

S-Type

Audio Mixing Console

Installation & User Manual



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While every effort has been taken to ensure the accuracy of the contents in this manual, CADAC Audio Mixing Consoles are being subject to continuous development, hence the information in this manual may not reflect latest product updates.
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Introduction

Welcome to the CADAC S-Type compact frame mixing console. The S-Type is the result of extensive market research, reflecting users' need for a high quality, moderately sized console with state of the art design and performance.

CADAC have been synonymous with superior audio quality, adaptability in use and rock solid build for over three decades. The S-Type, created from the same lineage, is equally suitable for the hard life on the road as well as the perhaps more peaceful existence in an industrial, corporate or theatre setting.

As is the case with the rest of the CADAC line-up, the S-Type provides complete flexibility that allows for any configuration the user wishes to apply, whilst providing the reliability that is paramount to the production of a show, concert or corporate event.

The audio legacy of previous CADAC mixing consoles is reflected in the design of the new S-Type. For those of you familiar with the legendary J and F-Types, it will come as no surprise to find the same renowned mic amplifier, VCA and fully parametric 4-band equaliser and respected audio architecture. The S-Type mirrors the same attention to quality and detail that have made the CADAC name the ultimate choice for the discerning professional.

Ergonomics has been placed high on the design brief. Every function switch is supported by an indicator LED for full visual feedback in low light conditions.

All internal busses are fully balanced and use very low value mix resistors to provide both low noise and exceptionally low crosstalk.

Output sections are fully balanced and compensated* to provide low noise with the power to drive long lines - again with very good CMRR. (*Compensated means that if one leg of the balanced circuit goes short circuit, there will be no 6dB drop in level.)

All areas of circuitry are extensively power decoupled. This prevents broadband noise from being transmitted into adjacent circuits through the power rails. Extensive decoupling of the signal paths minimizes the low frequencies phase shift.

The S-Type frame is available in 3 sizes - 17, 25 or 33-way. In combination, these frame sizes cater for the most common console requirements, and may, of course be configured to meet your specific needs. A standard feature is the ability to connect frames together via the external frame bus connector.

Finally, it goes without saying, that in the CADAC tradition the sound quality of the S-Type is in a class of its own.

1 System overview

1.1 The console

Mixing consoles comprise of a number of input channels and output groups with associated faders, monitoring and control functions. When module positions are fixed in relation to the frame structure, various operational compromises may occur. The S-Type console system allows for any module to be placed into any frame position and to change the number of frames associated with the system to increase or decrease the number of input channels and output groups to meet the needs of a particular project. Please be aware that the console needs to be turned off before any reconfiguration can be carried out.

There are three S-Type frames offering either 17, 25 or 33 module positions (slots). Each frame has provision for main and backup power supply inputs and any two adjacent frames have full audio bus and control function interconnection via 3 x 37-way D-type connectors for multiple frame connectivity.

The S-Type frame provides a total of 20 balanced busses - 8 sub-group busses, 1 dedicated stereo bus, 6 mono busses, 2 stereo auxiliary busses, 8 matrix busses and PFL. A further 8 matrix send busses and a stereo listen bus are provided. Standard channel VCA faders can access up to 8 VCA master faders.

The S-Type is designed to comply with following standards: EN55103-1:1997, EN55103-2:1997, EN60065:1998.

1.2 The frame

The S-Type frame is constructed from 1.6mm Zintec, fixed to 4mm aluminium end profiles. This construction allows multiple frames to be positioned so that modules are almost adjacent. Internal audio bussing is balanced and uses ribbon cables.

The rear panel of the frame contains outputs for the stereo master, plus insert sends and returns for the same. Two PSU input connectors are provided - one for main and for the backup supply. Power rail LEDs are provided for each PSU input. The S-Type frame also incorporates two Littlite connectors in addition to fan and Littlite fuses. A headphone jack is provided on the front of the frame.

The three standard frame sizes enable a vast variety of configurations to be achieved. For example:

17 slot frame: 8 mono input channels, 8 output groups and 1 stereo master
25 slot frame: 16 mono input channels, 8 output groups and 1 stereo master
33 slot frame: 24 mono input channels, 8 output groups and 1 stereo master

Note: The choice is yours, a 33 slot frame could be configured as follows:

20 mono input channels, 8 stereo input channels, 4 output groups and 1 stereo master.

By bus linking multiple frames together, larger configurations can be achieved. For example:

Two 25 slot frames:
40 mono input modules, 1 stereo input module, 8 output groups and 1 stereo master.

One 25 slot frame and one 33 slot frame:
48 mono input modules, 1 stereo input module, 8 output groups and 1 stereo master.

Three 25 slot frames:
56 mono input modules, 10 stereo input modules, 8 output groups and 1 stereo master.

The module electronics are cooled via internally mounted silent fans.

1.3 Power supply

The main power supply for the S-Type is integrated into an external 2U rack mount unit with the option of a backup PSU. See sub-section [2.3.1 Power supply description](#).

1.4 The modules

1.4.1 Input channel modules, 8411 Mono & 8412 stereo

Mono and stereo input modules are available for the S-Type. Both modules provide balanced insert sends and returns; four band parametric EQ - selectable pre or post insert and high-pass filter; balanced direct output - selectable pre/post fader, or post MIC pre-amplifier,

Each module incorporates a VCA channel fader, VCA Master assignment switches and a full range level meter (with dual input meters on the stereo input module).

Full details of the module functions can be found in chapters [4 Mono input module 8411](#) and [5 Stereo input module 8412](#). Also, see [Appendices](#).

1.4.2 Group, Matrix and Auxiliary master modules 8413 stereo & 8415 mono

Each of the output modules provide one Sub-Group output, an 8-way level controlled send to Matrix, Matrix Master, and an Auxiliary Master output.

Up to 8 modules may be specified per console (maximum configuration being two 8413 and six 8415 modules) and each module can be placed anywhere in the multi-frame console structure (they do not need to be placed adjacent to each other, or even in the same frame). Visual monitoring of output levels is provided on full range LED-meters, PFL facilities on the outputs are provided, as are balanced insert points on the Sub-Group and Matrix outputs.

Full details of the module function can be found in chapter 6 Group, Matrix and Auxiliary Master modules, 8413 stereo and 8415 mono.

1.4.3 Stereo output, Comms, Osc & Talkback module 8414

The Stereo Master module is fitted with a 100mm Penny & Giles fader, balanced insert send and returns and balanced outputs (these are found on the rear of the frame). The Stereo Master module also provides metering for both the main stereo mix and listen busses, while the stereo mix bus can also be routed to the Matrix sends in true stereo or summed mono via 4 dual concentric potentiometers.

Provision is made to inject an unbalanced stereo input source into the main stereo bus.

The S-Type console offers the operator PFL monitoring functionality. If the source signal is mono it will appear in mono and if the signal is in stereo it will appear in stereo.

PFL appears at the Listen output, which provides stereo meters, level control via a potentiometer and mute control. The Listen output busses appear on balanced XLR's on the rear of the module. PFL is also routed to the Headphones level control and mute, the output of which is provided via a jack socket on the front of the frame and is capable of driving 8 ohm loads.

The module also incorporates an oscillator with selectable frequencies at 100Hz, 1kHz and 10kHz. This is then routed via a level control to either the channels or the groups.

Littlites can be turned on and dimmed from this module.

The module also provides a talkback microphone input with gain control, HPF and phantom power. The signal can be routed to all 8 sub-groups and auxiliaries. The output can be muted, which can then be over-ridden via the talkback button.

Check Mute and Mute All functions are located towards the top of the panel. Full details of the module functions are discussed in chapter 7 Stereo output, Comms, Osc and Talkback module 8414.

Full details of the module functions are discussed in chapter 7 [Stereo output, Comms, Osc and Talkback module 8414](#).

2 Connections and setup

2.1 Setting up the console

The S-Type console is shipped in a flight-case to help protect it against any possible damage during transit. The following describes how to set up the S-Type:

1. If the console flight case is to be mounted on the CADAC PSU case, then first remove the PSU's case's front and rear cover. Note that if using a 2U drawer case, there is only a front cover. Both types of cases have wheels fitted with brakes at the front.
2. Using suitable manpower, place the console flight case on the 2U PSU or drawers case. Make sure that it is safely positioned. Otherwise position the flight case on a sturdy surface.
3. Unlock the latches and remove the front section of the console flight case to reveal the console armrest.
4. Unlock the remaining latches and remove the upper section by lifting it clear of the console.
5. If using multiple frames, then make sure that they are all located in the appropriate positions, all wheels are locked and start cabling the frames together.

2.2 Frame rear connections

The connections on the S-Type console rear frame include the following:

1. Frame to frame bus connections
2. Littlite connection
3. Stereo output Left
4. Stereo output Right
5. PSU 1
6. PSU 2
7. Littlite fuse 1A
8. Fans fuse 1.5A
9. Frame 0V terminals
10. Send > Insert Send (stereo mix bus)
11. Return > Insert Return (stereo mix bus)

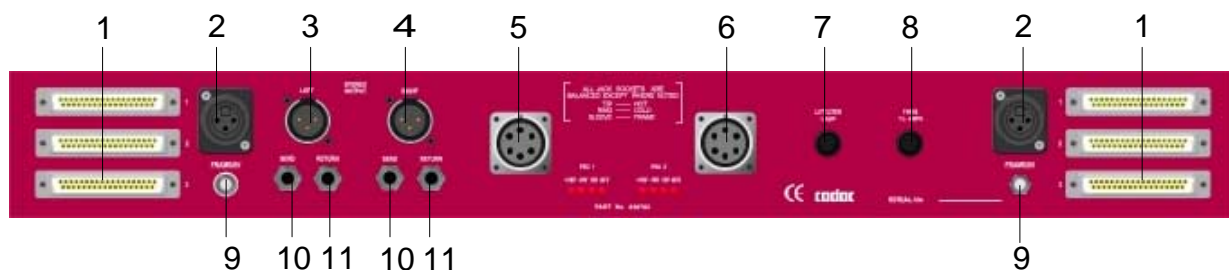


FIG 2-1. Frame rear panel

2.3 Connecting power supplies

2.3.1 Power supply description

The S-Type console is supplied with the model 8500 Power Supply Unit. Each 2U x 19" rack mount power unit supplies all 4 voltage required by the S-type console. If more than one frame is to be used, then the 8400 Power Supply Unit may be used.

Cadac consoles are designed to allow the use of two independent power supply systems in a redundant configuration - main and back-up. Both power supply units are used to power the console system, so that under normal conditions, the load is shared equally between the main and back-up PSU. If a fault occurs in one of the power units (causing it to shut down), the remaining power unit will power the console.

Designate one power supply unit as "PSU 1" and the other as "PSU 2". PSU 1 and PSU 2 should be connected to the same phase on the same 'spur', wherever possible. In situations where it is necessary to provide a separate "feed" to each PSU system, make sure the cable lengths are the same. This is to minimize any induced AC power input noise by ensuring that the 'EARTH IMPEDANCE' is the same for both PSU-systems.

The AC input connectors on each power supply have three conductors: LIVE (brown), NEUTRAL (blue) and EARTH (green/yellow). For safety and electromagnetic compatibility considerations, it is essential that the EARTH conductor is connected on all PSUs and the AC supply has an earth conductor that has a continuous circuit to the 'zero-signal reference potential' point in the building. The ZSRP point in a building is usually found near the place where the AC mains supply enters the building (often referred to as the MAIN GROUND REFERENCE EARTH ELECTRODE SYSTEM). The basic concept for correct AC mains wiring distribution is shown in figure 2-2. If you need further information about this complex subject, please refer to "Grounding systems and their implementation" by Charles Atkinson and Philip Giddins published in the AES Journal vol 43, No 6 - June 1995.

The grounding scheme in CADAC consoles is designed to meet the rigorous EEC Electromagnetic Compatibility requirements (EMC directive - 1996). Any RF noise induced in the console frame(s) is directed to the local ZSRP, which is the metalwork of the power supply units. In order to take full advantage 'RF noise immunity' capability of the CADAC system, PSU AC mains cables and the AC mains supply EARTH conductor must be connected correctly.

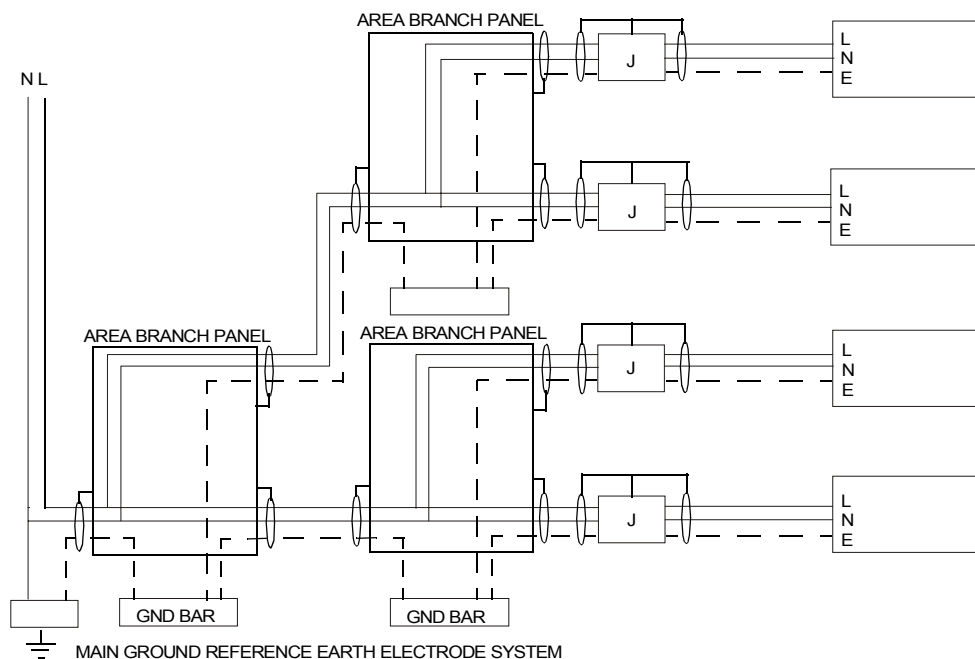


FIG 2-2. AC mains grounding diagram (single phase 200-240V)

2.3.2 AC power requirements

CADAC 8500 power supply units are designed to run from a minimum of 100V up to a maximum 250V, 50/60Hz.

The 8500 is rated at +13V@15A, $\pm 18V@11A$ and 48V@0.5A. This is sufficient to supply power to one frame. In the case of more than frame, each frame can be powered by a pair of 8500 Power Supply Units (one main and one for back-up purposes). Alternatively, 8400 Power Supply Units may be used, however please contact your local distributor, or CADAC directly before any connections are made.

The AC input is connected to the PSU via a 3-core cable, CMA reference 3183TQ - BASEC approved.

2.3.3 8500 Switch-mode power supply unit

The 8500 is based on a Excelsys power block, rated at +13V@15A, $\pm 18V@11A$ and +48V@0.5A, with additional circuitry as shown in the accompanying drawing set. The 2U power supplies are suitable for rack-mounting or flight cases, and are connected via a shielded multi-core cable with 6 pole military circular bayonet at each end. Each console may be powered from two independent power supply systems, operating simultaneously for continuous redundant operation.



FIG 2-3. 8500 power supply unit

2.3.4 Remote start of the PSU

Each 8500 switch-mode power supply provides the following outputs: 13V, $\pm 18V$ and 48V. Each PSU is fitted with a front panel mounted 9-way 'D-type' connector labelled "Connections for Remote Start". If a remote start facility is used, Power Failure and Over-temperature LEDs may also be fitted with the remote start switches if required.

Fig 2-5 shows the circuit for starting up a 'system' with a single switch. This has proved to be the most popular method of connecting the remote start facility. This circuit can easily be extended to provide a single switch for all PSUs if required. If multiple switches are to be used, see fig 2-4.

