**):



Notice how the on-screen **INP** button and source label flash while you are making your selection mimicking the console operation.

The selected DSP channel (INP 1) is now in access.

4. Now click on the **STRIP ASSIGN** button.

*The **STRIP ASSIGN** button flashes as do all the **SEL** buttons on the main **Strip Assign** display:*

5. Click on a **SEL** button to assign the source in access – INP 1 – to the virtual fader strip.

*The **SEL** button stops flashing and changes colour, from green to red, to indicate the assignment:*

6. Deselect the **STRIP ASSIGN** button and minimise the **Access/Assign** window.

*The **Strip Assign** display now shows the layout of your virtual fader strips – in our example, we have INP 1 assigned to the first fader (Layer 1):*

Save Settings in a Production

Just as on the console, settings are saved in mxGUI by saving a production:

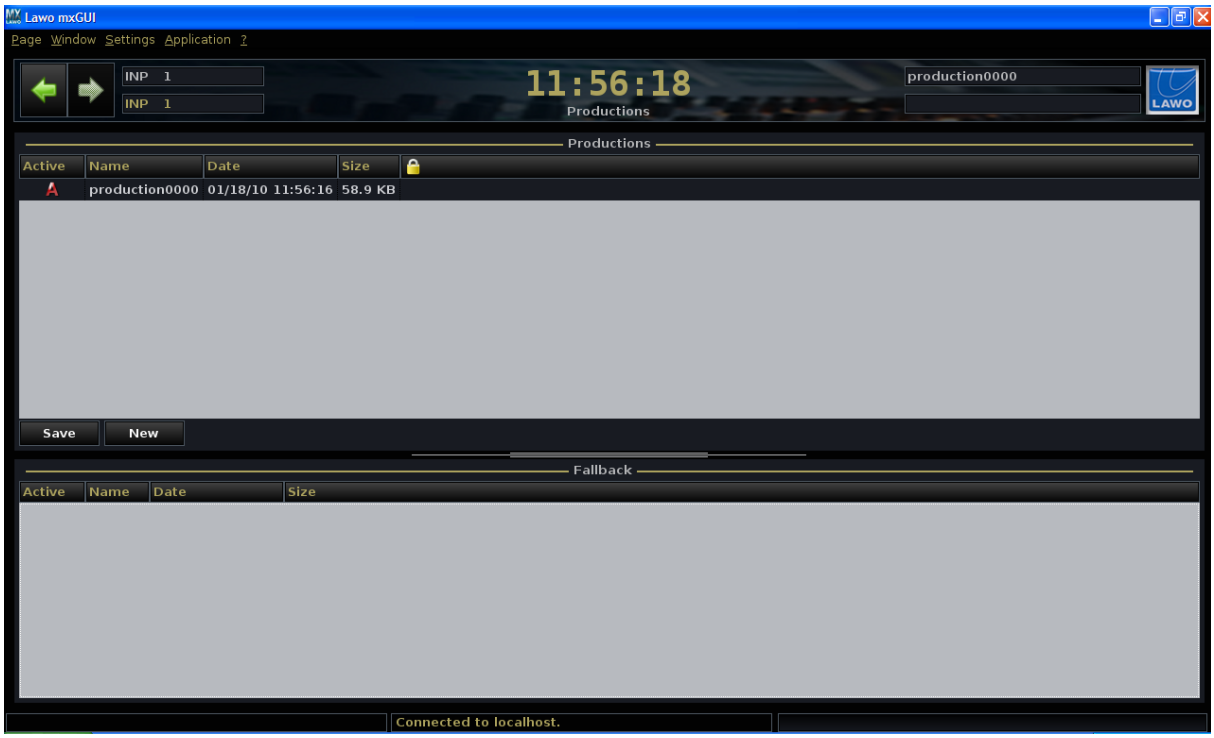
1. Select Page -> Production -> Production List to open the Productions display.

If this is the first time you have used mxGUI after installing the programme, then the list will be empty.

2. Click on **Save** to save all the settings so far into a new production.

As part of the save, the system automatically creates a backup production (in the lower half of the display) so this operation make take a few seconds.

Once the save is complete, you will see the new production appear in the **Productions** list:

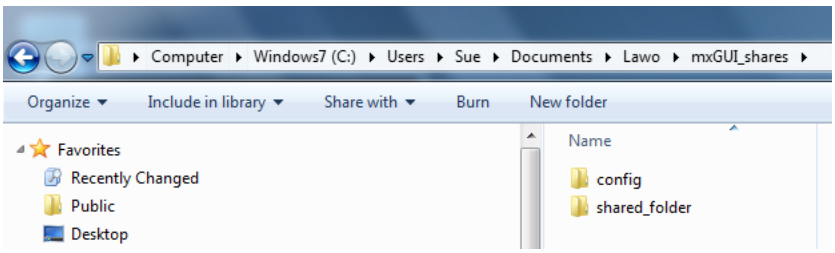


This is the active production, and its name appears in the title bar of all displays just as it would on the console GUI.

Now you have saved your settings into a production, you can close mxGUI and at a later date recall the production to continue working.

Note

Note that the complete “Local Control System” is stored within the **config** folder on the mxGUI computer:



You should not need to access this folder, as all files can be transferred using the **File Transfer** display. However, make sure you don’t edit or delete the **config** folder contents, otherwise you may edit or delete the mxGUI control system!

Depending on your computer’s configuration, this location may be hidden to normal users. For assistance, please contact your system administrator.

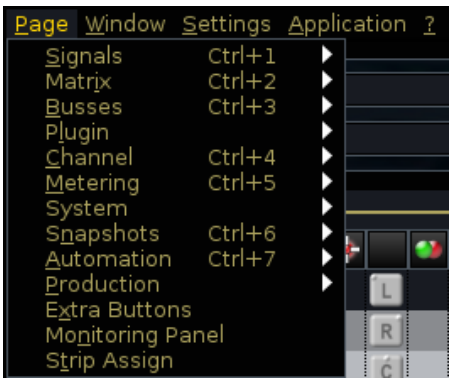
Operating Principles

Whether you are using mxGUI to prepare an offline setup or control mc^2 functions online, you need to know how to control settings using the mouse and keyboard on your computer.

Note that all these operations are available on your mc^2 console via the trackball and keyboard. However, if you've never worked in this way, here is a summary:

Changing Display

1. Select the **Page** main menu to access all of the available mxGUI displays:



2. You can click on the next and previous Page buttons to quickly step through the last few pages viewed (up to 16):

As an alternative to mouse operation, you can use your keyboard to open a particular display or menu:

1. Press **ALT** + **P** to open the **Page** menu.
2. Then press an underlined letter to select a display – for example, **S** to open **Signals**, **M** to open **Matrix**, etc.

Or use any of the available "Hot Key" commands shown within the main menus. For example:

3. Press [**CTRL**] + [**1**] to cycle through the available Signals displays: **Signal List** and **Signal Settings**.

Other "Hot Key" commands, not displayed, are:

4. Press [**ALT**] + [**Cursor Left**]/ [**Cursor Right**] to operate the next or previous Page buttons.

Dedicated Screen Buttons

For many functions, you will find dedicated screen buttons:

1. Screen buttons are always beveled with white text – for example, **Save**, **Save Partial**, **Load**, etc. within the **Snapshots List** display:

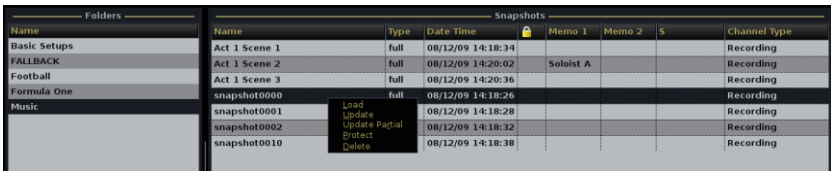
2. Or, the many dedicated buttons within the **Main** display:

Right-click Operations

Other operations may be 'hidden' and become available once you right-click on a selection:

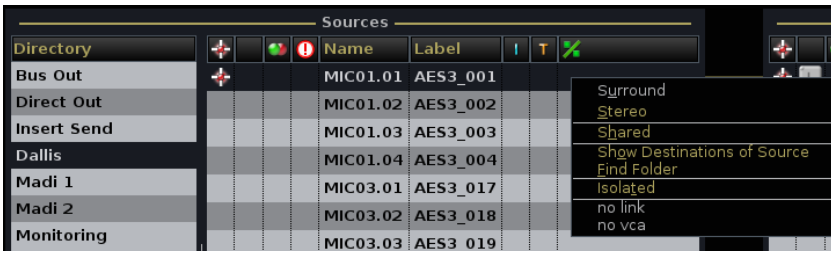
1. For example, right-click on a snapshot in the **Snapshots List** display:

You can now **Load**, **Update**, **Protect** or **Delete** the snapshot:



2. Right-click on a source in the **Signal List**:

You now have access to a variety of source options:

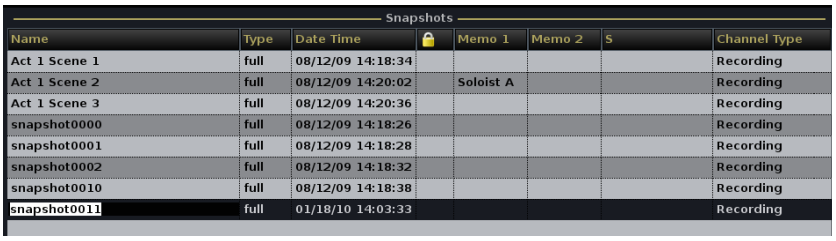


Naming Operations

Use your keyboard to name display entries, such as a snapshot, production or signal label, as you would on the console:

1. Make your selection – e.g. select a snapshot.
2. And do one of the following:

- Click once on the snapshot name – *all* the existing text is selected (white) so that when you type you will automatically overwrite the existing name:

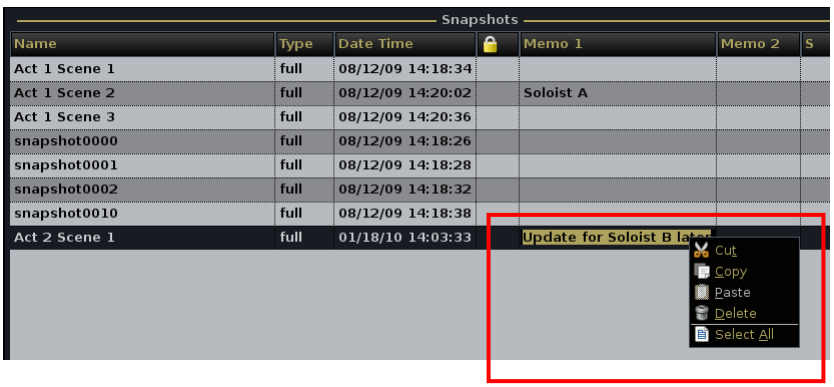


- Or, click twice to edit the existing name – a cursor appears at the end of the text (black) allowing you to easily append or modify the old name.

3. When you have finished, press Enter to confirm the new name.
4. Or, if you make a mistake and want to exit without making any changes, press **Esc**.

Note

Note that if you right-select a text field, you will access **Cut**, **Copy**, **Paste**, **Delete** and **Select All**:



Use these options to copy and paste text from one field to another – for example, to copy and paste snapshot memo text.

You can also use **CTRL+C** or **CTRL+V** on the keyboard to copy and paste selections.

Changing Focus

If you like working with keyboard shortcuts, then you can also use the keyboard to change the focus of the display:

1. Press **TAB** or **Shift**+**TAB** to change the focus area – for example, to move from the list of **Snapshots** to **Folders** on the **Snapshots List** display:

Note that **TAB** cycles around the display in a clockwise manner, and **Shift**+**TAB** in an anti-clockwise manner.

2. Then use the Up and Down keyboard buttons to step through the entries in the list.

Adjusting Parameter Values

In displays such as the **Main** display, you can adjust parameter values as follows. For example, to adjust EQ Gain:

1. Click on the arrows beside the value:

2. Or, focus on a value – either click on it, or press **TAB** or **Shift**+**TAB** on the keyboard – and:

- Press the Up and Down keyboard arrow buttons.
- Type in a new value.
- Use the mouse wheel to increment or decrement the value.

Resizing, Reordering, etc.

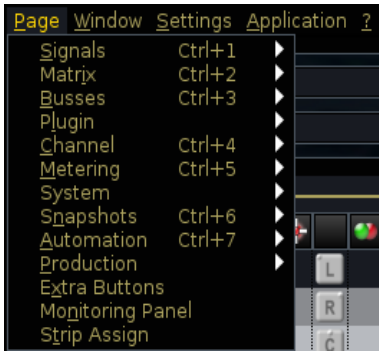
You can resize a display area by clicking and dragging the grey separator bar – for example, to widen the **Folders** list in the **Snapshots List** display, position the cursor above the grey separator bar, then click and hold while dragging to the right; the **Folders** and **Snapshots** windows resize accordingly. Note that if there is no grey separator bar, then resizing is not possible.

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 hold while dragging the column to the left or to the right. Release the mouse button when you are happy with the new position of the column.

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

If information within a window is hidden, then left/right or up/down scroll bars will automatically appear. Select a scroll bar at the bottom to scroll left/right or up/down.

New mxGUI Displays



To support complete console operation from mxGUI, two new displays are available from the **Page** menu: **Strip Assign** and **Production** -> **File Transfer**. Note that these displays are not included on your console GUI as they are not required when you have physical controls in front of you!

The Strip Assign Display

1. Select **Page** -> **Strip Assign** to open the **Strip Assign** display.

This display represents the physical fader strips on the surface of the console:

2. To view the whole of the surface use the left and right scroll bars at the bottom of the display.

Note

Note that the size of the surface is defined by the console configuration. When working online, this data is read directly from the online Control System. However, if you are operating offline, the surface size is dependent on the configuration stored by the Local Control System (the console_config.tcl file).

On each ‘fader strip’ you will see:

- **STRIP N** – identifies the fader strip. Note that main fader strips are marked as **MAIN N**.
- **Layer 2 Controls:**
  - SEL LAY 2 – the select (SEL) button.
  - Channel Name – always displayed.
  - Channel Name/User Label/Source Label – this label is switched by the LABEL buttons on the Access/Assign pop-up window.
  - Main Level (dB) – the fader level.
- **Layer 1 Controls** – as above but for layer 1.

Note that the empty grey area which separates layer 1 and layer 2 controls is deliberate; this may be used for new features in a future release of software!

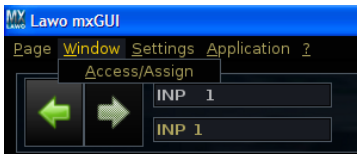
3. Press a **SEL** button to select a fader strip.
4. Click on the main level (dB) to adjust a fader level.

Tip

You can use the mouse wheel (if you have one) to adjust fader level or type in a value or use the up/down arrows.

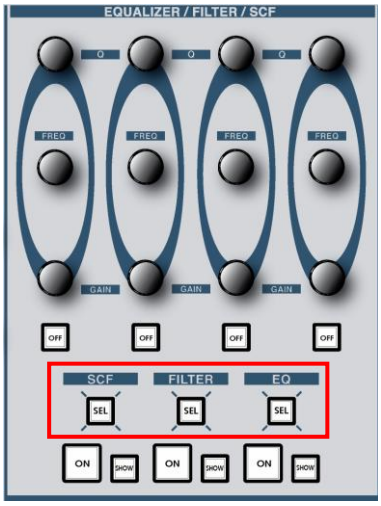
On its own, these are the only operations which can be performed from the **Strip Assign** display. However, if you open the **Access/Assign** pop-up window, then you can use the **SEL** buttons to perform assignment operations such as fader strip assignments, bus assignments, copy/ reset audio parameters, etc.

