

CDC FOUR

Digital Mixing Console

User Manual



Cadac Holdings Ltd.
One New Street
Luton
Bedfordshire
LU1 5DX

Telephone: +44 (0)1582 404202
Fax: +44 (0)1582 412799

Email:
General information: info@cadac-sound.com
Service enquiries: service@cadac-sound.com

IMPORTANT SAFETY INFORMATION

CAUTION: These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the User Manual unless you are qualified to do so. Refer all servicing to qualified service personnel.

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water. Do not expose this apparatus to dripping or splashing and ensure that no objects filled with liquids, such as vases, are placed on this apparatus.
6. Clean only with a dry cloth.
7. Do not block any of the ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus that produce heat.
9. Only use attachments/accessories specified by the manufacturer.
10. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as the power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
11. To completely disconnect mains power from this apparatus, the power supply cord must be unplugged.

For US and CANADA only:

Do not defeat the safety purpose of the grounding-type plug. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. When the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.



The lightning flash with arrowhead symbol, within an equilateral triangle is intended to alert the user to the presence of an uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

GENERAL PRECAUTIONS

- Do not place heavy objects on the control surface, expose it to sharp objects or handle the console in any way that may cause damage, e.g., rough handling and/or excessive vibration.
- Do not subject the equipment to dirt, dust, heat or vibration during operation or storage. Never expose the console to rain or moisture in any form. Should the console become wet, turn it off and disconnect it from the mains without further delay. The console should be given sufficient time to dry out before recommencing operation.
- When cleaning the console, never use chemicals, abrasive substances or solvents.
- The console control panel should be cleaned using a soft brush and a dry lint-free cloth. For persistent marks, use a soft cloth and isopropyl alcohol. Switches and potentiometers do NOT require cleaning or lubrication. For faders, see below.
- Keep these instructions for future reference. Follow all warnings in this manual and those printed on the console.
- The console must be connected following the guidance in this manual. Never connect power amplifier outputs directly to the console. Connectors and plugs must never be used for any other purpose than that for which they are intended.
- The console mains input must always be connected to correctly rated mains power as referred to in this manual. The mains input must, at all times, be connected to the local mains power supply using the supplied power cord. In cases where the supplied plug does not fit, a qualified electrician must be consulted.
- The power cord must be routed in such a way that the risks of accidentally stepping on it, stretching it or it being pinched are minimized.
- **WARNING ! THIS EQUIPMENT MUST BE EARTHED !**
- Ventilation slots must never be covered or obstructed in any way, otherwise airflow required for safe operation may be restricted. Where the console is to be operated in its flight-case, then this must be located in such a way that it allows for proper ventilation.
- Refer servicing to qualified technical personnel only.

CONFORMITIES

Declaration of Conformity

The Directives covered by this declaration: 2004/108/EC

The Products Covered by this Declaration: CDC FOUR audio mixing consoles

The Basis on which Conformity is being Declared: The products identified above comply with the requirements of the above EU Directive(s) by meeting the following standards:

BS EN 55103-1:2009 Product family standard for: audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 1 – Emission.

BS EN 55103-2:2009 Product family standard for: audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 2 – Immunity.

BS EN 61000-3 -2:2008 Electromagnetic Compatibility (EMC) Part 3. Limits. Section 2. Limits for harmonic current emissions (equipment input current ≤ 16 A per phase).

BS EN 61000-3 -3:2006 + A2:2009 Electromagnetic Compatibility (EMC) Part 3. Limits. Section 3. Limitation of voltage fluctuations and flicker in low voltage supply systems for equipment with rated current ≤ 16 A.

BS EN 60065:2002 + A1:2006 Audio, Video and similar electronic apparatus. Safety requirements.

BS EN 61000-4-2:2009 Electrostatic discharge immunity test.

BS EN 61000-4-6:2009 Immunity to conducted disturbances.

BS EN 61000-4-11:2004 Immunity to voltage dips, short interruptions and voltage variations

Attention!

The attention of the specifier, purchaser, installer, or user is drawn to special measures and limitations to use which must be observed when these products are taken into service to maintain compliance with the above directives. Details of these special measures and limitations to use are available on request, and are also contained in this User Manual.

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Introduction

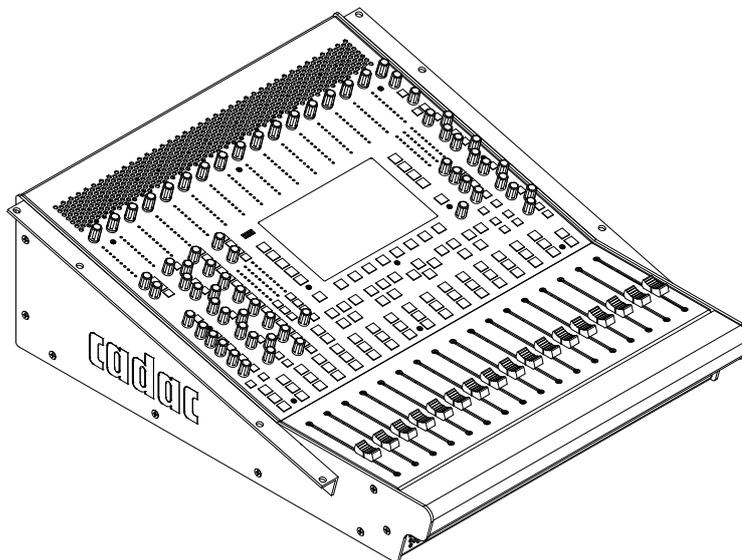
What's in the Box

The CDC FOUR console is shipped in a triwall carton. Before unpacking, inspect that the carton has not been damaged during shipping. If there are any signs of damage, inform the shipping agent.

Inside the carton, you should find the following items. If any are missing, contact your Cadac distributor immediately.

- CDC FOUR mixing console
- IEC power cable (with UK/European or US connector as appropriate)
- Detachable gooseneck console lamp
- This manual

Overview



Thank you for purchasing this Cadac CDC FOUR digital audio mixing console.

From its founding in 1967, Cadac's products have indisputably become the benchmark for sound reinforcement consoles. The CDC FOUR is Cadac's first compact digital mixer and is an all new development, based on a proprietary DSP mix platform. It makes available many of the features of our world-famous large-scale theatre and touring analogue desks in a compact, portable and fully-digital package. However, you will still find the attention to detail, high quality audio circuitry and reliability on which the reputation of the Cadac brand is built.

The CDC FOUR's basic configuration is 32/4/2, with 16 mic/line mono channels and 8 stereo channels. It also has 8 aux sends and 8 VCA groups. Input channels can be increased for live work with the optional CDC RACK Stagebox giving up to a further 32 inputs.

Ergonomically, the CDC FOUR employs the now-familiar concept of "layering" to reduce the width of the mixer to less than 19", having 16 motorised plus one manual (stereo master) 100 mm faders. The control surface has been designed to be as familiar as possible to operators mainly used to working with analogue

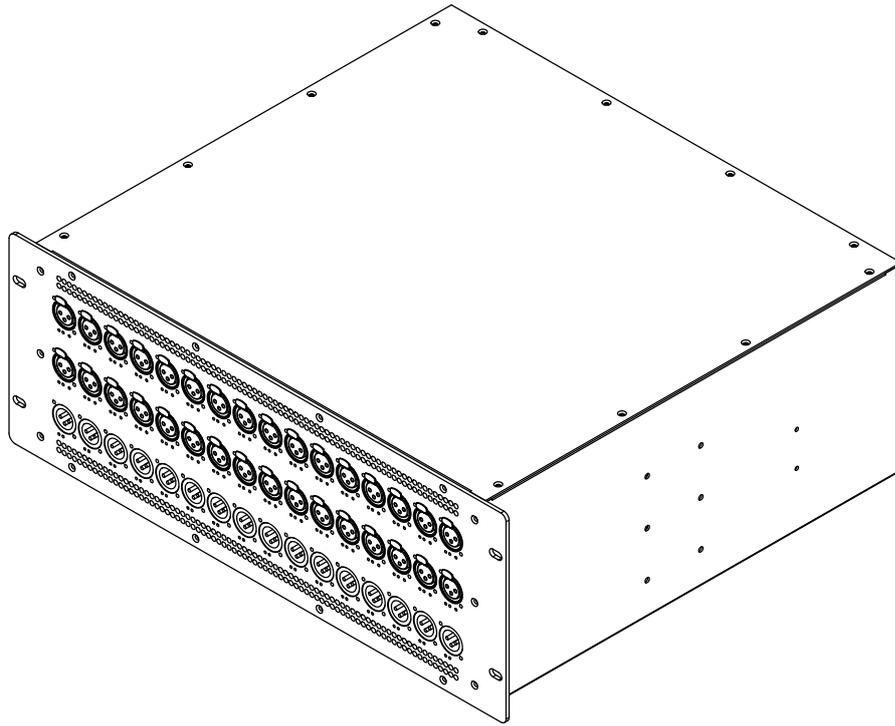
consoles. All the functions of the single, assignable, largely-standard channel strip are duplicated on the high-resolution TFT colour display, allowing the engineer to use either “conventional” controls or operate the mixer mainly through the display.

The CDC FOUR has a rear panel expansion port which can be fitted with a dedicated CADAC multichannel digital interface for use with the optional CDC RACK stagebox.

CDC FOUR – Main Feature Set

- 16 mic/line inputs
- 8 stereo inputs
- 4 group outputs plus stereo main output
- 8 VCA groups
- 8 aux sends
- 2 internal FX processors
- 4-band parametric EQ on all channels and groups
- Variable-frequency HPF on all channels
- Dynamics section (compressor/limiter plus gate) on all channels
- Adjustable per-channel delay
- Inserts and Direct Outs on all channels
- Fully-featured Monitor, PFL and Talkback sections
- Internal Universal PSU
- 7” 800 x 480 pixel TFT display
- Scene automation, with 100 mm motorised faders
- 96 kHz, 24-bit Delta-Sigma AD and DA converters
- Fourth generation 32/40-bit floating-point SHARC processors
- Low-noise, wide dynamic-range analogue mic pre-amps with gain controls
- Channel functions controllable either from standard channel strip or via display
- Dedicated hardware bargraph meters on each input and stereo main output
- Global metering display
- Dynamics gain reduction displays
- Optional interface card for the CDC RACK expansion stagebox
- Optional remote stageboxes (32-in/16-out or 32-in/8-out) with proprietary interface
- Optional rackmount kit
- Gooseneck console lamp
- No fans – silent in operation

Stagebox options

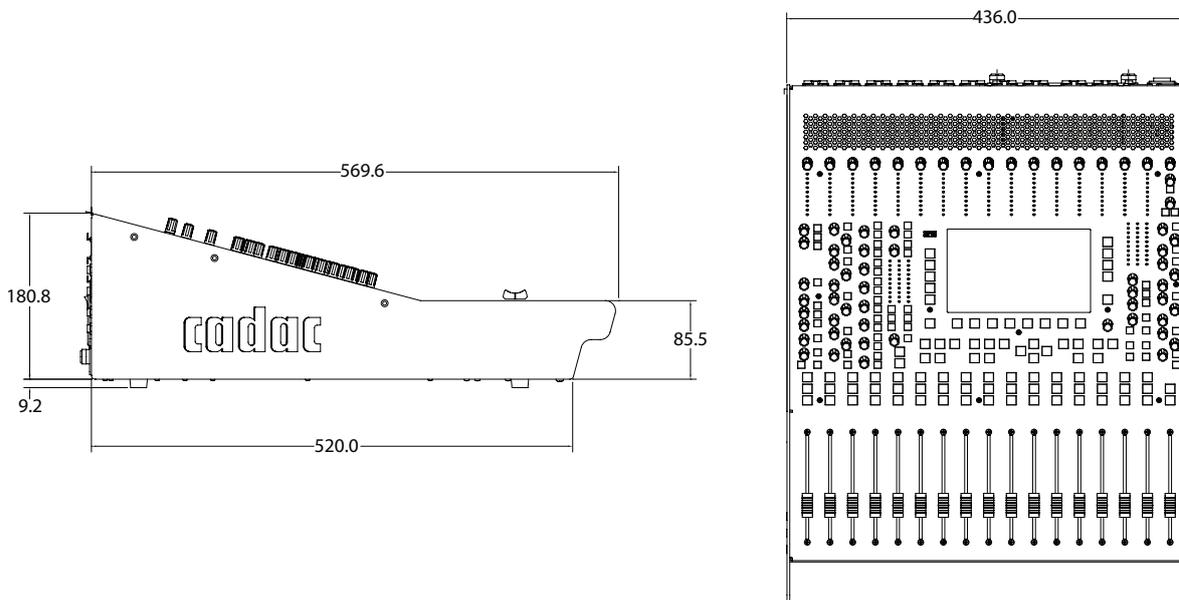


The CDC FOUR is designed to integrate immediately with existing analogue live sound installations, and may be used stand-alone, with a conventional stagebox and snake.

If more than 16 mic/line channels are required, a CDC-RACK can be added. This is a remote stagebox with integral, remotely-controllable analogue mic pre-amps of the same high-quality design as those in the CDC FOUR. It uses a proprietary multichannel digital protocol developed by CADAC to connect to the mixer, and two coaxial cables replace a conventional snake.

The CDC-RACK is a 19" rack-mounting unit which can be fitted with either 16 inputs and 8 outputs, or 32 inputs and 16 outputs. The additional input channels are available to the user using control surface layers (see "Layers" on page 23). In the case of the 8-output version, the stagebox output connectors can be assigned to any eight of the CDC FOUR's various outputs.

Mechanical details

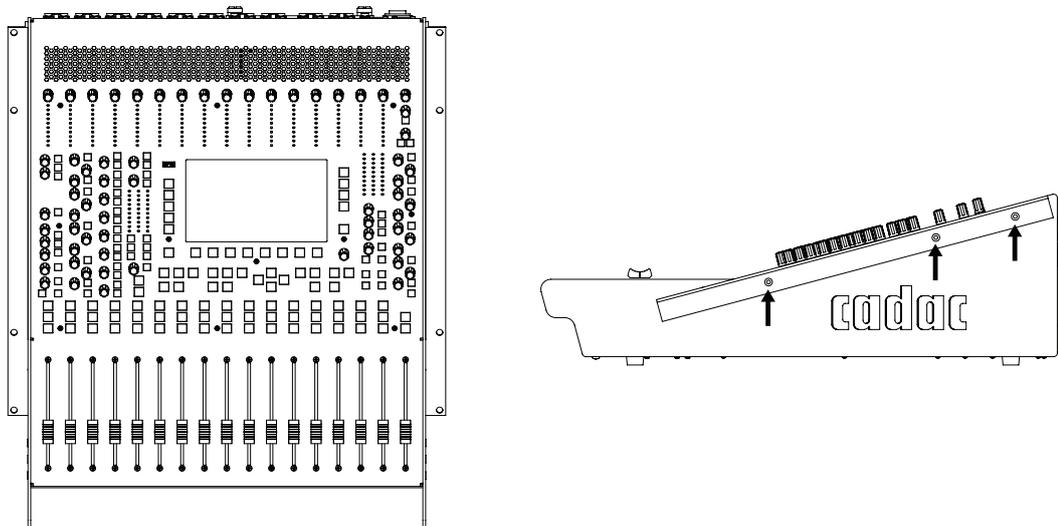


NOTE: when installing the CDC FOUR in a permanent or semi-permanent situation, an additional allowance must be made at the rear of the console for connectors and cables.