NOTE:

- The remote start switch must be of a 'momentary' type. You can use 3 separate single pole switches for each power supply to turn on 13V, $\pm 18V$ and 48V outputs of the PSUs alternatively use one single pole for the whole lot.
- The remote switch(es) must be mounted on a metal panel.
- Use shielded cable for the remote switch wiring.
- The 9-way D-type free plug must have a conductive shell. This is to ensure that the cable shield connects directly to the PSU unit chassis.
- Connect the cable shield to the metal panel where the remote start switch(es) are mounted.

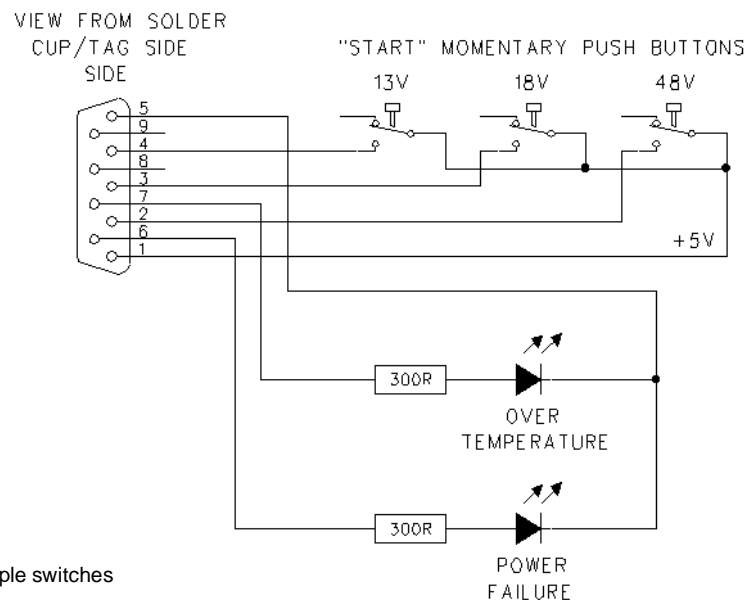


FIG 2-4. Remote start with multiple switches

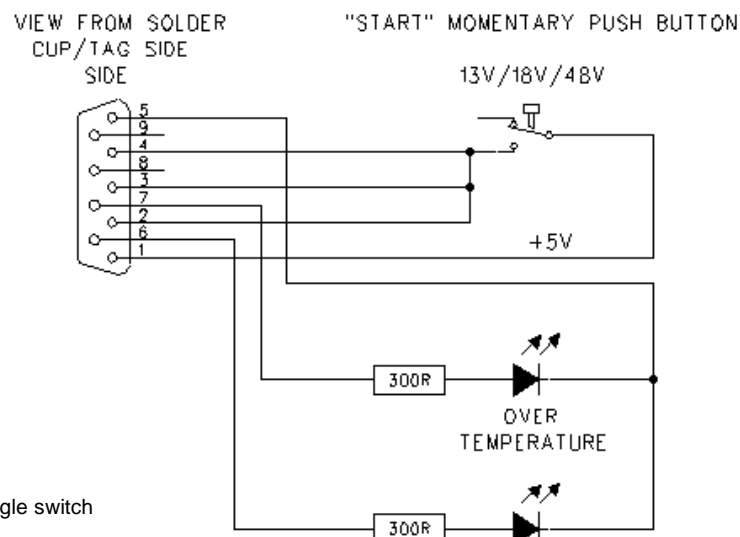


FIG 2-5. Remote start with a single switch

2.3.5 Replacing a power supply unit

If replacing a power supply unit is required, please note the following:

- The work should only be carried out by a suitably qualified electrician.
- Make sure that the power supply system's power switches are in the OFF position and the unit is disconnected from the mains.
- Observe the correct polarity when connecting the new PSU.
- Note that a console must never have one voltage without the other, for example +18V must never be fed into the console without -18V.

When switching the power supply back ON after replacement has taken place, make sure that both LEDs on the front of the PSU-system come on. If only one LED comes on, let go of the ON push-button immediately. Failure to do so may lead to fire hazard and major damage to the console.

2.4 Connecting the console frames

2.4.1 Frame to frame bus cables

When linking frames, plug the frame bus cable as shown in the diagram below:

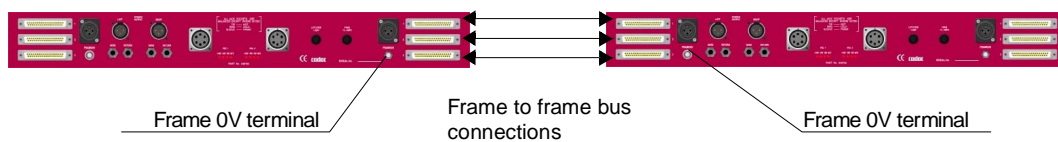


FIG 2-6. Audio Bus connections.

Also, see [Appendices](#).

2.4.2 Frame ground connection

Connect the frame-to-frame grounding cable. See figure 2-6 above for the location of the frame 0V terminals.

3 How to use the S-Type

This section of the manual provides instructions and information on how to use the S-Type. The flexibility of the S-Type allows the operator to achieve the same result in several ways. In this section you will learn how to perform certain procedures to achieve a desired result. This does not mean, however, that the same outcome cannot be achieved by taking a different route.

So to assist you in the most efficient way to become familiar with the S-Type, please start with the instructions given. As you build up experience, you may well find that alternative ways are better suited to your work practice.

3.1 Assigning channels to VCA Masters

3.1.1 Assigning an input channel to a VCA master

On the input channel, press the desired VCA Master numerical button to assign the input channel to that specific VCA Master fader. These assignment switches can be found to the left of the equalizer section. Normally you would assign a given number of input channels to one specific VCA Master, however, it is possible to assign an input channel to more than one VCA Master should this be required.

3.2 Using the sends

3.2.1 Selecting send to Sub-Group and setting signal level

The S-Type allows for routing to eight Sub-Groups with optional PAN control. To route to a Sub-Group, press the Send ON button for the desired Sub-Group 1-8. Send ON is indicated by the associated LED illuminating. Press the PAN button if you want to use the PAN control. The signal can also be routed to the dedicated stereo bus using the associated stereo push-button (ST) and PAN control, the latter being permanently active on the stereo send.

3.2.2 Selecting send to auxiliary and setting signal level

The input channel module has a dedicated Auxiliary ON/OFF switch for each Auxiliary send. The module has facilities for routing to 8 auxiliary busses. The first of these are stereo and are controlled by dual concentric potentiometers, the upper for setting the signal level, and the lower control for positioning the signal in the stereo field.

The remaining six sends are mono and have associated signal level controls.

All eight auxiliary sends can be individually switched pre or post fader.

3.2.3 Selecting send to matrix and setting signal level

By using the assignment buttons in the Sub-Group section in the respective input module, select a Sub-Group to which the signal has been routed. On the appropriate matrix sends section on the Group/Matrix module (8413 & 8415), enable the desired matrix send by selecting its corresponding switch. The matrix level can then be set using the associated matrix output level control.

To route the signal from the stereo mix bus to the matrix, select and enable the appropriate matrix send switches on the stereo output module (8414).

Example: If you would like to send the stereo output to matrix sends 3 and 4; press button 3 and 4 to route the left and right signal to matrix sends 3 and 4. Press SUM L+R if you wish to route the stereo signal as a mono sum to matrix sends 3 or 4. Note that odd numbers refer to left channels and even numbers to right channels.

3.3 Solo a channel (Destructive)

Press Check Mute located at the top of the 8414 module, then select the appropriate Mute button of the channel you wish to solo.

3.4 Using the PFL

The S-Type has facilities for monitoring through loudspeakers or headphones, each with its own level control for comfortable listening. Visual indication on the dual channel LED meter is also provided. The Listen facility is independent of whether the signal is in mono or stereo; it will appear in both left and right channels - either in mono to both left and right, or in true stereo.

Unless the PFL HOLD button is selected, pressing a PFL button will cancel any previously selected PFL. Selecting the PFL HOLD function allows more than one module PFL to be routed to the Listen bus at any one time.

3.4.1 PFL - one channel

Press the PFL button on the relevant input channel module to listen to the signal pre fader via the listen module.

3.4.2 PFL - a group of channels

Enable the PFL HOLD button on the 8414 module. Then press PFL on each of the channels to be monitored.

4 Mono input module 8411



The S-Type mono input channel module features a microphone input amplifier, which is the same as that fitted to the legendary J-Type - the most prevalent theatre console in the industry. The module has a full four-band parametric equaliser - also originating from the J-Type - which may be switched to pre or post the insert point. The 8411 also includes a HP-filter with a cut-off frequency of 160Hz and a slope of 12dB per octave.

The module incorporates a fully balanced direct output with level control; normally post fader but may be switched to pre fader or even post mic amplifier.

The input module allows routing to eight sub groups with optional pan control. It can also route to a dedicated stereo bus via the pan control. Additionally, it is possible to route to eight auxiliary busses; the first two of which are stereo on dual concentric potentiometers - level on the upper control and PAN on the lower control. The remaining six are mono with level control. All eight sends can be enabled and selected to be sourced pre or post fader on an individual basis.

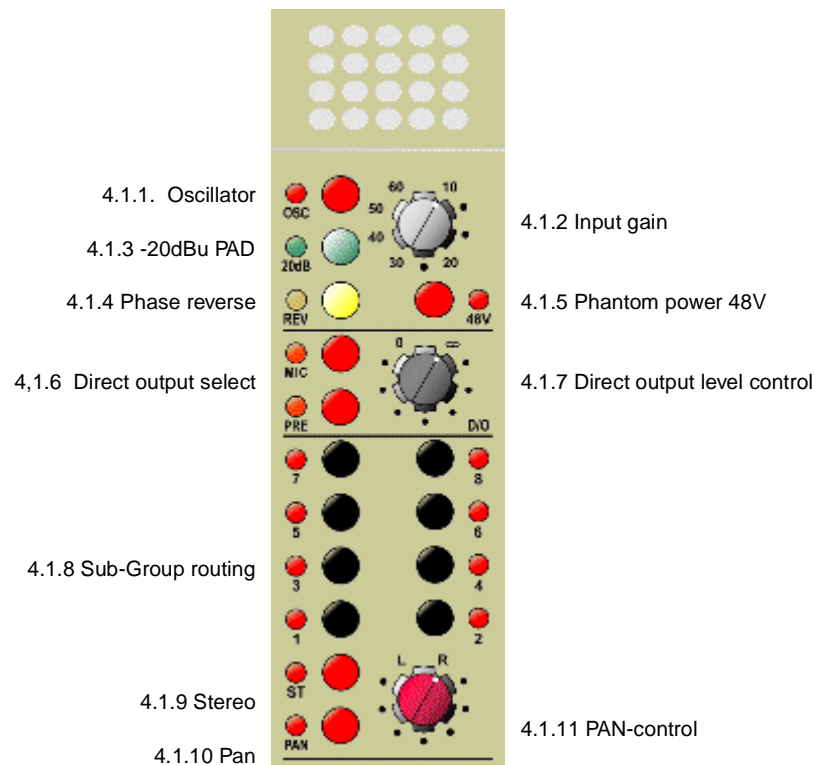
Each input channel can be assigned to up to a maximum of eight VCA masters.

The 8411 input channel module is equipped with a fully balanced insert send and return - the send stays live irrespective of whether the insert button is pressed. Also included are PFL and Mute buttons - inclusive of a destructive solo function.

The module is fitted with a 100mm P&G fader and located next to it, a 12 segment prefade input meter with a range of +18dB to -36dB (meter source is pre-fader). There is also a fader-open LED which, when extinguished, indicates that either the channel fader is closed or muted, or an assigned VCA Master is muted or pulled down to infinity.

Following pages describes the 8411 module in detail.

4.1 Front panel - mono input channel module 8411



4.1.1 Oscillator

Press this button to apply a line-up tone to the input. The frequency and level of the line up tone is set from the Stereo output, Comms, Osc & Talkback module 8414.

4.1.2 Input gain

This rotary control adjusts the MIC input gain between +10dBu and +60dBu.

4.1.3 -20dB pad

Pressing this button applies a -20dBu pad to the MIC input to accommodate for line level sources @0dBu (0.775V).

4.1.4 Phase reverse

Press this button to reverse the phase of the incoming signal.

4.1.5 48V Phantom power

Press this button to switch on 48V phantom power to any connected microphone. Please note that the 48V phantom power is disabled on this channel if the OSC switch is selected.

4.1.6 Direct output select

Normally the direct output is fed post fader; pressing PRE will source the signal pre-fader but post INS/EQ. Pressing MIC will override the PRE button (the PRE LED will extinguish) and source the Direct Output post MIC amplifier. In this condition the HP-filter is still available.

4.1.7 Direct output level control

Use this rotary control to adjust the direct output level. Level control is from infinity to 0dB.

4.1.8 Sub-group routing

The sub-group routing buttons allows a post fader signal to be routed to the Sub-Groups, with optional pan information, see 4.1.11. To route a signal from an input channel to a Sub-Group, press the relevant numerical button in the Sub-Group section of the input module.

Routing to matrix output

Before you can route a signal to the matrix outputs, the signal has to be routed to one of the sub-groups (see 4.1.8). The signal can then be routed to the matrix output by using the opposite controls on the 8413 & 8415 module.

4.1.9 ST - Stereo

Pressing this button routes a post pan and fader signal to the stereo master. The pan potentiometer will affect this signal regardless of whether the pan button is pressed, see 4.1.11.

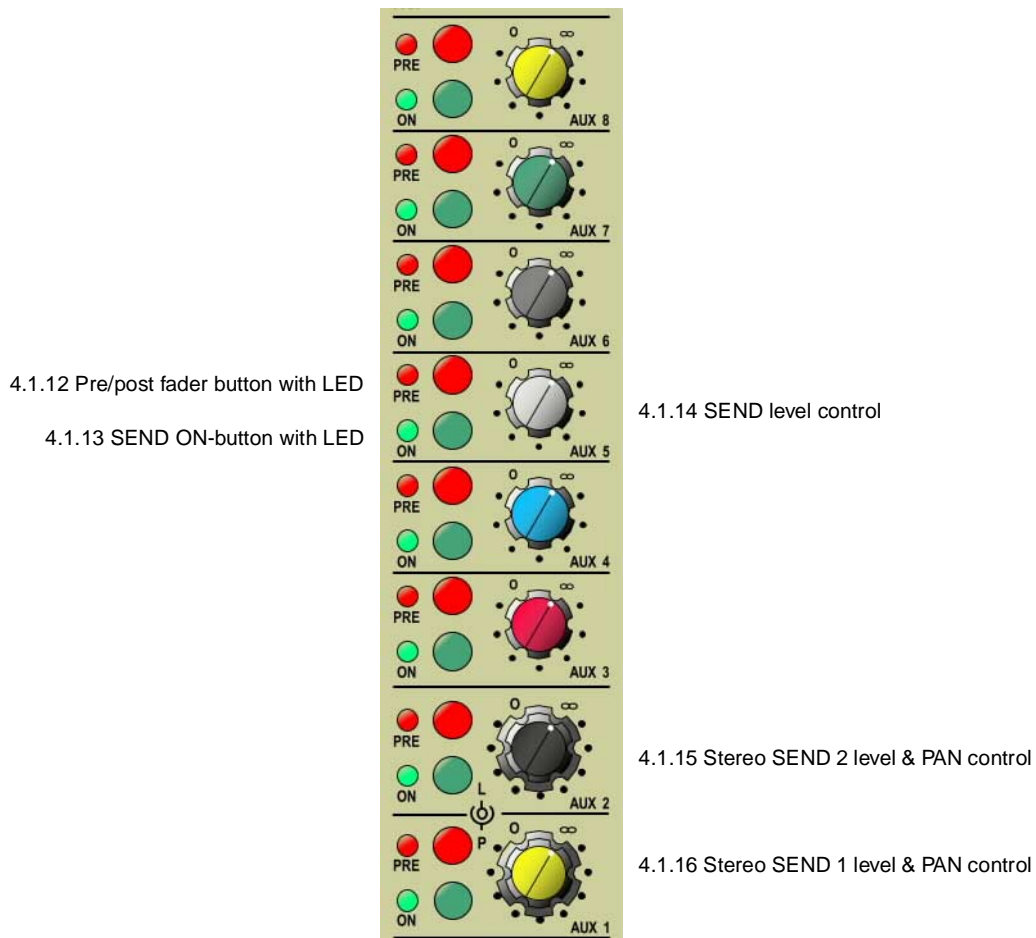
4.1.10 Pan

Press this button to enable panning of the sub-groups via the pan potentiometer.