The Access/Assign Window



1. Select **Window** -> **Access/Assign** to open the window:

This pop-up window replicates all the access and assignment functions found on the front panel of a mc^2 console. It is divided into the following control areas:



- **ACCESS** – selects the channel in access.
- **COPY AUDIO** – used to copy or reset audio parameters.
- **LABEL** – switches the fader strip Labels.
- **LINK** – used to create link or couple groups.
- **Bus Assign - Fader** – makes bus/VCA assignments.
- **BANK** - switches Banks
- **LAYER** – switches Layers
- **STRIP ASSIGNMENT** - assigns channels to fader strips.
- **SEL** – replicates the **SEL** buttons for each audio module (EQ, Gate, Compressor, etc.) within the Central Control Section. For example, you would use these buttons to select just the EQ when performing a copy function.

The **Access/Assign** window is a pop-up which can be moved anywhere and minimised when it's not needed. This makes it easy to use with a variety of displays – **Strip Assign**, **Main** display, **Bus Assign**, etc.

2. Use the on-screen controls in exactly the same way as the console front panel; you will find that buttons light and flash just as they do on the console.

As these operations are described in the Operators Manual we are not going to repeat them here. However, here are three tips/examples:

- For an example of how to make fader strip assignments, see Page 736.
- When adjusting parameters from the **Main** display, use the **Access/Assign** window to quickly change the channel in access. (This avoids having to go back and forth to the **Strip Assign** display to press a **SEL** button).
- To copy an EQ setting between two channels:

1. Open both the **Strip Assign** display and the **Access/Assign** window:

2. Select the source channel you wish to copy from by clicking on the **SEL** button – in our example, fader strip 1, layer 1 (INP 1).

3. Now click on the **COPY** button on the **Access/Assign** window.

*This automatically activates the **ONE** button for a one-shot copy assignment and all the fader **SEL** buttons across the **Strip Assign** display flash, in green, to indicate possible destinations:*

4. On the **Access/Assign** window, select the audio module to copy - in this example the **EQ SEL** button:

Note that the SEL AUX/AFV options (shown opposite) work exactly as on the console; click **AUX 1-8**, **AUX 9-16**, etc, to switch bank; the **SEL** button must be lit to select the bank. So, in our example above, only the EQ is selected.

5. Now select the channel you wish to copy to by clicking its fader **SEL** button on the **Strip Assign** display.

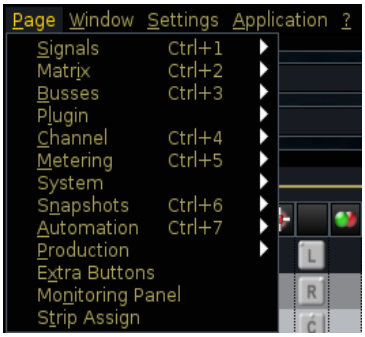
*The 4-band EQ setting is copied, and the **COPY** function and **Access/Assign** window automatically closes.*

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^2 console or Nova73). You might use this display to:

- Transfer a configuration to mxGUI. This allows you to prepare settings offline knowing that the configuration data matches that of the final system.
- Transfer offline setups (productions, snapshots, presets, custom function files) back to a mc^2 system.
- Transfer files to the mxGUI **shared_folder** – files stored here can be accessed by your host operating system and therefore copied to USB, emailed to another user, etc.

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 always 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^{2}66 Control System (online). Note that if you open the display offline, the only folder on the right of the display is the **Shared Folder**.

The method of operation is very similar to the **File** display of the mc^2 console:

1. Open or close directories by double-clicking on the directory name (or click on the arrow beside the directory name).

Within the Local or online Control System, data is structured as follows:

- **Active Production** – contains all data in the active production. The active production can be transferred in full, or opened in order to select individual elements such as a folder, snapshot or automation mix.
- **Productions** – contains all other productions. These are zipped files which cannot be opened. They can be transferred as a complete file, and then unzipped by loading the production to access their individual elements.
- **Presets** – contains presets (EQ, Dynamics, Panning, Channel, etc.). These are the presets saved and loaded from the **Main** display as described on Page 457.
- **Configuration** – contains all configuration data (Core Configuration, Signal List Configuration, Console Configuration and Custom Templates)

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.

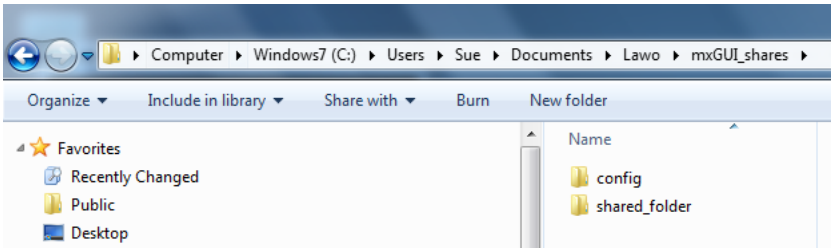
Also note that each file or folder is clearly marked with its **Type** – e.g. production, snapshot, channel preset, EQ preset, etc. This is important as files can only be transferred to a valid destination. For example, you cannot transfer a snapshot into the Automation directory!

Note

The Shared Folder

The contents of the **Shared Folder** can be accessed from the **File Transfer** display, and outside **mxGUI** from your host operating system. You should use the **Shared Folder** to organise files or transfer files externally (e.g. to USB or email).

Within your host operating system, the default location for the **Shared_Folder** is shown below:

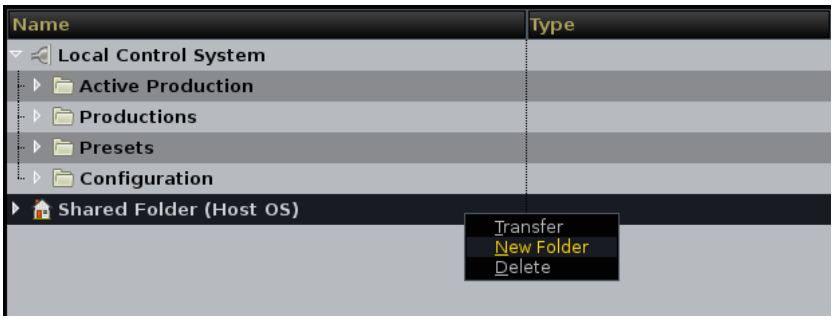


Note that depending on your computer's configuration, this location may be hidden. If you have trouble locating the **mxGUI_shares** folder, then please contact your system administrator.

You can create sub folders and manage files from your host operating system. Alternatively, you can use the **File Transfer** display within mxGUI as follows:

Creating Sub Folders

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.

Note that you can create folders within folders simply by right-clicking on the sub folder name.

Deleting Files or Folders

Note that for safety you cannot delete productions, snapshots, configuration files, etc. from the **File Transfer** display. However, you can delete files or folder from the **Shared Folder**:

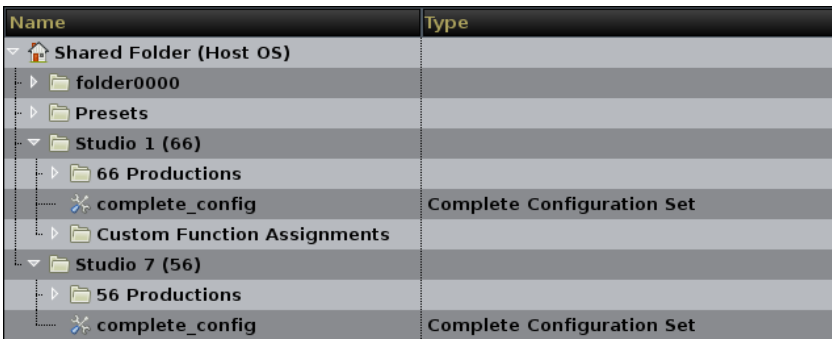
1. Right-click on the file or sub folder and select **Delete**.
2. Select **OK** to confirm.

The file or folder is deleted from the Shared Folder.

For more examples of using the **File Transfer** display to create an offline setup, see Page 764.

Organising Your Files

If you are going to use mxGUI to prepare settings for a range of different mc^2 systems, then it is important to organise your mxGUI files carefully. The best approach is to create folders within the **Shared Folder**:



In this example, we have created a folder for a number of mc^2 studios. Each folder stores all the productions and the configuration (complete_config) for the system. This keeps all relevant files together making it easy to reset mxGUI for each studio's configuration/productions.

Online Operation

When operating online, the mxGUI computer talks to a real mc^2 Control System via its control network (Ethernet). In this mode, mxGUI is simply acting as a remote control. You will see the same **Signal List**, **Productions** display, etc. as on the actual console, and all data (productions, presets, configuration, etc.) is being read from and stored to the console's Control System.

Network Connection

The mxGUI computer must be connected to the **ETHERNET** port of the control system. The control system location varies depending on your product (see the table below).

Note that all systems are supported except a stand alone **Nova73**:

System	Router Version	Control System	Control System Location	mxGUI with Rls ≥ 4.6	mxGUI with Rls < 4.6
Nova73 Standalone	980/31 or 980/32	Motorola	HD Core Board	no	no
Nova 73 Ripper	980/31 or 980/32	Intel	1HE Ripper	yes	no
Nova73 DSHS	980/32	Intel	1HE Ripper	yes	no
Nova73 MKII	980/33	Intel	HD Core Board	yes	no
mc² 56	980/33	Intel	HD Core Board	yes	no
mc² 66 classic	980/31 or 980/32	Intel	inside console	yes	no
mc² 66 top1	980/31 or 980/32	Intel	inside console	yes	no
mc² 66 MKII	980/33	Intel	HD Core Board	yes	no
mc² 90	980/31 or 980/32	Intel	inside console	yes	no
mc² 90	980/33	Intel	HD Core Board	yes	no
mc² 90 star²	980/33	Intel	HD Core Board	yes	no

For a direct connection to a single computer, you will need a crossed network cable (STP-CAT 5 with RJ45 connectors on both sides).

For connection to multiple computers via a network switch, use a straight (1:1) network cable.


Note

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

Depending on the number of network connections, one mc^2 system is able to support up to 16 mxGUI clients simultaneously.

TCP/IP Configuration

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

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

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

IP Address

The IP Address of your computer's Network Interface card must be unique, and set within the same range as that of the system.


Note

Note that depending on your Lawo product, the default TCP/IP address of the system will vary:

- **Nova73** – HD Core Router Module = 192.168.102.1
- **Nova73 DSHS** - matrix control server = 192.168.102.1
- **mc²56** – control system = 192.168.102.56
- **mc²66** – control system = 192.168.102.65
- **mc²90** – control system = 192.168.102.90

So, for example, if connecting to a mc²66 control system set your computer's IP Address to say 192.168.102.69.


Note

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

Note that the Local Host IP address of the mxGUI control system is always 192.168.56.101. You will need to know this address if you wish to restart the mxGUI Local Host or transfer configuration files using Admin HD.

Subnet Mask

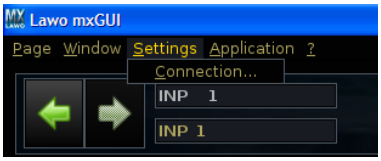
The Subnet Mask of your computer's Network Interface card should be identical to that of the system. For all products, the default Subnet Mask is 255.255.255.0.

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

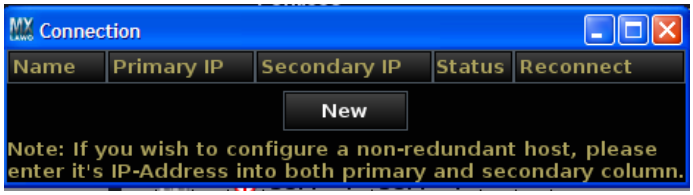
Getting Online

To test the connection and put mxGUI online:

1. Select **Settings** -> **Connection** from the main menus.



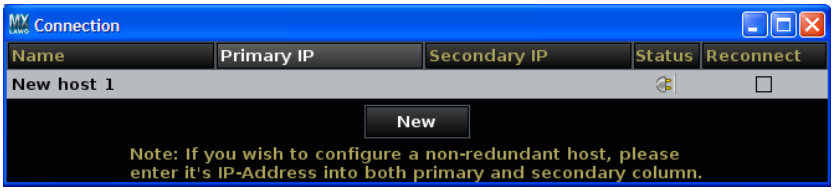
The Connection pop-up window appears:



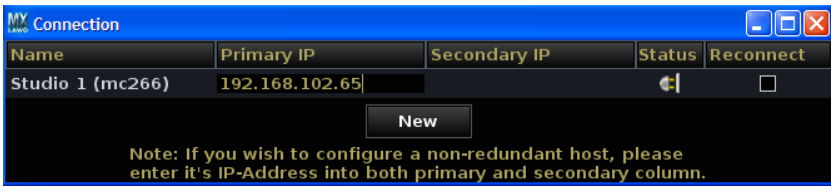
If this is the first time you have used the **Connection** window, then it will be blank. This window will eventually list all the systems which mxGUI can connect to, each with a **Name**, **Primary IP** address (main control system), **Secondary IP** address (redundant control system) and connection **Status**.

2. Click on **New** to create a new connection.

A generic host control system is added to the connections list:

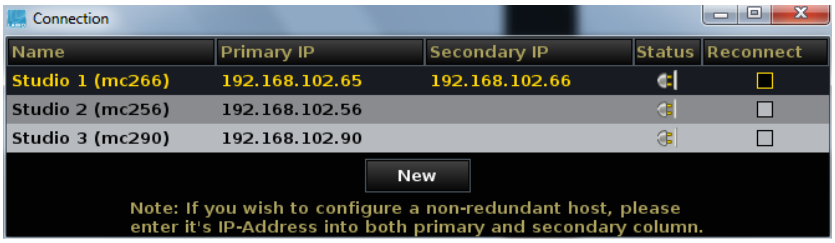


3. Click on **New host 1** to enter a name for this system – in our example, we have chosen **Studio 1 (mc²66)**.
4. Then enter the **Primary IP** address of the main control system – for example:



The connection is now prepared and you are ready to go online.

Note that you can prepare several connections for systems which you may wish to connect to at a later date. Our example below shows three different mc² connections, all currently offline:

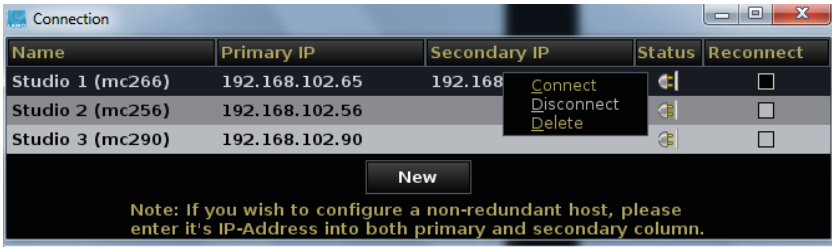


Note

If the console does NOT have a redundant control system, then you only need enter the **Primary IP** address.

If there is a redundant control system, then the **Secondary IP** address must also be entered. This is always 1 above the **Primary IP**. So, for example, if the **Primary IP** address is 192.168.102.65, enter 102.168.102.66 for the **Secondary IP**.

5. 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 mc² 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 your network connections and TCP/IP settings.

6. Having connected to the mc² system you can minimise the **Connection** window.

Note

Notice that the status bar at the bottom of all mxGUI displays now shows the IP address of the connected host:

Remote Operation

You can now use the mxGUI displays to view or change settings on the online mc^2 system. Please refer to Page 741 for tips on how to adjust settings.

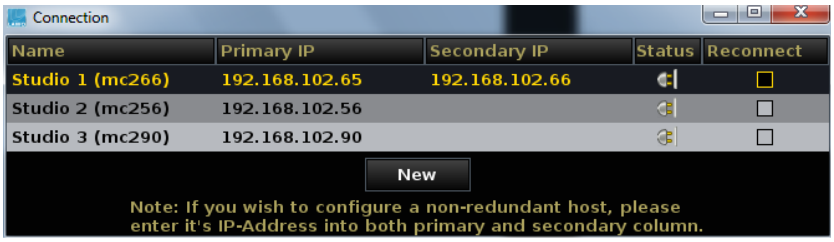
Remember that while operating online, mxGUI is changing, saving and updating data on the console Control System. So, make sure the console operator is aware you are online!

