

# ruby

## User Manual

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# 1. Introduction

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Welcome to **ruby**.

## About this Manual

This document describes all aspects of the ruby control surface, including its hardware components, installation, connections, operation and maintenance.

The surface requires a DSP Core such as Power Core and, optionally, may run with a VisTool MK2 touch-screen interface. You can find more information on these products in the relevant manuals.

Look out for the following which indicate:

**Notes** - points of clarification.

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

**Attention** - alert you when an action should *a/ways* be observed.

## Further Information

Mechanical drawings and data sheets (including weights and dimensions) are available from the **Download-Center** (after login).

## Lawo User Registration

For access to the **Downloads** area and to receive regular product updates, please register at:

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

## 2. Important Safety Instructions

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Please observe all of the instructions provided in the "General Safety Information for Lawo Equipment" booklet delivered with your devices. Double-click [here](#) to open the information as a pdf.

## 3. The Hardware

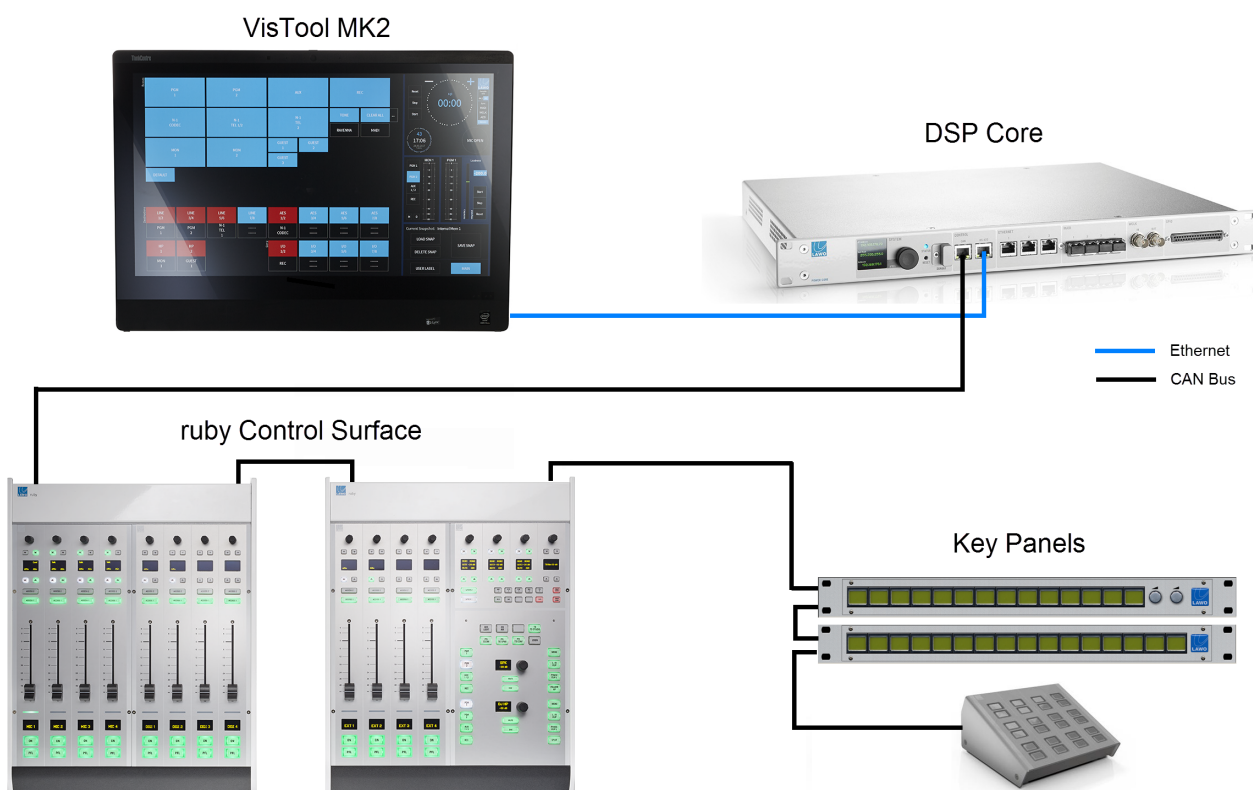
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This chapter describes the hardware components and options.

Topics include:

- [System Components](#)
- [DSP Core Compatibility](#)
- [Controls Overview](#)
- [Control Surface Variants](#)

### 3.1 System Components



A complete system consists of up to four components:

- **ruby Control Surface** (essential) – available in single or split-frame configurations.
- **DSP Core** (essential) – all audio interfacing, routing, control and signal processing.
- **VisTool MK2** (optional) – runs on an external PC to provide real-time displays and touch-screen control.
- **Key Panels** (optional) – a range of panels offering additional keys and talkback control.

This document describes the ruby control surface.

For more information on other components, such as the DSP Core or VisTool MK2, please refer to the manuals for those products.

### 3.2 DSP Core Compatibility

The ruby control surface is compatible with the following DSP Core products:

	<p><b>RUBY</b></p> 
<p><b>POWER CORE</b></p> 	<p>YES</p>
<p><b>COMPACT ENGINE</b></p> 	<p>4 - 16 Fader + Centrale Module (sapphire compact limits)</p>
<p><b>NOVA 17</b></p> 	<p>YES</p>

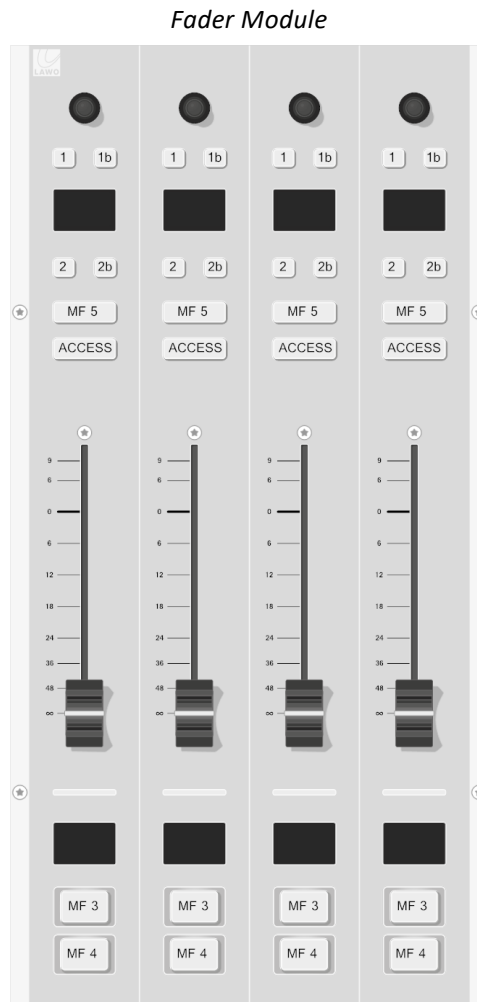


### 3.3 Controls Overview

Each control surface consists of at least one Fader Module (with 4 fader strips) and one Central Module (running in full mode).

Some of the control functionality is fixed (system-defined), while some is programmable by the configuration.

#### 3.3.1 Fader Module (954/45)



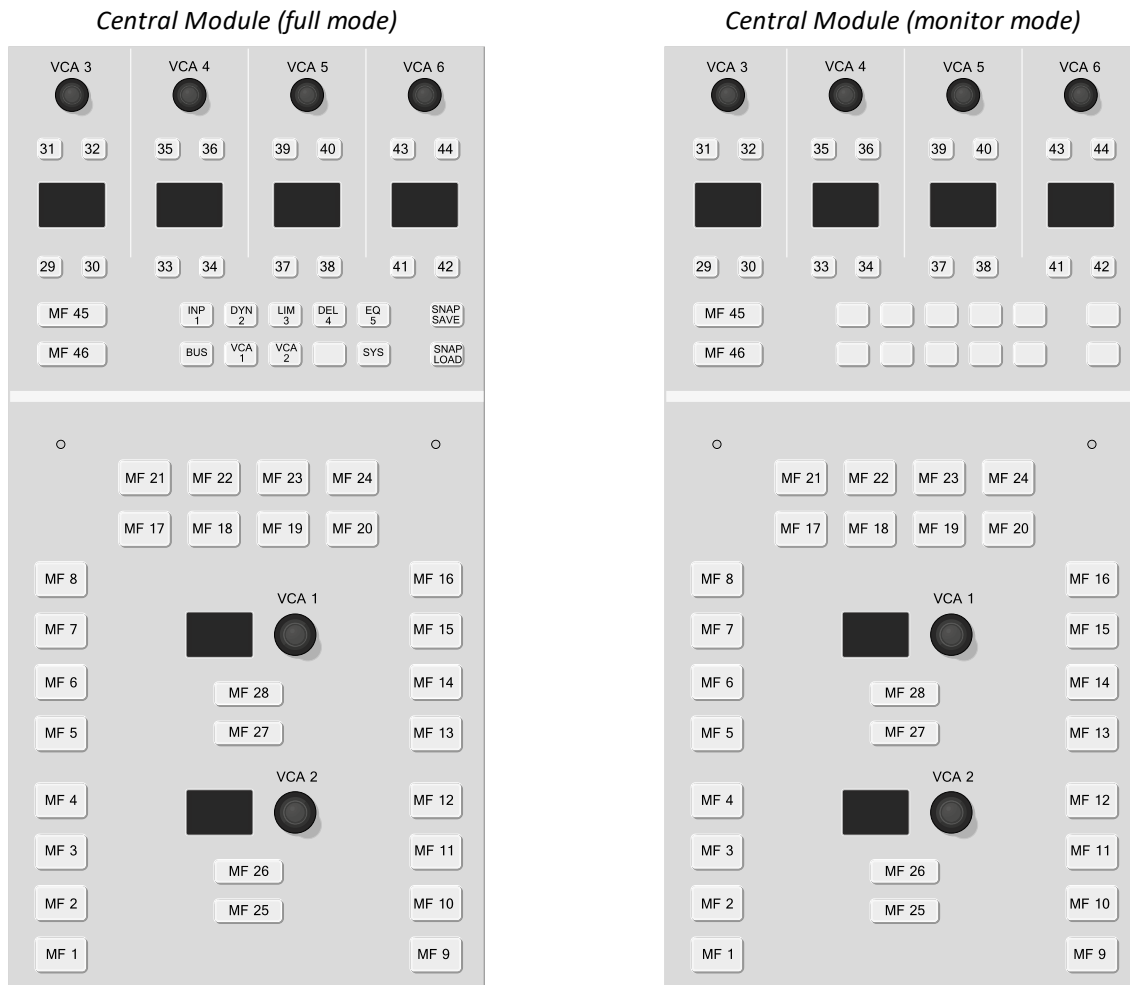
Each Fader Module provides four identical fader strips, each with an **ACCESS** key, 100mm motorised fader, backlight and label display.

The upper section includes a rotary control and four small MF Keys (1, 1a, 2, 2a). Their functions are labeled by the OLED displays.

There are then three large MF Keys (3, 4, 5) with foil-printed labels.

All MF Keys are defined by the configuration.

### 3.3.2 Central Module (954/50)



#### Central Module (full mode)

The upper section includes four sets of rotary encoders and small MF Keys which interact with the 12 Function Buttons: **INP**, **DYN**, **LIM**, etc. Their functions are labeled by the OLED displays. When none of the Function Buttons are active, the controls are defined by the configuration (MF Keys 29 to 42 and VCAs 3 to 6). When a Function Button is pressed, then the controls provide DSP parameter control, bus assign, system options and snapshots. To the left are two large MF Keys (45 & 46) with foil-printed labels.

In the lower section are more large MF Keys (1 to 28) with foil-printed labels, and two rotary encoders (VCAs1, 2) which are labeled by the displays.

All MF Keys and VCAs are defined by the configuration.

#### Central Modules (monitor mode)

Physically, these modules are identical to the full mode Central Module, but in the upper section the 12 Function Buttons are NOT supported. This means that there is no access to DSP parameters, bus assign, system options and snapshots.

All MF Keys and VCAs are defined by the configuration. Note that the 12 Function Buttons cannot be reprogrammed by the configuration and, therefore, will remain blank.

### 3.3.3 Programmable Functions

Programmable controls, such as MF Keys and VCA encoders, are defined by the configuration stored on the DSP Core. They can be edited using the ON-AIR Designer software, allowing you to change the operation as required.

In most cases, the large MF Keys are labeled by foil-printed labels and, by default, the control surface ships with the labels for the standard template functions. If you change the MF Key functionality, then you will need to exchange the foil-printed labels. Printed sheets with the most common labels are included with each control surface frame.

### 3.4 Control Surface Variants

8-fader single frame



12-fader split-frame



ruby can exist as a single or multi-frame control surface.

A choice of four main and five extender frames are available. Frames can be combined to increase the fader count or create a split-frame surface.

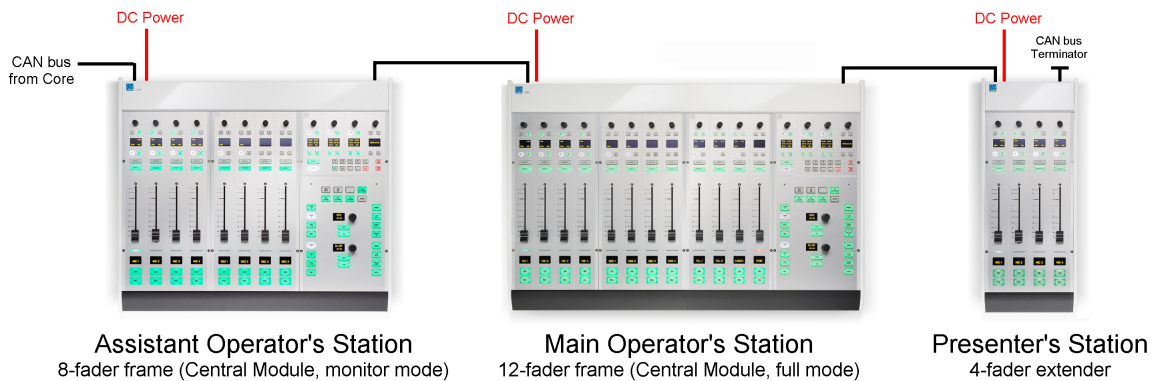
In total, the control surface can include any number of frames as long as the maximum number of faders does not exceed 60.

When connected to a standard DSP Core, the control surface must include a Central Module but this can exist only once. Thus, any additional Central Modules run in "monitor mode". In this instance, the surface supports up to 60 faders, a single Central Module (full mode) and up to 6 Central Modules (monitor mode).

If the DSP Core is a Power Core Max, then up to four full mode Central Modules are supported. In this instance, the surface supports up to 60 faders plus any of the following full/monitor mode Central Module combinations: 4+3; 3+4, 2+5; 1+6.

Each frame connects to the DSP Core via CAN bus, and is powered from its own 12V DC power supply (included). All frames include **CAN IN** and **CAN OUT** connectors for easy daisy-chaining. In each case, the CAN bus address of a module defines its functionality. Thus, frames can be wired in any order.

Split-frame Example



#### 3.4.1 Main Frame Layouts

Each of the main frame layouts includes a Central Module.

