

mc²36 MKII

Installation & Service Guide

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1. Introduction

About this Manual

This document describes the hardware, installation and service procedures for the **mc²36 MKII** control surface. Look out for the following which indicate:

Notes - points of clarification.

Tips - useful tips and short cuts.

Attention - alert you when an action should *always* be observed.

Further Information

Mechanical drawings and data sheets (including weights and dimensions) are available from the **Downloads** area at www.lawo.com (after **Login**).

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

Lawo User Registration

For access to the **Downloads** area and to receive regular product updates, please register at: www.lawo.com/registration.

2. Important Safety Instructions

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 same information (as a pdf).

Please also observe the "Safety Information" included in the product data sheets. These are available from the **Downloads** area at www.lawo.com (after **Login**).

3. The Hardware

This chapter describes the control surface hardware and options.

3.1 Overview

The **mc²36 MKII** comes in a range of predetermined frame sizes. The control surface includes integrated local IO and dual redundant power supplies. It also houses the A__UHD Core which is mounted internally. To provide cooling at extreme temperatures, the frame is fitted with slow turning, low noise fans. The fans are temperature controlled, so under normal operating conditions, they are inactive.



3.2 Frame Variants

In the first release, the control surface is available in two standard frame sizes: 16 or 32-fader.

Both variants include a central bay with 16 faders.

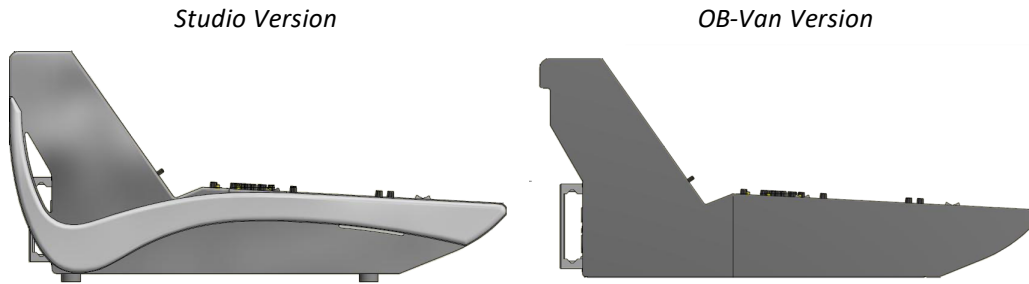
To make the 32-fader variant, a single channel bay is added. This adds 510 mm to the width of the console. Note that you cannot vary the layout and so the position of the centre section is as shown.

mc²36MKII Frame Options

mc ² 36 MKII	Studio Version	OB-Van Version	
16 Fader	<ul style="list-style-type: none"> • Dimensions: 833 x 820 x 380 mm / 32.8 " x 32.3 " x 15.0 " • Weight: 38 kg / 83.8 lbs 	<ul style="list-style-type: none"> • Dimensions: 765 x 820 x 380 mm / 30.1 " x 32.3 " x 15.0 " • Weight: 39 kg / 86.0 lbs 	
32 Fader	<ul style="list-style-type: none"> • Dimensions: 1343 x 820 x 380 mm / 52.9 " x 32.3 " x 15.0 " • Weight: 55 kg / 121.3 lbs 	<ul style="list-style-type: none"> • Dimensions: 1275 x 820 x 380 mm / 50.2 " x 32.3 " x 15.0 " • Weight: 56 kg / 123.5 lbs 	

Mechanical drawings and data sheets for all frame variants are available from the **Downloads** area at www.lawo.com (after **Login**). To help locate the correct data sheet, please refer to the [part numbers](#) appendix.

3.3 Mounting Options



Each frame can be ordered for either Studio or OB-Van (Mobile) mounting.

The Studio version comes with wider side panels and is ready for table-top mounting.

The OB-Van version is fitted with narrow aluminum side plates and is designed for crossbar mounting (i.e. no feet are supplied).

Option	Part Number
Studio Side Panels	976/60
OB Van Side Panels	976/61

3.4 Centre Section / 16F Controls

All consoles come with a centre section which provides 16 faders.

In the 16-fader variant, these are the only controls.

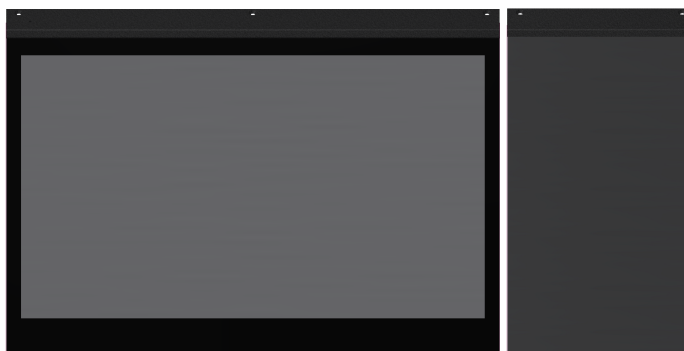
3.4.1 Centre Section Panels

1 x "Channel Display" (977/13)

A high resolution, touch-screen TFT display (identical to a channel bay). When fitted to the centre section, the display is known as the Central GUI.

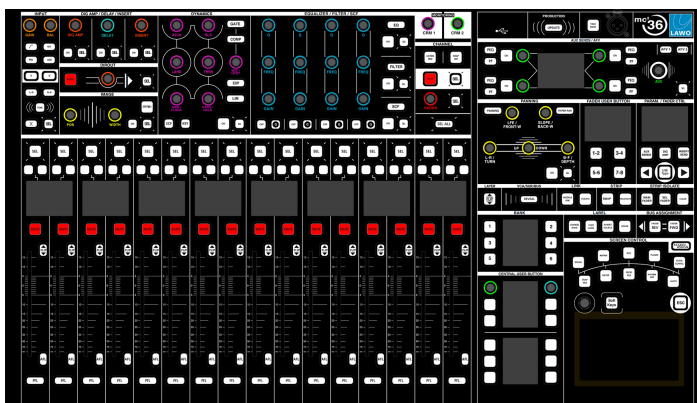
1 x Blanking Panel OVB (976/15)

A full height blanking panel for the overbridge.



1 x Central Panel (976/20)

with 16 x 100mm motorised faders, 43 rotary encoders, 14 mini TFT displays, 240 push-buttons, 1 XLR connector, 1 USB port, 1 trackpad with integrated left & right "mouse" buttons.



3.4.2 Ethernet Gateserver

Internally, the central bay is fitted with an Ethernet Gateserver mounted inside the frame. This handles all of the control data for the complete surface, and also hosts the console control system.

3.4.3 Further Information

All faders and rotary encoders are touch-sensitive.

You can find more information about the individual panels and displays in their [data sheets](#).

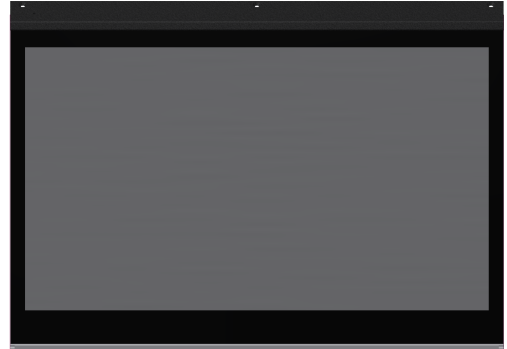
3.5 Channel Controls (apply to 32F)

In the 32-fader variant, a single channel bay is added to provide another 16 faders.

3.5.1 Channel Bay Panels

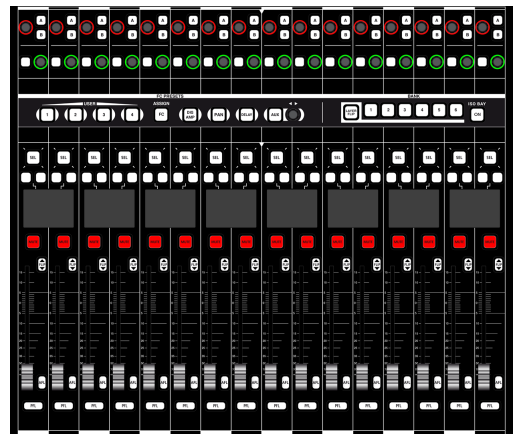
1 x Channel Display (977/13)

A high resolution, touch-screen TFT display.



1 x Fader Panel (976/10)

with 16 x 100mm motorised faders, 33 rotary encoders, 8 mini TFT displays, 177 push-buttons.



3.5.2 Ethernet Bayserver

Internally, each channel bay is fitted with an Ethernet Bayserver mounted inside the frame. This handles the control data within the bay, and connects to the Gateserver via the internal network.

3.5.3 Further Information

All faders and rotary encoders are touch-sensitive.

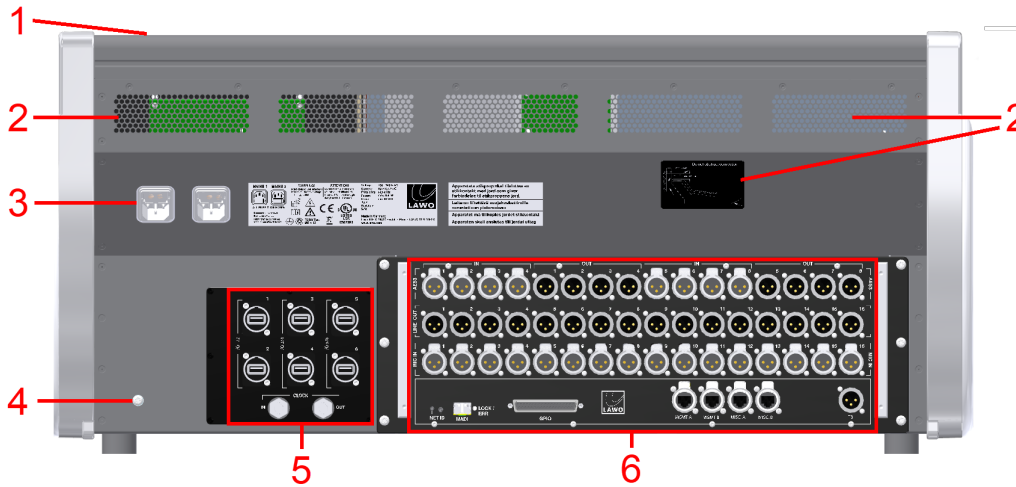
You can find more information about the individual panels and displays in their [data sheets](#).

3.6 Overbridge Options



The space to the right of the Central GUI is fitted with a full height blanking panel (976/15). This provides a general utility space to mount other devices (e.g. an external tablet).

3.7 Console Rear Panel



1 Removable Script Tray (optional)

One or more removable script trays may be ordered. The script tray glides across the top of the frame, and can be lifted on or off for removal.

2 Ventilation Holes & Sticker

The sticker shows the direction of airflow (required for convection cooling) and the minimum distance requirements (for installing the frame).

3 MAINS 1 & 2

The **MAINS 1** & **MAINS 2** connectors supply AC mains power to the frame. The sticker states the AC mains requirements.

4 CASE

The CASE grounding screw (M5 x 12mm) should be used to ground the frame.

5 A__UHD Core Connector Panel

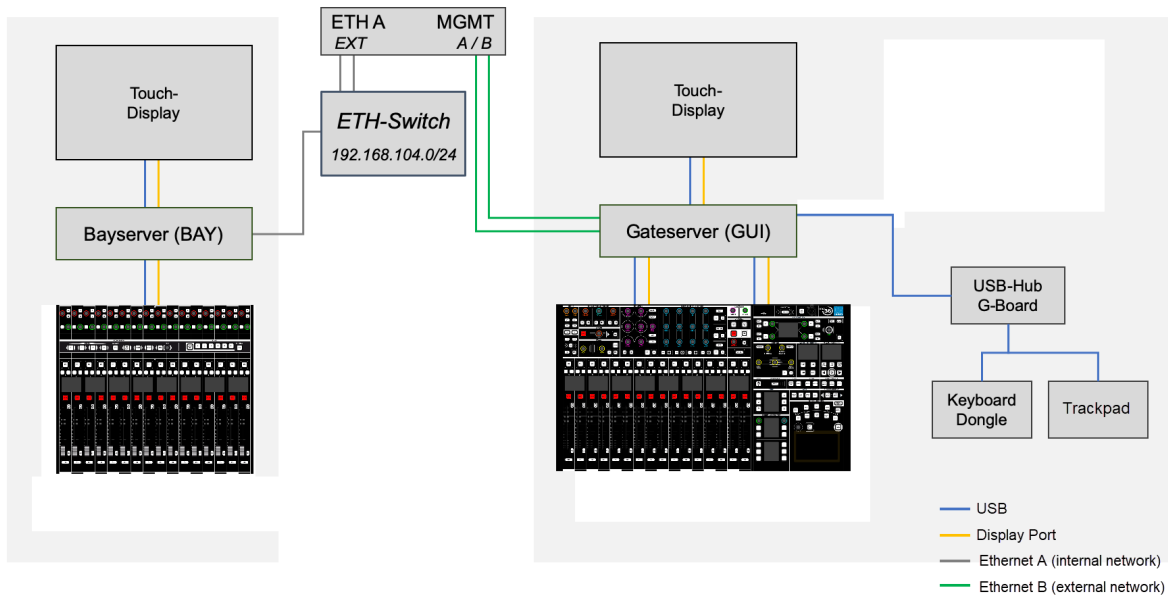
The three pairs of I/O ports can be used to stream multi-channel audio to and from the Media Network. The CLOCK IN and OUT ports can be used for external synchronization.