Fitting the rack mounting kit

The CDC FOUR is supplied with a pair of rack mounting brackets which permit the mixer to be installed in a standard 19" equipment rack.

To install the brackets, remove the three upper screws (those closest to the mixer control surface) which secure each metal end cheek to the chassis. Fit the rack mounting brackets over the end cheeks and refit the three screws. Note that the brackets are handed (i.e., one is designed to fit on the left hand side of the console and the other to the right). This is indicated by an 'L' or 'R' label affixed to the bracket.



Power supply matters



The CDC FOUR has an internal Power Supply Unit (PSU). The AC mains power switch is located on the rear panel, integral with the IEC receptacle to which AC mains is connected.

Removing the IEC cable from the rear receptacle will electrically isolate the CDC FOUR from the AC mains supply.



It is always good operating practice to turn a mixer on BEFORE turning on the amplifiers, etc., to which its outputs are connected. Similarly, always turn the amplifiers off BEFORE turning the mixer OFF.

An IEC cable is supplied with the mixer to connect this to the AC mains supply. The cable should be fitted with a mains plug suitable for your country; if this is not the case, either obtain one of the appropriate type, or replace the fitted plug with one of the correct type. Note the supply mains cable colour coding is as follows:

Mains connection	Mains cable core colour
Live	Brown
Neutral	Blue
Earth (Ground)	Green/Yellow



The PSU in the CDC FOUR is a “Universal” type, and may be connected to any AC mains supply voltage of between 90 and 260 V, and frequency 50 or 60 Hz. The IEC receptacle is integrated with both the mixer’s power on/off switch and a mains fuseholder (immediately above the connector). If it is necessary to replace this fuse, please only do so with one of the same type and rating:

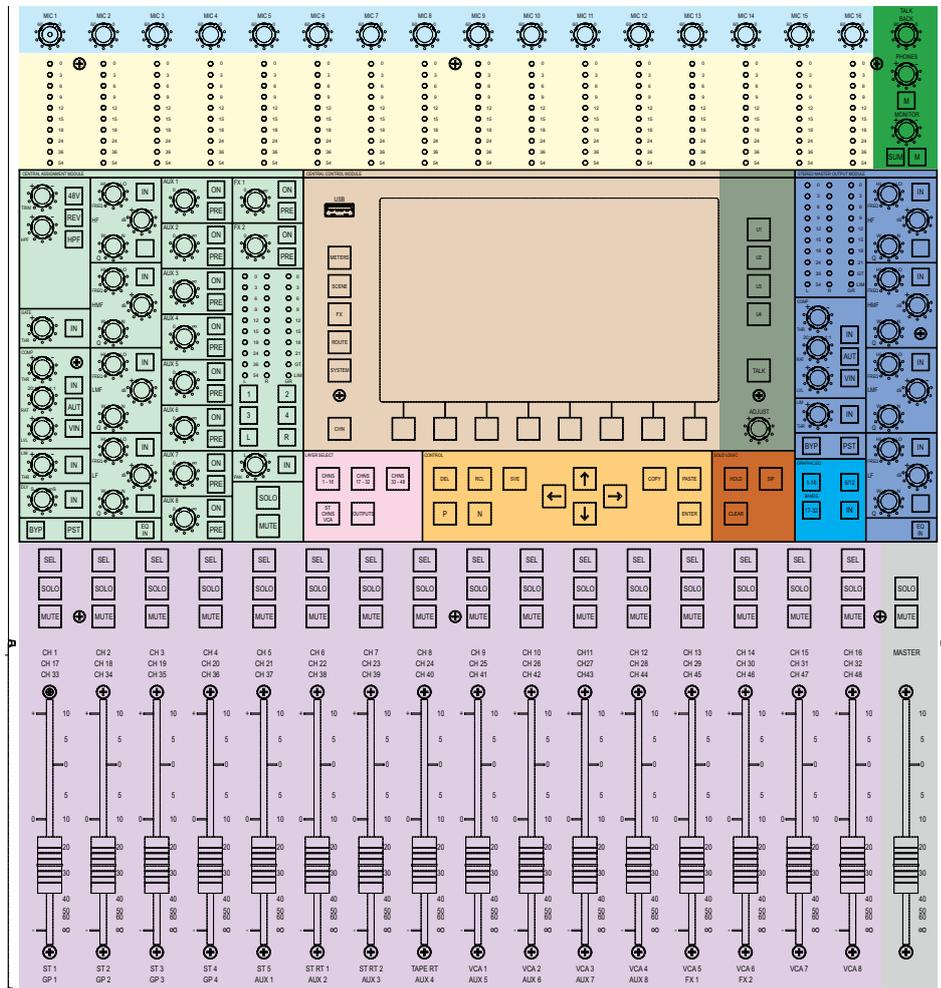
	115 or 230 V AC
Fuse type	T2LA, 20 mm dia. anti-surge
Fuse Rating	2 A

Note that the integral fuseholder has storage space for a spare fuse.

This fuse is the only user-replaceable component the CDC FOUR contains. A mains fuse should never be replaced without first making an attempt to ascertain the reason for its failure. If you are unsure why the fuse failed, or if the replacement fuse also fails immediately, consult your Cadac dealer.

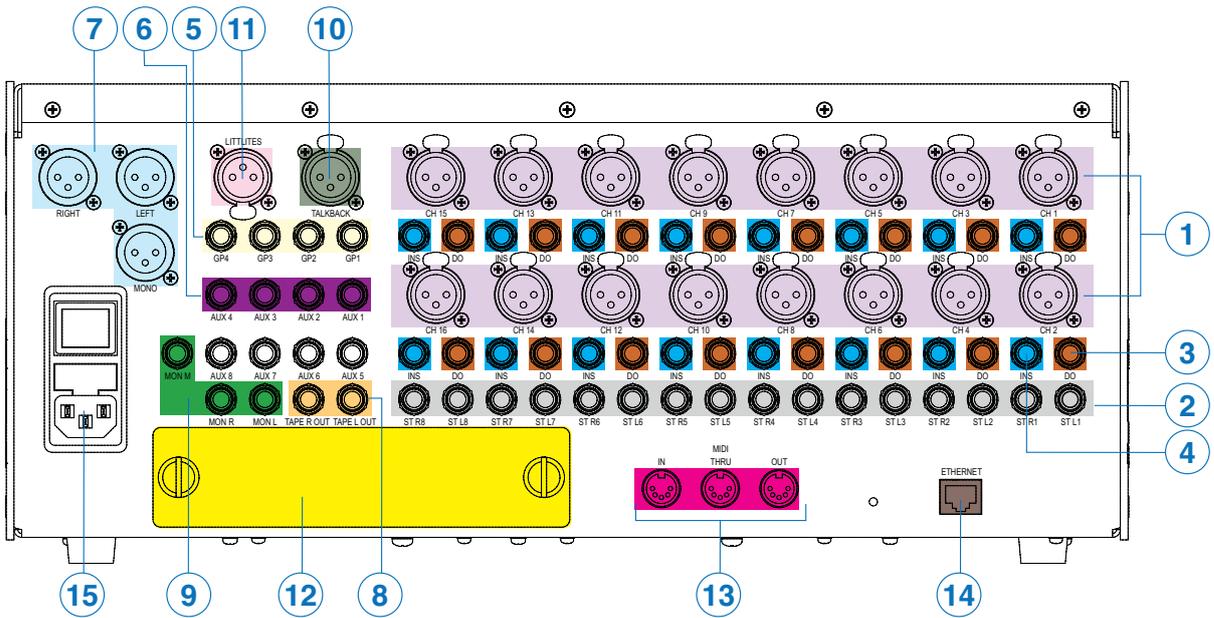
Controls and Connections

Top view - control surface



- Mic pre-amp gain controls
- Per-input bargraphs
- Central Assignment Module – “channel strip”
- Channel faders with SEL, MUTE and SOLO
- Stereo fader with MUTE and SOLO
- Central Control Module, including TFT screen and primary display controls
- Layer selection controls
- Screen navigation controls
- System utility controls, PTT button and parameter “soft knob”
- Stereo output channel
- Solo logic controls
- Talkback and monitor controls
- Graphic equaliser controls

Rear view – connector panel



* shown without optional CDC RACK interface installed

No.	Connection	Qty.	Marking
1	Mic/line inputs	16	CH 1-16
2	Stereo line inputs	16	ST 1-8
3	Channel direct outputs (one only indicated)	16	DO
4	Channel insert send/returns (only one indicated)	16	INS
5	Group outputs	4	GP 1-4
6	Aux send outputs	8	AUX 1-8
7	Stereo master outputs: L, R and mono sum	3	LEFT, RIGHT, MONO
8	Stereo tape outputs	2	TAPE OUT, L & R
9	Monitor outputs: L, R and mono sum	3	MON L, R, M
10	Talkback mic input	1	TALKBACK
11	DC output for console lamp	1	LAMP 12V
12	Expansion port*	1	-
13	MIDI ports	3	MIDI IN, THRU, OUT
14	Ethernet network port	1	ETHERNET
15	IEC mains connector, fuse and AC power switch	1	-

* shown without optional CDC RACK interface installed

Connector details

This section provides electrical details of the CDC FOUR's inputs and outputs. The tables at the end of this section, referred to in each connector description, summarise wiring details.

1. Mic/line inputs 1-16 - Neutrik® Combo A connectors. These sockets accept either a 3-pin XLR male connector or a ¼" (6.35 mm) 3-pole (TRS) jack plug. The sensitivity of the XLR input is suitable for microphones, while the jack input, which has an 18 dB pad, is intended for line level sources. The inputs are electronically balanced with an impedance of 1.2k ohms (mic) or 10k ohms (line). Nominal input level at the XLR (with gain control at minimum) is 0 dBu; maximum input level is +21 dBu. (Note that Cadac define 0 dBFS to be equivalent to +21 dBu in the CDC FOUR). 48 V phantom power is available at the XLR pins of this connector, switchable from the channel strip.

The mic/line inputs should be wired as per Table A (XLR connectors) or as per Table B (jack plugs).

2. Stereo line inputs 1-8 – eight pairs of ¼" (6.35 mm) 3-pole (TRS) jack sockets (separate L and R inputs). Intended for connection to the line outputs of external stereo equipment, including outboard FX processors and stereo tape returns. The inputs are electronically balanced with an impedance of 10k ohms. Nominal input level is 0 dBu; maximum input level is +21 dBu.

The stereo line inputs should be wired as per Table B.

3. Direct outputs 1-16 – pre-fade outputs from each of the 16 mono mic/line channels. The outputs are electronically balanced on ¼" (6.35 mm) 3-pole (TRS) jack sockets, and have a maximum output level of +21 dBu.

The direct outs should be wired as per Table B.

4. Channel inserts 1-16 – send and return insert points in each mono mic/line channel. The send and return are both unbalanced, and have a maximum level of +10 dBu. The connectors are ¼" (6.35 mm) 3-pole (TRS) jack sockets.

The inserts should be wired as per Table C.

5. Group outputs 1-4 – post-fade outputs of the four audio subgroups. Outputs are electronically balanced on ¼" (6.35 mm) 3-pole (TRS) jack sockets, and have a maximum output level of +21 dBu.

The group outputs should be wired as per Table B.

6. Aux sends 1-8 – the outputs of the mixer's eight auxiliary busses. Every channel can send pre- or post-fade to each Aux buss, and each Aux buss has a master level. The Aux busses can be used as sends to external FX equipment (normally pre-fade), or as performers' foldback (normally post-fade). The outputs are electronically balanced on ¼" (6.35 mm) 3-pole (TRS) jack sockets, and have a maximum output level of +21 dBu.

The Aux sends should be wired as per Table B.

7. Master outputs – the main outputs of the mixer. Three XLR male connectors are provided: for left and right channels, and a mono sum of left and right (L+R) - 6dB. The outputs are electronically balanced, and have a maximum output level of +21 dBu.

The master outputs should be wired as per Table A.

8. Tape outputs – a secondary, buffered set of master outputs on ¼” (6.35 mm) 3-pole (TRS) jack sockets, intended to facilitate connection of a stereo recording device. The signals at the L/R Tape Out connectors are identical to those at the L/R Master Outputs [7] above, and are post the master fader and mute. There is no equivalent mono sum output. The outputs are electronically balanced, and have a maximum output level of +21 dBu.

The Tape outputs should be wired as per Table B.

9. Monitor outputs - the mixer’s monitor outputs. Three ¼” (6.35 mm) 3-pole (TRS) jack sockets provide stereo monitoring, or a mono sum of left and right. The stereo outputs are useful in a recording situation, but the same signal is available for use in live sound at a dedicated headphone output under the front armrest, with a separate level control. The mono sum output can also be used in live sound situations to feed an engineer’s local wedge monitor. The monitor source may be selected to be the master outputs, the PFL/AFL system or the stereo tape return. The rear panel outputs are electronically balanced, and have a maximum output level of +21 dBu.

The monitor outputs should be wired as per Table B.

10. Talkback mic – a 3-pin female XLR connector on the rear panel for a dedicated dynamic mic or connection to a comms system.

The talkback mic should be wired as per Table A.

11. Console lamp – a 3-pin female XLR for connection of a gooseneck lamp to provide console illumination.

12. Expansion port – this may be fitted with an interface card for the CDC RACK expansion stagebox; this uses a dedicated CADAC digital multichannel protocol.