4-fader



8-fader



12-fader



16-fader



### 3.4.2 Extender Frame Layouts

The extender frames can be added to increase the fader count or create a split surface.

4-fader extender



8-fader extender



12-fader extender



16-fader extender



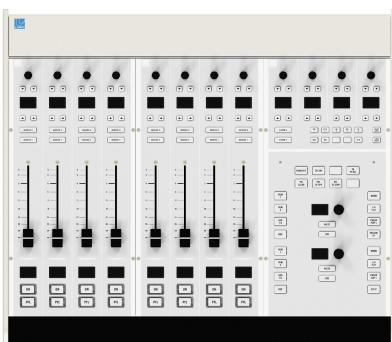
Central Module  
ext.



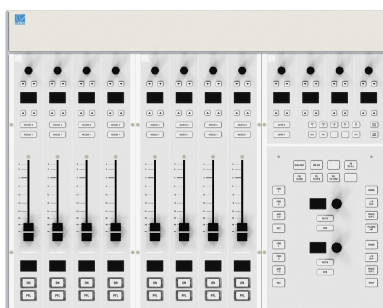
### 3.4.3 Placement Options

Each frame is available in one of three versions to provide different placement options. The version *must* be specified at the time of ordering; there is no possibility to convert the frame later.

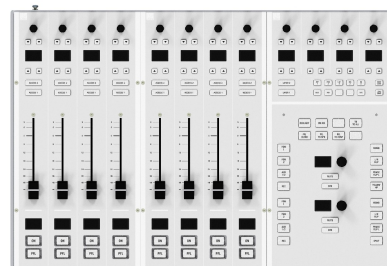
Table Top



Countersunk



Countersunk Short



The differences in construction are:

- **Table Top** - designed for table-top placement. This version includes a leather front buffer and stylish side/rear profiles.
- **Countersunk** - designed to fit flush within your studio furniture. This version comes with different front, rear and side profiles.
- **Countersunk Short** - the same as Countersunk but with shorter side profiles and no upper cover plate to hide the cables (i.e. the rear panel connectors will be visible).

Table Top Surface (rear view)



## 4. Installation

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This chapter describes how to install the control surface.

Topics include:

- [Packing List](#)
- [Preparation](#)
- [Installing Countersunk Frames](#)
- [Exchanging the MF Key Labels](#)
- [Grounding & Power](#)
- [Wiring](#)

### 4.1 Packing List

Each control surface frame ships with the following additional items:

- 1 x external 12V DC power supply - to power the frame.
- 1 x 2m IEC power cable (country-specific) - to connect mains to the 12V DC power supply.
- 1 x 3m RJ45 cable - to connect the CAN bus from the surface to the DSP Core or another frame.
- Printed sheets with "OFF" key foil printed labels (required for Button Start consoles only) - to re-label the fader strip MF Keys.

If the surface consists of multiple frames, then you will receive one set of accessories per frame (as every frame requires its own power, CAN bus and MF Key labels).

## 4.2 Preparation

A single control surface can consist of one or more frames.

### Unpacking

Each frame is delivered in its own box with all included accessories.

Please check the contents of the shipping boxes, and in the event of any transport damage, contact your local Lawo representative or email [support@lawo.com](mailto:support@lawo.com). A list of serial numbers for all components is included with the shipment. Please keep this list for your records.

### Dimensions and Weight

The dimensions and weight of the frame depend on its size and version: table-top, countersunk or countersunk short. Drawings for all frame variants are available from the **Downloads** area at [www.lawo.com](http://www.lawo.com) (after **Login**).

### Temperature and Cooling

The control surface is designed for normal studio installation and needs no special air conditioning.

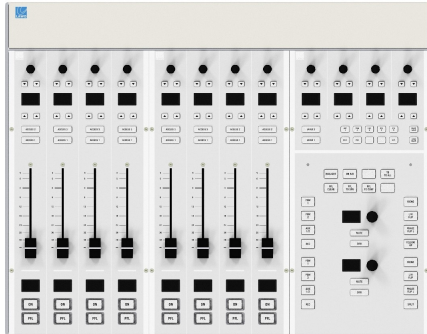
### Power Consumption & Electrical Voltage

Please see the [12V DC Power Supply](#) appendix.

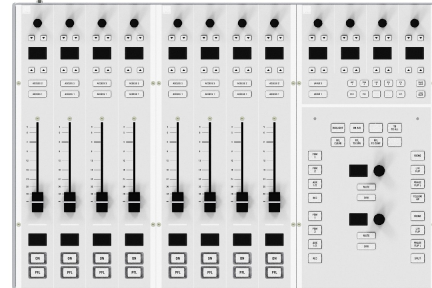


### 4.3 Installing Countersunk Frames

*Countersunk*



*Countersunk Short*



These consoles are optimized for easy countersunk mounting.

The frame has rounded-off edges so that it will fit smoothly into holes cut by a wood milling machine.

For the countersunk (regular) version, all cables can be hidden in the cable tray and connected to the console inlets from the open underside of the tray.

For the countersunk short version, the table must be designed to provide a small opening in order to properly cable the device.

All countersunk frames have flat side parts without edges. Therefore, the installer must provide some kind of support onto which the surface will rest.

Please see the [dimension drawings](#) for details.

## 4.4 Exchanging the MF Key Labels

The functions of the MF Keys are defined by the ON-AIR Designer configuration. Printed sheets with the most common labels are shipped with each frame.

To replace a label:

1. First remove the button cap.

It helps to use a small screwdriver to lift up the button cap (as the caps are recessed). However, you must take care not to scratch the surface.

2. Insert the foil plate between the button body and the transparent button cap.
3. Fasten the button cap back onto the button body by pressing it!

The photos below are taken from a ruby surface, but the procedure is identical for crystal and sapphire.

*Remove Button Cap*



*Insert Printed Foil*



*Label Exchange Complete*



## 4.5 Grounding & Power

8-fader ruby Surface (rear view)



### 4.5.1 Grounding

Although operator protection is guaranteed, it is best to establish an additional ground for EMC reasons. On the control surface, a grounding screw is provided beside the **CAN** bus connector:

1. Use the M4x8 **CASE** screw to fasten the grounding cable to the housing.

Each control surface frame must be on the same potential as all other system devices.

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

### 4.5.2 Power

The control surface is powered by its own external 12V DC power supply (955/50-80). This is an identical supply to the one used by Power Core. The PSU is delivered with its own IEC power cable (country-specific).

For dimensions, weight and electrical specification, see the [12V DC Power Supply](#) appendix.

➤ To connect DC power to the surface:

1. Connect the 12V DC power supply to the **DC IN** connector on the rear panel.
2. Using the IEC cable provided, connect your AC mains to the PSU.

The device *MUST* be connected to the mains using the power cable supplied with the system.

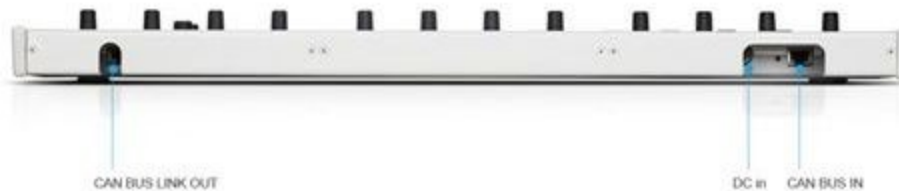
The surface has no on/off switch and starts automatically when power is applied.

## 4.6 Wiring

Each control surface frame requires two connections: power and CAN bus. Please see [Connector Pin-Outs](#) for pinning information.

All connectors are positioned on the rear panel, and so you must make sure that these are accessible. In the table-top and countersunk versions, the cable tray has an open underside and rear access holes:

*Table Top Surface (rear view)*



### 1 CAN Bus (CAT 5e)

The CAN ports connect the control surface to the DSP Core and any extenders or key panels.

All CAN bus connections must be point-to-point; a switch or hub is not allowed. Use a standard (straight 1:1) network cable: STP-CAT 5e with RJ45 connectors. Every frame is delivered with a suitable cable.

The maximum length of the CAN bus connection is 60 meters.

The CAN bus can be hot-plugged and so the cabling can be performed while the frames are powered.

### 2 DC In

See [Grounding & Power](#).

### 4.6.1 CAN Bus Cabling

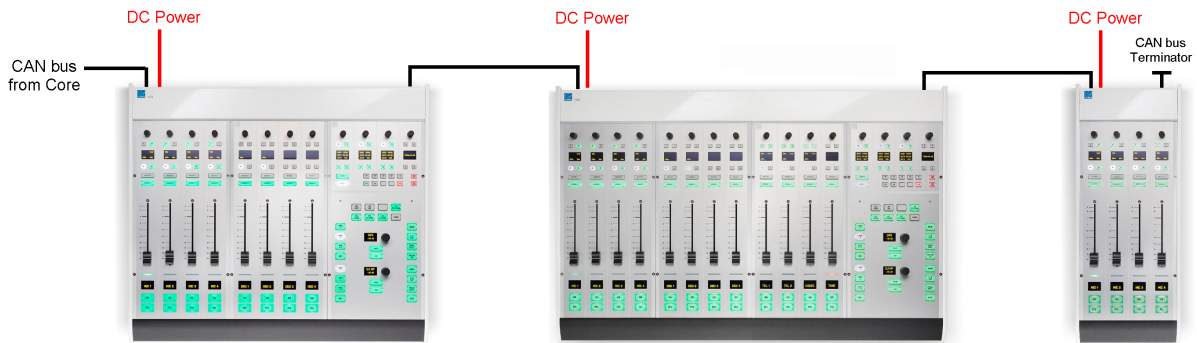
#### ➤ To connect a single frame:

1. Connect the DSP Core's **CAN** connector directly to the control surface **CAN BUS IN**.
2. Fit the CAN bus terminator supplied with the system to the **CAN BUS LINK OUT**.

## 4. Installation

### ➤ To connect multiple frames:

The CAN bus must be looped in a daisy chain fashion:



1. Start by cabling the DSP Core's **CAN** connector to the first frame's **CAN BUS IN**.
2. Then loop the first frame's **CAN BUS LINK OUT** to the **CAN BUS IN** connector on the next frame.
3. Continue to loop the CAN bus through the remaining frames (and any optional key panels). They may be connected in any order.
4. On the last frame or key panel in the chain, fit the CAN bus terminator supplied with the system.

## 5. System Setup

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This chapter describes how to set up the control surface.

Topics include:

- [Powering On the Device](#)
- [Can Bus Settings](#)

### 5.1 Powering On the Device

The ruby surface has no on/off switch and starts automatically when [power](#) is applied. You will see an initial flicker of LEDs on the control surface modules.

The console will be ready for operation once it is connected to the DSP Core (via CAN bus), and the DSP Core is booted and properly configured. These steps are described in the manual for your DSP Core.

## 5.2 Can Bus Settings

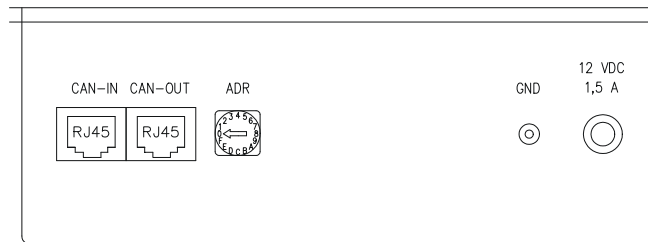
Each control surface module and key panel has two CAN bus settings: CAN bus speed and CAN bus address. Both settings are defined in the system configuration *and* on each physical module. They *must* match exactly to ensure correct operation.

The system configuration is edited using the **ON-AIR Designer** software:

- **CAN bus speed** is defined in the Project window.
- **CAN bus address** is defined in the Frames -> Surface window.

The settings stored on each physical module are edited using the [special functions mode](#).

On older Key Panels, you will find an **ADR** (Address) rotary selector beside the **CAN-IN** and **CAN-OUT** RJ45 connectors. Using a screwdriver, turn the rotary selector to set the CAN bus address.



### 5.2.1 CAN Bus Speed

The CAN bus speed defines the maximum distance which you can run the cables. A CAN speed of 500 kbit/sec is recommended.

Transfer Speed	Maximum Distance
500 kbit/sec (recommended)	60 m
100 kbit/sec	300 m

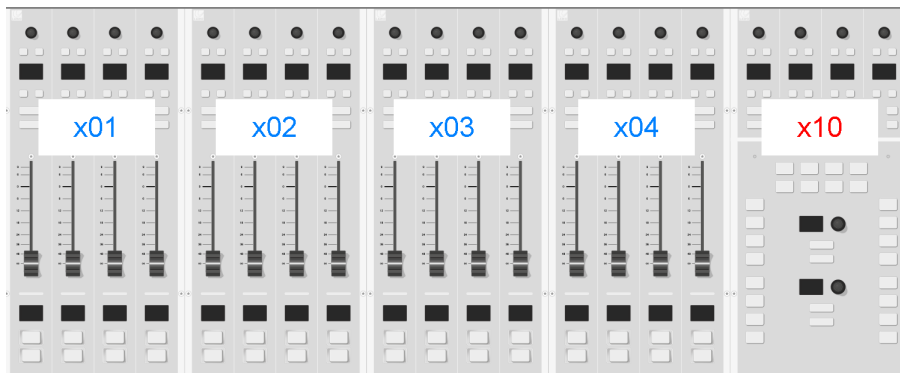


## 5.2.2 CAN Bus Addressing

The CAN bus address, also known as the Frame ID, is a unique address which defines the role of each control surface module within the system. For **ruby**, the following options are supported:

- **Address 01 to 0F** (hexadecimal) can be assigned to Fader Modules.
- **Address 10** (hexadecimal) is *always* assigned to the first full mode Central Module. Every layout includes this assignment.
- **Address 11** (hexadecimal) is not available for assignment.
- **Address 12 to 17** (hexadecimal) can be assigned to additional Central Modules:
  - For a standard DSP Core, these must run in monitor mode.
  - For Power Core Max, hex address 12 to 14 can run in either full or monitor mode; hex address 15 to 17 must run in monitor mode.

*Frame -> Surface: CAN Bus Addresses (hexadecimal)*



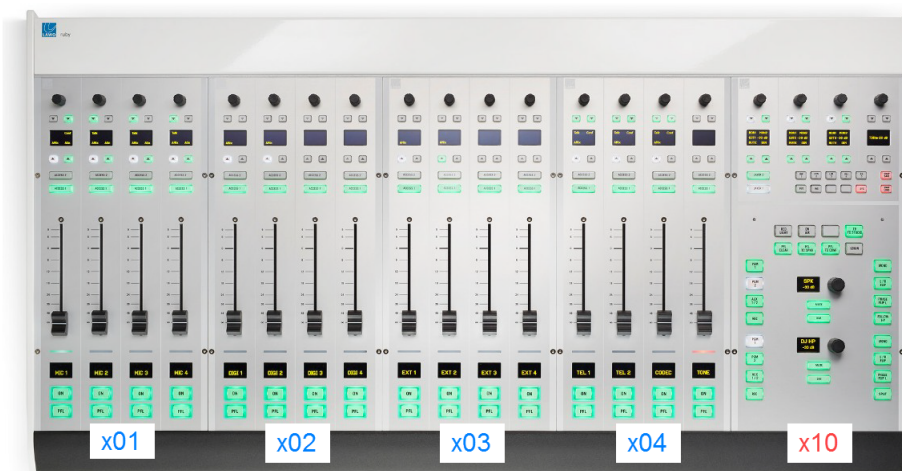
Each address must be unique, so do not assign the same address to more than one module. If you do so, this can lead to control conflicts and odd behaviour of the surface.