6 Local IO Connector Panel

Here you will find the connections for the built-in local IO. These are described [later](#).

The first two network ports (**MGMT A** & **MGMT B**) provide a connection to the mc² control system (for remote operation, configuration and maintenance).

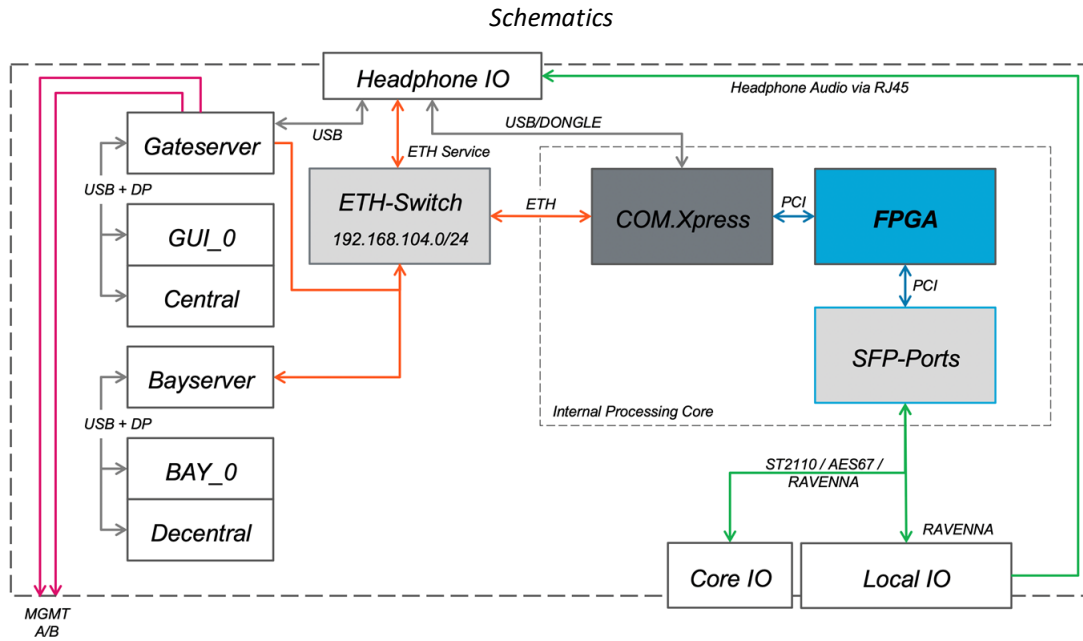
3.8 Control Surface Wiring



Internally, the control surface uses point-to-point connections, within each bay, to provide fault tolerance and convenient servicing. Any bay or panel can be isolated from the rest of the console, allowing panels and displays to be replaced during operation.

Firstly, within each bay, individual panels and displays connect to an Ethernet server mounted inside the frame: either a Bayserver (in channel bays) or Gateserver (in the centre section). The connections are made using both USB and Display Port. In the centre section, there is also a USB hub which connects to the console keyboard and trackpad.

Each Bayserver connects to an Ethernet switch to form what is known as the internal network or ETHERNET A. The Gateserver acts as a bridge between the internal and external networks. It handles all of the control data for the complete surface, and connects to the mc² control system in the A_UHD Core. In the **mc²36 MKII**, this connection is wired internally.



Externally, the following connection is wired from the internal network switch:

- **ETH A** (front buffer) - to connect a service computer.

Plus the following connections are wired from the Gateserver:

- **MGMT A & B** (rear panel) - to connect the Management Network.

The **MGMT A & B** ports provide a connection to the mc² control system (for remote operation, configuration and maintenance). While it is possible to connect a single device directly, it is more common to install a network switch to create a dedicated Management Network. Only one connection is essential for operation. A second can be installed to support redundancy.

3.8.1 Additional Notes for the Gateserver

The Gateserver provides a more sophisticated computing engine that can boot on its own once power is supplied to the control surface. To achieve this, the Gateserver has its own SSD storage containing the boot image. This must be updated separately using the mxUpdater utility (included with mxGUI).

After a successful boot, the Gateserver connects automatically to its partnered Core (by creating a VPN connection between the Gateserver and mc² control system). If there is no connection available, then the console will show "disconnected" screens. Once a valid network connection is established, the screens update to their "connected" state. This indicates that the console is ready for operation.

For the console to become fully operational, there must be a valid network connection between the Gateserver and mc² control system.

4. Installation

This chapter describes how to install the control surface.

4.1 Unpacking

The console is delivered as a fully assembled unit. All included accessories are shipped in the "Accessories" box. Any optional components are delivered in their own packing boxes.

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.

4.2 Packing List

Included

The following items are included with the control surface (in the "Accessories" box):

- **2 x 2m IEC power cables (country-specific)** - to connect mains power to the frame.
- **1 x USB keyboard** - to be installed as the console keyboard.
- **1 x dust-cover** - to protect the console when not in use.
- **1 x tool case + tools** - for performing service procedures.
- **1 x USB memory card** - containing the latest software and configuration files.

Optional

The following items must be ordered separately.

- **IO Connection Kits** - for the Media Network ports.
- **SFP module** - for the MADI port.
- **Removable Script Tray (959/41)**.

4.3 Mounting the Frame

The studio version comes ready for table-top mounting. The OB-Van version is designed for mounting onto a crossbar (not supplied). Note that a separate OB-Van mounting kit is not required, as the screw threads are integrated into the frame.

The frame *must* be mounted so that the faders work in a horizontal manner. It is forbidden to use the device in any other position, due to the convection airflow through and along the device.

All plug-in connectors are located on the front buffer and rear panel. Therefore, when installing, please leave enough room for the cables. You must also make sure that there is sufficient airflow around the device for cooling.

4.4 Dimensions and Weight

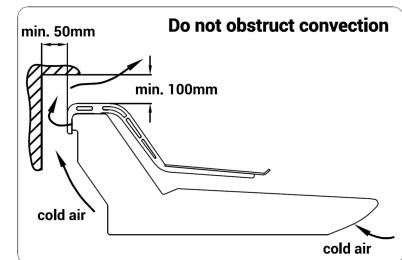
The dimensions and weight vary depending on the frame variant and control panel options. Mechanical drawings and data sheets for all frame variants are available from the **Downloads** area at www.lawo.com (after **Login**). To help locate the correct data sheet, please refer to the [part numbers](#) appendix.

4.5 Temperature and Cooling

Proper operation of the control surface can only be guaranteed at an ambient temperature between 10° C and 40° C and a relative humidity between 15% and 85% (not condensing).

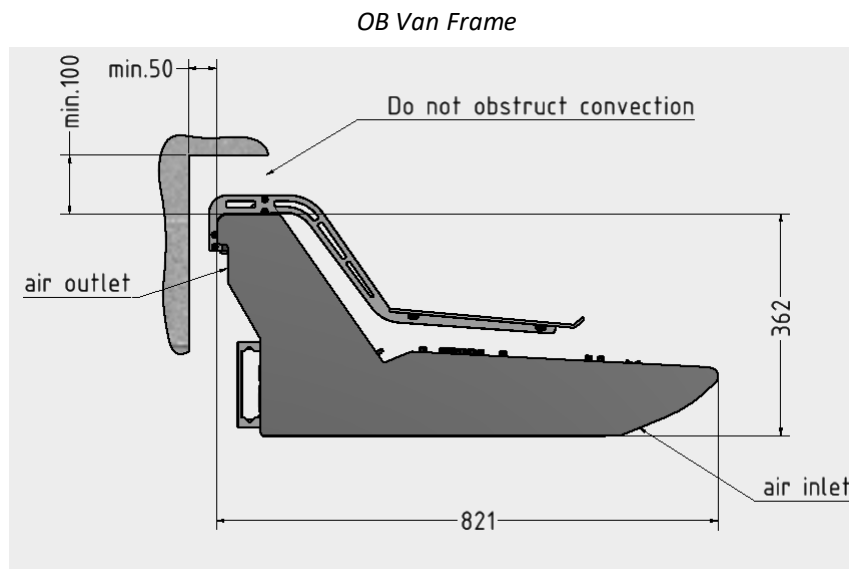
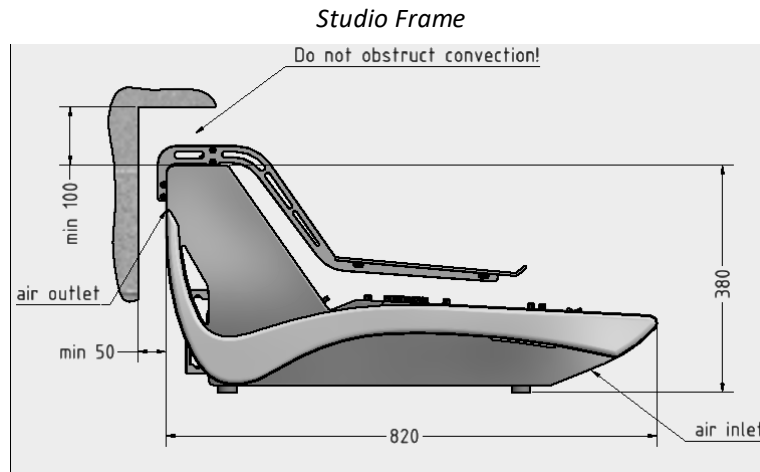
To keep the control surface cool in extreme conditions, the front panel is fitted with slow turning low noise fans which are temperature controlled.

When relying on convection cooling, it is vital to observe the minimum distances around the frame. The sticker on the rear of the frame summarizes the requirements.



ALWAYS observe the [minimum distances](#) around the console frame to allow for ventilation and cable ducting. Take care that no devices or cables obstruct the flow of air and, thereby, hinder cooling.

4.6 Minimum Distances for Control Surface Mounting



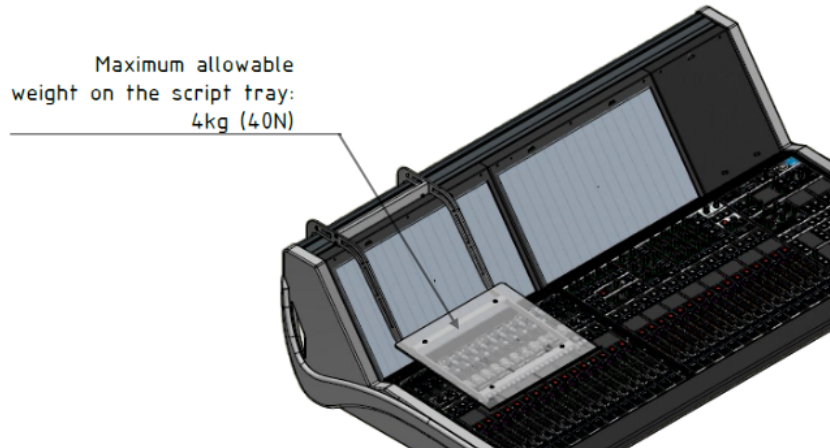
4.7 Installing the Console Keyboard

The USB keyboard (included in the "Accessories" box) is designed to be floating and positioned on top of the control surface when it is needed. Usually it is connected to one of the USB ports on the [front buffer](#) (below the centre section arm rest). A suitable cable is provided.