Disconnecting mxGUI

To disconnect mxGUI from the mc^2 system:

1. Maximise or open the **Settings** -> **Connection** window.
2. Select the online system, right-click and choose **Disconnect**.

*mxGUI is disconnected from the mc^2 control system and the **Status** of the **Connection** returns to is "unplugged" state:*



Note that connecting mxGUI to a different mc^2 system automatically cancels any existing online connections.

Offline Setup

When running offline, the mxGUI computer acts as just another mc^2 system – called the “Local Control System”. Settings are stored on the mxGUI computer by saving productions from the **Productions** display, presets from the **Main** display, etc. Once saved, files can be transferred back to an online mc^2 system using the **File Transfer** display.

What Can be Prepared Offline?

Anything which can be saved on a mc^2 console can be saved offline on the mxGUI Local Control System:

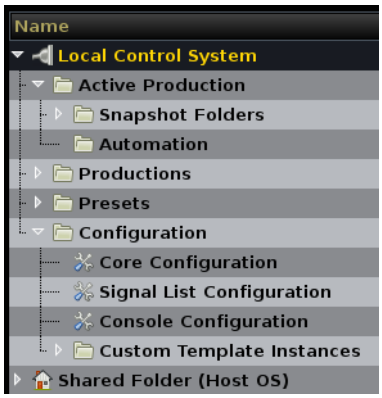
- Productions, Snapshots and Mixes - from the Snapshots, Mixes and Productions displays.

Note

Just as on a console, remember to save or update a production to store new snapshots, folders or mixes.

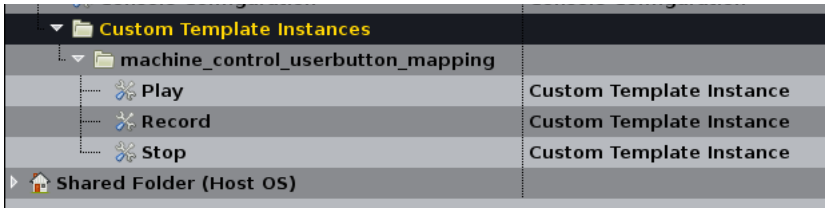
- **Presets** – module or channel presets can be saved from the **Main** display.
- **Custom Function Assignments** – the mapping of user buttons and other custom function assignments can be edited from the **Custom Functions** display.

Where are these Files Stored?



Open the **File Transfer** display to locate these files:

- **Active Production** – the active production can be opened to access individual snapshot folders, snapshots and automation mixes.
- **Productions** – contains all zipped productions; these can be transferred as a complete file.
- **Presets** – contains all module and channel presets.
- **Configuration** – contains all configuration data. The **Custom Template Instances** folder stores assignments made from the **Custom Functions** display:



Note that mxGUI cannot edit the Core Configuration, Signal List Configuration or Console Configuration.

mc² Compatibility

When preparing files offline it is important to understand the compatibility of different files between systems:

- **Productions** can be loaded on any mc² system. However, only transferrable 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 the correct Core Config and Signal List.

When preparing a production offline, it is always best to import the console configuration first. This ensures that the productions you create will load in full on the mc² system.

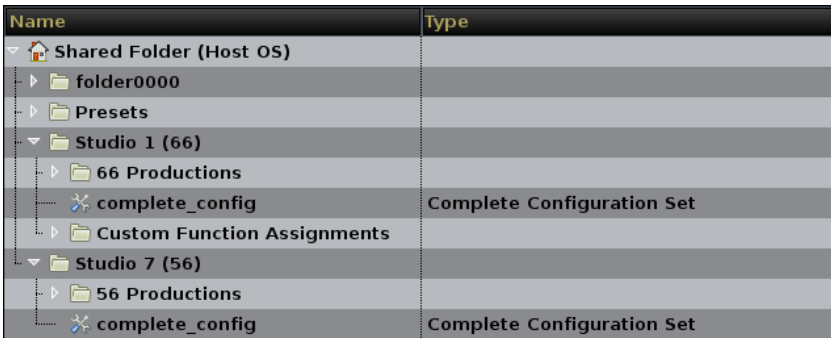
Tip

- **Presets** can be loaded to any mc² console regardless of the configuration or mc² 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; if the console does not support the same User Panel or HLSD, the custom assignment may be edited from the **Custom Functions** display, see Page 689.

Please see Page 131 for more information on exchanging data between DSP configurations which use different channel types.

Organising Your Files

If you are going to use mxGUI to prepare settings for a range of different consoles, then it is important to organise your mxGUI files carefully. The best approach is to create folders within the **Shared Folder**:



In this example, we have created a folder for each mc² studio. Each folder stores all the productions, any custom function assignments and the configuration (complete_config) for the console. This keeps all relevant files together making it easy to reset mxGUI for each studio's configuration/productions.

Note that we have also created a Presets folder to store module or channel presets. Because presets can be recalled on any mc² system, this is a top level folder and is not console specific.

Preparing a Production Offline

In order to prepare a production offline, it is important that the configuration stored on the Local Control System matches that of the final console. If not, some parts of the production, such as signal routing, may not load.

The best way to achieve this is to import the configuration from the console you are going to work on. Once imported, you can be sure that the productions you create will load in full on the mc^2 system.

For a fail safe approach these are the steps you should follow:

- Transfer the console's configuration to the mxGUI Shared Folder.
- Change the configuration of the Local Control System. This ensures that the configuration data running on mxGUI matches that of the actual console.
- Prepare your settings offline.
- Save settings by saving a production and/or snapshots or automation.
- Transfer the production back to the console.

Transferring the Configuration

The complete configuration set for a mc^2 system contains four individual components:

- **Core Configuration** – this file defines the HD Core/DALLIS System and its signal parameters (config.tcl).
- **Signal List Configuration** – this file defines the Directories, Subdirectories, Signal Names and Labels of the Signal List (gui_config.tcl).
- **Console Configuration** – this file defines the console surface (console_config.tcl).
- **Custom Template Instances** – these files store the custom function assignments edited from the **Custom Functions** display.

For simplicity, all four components can be zipped and transferred as a single file - called the **complete_config** – using the **File Transfer** display.

1. Make sure mxGUI is running the correct mc^2 emulation, and open an online connection as described on Page 757.
2. Select Page -> Production -> File Transfer to open the File Transfer display.
3. Select a location within the **Shared Folder** (on the left) as your destination.

4. 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**.

Note that you can transfer the configuration directly into the Local Control System's **Configuration** folder. However, this will overwrite the existing mxGUI configuration without any backup.

Note

We recommend copying the **complete_config** to the **Shared Folder** first so that you have a copy of the file. By storing the **complete_config** in a folder for the studio, you can keep the configuration and productions together.

While you are connected to the online system, you may wish to copy any useful productions to the Shared Folder. By loading an existing production, you can tweak existing settings rather than having to build your offline setup from scratch.

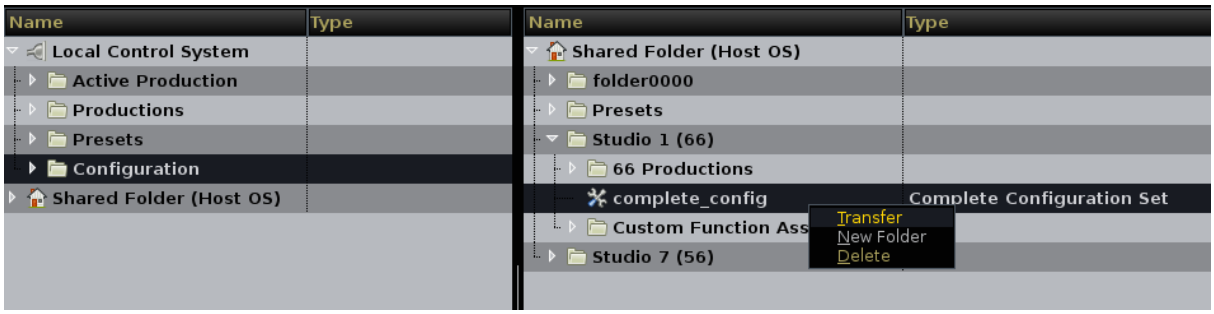
Tip

If you do not have network access to the console you wish to configure, then ask for the **complete_config** and any default productions to be sent to you (e.g. via email). Copy these into the **Shared Folder** using your host operating system.

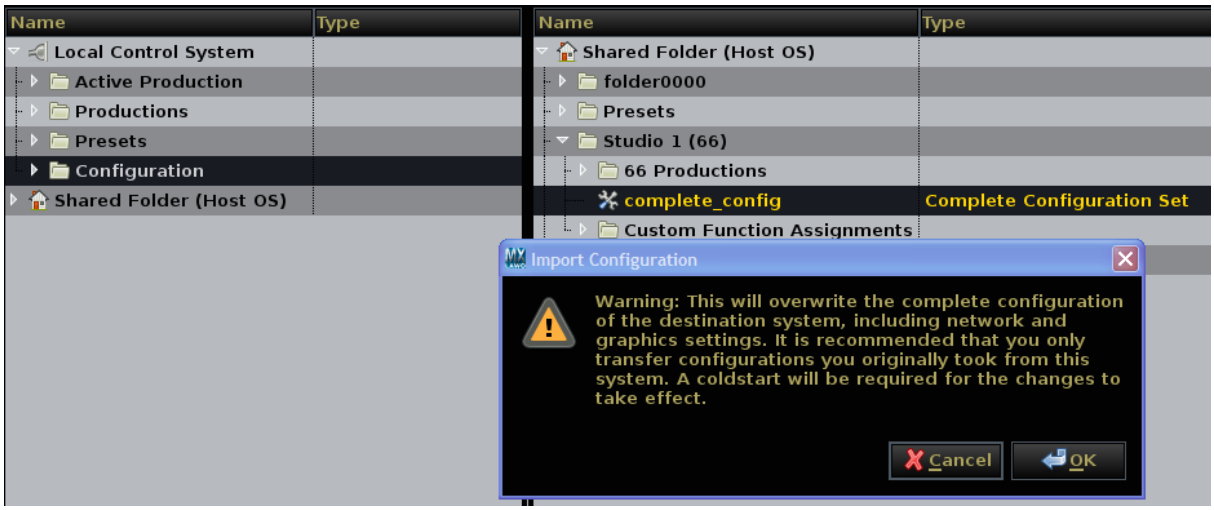
Changing the mxGUI Configuration

Having copied the configuration from the online system, you can now disconnect and import the **complete_config** to the Local Control System.

1. Disconnect the online system from the **Settings** -> **Connection** window.
2. From the **File Transfer** display, select the Local Control System's **Configuration** folder (on the left).
3. Locate the **complete_config** file you wish to import (on the right), right-click and choose **Transfer**:



A Warning pop-up appears:



Warning

Warning

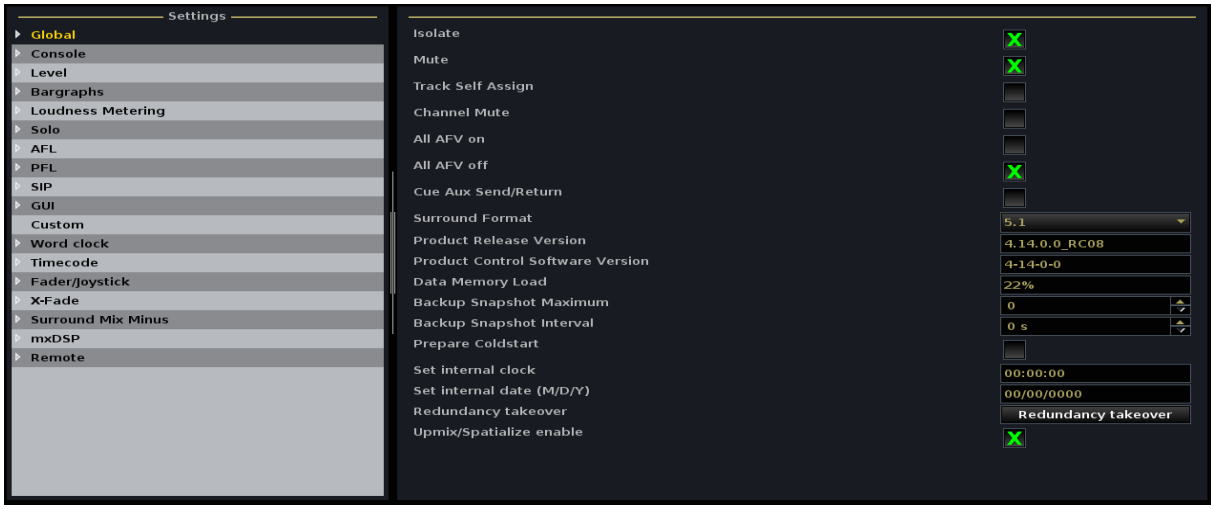
Selecting **OK** will overwrite the configuration of the mxGUI control system. If you wish to backup the existing configuration, do this first by transferring Configuration to the Shared Folder.

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: select **Application** -> **Quit**:
5. Then restart mxGUI.

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 HD Core configuration in the **Signal Settings** display.

Preparing Settings

You can now begin your offline setup.

If you imported some productions from the online system, then copy these into the **Productions** folder of the Local Control System using the **File Transfer** display. You can then load a production, from the **Productions** display, and use this as the starting point for your offline setup.

Refer to Page 741 for tips on how to adjust settings from mxGUI.

Saving Settings

You can save snapshots just as you would when sitting at the console. Settings must be saved into a production from the **Productions** display.

Transferring the Production to the Console

Having saved the production, it can be transferred back to the console using the **File Transfer** display.

1. Make sure mxGUI is running the correct mc^2 emulation, and open an online connection as described on Page 757.
2. Select Page -> Production -> File Transfer to open the File Transfer display.
3. Select the online system's **Productions** folder as the destination (on the right).
4. 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.

5. Now go to the console and load the production.

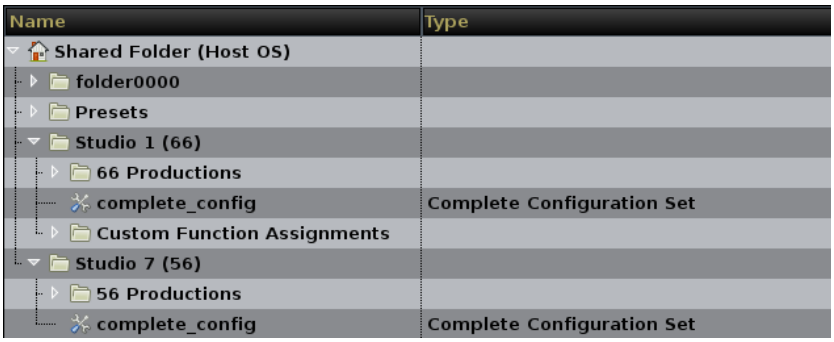
Your setup is recalled!

Note that you can transfer any type of file: productions, snapshots, automation, presets, and custom function assignments to the online control system. 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!

Backing up Your Offline Setups


Tip

Having completed the 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:



Important Notes

Note

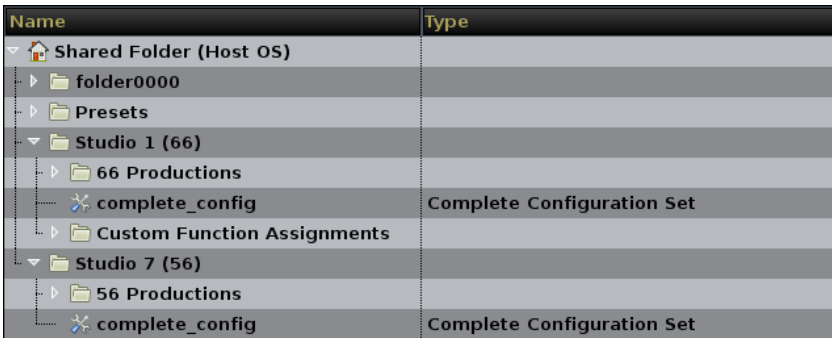
A production created offline will only load completely if:

- The configuration running on mxGUI matches that of the online system. Always check that you have the latest configuration from the console control system.
- mxGUI is running the correct mc²/Nova73 emulation.