13. MIDI ports – standard MIDI In, Out and Thru connectors

14. Ethernet port – RJ45 connector for software updates

15. AC mains - see “Power supply matters” on page 12 for wiring details.

Table A*

Pin	Connection
1	Screen
2	Signal 'hot' (phase)
3	Signal 'cold' (antiphase)

Table B*

Pin	Connection
Tip	Signal 'hot' (phase)
Ring	Signal 'cold' (antiphase)
Sleeve	Screen

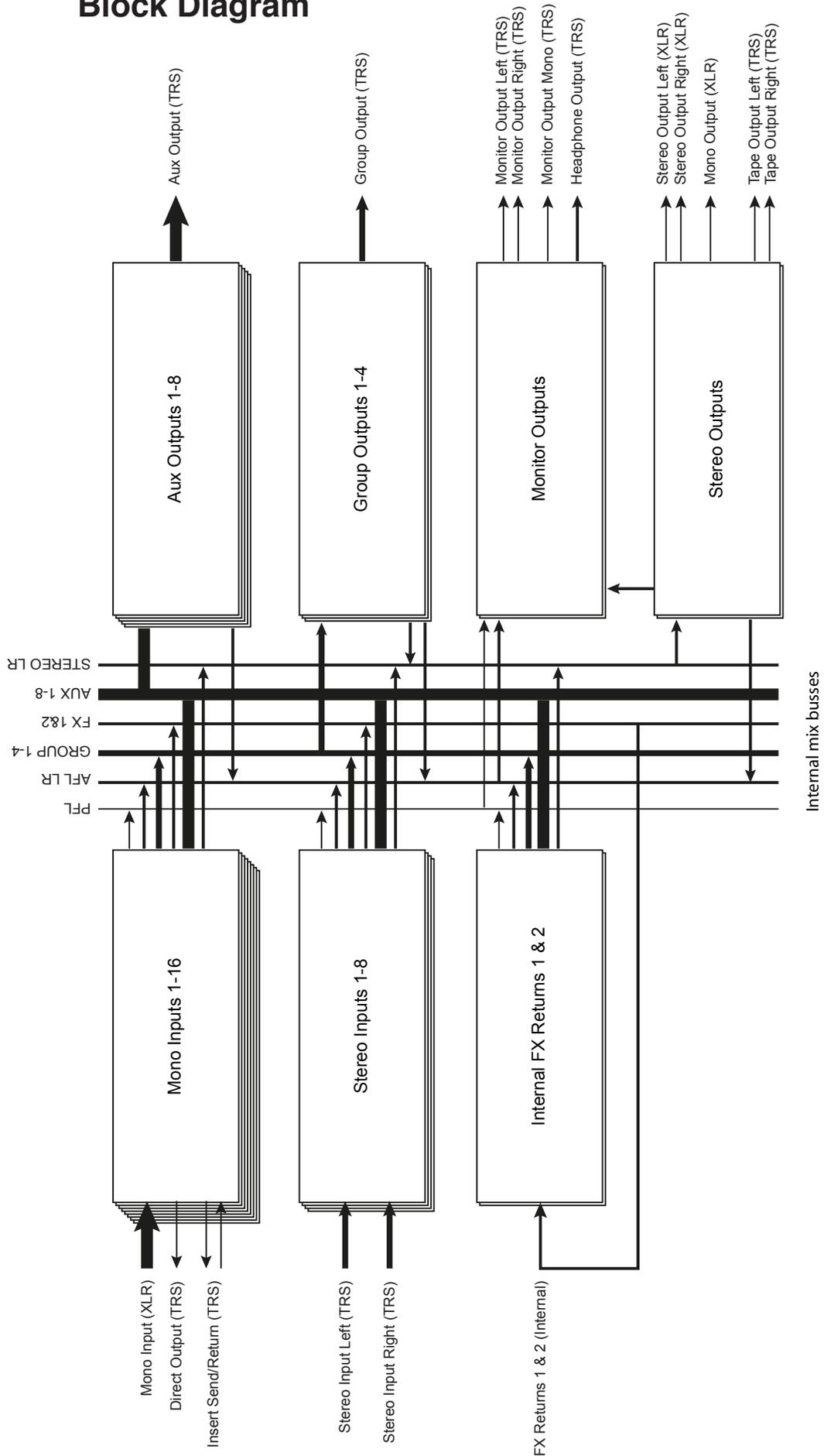
Table C

Pin	Connection
Tip	Send
Ring	Return
Sleeve	Screen (common)

* See the Appendix for information about connecting the CDC-FOUR to unbalanced sources and destinations.

Block Diagram

CDC FOUR - Basic Block Diagram

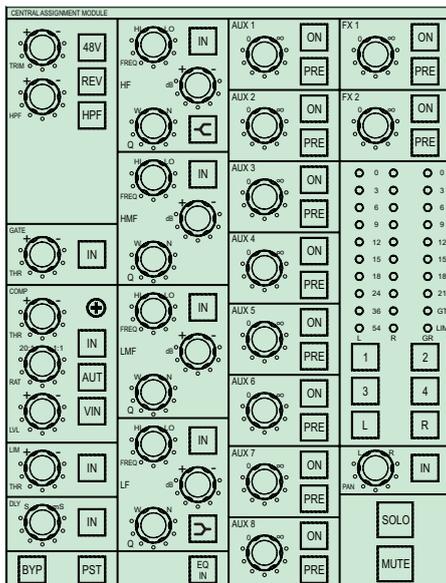


Fundamentals

Although the CDC FOUR control surface and operating system has been designed to retain the familiarity and facilities of an analogue console, there are a number of important aspects of its operation which differ markedly from analogue mixers. These include the following concepts:

- **Assignability** - a single channel strip whose controls can be assigned to any of the internal signal channels;
- **Layers** – the faders can be switched to control another set of channels or groups, resulting in a small control surface for a large configuration mixer;
- **TFT screen** – most of the mixer’s controls and statuses are accessible through the built-in display as well as by using hardware controls; some mixer functions are only available via the screen;
- **Soft keys** – various controls whose functions vary depending on the current state of the display, or of other mixer settings.

Central Assignment Module

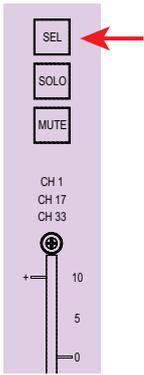


The Central Assignment Module (CAM) is essentially a single, fully-featured channel strip, such as would be found on an analogue mixer. The obvious differences are that potentiometers are replaced by continuous (360°) rotary encoders, and the push-buttons are electronically latching and internally illuminated. The encoders have a “press” function; turning the encoder knob while pressing it in allows a finer degree of parameter adjustment. The use of rotary encoders means that the value of the parameter which the control varies is not related to the physical position of the knob – in fact, the knobs do not have a pointer of any kind. Another implication of this system is that all the channel parameters have default values which have nothing to do with knob positions; these values can be regarded collectively as the “initial state” of the channel. The actual value of each parameter is available from the TFT display; this topic is covered in greater detail under “Screen displays”, see page 25.

The CAM controls the mixer’s DSP section, and is used to set the channel parameters for the following mixer sections:

- All mono mic/line channels
 - Stereo inputs 1-8
 - Subgroups 1-4
 - Aux. sends 1-8
 - FX returns 1 and 2
- Note that unlike an analogue mixer, many of the channel facilities found on an input channel strip are available to the output sections of the CDC FOUR. Furthermore, there is no significant difference in the facilities available to stereo line input channels compared to mono mic/line input channels.

However, it should be noted that not every channel facility is available to all types of signal channel. The exceptions are noted in a later section of the manual, see “Audio channel descriptions” on page 31.



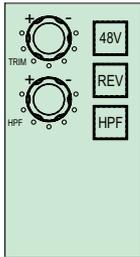
The SEL button

Each fader (except the stereo master) has a **SEL** button in addition to the usual **MUTE** and **SOLO**. The channel for which the CAM is active is selected by pressing **SEL**. Only one **SEL** button can be selected at a time.

Thus, if the **SEL** button above Fader 5 is pressed, the CAM will adjust the parameters of whatever signal is currently assigned to that fader. (Note that each fader, and hence each **SEL** button, may be assigned to one of up to five possible signals within the mixer. This concept is discussed further under “Layers”, see page 23.)

The controls on the CAM are now discussed in more detail:

Input stage:



TRIM - input gain trim.

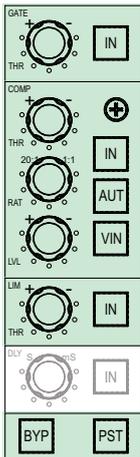
48v – phantom power at the mic input.

REV – phase reverse.

HPF – variable-frequency high-pass filter.

HPF – high-pass filter frequency.

Dynamics section:



GATE: THR – noise gate threshold.

GATE: IN – noise gate in/out.

COMP: THR – compressor threshold.

COMP: RAT – compressor ratio.

COMP: LVL – compressor gain make-up.

COMP: IN – compressor in/out.

COMP: AUT – sets compressor attack/release times automatically

COMP: VIN – selects “vintage” compressor algorithm.

LIM: THR – limiter threshold.

LIM: IN – limiter in/out.

BYP – dynamics section in/out.

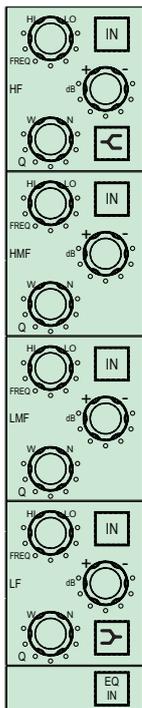
PST – dynamics section post-EQ.

Delay section:



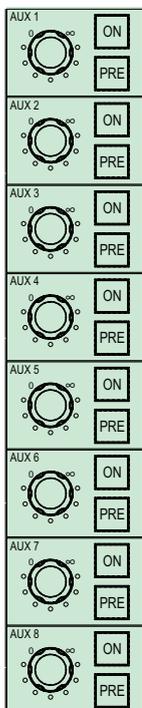
DLY – delay time.

DLY: IN – delay in/out.



EQ Section:

- HF: IN** – HF EQ in/out.
- HF: FREQ** – HF EQ frequency.
- HF: GAIN** – HF EQ cut/boost.
- HF: Q** – HF EQ Q setting.
- HF Shelf** – HF EQ bell/shelf switch.
- HMF: IN** – HMF EQ in/out.
- HMF: FREQ** – HMF EQ frequency.
- HMF: GAIN** – HMF EQ cut/boost.
- HMF: Q** – HMF EQ Q setting.
- LMF: IN** – LMF EQ in/out.
- LMF: FREQ** – LMF EQ frequency.
- LMF: GAIN** – LMF EQ cut/boost.
- LMF: Q** – LMF EQ Q setting.
- LF: IN** – LF EQ in/out.
- LF: FREQ** – LF EQ frequency.
- LF: GAIN** – LF EQ cut/boost.
- LF: Q** – LF EQ Q setting.
- LF Shelf** – LF EQ bell/shelf switch.
- EQ IN** – EQ section in/out.



Aux Sends:

- AUX 1** – Aux. 1 send level.
- AUX 1: ON** – Aux. 1 on/off.
- AUX 1: PRE** – Aux. 1 pre/post.
- AUX 2** – Aux. 2 send level.
- AUX 2: ON** – Aux. 2 on/off.
- AUX 2: PRE** – Aux. 2 pre/post.
- AUX 3** – Aux. 3 send level.
- AUX 3: ON** – Aux. 3 on/off.
- AUX 3: PRE** – Aux. 3 pre/post.
- AUX 4** – Aux. 4 send level.
- AUX 4: ON** – Aux. 4 on/off.
- AUX 4: PRE** – Aux. 4 pre/post.
- AUX 5** – Aux. 5 send level.
- AUX 5: ON** – Aux. 5 on/off.
- AUX 5: PRE** – Aux. 5 pre/post.
- AUX 6** – Aux. 6 send level.
- AUX 6: ON** – Aux. 6 on/off.

AUX 6: PRE – Aux. 6 pre/post.

AUX 7 – Aux. 7 send level.

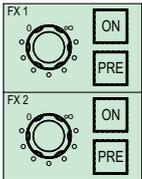
AUX 7: ON – Aux. 7 on/off.

AUX 7: PRE – Aux. 7 pre/post.

AUX 8 – Aux. 8 send level.

AUX 8: ON – Aux. 8 on/off.

AUX 8: PRE – Aux. 8 pre/post.



Internal FX Sends:

FX 1 – FX buss 1 send level.

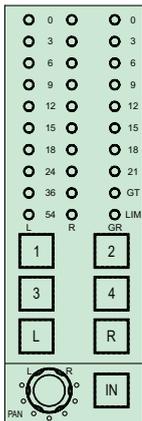
FX 1: ON – FX 1 on/off.

FX 1: PRE – FX 1 pre/post.

FX 2 – FX buss 2 send level.

FX 2: ON – FX 2 on/off.

FX 2: PRE – FX 2 pre/post.



Routing and metering section:

1 – Group 1 routing button.

2 – Group 2 routing button.

3 – Group 3 routing button.

4 – Group 4 routing button.

L – stereo buss (left) routing button.

R – stereo buss (right) routing button.

PAN – channel pan control.

PAN: IN – Group panning in/out.

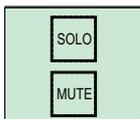
L METER – channel bargraph meter (left).

R METER – channel bargraph meter (right).

GR METER – dynamics section gain reduction bargraph meter.

GT – noise gate active LED.

LIM – limiter active LED.



Mute and Solo:

SOLO – channel PFL/AFL/SIP solo button.

MUTE – channel mute button.

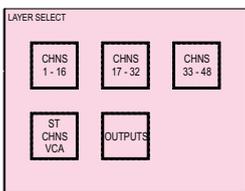
Layers

On an analogue mixer, the necessity for every channel (input or output) to have its own set of controls and electronic hardware inevitably means that the physical size of the mixer becomes proportional to the number of channels. An analogue mixer with many inputs and outputs has a very large “footprint”.

This relationship may be dispensed with in a digital mixer, which allows a small control surface to control large mixer configurations.

On the CDC FOUR, in 19” of control surface width, sixteen faders can control up to 48 mic/line and 8 stereo inputs, plus eight Aux sends, eight VCA masters, two internal FX returns and four output groups. This is achieved by arranging all these various fader-controlled channels into five* *layers*. Only one layer at a time is active; the faders, with their associated **MUTE**, **SOLO** and **SEL** buttons control the sixteen channels in that layer.

NOTE: The red **MASTER** fader always controls the main stereo output – it is not part of any layer.



The active layer is selected by the five **LAYER SELECT** buttons ([7] on “Top view - control surface” on page 13).

The first three layers make mic/line inputs 1-16, 17-32 and 33-48 respectively available to the fader set. The layers corresponding to mic/line inputs 17 and above will only be operative if the CDC RACK stagebox is connected to the mixer. The fader assignments for the mic/line input layers are printed on the fader panel above the faders.

The remaining two layers assign a combination of stereo inputs, VCA masters, group outputs, Aux sends and FX masters to the fader set. The fader assignments for these layers are printed on the fader panel below the faders.

* The faders may also be assigned to control the 1/3-octave graphic equaliser available to the main stereo output; this effectively constitutes two additional layers.

The table below summarises the signal which each fader controls in each layer:

FADER	LAYER SELECT BUTTON				
	CHNS 1-16	CHNS 17-24	CHNS 33-48	ST CHNS VCA	OUTPUTS
1	Mic/line input 1	Mic/line input 17	Mic/line input 33	Stereo input 1	Output group 1
2	Mic/line input 2	Mic/line input 18	Mic/line input 34	Stereo input 2	Output group 2
3	Mic/line input 3	Mic/line input 19	Mic/line input 35	Stereo input 3	Output group 3
4	Mic/line input 4	Mic/line input 20	Mic/line input 36	Stereo input 4	Output group 4
5	Mic/line input 5	Mic/line input 21	Mic/line input 37	Stereo input 5	Aux Send Master 1
6	Mic/line input 6	Mic/line input 22	Mic/line input 38	Stereo return 1	Aux Send Master 2
7	Mic/line input 7	Mic/line input 23	Mic/line input 39	Stereo return 2	Aux Send Master 3
8	Mic/line input 8	Mic/line input 24	Mic/line input 40	Tape return	Aux Send Master 4
9	Mic/line input 9	Mic/line input 25	Mic/line input 41	VCA master 1	Aux Send Master 5
10	Mic/line input 10	Mic/line input 26	Mic/line input 42	VCA master 2	Aux Send Master 6
11	Mic/line input 11	Mic/line input 27	Mic/line input 43	VCA master 3	Aux Send Master 7
12	Mic/line input 12	Mic/line input 28	Mic/line input 44	VCA master 4	Aux Send Master 8
13	Mic/line input 13	Mic/line input 29	Mic/line input 45	VCA master 5	FX Master 1
14	Mic/line input 14	Mic/line input 30	Mic/line input 46	VCA master 6	FX Master 2
15	Mic/line input 15	Mic/line input 31	Mic/line input 47	VCA master 7	-
16	Mic/line input 16	Mic/line input 32	Mic/line input 48	VCA master 8	-

The **SEL** button for each fader - and hence the entire Central Assignment Module – follows the currently selected layer. Thus pressing the **SEL** button above Fader 5 will assign the CAM to mic/line input 5 when the layer CHNS 1-16 is active, but to mic/line input 21 if the next layer, CHNS 17-32, is active, and to stereo input 5 if the layer ST CHNS VCA is active.