Take care to connect the keyboard to one of the control system USB ports and not the one marked "DONGLE"!

The keyboard is available in one of two layouts: either English (default) or German. Following installation, be sure to select the correct layout from the Central GUI's **System Settings** display (in the **Global** -> **System options**).

4.8 Fitting the Script Tray

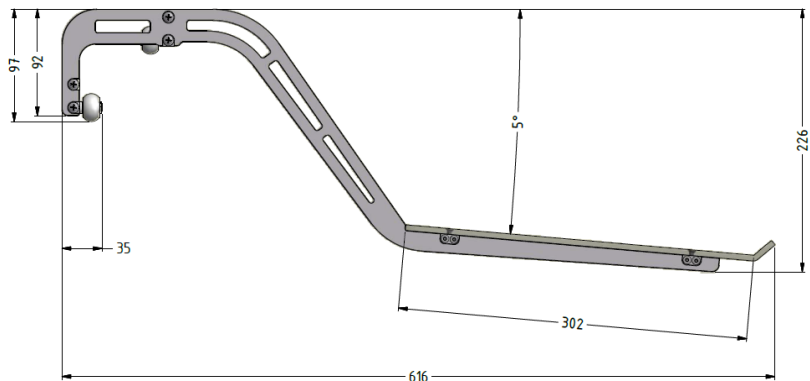
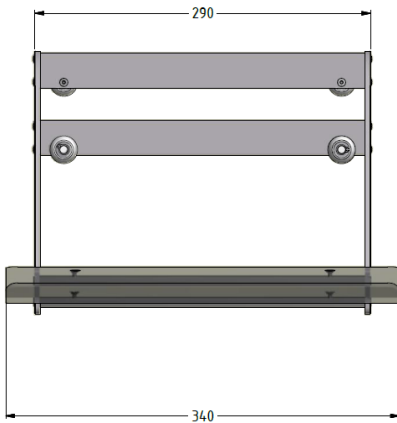


The script tray (959/41) is designed to be easily lifted on and off the console so that it may be removed when not required. Please note that there is no locking mechanism to anchor the script tray to the console, and so it *must* be removed for transportation.

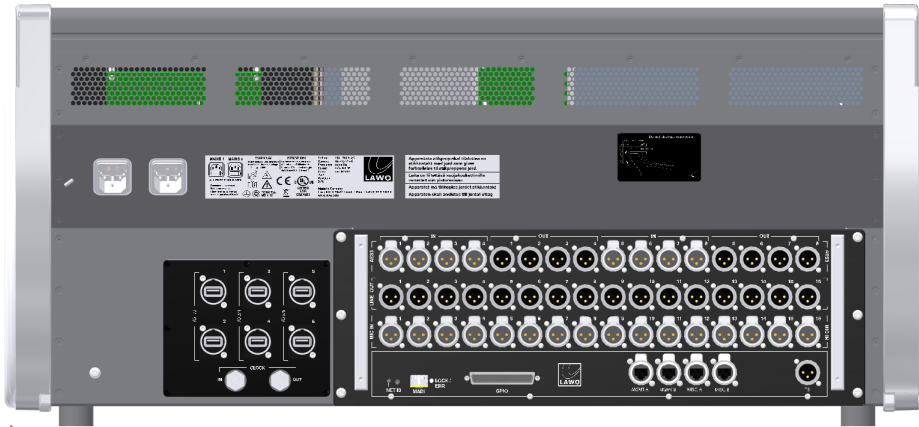
When fitted, the tray glides to the left or right. The maximum load of the script tray is 4kg.

DO NOT press down, sit on or place objects > 4kg onto the script tray, as to do so may damage the script tray and console surface.

Mechanical Drawings (Rear View & Side Profile)



4.9 Wiring from the Control Surface



The console rear panel provides the following connections:

- **MAINS 1 & MAINS 2** - AC mains power. Only one connection is essential for operation; the second provides redundancy.
- **CASE** - control surface grounding.
- **IO 1/2, 3/4 & 5/6** - multi-channel audio to/from the Media Network. For each pair of ports, only one connection is essential for operation; the second provides redundancy.
- **CLOCK IN & OUT** - external synchronization.
- **AES3, MIC, LINE, MADI, GPIO** - audio and GPIO breakouts for the local IO.
- **MGMT A & B** - control data to/from the Management Network. Only one connection is essential for operation; the second provides redundancy.
- **MISC A & B** - reserved for future implementation.
- **TB** - wired directly from the TALKBACK connector on the front panel.

You will also find headphone, USB and internal network connectors on the front buffer, and an XLR (for a talkback mic) and USB port on the front panel.

The topics which follow describe the connections in more detail.

4.10 Power

The control surface is powered by dual-redundant power supplies which are fitted internally within the frame. To operate the console, only one of the supplies is required. When both supplies are operational, the load is shared.

4.10.1 PSU Block Location

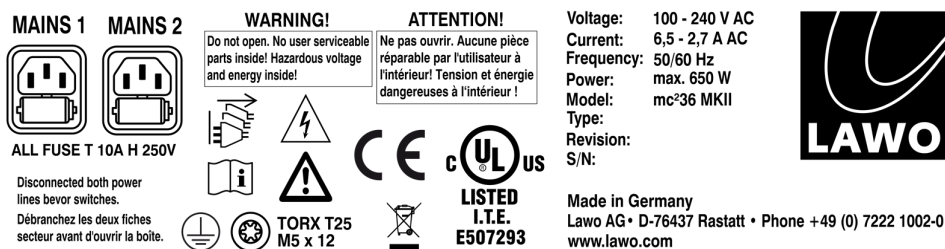
All of the frame variants are powered from a single PSU block (fitted inside the central bay).

The status of all PSU blocks can be monitored from the Central GUI (via the status bar). To change a faulty PSU, see [Replacing a Console Power Supply](#).

4.10.2 Electrical Specification

The power consumption varies depending on the frame variant, so please refer to the [data sheet](#) for the mc²36 MKII frame. The sticker on the rear of the frame provides a summary.

AC Mains Requirements (sticker)



The sticker contains the following information:

- MAINS 1** and **MAINS 2** connector diagrams.
- ALL FUSE T 10A H 250V**
- Warning: Disconnected both power lines bevor switches. Débranchez les deux fiches secteur avant d'ouvrir la boîte.
- WARNING!** Do not open. No user serviceable parts inside! Hazardous voltage and energy inside!
- ATTENTION!** Ne pas ouvrir. Aucune pièce réparable par l'utilisateur à l'intérieur! Tension et énergie dangereuses à l'intérieur!
- Technical specifications:
 - Voltage: 100 - 240 V AC
 - Current: 6,5 - 2,7 A AC
 - Frequency: 50/60 Hz
 - Power: max. 650 W
 - Model: mc²36 MKII
 - Type:
 - Revision:
 - S/N:
- UL LISTED I.T.E. E507293
- Made in Germany
- Lawo AG • D-76437 Rastatt • Phone +49 (0) 7222 1002-0
- www.lawo.com

4.10.3 Mains Connections

The **MAINS** connectors are located on the frame's rear panel. There are two connectors, one for each of the internal supplies.

For redundancy it is recommended to connect both **MAINS** connectors, each to a separate phase of the AC mains circuit.

There is no on/off switch, and so the frame will boot as soon as mains power is supplied. It is recommended that you install a master power switch to control all the power supplied to the frame.

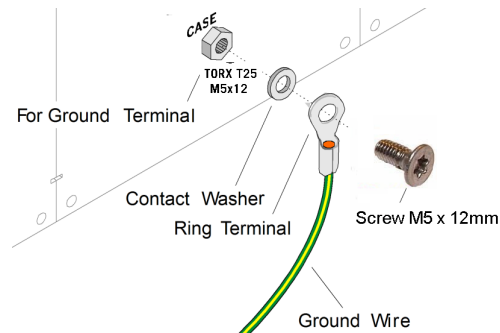
The **MAINS** connectors include an IEC locking mechanism for security. Please unlock before removing a connector. Be sure to turn the mains power off *BEFORE* connecting or disconnecting a cable.

Each frame *MUST* be connected to the mains using the IEC power cables supplied with the system. When running with two mains supplies, make sure that both circuits lie on the same ground potential. Otherwise, an internal bridge of two grounding wires can lead to a ground loop!

4.11 Grounding

Although operator protection is guaranteed (the control surface is connected to the ground of the power supply system via the IEC power connectors), it is best to establish an additional ground for EMC reasons.

1. Fasten the grounding cable to the rear of the frame using the **CASE** grounding screw (M5 x 12mm):



The control surface must be on the same potential as all other system devices/modules. For Scandinavian countries, **ALWAYS** use a grounded mains connection, to prevent the device from being grounded through Ethernet or other signal connections.

Grounding of Audio Interfaces

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

4.12 Control

Console Rear Panel



The **MGMT A** & **MGMT B** ports provide a connection to the mc² control system (via the Gateserver) for remote operation, configuration and maintenance. Only one connection is essential for operation. A second connection can be installed to support redundancy.

Connections are made via TCP/IP Ethernet.

A single computer or device can connect directly. However, it is more common to install a network switch to create a dedicated Management Network.

Lawo may deliver a suitable network switch with the system. This could be replaced by any other suitable switch fabric that provides comparable performance.

You must use a network switch and *NOT* a hub, and keep the Management Network separate from other traffic within the installation. The switch should support 1GB for best performance.

Cable Specification

Choose an Ethernet cable that meets the following specification.

- **Cable:** CAT 5 or better (CAT 5e/6/7); straight (1:1) or crossed cable*.
- **Connector:** RJ45.
- **Network Speed:** 1000, 100 or 10 Base-TX LAN. 1000 Base-TX (Gigabit Ethernet) is recommended.
- **Length:** up to 100m.

*For a direct connection, you will need a crossed network cable. When connecting to a network switch, use a straight (1:1) cable.

4.13 Local IO

Every mc²36 control surface includes built-in IO known as the "Local IO". This is designed for local connections such as loudspeakers, metering, talkback and headphones. The local IO frame is located inside the control surface (beneath the centre section). All connectors are accessed from the console's rear panel, except for the headphones which breakout on the front buffer.

The local IO provides 16 x Mic/Line in, 16 x Line out, 8 x AES3 IO, 1 x MADI (AES10), 1 x Phones, 8 x GPI and 8 x GPO for connection to external devices. There is also 1 x RAVENNA/AES67 interface which connects, internally, to the Core.

4.13.1 Local IO Connections



The following can be used connect external audio and GPIO devices:

- **16 x Mic/Line IN** - wired to 16 x XLR (female).
- **16 x Line OUT** - wired to 16 x XLR (male).
- **8 x AES3 IN** - wired to 8 x XLR (female).
- **8 x AES3 OUT** - wired to 8 x XLR (male).
- **1 x 64-channel MADI** - available via SFP. To use this port, you must fit a Lawo-certified [SFP module](#).
- **8 x GPIO** - wired to 1 x 37-pin, D-type (female).

See [Connector Pin-Outs](#) for wiring information.

Note that:

- The **TB** connector is wired from the female talkback XLR (on the front panel).
- You will find the stereo headphones socket on the front buffer.

4.13.2 Connecting the Local IO to the Core

In the mc²36 MKII, the local IO is wired internally to the spare Media Network IO port in the A__UHD Core.

NET ID

The **NET ID** button and LED can be used to reset the service IP address of the RAVENNA/AES67 interface to its default = **192.168.110.253**. Note that, for safety reasons, a press and hold is required; a quick press of the button performs no action.

First, make sure that the interface is booted and operating normally - the **NET ID** LED should be blinking yellow. Then, using a pointed object, press and hold the recessed button until the LED lights continuously. When the LED switches off, the reset is complete.

4.13.3 SFP Modules

The following SFP modules are available for the MADI port.

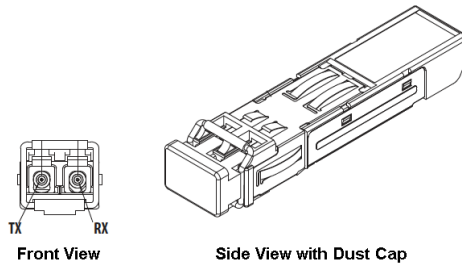
All SFPs must be Lawo-certified (as listed below). SFPs are not included and must be ordered separately.