4.1.11 Pan control

Use this rotary control to pan the signal within the stereo field.

Front panel - mono input channel module 8411



4.1.12 PRE - pre/post Fader

Press the PRE button to route the selected Auxiliary send pre-fader; the adjacent LED indicates when pre fader mode is active.

4.1.13 ON - Auxiliary send On/Off

Press the appropriate Auxiliary send ON-button to route the signal to one of the auxiliary busses; the adjacent LED will illuminate when the Auxiliary send is ON.

4.1.14 Auxiliary send level control

Use this rotary control to adjust the level of the SEND signal.

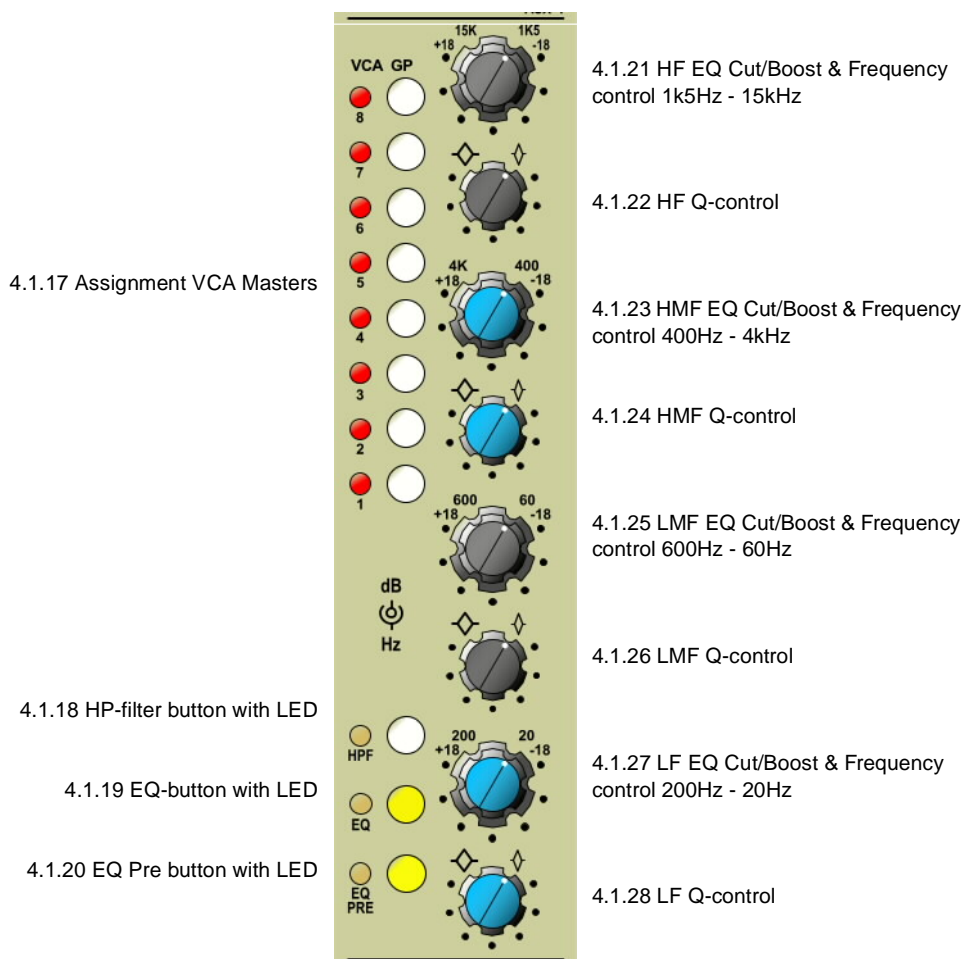
4.1.15 Stereo Auxiliary send 2 LEVEL and PAN control

Adjusts the Level (upper) and Pan (lower) of the Stereo Auxiliary send 2.

4.1.16 Stereo Auxiliary send 1 LEVEL and PAN control

Adjusts the Level (upper) and Pan (lower) of the Stereo Auxiliary send 1.

Front panel - mono input channel module 8411



4.1.17 VCA GP - Assignment VCA Masters

Using these buttons you can assign any of the eight VCA masters to any of the inputs. This enables you to control the module's output and mute via the applicable VCA Master fader and mute controls. Normally, you would assign an input channel to one VCA Master, it is, however, possible to assign the input channel to two or more VCA Masters, should this be required.

4.1.18 HPF - High Pass Filter In/Out

Pressing the HPF button will insert the high pass filter into the signal path. The HPF has a cut-off frequency of 160Hz, with a slope of 12dB per octave. Note that the HPF is situated immediately after the microphone amplifier and is not switched with the equalizer.

4.1.19 EQ - EQ In/Out

Press this button to switch the equalizer in circuit.

4.1.20 EQ PRE - EQ PRE button

Normally the equaliser is situated after the channel insert. Pressing the EQ PRE button will put the EQ before the channel insert.

4.1.21 HF EQ Cut/Boost & Frequency control 1k5Hz-15kHz

This dual concentric potentiometer allows the centre frequency to be adjusted between 1k5Hz and 15kHz (lower control) and the gain to be adjusted by $\pm 18\text{dB}$ (upper control). The gain control is centre detented.

4.1.22 HF Q-control

The Q-control varies the bandwidth of the selected frequency selected as per 4.1.21. As indicated on the front panel when turned towards the low 'Q' symbol (Q approximately 1.0) will cause a wide bandwidth of frequencies to be affected around the selected centre frequency. When set towards the high 'Q' symbol ('Q' approximately 3.0) a narrow band of frequencies will be affected around the centre frequency.

4.1.23 HMF EQ Cut/Boost & Frequency control 400Hz - 4kHz

This dual concentric potentiometer allows the centre frequency to be adjusted between 400Hz and 4kHz (lower control) and the gain to be adjusted by $\pm 18\text{dB}$ (upper control). The gain control is centre detented.

4.1.24 HMF Q-control

The Q-control varies the bandwidth of the selected frequency selected as per 4.1.23. The function of the Q-control is described in 4.1.22.

4.1.25 LMF EQ Cut/Boost & Frequency control 60Hz - 600Hz

This dual concentric potentiometer allows the centre frequency to be adjusted between 60Hz and 600Hz (lower control) and the gain to be adjusted by $\pm 18\text{dB}$ (upper control). The gain control is centre detented.

4.1.26 LMF Q-control

The Q-control varies the bandwidth of the cut/boost frequency selected as per 4.1.25. The function of the Q-control is described in 4.1.22.

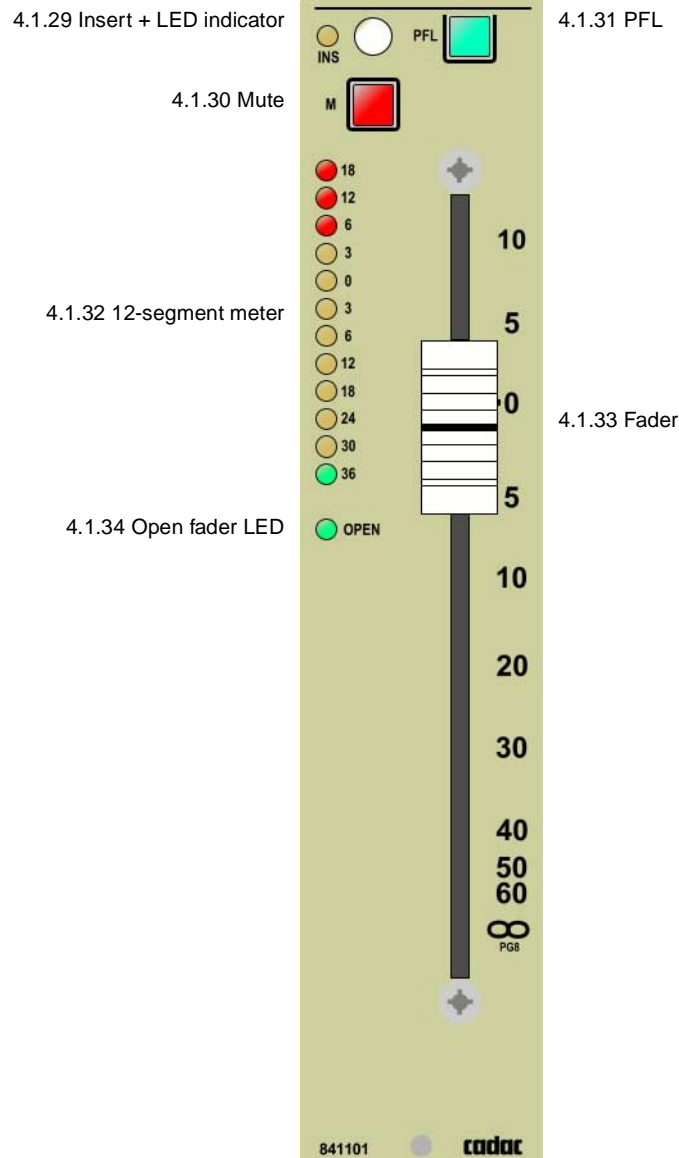
4.1.27 LF EQ Cut/Boost & Frequency control 20Hz - 200Hz

This dual concentric potentiometer allows the centre frequency to be adjusted between 20Hz and 200Hz (lower control) and the gain to be adjusted by $\pm 18\text{dB}$ (upper control). The gain control is centre detented.

4.1.28 LF Q-control

The Q-control varies the bandwidth of the cut/boost frequency selected as per 4.1.27. The function of the Q-control is described in 4.1.22.

Front panel - mono input channel module 8411



4.1.29 INS - Insert In/Out

Press this button to insert external equipment connected to the insert send and return jack sockets on the rear panel of the module. Please note that the insert send is permanently live and that the jack sockets are NOT normalized. The insert point can only be enabled by the front panel button. Note that selecting EQ PRE switches the equalizer pre insert send.

4.1.30 M - Mute

Press this button to mute all POST FADER signals from the input channel. When the CHECK MUTE button is pressed on the Stereo master module (8414) this button will act as a destructive solo, muting all other channels in the desk while remaining unmuted itself.

4.1.31 PFL

Press the PFL button to send the pre-fader signal to the LISTEN module. Note that selecting PFL will clear any previously selected PFLs, unless HLD (Hold) is selected on the Stereo master module 8414. If HLD is pressed, then the PFL will be added to any previously selected signals on the Listen bus.

A temporary hold-function can be achieved by selecting and holding the desired PFL. While holding down this switch you can add additional PFL channels as required. Pressing any of the selected PFL switches a second time will clear the selections and resume normal operation.

4.1.32 Meter

This is a 12-segment level meter showing the signal level immediately pre-fader.

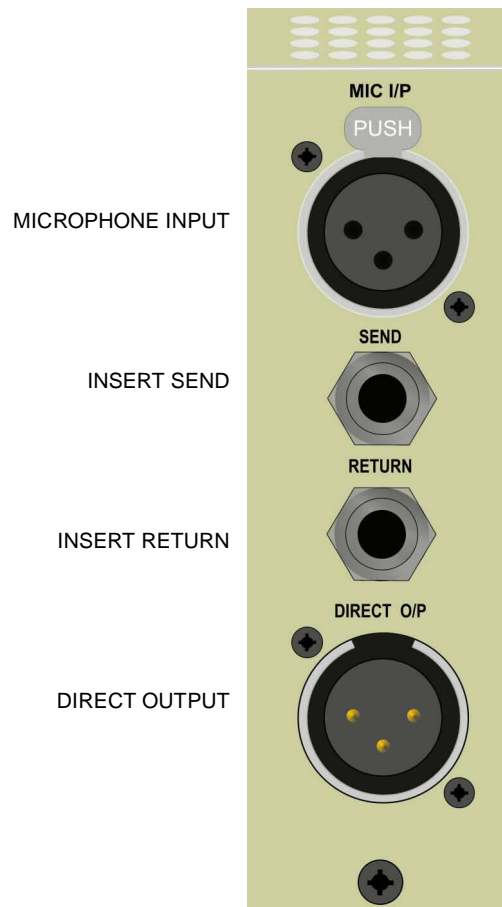
4.1.33 Fader

This 100mm conductive plastic P&G fader is used to control the signal level.

4.1.34 OPEN - Open fader LED

This LED illuminates when the fader is open and not muted locally or by a VCA master.

4.2 Rear panel - mono input channel module 8411



Inputs and outputs are electronically balanced and connected via 3-pin XLRs and follow the wiring convention:

PIN 1 = Screen
 PIN 2 = In-phase signal (hot)
 PIN 3 = Out-of-phase signal (cold)

The 0.25" TRS jack connectors use the wiring convention:

TIP = In-phase signal (hot)
 RING = Out-of-phase signal (cold)
 SLEEVE = Screen

IMPORTANT NOTE: Pin 1 on XLR connectors and the 'sleeve' connections on the jack sockets are connected to the FRAME. This is to ensure that the console can comply with the Electromagnetic Compatibility (EMC) directive.

5 Stereo input module 8412



The S-Type stereo input module has line level inputs for left and right channel respectively. In addition, it features a full four-band parametric equaliser which can be switched to pre or post the insert point. An HP-filter with a cut-off frequency of 160Hz; slope 12 dB per octave is included.

The stereo input module incorporates a fully balanced direct output with level control; normally post fader, but may be switched to pre fader, or even post input.

The module allows routing to eight sub-groups in true stereo with optional pan control. It can also route to a dedicated stereo bus via the pan control. Additionally, it is possible to route to eight Auxiliary busses; the first two of which are stereo on dual concentric potentiometers - level on the upper control and pan on the lower control. The remaining six are mono sends with level control. All eight sends can be enabled and selected to be sourced pre or post fader on an individual basis.

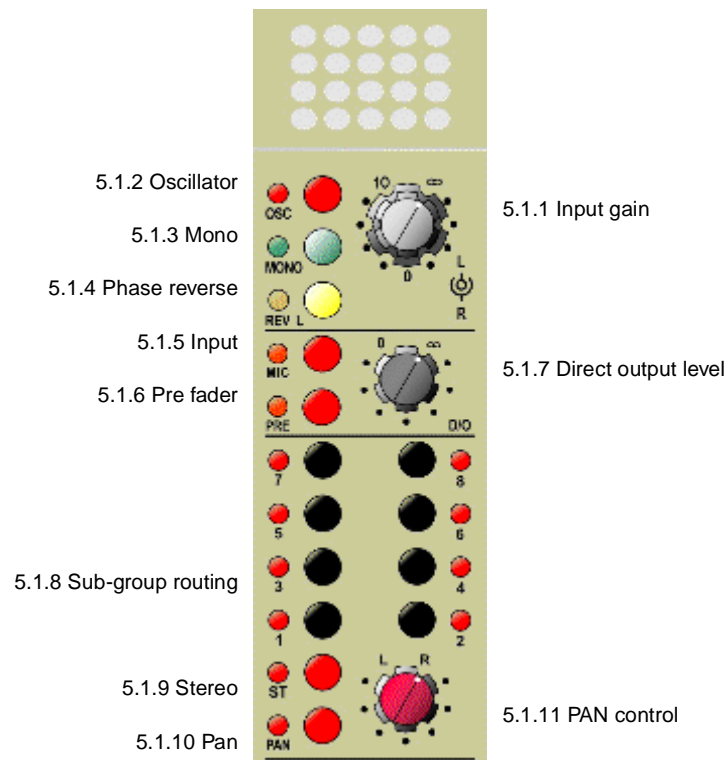
Each stereo input channel can be assigned to up to eight VCA masters.