Also note:

When you change the configuration of mxGUI, all other folders – **Active Production**, **Productions** and **Presets** – remain intact. This means that you will end up with a mixture of productions on the mxGUI Local Control System.

We recommend keeping a backup of all files within the shared folder. Create a sub folder for each mc² 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!

Chapter 11: Lawo Remote App

Overview

The Lawo Remote App is a free App which allows you to operate any fader of a mc² console, recall snapshots and control user-defined functions remotely from an iPhone, iPod or iPad.

From the Lawo Remote App you have access to the following:

- Fader level, Mute and Metering – for any fader assigned to the active Bank and Layer.
- Snapshots – load any Snapshot from any folder within the active Production.
- User Buttons – a special page of buttons allow you to control user defined functions such as monitoring, GPI control, etc. The button assignments are made from the **Custom Functions** display and stored as part of the console configuration.

Installing the Lawo Remote App

The Lawo Remote App can be downloaded, for free, from the App store, and installed on an iPhone, iPod or iPad. Download and install the App on your device in the usual manner.

Configuring the Network

The remote device communicates with the console's control system via WLAN (Wireless Local Area Network).

To use the Lawo Remote App you must have a properly configured wireless network access point and know the IP address of the mc² control system. There are several configuration options depending on your network infrastructure, so please consult your network administrator or refer to the technical document "TD_AccessPoint.iApp" for details.

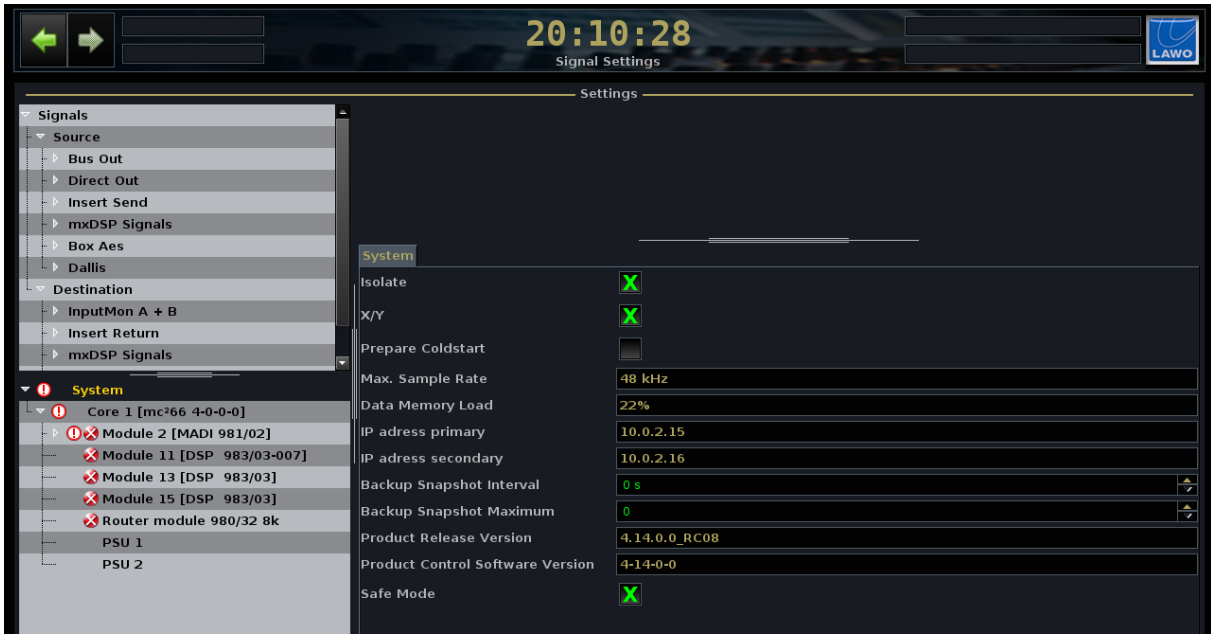
Once the wireless network access point is configured, you can find the IP address of the mc² control system from the **Signal Settings** display as follows:

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

Note that each time you press the **SIGNAL** button you toggle between two pages – **Signal List** and **Signal Settings** – so keep pressing until you see the **Signal Settings**.

2. Select the **System** from the “system tree” on the lower left of the display:

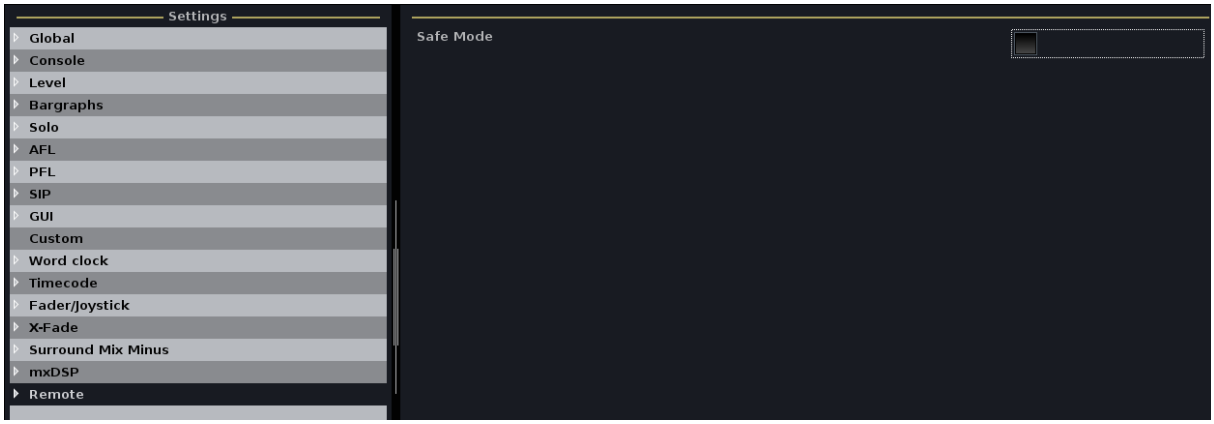
The IP address of the control system is displayed in the parameter area:



Enabling App Control

To prevent unauthorised control of the console, remote access must be enabled from the console's **System Settings** display:

1. Press the **SYSTEM** button, located on the SCREEN CONTROL panel, to view the **System Settings** display.
2. Select the **Remote** Topic and make sure that the **Safe Mode** option is unchecked:



The console may 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!

Note

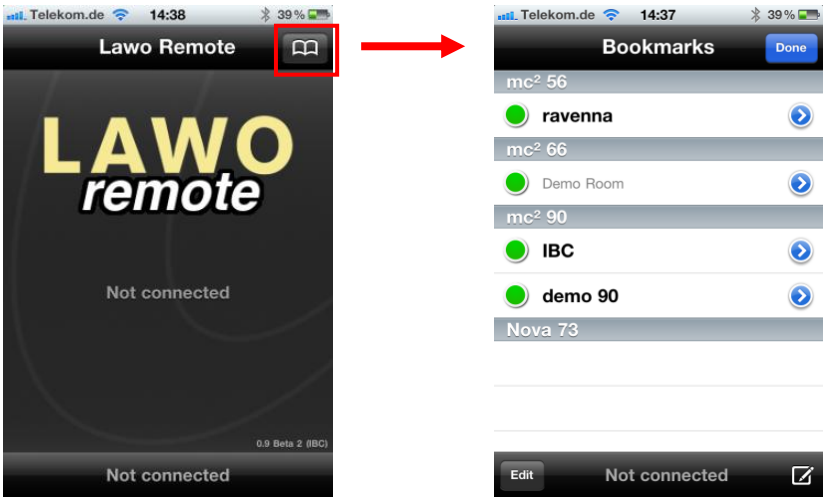
Starting the Lawo Remote App

1. On your device, open the Lawo Remote 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 all configured connections:*



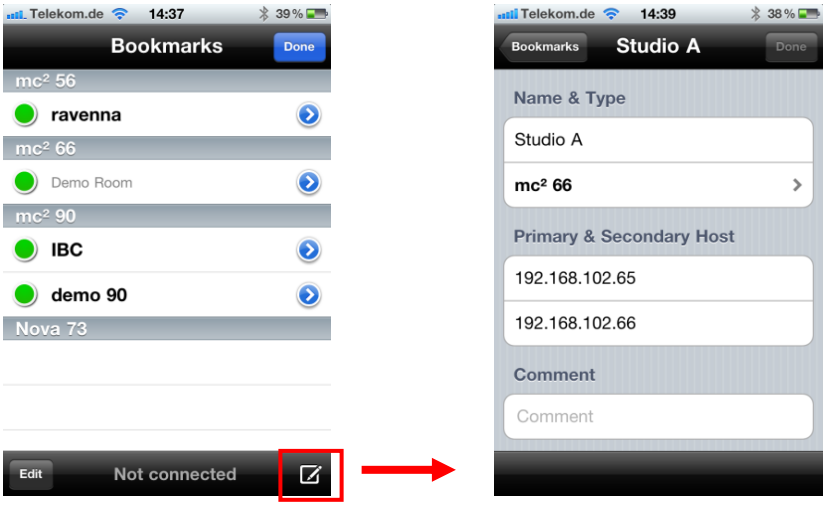
The list will be empty if no connections have been configured.

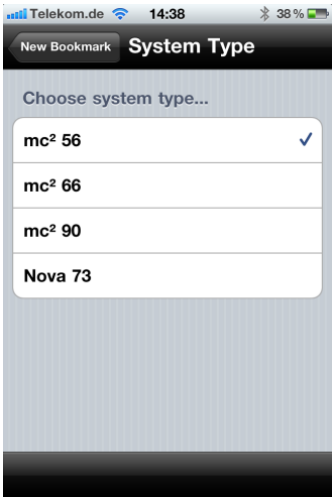
Configuring a New Connection

To configure a new connection:

1. Select the New Bookmark icon at the lower right of the display.

*The 'New Bookmark' page opens, and your new connection is automatically configured as an **mc²56**:*

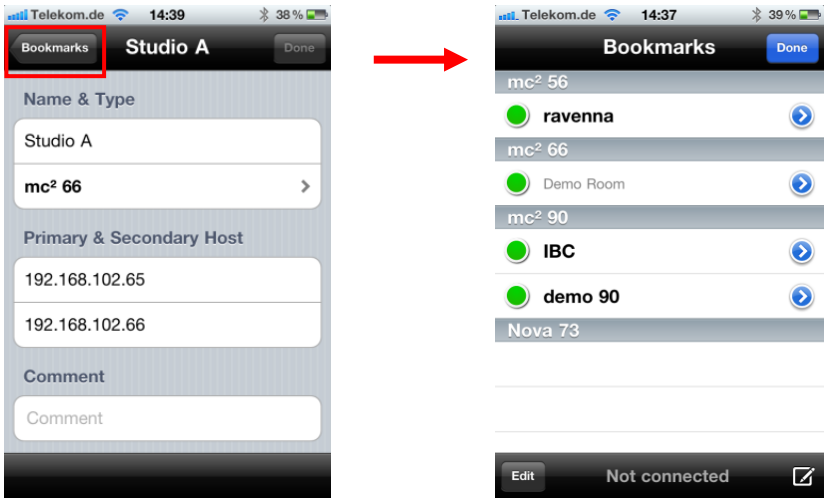




2. Touch each entry to edit the:

- **System Name** – e.g. **Studio A**. This name is used for reference within the Lawo Remote App.
- **System Type** – e.g. **mc²66**. Choose from the list of supported systems (opposite). 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.
- **Comment** - enter a Comment if you wish.

3. When you have completed each field, touch **Bookmarks** to return to the Bookmarks page.



The name of your new connection appears in the list.

4. At any time you can edit an existing connection, by touching the **Edit** button at the lower left of the **Bookmarks** page.

Connecting to the System

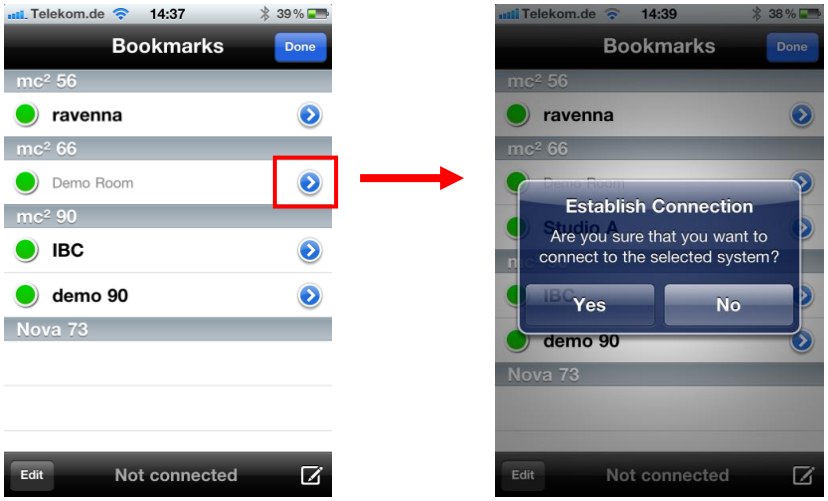
You can connect to any system configured within the **Bookmarks** page.

Note

Note that you may only connect to one system at a time.

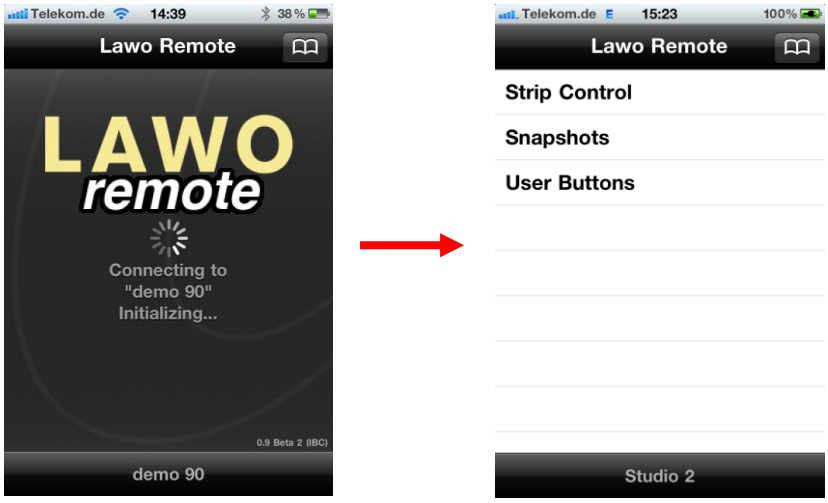
1. Open the **Bookmarks** page, and touch the arrow beside the name of the system you wish to connect to.

The following confirmation dialogue appears:



2. Touch **Yes** to continue.

The device attempts to connect. If successful, the operational menus appear and the connection status, at the bottom of the display, updates to show the system name:



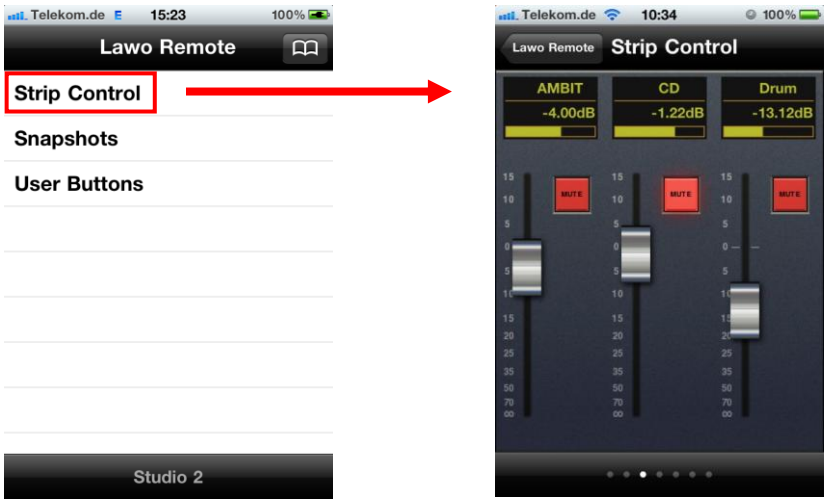
If the connection fails, then an error will appear. Check the system type and IP settings from the **Bookmarks** page. Check that the iPhone, iPod or iPad is connected to the correct WLAN. If the connection still fails, then there is a problem with your network or its configuration. Please contact your network administrator for assistance.