➤ **MADI Interface SFP Modules**

SFP Module Description	Part Number
MADI, 1310nm, multi-mode fiber, 2km	981/60-80
MADI, 1310nm, single-mode fiber, 20km	981/60-81
MADI, HD-BNC (75 ohm), copper, 100m	981/60-82

Installing the SFP

The SFP modules are hot-pluggable, and so they can be fitted or exchanged while the device is powered.



1. Remove the dust caps from both the port and SFP module.

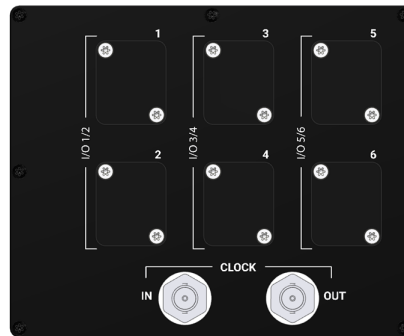
Store these carefully so that they can be replaced if a module is removed.

2. Push the SFP module into the rectangular slot.
3. Press gently and firmly until the module locks into position.

Attention: Before removal, please unlock SFP modules to avoid mechanical damage to the slots. If a module is removed, please refit the port's dust cap to protect the internal components. You *must* use the correct fiber type for your remote device. Using the wrong fiber type or exceeding the maximum optical input power can result in malfunction of, or damage to, the optical device.

4.14 Media Network IO

Console Rear Panel



The three pairs of IO ports can be used to stream multi-channel audio to and from the Media Network (up to 256 channels per port pair). Only one connection is required for operation; the second supports redundancy.

The streams are fully compatible with the SMPTE ST2110-30/31, AES67 and RAVENNA standards.

To achieve redundant streaming compatible with [SMPTE ST2022-7](#), you must connect the odd/even ports (Primary and Secondary) to discrete network paths.

All connections *must* be made via the Media Network (i.e. to and from a RAVENNA-compatible network switch). This ensures that the network's PTP clock signal is available to all streaming ports.

4.14.1 Audio-over-IP Specification

Each pair of I/O ports provides:

- RAVENNA: multi-channel digital audio-over-IP.
- Up to 256 bi-directional channels at 48kHz AND 96kHz.
- Up to 128 TX and 128 RX streams.
- Redundant streaming compatible with SMPTE ST2022-7 Class C.

RAVENNA provides full SMPTE ST2110-30 and AES67 compatibility, since these protocols are a subset of the RAVENNA specification.

The Media Network *must* be properly configured and managed. i.e. it must use a suitable network architecture; all components must support multicast (as opposed to unicast); a proper Quality of Service (QoS) must be configured; and so on.

Please *DO NOT* attempt to connect the streaming ports using an unqualifying IP network, as correct operation cannot be guaranteed.

You can find more details about the data network requirements and suitable components in the [Lawo IP Networking Guide](#).

4.14.2 IO Connection Kits







To use each I/O port pair, you must install one of the optional I/O connection kits. Several different kits are available, providing a choice of connector types and cable: RJ45 / copper, single-mode fiber (SMF) or multi-mode fiber (MMF).

Unless otherwise specified, the console comes with the RAVENNA-RJ45-Kit (976/70) fitted to ports 1/2, and blanking plates fitted to ports 3/4 and 5/6.

Rear Connector Panel (default spec)



The table below lists all possible options. Each kit includes everything required for a port pair: 2x SFP modules, connectors and interconnecting cables.

Name & Part Number	Contents	Connector Type
RAVENNA-RJ45-Kit (976/70)	<ul style="list-style-type: none"> • 2x SFP: 100/1000Base-T, RJ45 • 2x CAT6 Cable 1m • 2x Neutrik NE8FDX-P6-B 	<i>Neutrik etherCON</i> 
RAVENNA-MM-Fiber-Kit (976/71)	<ul style="list-style-type: none"> • 2x SFP: 850nm MM -7dBm, 1000 Base • 2x MMF Cable LC-LC 1m • 2x Hicon HI-FIBER4-FD • 2x Hicon HI-FIBER4-FCAP 	<i>Hicon/Sommer HI-FIBER4</i> 
RAVENNA-SM-Fiber-Kit (976/72)	<ul style="list-style-type: none"> • 2x SFP: 1310nm SM + MM -3dBm • 2x SMF Cable LC-LC 1m • 2x Hicon HI-FIBER4-FD • 2x Hicon HI-FIBER4-FCAP 	<i>Hicon/Sommer HI-FIBER4</i> 
RAVENNA-MM-Neutrik-Kit (976/73)	<ul style="list-style-type: none"> • 2x SFP: 850 nm MM -7dBm,1000 Base • 2x MMF Cable LC-LC 1m • 2x Neutrik OpticalCON DUO NO2-4FDW-A • 2x Neutrik OpticalCON DUO SCNO-FDW-A 	<i>Neutrik opticalCON DUO</i> 
RAVENNA-SM-Neutrik-Kit (976/74)	<ul style="list-style-type: none"> • 2x SFP: 1310nm SM + MM -3dBm • 2x SMF Cable LC-LC 1m • 2x Neutrik OpticalCON DUO NO2-4FDW-A • 2x Neutrik OpticalCON DUO SCNO-FDW-A 	<i>Neutrik opticalCON DUO</i> 
RAVENNA-MM-Fiberfox-Kit (976/75)	<ul style="list-style-type: none"> • 2x SFP: 850 nm MM -7dBm,1000 Base • 2x MMF Cable LC-LC 1m • 2x EBC1502-PXL-MM50 	<i>Fiberfox EBC1500</i> 

4. Installation

The examples below show the three different optical fiber connectors fitted to ports 3/4.

IO 3/4 = Fiberfox



IO 3/4 = HI-FIBER4



IO 3/4 = opticalCON



4.14.3 Installing an IO Connection Kit

In the example which follows, an RJ45 kit is installed on IO ports 1/2. Other connection kits are installed in a similar manner.

The kits should always be assembled in port pairs 1/2, 3/4 and 5/6, starting with 1/2.

Preparation

Each IO connection kit comes as a bundle containing:

- 2 x SFP modules.
- 2 x interconnecting cables (to connect the SFP modules to the connectors).
- 2 x rear panel connectors.
- Labeling / numbering accessories (to label the cables).

1. Start by unpacking the kit and assembling the components.

Each cable should be fitted with an SFP module on one end and rear panel connector on the other.

2. Use the accessories to label both ends of each cable.

The numbering should match the intended IO ports. So, cable 1 for IO port 1, cable 2 for IO port 2, and so on.

A fully assembled kit should look as shown.

Connector Kit (as delivered)



Connector Kit (assembled)



Installation Procedure

To install an IO connection kit, it is necessary to remove the Overbridge blanking panel and lift up the Central Panel, in order to access the relevant parts of the console.

DO NOT attempt to open the frame without first disconnecting the mains supply.

1. Using a T20 Torx driver, unfasten the two screws at the top of the Overbridge blanking panel. It is best to stand behind the console frame as shown:

View from above



2. Gently tilt the unit forwards and remove the RJ45 connector (on the back of the panel):



3. Carefully remove the Overbridge blanking panel by lifting it out of the frame. Lay it face-down on a piece of foam, or similar ESD-proof protective material, away from the console.

Make sure that the two pins on the front of the Overbridge panel do NOT damage the Central Panel.

4. Follow the first three steps in "[Replacing a Panel](#)" to open the Central Panel and hold it in place using the Hood Fastener.

Note that it is not necessary to disconnect or remove the Central Panel.

4. Installation

- On the rear connector panel, remove the blanking plates (or existing connectors) for the IO ports you wish to install.

There are two screws per port as shown:

Rear Connector Panel



Keep the screws somewhere safe as you will need them again later. The blanking plates can be removed completely and stowed in a safe place (for future use).

You are now ready to fit the new connector kit which you assembled earlier.

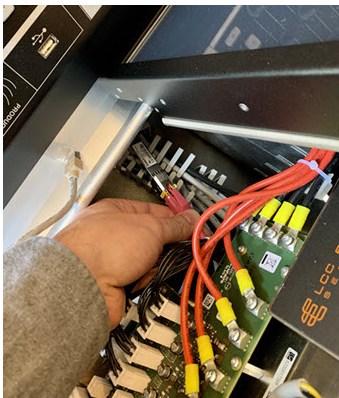
- Starting with the SFP module end, thread the first cable into the console through the IO port.

Take care to use the correct labeling. So, cable 1 through IO port 1, cable 2 through IO port 2, and so on.



- Grab the cable from inside the console, below the power distribution board, and guide it towards the front of the frame. Thread the cable all the way through until the rear connector can be brought into position.

Inside Console Frame



Rear Connector Panel



- Secure the connector to the rear panel by replacing the two screws (removed in step 5).



- Repeat steps 6 to 8 to thread the remaining cables and secure the connectors.

You are now ready to connect the SFP modules to the internal processing core (inside the frame).

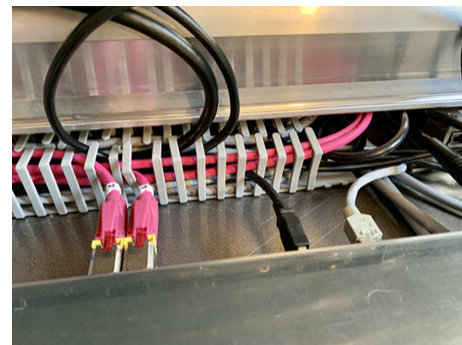
- From the front of the console, guide each of the cables towards the internal processing core and insert the SFP module into the correct slot.

Make sure that the cables run properly through the frame and are fixed in place using the cable raceways. Take care not to bend the cables by laying sufficient loops as shown.

Inside Console Frame

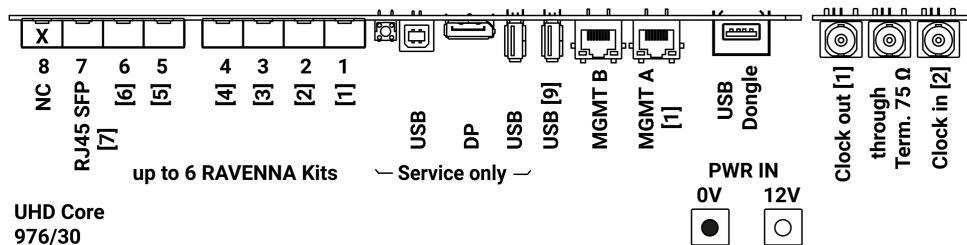


SFPs & Cables (correctly installed)



The SFP slots are numbered as shown in the diagram below. You should use slot 1 for IO port 1, slot 2 for IO port 2, and so on. Note that slot 7 is reserved for the internal connection to the Local IO, and slot 8 is unused.

Internal Processing Core (connections)



Once the SFP modules are installed, you are ready to close the frame.

- Close the Central Panel (see step 4).
- Replace the Overbridge blanking panel (see steps 1 to 3).
- When everything is back in place, re-connect the rear mains IEC power connectors, and power on. Then check the functionality of the newly connected IO ports.

4. Installation

To fit protective covers with a fastening cable, attach the cable to the top left screw as shown below. The blanking plate has its own screw which must also be used.

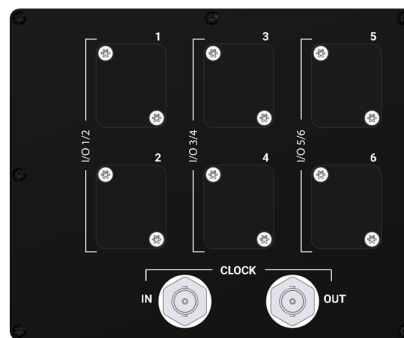
The stickers showing the cable specification should be positioned centrally above each port.

Rear Connector Panel (with covers + stickers)



4.15 External Synchronization

Console Rear Panel

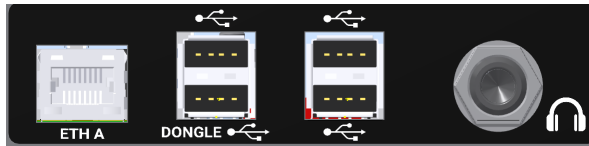


The **CLOCK IN** can be used to connect an external sync reference. The input accepts Wordclock only. When running the system referenced to Wordclock, the frequency of the sync source **MUST** match the internal operating sample rate of the system.

The **CLOCK OUT** provides a Wordclock out of the current system clock.