Every channel parameter for all the channels in a layer retains its last value when the active layer is changed. This means that all levels, EQ settings, sends, etc., adjusted for a particular input will stay exactly as they are when you change to a different layer. Although the fader set and CAM are now assigned to mic/line inputs 17-32, it is possible to check and adjust parameters in mic/line inputs 1-16 – or any other layer – through the TFT display. Note that as the active layer is changed, the motorised faders will automatically move to the correct positions for the new layer.

Screen displays - overview

The TFT screen in the Central Control Module displays various information about the current status of the mixer. The screen may be switched to display any one of several pages, each of which is concerned with a particular set of mixer functions.

There are six pages available, selected by the page select buttons to the left of the display:

CHN: this is the default view.



The screen shows a representation of a single channel strip. Every control on the CAM has a “virtual” equivalent on the display, and the page layout follows the conventional signal flow through a channel. It is divided into five vertical strips, the first four of which follow the layout of controls on the CAM. The fifth (rightmost) page strip shows the channel fader and VCA assignment.

The on-screen display always follows the SEL and LAYER selection; thus the screen provides confirmation of the control settings for the currently selected channel.

Because the rotary controls in the CAM are 360° encoders, their physical position is not an indication of the parameter value (as would be the case on an analogue mixer). However, the Channel page shows all current parameter values. Switch settings are displayed in textual format and rotary controls are represented as “analogue” 300° potentiometers, with the actual parameter value alongside in text.

FX: this page allows control of the CDC FOUR’s two internal FX processors.



The processors’ inputs are two “virtual busses”, FX1 and FX2, which can be used in the same way as any of the Aux sends. The outputs may be routed to the stereo output and their FX return levels controlled by faders 13 and 14 when the OUTPUTS layer is active.

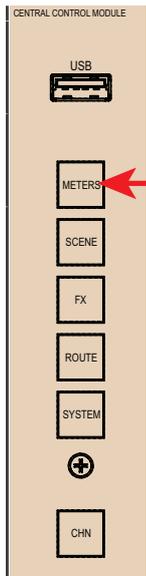
See “FX processing” on page 58 for more information.

SCENE: the Scene page is concerned with the CDC FOUR’s scene memory.

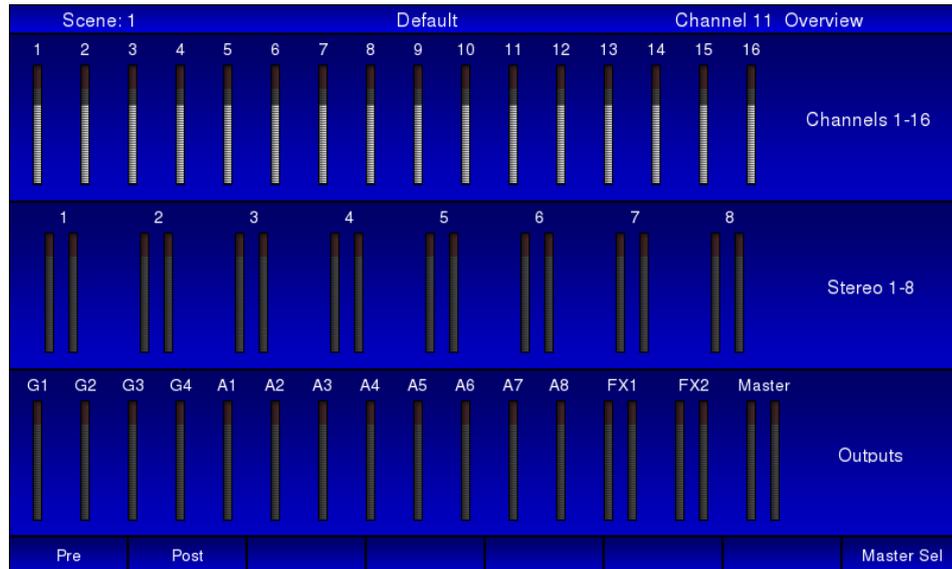


The CDC FOUR is equipped with a “snapshot”-style scene automation system, which allows all current console parameters (both switch and rotary control settings) to be saved as a Scene. Scenes may be named and assembled into a performance sequence off-line, and then, during performance, recalled by a single button press. This allows the mixer to easily and seamlessly switch between complex set-ups to suit, for example, successive scenes of a stage drama, or different musical numbers. The motorised faders form part of the scene memory, and when a Scene is recalled, will assume the position they were in when the Scene was saved.

See “Scene Control” on page 67 for more information.



METERS: this page gives a “global” overview of up to 50 bargraph meters simultaneously.



The page is divided in to three areas horizontally. The upper area has 16 meters showing the signal level in each of the on-board mic/line channels; the middle area has 8 dual meters showing the signal level in the eight stereo input channels; the lower area has 12 meters showing the signal levels of the four Groups and eight Aux sends, and 3 dual meters showing the FX return levels and the stereo master signal. Metering may be selected pre- or post-fade from the screen.

See “Metering” on page 53 for more information.

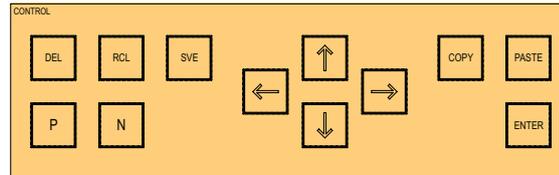
Screen navigation



As channel parameters can be varied both from the TFT display or the CAM, a simple system of screen navigation is provided. On the CHN page, the virtual control corresponding to the last-adjusted control on the CAM is highlighted by a red rectangular cursor (see left).

The cursor moves around the screen as the various channel controls are adjusted.

Any channel parameter may be adjusted from the screen by moving the cursor to the appropriate virtual control with the four “arrow” keys below the display.



In general, the “**up**” and “**down**” keys will move the cursor vertically within the current strip, and the “**left**” and “**right**” keys will move it either to adjacent controls in the same strip or into the next strip. With the desired virtual control highlighted, its parameter value may be adjusted by the **ADJUST** knob.

Note that the **ADJUST** knob is used for both “rotary” functions (EQ adjustments, send levels, etc.) and switch functions (send pre/post, filters in/out, etc.). Rotary functions are represented on-screen by a 300° arc, which changes colour clockwise from blue to white as the knob is turned. The actual numeric parameter value is displayed alongside. Switch functions are represented by small rectangular “buttons”. Status is either indicated by an integral “virtual LED”, which illuminates (white) when the switch is **On**, or by the text label on the button changing.

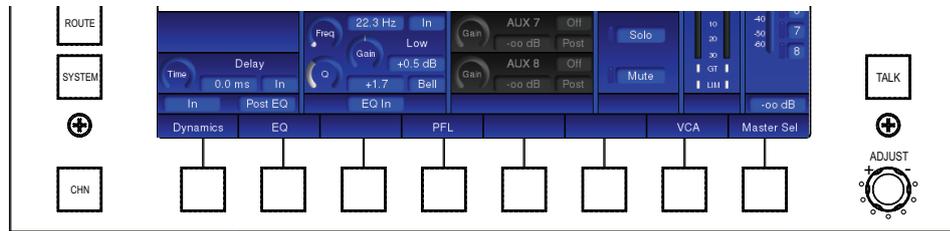


If a section of the channel processing is bypassed (e.g., gate, compressor, EQ, etc.), the screen display corresponding to the section is “dark” (greyed-out) to indicate it is not available. See left for example; only AUX 1 and AUX 2 are active.

The same screen navigation principle applies to the other screen pages (with the exception of the METERS page, which has no controls).

Softkeys

The CDC FOUR has a set of eight “soft” keys below the screen display. These have no printed legends; each button’s function is indicated on the TFT screen immediately above.



In general, the softkeys bring up an additional display page, which presents a section of the current channel in greater detail – e.g., EQ or Dynamics.

Softkeys with a blank legend space above them on the screen have no function.

Audio channel descriptions

Input channel

A detailed block diagram of the Input channel may be found in the Appendix on page 74.

The CDC FOUR can handle up to 48 mono mic/line inputs, divided into three blocks of 16. The inputs to Channels 1 to 16 are on the rear panel; those for Channels 17 to 48 are only available if the CDC RACK stagebox is in use.

The CAM and the TFT display are made active for a mic/line input when one of the first three layers is selected (**CHNS 1-16**, **CHNS 17-24**, **CHNS 33-48**). The active channel is that whose **SEL** button is illuminated. If no CDC RACK is connected, the two buttons **CHNS 17-32** and **CHNS 33-48** will be inoperative.

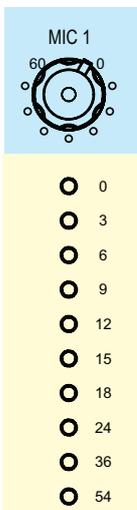
Mic pre-amps

Mic/line inputs 1 to 16 are equipped with high-quality, low-noise mic pre-amps. This design uses premium ICs and exhibits wide dynamic range and excellent CMRR. The gain control operates in the analogue domain, and has a range of 0 to +60 dB.

Meters

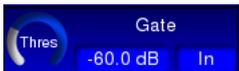
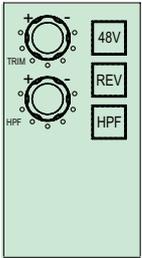
The 10-segment LED bargraph meter shows either the pre-fade or post-fade signal in the channel, as selected by the Pre/Post switch on the METERS screen page. The sixteen fixed meters (below the mic pre-amp gain controls) change source with layer selection, thus can be used to monitor stereo inputs, group and Aux sends, etc., as well as mic/line inputs. When the ST CHNS VCA layer is selected, the odd numbered meters show the left legs of the stereo channels, and the even-numbered the right.

The lowest LED (coloured green) illuminates at -54 dB and can be considered a “signal present” LED. The top three LEDs (coloured red) illuminate at -6 dB, -3 dB and 0 dB respectively. Note that the 0 dB reference for these levels is 0 dBFS (digital clipping). Thus the input gain should be adjusted so that the top LED never illuminates.



Remainder of input channel - CAM/screen control

All other input channel functions are controlled from either the CAM or the screen. In CHN mode, the screen displays a virtual channel strip with a full set of controls which may be adjusted using the **ADJUST** knob.



Input stage:

TRIM - input gain trim, range -48 to +12 dB. Default setting is 0 dB.

48v – enables 48 V phantom power at the mic input. Default is **Off**.

REV – phase reverse switch. Default is **Off**.

HPF (button) – enables the variable-frequency high-pass filter. Default is **Off**.

HPF (rotary) – adjusts the cut-off frequency of the high-pass filter. Range is 14 Hz to 400 Hz, slope 12 dB/oct. Default setting is the minimum: 14 Hz.

Noise gate:

THR – adjusts the threshold of the channel's noise gate in the range from “off” (below -74.9 dB) to -20 dB. Default setting is -60 dB. When the gate is in circuit, signals below the threshold level will be rejected; the signal level needs to exceed the threshold in order to open the gate.

IN – switches the noise gate into the signal chain. Default is **Out**.

NOTE: Additional Gate parameters are available from the Dynamics Details screen page – see “Dynamics detail” on page 54.

Compressor:

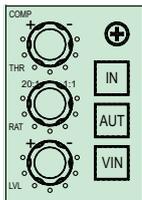
THR – adjusts the threshold of the channel's compressor in the range -48 dB to 0 dB. Default setting is -12 dB. Signals below the threshold will not be compressed. Signals above the threshold will have their levels reduced to a degree determined by the ratio control (below).

RAT – adjusts the compression ratio between 1:1 to 20:1. Default setting is 1:1 (i.e., no compression). A compression ratio of 1:1 implies zero compression; higher values will proportionately reduce the dynamic range of the signal, e.g., at a setting of 2:1, signals 10 dB above the threshold will be compressed to be only 5 dB above the threshold.

LVL – adds gain to compensate for compressor action. Range is -12 dB to +12 dB. Default setting is 0 dB.

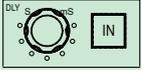
IN – switches the compressor into the signal chain. Default is **Out**.

AUT – in Auto mode, the compressor's Attack and Release time constants are not fixed, but programme-dependent, and set by an algorithm which makes the compressor's action unobtrusive. In Manual mode, the time constants may be adjusted from the Dynamics Detail page (see NOTE below).



VIN – enables an alternative compressor algorithm which makes the compressor act like a leveller, modelling the sound of certain vintage compressors.

NOTE: Additional Compressor parameters are available from the Dynamics Details screen page – see “Dynamics detail” on page 54.



Delay section:

DLY – the CDC FOUR allows an adjustable delay to be inserted in each signal channel. Range 0 to 100 ms. Default setting is zero.

DLY: IN - switches the delay circuit into the signal chain. Default is **Out**.



Dynamics/Delay Global:

BYP - switches the complete dynamics section (gate, compressor and limiter) and delay section in and out of the signal chain. Default is **Out**.

PST – the dynamics and delay sections can be pre- or post-EQ in the CDC FOUR. Pressing **PST** inserts them after the equaliser. Default is **Off** (i.e., dynamics are pre-EQ).

EQ Section:

The CDC FOUR's equaliser is a 4-band parametric type, with bell-shelf switching on the highest and lowest bands. The channel's frequency response (EQ curve) can be seen on the EQ detail page (see page 54).

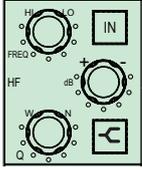
IN – switches the HF section of the equaliser into circuit. Default is **Out**.

FREQ – adjusts the frequency of the HF section of the equaliser. This will be the centre frequency of a bell filter if the **Shelf** switch is set to **Bell**, and the turnover frequency if it is set to **Shelf**. Range is 1.5 kHz to 15 kHz. Default setting is 1.5 kHz.

GAIN – allows 18 dB of cut or boost in the selected frequency band. Default setting is 0 dB (flat response).

Q – adjusts the bandwidth of a bell filter; Q range is 1.0 (wide) to 3.0 (narrow). Default setting is 1.0. If the **Shelf** switch is **On**, the control is inoperative and is removed from the screen display.