Controlling Parameters

The main operational menus appear once you have an active connection to the mc² system.

Strip Control

1. Select **Strip Control** to control the fader level and mute for any fader assigned to the active Bank and Layer:



You will see the label and level in dB for three fader strips at a time.

2. Touch and drag up or down on a fader to adjust the fader level.
3. Touch the **MUTE** button to mute or unmute the channel.

Any changes are reflected on the console control surface.

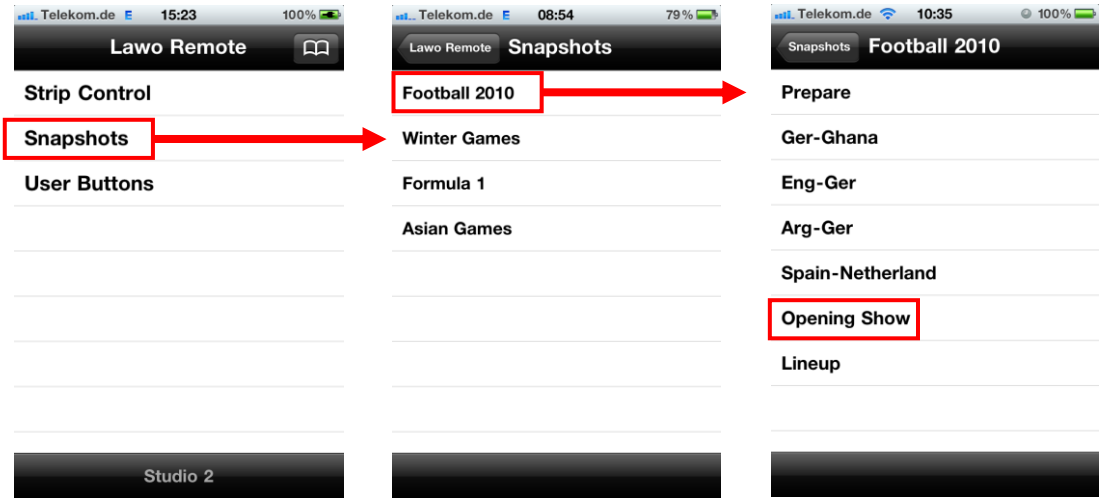
4. Touch and drag to the left or right to scroll across the fader bay.
5. Touch one of the dots at the bottom of the page to access a different fader bay. Each dot represents a fader bay (of 8 strips). The number of dots depends on the size of the control surface.
6. To return to the main menus, select the **Lawo Remote** button (top left).

Note that you cannot change Banks or Layers from the Lawo Remote App.

Note

Snapshots

1. Select **Snapshots** to load a Snapshot from any folder within the active Production:



2. Select the folder:
3. Then select the snapshot followed by **Load**.

The snapshot is loaded to the console. If any snapshot Filter Modes or SNAP ISO buttons are active, then these are applied.

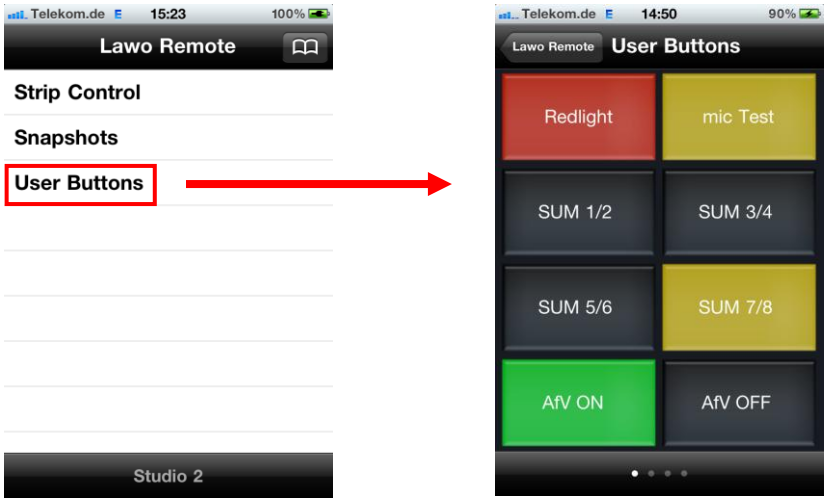
4. To return to the main menus, select **Snapshots** followed by the **Lawo Remote** button (top left).


Note

Note that you cannot save or update snapshots from the Lawo Remote App, or change production.

User Buttons

1. Select **User Buttons** to access a special page of buttons designed for monitoring functions such as source selection and monitor level control:



2. Touch a button to action its function.
3. Touch one of the dots at the bottom of the page to access a different page of functions.
4. To return to the main menus, select the **Lawo Remote** button (top left).

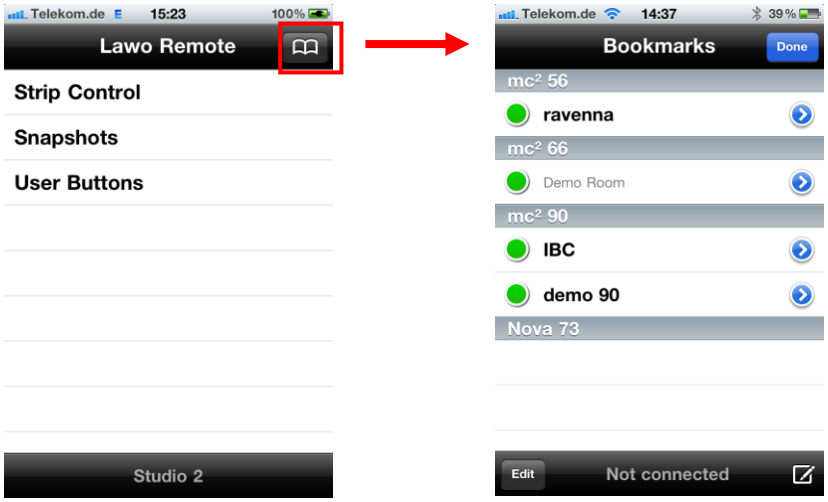
Note

Note that the Lawo Remote user buttons are assigned from the **Custom Functions** display, and therefore may vary when you connect to a different console. For details on how to change the assignments, please see Page 689.

Disconnecting from the System

1. To disconnect from the system, select the Bookmarks icon at the top right of the display.

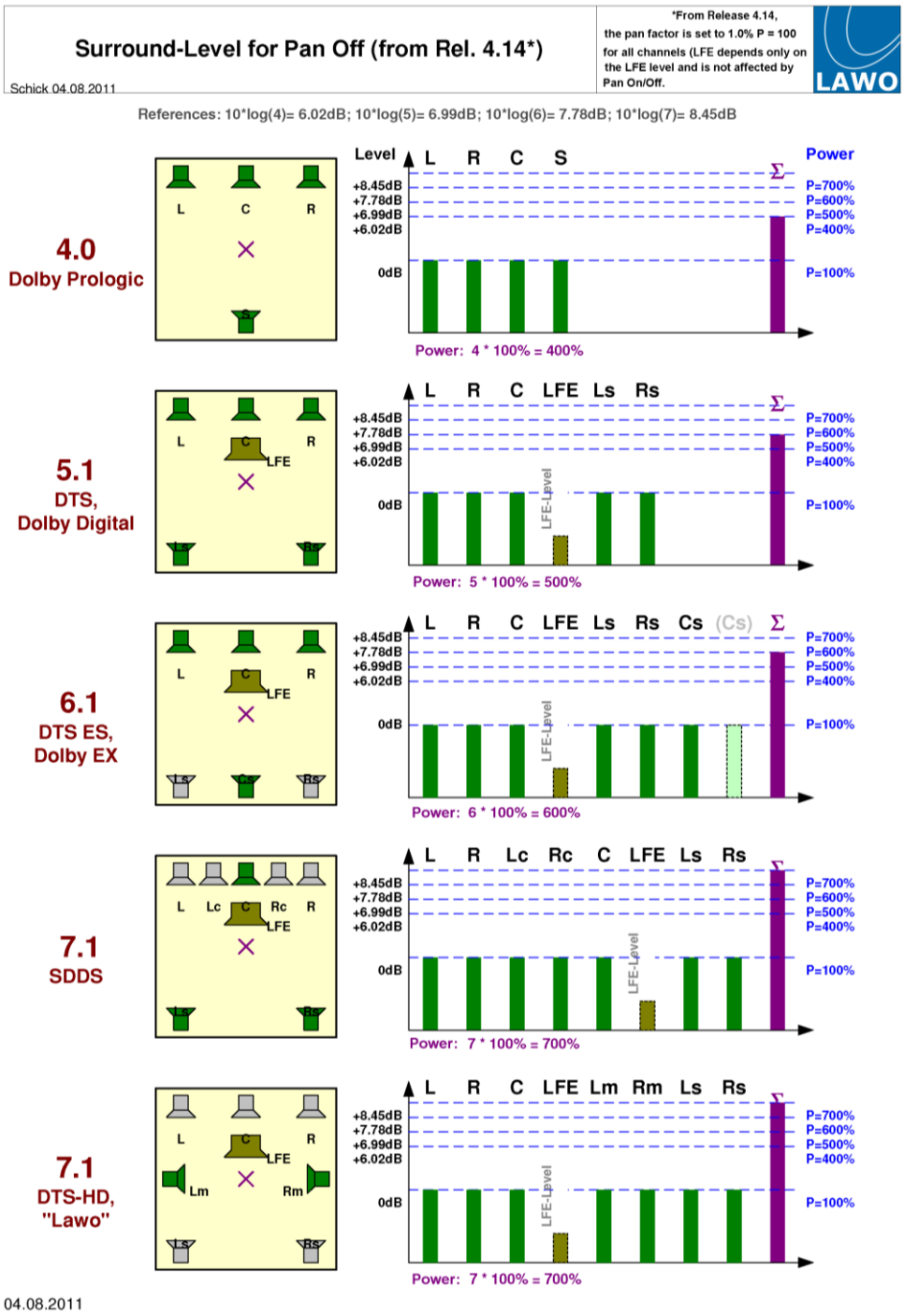
*The **Bookmarks** page re-opens and the connection status, at the bottom of the display, updates to "Not connected":*



Appendices

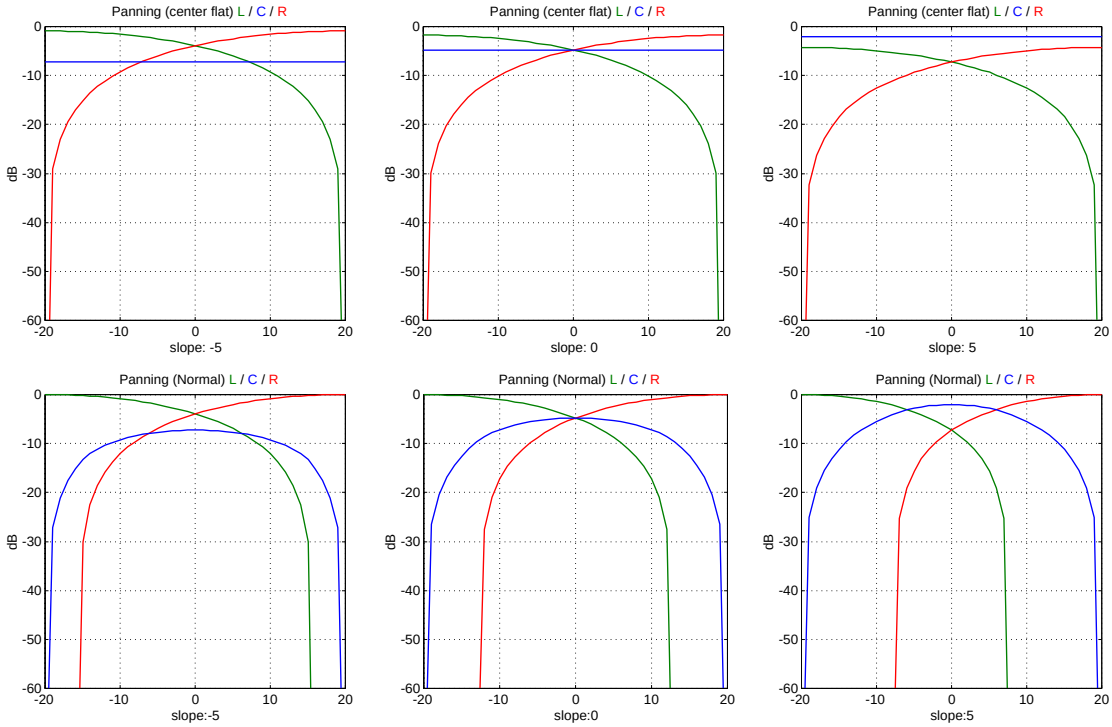
Appendix A: Surround Levels

The following diagrams show the power output to each speaker, when panning is off, for each of the console's surround formats. Note that the power factor changed in Version 4.14 software, so that 100% of the source feeds all channels, except the LFE, to make it easier to measure your speaker and metering systems.



Appendix B: Pan Slope

The following diagrams demonstrate how the slope control affects Left-Centre-Right panning:



Appendix C: 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

Appendix D: VCA, Surround, Link and Couple Masters

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 may 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 may 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 may 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, as defined from the **System Settings** display, see Page 661. For all other group types (Surround VCAs, Links and the Couple group), slave faders always move.

VCA Link 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
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	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
Expander threshold	OFF	On	Off	Off	Off	Off	Off	Off	Off
Expander gain	OFF	On	Off	Off	Off	Off	Off	Off	Off
Expander ratio	OFF	On	Off	Off	Off	Off	Off	Off	Off
Expander attack	OFF	On	Off	Off	Off	Off	Off	Off	Off
Expander hold	OFF	On	Off	Off	Off	Off	Off	Off	Off
Expander release	OFF	On	Off	Off	Off	Off	Off	Off	Off
Expander delay	OFF	On	Off	Off	Off	Off	Off	Off	Off
Expander on	OFF	On	Off	Off	Off	Off	Off	Off	Off
Module link	OFF	On	Off	Off	Off	Off	Off	Off	Off
Gate threshold	OFF	On	Off	Off	Off	Off	Off	Off	Off
Gate floor	OFF	On	Off	Off	Off	Off	Off	Off	Off
Gate hysteresis	OFF	On	Off	Off	Off	Off	Off	Off	Off
Gate attack	OFF	On	Off	Off	Off	Off	Off	Off	Off
Gate hold	OFF	On	Off	Off	Off	Off	Off	Off	Off
Gate release	OFF	On	Off	Off	Off	Off	Off	Off	Off

VCA Link Table (continued)

Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
Gate delay	OFF	On	Off	Off	Off	Off	Off	Off	Off
Gate on	OFF	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	OFF	On	Off	Off	Off	Off	Off	Off	Off
Compressor gain	OFF	On	Off	Off	Off	Off	Off	Off	Off
Compressor ratio	OFF	On	Off	Off	Off	Off	Off	Off	Off
Compressor attack	OFF	On	Off	Off	Off	Off	Off	Off	Off
Compressor hold	OFF	On	Off	Off	Off	Off	Off	Off	Off
Compressor release	OFF	On	Off	Off	Off	Off	Off	Off	Off
Compressor delay	OFF	On	Off	Off	Off	Off	Off	Off	Off
Compressor on	OFF	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	OFF	On	Off	Off	Off	Off	Off	Off	Off
Limiter gain	OFF	On	Off	Off	Off	Off	Off	Off	Off
Limiter hysteresis	OFF	On	Off	Off	Off	Off	Off	Off	Off
Limiter attack	OFF	On	Off	Off	Off	Off	Off	Off	Off
Limiter hold	OFF	On	Off	Off	Off	Off	Off	Off	Off
Limiter release	OFF	On	Off	Off	Off	Off	Off	Off	Off
Limiter delay	OFF	On	Off	Off	Off	Off	Off	Off	Off
Limiter on	OFF	On	Off	Off	Off	Off	Off	Off	Off
Limiter soft knee	OFF	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
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

VCA Link Table (continued)

Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
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
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

Surround 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	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
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

Surround Master Table (continued)

Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
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
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
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

Surround Master Table (continued)

Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
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
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

Note that analogue input gain is not linked by the Surround Master; only digital input gain for AES or MADI sources is linked when using a Surround Master.