Both connections use a standard 75 ohm BNC connector. The maximum cable length depends on the equipment you are connecting to.

4.16 Front Buffer Connections



The following connections can be found on the front buffer (beneath the trackpad).

1 x ETH A Network Port

Connects to the control surface internal network (ETHERNET A).

4 x USB 2.0 Ports

- 3 x USB - connect to the mc² control system. The ports can be used to connect a USB memory stick (to save and load user data).
- 1 x USB (marked DONGLE) - connects to the A_UHD Core. This port is reserved for future implementation.

1 x Stereo Phones

This stereo phones output can be used to connect a pair of stereo headphones. The socket is wired from the Headphone 1 output which, by default, follows the CRM 1 source selector.

4.17 Connecting a Talkback Mic

Talkback User Button & Connector



Rear Panel Connectors



The female XLR on the Central Panel (976/20) can be used to connect a talkback microphone.

It is wired directly to the male XLR (marked TB) on the console's rear panel. Note that the console does not include a dedicated talkback mic preamp, and so the rear panel TB connector must be wired either to an external communications system (via a mic preamp), or to one of the console's local IO mic/line inputs.

5. Service Procedures

This chapter describes the service procedures available for the hardware.

5.1 Preparation

Please read and observe ALL of the [Important Safety Instructions](#) BEFORE servicing any component.

The system carries highly sensitive electronic components, and therefore should only be handled by authorized personnel, and with the utmost care.

In particular, ALWAYS observe the following procedures:

- The workspace must be ESD proof.
- Before removing parts of the casing, shields, etc. the device MUST be switched off and disconnected from the mains supply.
- Check the unit for electrical safety after completing the work.

Using the Service Instructions

We recommend that you read all of the instructions in full before starting a procedure. Any product-specific tools, such as Torx drivers, can be found in the Lawo tool case delivered with your system.

Further Information

Mechanical drawings and data sheets are available from the **Downloads** area at www.lawo.com (after **Login**).

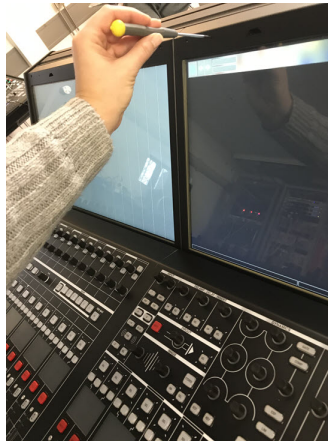
If you need further assistance, the Lawo Support Department can be contacted by email at support@lawo.com, or by telephone during normal working hours - please visit the **Support** area of the Lawo website for the most up-to-date contact details.

5.2 Restarting a Bayserver or Gateserver

Each bay has its own Ethernet server which can be restarted from the front panel. The procedure is the same for Bayservers (in channel bays) and the Gateserver (in the centre section). Note that if you restart the Gateserver, then this will affect the whole console.

You should perform this procedure if the graphics on an individual display freeze or look odd. Or, if the controls and indicators on a panel do not respond or update. These symptoms can sometimes occur if the server loses its Ethernet connection to the mc² control system.

1. Using a pointed object, press the recessed button at the top of the display:



The server restarts in a few seconds; during this time you will see the boot-up screen on the display. Once complete, communication with the control system is re-established, and the Channel Display (or Central GUI) is reinstated.

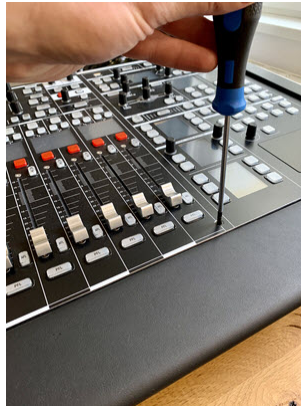
5.3 Replacing a Panel

Each control surface panel can be replaced without affecting the rest of the system. Channel bays are fitted with one 16-fader panel per bay. The centre section is fitted with one central panel connecting to two circuit boards.

DO NOT attempt to open the frame without first disconnecting the mains supply.

1. Remove the screws at the bottom of the panel using a T20 Torx driver.

The number of screws vary depending on the panel type: Fader Panels have three screws, while the Central Panel has four.



You should remove the screws completely and place them carefully to one side, so that they do not fall into the frame when the panel is lifted. The springs beneath the panel will raise it slightly from the frame.

2. Gently lift the panel using your fingers:



3. Use the [Hood Fastener](#) to keep the panel in place while you work:

Fader Panel (976/10)



4. Remove the connectors, taking note of where each one is fitted.

The Fader Panel (976/10) has 1 x Display Port, 1 x USB and 1 x power.

The Central Panel (976/20) has 2 x Display Port, 2 x USB and 2 x power, plus two further connectors for the panel's Talkback XLR and USB port.

5. Carefully remove the panel by lifting it out of the frame. Lay it face-down on a piece of foam, or similar ESD-proof protective material, away from the console.

6. Check that the rotary switch settings on your replacement panel are correct - they should both be set to 0, irrespective of the frame position. For more details, please see the panel's [data sheet](#).

7. Insert and reconnect the replacement panel, and fasten the screws back into place.

Once the control surface is powered, the panel will boot within a few seconds.

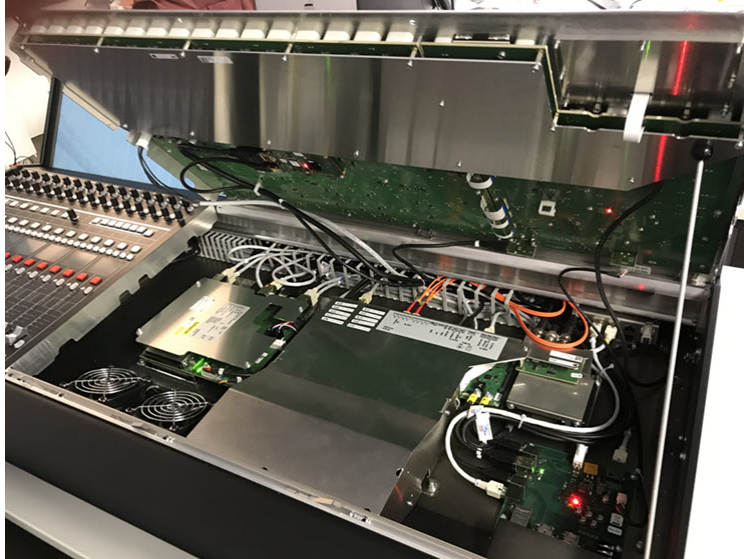
8. [Restart](#) the bay's server to refresh the communication with the control system.

5.4 Using the Hood Fastener

The Hood Fastener can be used to keep a Fader or Central Panel in place while you work.

DO NOT attempt to open the frame without first disconnecting the mains supply.

1. Follow the previous section's steps to [lift](#) the panel - you will see the Hood Fastener stowed safely within the frame.
2. Release the fastener from its catch, and place the "ball" end into the cut-out in the metal plate:



When you have finished working inside the frame, replace the hood fastener safely back into its catch, before lowering the panel back into place.

5.5 Replacing a Fader

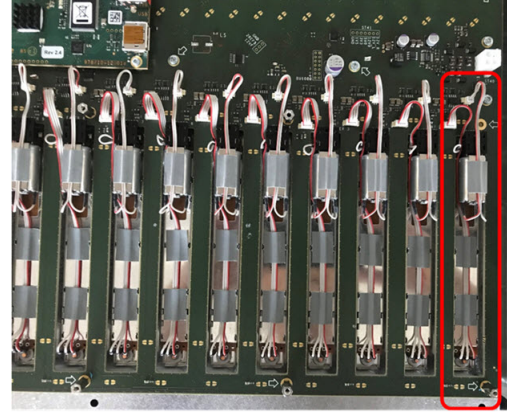
An individual fader unit can be replaced by removing the panel from the console.

In our example, it is the left-hand fader with the panel face-up which is being replaced:

Panel Face-up

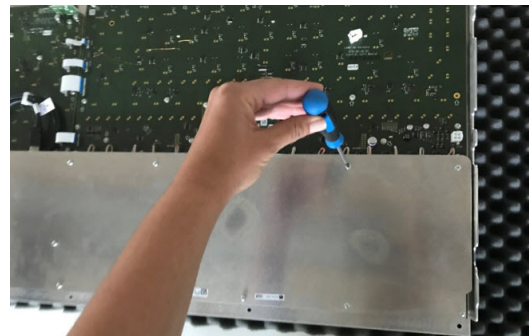
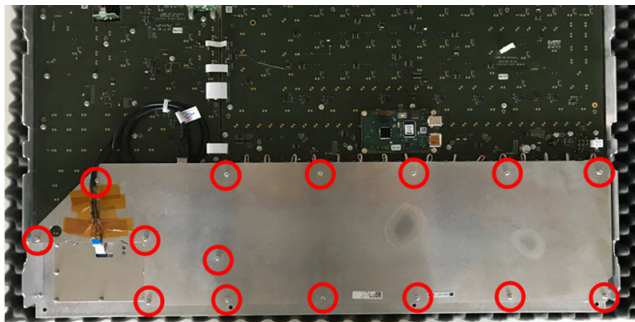


Panel Face-down



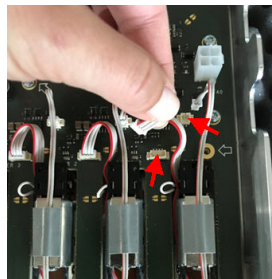
DO NOT attempt to open the frame without first disconnecting the mains supply.

1. Remove the panel from the console frame as described [earlier](#), and lay it face-down on a piece of foam, or similar ESD-proof protective material, away from the console.
2. Remove the metal cover plate by unfastening the screws shown below. Take care not to damage the trackpad cable.



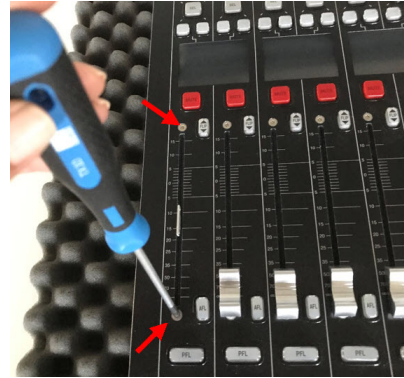
Place the metal cover plate carefully to one side.

3. Using a small flat-blade screwdriver, release the catches to disconnect the fader unit cables - there are two cables to release:

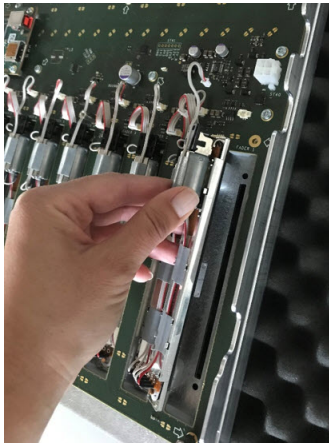


5. Service Procedures

4. Turn the panel face-up and remove the fader cap.
5. Remove the two screws holding the fader unit in place (using a T10 Torx driver):

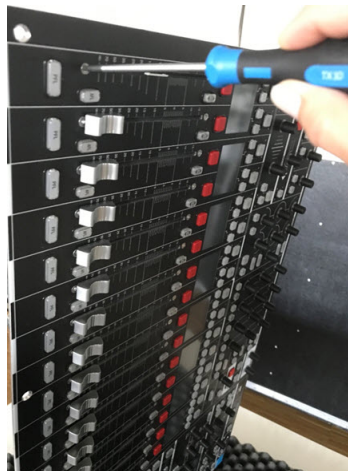


6. Turn the panel face-down and remove the fader unit. Note that the unit will be loose, and so it helps to support it from behind as you turn the panel.



You are now ready to fit the replacement.

7. Insert the new fader unit into position.
8. Carefully lift the panel onto its side, supporting the fader from behind, and replace the two front panel screws:



9. Turn the panel face-down once more and reconnect the two fader unit cables (see step 3).
10. Fit the panel back into the console frame, apply mains power and then [restart](#) the server (to refresh the communication). Then test the new fader's functionality.

5.6 Replacing a TFT Display

Each of the touch-screen displays can be replaced without affecting the rest of the system.

If you need to replace the centre section display, then connect an mxGUI computer so that it can run online and provide continued access to central GUI operations.

DO NOT attempt to open the frame without first disconnecting the mains supply.