To mirror faders or other controls, use the programmable logic features of the DSP Core, such as "fader mapping" or "source replication".

### Single-frame Consoles

By default, each control surface frame ships with the following CAN bus addresses: the first Fader Module on the left = hex address 01; the next Fader Module = hex address 02; and so on; the Central Module = hex address 10. Thus, for a single-frame console there is usually no further action required, as the modules will map correctly to the configuration.

*Console: CAN Bus Addresses (hexadecimal)*

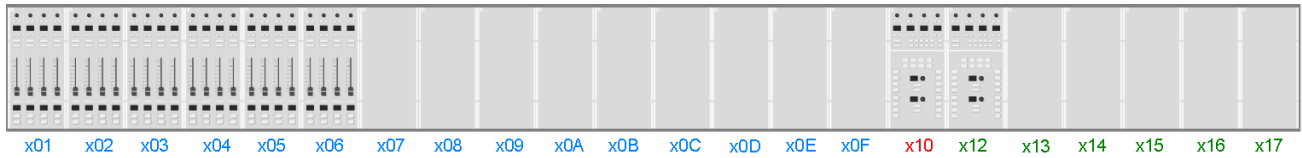


### Split-frame Consoles

For a split-frame surface, you will need to adjust the CAN bus addresses on the additional frames so that they match the configuration supplied with the system. An example is shown below.

In this instance, the Frame -> Surface configuration does not look anything like the physical console, as it is the CAN bus addresses which define the functionality. In our example, the surface on the left controls faders 1 to 24 (in two layers); while the surface on the right controls faders 25 to 48.

*Frame -> Surface: CAN Bus Addresses (hexadecimal)*



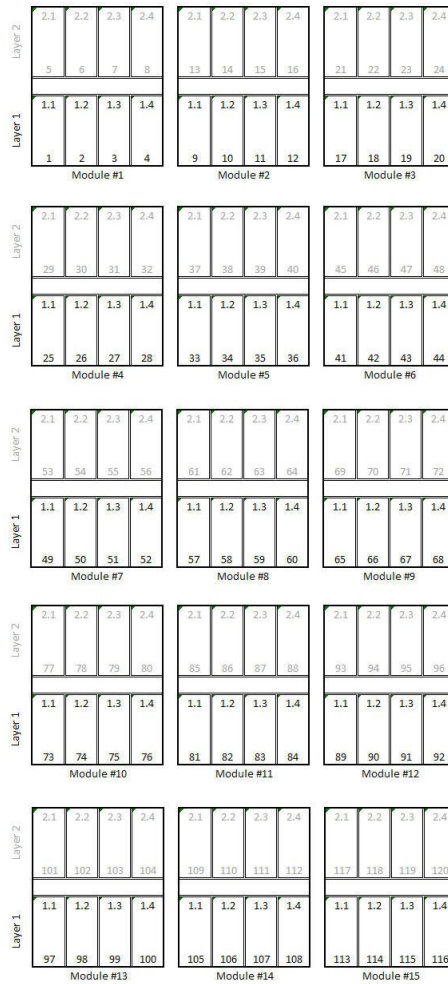
*Console: CAN Bus Addresses (hexadecimal)*



### Control Surface Layers (Fader Mappings)

Each Fader Module supports two layers. This means that the module set to hex address 01 controls fader strips 1 to 4 (Layer 1) and 5 to 8 (Layer 2); the module set to hex address 02 controls fader strips 9-12 and 13-16; and so on.

*Fader Mappings*



## 6. Operation

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This chapter describes the operation of the surface once a DSP Core has been connected and properly configured.

Topics include:

- [Basic Operations](#)
- [Fader Strip Control](#)
- [Source-Specific Functions](#)
- [The Central Module\(s\)](#)
- [Assigning Fader Strips](#)
- [RAVENNA Source Stream Selection](#)
- [Matrix Pool Sources](#)
- [Bus Assign](#)
- [Input Gain & Pan](#)
- [DSP Parameters](#)
- [Metering](#)
- [Monitoring & Talkback](#)
- [Conference Bussing \(N-1/Mix Minus\)](#)
- [VCA Grouping](#)
- [Fader Mappings](#)
- [Editing User Labels](#)
- [Snapshots](#)
- [The SYS Menu](#)

## 6.1 Basic Operations

### 6.1.1 Starting the System

1. To start the hardware components, apply power to the control surface and DSP Core.
  - You will see an initial flicker of LEDs on the control surface modules, and any optional key panels.
  - If the DSP Core has a front panel display, then boot-up progress is shown on the display.

At the end of the boot-up, the DSP Core loads its latest settings (stored at the last shut down). The hardware components are now ready for operation - this takes approximately 20 seconds from power on.

2. If your system includes VisTool MK2, then turn on the control PC and double-click on the "**Start VisTool**" desktop icon.

The session loads and connects to the hardware. Providing there are no error messages, the GUI is ready for operation.

### 6.1.2 Trouble-shooting

#### ➤ VisTool Does Not Open

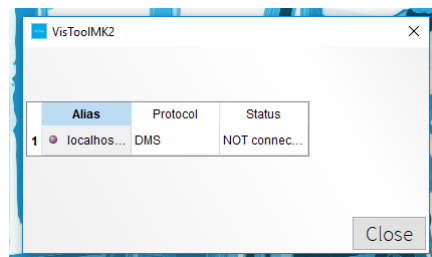
If the VisTool GUI does not appear, then there could be a problem with the start script or the selected monitor. Check the settings prepared in VisTool Admin.

#### ➤ No License Found

If a software license is not found when you start VisTool, then an error message appears. Follow the activation procedure (described in the "VisTool MK2 User Guide") to activate your license. If the license is installed onto a USB dongle, then check that the dongle is connected to the host PC!

#### ➤ No Hardware Connection

If the VisTool GUI opens but there is a problem with the network connection to the DSP Core, then the following window appears:



In this instance, you should check the following:

- The network cabling and IP settings of the control PC, see [Configuring the Network Settings on the PC](#).
- The IP address of the DSP Core, see [Editing the System IP Settings](#).

### 6.1.3 Working with VisTool

The VisTool GUI is designed for touch-screen operation and so you can simply touch a button to action a function. If touch-screen functionality is not available, then use your mouse and mouse keys to make selections.

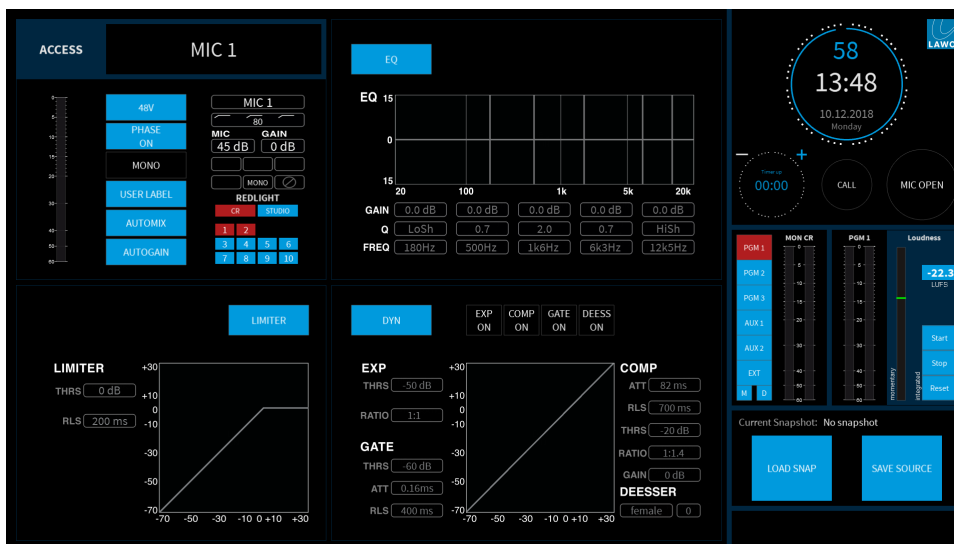
The main page, known as the DOCK, appears on the right of the screen so that it can sit alongside other applications. It provides master functions such as the system clock, timer, mic open indicator, output metering and monitoring selections.

Other pages appear alongside the DOCK as needed. For example, press a fader strip **ACCESS** key and the "Source Parameters" page appears. In each case, the full-screen pages appear to the left of the DOCK, so that the DOCK remains accessible at all times.

DOCK



Source Parameters + DOCK



In a custom configuration, there may be more pages available from the DOCK. For example, to provide metering or advanced options.

You can change page using the **PAGE UP** and **PAGE DOWN** keys on your PC keyboard. This will scroll through all of the available pages.

### 6.1.4 Shutting Down the System

There is no special shutdown procedure for the hardware components, and so you can turn off the control surface and the DSP Core by turning off the mains power.

To close VisTool, press ALT + F4 on your PC keyboard.

Note that closing VisTool on the control PC only closes the current session, and is not the same as restarting the system. To do this you will need to restart the DSP Core (described later).

## 6.2 Fader Strip Control

Any fader strip can control any type of source (or summing bus) and, depending on the configuration, support layer switching and fader mapping. This enables lots of signals to be controlled from very few physical faders.

All MF Keys are programmed by the configuration and are defined per source. MF Key 5 is only available if Layer 2 is disabled. All other controls provide the same fixed functionality regardless of the configuration.

### 1 Input Gain, Pan & Stream Selection

Tap down on the rotary control to step through the available parameters, and then turn to adjust the current value - the parameter name and value appear briefly in the electronic display.

The available parameters vary depending on the type of source. For more details, see [Input Gain & Pan](#) and [RAVENNA Source Stream Selection](#).

### 2 Source-Specific Functions (MF Keys 1, 1b, 2, 2b)

The four small MF keys are labeled by the electronic display. They are programmed by the configuration and are defined per source. Typical functions include Conference enable, AutoGain, AutoMix and Talkback.

### 3 ACCESS / ACCESS 2 (MF Key 5)

Use the **ACCESS** keys to switch the fader strip between its two layers, select a source (for [parameter control](#)) or activate [strip assign](#) mode.

If Layer 2 is disabled by the configuration, then **ACCESS 2** operates as MF Key 5. In this instance, there is no layer switching and the button can perform a different function such as PFL or talkback.

### 4 Fader

Use the fader to adjust the source's mix level to the summing bus outputs. The level can be adjusted from  $-\infty$  to +9dB.

### 5 Signal Present / Source Type Indicator

For summing buses, the backlight always indicates the type of bus. The colors are defined by the configuration.

For input sources, the backlight can indicate the type of source or show when signal is present. There are three possibilities:

- **Signal Present only** – the backlight illuminates when signal is present. Up to 8 level thresholds can be configured, each with its own color code and state.
- **Source Color only** – the backlight indicates the source type. The source color can be static, or individual colors can be driven by logical triggers - for example, to indicate a change of status such as assigned to PGM, off-air recording, incoming call, etc.
- **Mix Mode** – combines both options, where signal present takes priority.

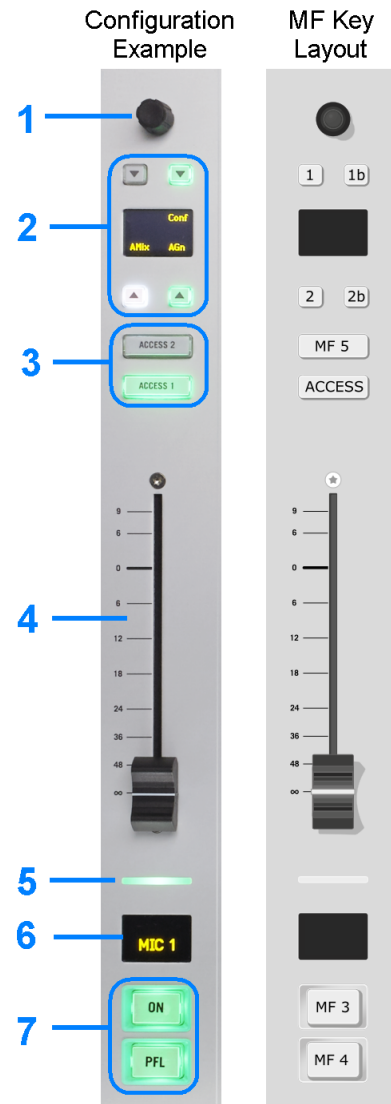
### 6 Source Label

This display always shows the name of the source (or summing bus) controlled by the fader strip.

In addition, you may see two lines of user labels (if user labels are enabled in the configuration). There are three possibilities: user labels on, off or toggle. Once enabled, the text can be edited using either [VisTool MK2](#) or the [User Labels](#) software.

### 7 MF Keys 3 & 4

The two large MF keys are programmed by the configuration and are defined per source. In our example, they are channel **ON** and **PFL**.





### 6.3 Source-Specific Functions

The four small MF Keys on each fader strip are labeled by the electronic display. Their default functions vary depending on the type of source. The standard configuration supports the following functions:



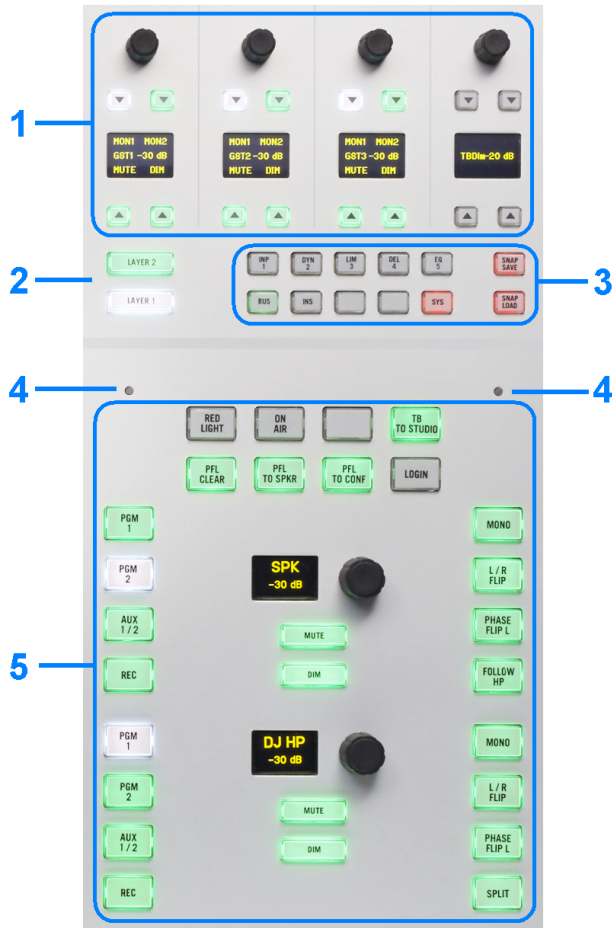
- **CONF** - the DJ, LINE, TEL 1 and TEL 2 sources can be assigned onto the conference bus to create a mix minus for the source. You must enable **CONF** on more than one source to activate the conference. The conference system is described in more detail [later](#).
- **TALK** - press this key to talk to the TEL 1 or TEL 2 sources (via their n-1 return) or to the GUEST headphones.
- **AGn** - enable this key to turn on [AutoGain](#) for the DJ and GUEST mics.
- On the TONE source, the 4 small keys select the frequency of the tone: 63Hz, 400Hz, 1kHz or 12.5kHz.