The 8412 stereo input module is equipped with a fully balanced insert send and return - the send stays live irrespective of whether the insert button is pressed. Also, included on the module are PFL and Mute buttons - inclusive of a destructive solo function.

The module is fitted with a 100mm P&G fader, and located next to it, a 12-segment meter with a range of +18dB to -36dB (meter source is pre fader). There is also a fader-open LED, which, when extinguished, indicates that either the channel fader is closed or muted, or an assigned VCA Master is muted or pulled down to infinity.

Following pages describes the 8412 module in detail.

5.1 Front panel stereo input module 8412



5.1.1 Input gain Left/Right

This dual concentric rotary control (Left - upper control, Right - lower control) is used to adjust the input gain between infinity and +10dB.

5.1.2 OSC - Oscillator

Press this button to apply a line up tone to the input. The frequency and level of the line up tone is controlled from the 8414 module.

5.1.3 Mono

Press this button to sum left and right channel to mono.

5.1.4 REV L - Phase reverse left channel

Pressing this button reverses the phase of the incoming left signal.

5.1.5 Input

Press this button to route the line input - post input amplifier - to the Direct output.

5.1.6 PRE - Pre fader

Press this button to route the pre-fader signal to Direct Output. If INPUT or PRE are not selected the Direct Output is sourced post fader.

5.1.7 Direct output level control

Use this rotary control to adjust the direct output level. Level control is from infinity to 0dB.

5.1.8 Sub-group routing

The sub-group routing buttons allow post fader signal to be routed to the sub-groups, with optional pan information, see 5.1.11. To route a signal from an input channel to a sub-group, press the relevant numerical button on the sub-group.

Routing to matrix output

Before you can route a signal to the matrix outputs, the signal has to be routed to one of the sub-groups (see 5.1.8). The signal can then be routed to the matrix sends by using the appropriate controls on the 8413 & 8415 modules.

5.1.9 ST - Stereo

Pressing this button routes a post pan and fader signal to the Stereo master. The PAN potentiometer will affect this signal regardless of whether the pan button is pressed, see 5.1.11.

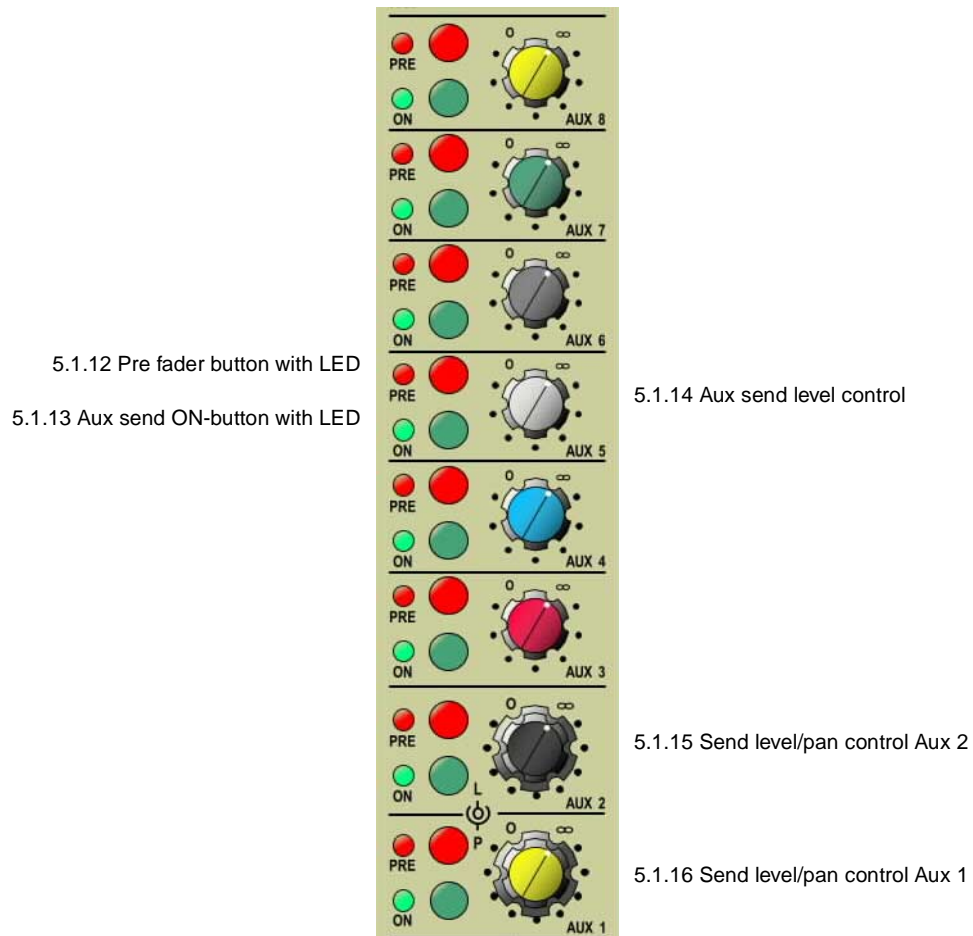
5.1.10 PAN

Press this button to enable panning of the sub-groups via the PAN potentiometer.

5.1.11 PAN control

Use this rotary control to pan the signal within the stereo field.

Front panel stereo input channel module 8412



5.1.12 PRE - Pre/post fader

Press the PRE button to route the selected Auxiliary send pre-fader; the adjacent LED indicates when pre-fader mode is active.

5.1.13 ON - Auxiliary send On/Off

Press the appropriate Auxiliary send ON button to route the signal to one of the Auxiliary busses; the LED will illuminate when the Auxiliary send is ON.

5.1.14 Auxiliary send level control

Use this rotary concentric control to adjust the level of the Auxiliary send.

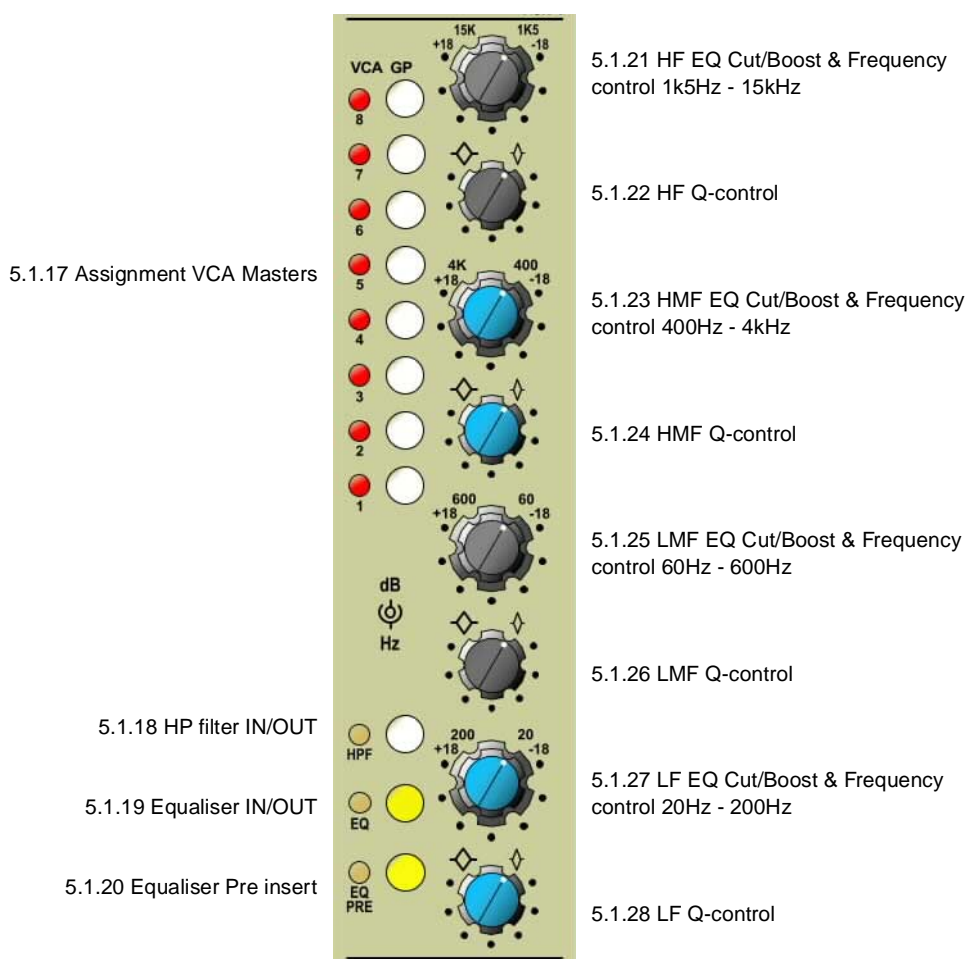
5.1.15 Stereo Auxiliary send 2 LEVEL and PAN control

Adjusts the level (upper control) and PAN (lower control) of stereo auxiliary send 2.

5.1.16 Stereo Auxiliary send 1 LEVEL and PAN control

Adjusts the level (upper control) and PAN (lower control) of Stereo Auxiliary send 1.

Front panel stereo input channel module 8412



5.1.17 VCA GP - Assignment VCA Masters

Using these buttons you can assign any of the eight VCA Masters to any of the inputs. This enables you to control the module's output level and mute via the applicable VCA Master fader and mute controls. Normally, you would assign an input channel to one VCA Master. It is, however, possible to assign the input channel to two or more VCA Masters, should this be required.

5.1.18 HPF - High Pass Filter In/Out

Pressing this button will insert the highpass filter into the signal path. The HP-filter has a cut-off frequency of 160Hz; slope is 12 dB per octave. Note that the HPF is situated immediately after the MIC amplifier and is not switched with the equalizer.

5.1.19 EQ - EQ In/Out

Press this button to insert the equaliser into the signal path.

5.1.20 EQ - EQ PRE button

Normally the equalizer is situated after the channel insert. Pressing the EQ PRE button will switch the EQ pre the channel insert.

5.1.21 HF EQ Cut/Boost & Frequency control 1k5Hz - 15kHz

This dual concentric control allows the centre frequency to be adjusted between 1k5Hz to 15kHz (lower control) and the gain to be adjusted by ± 18 dB (upper control). The gain control is centre detented.

5.1.22 HF Q-control

The Q-control varies the bandwidth of the selected frequency when gain is applied as per 5.1.21. As indicated on the front panel when turned towards the low 'Q' symbol (Q approximately 1.0) will cause a wide bandwidth of frequencies to be affected around the selected centre frequency. When set toward the high 'Q' symbol ('Q' approximately 3.0) a narrow band of frequencies will be affected around the centre frequency.

5.1.23 HMF EQ Cut/Boost & Frequency control 400Hz - 4kHz

This dual concentric control allows the centre frequency to be adjusted between 400Hz to 4kHz (lower control) and the gain to be adjusted by ± 18 dB (upper control). The gain control is centre detented.

5.1.24 HMF Q-control

The Q-control varies the bandwidth of the cut/boost frequency selected as per 5.1.23. The function of the Q-control is described in 5.1.22.

5.1.25 LMF EQ Cut/Boost & Frequency control 60Hz - 600Hz

This dual concentric control allows the centre frequency to be adjusted between 60Hz to 600Hz (lower control) and the gain to be adjusted by ± 18 dB (upper control). The gain control is centre detented.

5.1.26 LMF Q-control

The Q-control varies the bandwidth of the selected frequency when gain is applied as per 5.1.25. The function of the Q-control is described in 5.1.22.

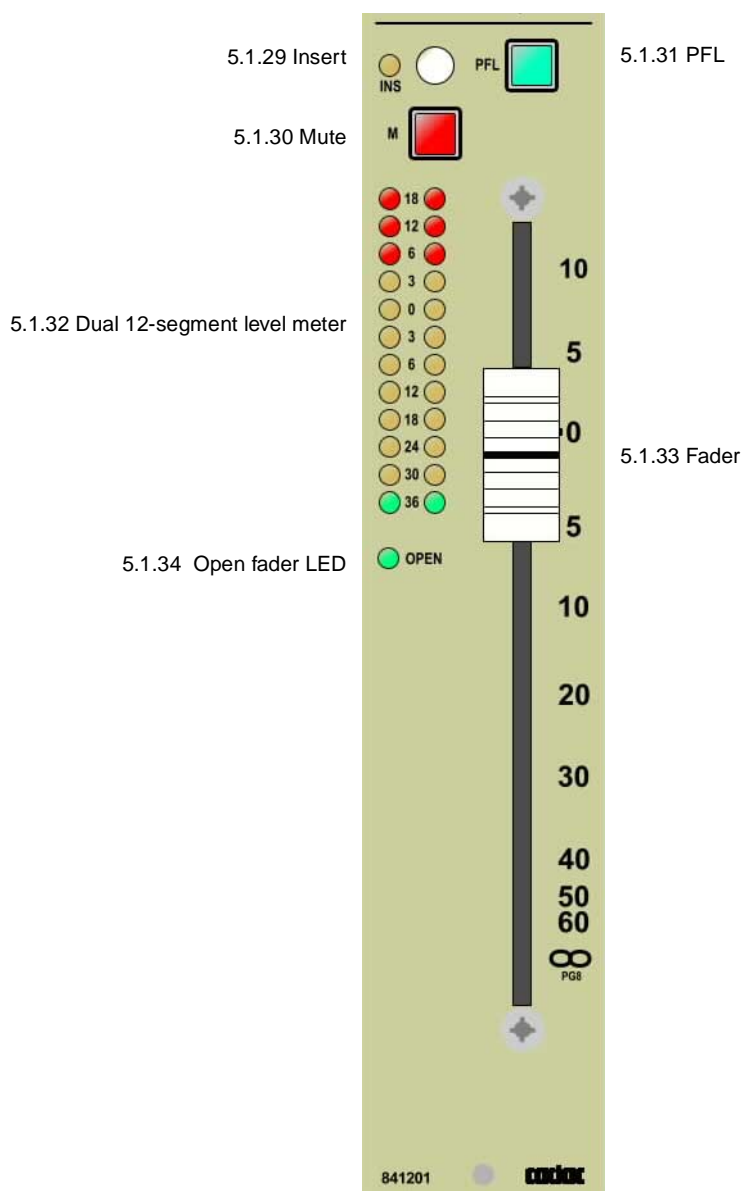
5.1.27 LF EQ Cut/Boost & Frequency control 20Hz - 200Hz

This dual concentric control allows the centre frequency to be adjusted between 20Hz to 200Hz (lower control) and the gain to be adjusted by ± 18 dB (upper control). The gain control is centre detented.

5.1.28 LF Q-control

The Q-control varies the bandwidth of the selected frequency when gain is applied as per 5.1.27. The function of the Q-control is described in 5.1.22.

Front panel stereo input channel module 8412



5.1.29 Insert In/Out

Press this switch to insert external equipment connected to the insert send and return jack sockets on the rear panel of the module. Please note that the insert send is permanently live and that the jack sockets are NOT normalized. The insert point can only be enabled by the front panel button. Note that selecting EQ PRE switches the equalizer pre insert send.

5.1.30 Mute

Press this button to mute all post-fader signals from the input channel. When the CHECK MUTE button is pressed on the stereo master module (8414) the channel's Mute will act as a destructive solo, muting all other channels in the desk while remaining un-muted itself.

5.1.31 PFL

Press this button to send the pre-fader signal to the LISTEN module. Note that selecting PFL will clear any previously selected PFLs, unless HLD (Hold) is selected on the stereo master module 8414. If HLD is pressed, then the PFL will be added to any of the previously selected signals on the Listen bus.