Shelf – switches the HF section of the equaliser between Bell and Shelving modes. In Shelving mode, the EQ section acts as a “treble” control, and has a fixed slope of 6 dB/octave. Default is **Bell**.

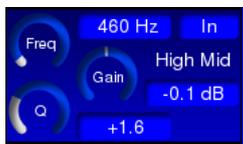
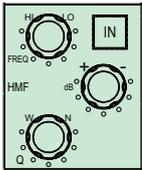


IN – switches the HMF section of the equaliser into circuit. Default is **Out**.

FREQ – adjusts the frequency of the HMF section of the equaliser. The section is always a Bell filter. Range is 400 Hz to 4 kHz. Default setting is 400 Hz.

GAIN – allows 18 dB of cut or boost in the selected frequency band. Default setting is 0 dB (flat response).

Q – adjusts the bandwidth of the filter; Q range is 1.0 (wide) to 3.0 (narrow). Default setting is 1.0.

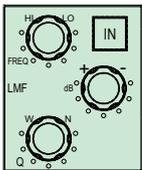


IN – switches the LMF section of the equaliser into circuit. Default is **Out**.

FREQ – adjusts the frequency of the LMF section of the equaliser. The section is always a Bell filter. Range is 60 Hz to 600 Hz. Default setting is 60 Hz.

GAIN – allows 18 dB of cut or boost in the selected frequency band. Default setting is 0 dB (flat response).

Q – adjusts the bandwidth of the filter; Q range is 1.0 (wide) to 3.0 (narrow). Default setting is 1.0.

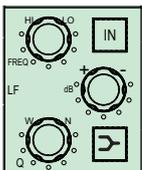


IN – switches the LF section of the equaliser into circuit. Default is **Out**.

FREQ – adjusts the frequency of the LF section of the equaliser. This will be the centre frequency of a bell filter if the **Shelf** switch is set to **Bell**, and the turnover frequency if it is set to **Shelf**. Range is 20 Hz to 200 Hz. Default setting is 20 Hz.

GAIN – allows 18 dB of cut or boost in the selected frequency band. Default setting is 0 dB (flat response).

Q – adjusts the bandwidth of a bell filter; Q range is 1.0 (wide) to 3.0 (narrow). Default setting is 1.0. If the **Shelf** switch is **On**, the control is inoperative and is removed from the screen display.



Shelf – switches the LF section of the equaliser between Bell and Shelving modes. In Shelving mode, the EQ section acts as a “bass” control, and has a fixed slope of 6 dB/octave. Default is **Bell**.



EQ IN – switches the entire 4-band EQ section into circuit. Default is EQ Out; in this state, the entire EQ section of the CHN page is “dark”.

Aux Sends:

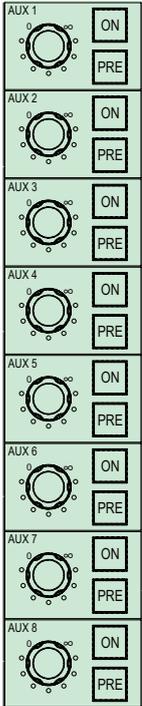
The CDC FOUR’s eight auxiliary sends are identical in operation. For brevity, only Aux 1 is described:

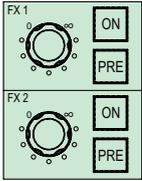
AUX 1 – level control from the channel to Aux Buss 1. Range is $-\infty$ (i.e., off); then -75 dB to 0 dB. Default is **Off**.

ON – unmutes the feed to Aux Buss 1. Default is **Off**.

PRE – default source for Aux. Sends is post-fade, but can be changed to pre-fade with the **PRE** button. Both pre- and post-fade sends are post-Channel Mute.

The status of all eight Aux. sends for blocks of 16 input channels may be viewed on the screen ROUTE page. See page 51.





FX Sends:

The CDC FOUR has two internal DSP-based effects processors, which provide a selection of time-domain effects such as delay and reverb. The inputs to these are additional sends, denoted FX1 and FX2, and the outputs are routed to the main LR stereo buss or Groups 1 to 4 via two faders in the OUTPUTS Layer. See “FX processing” on page 58 for full details.

The two FX sends are identical in operation. For brevity, only FX 1 is described:

FX 1 – level control from the channel to internal FX buss 1. This routes the signal to FX processor 1. The level control’s range and default settings are the same as the Aux. sends.

ON – unmutes the feed to FX Send 1. Default is **Off**.

PRE – default source for FX Send is post-fade, but can be changed to pre-fade with the **PRE** button. Both pre- and post-fade sends are post-Channel Mute.

Routing and metering section:

The CDC FOUR has four mono group busses in addition to the main LR stereo buss. The groups may either be used as subgroups into the main mix or as additional outputs from the mixer. The usual set of routing buttons and odd/even panning is provided.

1 - 4 – four buss select buttons which route the channel to Audio Groups 1 to 4 respectively.

L & R – two buss select buttons which route the channel respectively to the L and R legs of the stereo master buss. Note that the pan control is always in circuit with respect to the L & R busses.

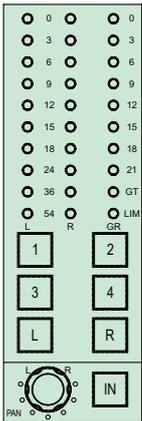
PAN – allows the channel signal to be panned between odd-numbered busses (and the L leg of the master buss) and even-numbered busses (and the R leg of the master buss). Default is “centre” – i.e., equal signal levels are routed to the selected busses. The adjacent **IN** button must be enabled for the pan control to be active for the four groups; it is always operational across the main L/R buss.

IN – enables the **PAN** control for panning between odd- and even-numbered groups. Default is **Out**; in this state, the signal in the channel is sent at equal level to all busses selected by the routing buttons 1 to 4.

L & R METERS – two 10-segment LED bargraph meters indicating channel signal level are fitted in the CAM area. With mic/line channels, both L and R meters give the same indication. The meters show the pre-fade (and hence pre-pan) signal level relative to 0 dBFS. The bottom LED is green and illuminates at -54 dBFS, and thus acts as a “signal present” LED. The top three LEDs are red, the uppermost indicating the digital peak level of 0 dBFS. The remainder of the LEDs are yellow.

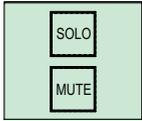
GR METER – an 8-segment LED bargraph meter indicating the instantaneous gain reduction being applied by the dynamics section’s compressor.

GT – a red LED which illuminates when the channel’s Noise Gate is opened by the signal exceeding the threshold.



LIM – non-operative for input channels.

Mute and Solo:



SOLO – routes the signal in the channel to the internal PFL or AFL busses, to permit the signal to be monitored without otherwise interrupting the mixer’s routings. The operation of the Solo system is controlled from the Solo Logic section, see “Solo control” on page 63.



MUTE – mutes the signal in the channel. Note that all Aux. Sends are also muted, but Insert Sends and Direct Outs remain active.

Note that the CAM’s **MUTE** and **SOLO** buttons have exactly the same function as the fader block **MUTE** and **SOLO** buttons for the channel currently assigned to the CAM (i.e., those immediately below whichever **SEL** button is currently illuminated).

Stereo inputs

A detailed block diagram of the Stereo Inputs may be found in the Appendix on page 75.

The CDC FOUR has eight stereo line channels, with inputs on the rear panel.

The CAM and the TFT display are made active for a stereo channel when the **ST CHNS VCA** layer is selected. The stereo channels are then controlled by Faders 1 to 8, and that assigned to the CAM and TFT display is the one whose **SEL** button is illuminated.

Analogue mixers generally offer a more limited set of controls on stereo channels than on mono. This need not apply to a digital mixer, and on the CDC FOUR, a stereo line channel has almost the same set of controls as a mono channel.

For this reason, only the differences from a mono channel are summarised below. The description of the mono mic/line channel applies in all other respects. Refer to Page 32 onwards for full details.



Input stage:

TRIM - input gain trim, range -48 to +12 dB. Default setting is 0 dB.

Phase reverse – reverses the phase in the left leg of the channel only.

Aux Sends:

In a stereo channel, a mono sum of left and right legs is fed to the auxiliary busses. The send controls otherwise operate in an identical manner to those in a mono channel. Post-fade sends are derived pre-balance control, but post-Channel mute.



Routing and metering section:

The left and right legs of a stereo channel are fed to the L and R busses of the main stereo mix via the pan control, which is reconfigured to operate as a stereo balance control.

With the pan control **IN** button **Off**, pressing any of the group routing buttons **1** to **4** sends a mono sum of the left and right legs to that group; routing to multiple groups will operate in the same way. If the pan **IN** button is **On**, stereo routing to odd/even pairs of groups results. The stereo image set by the balance control is maintained, with the left leg selectable to Groups 1 and 3, and the right leg to Groups 2 and 4.

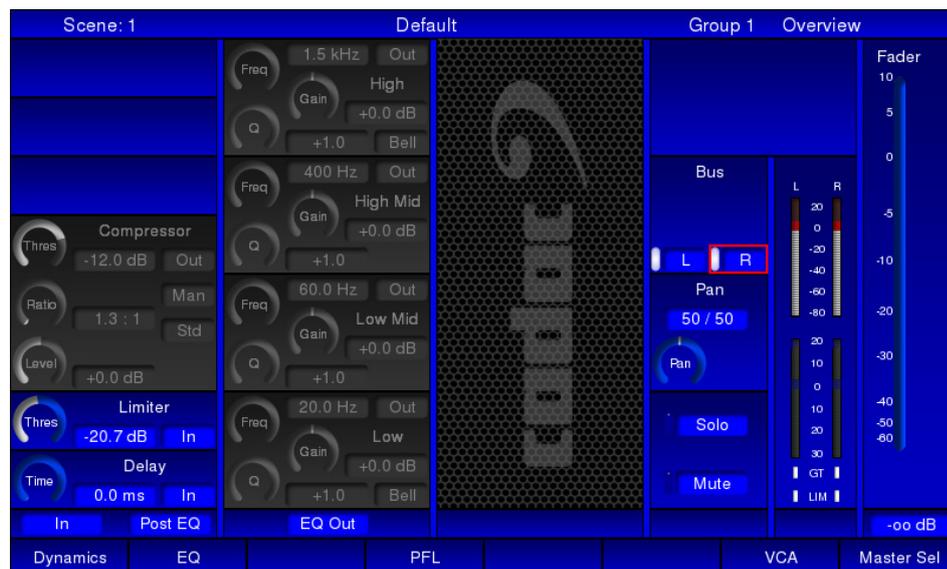
Pan – acts as a balance control; turning the control clockwise from the centre position will attenuate the left leg of the channel but leave the right leg unaltered in level. At the maximum, the left leg is fully attenuated. The opposite applies for anticlockwise rotation.

Groups

A detailed block diagram of the Groups may be found in the Appendix on page 76.

The CDC FOUR has four mono groups, with outputs on the rear panel. They may be used either for recording or other external purposes, or the outputs may be ignored, and they can form subgroups into the main stereo mix.

Some channel functions are absent from groups (relative to the input channels). The differences from a mono channel are summarised below. The description of the mono mic/line channel applies in all other respects. Refer to Page 32 onwards for full details.



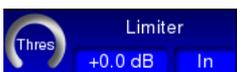
Input stage:

All input functionality is removed. The Input Trim, high-pass filter and phase controls are inoperative and their virtual counterparts do not appear on-screen.

Noise gate:

The groups do not have noise gates. All noise gate controls are inoperative and their virtual counterparts do not appear on-screen.

Limiter:



The groups' dynamics sections have a dedicated limiter as well as the compressor section fitted to the input channels.

THR - adjusts the threshold of the group's separate limiter section in the range -40 dB to +21 dB. Default setting is +21 dB (i.e., no limiting).

IN - switches the limiter into the signal chain. Default is **Out**.

Aux Sends:

The groups do not have Aux Send facilities. All Aux Send controls are inoperative and their virtual counterparts do not appear on-screen.

FX Sends:

The groups cannot send to the internal FX processors. All FX Send controls are inoperative and their virtual counterparts do not appear on-screen.



Routing and metering section:

Any of the four groups may be routed to the main LR stereo buss, permitting their use as subgroups. The groups default with this routing enabled. The **PAN** control is always in circuit, and with the control at its centre position (50/50, the default value), the mono group signal feeds the left and right legs of the main stereo buss equally, and is thus in the centre of the main stereo image. Full left-right panning is possible, using either the **PAN** control on the CAM or via the screen using the **ADJUST** control. However, the pan control **IN** button is disabled.

1 - 4 – the four group routing buttons **1** to **4** are not available to groups; thus it is not possible to route a group to another group (or itself!).

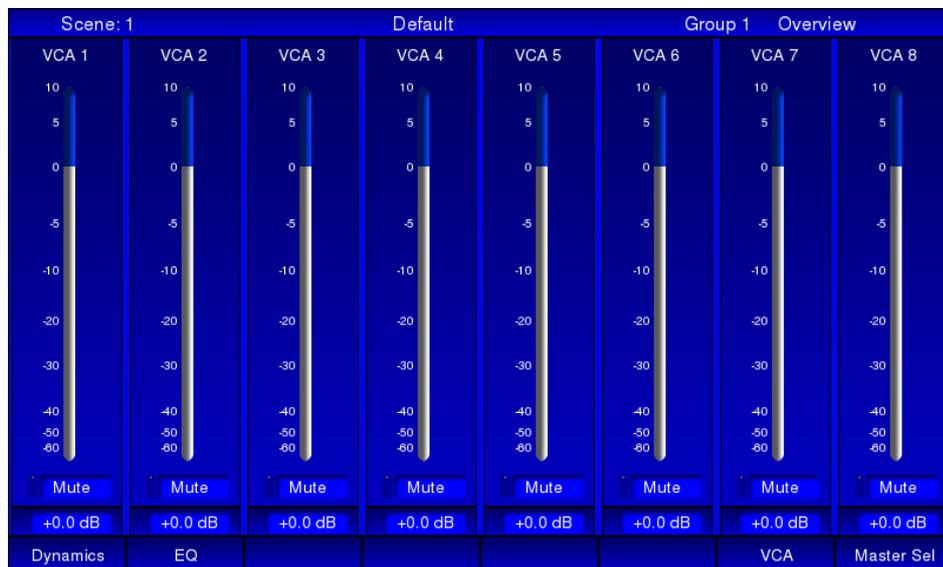
L & R – a group may be routed to either the left or right legs of the main stereo buss individually, though the setting of the **PAN** control will affect the level (i.e., routing to L and panning fully right will result in no signal).

VCA groups

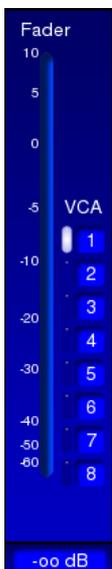
Although the CDC FOUR, as a digital mixer, has no actual VCAs – these being a purely analogue concept – the terminology is retained for reasons of familiarity.