## 6.4 The Central Module(s)

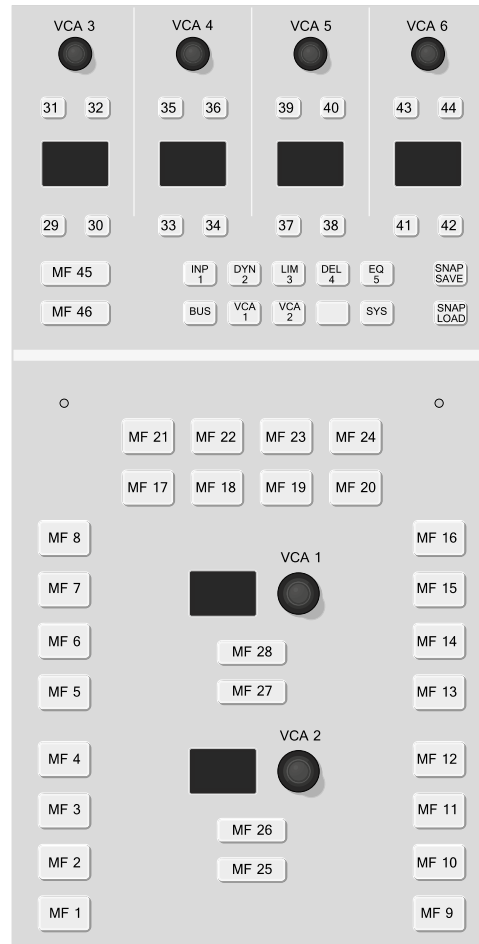
Every control surface includes one Central Module running in full mode. If your surface has additional Central Modules, then these must run in monitor mode.

### 6.4.1 The Central Module

Configuration Example



MF Key Layout



#### 1 Rotary Controls, Small MF Keys & OLEDs

The four sets of rotary controls, small MF Keys and OLED displays interact with the 12 Function Buttons (3).

When none of the Function Buttons (3) are active, the controls have a default functionality that is programmed by the configuration.

If a Function Button (3) is pressed, then the controls can be used to adjust the relevant parameters. For example, to control EQ parameters on a MIC source, first press **ACCESS** on the MIC fader strip; then press the **EQ** Function Button on the Central Module - you can now use the four sets of controls to adjust the EQ parameters. The parameter value and button functions are shown in the OLED.

#### 2 MF Keys 45 & 46

These two MF Keys are programmed by the configuration. On consoles with more than one layer, they usually provide global layer switching.

### 3 Function Buttons

The dual engraved function buttons are used for:

- **Parameter Control** – press **INP**, **DYN**, **LIM**, **DEL**, **EQ** or **INS** to map parameters for the source in ACCESS onto the four sets of rotary controls (1).
- **Bus Assign** – press **BUS** and then select a page (1 to 5) to map bus assignments onto the Fader Module's small MF Keys.
- **VCA Assign** (optional) – press **BUS** and then select **VCA 1** or **VCA 2** to map VCA assignments onto the Fader Module's small MF Keys. Note that VCAs must be enabled in the configuration to support this function.
- **Snapshot Control** – press and hold **SNAP LOAD** and select a snapshot (1 to 5) to load. **SNAP SAVE** works in a similar manner. The configuration can define an **UNLOCK** MF Key to protect the snapshot save and load functions.
- Press **SYS** to map the system options onto the four sets of rotary controls (1).

### 4 Ambient Light Detectors

The two detectors automatically adjust the brightness of buttons and displays according to the ambient light level. Two detectors are included so that if one is covered by a script, the surface does not dim! The configuration can disable the sensor or assign an on/off MF Key.

### 5 MF Keys (1 to 28) & Rotary Controls (VCA 1 & 2)

The 28 MF Keys and two rotary controls are programmed by the configuration. In our example, the MF Keys are programmed for monitor source selection and the rotary controls for monitor level. The two displays always show the name and parameter value related to the rotary control functions (e.g. **SPK** and **DJ HP**).

Depending on the configuration, each rotary control can adjust two parameters: turn to adjust the first (e.g. monitor level); push down and turn to adjust the second (e.g. monitor balance).

#### 6.4.2 Central Modules (monitor mode)

On a Central Module running in monitor mode, all controls are defined by the configuration.

Each module provides 46 MF Keys and six rotary controls (VCA 1 to 6), following the same MF Key/VCA layout as on the main Central Module. The displays always show the name and parameter values related to the rotary control functions.

Depending on the configuration, each rotary control can adjust two parameters: turn to adjust the first; push down and turn to adjust the second.

Note that the 12 "Function Buttons" are not supported and cannot be programmed. Therefore, they will remain unused.

## 6.5 Assigning Fader Strips

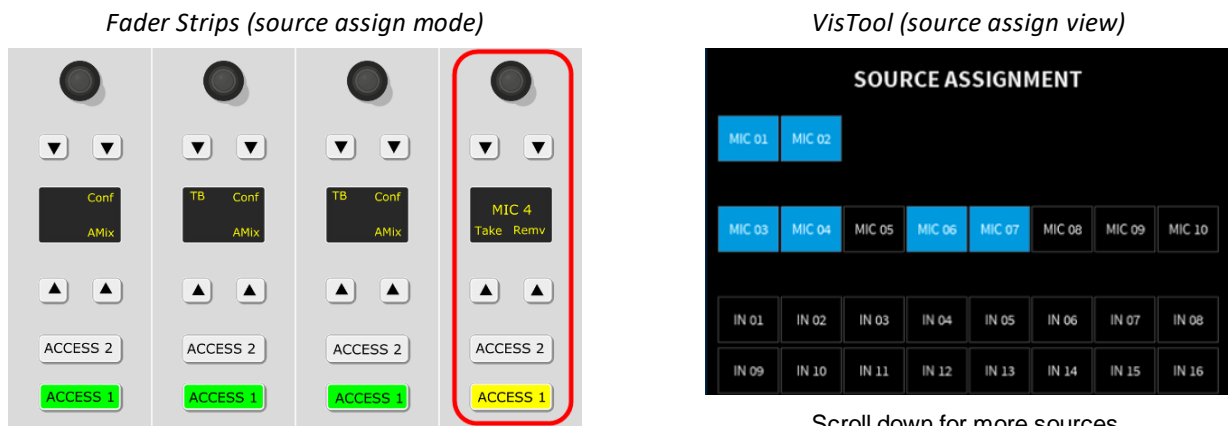
Any source or summing bus defined in your configuration can be assigned to any fader strip. Please note:

- All sources assigned to fader strips are active in the mix, including sources assigned to Layers 1 and 2 and to virtual fader strips.
- The maximum number of sources which can be summed simultaneously depends on the resources provided by your DSP Core.
- In the configuration, if the Only Default option is enabled for a fader strip, then its source cannot be reassigned.
- Sources are made available for assignment using the List Enable option in the configuration.
- A source can be assigned only once; you cannot assign a source to two different faders. However, you can map a fader so that it can be controlled from two different locations, see [Fader Mappings](#).
- Your user rights may globally disable the "source assign" mode.

### 6.5.1 Assigning a Source to a Fader

1. Double-press an **ACCESS** key (it turns yellow) - the fader strip switches into "strip assign" mode, and the "Source Assignment" buttons appear on VisTool.

Note that you can double-press either **ACCESS 1** or **ACCESS 2** to assign the main or alternate layer.



Scroll down for more sources.

On VisTool, the buttons are color-coded to show the current status of each source:

- **Black** = source not assigned and available.
- **Blue** = source assigned and available (its fader is closed).
- **Red** = source assigned and NOT available (its fader is open).

If you choose a blue source, then it will move from its existing location to the fader strip in access.

You cannot choose a red source as it is deemed to be on-air. In this instance, first find the source on the surface and close its fader - the button color changes from red to blue, and the source can be selected.

### 2. Make the assignment using either the fader strip controls or VisTool:

#### ➤ From the fader strip:

- Turn the rotary control to scroll through the available sources.
- Once you found the desired source, press **TAKE** to make the assignment - the fader label updates and the strip assign mode cancels.
- Alternatively, press **REMV** to remove the source - the fader strip is cleared and strip assign cancels.

#### ➤ On VisTool:

- Select an available source (black or blue) to make the assignment - the fader label updates and the strip assign mode cancels.
- Alternatively, select **REMOVE** to remove the source - the fader strip is cleared and strip assign cancels.
- The **CANCEL** button cancels out of the strip assign mode without making any changes.

### 3. Once an assignment has been made, the console returns to its normal mode of operation: **ACCESS** keys green + **DOCK** in view.

#### ➤ **Troubleshooting**

If you attempt to assign a source but nothing happens, check the following:

- Is the fader open on the strip you wish to assign? If so, you must close the fader.
- Is the source already assigned to a different fader strip and the fader open? If so, the source is deemed to be on-air, and so you must find the source and close its fader.

## 6.6 RAVENNA Source Stream Selection

For a RAVENNA source, you can select a stream using the fader strip rotary control and **TAKE** button.

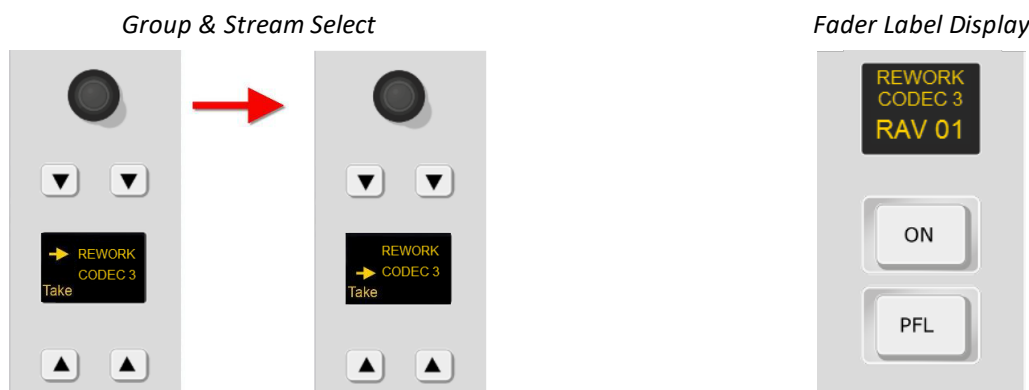
### 6.6.1 Stream Naming & Organization

To support this feature, streams must be announced to the network using the following naming convention: "Group:Stream". When using dynamic input switching, this provides a two-step navigation process: first select the Group, and then browse through all available Streams within that Group. Both the Group and Stream labels can be up to 8 characters.

By default, the labels are retrieved automatically from the network. Streams with the same Group name are combined into a single Group even if they are provided by different devices. The list presented to the operator is updated automatically so that newly discovered streams are added, and streams which can no longer be detected are erased. To prevent access to certain streams, filters can be applied in the configuration.

In cases where streams cannot be named using the above convention, it is possible to map specific streams to pre-configured labels. In this instance, the list of streams presented to the operator is fixed and is independent of stream availability.

### 6.6.2 Selecting a Stream



1. Press down on the fader strip rotary control to step through the input parameters until you reach the stream selection menu.

The display shows either the current Group and Stream name, or the text "**not in pool**".

2. Turn the rotary control to scroll through the available Groups and press down to make a selection.
3. Turn the rotary control again to scroll through all available Streams with that Group.

If your network supports dynamic stream detection, then the list of available streams updates automatically.

4. Once you are happy with the selection, press the **Take** button to start the subscription process.

There will be a brief pause in the audio while the streaming connection is configured. During this time, the connection status is shown in the fader label display. The display updates to show the stream name once the subscription is successful.

In our example, the three lines of text show the following information:

- **REWORK** = the Group name (detected from the network).
- **CODEC 3** = the Stream name (detected from the network).
- **RAV 01** = the source Display Name (defined in the configuration).

### 6.6.3 Stream Subscription: Status Messages

Whenever you subscribe to a stream, the fader strip label display reports back on the status of the connection. Under normal circumstances, the expected sequence of messages is as follows:

"Mute" -> select a stream and press **Take** -> ("Pending") -> "Tuning" -> ("Unstable") -> "<Stream-Name>"

Note that messages shown in ( ) may or may not appear. The table below explains the meaning of each message in more detail.

Status Message	Meaning
"Mute"	No stream is connected to the source's RAVENNA input.
<b>ACTION:</b> select a stream via the rotary control and press <b>TAKE</b> .	
("Pending")	<p>Appears IF the connected stream is not yet available. In this instance, the console will wait for the stream announcement to appear on the network, and then automatically initiate the subscription process.</p> <p>Typically, this message does not appear when selecting a stream from a RAVENNA source pool, as the list presented to the operator is constantly updated (in the background).</p> <p>The message can appear if the source has been configured using a default subscription, if a stream is connected via VSM, or following a warmstart while restoring the last known connection.</p>
"Tuning"	<p>Appears while the console measures the streaming quality, and sets its stream receiving parameters to ensure correct audio playback.</p> <p>During the tuning cycle the audio input is muted, and then unmuted once the task is complete.</p> <p>If a stream is being received for the first time, then the tuning process can take a couple of seconds. This initial tuning information is stored in a permanent memory. It is then used whenever you select the same stream, thereby speeding up all subsequent connections.</p>
("Unstable")	<p>Appears IF the stream jitter is extremely high and cannot be dealt with; IF the stream stops for some reason; or IF the PTP clock information is missing. You can open the RAVENNA pages (in the Web UI) to view additional information on specifics.</p> <p>In this instance, the console will attempt to heal itself, and mute the audio input until the stream reaches stable conditions.</p> <p>Typically, it is very rare to see this message during the subscription phase.</p> <p>If an unstable stream is due to a PTP problem, then console will start a new "Tuning" cycle before the audio input is unmuted.</p>
"<Stream-Name>"	Once the subscription is successful, the name of the connected stream is displayed.

On rare occasions, the following error messages may also appear:

Status Message	Meaning
"PoolErr"	<p>Appears IF there is a problem connecting to the stream.</p> <p>This can occur if the selected stream is not available on the network any longer, but is still presented in the console's list of streams. Since this list is updated cyclically, the problem should not persist.</p> <p>If you see this error, please repeat the subscription process. If the issue persists, check your network settings.</p> <p>The audio input will be muted while the error message is displayed.</p>
"RavErr"	<p>Appears IF there is an invalid combination of status flags for the RAVENNA stream.</p> <p>Since the flags are updated cyclically, the error should heal itself. If the issue persists, then check the RAVENNA pages (in the Web UI).</p> <p>The audio input will be muted while the error message is displayed.</p>

## 6.7 Matrix Pool Sources

For a specially-configured matrix pool source, you can select a signal from a remote matrix using the fader strip rotary control and **TAKE** button. This works in a similar manner to the AoIP stream selection for RAVENNA sources, but this time the pool provides access to pre-configured signals from a networked router.