A temporary hold function can be achieved by selecting and holding the desired PFL. While holding down this switch you can add additional PFL channels as required. Pressing any of the selected PFL switches a second time will clear the selections and resume normal operation.

5.1.32 Dual 12-segment level meter

12-segment level meters showing the channel signal level immediately pre-fader.

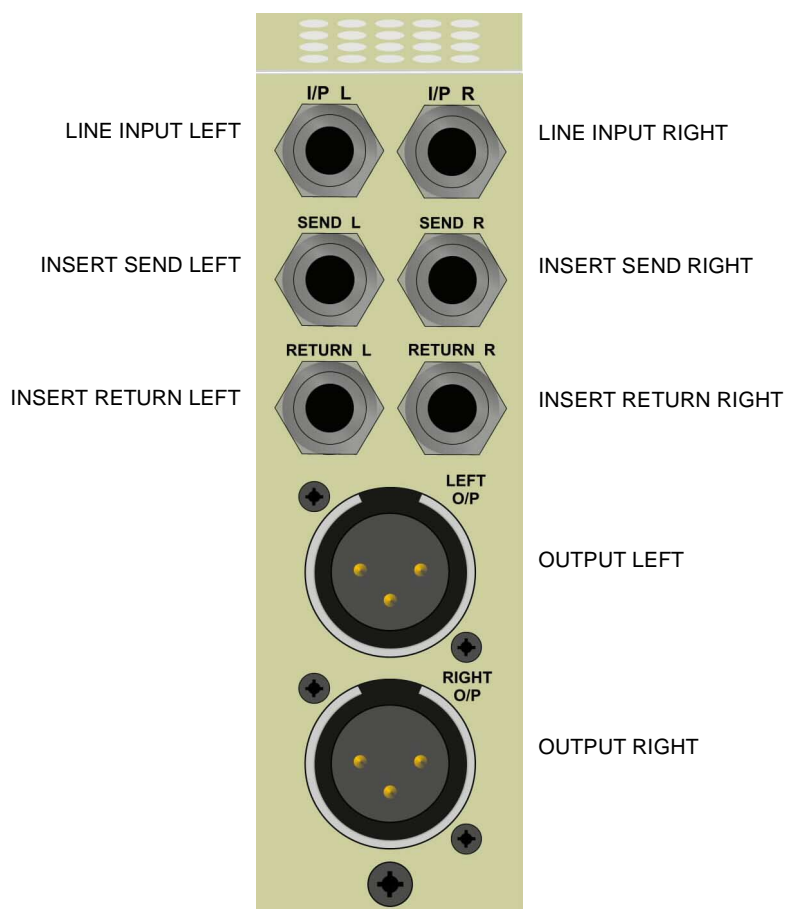
5.1.33 Fader

100mm plastic conductive P & G fader used to control the signal level.

5.1.34 Open fader LED

This LED illuminates when the fader is open and not muted locally or by a VCA Master.

5.2 Rear panel stereo input channel module 8412



Inputs and outputs are electronically balanced and connected via 3-pin XLRs and follow the wiring convention:

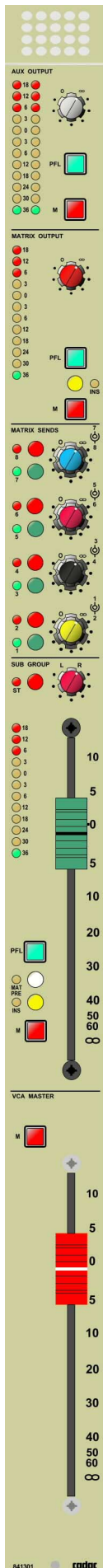
PIN 1 = Screen
 PIN 2 = In-phase signal (hot)
 PIN 3 = Out-of-phase signal (cold)

The 0.25" TRS jack connectors use the wiring convention:

TIP = In-phase signal (hot)
 RING = Out-of-phase signal (cold)
 SLEEVE = Screen

IMPORTANT NOTE: Pin 1 on XLR connectors and the 'sleeve' connections on the jack sockets are connected to the FRAME. This is to ensure that the console can comply with the Electromagnetic Compatibility (EMC) directive.

6 Group, matrix and aux output - stereo 8413, mono 8415



Each console can have up to 6 x 8415 and 2 x 8413 (note that the illustration depicts the stereo version) which will give you access to all the available Group, Matrix and Auxiliary outputs of the desk.

Each group module comprises of a sub-group output with a full size P&G fader, 12-segment meter, PFL, Mute and Insert. It is possible to send the sub-group signal to the stereo bus with panning. In addition, there is a switch to change the send to matrix to be pre rather than post sub-group fader.

The matrix sends on the module consists of 8 individual routing buttons and four dual concentric potentiometers for the send level - odd send (upper control), even send (lower control). This leads to the Matrix master output, which has a potentiometer for output level control, 12-segment meter, PFL, Mute and Insert.

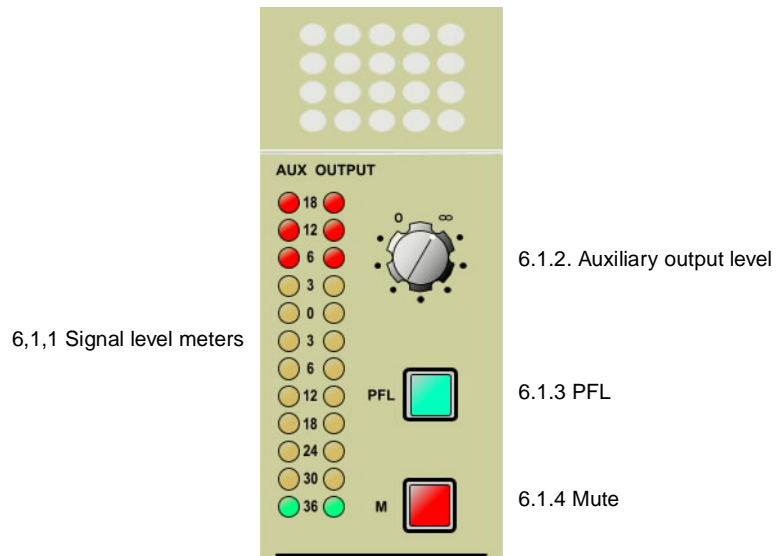
The final output on the module is the Auxiliary Master output, which comprises of a potentiometer for level control, 12-segment meter (2 in the case of the stereo 8413), PFL and Mute.

Inputs and outputs are electronically balanced on 6.3mm jack sockets, except the sub-group and Matrix master outputs that are available on XLR connectors.

The module mix bus coding for the Sub-group, Matrix and Auxiliaries is manually selectable using 4-way jumpers (8-way for the two stereo auxiliary masters). For details on this, see [B. Mix bus coding](#)

The VCA Master is located at the bottom of the module and consists of a 100mm P&G fader and mute control.

6.1 Front panel group, matrix and aux output: Stereo 8413 - Mono 8415



6.1.1 Signal level meters

12-segment level meters displaying the Auxiliary master output level. Meter source is post Auxiliary Master level control.

6.1.2 Auxiliary Master output level

This rotary controls adjusts the signal level of the auxiliary master output. Level control gain range from infinity to 0dB.

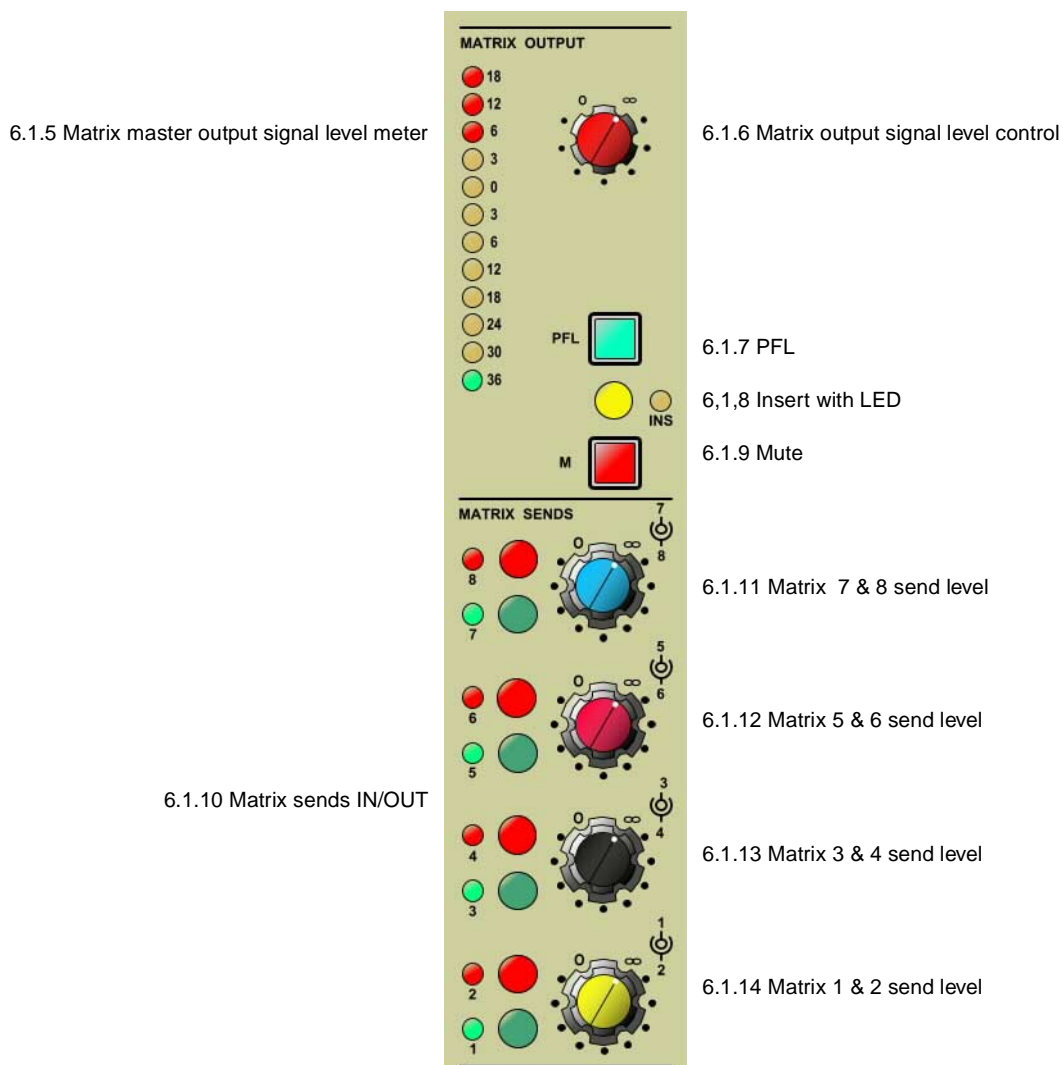
6.1.3 PFL

Press this button to listen to the auxiliary master output signal pre fader.

6.1.4 Mute

Press this button to mute the auxiliary master output signal.

Front panel group, matrix and aux output: Stereo 8413 - Mono 8415



6.1.5 Matrix Master level meter

12-segment level meter showing the signal level of the matrix master output.

6.1.6 Matrix Master level control

This rotary control is used to adjust the signal level of the matrix master output.

6.1.7 PFL

Press this button to listen to the matrix master pre-fader.

6.1.8 Insert

Press this button to connect the pre-fader send/return insert jacks into the signal path. Please note that the insert send is permanently live and that the jack sockets are NOT normalized.

6.1.9 Mute

Press this button to mute the matrix master.

6.1.10 Matrix sends IN/OUT

Press any of these buttons to turn the appropriate matrix sends ON or OFF.

6.1.11 Matrix 7 & 8 send level

These rotary controls are used to adjust the output signal levels of the matrix sends 7 and 8. Upper control for Matrix send 7 and lower control for Matrix send 8.

6.1.12 Matrix 5 & 6 send level

These rotary controls are used to adjust the output signal levels of the matrix sends 5 and 6. Upper control for Matrix send 5 and lower control for Matrix send 6.

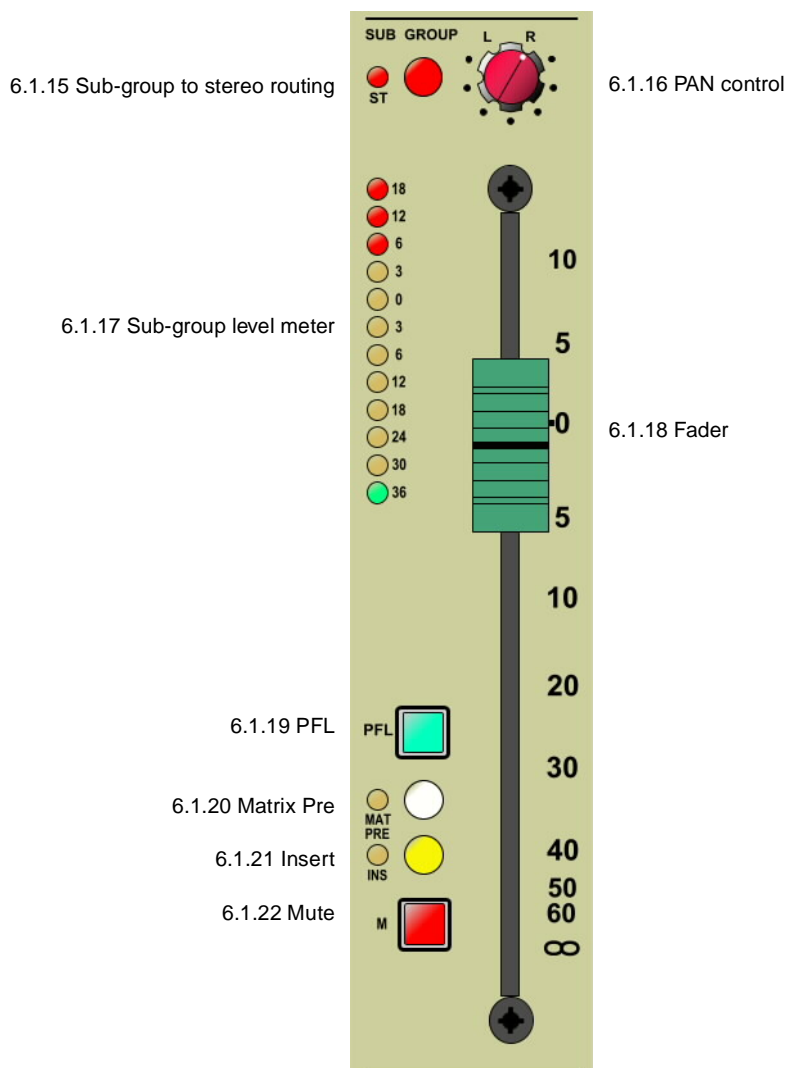
6.1.13 Matrix 3 & 4 send level

These rotary controls are used to adjust the output signal levels of the matrix sends 3 and 4. Upper control for Matrix send 3 and lower control for Matrix send 4.

6.1.14 Matrix 1 & 2 send level

These rotary controls are used to adjust the output signal levels of the matrix sends 1 and 2. Upper control for Matrix send 1 and lower control for Matrix send 2.

Front panel group, matrix and aux output: Stereo 8413 - Mono 8415



6.1.15 ST - Sub group stereo

Press this button to send the sub-group post fader signal to the stereo master with optional panning.

6.1.16 PAN control

This rotary control is used to place the sub-group signal at the desired point in the stereo field when routing to the Stereo master.

6.1.17 Sub group level meter

12-segment level meter displaying the signal level of the sub-group. Meter source is post sub-group fader.

6.1.18 Fader

100mm plastic conductive P & G fader used to adjust the sub-group output level.

6.1.19 PFL

Press the button to listen to the sub-group signal pre-fader.

6.1.20 Matrix Pre

Press this button (MAT PRE) to source the matrix sends pre sub-group fader. This allows the sub-group to be used as an additional send without altering matrix send levels.