1. Unfasten the three screws at the top of the display using a long T20 Torx driver, and gently tilt the unit forwards:



The Torx driver shaft **MUST** be long enough to turn the countersunk screws without scratching the front panel. If you attempt to use a short driver, or driver attachment, damage can occur.

2. Remove the connectors, taking note of where each one should be fitted.

Each display has 1 x Display Port, 1 x USB and 1 x power connector.

3. Carefully remove the display by lifting it out of the frame. Lay it face-down on a piece of foam, or similar ESD-proof protective material, away from the console.
4. Fit the replacement in the reverse manner.

Once the control surface is powered, the display will refresh within a few seconds.

5. [Restart](#) the bay's server to refresh the communication with the control system.

The touch-screen displays are calibrated before leaving the factory and require no further calibration by the customer.

5.7 Bayserver & Gateserver Switch Settings

Within each channel and central bay, individual panels and displays connect to an Ethernet Bayserver or Gateserver (mounted inside the frame). In both cases, the servers have a number of switches which are used as follows.

- **S1 DIP Switch 1 (One PSU only)** – set to ON if only one PSU is connected.
- **S1 DIP Switch 2 (PSU Connected)** – set to ON if a PSU block is installed in the bay.
- **S1 DIP Switch 4 (GUI Mode)** – sets the GUI mode: ON = Central GUI, OFF = Channel Display.
- **S1 DIP Switch 3, 5, 6, 7, 8** – are unused and should be set to OFF.
- **SW1 Rotary Switch (Address)** – sets the bay index, counted from left to right (in two's) as viewed from the front of the frame starting at 0.

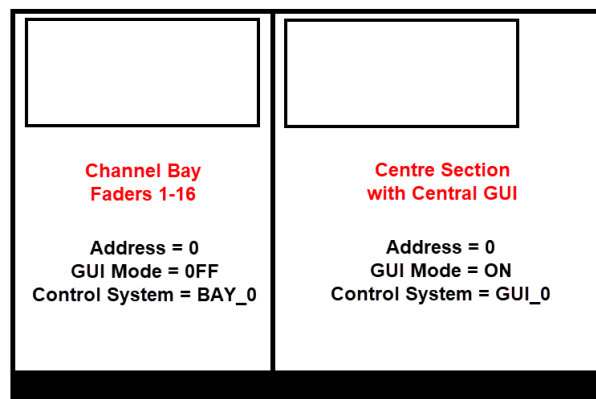
You may need to adjust the settings if you are replacing a TFT display.

Start by setting the **S1 DIP Switches 1 and 2** to the correct positions (as described above).

If the server is fitted to a central bay, set the **S1 DIP Switch 4 (GUI Mode)** to **ON** and the **SW1 Rotary Switch (Address)** to **0**.

If the server is fitted to a channel bay, then set the **S1 DIP Switch 4 (GUI Mode)** to **OFF** and the **SW1 Rotary Switch (Address)** to the correct index number (**0** or **2**).

The example below shows the correct settings for a 32-fader frame:



5.7.1 Adjusting the Bayserver Settings

The instructions below apply to a channel Bayserver. Note that the settings for a Gateserver can be adjusted in a similar manner.

In both cases, the server is mounted inside the console frame. Therefore, you will need to lift a panel to access its switches.

DO NOT attempt to open the frame without first disconnecting the mains supply.

1. Lift either the Fader or Central Panel in the bay you wish to adjust as described [earlier](#), and secure it in place using the [Hood Fastener](#).

As soon as you lift the panel, you will see the Bayserver mounted inside the frame. Note that you do not need to disconnect any cables.

The function of the Bayserver connectors and switches is explained on the sticker.

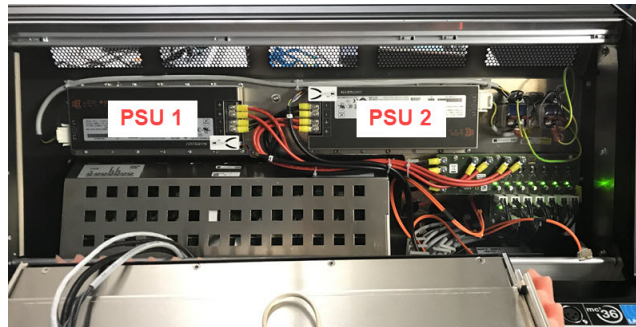
2. Locate the S1 DIP switches and SW1 rotary switch. They can be accessed through a cut-out in the protective cover plate (highlighted below):



3. Set the **S1** DIP switches to the desired ON/OFF positions. Check the positions carefully as the switches are mounted upside down when viewed from the front buffer.
4. Set the **SW1** rotary switch to the required address.
5. Replace the panel.

5.8 Replacing a Console Power Supply

The control surface is powered by dual-redundant power supplies which are fitted inside the frame behind the Central GUI TFT display and Overbridge:



The two supplies come as a complete "PSU block" which can be replaced in its entirety - i.e. it is not possible to replace an individual supply.

All of the standard frame sizes are powered from a single PSU block (fitted to the central bay).

To replace the PSU block you will need to remove the Central GUI display and Overbridge blanking panel.

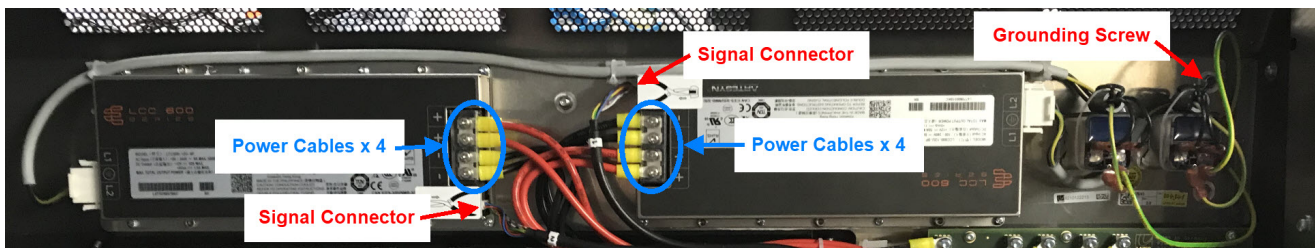
1. Turn off the power to the control surface by [disconnecting ALL MAINS](#) connectors - press the red button on the IEC connector to release the plug.

You must remove the **MAINS** connectors from the frame, rather than from the wall, as the IEC sockets form part of the PSU module. If you do not, then the PSU module will get stuck during step 8.

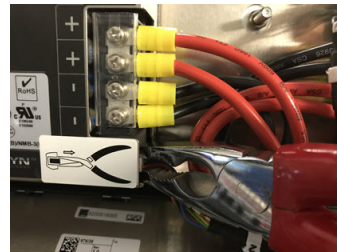
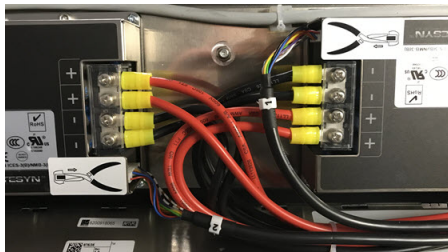
2. In the central bay, remove the TFT display as described [earlier](#).
3. Then remove the Overbridge blanking panel to the right of the display.

You will see the PSU block mounted at the rear of the frame.

4. Using a T20 Torx driver, disconnect the PSU block from its distribution board by loosening the 8 screws shown in blue below.
5. Remove the grounding cable by loosening its screw.
6. Using a small pair of pliers, remove the two signal connectors (which go to the GateServer):



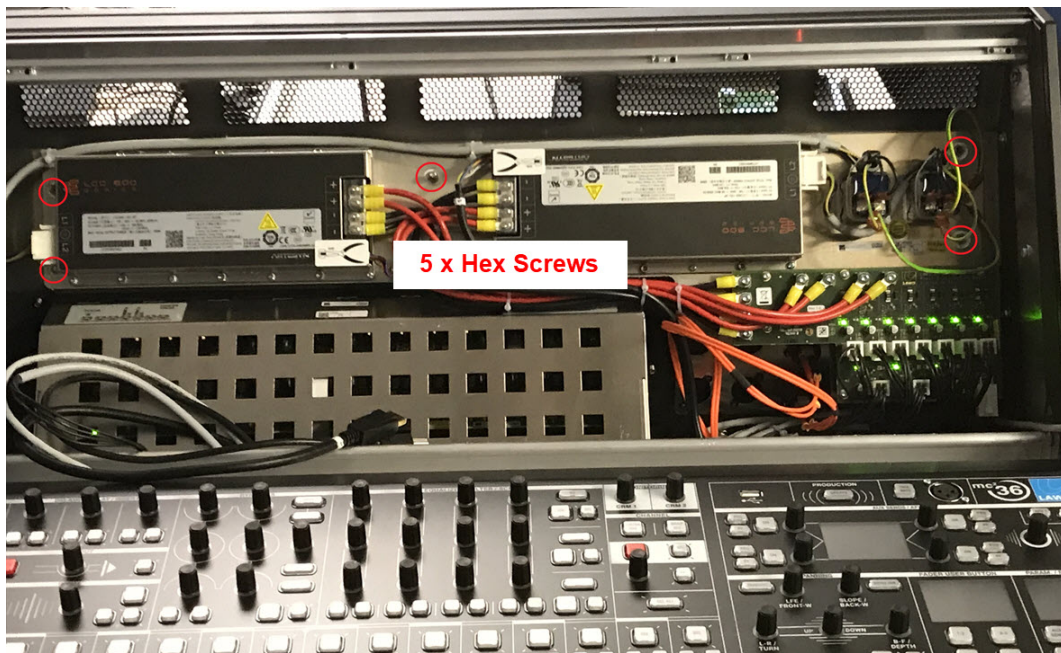
Note that you will need to carefully pinch the signal connector, using your pliers, to remove it from the PSU:



Steps 4, 5 and 6 allow the PSU block to be removed with all of its cables (power, grounding and signal).

Do **NOT** disconnect any wires other than those shown.

7. Using a 8mm hex socket, remove the five nuts holding the PSU block in place:



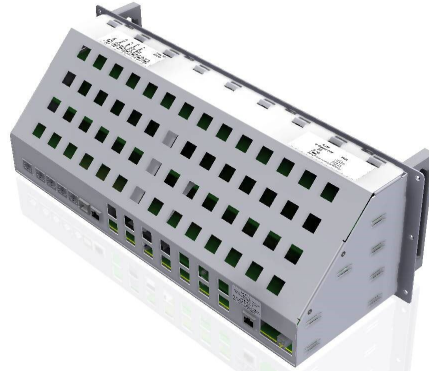
Take care *NOT* to drop any nuts or washers into the desk.

8. Remove the PSU block from the frame.
9. Now fit the replacement and secure using the five hex nuts shown in step 7.
10. Replace the power, signal and grounding cables (see steps 4 to 6).
11. Replace the Overbridge panel and TFT display.
12. When everything is back in place, re-connect the rear mains IEC power connectors, and power on.

5.9 Replacing the Local IO

The local IO exists as a self-contained unit which is mounted inside the control surface behind the Central GUI and Overbridge.

Local IO Unit (profile)



To replace the local IO unit, you will need to disconnect all of its cabling from the rear panel, and remove the Central Panel, Central GUI display and Overbridge blanking panel.

DO NOT attempt to open the frame without first disconnecting the mains supply.

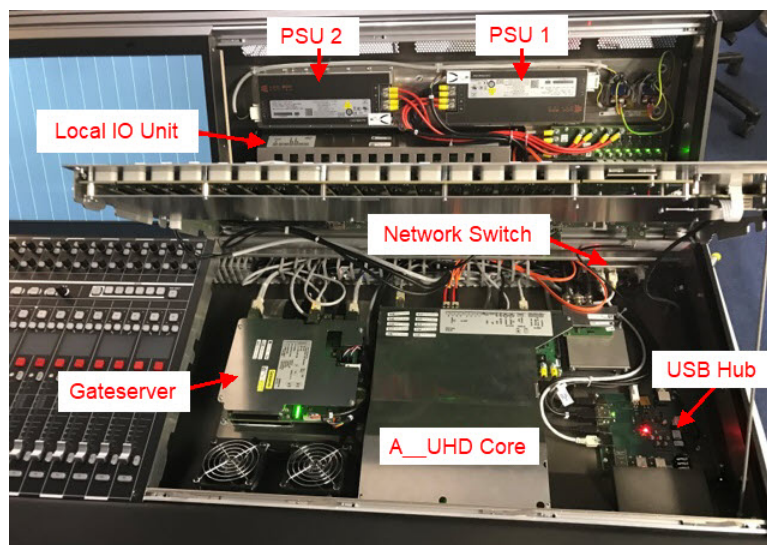
1. Disconnect all of the local IO cabling from the console's rear panel. See [Local IO Connections](#).