### 6.7.1 Signal Naming & Organization

To support this feature, inputs within the remote matrix must be named using the the following naming convention: "Group:Signal". When using dynamic input switching, this provides a two-step navigation process: first select the Group, and then browse through all available Signals within that Group. Both the Group and Signal labels can be up to 8 characters.

By default, the signal labels are retrieved automatically from the networked router (if using NetCom or Remote MNOPL protocols).

### 6.7.2 Selecting a Matrix Pool Signal



1. Press down on the fader strip rotary control to step through the input parameters until you reach the signal selection menu.

The display shows either the current Group and Signal name, or the text "**not in pool**".

2. Turn the rotary control to scroll through the available signal Groups and press down to make a selection.
3. Turn the rotary control again to scroll through all available Signals with the Group.
4. Once you are happy with the selection, press the **Take** button to assign the signal - the fader label display updates accordingly.

In our example, the three lines of text show the following information:

- **MADI** = the Group name (defined in the remote matrix).
- **In 3** = the Signal name (defined in the remote matrix).
- **Nova17** = the source Display Name (defined in the configuration).



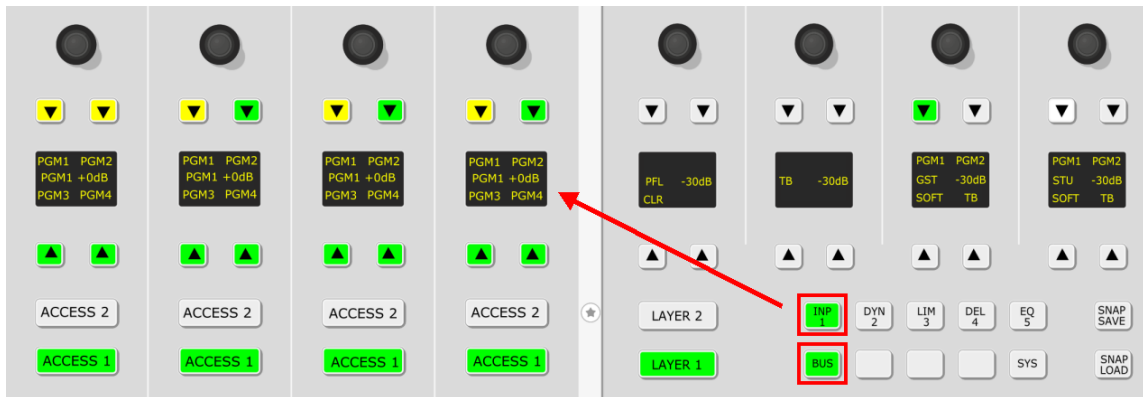
## 6.8 Bus Assign

Once a source is assigned to the surface, it can be routed to any of the console's summing buses. Depending on the configuration, up to 20 buses may be available. Each one can be fed either pre or post fader. An AUX bus has an independent send level. All post-fader assignments are affected by the fader level AND channel ON/OFF status. The example below describes two pages of assignments, but up to five pages are possible.

### 6.8.1 Assigning a Source to a Bus

1. On the Central Module, press **BUS** and then a page number: e.g. **1** for PGM or **2** for AUX.

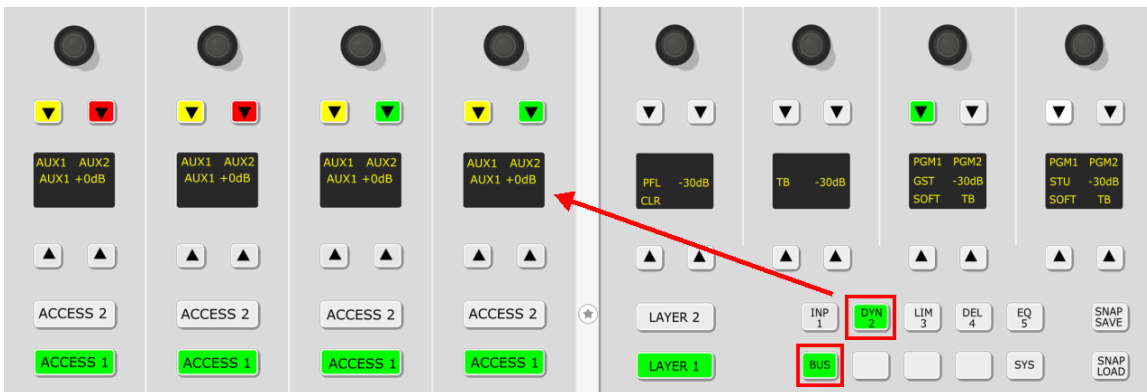
*Fader Strips (PGM bus assign)*



The fader strips switch into "bus assign" mode, and their soft keys show the current assignments:

- **Yellow** = post-fader.
  - **Green** = off (not assigned).
  - **Red** = pre-fader (available for AUX buses only).
2. Press a soft key to assign (or de-assign) the source from a bus - its color updates. Keep pressing to cycle through the available options.
  3. On the AUX page, you can also adjust the aux send level.

*Fader Strips (AUX bus assign)*



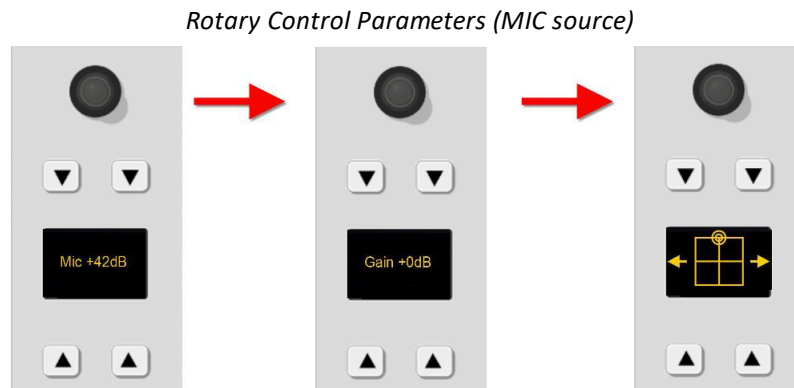
The display shows the level of the last AUX send adjusted. Tap down on the rotary control to access the alternate send. When the correct AUX is displayed, turn the control to adjust the level. Aux send levels can be adjusted from -120dB to +9dB.

4. When you have finished editing the bus assignments, deselect **BUS** (on the Central Module) - the rotary controls and soft keys return to their default functions (described [earlier](#)).

### 6.8.2 Assigning a Bus to an Output

The configuration determines the default audio outputs for each summing bus. If you have VisTool, then it may be possible to change the output routing from an on-screen matrix.

### 6.9 Input Gain & Pan



The quickest way to adjust input gain, or the left/right pan position, is to turn the fader strip rotary control.

For MIC sources, two separate input gains are available: **Mic** gain (in the analog mic preamp) and channel **Gain** (applied in the digital domain). For other sources, only channel **Gain** is available.

For a mono source, you will see left/right pan. For a stereo source, this changes to left/right balance.

1. Turn the rotary control to adjust the first parameter - you will see both its name (e.g. **Mic** gain) and value (e.g. **+42dB**).
2. Press down on the rotary control to step to the next parameter (e.g. channel **Gain**).
3. Press down again to reach the next parameter (e.g. left/right pan).
4. If you keep tapping down, then the sequence repeats. The available parameters for a mono MIC source are shown above.

To interrogate parameters without making a change, tap down on the rotary control without turning - the display will show the parameter and its current value.

#### 6.9.1 Surround Panning

If a surround bus is configured and surround parameters are enabled on the source, then the sequence includes the following.

- **Left/Center/Right pan position**
- **Front/Rear pan position**
- **Slope** – from 0.0 to 1.0 (see below).
- **LFE** – low frequency effect level, from -120 to +9 dB.

The Slope adjusts signals feeding the discrete center channel within the surround field. It may be used to balance between discrete and phantom center signals. To see the effect, position the source at front center, and adjust the slope to a setting of 1.0; the signal feeds only the discrete center output. Now set the slope to a value of 0.0; the signal feeds only left and right (phantom center).

On a stereo source you can adjust the left/right balance, front/rear pan and LFE level. Center slope is not available.

On a surround (5.1) source you can adjust LFE level only; the surround source is assigned directly to the surround bus (e.g. left to left, center to center, etc.)

If a surround source is assigned to a stereo bus, then the source is mixed onto the bus according to the surround downmix parameters set within the configuration. If a surround source is assigned to a mono bus, then the stereo downmix is converted to mono by subtracting 3dB from, and then summing, the L and R channels.

## 6.9.2 Using AutoGain

AutoGain is available for all of the MIC sources. When enabled, it sets the **Mic** gain automatically (in the analog preamp).

Mic gain cannot be adjusted manually while AutoGain is enabled.

The system works by measuring the incoming signal level over a period of 5 seconds. Using an average of that measurement, it then sets the mic gain value automatically. The mic gain will then remain at the same value, until either a different value is loaded by a snapshot or AutoGain is turned off.

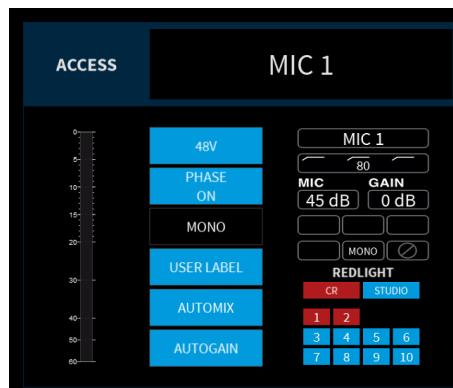
Please note:

- The gain adjustment happens automatically and so it is best to enable AutoGain *BEFORE* the channel goes on-air. Otherwise the signal may distort while AutoGain finds the ideal level.
- To use the system effectively you will need to ask the talent to speak into the microphone at their intended "on-air" level.

1. Start by asking the talent to speak and then turn on AutoGain by pressing the MIC source **ACCESS** key and enabling **AUTOGAIN**.

You can do this either by pressing the **AGn** soft key (on the MIC source fader strip), or pressing the MIC source **ACCESS** key and selecting **AUTOGAIN** (on VisTool):

VisTool Input Parameters



The measurement now takes place and the AutoGain value is adjusted. During this time, the **AUTOGAIN** button flashes in red to indicate that automatic gain adjustment is in progress. If the channel is turned ON, then you will hear the gain changing.

2. Once the process is complete, the **AUTOGAIN** button change to static red.

AutoGain is now set and enabled, ready for your talent to speak on-air.

3. To turn off AutoGain, press the **AUTOGAIN** button again - the button changes color (blue = off).

The mic gain now reverts to its previous value (before AutoGain was enabled), and MIC gain can be adjusted manually.

## 6.10 DSP Parameters

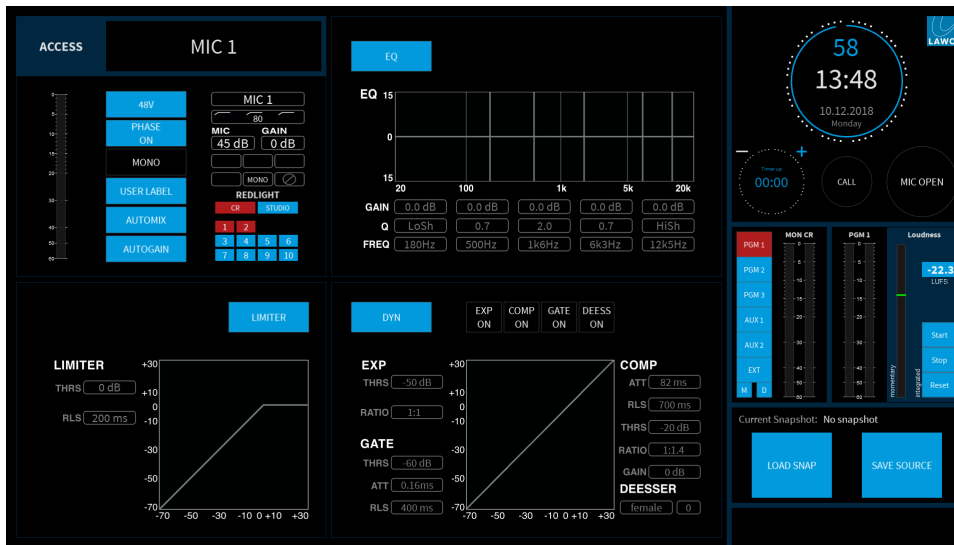
The remaining source parameters can be adjusted by selecting a source. The DSP available is defined by the DSP Core and its configuration. Therefore, for more details on specific parameters, please refer to the manual for your DSP Core. This topic describes the operating principles.

### 6.10.1 Adjusting Source Parameters

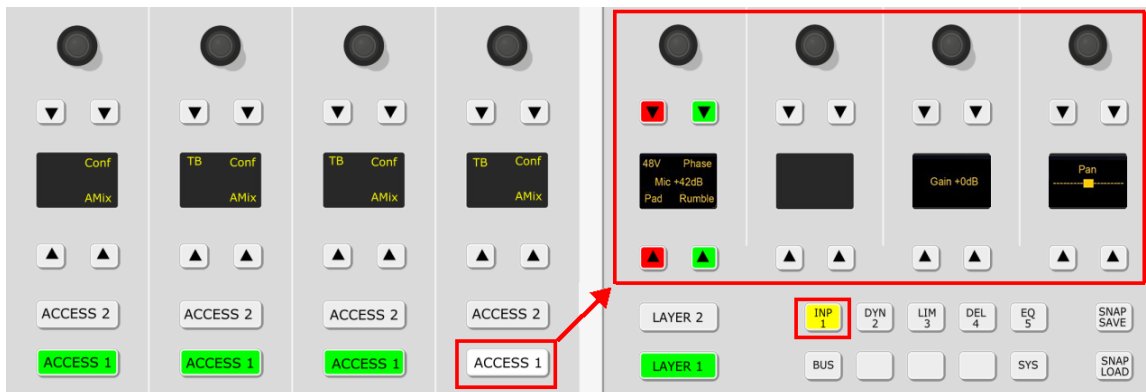
1. Select the source you wish to work on by pressing its fader strip **ACCESS** key - the key turns white.

The upper controls on the Central Module switch into "parameter control" mode, and on VisTool the "Source Parameters" page appears:

VisTool (Source Parameters page)



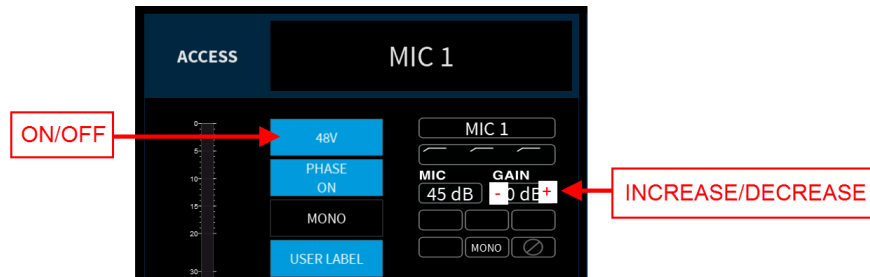
Control Surface (INPUT parameters)



VisTool shows all available parameters, and so this is the best way to get an overview of a source.