6.1.21 Insert

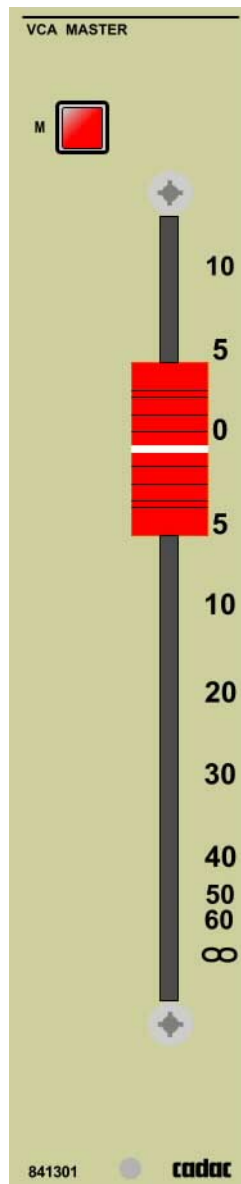
Press this button to connect the pre-fader send/return insert jacks into the signal path. Please note that the insert send is permanently live and that the jack sockets are not normalized.

6.1.22 Mute

Press this button to mute the sub-group output.

Front panel group, matrix and aux output: Stereo 8413 - Mono 8415

6.1.23 VCA Master - Mute



6.1.24 VCA Master - Fader

6.1.23 M - VCA Master - Mute

Press this button to mute the VCA Master and associated input channels.

6.1.24 VCA Master - Fader

100mm plastic conductive P & G fader used to control the VCA Master level.

6.2 Rear panel group, matrix and aux output: Stereo 8413 - Mono 8415



8413 stereo



8415 mono

Inputs and outputs are electronically balanced and connected via 3-pin XLRs and follow the wiring convention:

PIN 1 = Screen
 PIN 2 = In-phase signal (hot)
 PIN 3 = Out-of-phase signal (cold)

The 0.25" TRS jack connectors use the wiring convention:

TIP = In-phase signal (hot)
 RING = Out-of-phase signal (cold)
 SLEEVE = Screen

IMPORTANT NOTE: Pin 1 on XLR connectors and the 'sleeve' connections on the jack sockets are connected to the FRAME. This is to ensure that the console can comply with the Electromagnetic Compatibility (EMC) directive.

7 Stereo output, Comms, Osc and Talkback module 8414



The 8414 module contains the main stereo output with a full size 100mm fader, 12-segment meters for left and right channels in addition to PFL, Mute and Insert.

The module enables you to send the stereo mix to the matrix outputs via individual routing buttons and dual concentric potentiometers - odd numbers goes to left (upper control), even number goes to right (lower control). In addition, each pair of sends has a sum-to-mono feature.

The oscillator can be switched to 100Hz, 1kHz and 10kHz and can be routed to the channels and/or the sub-groups.

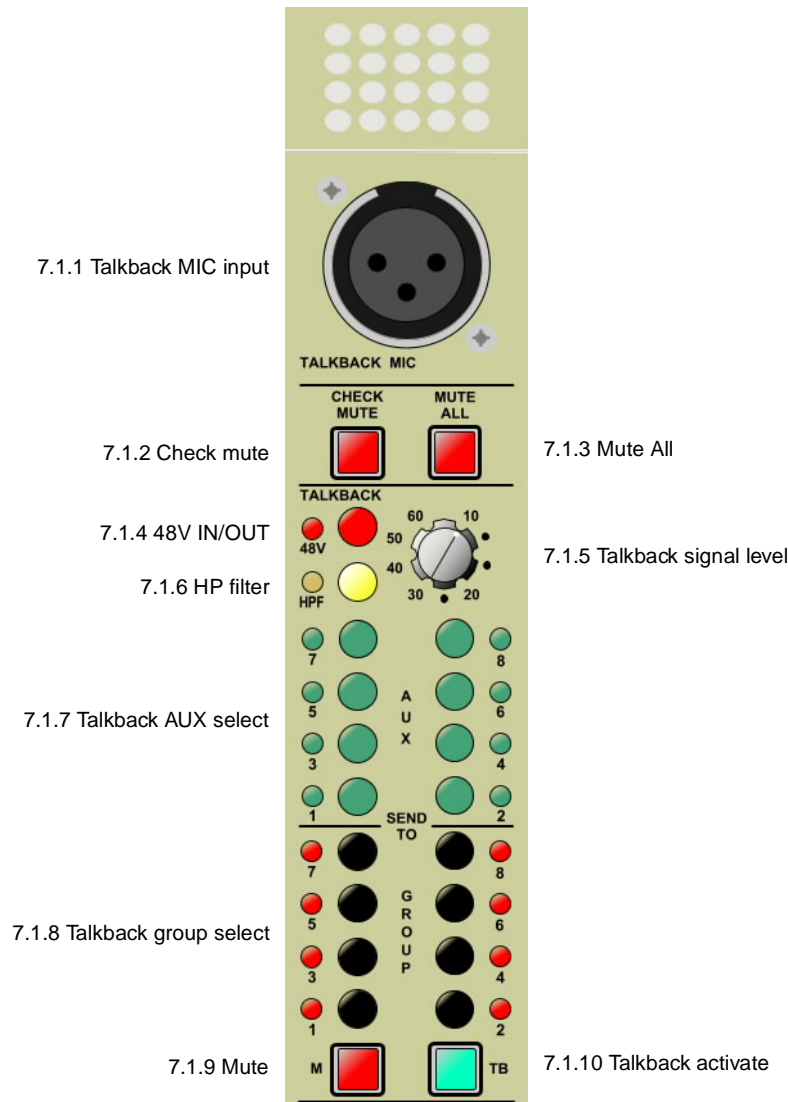
The talkback section contains the same mic amplifier as found on the mono input channels with optional 48V and HPF. The talkback signal can then be routed to the auxiliary sends and sub-groups.

The listen output level is controlled via a dedicated level control. Two dedicated 12-segment level meters provide visual feedback. Mute, Hold and Clear buttons are included.

In normal mode, the PFLs are self cancelling, i.e. pressing any PFL buttons on the console will clear any previous selection. By selecting the PFL Hold switch it is possible to enable multiple PFL switches simultaneously.

A temporary hold function can be achieved by selecting and holding the desired PFL switch, while adding additional PFLs as required. Pressing the PFL switch a second time will clear the selected channels and resume normal operation.

7.1 Front panel Stereo output, Comms, Osc and Talkback module 8414



7.1.1 Talkback microphone input

A 3-pin female XLR is provided at the top of the 8414 module to allow the connection of a talkback microphone. The microphone amplifier gain control is located in the lower section of this module.

Note: Talkback microphone is NOT included with the S-Type.

7.1.2 Check mute

Enabling CHECK MUTE allows an operator to use the input channel MUTE buttons in a Destructive Solo mode.

7.1.3 Mute All

The MUTE ALL feature mutes all channels, master outputs, (including sub-group, matrix and auxiliary master) and Stereo master.

7.1.4 48V IN/OUT

Press this button to provide +48V phantom power to the Talkback microphone XLR.

7.1.5 Talkback signal level

This rotary control adjusts the Talkback MIC input gain between 10dBu and 60dBu.

7.1.6 HP filter IN/OUT

Press this button to activate the highpass filter post Talkback microphone amplifier.

7.1.7 Talkback AUX select

These assignment switches allow talkback to be routed to any of the auxiliary busses on an individual basis.

7.1.8 Talkback group select

These assignment switches allow talkback to be routed to any of the sub-group busses on an individual basis.

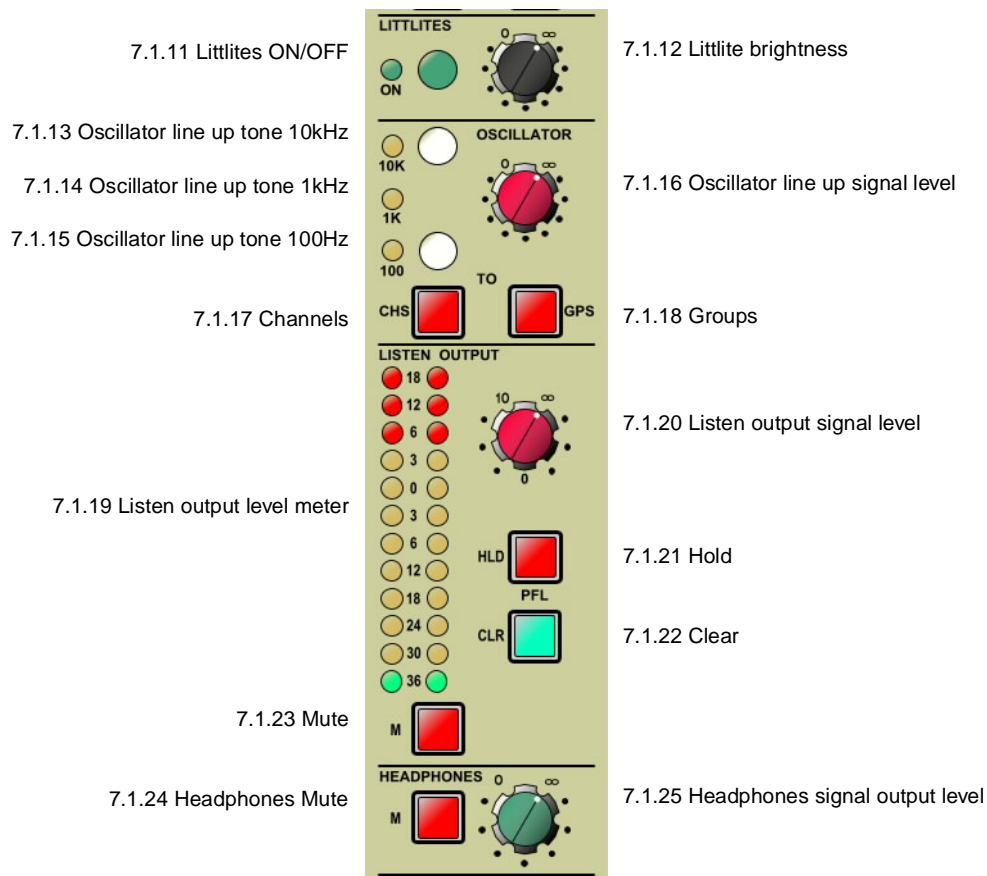
7.1.9 Mute

Pressing this button will mute the Talkback feature. Pressing the TB button (7.1.10) will over-ride the MUTE.

7.1.10 Talkback activate

Pressing the TB button will activate the talk-back feature across the selected auxiliary and sub-group busses..

Front panel Stereo output, Comms, Osc and Talkback module 8414



7.1.11 Littlites ON/OFF

Press this button to switch the littlites ON/OFF. ON is indicated by the adjacent LED illuminating.

7.1.12 Littlite brightness

This rotary control enables you to adjust the brightness of the littlites.

7.1.13 Oscillator line-up tone 10kHz

Enabling this switch activates a 10kHz line up tone, which is available for selected input channels and/or all sub-groups (see 7.1.17 and 7.1.18).

7.1.14 Oscillator line-up tone 1kHz

When both 10kHz and 100Hz oscillator switches are in the OFF position, a 1kHz line up tone is available for selected input channels and/or all sub-groups (see 7.1.17 and 7.1.18).

Note: When both 10kHz and 100Hz oscillator switches are in the ON position, the oscillator will default to 10kHz. Only the 10kHz LED will be illuminated.

Note: The OSC button will need to be enabled on the desired input modules. Level control gain range from infinity to 0dB.

7.1.15 Oscillator line-up tone 100Hz

Enabling this switch activates a 100Hz line up tone, which is available for selected input channels and/or all sub-groups.

7.1.16 Oscillator line-up signal level

Use this rotary control to set the level of the line up tone selected.

7.1.17 Channels

Press this button to apply a line up tone to the channel(s) selected. Note: The OSC button will need to be enabled on the desired input modules.

7.1.18 Groups

Press this button to assign line-up tone to all sub-group busses.

7.1.19 Listen output level meter

Dual 12-segment LED meter indicating the signal level of the Listen output.

7.1.20 Listen output signal level

Use this rotary control to adjust the signal level of the Listen output. Level control gain range from infinity to +10dBu.

7.1.21 Hold

When activated, the HLD switch provides a PFL latching function, whereby multiple PFL switches can be enabled simultaneously. All can be cleared by pressing the CLR button (7.1.22).

7.1.22 Clear

Pressing this button will clear all enabled PFL switches.

7.1.23 Mute

Press this button to mute the listen output.

7.1.24 Headphones Mute

Press this button to mute the signal sent to the headphones.

7.1.25 Headphones output signal level

Use this rotary control to adjust the signal level to the headphones. Headphone level control range from infinity to 0dB.

Front panel Stereo output, Comms, Osc and Talkback module 8414

7.1.26	Right channel to matrix output 8		7.1.38	Output level to matrix 7+8
7.1.27	Sum L+R to matrix output 7+8		7.1.39	Output level to matrix 5+6
7.1.28	Left channel to matrix output 7		7.1.40	Output level to matrix 3+4
7.1.29	Right channel to matrix 6		7.1.41	Output level to matrix 1+2
7.1.30	Sum L+R to matrix output 5+6			
7.1.31	Left channel to matrix output 5			
7.1.32	Right channel to matrix output 4			
7.1.33	Sum L+R to matrix output 3+4			
7.1.34	Left channel to matrix output 3			
7.1.35	Right channel to matrix output 2			
7.1.36	Sum L+R to matrix output 1+2			
7.1.37	Left channel to matrix output 1			

7.1.26 Right channel to matrix output 8

Press this button to route the stereo master right channel signal to matrix send 8.

7.1.27 Sum L+R to matrix output 7+8

Press this button to mono sum the stereo master. The mono sum is then available to be routed to matrix sends 7 and/or 8.

7.1.28 Left channel to matrix output 7

Press this button to route the stereo master left channel signal to matrix send 7.

7.1.29 Right channel to matrix output 6

Press this button to route the stereo master right channel signal to matrix send 6.

7.1.30 Sum L+R to matrix output 5+6

Press this button to mono sum the stereo master. The mono sum is then available to be routed to matrix sends 5 and/or 6.

7.1.31 Left channel to matrix output 5

Press this button to route the stereo master left channel signal to matrix send 5.

7.1.32 Right channel to matrix output 4

Press this button to route the stereo master right channel signal to matrix send 4.

7.1.33 Sum L+R to matrix output 3+4

Press this button to mono sum the stereo master. The mono sum is then available to be routed to matrix sends 3 and/or 4.

7.1.34 Left channel to matrix output 3

Press this button to route the stereo master left channel signal to matrix send 3.

7.1.35 Right channel to matrix output 2

Press this button to route the stereo master right channel signal to matrix send 2.

7.1.36 Sum L+R to matrix output 1+2

Press this button to mono sum the stereo master. The mono sum is then available to be routed to matrix sends 1 and/or 2.

7.1.37 Left channel to matrix output 1

Press this button to route the stereo master left channel signal to matrix send 1.

7.1.38 Output level to matrix 7+8

These rotary controls are used to adjust the output signal levels of matrix sends 7 and 8. Upper control for matrix send 7 and lower control for matrix send 8.

7.1.39 Output level to matrix 5+6

These rotary controls are used to adjust the output signal levels of matrix sends 5 and 6. Upper control for matrix send 5 and lower control for matrix send 6.