The CDC FOUR allows the creation of up to eight “control groups”, which operate in exactly the same way as VCA groups on an analogue mixer. Any input channel (mono or stereo) may be assigned to any VCA group or combination of VCA groups. The level of all the channels in the group may then be adjusted simultaneously by a single fader.

The VCA master faders are available when the **ST CHNS VCA** layer is selected; faders 9 to 16 are assigned for this purpose. Note that as VCA groups are entirely “virtual”, they are not assigned to the CAM. When the **ST CHNS VCA** layer is selected, pressing a **SEL** button above any of the VCA faders opens a dedicated VCA screen page, which gives an overview of the VCA master fader settings.



Note that this page may also be viewed at any time by the use of **Softkey 7**, which is available on all input and output pages.



VCA group assignment

Any mono or stereo input channel may be assigned to any combination of VCA groups. The assignment is made via the display; there are no equivalent hardware keys. The VCA group buttons are at the extreme right of the Channel page and may be selected by moving the cursor to them with the navigation keys, and operated by rotating the **ADJUST** knob.



Levels within VCA groups

As with all layers, when the **ST CHNS VCA** layer is selected, faders 9 to 16 immediately move to their correct positions. If no adjustment of VCA master levels have been made, this position will be at the 0 dB mark. The implication of this is that simply assigning a channel to a VCA group does not alter its signal level anywhere in the mixer. The level in the mix may now be adjusted in two places – by the channel’s own fader or by the VCA master. The fader positions of the two faders effectively “add” to define the overall signal level. Thus if the channel fader is at -6 dB and the VCA fader is set to -10 dB, the level of the channel in the mix will be the same as it would if the channel fader were set to -16 dB without any VCA assignment being made.

The *relative* levels of all the channels assigned to any one VCA group remain unchanged; adjusting the VCA master alters the level of the whole set of channels without disturbing their inherent mix. A common application is to assign all the channels being used to mic a drum kit to a VCA group after a satisfactory balance of the kit has been made. The VCA master fader will then alter the level of the whole kit in the mix, without altering any the internal balance, or any stereo imaging.

VCA Group Muting

A VCA group may be muted by pressing the **MUTE** button above the VCA master fader. This mutes all the channels assigned to the group. A corresponding virtual **MUTE** button is provided on the TFT VCA page. The individual channels’ **MUTE** buttons – both the physical ones and the on-screen virtual buttons – illuminate to confirm this.

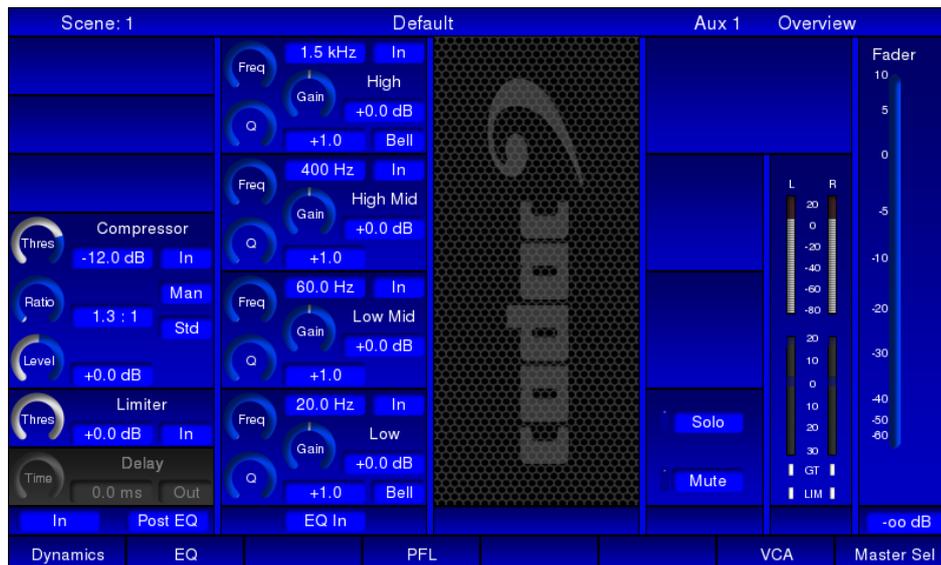
Note that the **SOLO** button has no function for a VCA group.

Aux outputs

A detailed block diagram of the Aux Outputs may be found in the Appendix on page 77.

The CDC FOUR has eight auxiliary sends, with outputs on the rear panel. All the sends are mono. They may be used for external FX sends, or for foldback purposes.

The Aux Send channels have processing similar to that of the Groups; the main difference is the absence of any routing. The differences from a mono channel are summarised below. The description of the mono mic/line channel applies in all other respects. Refer to Page 32 onwards for full details.



Input stage:

All input functionality is removed. The Input Trim, high-pass filter and phase controls are inoperative and their virtual counterparts do not appear on-screen.

Noise gate:

The Aux Send channels do not have noise gates. All noise gate controls are inoperative and their virtual counterparts do not appear on-screen.

Limiter:

The Aux Sends' dynamics sections have a dedicated limiter as well as the compressor section fitted to the input channels.

THR - adjusts the threshold of the Aux send's separate limiter section in the range -40 dB to +21 dB. Default setting is +21 dB (i.e., no limiting).

IN - switches the limiter into the signal chain. Default is **Out**.

Aux Sends:

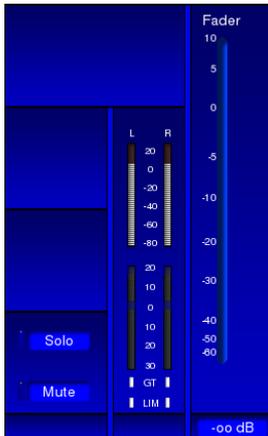
It is not possible to send an Aux output to another Aux Send. All Aux Send controls are inoperative and their virtual counterparts do not appear on-screen.

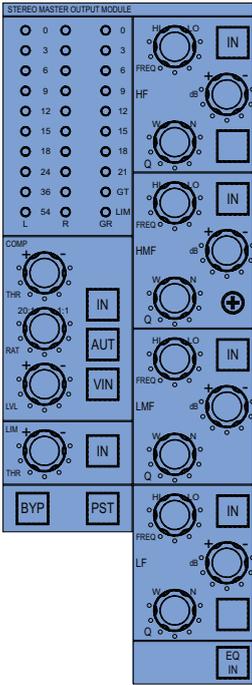
FX Sends:

The Aux outputs cannot send to the internal FX processors. All FX Send controls are inoperative and their virtual counterparts do not appear on-screen.

Routing and metering section:

It is not possible to route an Aux output anywhere else, thus the routing buttons **1** to **4** and **L & R** are inoperative. As the sends are mono, the **PAN** controls are also inoperative. **MUTE** and **SOLO** are still functional, however.



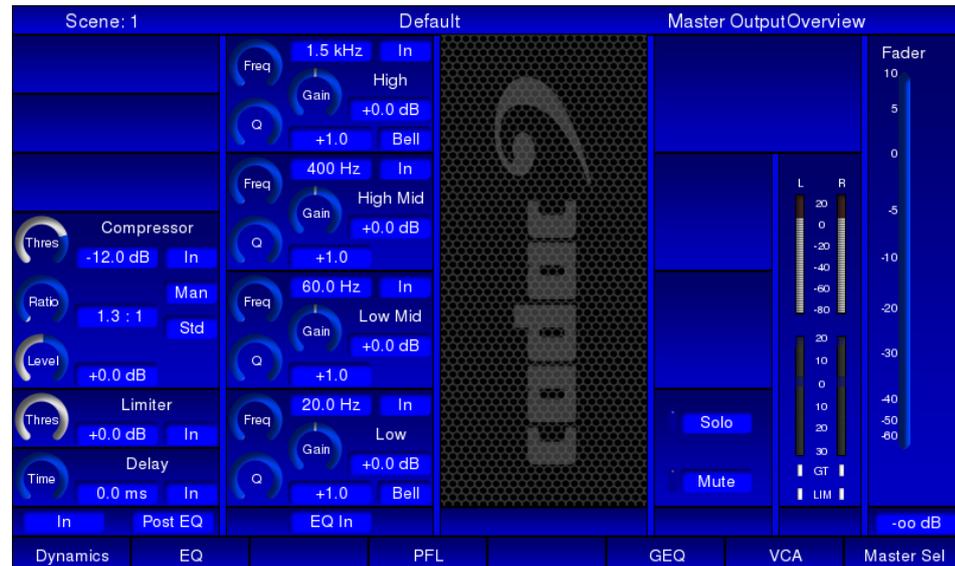


Stereo master

A detailed block diagram of the Stereo master may be found in the Appendix on page 78

The stereo master channel on the CDC FOUR differs from all the other channel types in several respects, most importantly, the absence of a **SEL** button, and the provision of a dedicated set of controls. The controls and facilities on the Stereo Master Output Module (SMOM) are very similar to those which the CAM provides to the other channel types.

The TFT screen can be selected to display the stereo master channel by pressing **Softkey 8** from any other page:



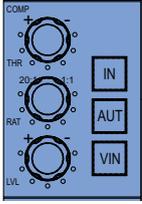
Derived outputs

The main stereo outputs from the left and right leg D-to-A converters in the stereo master output channel are also routed internally to the stereo tape outputs (**TAPE L OUT** and **TAPE R OUT**) and the mono sum output (**MONO**). All outputs are fully buffered from each other.

The stereo tape outputs provide an identical balanced signal to that at the stereo master outputs, except that 3-pole ¼" jacks are used.

The mono sum is a balanced (L+R) - 6dB sum of the master stereo output.

The facilities of the Stereo Master Output Module are as follows:



Compressor:

THR - adjusts the threshold of the channel's compressor in the range -48 dB to 0 dB. Default setting is -12 dB.

RAT - adjusts the compression ratio between 1:1 to 20:1. Default setting is 1:1 (i.e., no compression).

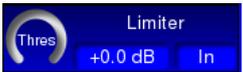
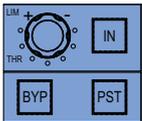
LVL - adds gain to compensate for compressor action. Range is -12 dB to +12 dB. Default setting is 0 dB.

IN - switches the compressor into the signal chain. Default is **Out**.

AUT - in Auto mode, the compressor's Attack and Release time constants are not fixed, but programme-dependent, and set by an algorithm which makes the compressor's action unobtrusive. In **Manual** mode, the time constants may be adjusted from the Dynamics Detail page (see NOTE below).

VIN - enables an alternative compressor algorithm which makes the compressor act like a leveller, modelling the sound of certain vintage compressors.

NOTE: Additional Compressor parameters are available from the Dynamics Details screen page - see page 54.



Limiter:

THR - adjusts the threshold of the master output's separate limiter section in the range -40 dB to 0 dB. Default setting is 0 dB.

IN - switches the limiter into the signal chain. Default is **Out**.

Dynamics Global:

BYP - switches the complete dynamics section (compressor and limiter) in and out of the signal chain. Default is **Out**.

PST - the dynamics section can be pre- or post-EQ. Pressing **PST** inserts it after the equaliser. Default is Off (i.e., dynamics are pre-EQ).

EQ Section:

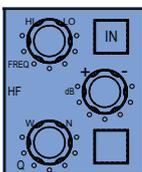
The CDC FOUR's stereo master channel is equipped with a 4-band parametric equaliser, with bell-shelf switching on the highest and lowest bands. The channel's frequency response (EQ curve) can be seen on the EQ detail page (see page 54).

IN - switches the HF section of the equaliser into circuit. Default is **Out**.

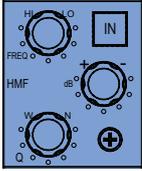
FREQ - adjusts the frequency of the HF section of the equaliser. This will be the centre frequency of a bell filter if the **Shelf** switch is set to **Bell**, and the turnover frequency if it is set to **Shelf**. Range is 1.5 kHz to 15 kHz. Default setting is 1.5 kHz.

GAIN - allows 18 dB of cut or boost in the selected frequency band. Default setting is 0 dB (flat response).

Q - adjusts the bandwidth of a bell filter; Q range is 1.0 (wide) to 3.0 (narrow). Default setting is 1.0. If the **Shelf** switch is **On**, the control is inoperative and is removed from the screen display.



Shelf – switches the HF section of the equaliser between Bell and Shelving modes. In Shelving mode, the EQ section acts as a “treble” control, and has a fixed slope of 6 dB/octave. Default is **Bell**.

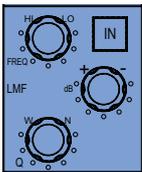


IN – switches the HMF section of the equaliser into circuit. Default is **Out**.

FREQ – adjusts the frequency of the HMF section of the equaliser. The section is always a Bell filter. Range is 400 Hz to 4 kHz. Default setting is 400 Hz.

GAIN – allows 18 dB of cut or boost in the selected frequency band. Default setting is 0 dB (flat response).

Q – adjusts the bandwidth of the filter; Q range is 1.0 (wide) to 3.0 (narrow). Default setting is 1.0.

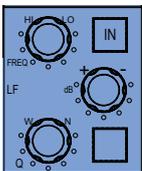


IN – switches the LMF section of the equaliser into circuit. Default is **Out**.

FREQ – adjusts the frequency of the LMF section of the equaliser. The section is always a Bell filter. Range is 60 Hz to 600 Hz. Default setting is 60 Hz.

GAIN – allows 18 dB of cut or boost in the selected frequency band. Default setting is 0 dB (flat response).

Q – adjusts the bandwidth of the filter; Q range is 1.0 (wide) to 3.0 (narrow). Default setting is 1.0.



IN – switches the LF section of the equaliser into circuit. Default is **Out**.

FREQ – adjusts the frequency of the LF section of the equaliser. This will be the centre frequency of a bell filter if the **Shelf** switch is set to **Bell**, and the turnover frequency if it is set to **Shelf**. Range is 20 Hz to 200 Hz. Default setting is 20 Hz.

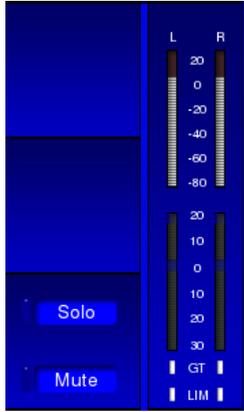
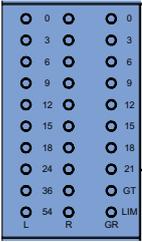
GAIN – allows 18 dB of cut or boost in the selected frequency band. Default setting is 0 dB (flat response).

Q – adjusts the bandwidth of a bell filter; Q range is 1.0 (wide) to 3.0 (narrow). Default setting is 1.0. If the mode is set to **Shelf**, the control is inoperative and is removed from the screen display.

Shelf – switches the LF section of the equaliser between Bell and Shelving modes. In Shelving mode, the EQ section acts as a “bass” control, and has a fixed slope of 6 dB/octave. Default is **Bell**.

EQ IN – switches the entire 4-band EQ section into circuit. Default is EQ **Out**; in this state, the entire EQ section of the CHN page is “dark”.