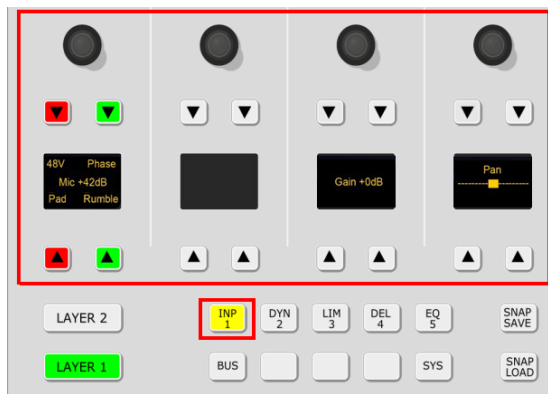
The surface controls are paged through different parameter sets using the **INP**, **DYN**, **LIM**, **DLY** and **EQ** keys on the Central Module.

2. VisTool is often the quickest way to make a simple change:



- For switched parameters, such as **48V**, touch the button to turn the option on or off: red = on; blue = off.
- For variable parameters, such as GAIN, you can use the hidden + and - buttons behind the value fields to increase or decrease the value.

3. Alternatively, use the surface controls as follows.



- First, choose the parameters you wish to adjust by selecting a function key on the Central Module. For example, press **INP** to adjust the input and pan parameters for the selected source. The 16 soft keys and 4 rotary controls update, and are labeled by the displays (as shown above).
  - Then press a soft key (e.g. **Pad**), to turn the option on or off: red = on; green = off.
  - Turn a rotary control (e.g. **Mic**) to adjust its value - the current value (e.g. **+42dB**) is shown in the display.
4. At any time you can press **ACCESS** on a different fader strip or alternate layer to adjust the parameters for another source.
  5. When you have finished adjusting the parameters, deselect the **ACCESS** key - the upper controls on the Central Module return to their default functions (described [earlier](#)), and the VisTool "Source Parameters" page closes.

### 6.11 Metering

#### 6.11.1 Output Metering

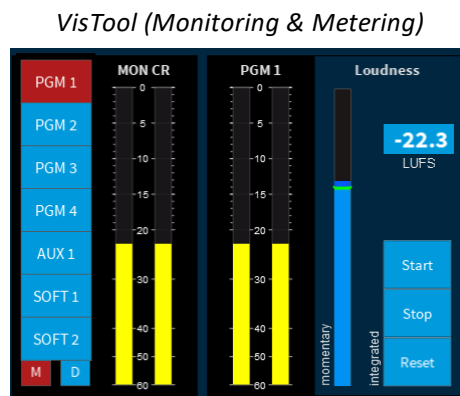
There is no integrated metering on the Central Module, and so all output metering must be configured on VisTool.

The example shown below includes two output meters for follow MONITOR and PGM 1:

- **MONITOR** - meters the Control Room monitor source, before the CR volume and mute/dim.
- **PGM 1** - *always* meters the PGM 1 output.

Both meters are stereo PPMs (Peak Program Meters) and use a digital scale relative to 0dBFS. The PGM 1 meter also includes measurements for loudness.

#### 6.11.2 Loudness Metering (for PGM 1)



On VisTool, there are two loudness measurements: momentary and integrated which conform to the ITU-R BS1770.

##### Momentary Loudness (Bargraph)

The blue bargraph represents the average energy of the summed component channels: left and right. The average is measured using either a Momentary (400ms sliding window) or Short term (3s sliding window) integration time.

The color indicates whether loudness is above or below the Target Level:

- **Light Blue** = equal to, or below, the Target Level.
- **Dark Blue** = above the Target Level.

Scale markers indicate a tolerance of +/- 1 LU/LK.

##### Integrated Loudness Measurement (in LUFS)

The integrated loudness measurement is controlled by the on-screen **Start**, **Stop** and **Reset** buttons. It is very useful for measuring loudness over a longer period - for example, for the duration of the show.

The measurement is displayed in LUFS (Loudness Units Full Scale).

## 6.12 Monitoring & Talkback

The monitoring and talkback functions are defined by the configuration. Please refer to your system specification for more details.

### 6.12.1 PFL & AFL

Up to 5 independent listen buses (PFL or AFL) can be defined by the configuration. This is particularly useful when working with multiple operating stations, as each station can feed a different output.

Each bus can feed a dedicated output, or be switched automatically to your speakers or headphones whenever a PFL (or AFL) is active. These options are defined by the configuration.

**PFL** (or **AFL**) is usually available on one of the fader strip MF Keys. The operation will vary depending on the mode selected in the [SYS](#) menu. Below is a description of the default mode, PFL SUM.

#### ➤ PFL SUM operation

Multiple **PFLs** can be active to listen to a number of sources:

- On a closed fader, press **PFL** to route the source onto the stereo PFL bus; the **PFL** automatically cancels when you open the fader.
- On an open fader, press **PFL** to put the channel into "PFL Prepare". Nothing happens until you close the fader; once the fader is closed, **PFL** becomes active.

#### ➤ PFL Clear

One of the MF Keys on the Central Module is usually programmed for **PFL Clear**. This provides a handy way of cancelling all active PFLs across the console.



### 6.13 Conference Bussing (N-1/Mix Minus)

The conference system can be used to generate N-1/mix minus feeds for particular sources within your configuration.

Each source added to the conference system receives an automatically switched mix minus feed. When their source fader is open (on-air), they will hear PGM 1 minus themselves. When their source fader is closed (off-air), they will hear the conference bus minus themselves - this allows members of the conference to hear each other while they are off-air.

Let's assume you wish to use the conference system for 3 sources: **MIC 1** (the DJ), **MIC 2** (a studio guest) and **IN 1** (a phone-in guest).

#### Setting Up the Monitoring

The first step is to set up the monitoring so that the mix minus feed for each source is returned to the correct destination. For our example, we will assume:

- The DJ is listening on his/her headphones (controlled via MON HP).
- The studio guest is also listening on his/her headphones (controlled via MON GUEST).
- The phone-in guest is receiving the IN 1 mix minus return (there are no separate level controls for this output).

If the system is set to the DEFAULT audio, then:

- Connect the DJ headphones to the HP 1 output.
- Connect the guest headphones to the HP 2 output.
- Connect the phone-in guest's return to the IN 1 n-1 return .

#### Working with the Conference System

Once the monitoring returns are in place, then the conference system operates as follows:

1. Turn on the **CONF** bus assign buttons for all sources within the conference – in our example, on the **MIC 1**, **MIC 2** and **IN 1** fader strips.

This routes each source onto the conference bus; the **CONF** buttons will turn red, yellow (flashing) or white depending on the status of the faders:



For the conference system to work you must have at least two sources with **CONF** enabled.

Each source within the conference system now receives an automatically switched mix minus feed; what they hear will depend on the status of the three source faders.

2. Close all three source faders.

The **CONF** buttons become red and all sources will hear the conference bus minus themselves. In other words, they can hear each other, but not themselves, and chat off-air.

3. Open one of the faders – e.g. the DJ's fader.

The MIC 1 source is now assumed to be on-air, and the DJ's monitor feed is automatically switched to PGM 1 minus themselves. This is reflected by the flashing (yellow) **CONF** button:



The **CONF** buttons on the studio and phone-in guest fader strips remain red. This is because their faders remain closed, and so the two guests are still hearing the conference bus minus themselves and can continue their off-air conversation. Also, if you close the DJ fader, the DJ's monitor feed reverts to a conference bus mix minus, so they can rejoin the off-air conversation if required.

4. Finally, open both the MIC 1 and MIC 2 faders.

Both the DJ and studio Guest are now on-air, and so they will hear PGM minus themselves (yellow flashing **CONF** buttons):



In this mode, there are less than two active conference sources and so the conference is cancelled. The phone-in guest's monitor feed is automatically switched to a PGM 1 mix minus. This state is reflected by the white **CONF** button.

5. To cancel the conference for any of the sources, deselect the **CONF** button.

The **CONF** buttons turn green (off) and the source's monitor feed receives PGM 1 minus themselves at all times.

## 6.14 VCA Grouping

VCA grouping can be used to control several sources or summing buses from a single master fader.

Up to 8 VCA masters can be defined in the configuration, and you can assign any number of fader strips to each VCA master.

Please note:

- A fader strip can only ever be assigned to a single VCA.
- A VCA master cannot be slaved to another VCA.
- For your console to support VCA grouping, at least one VCA master must be defined in the configuration.

### 6.14.1 Assigning Faders Strips to a VCA

Fader strips are assigned to VCAs in a similar manner to the Bus Assign mode (described [earlier](#)).

1. On the Central Module, select **BUS** and **VCA 1** - the fader strip MF Keys are switched into “VCA assign” mode globally across the console.

Each MF Key is labeled and color-coded to show:

- **Red** = VCA assign on.
- **Green** = VCA assign off.

Note that the fader strip rotary controls have no function.

2. Use the MF Keys to change the assignments.
3. To access the second page of VCA masters, press **VCA 2** – you can now change the assignments to VCAs 5 to 8.
4. When you have completed all your assignments, deselect the **BUS** button to return the fader strip MF Keys to their default functions.

VCA assignments can be displayed in the metering pages of VisTool. Or, you can interrogate assignments by re-entering the “VCA assign” mode.

### 6.14.2 Assigning the VCA Master to a Fader Strip

VCA masters are available as sources when you activate source selection from a fader strip. This means that you can assign a VCA master to any fader strip in the usual manner, see [Assigning Fader Strips](#).

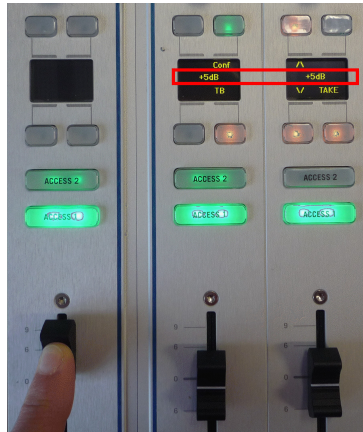
Once assigned, the fader strip label display and backlight update according to the display name and color coding defined in the configuration.

### 6.14.3 Working with VCAs

VCA groups use non-moving slave faders. This means that when you move the master fader, the slave faders remain stationary even though their level is changing. This allows you to see and update slave fader positions even if the VCA master is closed.

If the **Show Group Fader Values** option is enabled (in the "System -> Definition -> Param = Fader" branch of the 'Tree Definition'), then you will see the resulting fader values applied to VCA slaves in the fader strip displays. In our example, both slave faders are at 0dB, but the master VCA has been moved to +5 and therefore the combined level is +5dB:

*Combined level shown in slave fader displays*

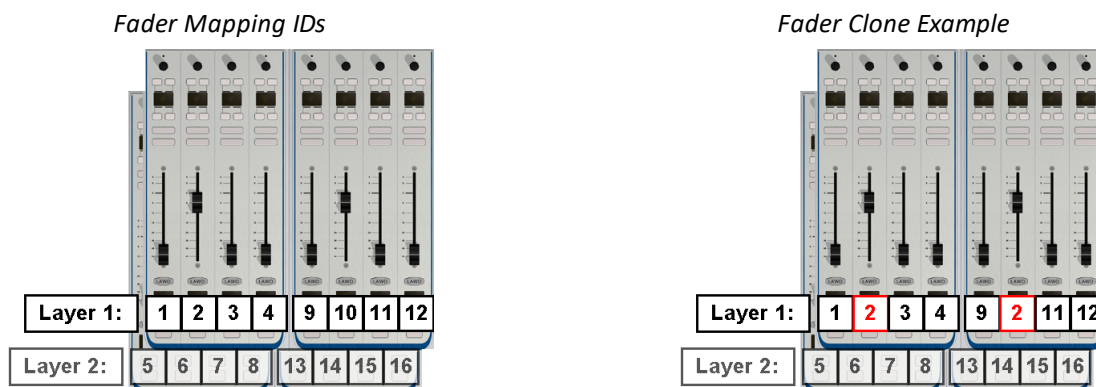


If the **Group Fader Values Fallback** option is also enabled, then the displays will revert to their default mode (e.g. source name) after a certain time period. The time period is set by the **Group Fader Value Hold Time** (in seconds).

## 6.15 Fader Mappings

Any fader strip can be mapped to a different control surface position using fader mappings. The system works by giving every fader strip a unique mapping ID. This includes faders on Layer 1 and Layer 2 for all Fader Modules.

MF Keys, defined by the configuration, can then reassign any fader ID to any control surface position. For example, a fader can be cloned by assigning the same ID to two positions. Move one of the cloned faders, and the other follows; select a new source for the fader, and the other follows.



The mapping numbers identify both layers. Therefore Module 1 contains Faders 1 to 4 and 5 to 8; Module 2 starts at Fader 9 and so on.

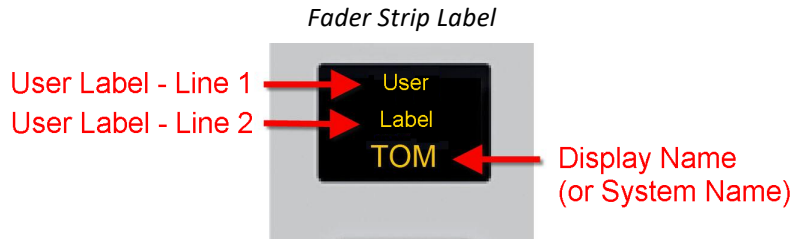
There are three main applications for fader mappings:

- To clone a fader - as shown above.
- To move fader strips – for example, to rearrange the layout for different types of production.
- To map invisible fader strips onto physical faders – to create additional "layers".

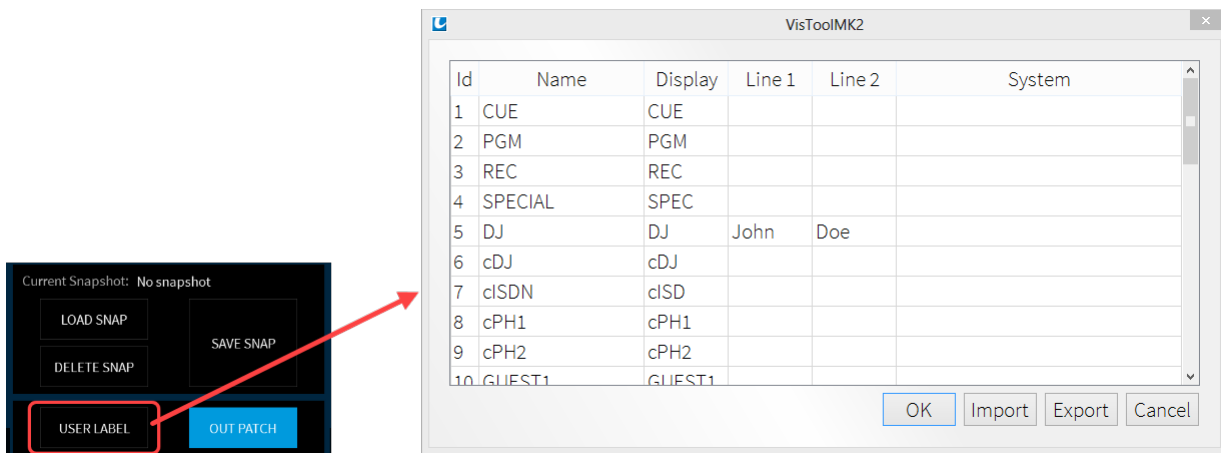
The first two applications are particularly useful for multi-operator layouts, as faders can be cloned at different operator stations, or the control surface can be re-configured from single to multi-user.