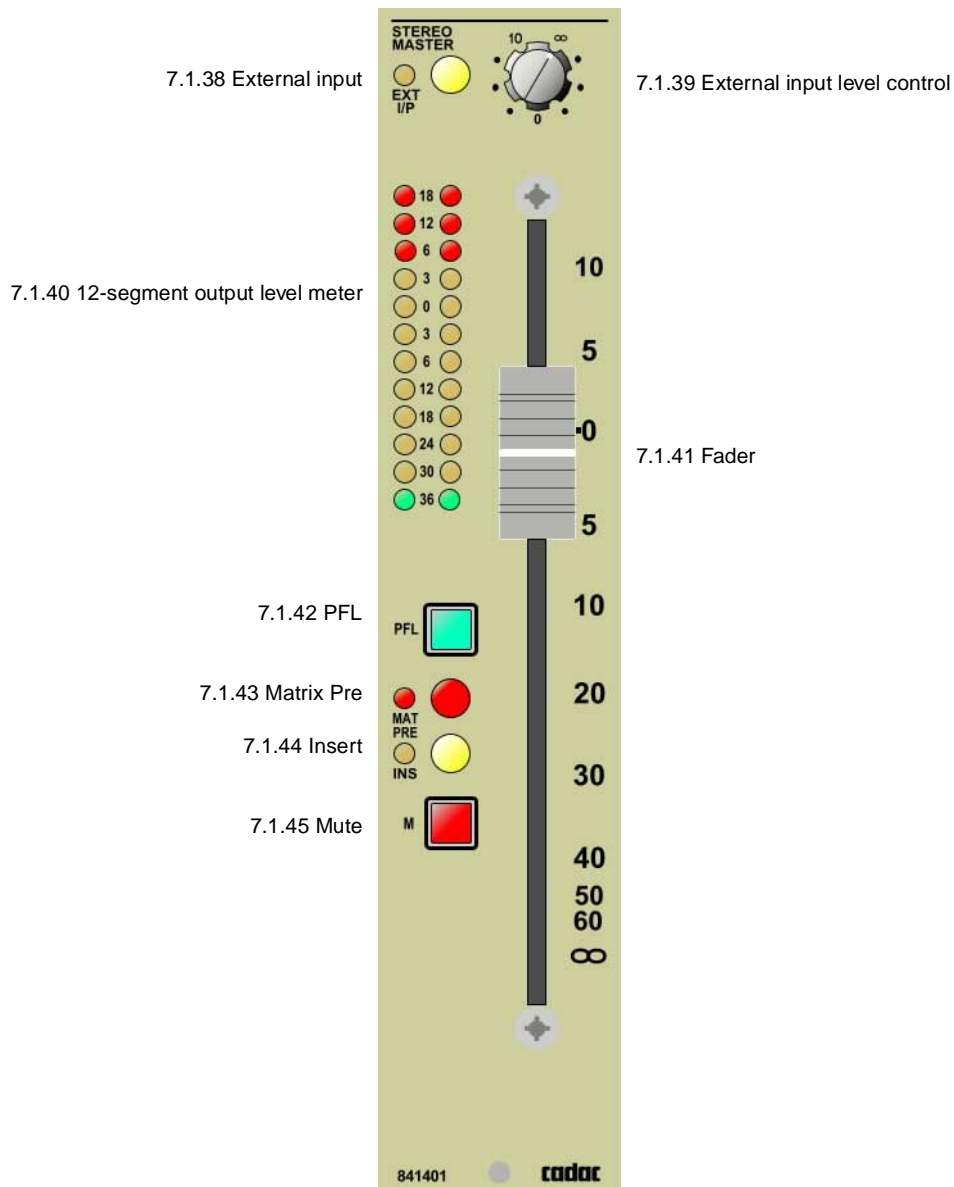
7.1.40 Output level to matrix 3+4

These rotary controls are used to adjust the output signal levels of matrix sends 3 and 4. Upper control for matrix send 3 and lower control for matrix send 4.

7.1.41 Output level to matrix 1+2

These rotary controls are used to adjust the output signal levels of matrix sends 1 and 2. Upper control for matrix send 1 and lower control for matrix send 2.

Front panel Stereo output, Comms, Osc and Talkback module 8414



7.1.42 External input

Press this button to route the external input source to the main stereo bus.

7.1.43 External input level control

Use this rotary control to adjust the input level of the external input signal. Level control gain range from infinity to +10dB.

7.1.44 12-segment output level meter

This dual 12 segment LED meter indicates the signal level of the stereo master. Meter source is post Stereo master fader.

7.1.45 Fader

Full size 100mm P & G conductive plastic fader adjusting the main Stereo master output signal.

7.1.46 PFL

Press this button to listen to the stereo master pre-fader.

7.1.47 Matrix Pre

Press this button (MAT PRE) to source the matrix sends pre stereo master fader. This allows the stereo master level to be altered without changing matrix send levels.

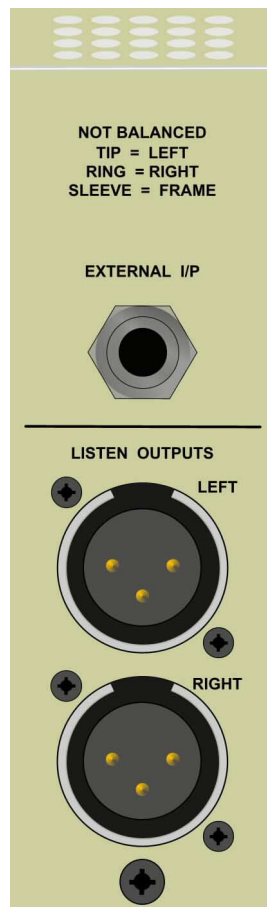
7.1.48 Insert

Press this button to connect the pre-fader send/return jacks into the signal path.

7.1.49 Mute

Press this button to mute the stereo master output.

7.2 Rear panel Stereo output, Comms, Osc and Talkback module 8414



Inputs and outputs are electronically balanced and connected via 3-pin XLRs and follow the wiring convention:

PIN 1 = Screen
 PIN 2 = In-phase signal (hot)
 PIN 3 = Out-of-phase signal (cold)

The 0.25" TRS jack connector for the external input is unbalanced:

TIP = LEFT
 RING = RIGHT
 SLEEVE = Screen

IMPORTANT NOTE: Pin 1 on XLR connectors and the 'sleeve' connections on the jack sockets are connected to the FRAME. This is to ensure that the console can comply with the Electromagnetic Compatibility (EMC) directive.

Appendices

A. Important information regarding EMC

In live sound applications, it is normal for the console to be situated a long way from its sound sources and amplifier/loudspeaker system. This inevitably means cable runs of many hundreds of metres. In order to minimize noise and interference pick up on the cables, it is generally agreed that the "balanced line" connection system is essential. On the S-Type console, all inputs and outputs (including insert points) are fully balanced. The only exception to this is the external input on the stereo master, which is unbalanced.

Great attention is paid to the construction and layout of all printed circuit boards used in the console. It is relatively simple to design high performance circuits that work perfectly on the bench, but it is somewhat more difficult (and costly) to engineer the printed circuit boards in a way that allows this performance to be repeated in production. CADAC use layout techniques that have been developed over the years to minimize variations in production quality and in the case of logic circuits, to absorb any interference that may be generated inside the console.

The part of a console that is most prone to interference pick up is the mixing bus. Mixing bus wires have dimensions large enough to allow them to be one quarter of a wave-length of many medium wave radio transmissions. In other words, a mixing bus can be an antenna for radio reception. Since the airwaves are becoming ever more polluted with radio transmissions, CADAC use a balanced bus system for all mixing requirements.

In general, analog audio circuits do not transmit unwanted signals into the surrounding air space (unless a poor design or component fault causes a circuit to produce oscillation). On the other hand, using a computer (embedded processor or controller) to handle any form of automation always produces a wide range of unwanted high frequency radiation. Some artifacts from this **can** cause interference to the audio system **and** radiate interference to external equipment. CADAC designs are engineered to minimize any potential interference generated inside the system and to prevent radiation into the environment. The techniques used also have the advantage of making the system immune to external interference.

On the 1st January 1996, new European legislation known as the EMC Directive came into force. The EMC Directive requires that all electronic equipment manufactured or imported for sale in the EEC must not emit electromagnetic interference that can impair the performance of other systems or sub-systems. Similarly, the product must also be immune to a wide range of natural and man-made electromagnetic interference in its operating environment. Many countries outside the EEC are also developing or have already put into place similar legislation. In order to conform to these rules, a number of changes were required to the basic design of our consoles and modules. One of the main changes is:

All cable 'screen' connections are bonded to the frame.

The figure overleaf shows the required connection scheme for XLR connectors.

Please note that in the case of 'line' or 'free' connectors (XLRs on cables), the 'pigtail' formed from the cable screening braid should be as short as practical and soldered to the *shell ground tag*. Pin 1 is then connected to the 'pigtail' approximately halfway between the *shell ground tag* and the start point of the cable screening braid. The twisted pair should be left 'twisted' right up to the signal solder tags.

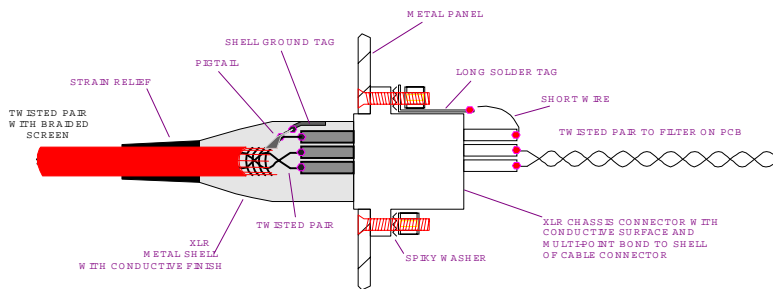
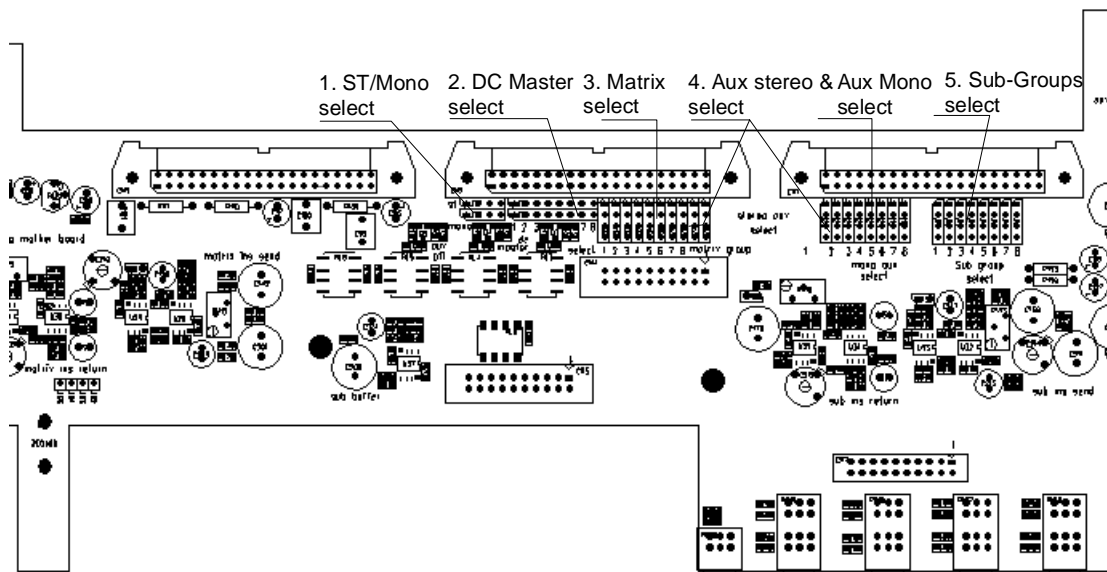


FIG APP -1. XLR connections.

The chassis half of the connector is bonded to the metalwork with the usual nuts, bolts and spiky washers. The solder tag should be as long as possible so that the length of the 'short wire' is a minimum. The twisted pair (from the signal pins - pin 2 & pin 3) are soldered onto the motherboard adjacent to the 'input RFI filter' components.

B. Mix bus coding

The module mix bus coding is manually selectable. For details about how to do this, see below:



1. Group module 1 or 2 should be set to stereo, all others to mono.
2. Select DC Master by inserting a 2-way jumper in position to select 1 - 8.
3. Select appropriate matrix group 1 - 8 with the link.
4. Out of the 8 auxiliary sends, the first two are in stereo and so requires two jumper links, the remaining 6 aux's require one link.
5. Finally, in the block of 8 links for the sub-groups - place the link in position 1 - 8.

NOTE: The left hand group module should be number one, working towards right incrementing one at the time.

All links in the same module must be the same number.

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Technical specifications

Microphone input

Electronically balanced: Input impedance is 1k2Ohms
 Gain is continuously variable from 10 to 60dB. CMRR is better than 80dB.

Outputs

All outputs are electronically balanced. The output impedance is 33ohms in series with 1000uF. Maximum output is +21dBu into 2kOhms.

Mixing system

All mixing busses are of the differential current summing type, providing 80dB rejection of external noise fields. The system is designed so that the gain of the summing amplifier is proportional to the number of channels routed to the bus. For example, the basic noise contributed by a group-summing amplifier with no inputs selected, is typically -105dBu.

Complete signal path

Output noise: Better than -85dBu
 Frequency response: 20Hz to 20kHz ±0.5dB
 Maximum gain: Microphone input to sub-group output = 80dB
 Total harmonic distortion: Output level into 2kOhms = +20dBu:

20Hz	50Hz	100Hz	1kHz	10kHz	20kHz
<0.02%	<0.02%	<0.03%	<0.04%	<0.06%	<0.08%

Measured from a microphone input (10dB gain) to a sub-group output, with the input channel VCA fader and sub-group fader set at '0' (unity gain). The equaliser is in circuit and the controls set flat.

Low frequency phase linearity

<6° at 30Hz; input to output
 Measured by applying a a tone to the microphone input at 10dB gain, routing that channel (EQ selected and set flat) to a sub-group.

Frequency response

MIC input (+10dB gain) to:

Matrix	+0/-0.5dB	20Hz-20kHz
	+0/-3dB	20Hz-60kHz
Aux	+0/-0.5dB	20Hz-20kHz
	+0/-3dB	20Hz-75kHz
Direct output	+0/-0.5dB	20Hz-20kHz
	+0/-3dB	20Hz-110kHz
Sub group	+0/-0.5dB	20Hz-20kHz
	+0/-3dB	20Hz-72kHz

Total harmonic distortion

+20dBu into 2kOhms, VCA in circuit, fader set 0dB, EQ in and flat

0.012%	at 1kHz
<0.03%	20Hz-20kHz

(continued on next page)

Noise figure

Microphone, 10dB gain, with fader set to 0dB.

<-93dBu	200 Ohms, 10dB gain
<-69dBu	200 ohms, 60dB gain

Mic input to:

Matrix	<-93dBu
Sub group	<-93dBu
Mono Aux outputs	<-93dBu
Stereo Aux outputs	<-91dBu

Residual noise:

Matrix	<-100dBu
Sub group	<-99dBu
Aux outputs	<-100dBu

Crosstalk

0dBu input level, total gain = 20dB

Adjacent channels	-89dBu (noise on input)	at 1kHz
	-89dBu (noise on input)	at 20kHz
Adjacent sub outputs	-110dBu	at 1kHz
	-86dBu	at 20kHz
Adjacent matrix o/p's	-117dBu	at 1kHz
	-87dBu	at 20kHz
Adjacent aux outputs	-88dBu	at 1kHz
	-65dBu	at 20kHz
Channel mute isolation	-115dBu	at 1kHz
	-96dBu	at 20kHz
Channel fader isolation	-106dBu	at 1kHz
	-92dBu	at 20kHz

Input/Output capability

Maximum input level	+11dBu at minimum gain
	+31dBu with -20dB pad
Maximum output level	+22dBu into 2kOhms

Phase response (degrees)

Mic input to sub group/matrix/aux output, EQ - in and flat

	20Hz	100Hz
Sub	4.9°	0.84°
Aux	4.7°	0.85°
Direct output	2.9°	0.57°

Common mode rejection ratio (dB)

Electronically balanced mic input to direct output.