Metering section:

L & R METERS – two 10-segment LED bargraph meters indicating the signal level of the stereo master output are fitted in the Stereo Master Output Module area. The meters show the post-fade signal level relative to 0 dBFS – i.e., the main stereo signal leaving the mixer. The bottom LED is green and illuminates at -54 dBFS, and thus acts as a “signal present” LED. The top three LEDs are red, the uppermost indicating the digital peak level of 0 dBFS. The remainder of the LEDs are yellow.

GR METER – an 8-segment LED bargraph meter indicating the instantaneous gain reduction being applied by the dynamics section’s compressor.

GT – not used.

LIM – a red LED which illuminates when the signal in the channel exceeds the limiter threshold.

Mute and Solo:

SOLO – routes the stereo master signal to the internal AFL buss, to permit the signal to be monitored without otherwise interrupting the mixer’s routings. The operation of the Solo system is controlled from the Solo Logic section, see page 63.

MUTE – mutes the master stereo output, the mono sum output and the stereo tape output. To be used with caution!

FX sends and returns

The two FX channels in the CDC FOUR differ from the other channel types in that they are entirely internal to the mixer and have no external signal inputs or outputs.

As shown in the channel descriptions above, all mono and stereo input channels are able to send to the two internal FX busses, **FX 1** and **FX 2**, via the dedicated controls on the CAM, or their virtual on-screen equivalents. The signals on the FX busses are summed in the normal way (though wholly in the digital domain) and may have EQ and dynamics applied in the same way as other types of channel. The signal is then passed to a DSP FX processor, which can add time-domain effects such as reverb and delay. (See “FX processing” on page 58 for more details of the effects themselves). The processed signal (now in stereo) is then available to be fed back into the mix (and elsewhere) via the two FX return faders **FX 1** and **FX 2**; these are faders 13 and 14 in the **OUTPUTS** layer. This process is exactly analogous to patching in an external FX unit to an analogue mixer, where an Aux send would be used to send a signal from one or more channels to the FX unit, and the unit’s output would be brought back into the mixer via dedicated FX returns or spare channels as available, or desired.

The CAM and the TFT display are available to an FX channel when the **OUTPUTS** layer is selected. Pressing the **SEL** button above one of the faders assigns the FX channel to the CAM and screen.



On the CDC FOUR, the FX channels have an almost identical set of controls to a mono channel, although they are treating a stereo signal; this includes EQ, routing and Aux sends. For this reason, only the differences from a mono channel are summarised below. The description of the mono mic/line channel applies in all other respects. Refer to Page 32 onwards for full details.

Input stage:

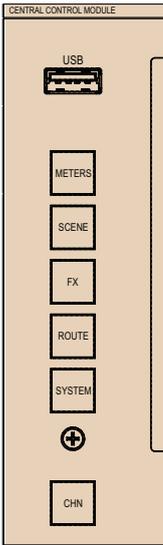
All input functionality is removed. The Input Trim, high-pass filter and phase controls are inoperative and their virtual counterparts do not appear on-screen.

Noise gate:

The FX sends do not have noise gates. All noise gate controls are inoperative and their virtual counterparts do not appear on-screen.

FX Sends:

It is not possible to send the signal in an FX return back into an FX send. The FX send controls are inoperative and their virtual counterparts do not appear on-screen.



Other screen pages

The TFT screen has several further pages available; some of these are selected by the buttons to the left of the display:

Two further “Detail” pages – **EQ Detail** and **Dynamics Detail** are opened from Softkeys on the Channel Overview page.

Channel

The Channel pages displayed for the various types of channel have already been described in detail. The Channel page for the currently selected channel (the one in the current layer with its **SEL** button illuminated) may be displayed at any time by pressing the **CHN** button.

Routing

The **ROUTE** button opens the Routing screen page.

	Scene: 1				Default				Channel 11				Routing			
	G 1	G 2	G 3	G 4	L	R	A 1	A 2	A 3	A 4	A 5	A 6	A 7	A 8	FX1	FX2
Ch 1	ON	ON	off	off	off	off	-4.2	-3.2	-59.8	-∞	-∞	-∞	-∞	-∞	-∞	-∞
Ch 2	ON	ON	off	off	off	off	-∞	-5.0	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞
Ch 3	ON	ON	off	off	off	off	-∞	-4.2	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞
Ch 4	ON	ON	off	off	off	off	-∞	-2.0	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞
Ch 5	ON	ON	off	off	off	off	-∞	-4.4	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞
Ch 6	ON	ON	off	off	off	off	-∞	-11.0	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞
Ch 7	off	off	off	off	ON	ON	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞
Ch 8	off	off	off	off	ON	ON	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-12.4	-∞	-∞
Ch 9	off	off	off	off	ON	ON	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞
Ch 10	off	off	off	off	ON	ON	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞
Ch 11	off	off	off	off	ON	ON	-∞	-∞	-∞	-∞	-∞	-∞	-8.2	-∞	-∞	-∞
Ch 12	off	off	off	off	ON	ON	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞
Ch 13	off	off	off	off	ON	ON	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞
Ch 14	off	off	off	off	ON	ON	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞
Ch 15	off	off	off	off	ON	ON	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞
Ch 16	off	off	off	off	ON	ON	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞
Outputs	VCA												Master Sel			

The page is arranged in tabular form, with channels as rows. The columns represent, from left to right, routing status to Groups 1 to 4 (G1 – G4) and the left and right legs of the main stereo output (L and R); these may be displayed as **ON** or **off**; followed by the send level to each of the eight Aux busses (A1 - A8) and the two internal FX sends (FX1 and FX2). The send levels are displayed directly in dBs relative to “full level”, with $-\infty$ indicating ‘off’, and a level range of **-75** to **0**. Note that the level is followed by an asterisk (*) if the send is selected pre-fade.

Inactive routings appear in black. When a routing button on the CAM is pressed, the corresponding routing flag turns blue and the legend changes. The Aux and FX sends are black when the send is not enabled by its **ON** button, and turns blue when it is pressed. Note that the actual send level is still displayed when the send is **OFF**; this allows a send level to be preset but the send itself muted until required, as would be the case with an analogue mixer.

As with the **CHN** page, the arrow keys may be used to navigate the cursor around the page, and the **ADJUST** knob used to set the routing to the L/R and Group buses, and to adjust Aux Send or FX Send levels. This is a useful feature as it permits send levels to be set for multiple channels without assigning them successively to the CAM.

Similar pages are presented for the **CHNS 17-32** and **CHNS 33-48** layers, providing that a CDC RACK stagebox is connected. If the **ST CHNS VCA** layer is active, the Routing page shows the routings for the eight stereo channels:

	Scene: 1				Default								Stereo 4				Routing	
	G 1	G 2	G 3	G 4	L	R	A 1	A 2	A 3	A 4	A 5	A 6	A 7	A 8	FX1	FX2		
ST 1	off	off	ON	ON	off	off	-00	-00	-00	-00	-00	-00	-00	-00	-00	-00		
ST 2	off	off	ON	ON	off	off	-00	-00	-00	-00	-00	-00	-00	-00	-00	-00		
ST 3	off	off	off	off	ON	ON	-10.4	-00	-00	-00	-00	-00	-00	-00	-00	-00		
ST 4	off	off	off	off	ON	ON	-12.4*	-00	-00	-00	-00	-00	-00	-00	-00	-00		
ST 5	off	off	off	off	ON	ON	-00	-00	-00	-00	-00	-00	-00	-00	-00	-00		
ST RT 1	off	off	off	off	ON	ON	-00	-00	-00	-00	-00	-00	-00	-00	-00	-00		
ST RT 2	off	off	off	off	ON	ON	-00	-00	-00	-00	-00	-00	-00	-00	-00	-00		
TAPE	off	off	off	off	ON	ON	-00	-00	-00	-00	-00	-00	-00	-00	-00	-00		

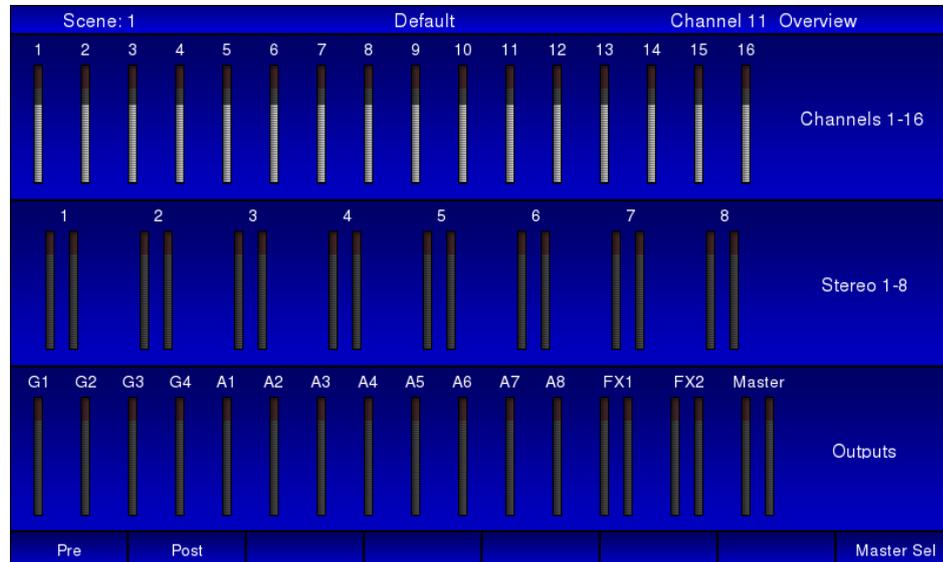
If the **OUTPUTS** layer is active, the Routing page shows the routings for Groups 1 to 4 and the two FX channels FX1 and FX2:

	Scene: 1				Default								FX 1				Routing	
	G 1	G 2	G 3	G 4	L	R	A 1	A 2	A 3	A 4	A 5	A 6	A 7	A 8	FX1	FX2		
GP 1					ON	ON												
GP 2					ON	ON												
GP 3					off	off												
GP 4					off	off												
FX 1	off	off	off	off	ON	ON	-00	-00	-00	-00	-00	-00	-00	-00	-00	-00		
FX 2	off	off	off	off	ON	ON	-00	-00	-00	-00	-00	-00	-00	-00	-00	-00		

Note that this page displays the reduced set of routings that are permitted for outputs; Groups can only be routed to the main stereo output, FX return channels cannot be routed back to themselves, and Aux channels have no routing possibilities at all, and are thus not included on the page.

Metering

The **METERS** button opens the Metering page. This allows the signal levels in all the CDC FOUR's internal channels to be viewed simultaneously. The meters displayed on the Metering page are "virtual copies" of the meters on the Channel Overview pages.



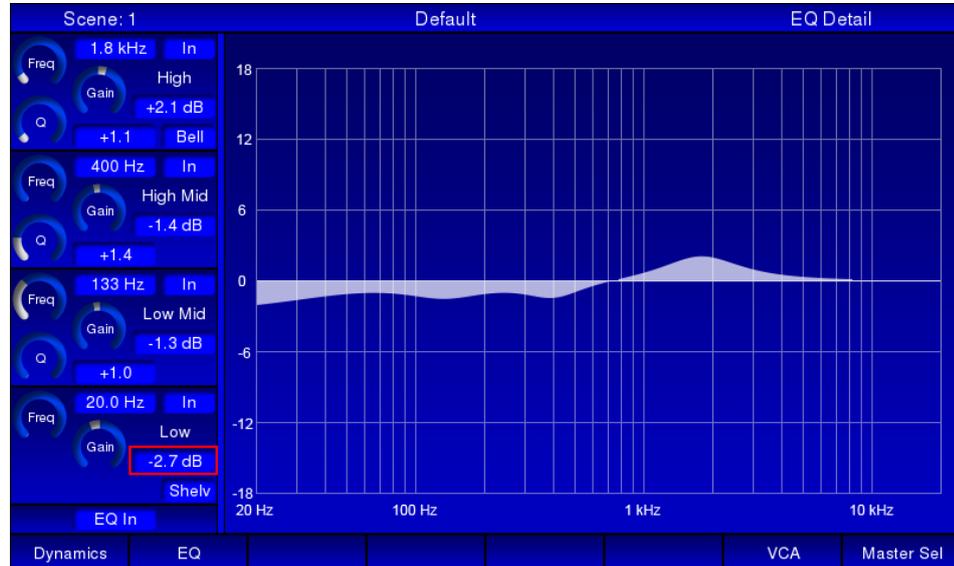
The screen is divided into three, with input meters at the top and centre and output meters at the bottom. Channels 1 to 16 are displayed at the top, the eight stereo channels as dual meters in the centre, and meters for the four Groups, eight Aux sends, two FX sends and the stereo master at the bottom. The FX sends and stereo master have dual meters.

The middle and lower areas are constant, but the upper area will change with selection of the higher-numbered input channel layers (17-32 and 33-48), if the CDC RACK stagebox is in use.

The metering source for the mono and stereo channels may be switched between pre- or post-fade by **Softkeys 1** and **2** respectively. Two further softkeys select the output meters (the bottom meter panel) to switch pre- or post-fade in a similar manner.

EQ detail

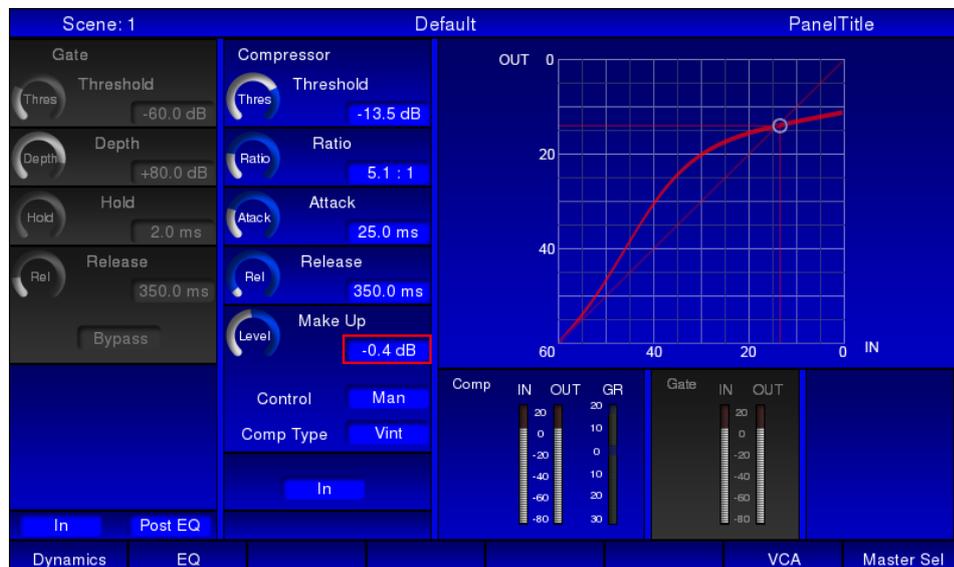
This page is opened by pressing **Softkey 2** from any Channel Overview page. It provides a graphical representation of the currently selected channel's equaliser response.