Console Rear Panel



2. Remove the Central Panel, Central GUI display and Overbridge blanking panel as described earlier. See [Replacing a Panel](#) and [Replacing a TFT Display](#).

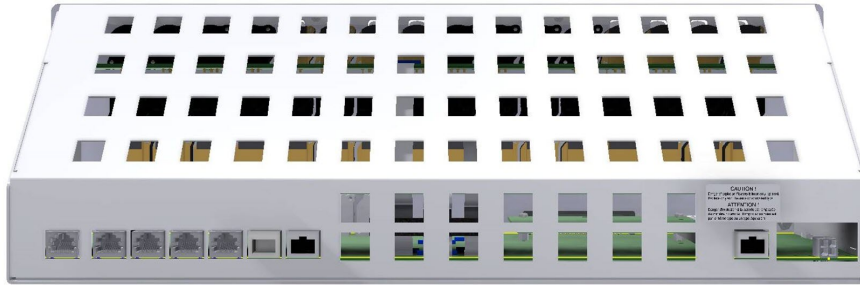
In each case, the panel should be removed completely. You will see the local IO carrier unit mounted at the rear of the frame:



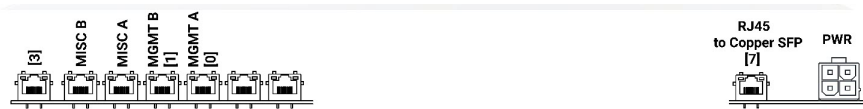
3. Disconnect all of the internal connectors from the front of the unit, taking note of where each one should be fitted.

There are five RJ45 connectors on the left, and one RJ45 connector plus two power connectors on the right. The function of each connector is explained on the stickers attached to the unit.

Internal View (from front)



Local IO Unit (internal connections)



4. Now move to the rear of the console and loosen the local IO unit from the frame.

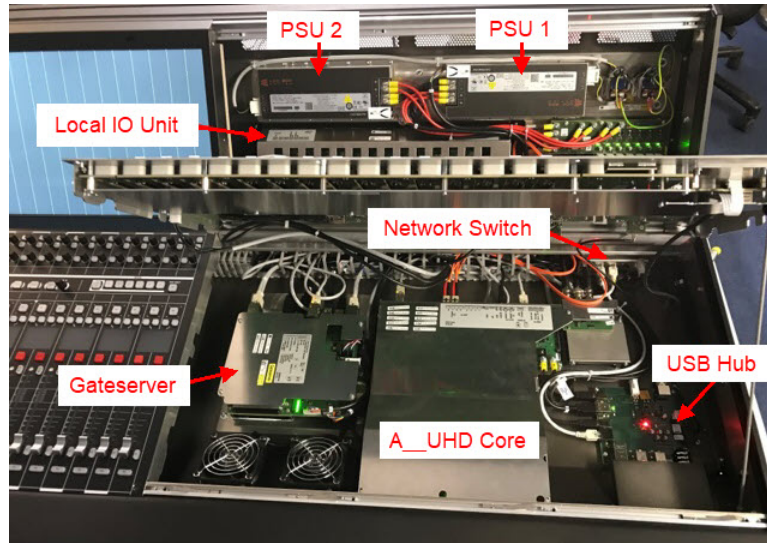
There are six screws, three on each side, holding the unit in place. Remove all of the screws using a T20 Torx driver.



5. Carefully remove the unit by sliding it out of the rear of the console frame. Take care that the frame does not scrape the unit, and that the cables do not get caught.
6. Slide the replacement into the console frame, taking care not to scratch the unit or get any cables caught underneath.
7. Replace the six screws to hold the unit in place (see step 4).
8. Replace the internal connectors (see step 3).
9. Replace all panels and the TFT display (see step 2).
10. Replace the [local IO connections](#) on the rear panel.
11. When everything is back in place, re-connect the rear **MAINS** IEC power connectors, and power on. Then check the functionality of the local IO.

5.10 Replacing the Network Switch

The internal network switch, which distributes the ETHERNET A connections, is mounted inside the control surface below the Overbridge. Internally, it is located to the right of the Local IO unit:

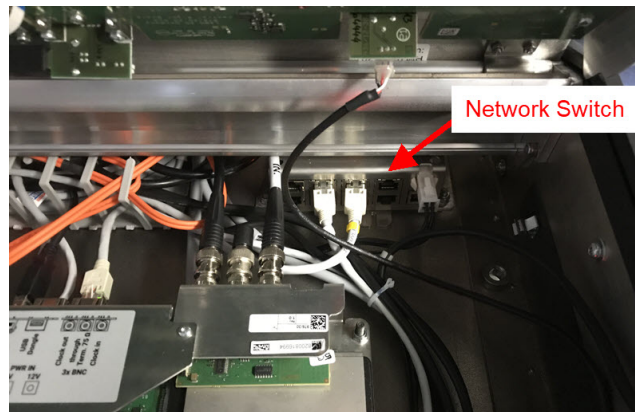


To replace the switch, you will need to remove the Central Panel, Central GUI display and Overbridge blanking panel.

DO NOT attempt to open the frame without first disconnecting the mains supply.

1. Remove the Central Panel, Central GUI display and Overbridge blanking panel as described earlier. See [Replacing a Panel](#) and [Replacing a TFT Display](#).

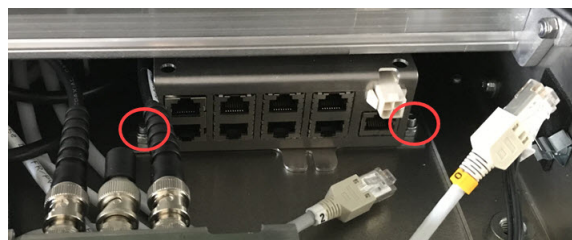
In each case, the panel should be removed completely. You will see the network switch mounted at the rear of the frame.



2. Disconnect all of the internal connectors from the front of the unit, taking note of where each one should be fitted.

There are several RJ45 network connectors on the left plus a single power connector on the right.

3. Now loosen the unit from the console frame. There are two hex nuts on each side of the unit holding it in place.



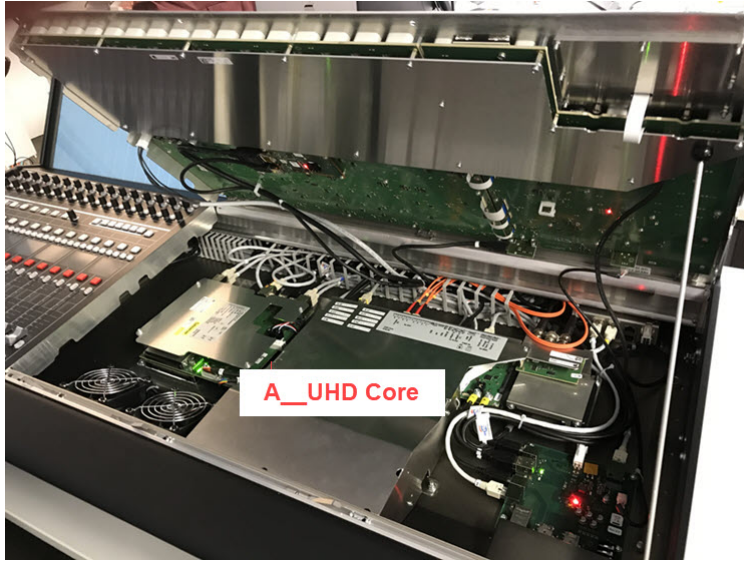
4. Carefully remove the unit by sliding it forwards and out of the console frame. Take care that the frame does not scrape the unit, and that the cables do not get caught.
5. Slide the replacement unit into the console frame, taking care not to scratch the unit or get any cables caught underneath. Tighten the nuts to hold the unit in place.
6. Replace all panels and the TFT display (see step 1).

Once the control surface is powered, the switch will boot within a few seconds.

7. [Restart](#) the Gateserver to refresh the communication with the control system.

5.11 Replacing the A__UHD Core

The A__UHD Core is mounted inside the control surface under the Central Panel.



It handles all audio interfacing, signal processing, routing and control, and can be replaced as a complete unit. Before replacing the core, you should make a backup of all user data (productions, snapshots, presets and configuration data), so that the current configuration can be reinstated.

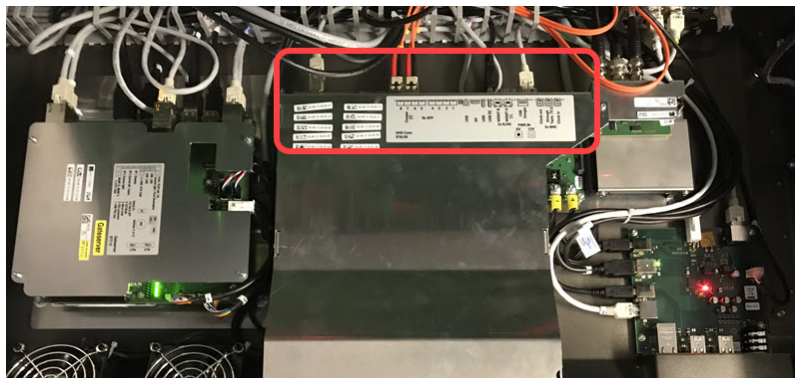
To replace the core, you will need to lift the Central Panel.

DO NOT attempt to open the frame without first disconnecting the mains supply.

1. Lift the Central Panel as described [earlier](#), and secure it in place using the [Hood Fastener](#).

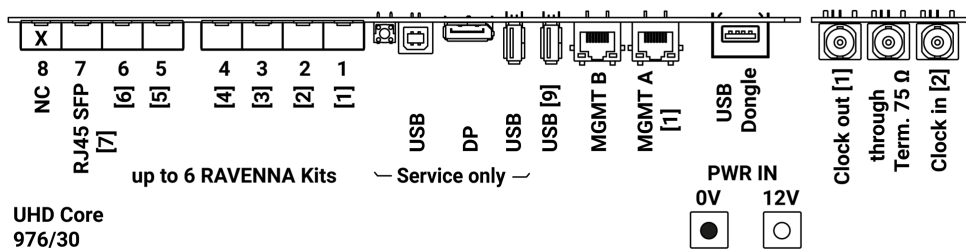
As soon as you lift the panel, you will see the A__UHD Core mounted inside the frame.

2. Remove all of the connectors from the rear of the core, taking notes on where each one should be fitted.



The function of each connector is explained on the sticker attached to the top of the core.

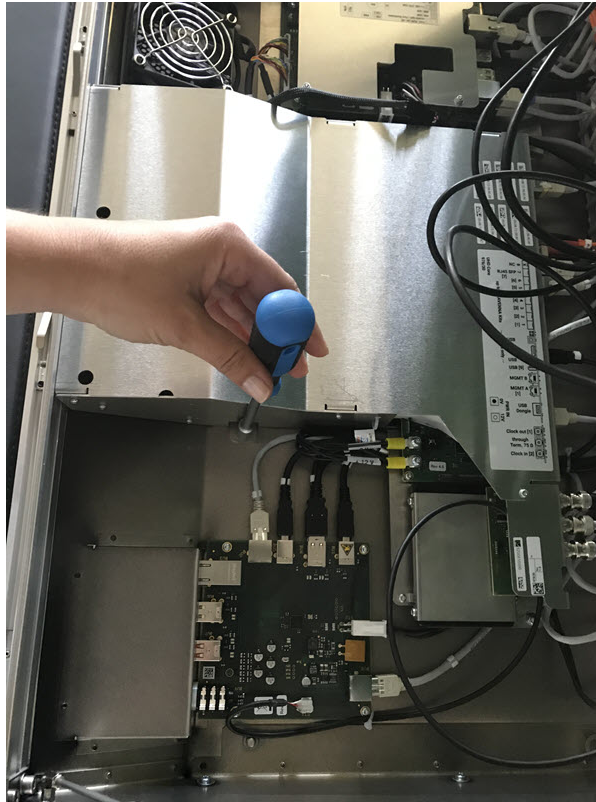
Internal Processing Core (connections)



3. Once all the cables have been disconnected and carefully stowed, loosen the unit from the console frame.

There are five hex nuts holding the unit in place.