Note

Link 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
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
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

Link Master Table (continued)

Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
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
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

Link Master Table (continued)

Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
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
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

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
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

Couple Group Master Table (continued)

Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
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
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
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

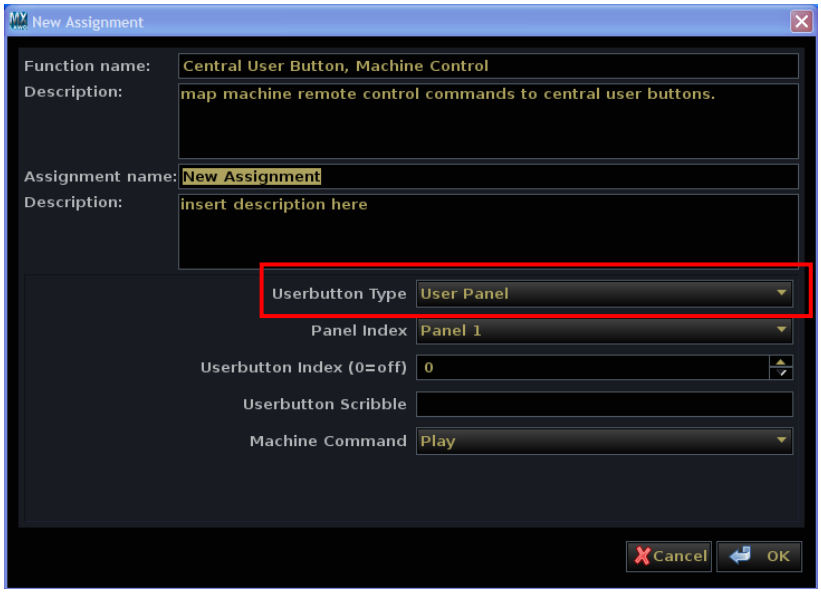
Couple Group Master Table (continued)

Parameter	Mode	Slave Operation	Apply On Assign	Restore	Relative Fader	Slave Controls Master	Invert	Ignore Module Link	Ignore Suspend
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
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

Appendix E: User Button Numbering

On the mc²66, there are a number of user buttons which can be assigned from the **Custom Functions** display, see Page 689.

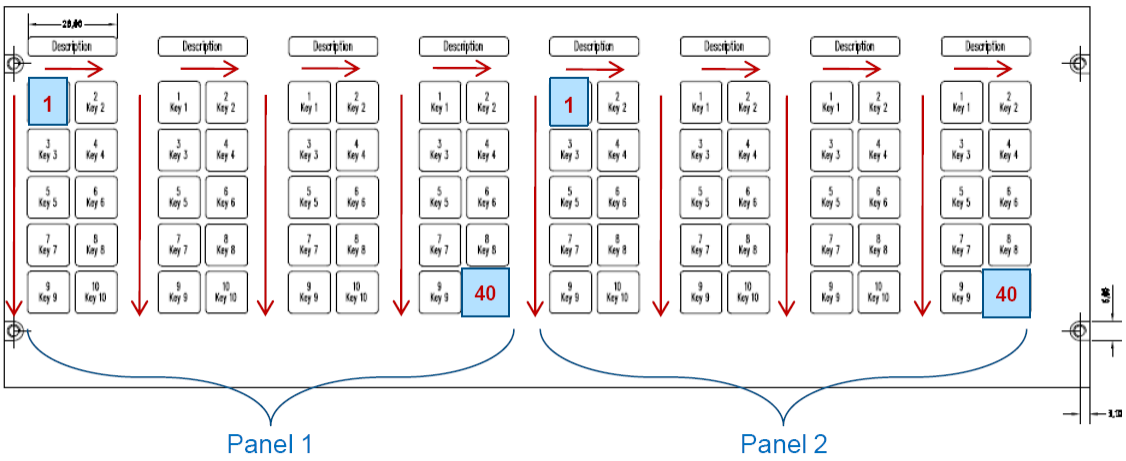
Five different userbutton types are available:



The drawings which follow show the panel index and button numbering for each type.

User Panel

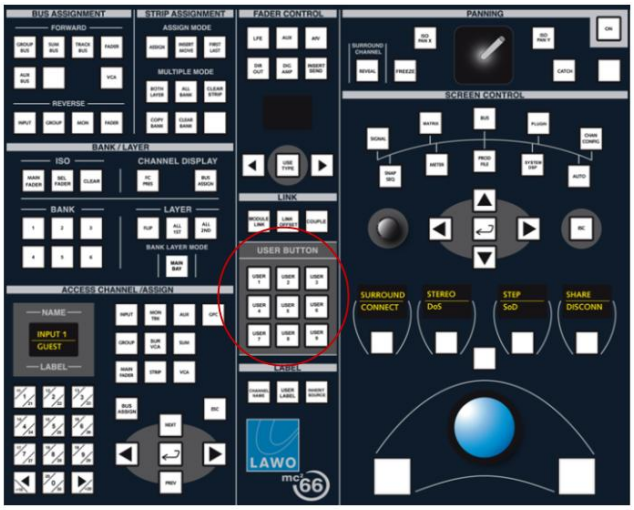
User Panels are panels that only include user buttons, for example 40 or 80 buttons as shown below. The panel index and button numbering are as follows:



mc²66 user panel

Access Panel

This panel type addresses the user buttons on the mc^2 control panels in the centre section of the console. The button numbering is shown below:



mc²66 access panel

Note that the classic mc^{2}66 does not support Access Panel user buttons.

Note

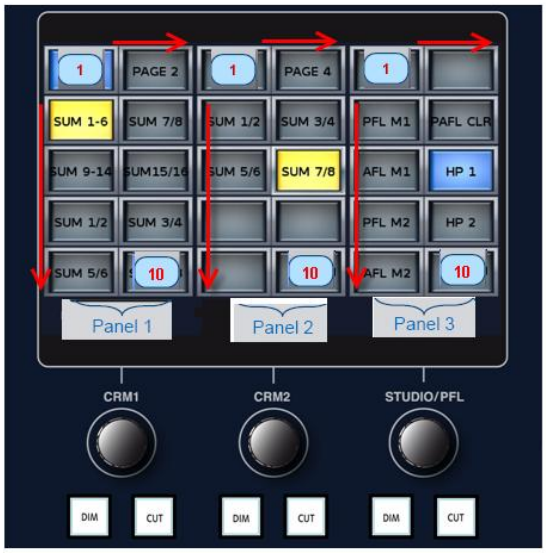
Monitoring Panel User

This panel type is not supported by the mc^{2}66. It is used on the mc^{2}90 to programme the user buttons on the Monitor Panel.

Monitoring Panel

MKII mc²66

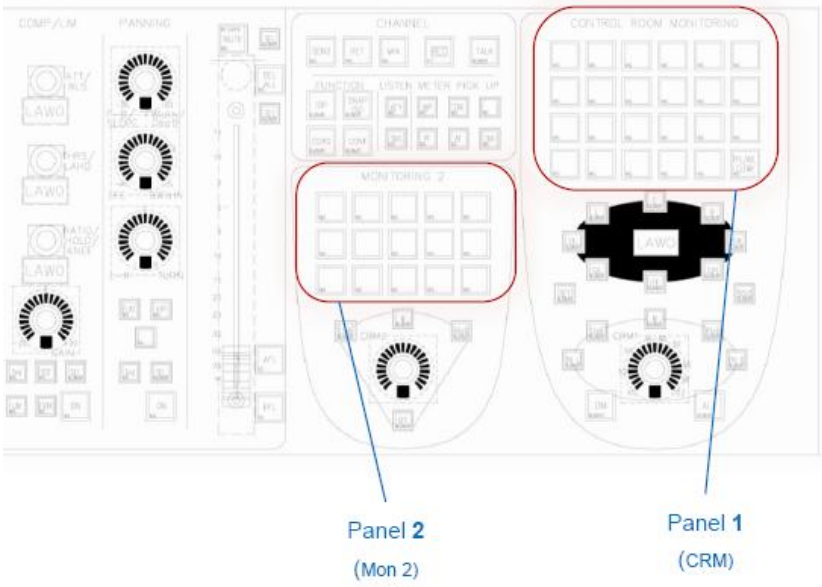
This panel type refers to the touch-screen user buttons on the Monitor Panel GUI:



mc²66 monitor panel (touch)

Classic mc²66

This panel type refers to the CRM 1 and CRM 2 monitor panels in the centre section. The panel index is as follows:

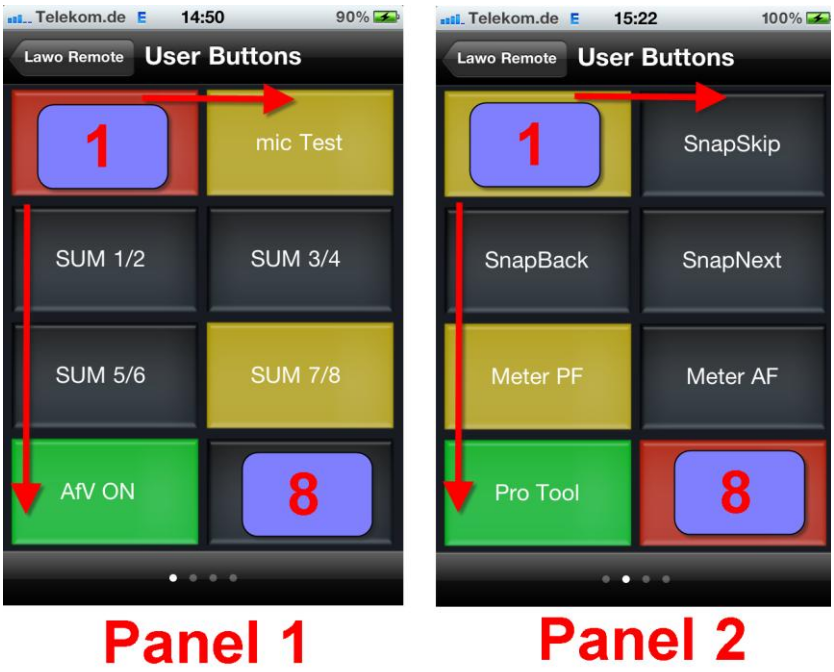


Buttons are numbered from left to right starting from top left through to bottom right.

Lawo Remote APP

This panel type refers the user buttons available from a device running the Lawo Remote App (iPhone, iPod or iPad).

The panel index and button numbering for the first two panels is shown below:

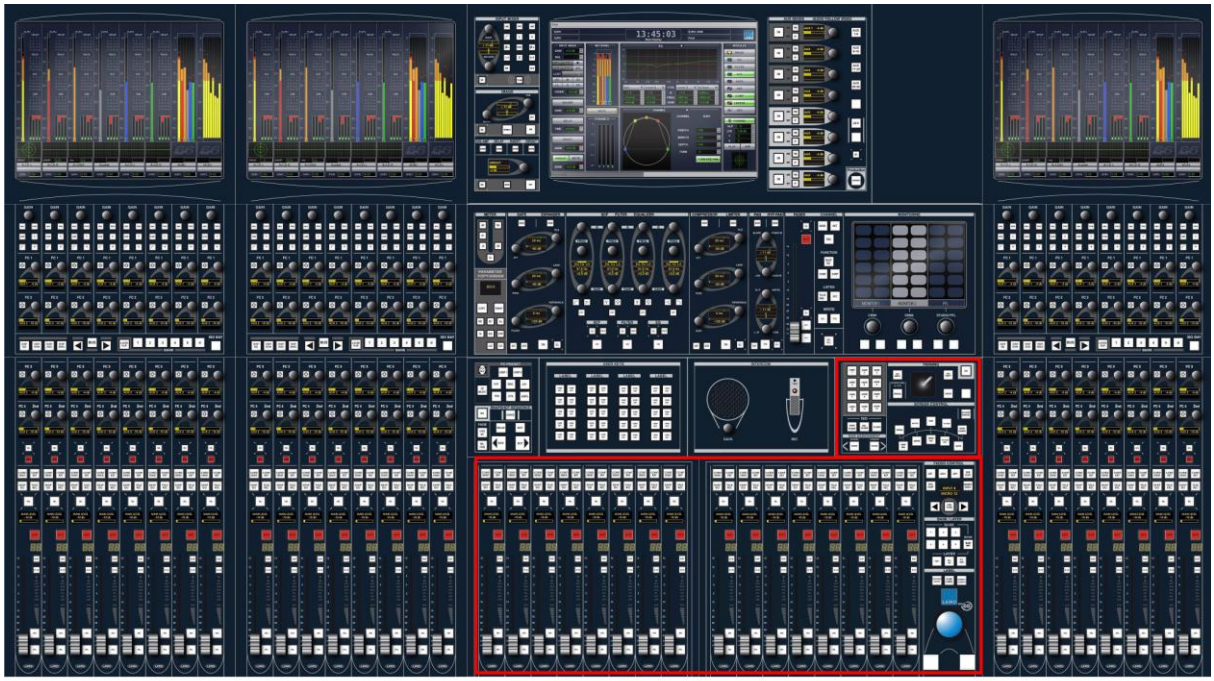


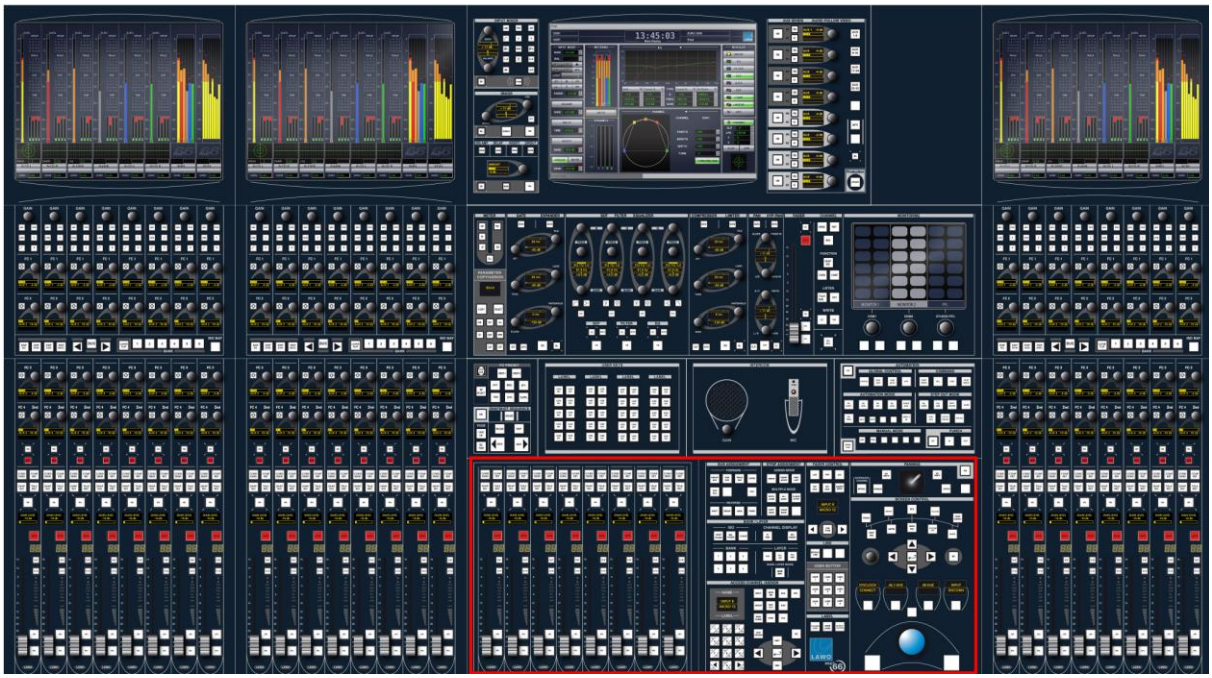
Up to four User Button panels may be configured.