## 6.16 Editing User Labels

If user labels are enabled by the ON-AIR Designer configuration, then the text can be edited using VisTool. Up to three lines of text are supported.



Usually, a dedicated button is configured to open the user labels editor. In the VisTool standard template, this appears on the MAIN dock.



The user labels editor can also be opened from VisTool Editor (via the Util menu).

The **Id**, **Name** and **Display** fields are defined by the ON-AIR Designer configuration and cannot be changed. By default, a source uses its **Display** name unless a **System** name is entered.

1. Use the **Line 1** and **Line 2** fields to edit the two user label lines (up to 8 characters per line).
2. To replace the **Display** name, enter text into the **System** field. The **System** name replaces the **Display** name until such time as the **System** field is cleared.
3. Once you have finished editing, select **OK** to transfer the labels to the system - the editor closes and the labels on the control surface update.

The **Export** button will save all labels into an **.xml** file. This allows to copy the file to another VisTool PC and then select **Import** to import the labels. When using import, the labels are applied to sources with an identical source **Name** field.

You should take care when deleting a source from the ON-AIR Designer configuration for the following reasons.

Whenever a source is added to the configuration, it is assigned an internal "sys" number. These numbers are remapped if a source with a lower sys number is later removed. System labels are assigned to the sys number rather than the source name. Thus, if a source is deleted from the configuration, the labels of all sources with a larger sys number are moved (shifted downwards). The sys numbers can be viewed in the Ember+ tree to see what affect this may have on your system.

### Configuring Operator Access to the User Labels Editor

Usually, the user labels editor can be opened in one of two ways: a button on a VisTool page or an MF Key (or other control signal) from the remote system.

For option one, add a Box element to the VisTool project, and link this to the "Predefined User Text -> User Label -> Edit" option.

For option two, add a "Logic -> VispageSwitch" element to the ON-AIR Designer project, and define the Edit PC Labels function. It is important that the **Station ID** (defined for the "Logic -> VispageSwitch" element) matches the one entered in VisTool Sessions. If not, the trigger from the remote system will not work.

## 6.17 Snapshots

### 6.17.1 Introduction

The snapshots system includes five local memories (stored on the DSP Core) plus an unlimited number of VisTool snapshots (stored on the control PC).

The local memories always save and load settings globally, while VisTool snapshots come in two types: Full snapshots (to save settings globally) or Source snapshots (to save only the settings for the source in access).

It is not recommended that snapshots are loaded during a live broadcast, as to do so may result in sources being taken off air!

### 6.17.2 What's Stored in a Snapshot?

The following settings are stored in all snapshots:

- **Fader Strip Assignments** – the assignment of sources and buses to fader strips.
- **User Labels** – the two User Label text lines for all sources and buses.
- **RAVENNA/AES67 Stream subscriptions** handled via a RAVENNA pool.
- **Input Parameters** – such as mic gain, 48V, etc. for all sources.
- **DSP settings** – EQ, Dynamics, Limiter, Delay and De-Esser for all sources and buses.
- **Fader Levels (optional)** – see below.
- **Bus Assignments** – the assignment of sources to summing buses and their send levels.
- **Insert Assignments** – the assignment of insert devices for all sources.
- **VCA Group Assignments** – the assignment of all sources to VCA Groups.
- **Logical States** – up to 32 logical states defined by the ON-AIR Designer configuration (via "System -> Definition -> Parameter = Logic Snapshot").
- **Matrix Connects** – up to 128 matrix connections defined by the ON-AIR Designer configuration (via "System -> Definition -> Parameter = Matrix Snapshot").

#### Fader Levels

The **Production Mode (Save Value)** option, in the ON-AIR Designer configuration, determines whether fader levels are stored and recalled by snapshots. This option is set in the "System -> Definition -> Parameter = Fader" branch of the 'Tree Definition'.

- **Production Mode (enabled)** = fader levels are loaded. Recommended for production systems.
- **Production Mode (disabled)** = fader levels are ignored (not loaded). Recommended for on-air systems.

#### Other Recall Options

The following options, in the ON-AIR Designer configuration, affect how snapshot settings are recalled globally across the console. These are set in the "System -> Definition -> Parameter = Snapshots" branch of the 'Tree Definition'.

- **Load max. Fader No.** - specifies whether parameters are loaded for all faders or only up to a certain fader number. You can use this option to exclude fader strips from snapshot recall.
- **Load Audio Always** - if ticked, audio-related parameters are loaded for all faders regardless of the **Load max. Fader No.** You can use this option to load audio-related parameters to all faders, while loading fader strip assignments up to a certain fader number.
- **Enable Load Groups Logic** - can be used to change which source parameters load depending on fader status. By default, all parameters if source faders are closed, and do not load if source faders are open. By assigning control signals to the various load group inputs, you can modify this behaviour as you wish. See Selective Loading of Source Parameters.



### 6.17.3 Using the Local Snapshot Memories

The five local snapshot memories always reset the console globally. They are stored, recalled and cleared as follows.

The configuration can define an UNLOCK function to protect the local snapshots from being saved or deleted by accident. If this is the case, then you will need to activate **UNLOCK** (usually an MF Key) before you can perform an operation. (Use **Snap Unlock**, in the "System -> Definition -> Parameter = Snapshots" branch of the 'Tree Definition', to activate this option.

In addition, your user rights may prevent you from saving or deleting the 5 local snapshot memories.

➤ **To store settings in a local memory:**

1. Press and hold **UNLOCK** followed by **SNAP SAVE**.

If a memory has been used, then the numbered buttons, **1** to **5**, illuminate in red. A green button indicates a free memory. If you select a used memory, then its contents will be overwritten.

2. Keep holding **SNAP SAVE** and select a memory - e.g. number **4**.

The **SNAP SAVE** button flashes magenta to indicate a successful operation.

➤ **To recall settings from a local memory:**

1. Press and hold **UNLOCK** followed by **SNAP LOAD**.

You can see which memories contain data by looking at the lit buttons.

2. Keep holding **SNAP LOAD** and select a memory - e.g. number **4**.

The **SNAP LOAD** button flashes magenta to indicate a successful operation and the console resets.

➤ **To clear a local snapshot memory:**

1. Press and hold **UNLOCK** followed by both **SNAP LOAD** and **SNAP SAVE**.

You can see which memories contain data by looking at the lit buttons.

2. Keep holding **SNAP RECALL** and **SNAP STORE** and select a memory - e.g. number **4**.

The snapshot memory is cleared.

3. To check if the operation has been successful, press and hold **SNAP RECALL** - the memory number should now be clear (unlit).

## 6.18 The SYS Menu

The **SYS** key on the Central Module provides access to a number of system-wide options. These options are stored in the DSP Core's warm start data. Therefore, if you make changes they will affect all users.

Usually the menu is protected by the "Unlock" function, so press hold **UNLOCK** + **SYS** to map the available options onto the four sets of rotary controls at the top of the Central Module.

The **SYS** menu can be disabled by the configuration. In this instance, the **SYS** key has no function.

### 6.18.1 Fader Options

#### Fader Speed

Turn the **Fader** rotary control to change the fader speed. You can select **Slow**, **Medium** or **Fast** to change the speed at which faders will open or close in response to external control signals such as a fader start, or when loading snapshots. Only the physical fader speed is affected, not the response time of any changes to audio level.

#### Fader Notch

Enables or disables the fader notch. With the notch enabled, you will feel a notch at 0dB when you move a fader.

#### Fader Hot mode

Enables or disables 'hot fader' mode. When disabled, the faders motors are active and so the faders will move when you turn a channel on or off. When enabled, the fader motors are inactive; this allows you to open faders without passing audio, and then start channels at a later stage.

### 6.18.2 PFL Mode

Turn the **PFL Mode** rotary control to change the PFL mode for the PFL / Cue bus. The mode affects whether you can select multiple PFL / CUE buttons, and what happens when you open or close faders with PFL enabled.

The available options are:

- **SUM** (default mode) – multiple PFL buttons may be selected. Where faders are closed, sources are summed onto the PFL Bus; when a fader is opened, PFL is cancelled. Where faders are open, sources are put into 'PFL Prepare' and will be summed onto the PFL Bus once the fader is closed.
- **SUM R** – identical to **PFL Mode SUM** but PFL recurs if you open the fader (cancel the PFL) and then close the fader. In this mode, PFL is only cancelled by deselecting the PFL button.
- **PFL** – identical to PFL SUM, but PFL buttons intercancel such that only one source may ever be in PFL or PFL prepare.
- **PFL R** - identical to **PFL Mode PFL** but PFL recurs if you open the fader (cancel the PFL) and then close the fader. In this mode, PFL is only cancelled by deselecting the PFL button.
- **PFL A** - this mode is called PFL Always and is identical to **PFL Mode SUM** with the exception that it allows open faders to be put into PFL rather than PFL Prepare.
- **PFL AR** - this mode is a combination of PFL Always and PFL Recurring which means that PFL is never cancelled by opening a fader.
- **PFL PUSH** – PFL is momentary. This means PFL is active when you press the PFL button, and cancels on release.
- **PFL DJ** - allows you to prepare a fader level which is applied when you put the fader on-air. Press PFL and adjust the fader level. Then deselect PFL and press START to put the fader on-air - the fader jumps to the prepared level. (Note that the prepared level is applied only once. So, if you take the fader off-air, and then press START again - the fader jumps to 0dB as normal.)
- **AFL** - the channel's PFL buttons operate as AFL (After Fade Listen). The channel's after-fader signal is routed to the PFL bus. Multiple AFLs may be summed. AFL is only cancelled by deselecting the AFL button.
- **AFL/PFL** - as for **AFL**, but the channel's PFL signal is heard when the fader is closed; when the fader opens, the listen bus receives AFL.

## 7. Maintenance

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This chapter describes the maintenance procedures for the control surface frames and components.

Topics include:

- [Checking the Hardware Status](#)
- [Updating Firmware](#)
- [The Special Functions Mode](#)
- [Replacing Defective Parts](#)
- [Locating the Control Surface Serial Number](#)
- [Cleaning the Devices](#)

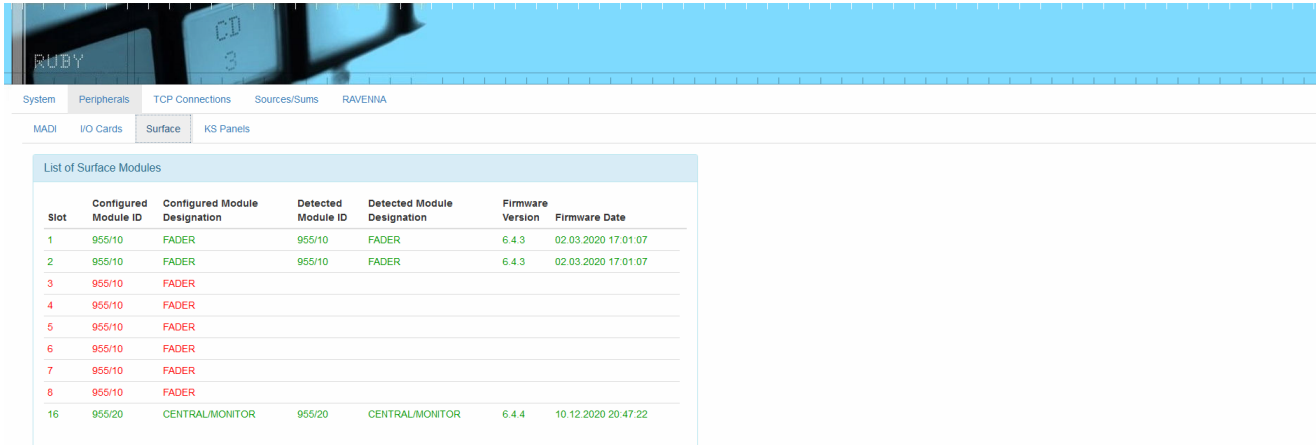
## 7.1 Checking the Hardware Status

The Web UI can be used to check the hardware status of each control surface module.

To open the Web UI, connect a computer to DSP Core control system network, open a suitable browser application and enter the IP address of DSP Core into the URL field.

If the DSP Core is Power Core, then you can check the status of the control surface components from the **Peripherals -> Surface** menu:

*Peripherals -> Surface*



The screenshot shows the 'Surface' menu in the Web UI. Below the menu, there is a table titled 'List of Surface Modules' with the following data:

Slot	Configured Module ID	Configured Module Designation	Detected Module ID	Detected Module Designation	Firmware Version	Firmware Date
1	955/10	FADER	955/10	FADER	6.4.3	02.03.2020 17:01:07
2	955/10	FADER	955/10	FADER	6.4.3	02.03.2020 17:01:07
3	955/10	FADER				
4	955/10	FADER				
5	955/10	FADER				
6	955/10	FADER				
7	955/10	FADER				
8	955/10	FADER				
16	955/20	CENTRAL/MONITOR	955/20	CENTRAL/MONITOR	6.4.4	10.12.2020 20:47:22

- If a component is shown in green, then it is configured and operational.
- If a component is shown in red, then it is configured but there is a problem - it is not fitted or connected, or it may be faulty.
- If a component is not listed, then it is not configured.

In the example above, the system has detected two Fader Modules and one Central Module. A further six Fader Modules are configured, but either they are not fitted or their frame is not connected.

For more details about the Web UI, please refer to your the DSP Core manual.

## 7.2 Updating Firmware

It is important that all system components are running the correct firmware including all of the control surface modules. This is handled by a firmware update tool, called SoP Explorer, which is included with the ON-AIR Designer installer.

The current revision of each system component (Surface, System and IOs) can be checked and, if necessary, updated by transferring files from a networked computer. Full details on how to use the tool can be found in your the DSP Core manual.

### 7.3 The Special Functions Mode

Each of the control surface modules offers a “special functions” mode. This can be used to adjust system settings and test the module's components (lamps, buttons, etc.)

Double-click on the links below to open the special functions mode documentation (as a pdf):

- [ruby Fader Module SF mode](#)
- [ruby Central Module SF mode](#)

## 7.4 Replacing Defective Parts

The CAN bus is hot-pluggable which means that the control surface can be connected and disconnected during uptime. This allows fast replacement of a frame in the case of a hardware failure. Providing the replacement frame is set to the correct CAN bus addresses, it will immediately take over the same functions as the exchanged frame.



## 7.5 Locating the Control Surface Serial Number

The serial number of your control surface can be found on the product information sticker placed on the underside of the panel:

*Sticker Location*



The **S/N** field indicates the Serial Number:

*Product Information Sticker*



## 7.6 Cleaning the Devices

Lawo radio products are made from a variety of different materials, and each material might have specific cleaning requirements. Therefore, a general allowance for disinfection of product surfaces with disinfectants containing alcohol cannot be given.