A__UHD Core (side view)



4. Carefully lift the core out of the console frame. Take care that the frame does not scrape the unit, and that the cables do not get caught.

You are now ready to fit the replacement.

5. Position the new unit into the frame, taking care not to scratch the unit or get any cables caught underneath. Tighten the five hex nuts to hold the unit in place.
6. Replace all connectors (see step 2).
7. Replace the Central Panel, and fasten into place (see step 1).
8. When everything is back in place, re-connect the rear **MAINS** IEC power connectors, and power on. The control system will start to boot. When boot-up is complete, the console will reset accordingly.

You can now reset the management IP address in the usual manner, and transfer back your user data.

6. Appendices

This chapter includes further information which you may find useful.

6.1 Part Numbers

System Component		Part Number
mc²36 MKII Console	16-Fader, Studio	976/16S
	16-Fader, OBVan	976/16V
	32-Fader, Studio	976/32S
	32-Fader, OBVan	976/32V
mc²36 MKII Frame	16F	976/50
	32F	976/51
Mounting Options	Studio Side Panels	976/60
	OB Van Side Panels	976/61
Control Surface Modules	Fader FC Panel	976/10
	Central Panel	976/20
	Channel Display	977/13
	Overbridge Blanking Panel	976/15
Internal Components	System Core	976/30
	Local IO	976/35
	PSU Block, double	976/43
	Ethernet Bayserver	977/14
	Ethernet Gateserver	977/15
Accessories	Internal Network Switch	978/42
	Script Tray (standard)	959/41
	IO Connection Kits	see IO Connection Kits

6.1.1 Data Sheets

Further technical information can be found in the product data sheets available from the **Downloads** area at www.lawo.com (after **Login**).

To help locate the correct data sheet, please use the part numbers listed above.

6.2 Mechanical Drawings

The following diagrams show the mechanics of each control surface variant. In each case, double-click on a link to open the diagram (as a pdf).

- [16-Fader OB-Van](#)
- [16-Fader Studio](#)
- [32-Fader OB-Van](#)
- [32-Fader Studio](#)

6.3 Wiring Diagrams

The following diagrams show the control surface internal wiring in more detail. In each case, double-click on a link to open the diagram (as a pdf).

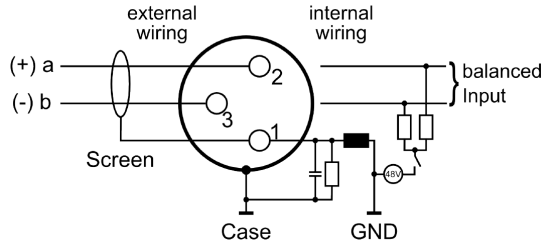
- [Cabling: Control & Power](#)

6.4 Connector Pin-Outs & IO Specifications

The following connectors appear either on the rear panel or front buffer.

6.4.1 Mic/Line In

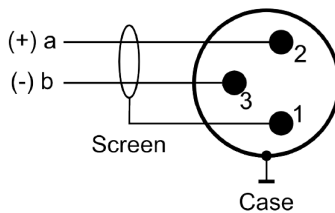
3-pin XLR connector, female.



All MIC/LINE IN connections are electronically balanced and floating (suitable for balanced or unbalanced use). They feature a discrete class-A preamplifier with superb performance at both low (mic) and high (line) levels. In addition to variable microphone pre-amp gain, each input comes with switchable 48V phantom power, a high-pass filter and 20dB PAD. The maximum analog input level (with the PAD enabled) is +24dBu.

6.4.2 Talkback (TB)

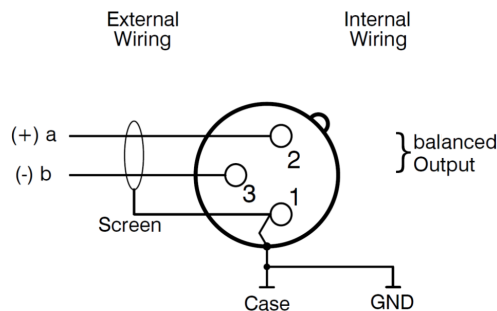
3-pin XLR connector, male.



This connector is wired from the 3-pin female XLR Talkback connector on the front panel.

6.4.3 Line Out

3-pin XLR connector, male.

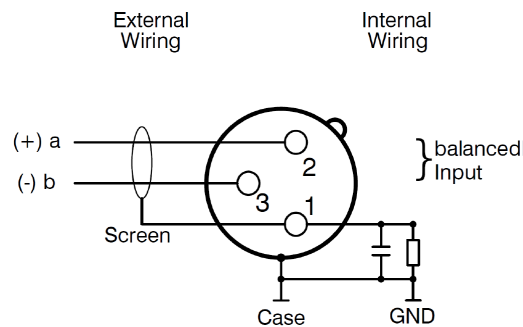


All LINE OUT connections are electronically balanced and floating (suitable for balanced or unbalanced use). For LINE OUTs, the maximum analog level can be adjusted to +12, +15, +18, +21 or +24 dBu relative to digital full scale (dBFS). This is a factory-configured setting; +24dBu is recommended.

For connection to an unbalanced input stage one line needs to be shorted to ground (hot or cold) like with a transformer-coupled output stage. The level will remain the same as with a balanced load.

6.4.4 AES3 In

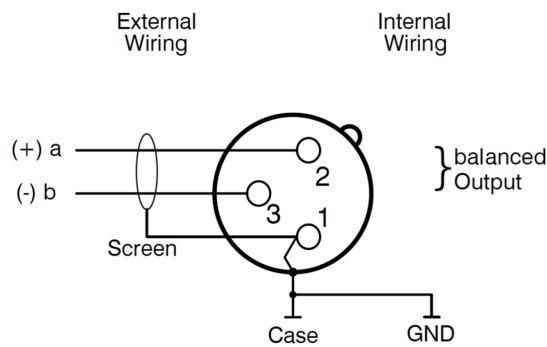
3-pin XLR connector, female.



All AES3 IN connections conform to the stereo AES3 standard. The inputs have sample rate conversion (SRC).

6.4.5 AES3 Out

3-pin XLR connector, male.



All AES3 OUT connections conform to the stereo AES3 standard.

6.4.6 MADI

The console's MADI interface conforms to AES 10, and supports up to 64 bi-directional channels at 48kHz, or 32-channels at 96kHz.

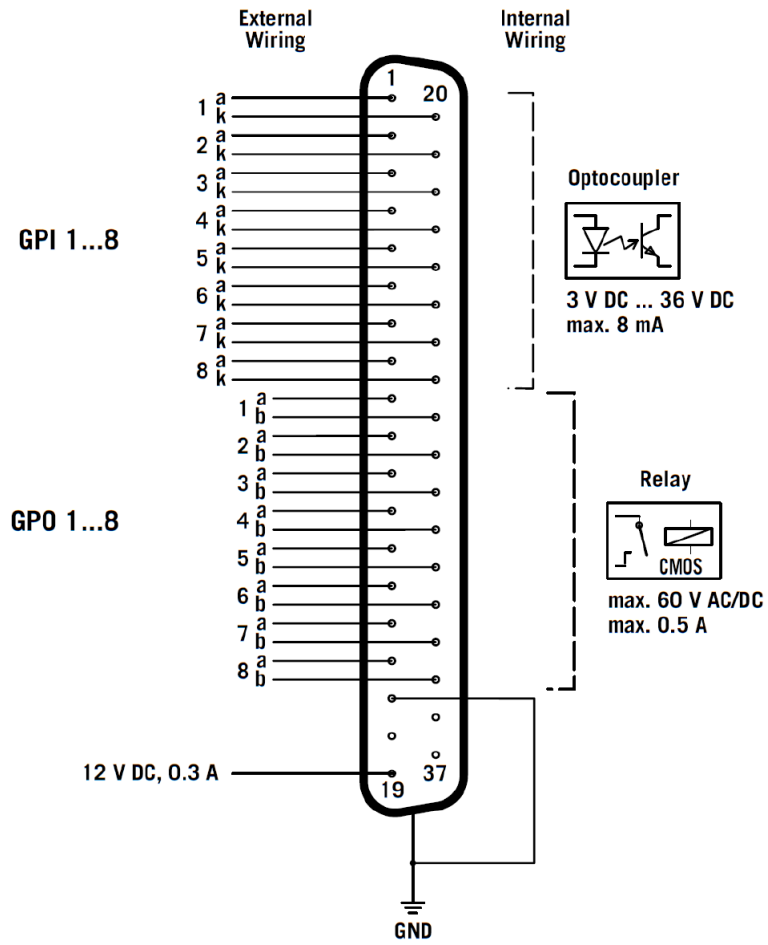
To use the interface you must fit a Lawo-certified SFP module. The SFP determines the cable type and connector. The maximum distance depends on the cable type.

The LOCK / ERR LED indicates the status of the MADI link:

- **Green** = valid MADI signal detected.
- **Red** = MADI signal or link error.
- **Off** = no signal detected.

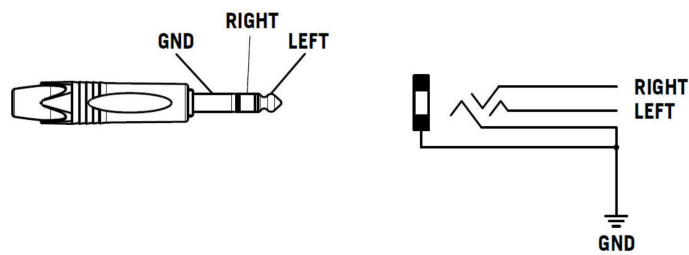
6.4.7 GPIO

37-pin D-type connector (DB37), female.



6.4.8 Headphones

6.35mm stereo jack connector.

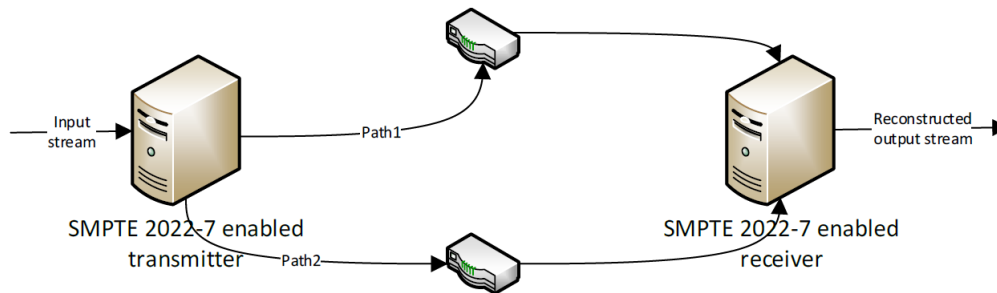


6.5 SMPTE ST2022-7 (SPS)

SMPTE ST2022-7 is a method of recovering lost data packets when streaming data over an IP network. The technology is also known as Seamless Protection Switching (SPS). Within a RAVENNA installation, it can be used to provide main and redundant paths for audio/video streams and PTP synchronization.

Concept

The diagram below illustrates the concept in a standard data network:



A SMPTE ST2022-7-enabled transmitter duplicates the input stream and sends it via two different network paths to the destination receiver. The receiver (also SMPTE ST2022-7-enabled) combines the data from both paths and reconstructs the original stream. If a packet from path 1 is missing, then the packet is taken from path 2. If path 1 is lost completely, then the entire stream is taken from path 2. And vice versa. The result is that the receiver can switch from one path to the other without impacting upon the stream content.

The network class determines how much delay between the two paths can be tolerated. Class C devices have an extended buffer size, and so can handle longer delays than Class A. Thus, Class C compatible devices can cope with a larger network infrastructure.

Configuration

To configure SMPTE ST2022-7, you will need to create two separate paths in the Media Network. This means doubling the network's infrastructure and then connecting each sending and receiving device to both paths. Within Lawo systems, the two paths are usually known as the primary (red) and secondary (blue) networks.

For partnering connections between the Core and a remote IO device, the streams are created automatically by the AdminHD configuration. For RAVENNA Tie-lines, the streams must be configured manually using the device's Web UI.

In all cases, you *must* use an odd/even pair of ports to configure SPS. i.e. ports 1+2 or 3+4, but not 2+3!