Appendix F: Extra Faders Configuration

From Version 4.14 software onwards, the MKII mc²66 supports centre sections fitted with 16 main faders. With this configuration, the console can support up to 64 physical faders across the width of standard OB.

The examples below compare a 16+**16**+8 to a 16+**8**+8:

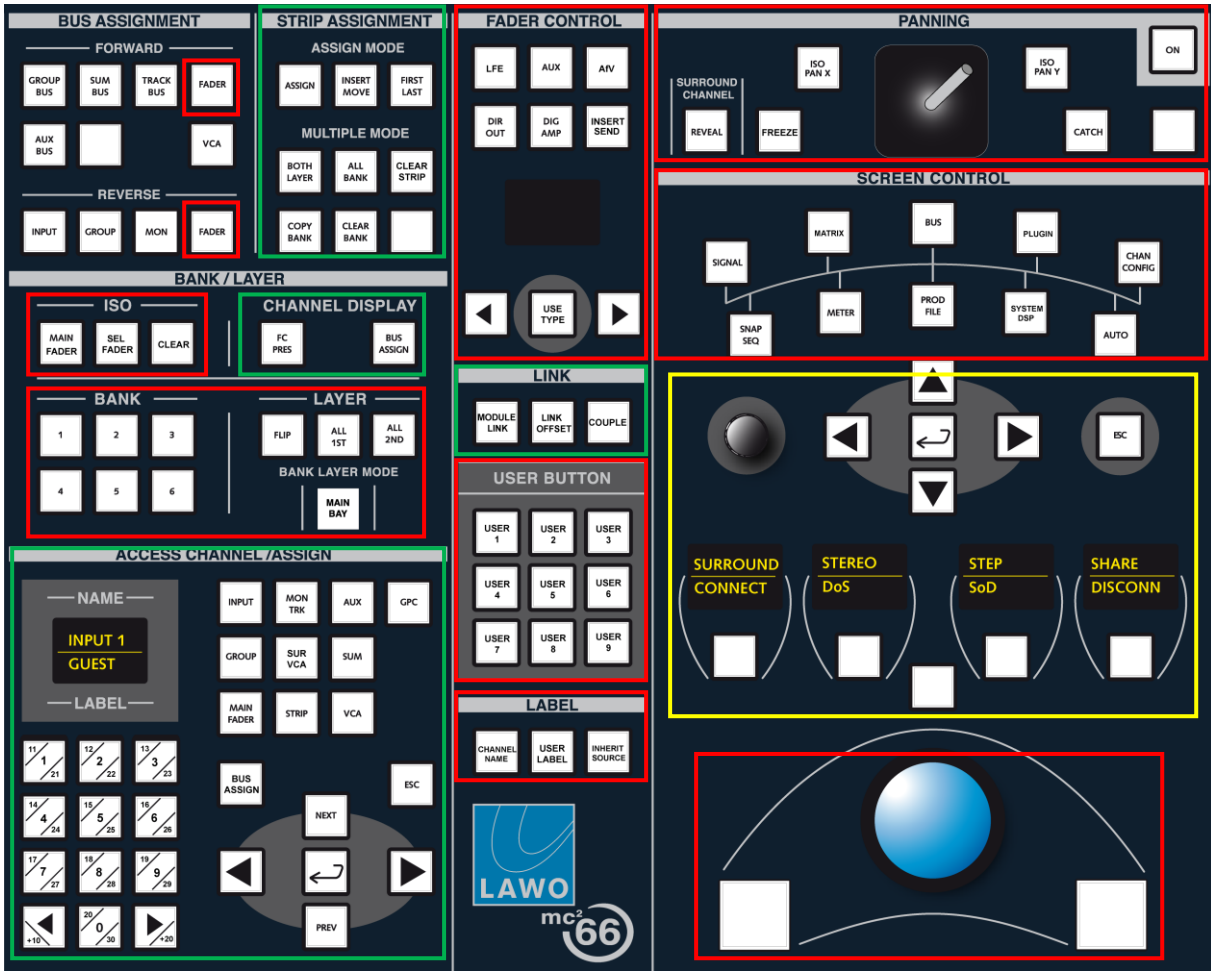




Full functionality is supported by both configurations. However, for 16 main fader consoles, there are some operational differences.

Operational Differences Summary

The extra main faders replace the ACCESS/ASSIGN and SCREEN CONTROL panel shown below:



Controls outlined in red can be found on one of the two new front panels fitted to a 16 main fader console (see later).

All other controls are operated from the touch-screen:

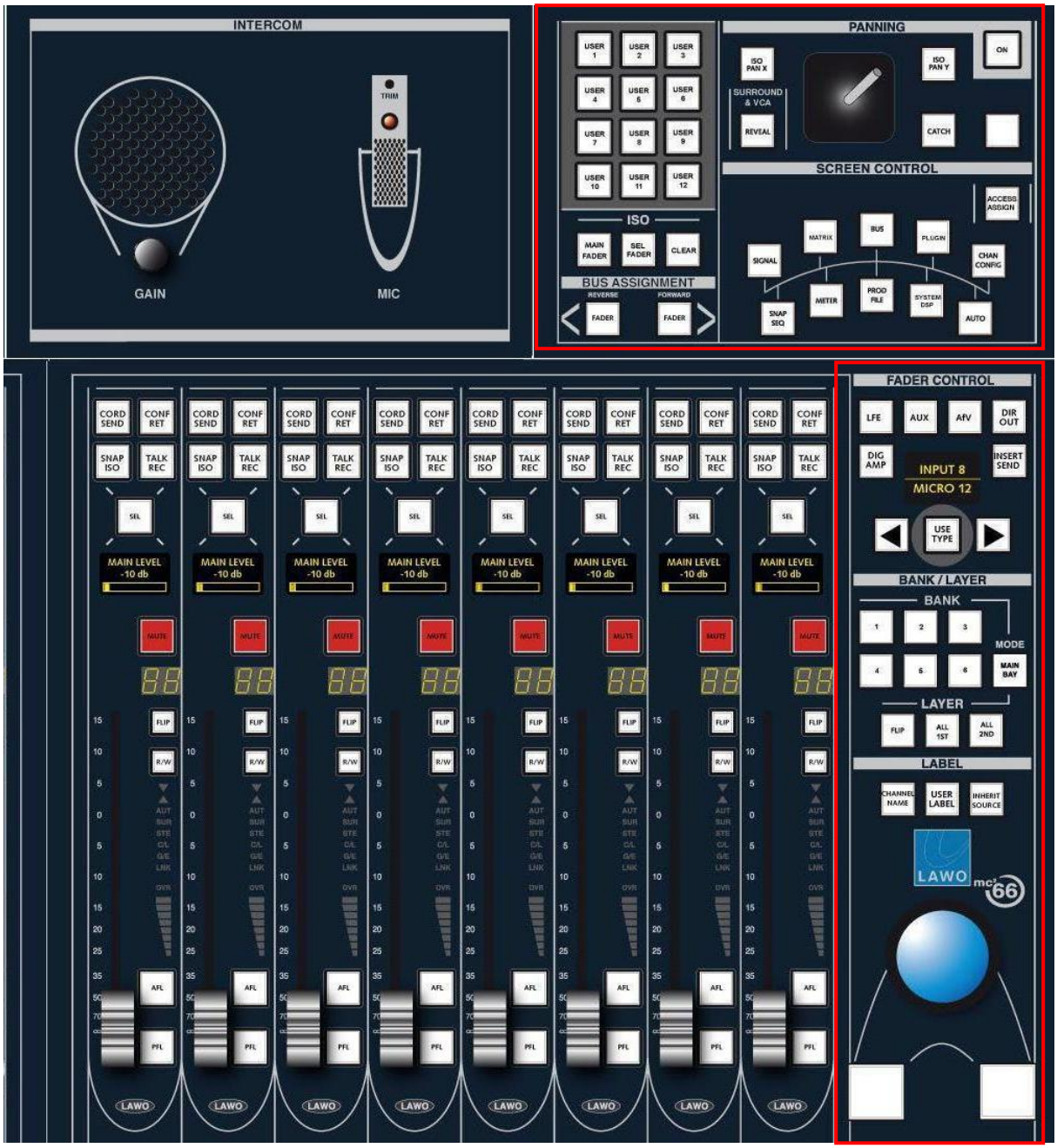
- Controls outlined in green can be found on the **ACCESS/ASSIGN** pop-up window which appears on the Monitoring touch-screen.
- Functions on the SCREEN CONTROL soft keys (outlined in yellow) are operated from the relevant Central Control Screen display.

Note that the **GROUP BUS**, **SUM BUS** and other channel type buttons on the BUS ASSIGNMENT panel have no alternate location, as all bus assignments can be performed using REVERSE **FADER** or FORWARD **FADER**.

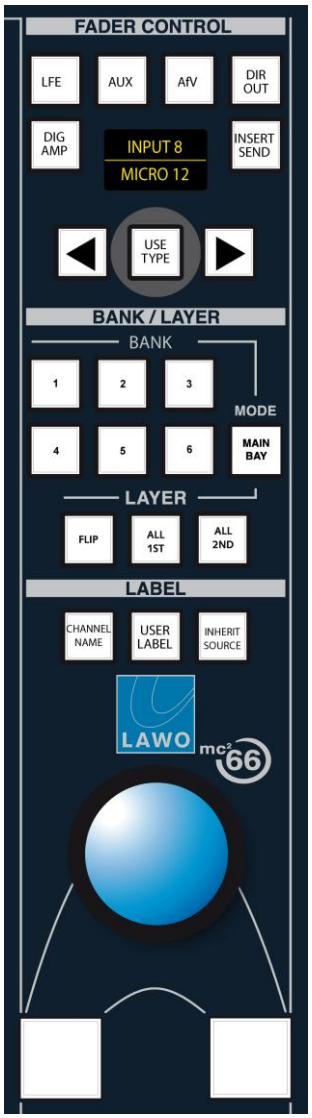
Alternative Front Panels

The following panels are fitted to a 16 main fader console:

- **User Panel Screen Control** – includes the joystick, Screen Control display selection and other functions.
- **Fader Panel Short Control** – includes the trackball, mouse keys and other functions:



Fader Panel Short Control

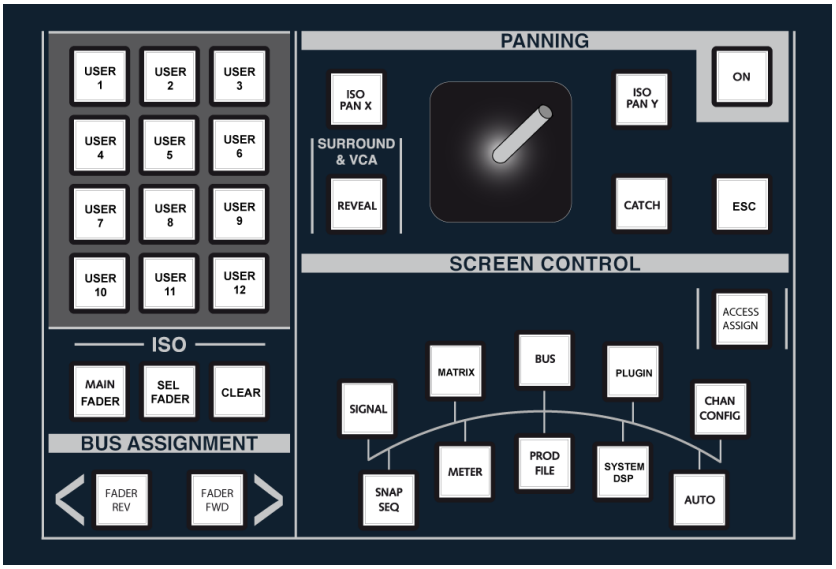


This panel contains:

- **FADER CONTROL** – see Page 364.
- **BANK/LAYER switching** – see Page 134.
- **LABEL switching** – see Page 368.
- **Trackball and mouse keys** – see Page 47.

The operations are identical to those on a standard 8 main fader console.

User Panel Screen Control



The User Panel Screen Control *MUST* be fitted as one of your three user panel options. It may be positioned in any of the three user panel slots but makes most sense on the right above the trackball and below the Monitoring panel.

This panel contains:

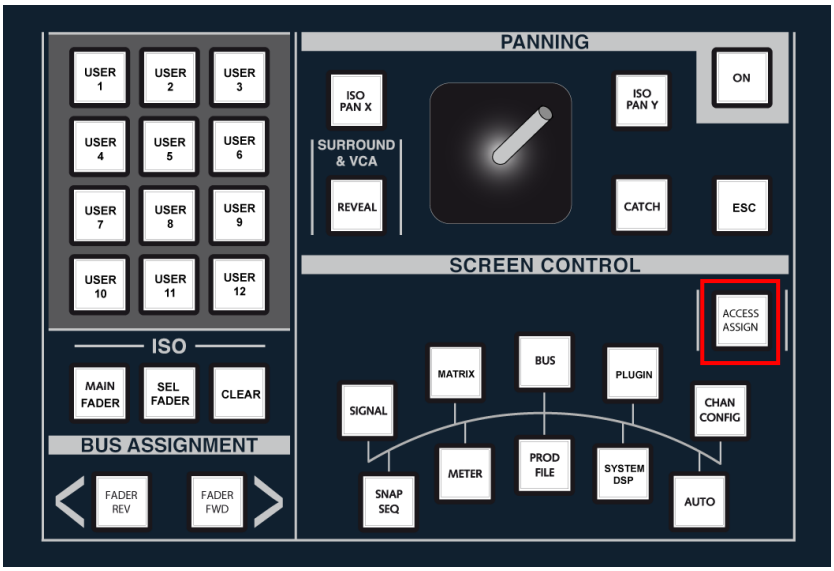
- **USER buttons** – see Page 366. (There are 12 user buttons, as opposed to the 9 on a standard console.)
- **ISO fader functions** – see Page 140.
- **BUS ASSIGNMENT** – see Pages 65 and 167.
- **PANNING** – see Page 225. (Note that the **FREEZE** function is *NOT* supported.)
- **SCREEN CONTROL** – see next page
- **ACCESS/ASSIGN** – see next page.

Screen-operated Functions

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

ACCESS/ASSIGN Window

1. Press **ACCESS ASSIGN** button on the User Panel Screen Control:



The ACCESS/ASSIGN window appears on the Monitoring touch-screen above the User Panel:

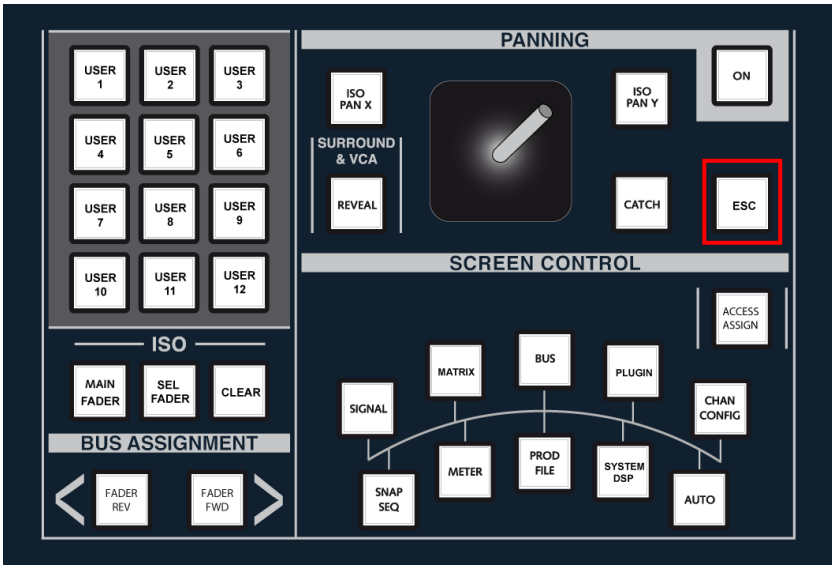
2. Touch the on-screen buttons to operate the functions in the usual manner.