	20Hz	100	1k	10k	20k
20dB gain	65	85	85	60	55

NOTE: 0dBu = 0.775V r.m.s. without reference to impedance. Unless stated otherwise, all specifications apply to the frequency range 20Hz-20kHz. All noise measurements are r.m.s. via a DIN audio band filter, with -3dB points at 22Hz and 22kHz.

Glossary

TERM	DEFINITION
A-channel	The odd numbered mix group on a group module. When working in stereo, the left channel is reproduced by channel A and the right channel by channel B.
ADDITIVE function	An additive function is provided in that every new PFL or Listen signal is mixed with the previous one.
assign	The process of, for example, allocating a Master fader to control a number of input channels. The input channels can then be said to be assigned to that specific Master fader.
assignable LED meter	LED-meter that measure the signal level of more than one source.
assigned	See assign above.
assignment	See assign above.
Assignment buttons	Buttons that need to be pressed to assign input channel faders to a DC Master fader or a Mute group. The assignments buttons include the numerical buttons (1 - 8), located on the channel modules.
aux group	A mixing group for signals that are not part of the main audio outputs on a console.
aux output	Level controlled output of the resulting mixed signals of the auxiliary mixing group.
B-channel	See A-channel above.
Balanced line	A balanced line consists of two identical conductors that carry the same signal but have opposite polarity with respect to ground. Balanced lines are very useful in reducing or eliminating unwanted interference. Interference induced in each conductor signals have the same polarity in both lines and the noise currents flow in the same direction. At the load end of the line, noise currents are found to be opposite in polarity, but equal in amplitude, so in theory, they cancel completely. In practice, interference signals do not cancel completely due to small differences in the inductance of each conductor.
bargraph meter	Meter that indicates the signal level by means of LEDs.
Boost	To increase the level of amplification of a certain frequency (-range).
boot-up	Start-up procedure.
bus cable	Cable that inter-connects the frames in a console system.

bussed together	Console frames that are inter-connected by means of a bus cable are said to be bussed together.
By-pass	By-passing something is the same as skipping it, for example, stopping the channel VCA from being controlled by the DC Master fader requires the DC Master fader to be by-passed.
Call Remote	Feature of the Osc & Comms module that activates a call light at a remote location.
channel	Input or output signal that forms a part of the final mix.
CHANNEL PRIORITY	Mode in which an input PFL overrides an output Listen.
channel VCA	Voltage controlled amplifier for controlling the input channel or output group signal. The degree of amplification is determined by the VCA drive voltage, derived from a fader or potentiometer.
CHECK	Feature that allows the operator to use an input channel MUTE button as a 'solo-in-place' button.
CLEAR	CLEAR buttons are used to cancel a selection.
CMRR	Common mode rejection ratio is the ratio of response for a normal mode signal to the response for a common mode signal of the same amplitude. CMRR is usually specified in decibels.
cold	Refers to pin 3 on an XLR-connector. The signal on pin 3 is opposite in polarity to pin 2 and hence is referred to as cold.
Common mode	Where all currents (signal and interference) flow in the same direction in each conductor. Normally, interference currents are an unintended by-product of the cable connection and the main cause of cable interference problems.
comms functions	Functions that allow an operator to communicate with remote locations.
Comms MIC	Microphone used for communicating with remote locations.
Comms MIC input	Microphone input located on the Osc & Comms module used for various talkback and communications functions.
communication functions	Refers to the Osc & Comms module, which in addition to its oscillator functions also has communication functions as described under Comms MIC and Comms MIC input above.
configuration	The arrangement of features to produce a certain outcome.
Configuring	See configuration above.
console modularity	Frame design concept allowing any module to be put in any position in the frame.
D/O	Direct Output.

DC Group	A direct current bus that controls the VCA drive voltage.
DC Master	DC controlled fader serving as a master fader to which one or more channel faders has been assigned.
DC Master assignment	Assignment of one or more channel faders to a Master fader.
DC master membership	Channel fader assigned to a certain DC Master fader.
dedicated stereo bus	Bus exclusively used for stereo signals
destructive SOLO	Pressing CHECK will invert the MUTE-function so that all unmuted channels will become muted and the muted channel will become unmuted. A form of SOLO function.
Differential mode	Currents flowing in a pair of signal lines that are principally concerned with the signals themselves. Any induced interference on either line appears to be in common mode with respect to the signal currents (differential or normal mode) and thus cancel.
DIM	Feature on the Listen & Stereo output module that attenuates the Listen L/S outputs 1 and 2 by approximately 20dB.
Direct Output Select	The direct output signal is normally post fader. Pressing the PRE button will take the signal from pre-fader but post INS/EQ. Pressing MIC will override the PRE button (the PRE LED will go out) taking the d/o directly from the o/p of the MIC amp. In this state the highpass filter is still available if needed.
dual group	Group module with odd end even mixing amplifiers.
dual mono	A group module configured for dual mono operation.
EARTH IMPEDANCE	The total opposition to the flow of current in a dedicated earth conductor. At frequencies above 50/60 Hz, the total opposition to current flow will be more inductive than resistive in the context used (power supply mains connections). Best results are achieved if the length of the AC power input cables to the main and backup PSUs are the same.
electro-magnetic interference	Radiated and conducted phenomena associated with the electric and magnetic fields generated unintentionally by electronic circuits and systems.
electronically balanced input	An electronic amplifier stage used to amplify the difference voltage between two input signals. In the ideal case the output is entirely independent of the individual signal levels - only the difference matters. This type of circuit is also known as a differential amplifier. When the input signal is fed from a balanced line, the common mode rejection to interference signals is extremely good. In other words, a good differential amplifier has a high common mode rejection ratio (CMRR).

electronically balanced output	An electronic amplifier stage that produces two identical output signals, except that one output signal has the opposite polarity to the other.
EMC	Electro-magnetic compatibility. A series of regulations imposed by member countries of the European Union on manufacturers of electrical and electronic equipment, to control electro-magnetic emissions and susceptibility. The particular standard for audio equipment and systems is: EN55103-1 (emissions) and EN 55103-2 (immunity).
EQ PRE INS	Input channel feature allowing the equalizer to be put in circuit before the Channel Insert.
equalizer	Input channel stage allowing the frequency response to be altered within $\pm 18\text{dB}$ at four different frequencies.
EXT I/P	A connector allowing an external signal to be plugged into the Oscillator module.
external relay switched equipment	See Event above.
fader display	Alphanumeric display on the DC Master faders showing the allocated number for each DC Master.
fader panel	Located below the input/output channel modules, the fader panel contains the fader itself and LEDs for indicating DC or MG assignment. It also has buttons for MUTE, Bypass, SET, Isolate and input level bargraph meter.
fader tray	Area of the console surface that accommodates the fader modules.
FoH	Abbreviation of Front-of-House. Refers to the location/configuration of a console in a production setup.
frame	The part of the console that holds modules and fader panels.
full L-C-R panning	Panning mode that allows the signal from an input channel or output group to be positioned between left, centre or right outputs.
Global listen	All channels set to Listen mode.
global PFL	All channels set to PFL mode.
group	Module where signals are mixed together from appropriately assigned input channels.
HF	High Frequency control located in the EQ-section of each input channel.
high-pass filter	Filter that cuts off undesired low frequencies.
HMF	Higher Mid-Frequency control located in the EQ-section of each input channel.
HOLD	Applies to the PFL/Listen feature. If HOLD is OFF, any new selected PFL or Listen signal will cancel the previous one (intercancel function). When HOLD is ON, it is possible to mix the new signal with the previous one if any of the buttons PFL or Listen is pressed on another module.

hot	Refers to pin 2 on an XLR-connector. The signal on pin 2 always has positive polarity and is hence referred to as hot. See also <i>in-phase signal</i> .
HP Filter	Filter that cuts off undesired low frequencies.
HP Filter Frequency control	A rotary control to set the cut-off frequency for the HP filter.
I/P	Abbreviation of Input.
I/P channel	Input channel
Inject	An additional input connector for an output group.
In-phase signal	A signal is said to be in-phase if the positive and negative parts of the waveform follow the positive and the negative parts of a source waveform to which it is being compared.
Input module	Module in a (console)-frame into which the input signal is fed.
input RF filter	Input filter that absorbs Radio Frequencies.
Insert send/return	A point where the signal in an input channel or output group may be sent out to, and returned from an external processing device.
INTERCANCEL	Used in conjunction with PFL and Listen functions, this term means that any active PFL or Listen will be cancelled when a new signal is selected. Note that even if the INTERCANCEL mode is active, pressing a PFL or Listen, while at the same time holding down any of the same buttons on another module, will cause the signals to mix.
internal jumper	Used internally in the console, jumpers can be configured by the user to obtain a certain result.
internal jumper settings	The configuration of jumpers required for a certain result.
jumper options	Various ways to fit a jumper depending on what result is desired.
Listen LEFT	When selected, this feature on the Listen & Stereo Output module allows monitoring of the LEFT channel.
Listen module	Module for monitoring LISTEN and PFL selection.
L-R panning	Panning between Left and Right channels with unpanned centre with level control.
MAIN FRAME	Frame in a console setup that accommodates the Central Control Module.
Main output	See <i>Matrix output</i> .
master	Fader controlling a group of channels.
Master DC fader	See <i>DC Master</i> .
matrix	Collective name for all the matrix send potentiometers.

matrix group	Module where signals are mixed together from appropriately assigned matrix sends.
matrix output	Level controlled output of the resulting mixed signals of the matrix.
matrix send	A potentiometer for sending signal from a group module to a matrix bus.
MG	Abbreviation of Mute Group
MG assignment	The process of assigning an input channel to a Mute Group.
microphone level	The signal strength of the microphone output.
mixing bus	An electrical conductor or pair of conductors for adding electrical signals together.
Mnemonic	Defined as something that supports memory.
module	A structure for housing electronic circuits and components. A mixing console is built up from a number of different modules, each having a certain function such as an input module, output module, stereo module or it may involve other functions.
monitor amplifier	Amplifier connected between a console output (usually the LISTEN module) and the monitor speakers.
monitored output	Console output that is being monitored (listened to), either via headphones or an external amplifier and speakers.
MSTR	Abbreviation of Master.
MTX PRE	Feature of the Output & Matrix module allowing the OUTPUT to be routed directly from the group to the MATRIX pre-fader.
MUTE group	Group of channels that have been assigned to one Mute Group and can be muted by pressing one button.
Mute group assignments	The process of assigning channels to one mute group i.e. all channels in that group may then be muted by pressing only one button.
O/P	Abbreviation of OutPut.
on-board jumpers	Inter-connects that may be configured by the user to suit a certain application.
OPEN LED	Located on a fader panel, this LED illuminates when the channel VCA is open and not muted locally or by assignment to a Mute Group.
Osc frequency	Feature of the Oscillator & Communications module allowing the integral module oscillator to be set to generate a certain frequency within the range of 31Hz to 16kHz, as indicated by the switch.
oscillator	An electronic circuit used to generate a single frequency or noise spectrum.
Oscillator/Comms module	Module that features an oscillator, remote calling and communication functions.

Out-of-phase signal	A signal is said to be out-of-phase if the positive and negative parts of the waveform are opposed to the positive and the negative parts of a source waveform to which it is being compared.
override	Bypass or cancel a function.
pad	Electronic circuit that attenuates an input signal to allow for a line-level source to be connected to a microphone input.
PAN Control	Potentiometer used to place a signal somewhere in the stereo field.
panning	See PAN control
pan-pot	See PAN control
P-Fade	Programmable fader function.
PFL	Abbreviation of Pre Fader Listen.
PFL to AFL	Conversion of Pre Fader Listen to After Fader Listen.
phase-change	Change of the polarity of the in-coming signal.
PNG	Abbreviation of Pink Noise Generator.
Pink noise	Electronically generated noise that has equal noise power per octave. This means that the power per Hz drops at 3dB per octave. Thus the power spectrum is similar to live music.
post fader metering	The signal level displayed on the meter indicates the level of the signal after the fader.
POST-FADE	Indicates after fader.
post-fade signal	The signal that is available after the fader.
Pre/Post fader monitor	Function that allows the signal to be monitored either before or after fader.
pre-fader signal	A signal that is not controlled by the fader.
Pre-INS monitor	A monitoring point before the insert stage.
PSU fault indicators	LEDs on the CCM that illuminates when a power supply system is connected to the console.
PSU SYSTEM	One or more power supply systems that provide power to the console.
Q-control	The Q-control varies the bandwidth of the cut/boost frequency selected on the equalizer, thereby narrowing or widening the frequency band affected by the EQ-section.
redundant configuration	Cadac consoles are designed to allow the use of two independent power supply systems in a redundant configuration – “main” and “backup”. Both sets of power supply units are used to power the console system so that under normal conditions, the ‘load’ is shared between the “main” and “backup” PSU’s. If a fault occurs in one of the power units (causing it to ‘shut-down’), the remaining power unit will continue to power the console.

reference ground conductor	A conductor or area that provides the lowest possible transfer impedance to the internal circuits and/or equipment, normally assumed to be at a potential of 0V.
transfer impedance	The voltage developed within a victim circuit (for instance, a cable carrying a sensitive signal) divided by the interference currents flowing in a source circuit.
remote calling	Function on the Osc & Comms module that allows communication between the operator and a remote location.
Remote MIC routing	Function on the Osc & Comms module used to route the Remote Input signal to LISTEN L and R and the console's TALKBACK bus.
re-route	To take an existing signal route and re-direct it to another output.
Reset	Bring back to original status.
RING	Part of the 0.25" TRS jack connector that carries the out-of-phase (cold) signal.
route	Signal path; direct a signal along a certain path.
Routing switches	Switches used to direct the signal along a certain path.
Screen	Part of a cable (also known as braid) that protects the signal conductors from electro-magnetic interference.
self-test	After power-up of the console the CCM performs a self-test during which process all of the frames are scanned to verify the location of both input and DC Master faders. This information is crucial to enable correct recall of previously saved module information for console snapshots for the scene recall system.
Send	A potentiometer and/or switch on a module which sends a signal onto a mixing bus.
Send Bus	A set of wires accessible to all sends.
SLEEVE	The part of a 0.25" TRS jack connector which is connected to the cable screen to provide earth connection.
SOLO	See <i>solo-in-place</i> below.
solo-in-place	Pressing the CHECK function on the Osc & Comms module allows an operator to use input channel MUTE buttons as a 'solo-in-place' for trouble-shooting.
spur	A console PSU-system in a <i>redundant configuration</i> should be connected to the same phase and circuit (<i>spur</i>).
stereo group	Group module configured for stereo operation.
stereo master bus	Dedicated stereo mix bus.
stereo pair	Two mono input channels configured as a stereo pair through hard-panning each channel left and right respectively.

sub-group	Normally receives a signal via an on/off switch only, with no independent level control.
sub-output	Level controlled output of the resulting mixed signals of the sub-group.
summed signal	One or more signals that are electronically added together.
switch-mode power supply	A power supply whose operation is based on high-frequency switching and may or may not include an input transformer stage. The switch-mode power supply output voltage variations are filtered out by an LC filter.
test signal	A signal that has a known voltage or power level.
TIP	Part of the 0.25" TRS carrying the in-phase-signal (hot).
TRS jack connectors	A type of input or output connector where: TIP = In-phase signal (hot) RING = Out-of-phase signal (cold) SLEEVE = Screen
VCA	Abbreviation of Voltage Controlled Amplifier
VCA switch	Allows the A & B outputs and matrix output on an O/P module to be controlled by the VCA fader directly below the module.
WRITE mode	Indicates that a motorized fader is sending position data to the CCM.
X-fade	Also referred to as cross-fade, this feature of CADAC's console automation software allows programmed cross-fading
XLR connectors	A type of input or output connector where: PIN 1= ground PIN 2= + phase PIN 3= - phase
zero-signal reference potential	The potential of a point or area in a circuit, system or sub-system that is conventionally taken as 0 volts with respect to all other local voltages.