Our console surfaces and panels are not entirely approved for treatment with chemical cleaning agents and disinfectants. Component surfaces and electronics can be permanently damaged by treatment with such agents and the lifespan can be dramatically shortened. Please note that some substances can lead to discoloration of surfaces.

Lawo is not responsible for damage caused by unauthorized use of disinfectants on radio products and console surfaces.

This is a general instruction and recommendation for cleaning that applies to all Lawo radio products.

- Before you clean the device, unplug all external power sources.
- Clean the device with a soft cloth, dipped lightly in warm to hot soapy water.
- Do not use any liquid cleaning agents or spray cleaners which may contain flammable materials.
- Do not get moisture into any openings.
- Do not use aerosol sprays, bleaches, or abrasives.
- Do not spray cleaners directly onto the item.

The above information and our technical application advice are given to the best of our knowledge.

### 7.6.1 Cleaning the Control Surface

To clean the control surface please use a cleaning cloth with the following properties:

- Antistatic
- Fluff-free
- Without emery pieces

**DO NOT** spill liquids into any system components!  
**DO NOT** clean the mixing console with sharp instruments!

# 8. Troubleshooting

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This chapter covers some typical problems and their solutions.

Topics include:

- [Solving Connectivity Issues](#)
- [Boot-up Issues](#)

## 8.1 Solving Connectivity Issues

### 8.1.1 The control surface is behaving oddly

This can occur if the same CAN bus address is used for more than one module.

1. Check the CAN bus addresses of each module using the [special functions](#) mode. Each address must be unique and match the one defined by the configuration.

### 8.2 Boot-up Issues

#### 8.2.1 The system will not boot

1. Try restarting the system with a warm start.
2. If this is unsuccessful perform a cold start.
3. Are there feedback loops in the configuration which may stop the system from booting? For example:
  - The output of a logic function (e.g. OR8) is used as an input signal for the same function.
  - Control signals from a source (e.g. CD player) are used to feed control functions of the same device creating a control loop.

The default mode can be used to exit the loop and load an empty configuration. Once boot-up is complete, you can use SoP Explorer to reload all system firmware and the ON-AIR Designer to transfer a different configuration.

## 9. Appendices

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This chapter includes further information which you may find useful.

Topics include:

- [Part Numbers](#)
- System Reference Levels
- [Dimension Drawings](#)
- [Connector Pin-Outs](#)
- [The 12V DC Power Supply](#)
- [The User Labels Software](#)

## 9.1 Part Numbers

System Component		Part Number
ruby	Fader Module	954/45
	Central Module	954/50
Accessories	12V DC power supply	955/50-80

Control Surface Frame	Part Number		
	Table Top	Countersunk	Countersunk Short
ruby 4-fader	RU4FTT	RU4FCS	RU4FCSS
ruby 8-fader	RU8FTT	RU8FCS	RU8FCSS
ruby 12-fader	RU12FTT	RU12FCS	RU12FCSS
ruby 16-fader	RU16FTT	RU16FCS	RU16FCSS
ruby 4-fader Extender	RU4FEXTT	RU4FEXCS	RU4FEXCSS
ruby 8 fader Extender	RU4FEXTT	RU8FEXCS	RU8FEXCSS
ruby 12-fader Extender	RU12FEXTT	RU12FEXCS	RU12FEXCSS
ruby 16-fader Extender	RU16FEXTT	RU16FEXCS	RU16FEXCSS
ruby Central Module Extender	RUCMEXTT	RUCMEXCS	RUCMEXCSS

### 9.1.1 Data Sheets

Further technical information can be found in the product data sheets. The system part numbers will help you locate the data sheets for the main system components.

All documentation is available from the **Downloads** area at [www.lawo.com](http://www.lawo.com) (after **Login**).

## 9.2 Dimension Drawings

Please use the links below to open the dimension drawing as a pdf:

- [Ruby Table Top Dimension Drawing](#)
- [Ruby Countersink Dimension Drawing](#)
- [Ruby Countersink Short Dimension Drawing](#)

The drawings show an 8-fader main frame.

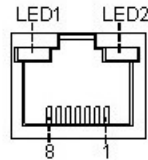
Drawings for other frame sizes are available from the **Downloads** area at [www.lawo.com](http://www.lawo.com) (after **Login**).



## 9.3 Connector Pin-Outs

### 9.3.1 CAN

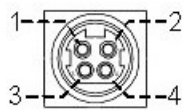
8-pin RJ45 connector, female.



PIN No:	FUNCTION
1	BUS high
2	BUS low
3	GND
4	n.c.
5	n.c.
6	n.c.
7	n.c.
8	n.c.
LED1	CAN Rx
LED2	CAN Tx

### 9.3.2 DC Power Input

4-pin Kycon connector, female.

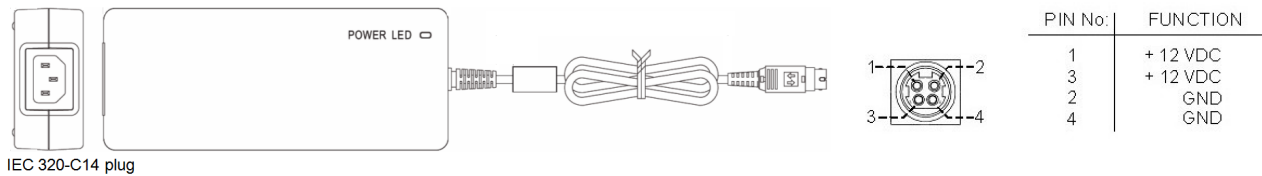


PIN No:	FUNCTION
1	+ 12 VDC
3	+ 12 VDC
2	GND
4	GND

## 9.4 The 12V DC Power Supply

12V DC Power Supply (955/50-80)

DC Plug Pinning



### Dimensions and Weight

Parameter	Conditions		Unit
Mechanical data			
Width		72	mm
Height		35	mm
Length		175	mm
Weight		670	g
Cable length	without plug	1200	mm

### Electrical Specification

Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Voltage		85		264	VAC
Frequency		47		63	Hz
Input Current		1,85A/115VAC 1A/230VAC			AAC
Inrush Current		120A/230VAC			AAC
Efficiency		89			%
Output Voltage		12±5%			VDC
Output Current				11.5	ADC
Leakage Current				0,75	mA

## 9.5 The User Labels Software

The **User Labels Software** can be used to edit [source labels](#) during runtime.

### 9.5.1 System Requirements

#### **ruby**

The DSP Core *MUST* be running OS Version 3.4.0.17a software or higher.

If the OS-Version is lower than 3.4.0.17a, please contact your local Lawo representative or email [support@lawo.com](mailto:support@lawo.com).

#### **PC Requirements**

- Windows 7, 8 or 10 operating system. Note that Windows 10 LTSB (Long Term Servicing Branch) for Enterprise installations is not supported.
- Core-I5 (or higher) CPU
- 2GB RAM, minimum

### 9.5.2 Installing the Software

The **userlabels.exe** setup application is included with your system software.

1. Copy the **userlabels.exe** application onto your computer.
2. Double click on the **userlabels.exe** application icon:

Name	Date modified	Type	Size
VisTool2	14/03/2012 09:43	File folder	
userlabels-1.4.3.0	08/03/2012 22:32	Application	3,088 KB
zirkon-4.0.0.1	08/03/2012 22:33	Application	15,439 KB

This starts the 'DSA User Labels Setup Wizard':



3. Follow the Wizard's instructions accepting the default options provided.
4. When you reach the 'Summary' window, check the options and click **Install** - the software is installed on your computer; this may take a few minutes.

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

5. When the installation is complete, a confirmation window appears - click on **Finish** to exit the 'Setup Wizard'.

If you have any problems with the installation, please contact your local Lawo representative or email [support@lawo.com](mailto:support@lawo.com).

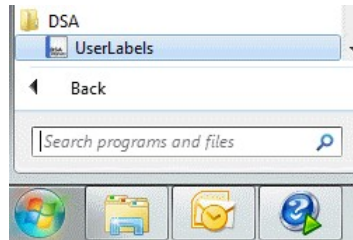
### 9.5.3 Network Connection

You should connect the **User Labels** PC to DSP Core's Ethernet port either directly or via a network switch. *Do NOT* use an Ethernet hub as this will interrupt the data stream. See Wiring: CONTROL Network.

The **User Labels** software uses the DMS service (the first DMS Channel) specified by the **VisAdmin** program, which is automatically installed when you install **VisTool MK2**. See the "VisTool User Guide" for details.

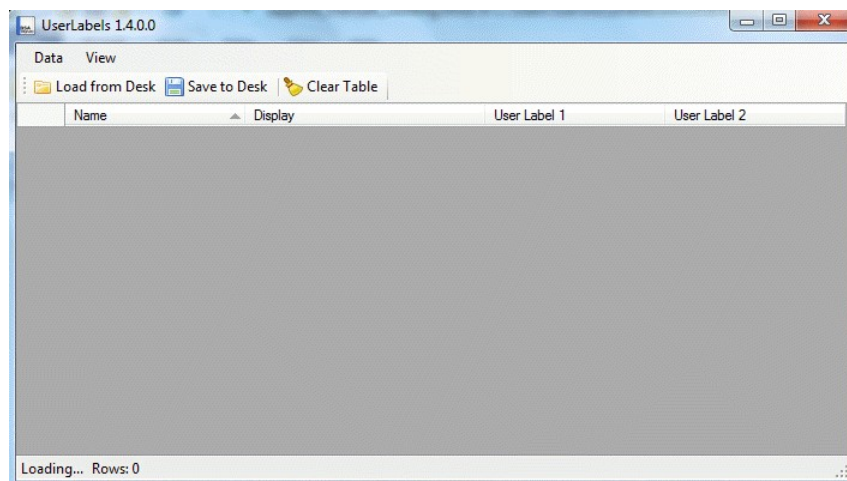
### 9.5.4 Editing User Labels

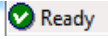
1. Start the "User Labels" application either by selecting its desktop icon or by selecting **START -> All Programs -> DSA -> User Labels**:



This is the default file path created during a standard install.

The application opens with an empty window:



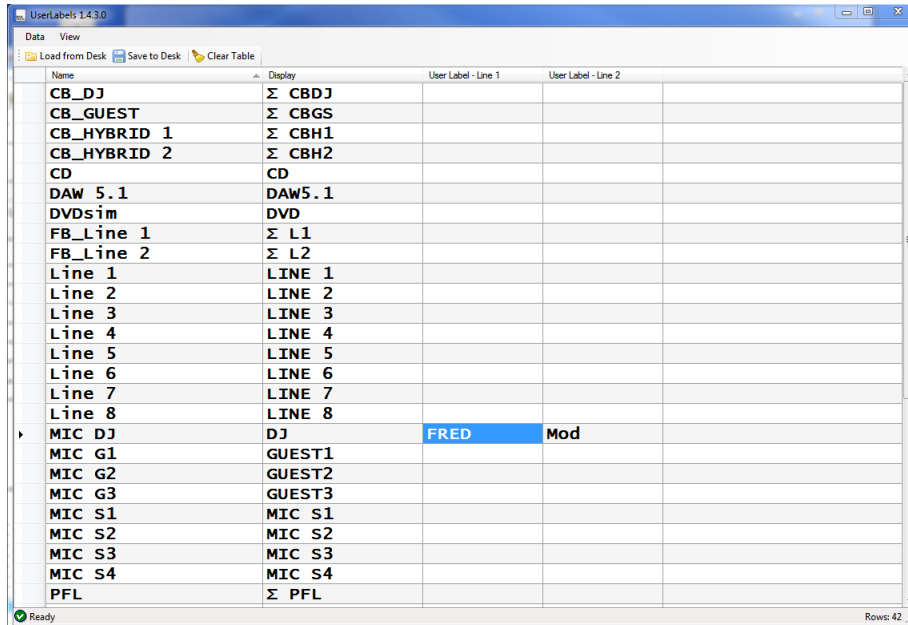
When online, the  **Ready** flag at the bottom left of the window indicates that the software is communicating correctly with the **ruby** system. If this flag does not appear, then check the [network connection](#) to the system.

- To transfer the current labels from the console, select **Load from Desk**.

The window updates to show the **Name**, **Display** name and **User Label** Lines for all sources and buses defined in the configuration.

Note that you will see all sources and buses even if they are not assigned to a fader strip.

- Click in the **User Label - Line 1**, or **User Label - Line 2**, fields to edit or add a name. You may enter up to 8 characters in each line:



Name	Display	User Label - Line 1	User Label - Line 2
CB_DJ	Σ CBDJ		
CB_GUEST	Σ CBGS		
CB_HYBRID 1	Σ CBH1		
CB_HYBRID 2	Σ CBH2		
CD	CD		
DAW 5.1	DAW5.1		
DVDsim	DVD		
FB_Line 1	Σ L1		
FB_Line 2	Σ L2		
Line 1	LINE 1		
Line 2	LINE 2		
Line 3	LINE 3		
Line 4	LINE 4		
Line 5	LINE 5		
Line 6	LINE 6		
Line 7	LINE 7		
Line 8	LINE 8		
MIC DJ	DJ	FRED	Mod
MIC G1	GUEST1		
MIC G2	GUEST2		
MIC G3	GUEST3		
MIC S1	MIC S1		
MIC S2	MIC S2		
MIC S3	MIC S3		
MIC S4	MIC S4		
PFL	Σ PFL		

The **Name** and **Display** fields are defined by the configuration and cannot be edited by the **User Labels** software. (Use the **Reference** name and **Display** name in Source -> Parm to configure these options.)

- When you have finished editing, select **Save to Desk** to transfer the new User Labels to the console. This can be done at any time, even when the console is on-air.

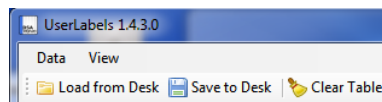
Note that:

- User labels for all source and buses in the configuration are saved when you save a snapshot. This means that you can save and recall labels for specific shows along with other settings, see [Snapshots](#).
- The last User Labels are stored in the console's warm start data. This means that when you power on you will get back to wherever you were when the power was last turned off!

### 9.5.5 Other Functions

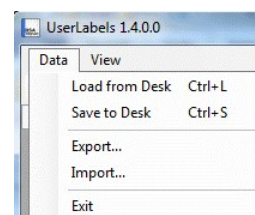
The "User Labels" software includes some other buttons and menu options:

- Clear Table** - select this button to clear the User Labels for all sources and buses in the table.



- Data Menu:**

- Load from Desk** - transfers the current user labels from the console.
- Save to Desk** - transfers user labels from the software to the console.
- Export...** - use this option to export the current user label table as an .xml file. You can use this to copy user labels from one system to another.



- **Import...** - use this option to import user labels from an .xml file.
- **Exit** - closes the User Labels software application.
- **View Menu:**
  - **Identifier** - displays the internal System Number. This number cannot be modified and is for information only.
  - **Font...** - select to open the Font dialogue box. You can use this to adjust the on-screen font for the user labels table.