The operations are identical to those on a standard console:

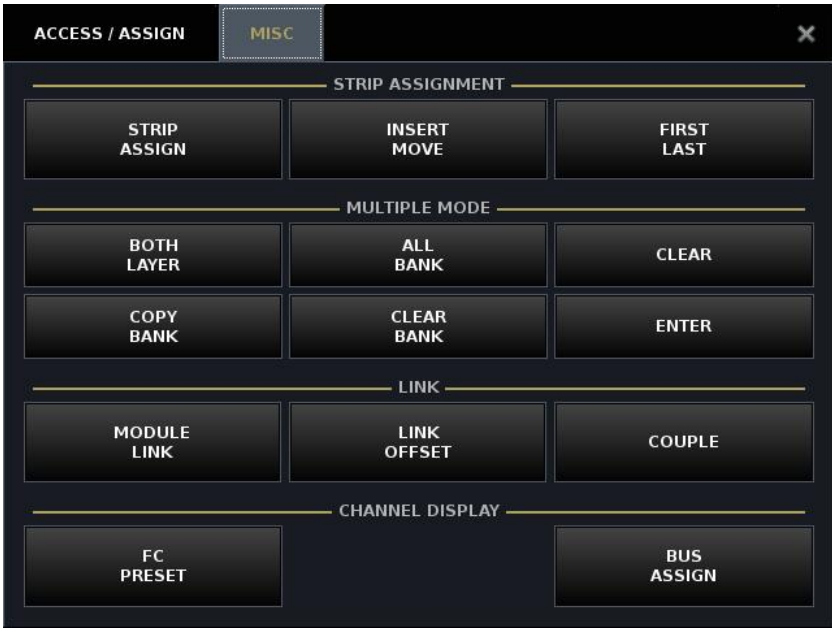
- **ACCESS/ASSIGN** – see Page 37.
- **STRIP ASSIGNMENT** – see Page 147.

Tip

Use the **ESC** (Escape) button on the PANNING panel to cancel an active function.



3. Touch **MISC** to tab to a second page of functions:



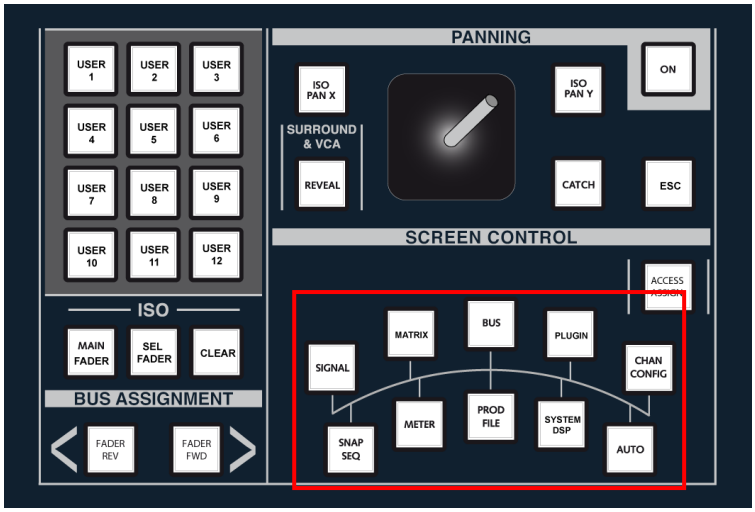
- **STRIP ASSIGNMENT** and **MULTIPLE MODE** – see Page 147.
- **LINK** – see Page 353.
- **CHANNEL DISPLAY** – see Page 367.

4. Touch the **X** at the top right, or deselect the **ACCESS/ASSIGN** button to cancel the window.

The touch-screen returns to displaying Monitoring functions.

SCREEN CONTROL Functions

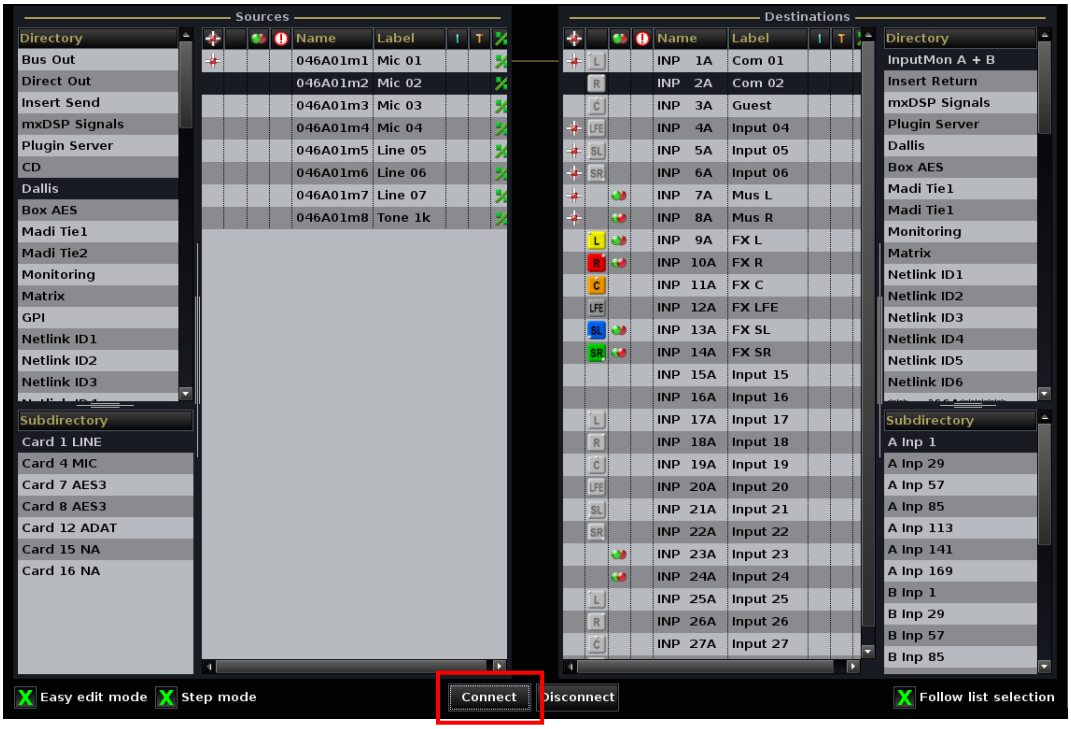
The User Panel Screen Control provides display selection buttons for fast access to the SCREEN CONTROL displays:



1. Press a button to cycle through the available pages.
2. To navigate within each display, use the trackball or touch-screen.
3. To action a function, either touch or select the on-screen button.
4. Or, right-click to reveal further options.

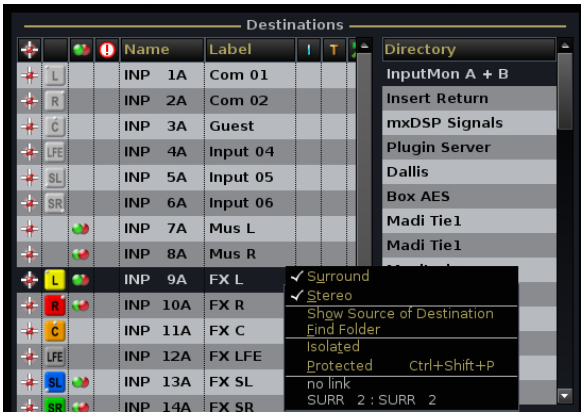
For example, to make a route from the **Signal List** display:

1. Select your source and destination.
2. Then select the **Connect** button:



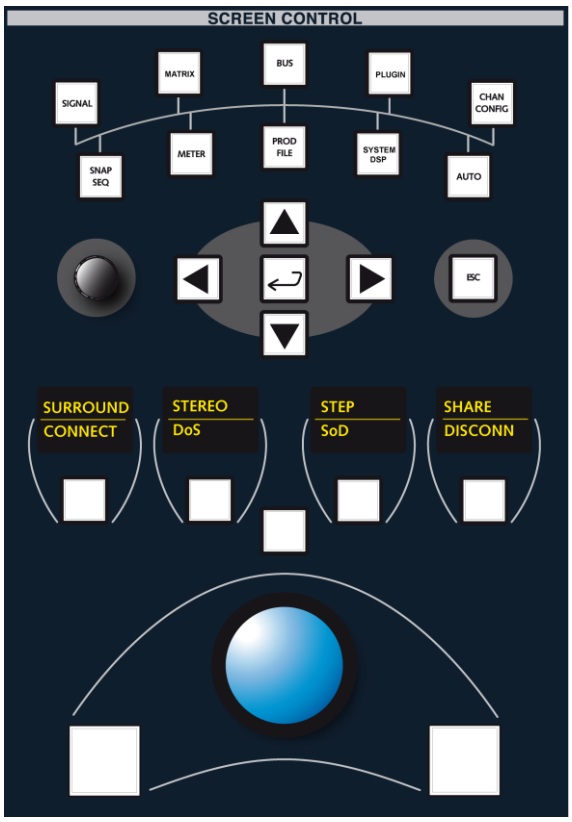
To access other “hidden” options:

1. Select a signal using the trackball and left mouse key.
2. Press the right mouse select button (right-click):



3. Select an option using the trackball and left mouse key to change its state.

Note that on a standard 8 main fader console, these options appear on the SCREEN CONTROL panel soft keys:



Therefore, whenever you read “press the XXXX soft key” throughout this manual, you should look for an equivalent on-screen button, or right-click drop-down menu.

You can find more details on SCREEN CONTROL operation on Page 40.

Appendix G: Broadcast and Recording Channels Summary

From Version 4.16 software, DSP configurations come in a choice of two channel types:

- **Broadcast Channels** – doubles the number of channels per DSP card, with a simplified signal flow ideal for live broadcast applications.
- **Recording Channels** – operate in the same way as previous software releases. These channels provide more processing modules and flexibility.

The type of channel is selected globally for the console when you choose a configuration from the **DSP Configuration** display, see Page 122. Each DSP configuration supports only one channel type; you cannot mix Broadcast and Recording channels.

Broadcast channels are *NOT* supported if:

- Your system is running at higher sample rates such as 88.2 or 96kHz.
- Your system uses a 3K MkI Router module (used in some classic mc^{2}66 systems).
- Your system has DSP 983/02 cards (Broadcast channels are only supported by DSP 983/03 cards).

Note

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).

On classic **mc^{2}66** systems, you may see a slow down on the console's graphical displays if you run more than 4 DSP cards with a Broadcast channel DSP configuration. The slow down only affects graphical updates to displays, such as the **Channel Display**, and does not affect the real-time processing of audio.

Note

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 Admin HD, in order to access the additional input channels, groups and sums.

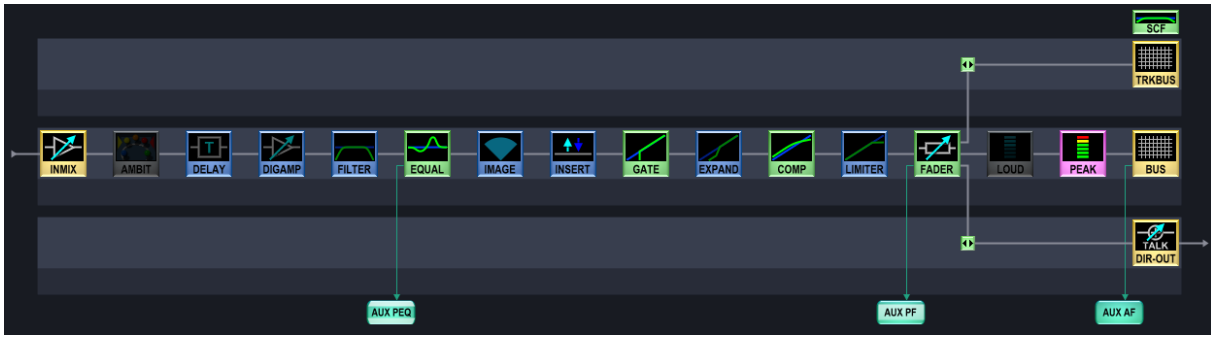
The main differences between the channel types are that a Broadcast channel has no track bus send, no Filter section and simplified Dynamics, with a choice of Gate, Expander and Compressor (known as Combi-Dynamics) *or* Limiter.

All the differences between Broadcast and Recording channels are summarised in the following table and diagrams:

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: **GATE** **EXPANDER** **COMPRESSOR** **LIMITER**	**Combi-Dyn** OR **Limiter** ✓ × ✓ × ✓ × × ✓ In Combi-Dynamics, the GATE, EXP and COMP move together within the channel signal flow. Each section can be turned on/off separately, but thresholds cannot overlap; the 3 sections share one Look Ahead Delay value.	4 independent dynamics ✓ ✓ ✓ ✓ Each section can be positioned independenty with separate on/off. There are no limitations on threshold values, and each section has its own Look Ahead Delay. You can also apply an external key and/or sidechain filtering.
FADER (Level, Mute, AFL, PFL)	✓	✓
LOUD (Loudness Meter)	✓ Suspends selected DSP modules.	✓ Suspends selected DSP modules.
PEAK (Peak Metering)	✓	✓
TRKBUS (Track Bus Send)	×	✓
BUS (Main Bus Send)	✓	✓
DIROUT (Direct Out)	✓	✓
Aux Sends: Pre EQ Pre Fader Post Fader (AF)	 × ✓ ✓ (after fader)	 ✓ ✓ ✓ (pre-bus)

Input Channel (Broadcast channel DSP Configuration)

Input Channel (Recording channel DSP Configuration)



For specific details on operation, please refer to Chapter 4.

Technical Data

Control Panel

- Frames from 16 +8 faders to 96+16 faders.
- Extender bays may stand alone from the main frame.
- 6 banks each with 2 layers.
- 100 mm faders + 5 rotary controls per fader strip.

Signal processing

- Up to 768 channels and 144 summing Busses, 40bit floating point.
- Delay up to 1800 ms, units in frm, ms and m.
- Surround formats: DTS/Dolby Digital 5.1, Dolby Prologic 4.0, DTS ES/Dolby EX 6.1, SDDS 7.1, DTS-HD 7.1, diverse panning characteristics.
- 8-wide AFL bus.
- Stereo PFL bus.
- 32 AUX sends.
- Audio Follow Video with up to 128 events.
- Solo in place.
- Permanent Input measuring point in the fader; adjustable measuring points INPUT, PF, AF DIROUT in the channel display.
- Modules: INMIX, DIGITAL AMP, 2-band fully parametric FILTER, 4-band fully parametric EQ, INSERT, DELAY up to 1800ms, EXPANDER, GATE, COMPRESSOR, LIMITER, IMAGE, METER, DIRECT OUT.
- AMBIT: conversion of stereo signals to surround
- Loudness metering: full integration complying with ITU-R BS.1770

Routing Matrix

- Up to 8192 cross points.
- 96kHz.
- 24 bit.

Interfaces

- Mic/Line, Line Out, AES, SDI, Madi, ATM, GPIO, serial (for further information see the DALLIS manual).
- Monitoring systems - stereo and surround.

Synchronisation

- Black & Burst, Wordclock, AES3, MADI with automatic switching.

Redundancies

- PSUs, DSP boards, Router board/Control System, DALLIS boards.
- PSU for control system and control panel.

Control

- Mix-minus control with two conference systems.
- Diverse tally- fader start modes.
- Program switch.
- Audio Follow Video.
- Manifold T/B integration.

External control systems

- External matrix controller VSM, BFE, Jupiter.
- Lawo TCL.

Remote Maintenance

- Link via ISDN or VPN.
- Software updates, error diagnostics, remote.

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