The EQ curve is displayed as a conventional frequency response graph, with a logarithmic frequency scale from 20 Hz to 20 kHz. The EQ section's virtual controls are included on the screen; the cursor and navigation keys may be used to adjust the EQ response instead of the CAM if preferred. As with the Channel Overview page, the EQ responses of each channel may be viewed and compared by pressing each channel's **SEL** button in turn.

Dynamics detail

This page is opened by pressing **Softkey 1** from any Channel Overview page. It provides a graphical representation of the transfer characteristic of the currently selected channel's compressor.



The dynamics section's virtual controls are included on the screen; the cursor and navigation keys may be used to adjust dynamics parameters instead of the CAM if preferred. The Dynamics detail page differs from the EQ detail page in the important respect that additional dynamics parameters are available for adjustment. These parameters cannot be accessed from the CAM, but may be adjusted using the cursor and **ADJUST** controls.

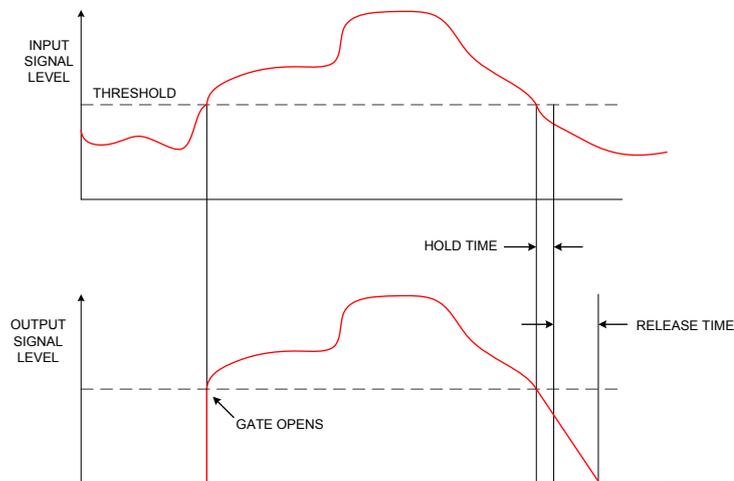
Noise Gate

In addition to the Threshold (**THR**) and Gate In (**IN**) controls that are available from the CAM and Channel Overview page, the Dynamics detail page provides the following controls:

Depth – adjusts the attenuation applied to signals below the threshold. The range is 0 dB to 96 dB, with a default setting of 80 dB. Setting a lower Depth parameter causes the gate to only “partially close”, and not fully reject signals whose level is below the gate threshold.

Hold – a noise gate's action can be obtrusive if it closes too suddenly when the signal drops below the threshold level. The **Hold** and **Release** (see below) parameters control this timing. **Hold** is variable between 2 ms and 2 s, and has a default setting of 2 ms. When the signal level drops below the threshold, the gate remains open for the Hold time before the gate begins to close again.

Release – sets the time over which the gate attenuates the signal (to the level set by **Depth**) after the expiry of the **Hold** time. It has a range of 2 ms to 2 s, with a default setting of 350 ms, which is a suitable value for many musical sources. The attenuation increases linearly over the Release period, minimising the audible effect of the gate closing.



Compressor

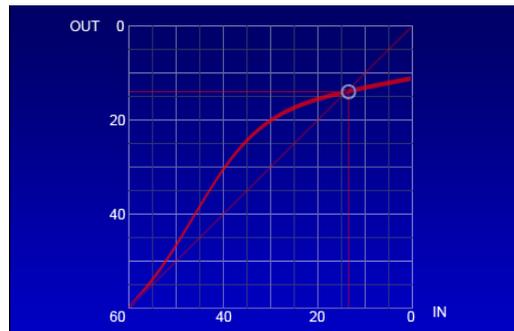
Threshold, **Ratio** and **Level** parameters, plus Compressor **In**, **Manual/Auto** and **Standard/Vintage** settings are available from the CAM and Channel Overview page. In addition to these, the Dynamics detail page also provides the following controls:

Attack – this is a time parameter which determines how rapidly compression is applied to signals once they have exceeded the value set by the **Threshold** control. With some percussive sounds, applying compression too quickly removes the initial transient of the signal, which can rob it of its character. The range of times available is 0.5 ms to 100 ms; the default value is 25 ms.

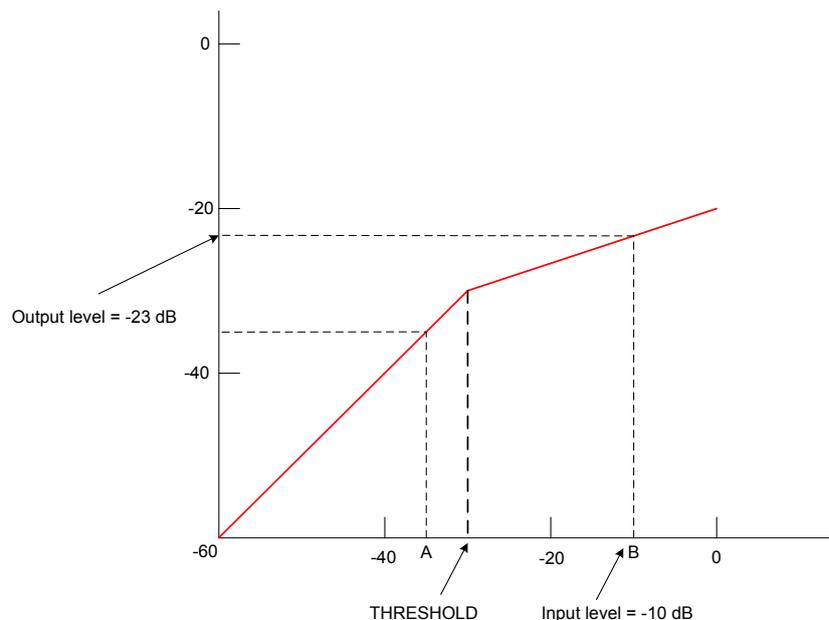
Release – this works in a similar manner to the Noise Gate’s Release parameter; after the signal level drops below the compressor threshold, the gain reduction applied as a result of the compressor action is gradually reduced. Setting the Release parameter to suit the signal being treated will generally minimise the effect of “pumping” that compression can produce.

Transfer Characteristic and meters

The Dynamics detail page also provides separate input and output metering for the gate, compressor and limiter (in the case of the Groups and Aux Sends), which allows a quick evaluation to be made of the effects of the dynamics processing. A Gain Reduction meter for the compressor is also implemented on-screen.



The transfer characteristic displays the relationship between input and output levels graphically, and shows the effects of the compressor’s **Threshold**, **Ratio** and **Level** controls. The horizontal (x-) axis represents input signal levels, and the vertical (y-) axis output levels. The output signal level for any input signal level can be found by tracing a line vertically from the x-axis at the point representing the input signal level to the transfer curve, then reading across horizontally to the y-axis.



With no compressor action (i.e., with the compressor by-passed, or with **Ratio** set to 1:1), the transfer characteristic is a straight line at 45° to both axes. The line becomes “kinked” when compression is applied. In the example above, the input signal at A is at -35 dB, and hence below the threshold of -30 dB; no compression

is applied, and the output level is also -35 dB. The signal level at B is -10 dB, which is above the threshold. This results in the output level being reduced by 13 dB to -23 dB. Real world signals, of course, have a dynamic range which includes elements both above and below the threshold, so the effect of compression is only for the louder elements to be reduced in level, which will reduce the overall volume. This reduction can be compensated for with the **Level** control.

As with the Channel Overview page, the dynamics processing of each channel may be viewed and compared by pressing each channel's **SEL** button in turn.

FX processing

The **FX** button opens the FX Settings page; the two internal DSP effects processors are controlled from here. The two processors each have their own (identical) control page; **Softkeys 4** and **5** select that for **FX1** and **FX2** respectively. The controls on these pages have no hardware equivalents, and are selected and are adjusted by using the cursor keys and the **ADJUST** control.



Each FX processor comprises three separate FX “modules”: Reverb, Delay and Modulation.

The default input signal to each FX module is the signal being sent to the **FX1** (or **FX2**) buss. This is indicated by the **Input** buttons, which may alternatively be set to **Off** to disable the effect of that module, or to the other FX buss, or to any of the eight Aux busses. The three modules are effectively “in parallel”, and may be used individually, or in combination. Alternatively, the modules may be connected “in series” using the Send controls in the Modulation and Delay modules. Thus, the Modulation module may feed either the Delay or Reverb modules, with the Reverb or Delay module remaining free to be used with another source; or all three modules may be cascaded.

The outputs of the two FX processors can be added to the Stereo Master mix, or to any of the four Groups, by using faders 13 and 14 in the **Outputs** layer. See “FX sends and returns” on page 49 for full information on the audio path of the FX channels.

Module 1 - Modulation

The Modulation module may be used to generate a range of time-variant “phasing” effects of various kinds. 8 standard modulation presets are provided, which may be selected with the **Preset** control. These are:

- Chorus Slow**
- Chorus Fast**
- Flanger Slow**
- Flanger Fast**
- Celeste Slow**
- Celeste Fast**
- Rotor Slow**

Rotor Fast

Once a Preset has been selected, the effect may be modified as required by adjusting its various parameters:

Filtering – the Modulation module is provided with variable-frequency hi-pass and lo-pass shelving filters which may be used to select the band of frequencies that the Modulation will apply to. The lo-pass filter turnover frequency is adjusted with the **LS Frequency** control, which has a range of 20 to 200 Hz, with a default value of 100 Hz. The **LS Gain** control has a range of ± 18 dB. Similarly, the HS controls affect the higher frequencies; **HS Frequency** has a range of 1.5 to 15 kHz with a default value of 6.3 kHz; the **HS Gain** range is also ± 18 dB.

Modulation – the **Modulation** rate and **Intensity** controls adjust the frequency and amount of modulation respectively. The controls' ranges are in arbitrary units, from 50 to 200, with default values of 100.

Sends – the **Send Reverb** and **Send Delay** controls send the Modulation module's output to the Reverb and Delay modules respectively.

Modulation output – the output level to the FX return channel from the Modulation module is adjusted with the **Modul Out** control. A **Modul Pan** control is also provided.

Module 2 - Delay

The Delay module is an audio delay line configured specifically for musical use. The module can generate single or multiple echoes at time intervals which may be specified in terms of BPM, and can be set by the user using a **Tap Tempo** feature. Six delay presets are provided, which may be selected with the **Preset** control:

One Echo 1/4
Two Echo 1/8
Three Echo 1/16
Three Echo 1/16 Delayed
Four Echo 1/16
One Echo 1/4 with 4 Reflect.

Once a Preset has been selected, the delay effect may be modified as required by adjusting its various parameters.

Filtering – the Delay module is provided with the same variable-frequency hi-pass and lo-pass shelving filters as the Modulation module. The **LS Frequency**, **LS Gain**, **HS Frequency** and **HS Gain** controls have the same functions, parameter ranges and default values.

Delay time - may be set as a BPM value, using the **Tempo** control (range 40 to 240 BPM) in conjunction with the **Factor** control. The **Factor** control has a range of 0 to 13 (arbitrary units), with a default value of 8. With **Factor** set to 8, the **Delay Time** (displayed below the **Factor** control) is based on one repeat per beat; i.e., with a **BPM** of 120 and **Factor** set to 8, the delay time will be 500 ms. Setting **Factor** to 9 doubles the delay time to 1 s; setting it to 7 halves it to 250 ms. The maximum delay available from the Delay Module is 2 s.

The table below summarises the relationship between Factor and Delay Time:

FACTOR	RATIO TO BPM
1	1/24
2	1/16
3	1/12
4	1/8
5	1/6
6	1/4
7	1/2
8	Equivalent to BPM
9	x 2
10	x 3
11	x 4
12	x 5
13	x 6

Alternatively, a delay time may be set directly by adjusting the **BPM** and **Factor** controls while observing the **Delay Time** display. **Factor** will operate as a “coarse” delay time control, while **BPM** will act as a “fine” control.

Additionally, the output of the delay line may be fed back to its input with the **Feedback** control to create multiple echoes with decaying amplitude.

Tap Tempo – Softkey 1 may be used to input a BPM value by tapping the button; a minimum of three taps is required. The tempo of the taps will then define the delay time.

Sends – the **Send Reverb** control sends the Delay module’s output to the Reverb module.

Module output – the output level of the Delay module is adjusted with the **Delay Out** control. A **Delay Pan** control is also provided.

Module 3 – Reverb

The Reverb Module offers six basic room/plate simulations, which may be selected with the **Preset** control:

Hall Bright – a large space

Hall Warm – as Hall Bright, but with less hard surfaces

Room Bright – a small space

Room Warm – as Room Bright, but with less hard surfaces

Plate Bright – simulation of a traditional echo plate

Plate Warm – as Plate Bright, but with reduced HF reflections

Once a Preset has been selected, the reverberation may be modified as required by adjusting its various parameters.

Filtering – the Reverb module is provided with the same variable-frequency hi-pass and lo-pass shelving filters as the Modulation and Delay modules. The

LS Frequency, LS Gain, HS Frequency and **HS Gain** controls have the same functions, parameter ranges and default values.

Reverb – the **Reverb Time** parameter sets the basic “size” of the space being simulated, i.e., its RT_{60} value. The range of available reverb times is preset-dependent:

PRESET	MIN.	MAX	DEFAULT
Hall Bright	0.8 s	12.0 s	1.6 s
Hall Warm			
Room Bright	0.4 s	8.0 s	0.8 s
Room Warm			
Plate Bright	0.4 s	6.0 s	0.6 s
Plate Warm			

Module output – the output level of the Reverb module is adjusted with the **Reverb Out** control.

System



The System page provides controls for the CDC FOUR's oscillator, talkback routing, monitor control functions and Solo system control. The page is divided in four Modules, plus an area on the right for PFL and AFL metering. Most of the controls on these pages have no hardware equivalents, and are selected and adjusted by using the cursor keys and the **ADJUST** control.

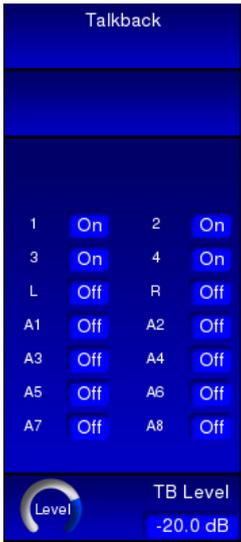
Oscillator

The CDC FOUR's line-up oscillator can generate a sine wave, white noise or pink noise for system test or alignment, or for room equalisation purposes.

The oscillator is enabled by pressing **Softkey 1 (OSC On/Off)**. The **Type** button selects the oscillator output signal – **Sine**, **White** (Noise) or **Pink** (Noise). When Sine is selected, a **Freq** control becomes available; in this mode, the oscillator has a range from 10 Hz to 10 kHz. The Oscillator output level is adjusted with the **OSC Level** control.

The routing buttons allow the oscillator signal to be routed to any combination of:

- L & R** – Stereo master buss
- 1 to 4** – Groups 1 to 4
- A1 to A8** – Aux busses 1 to 8



Talkback

A dynamic microphone or talkback headset mic may be connected to the **TALKBACK** connector on the rear panel. Talkback mic level is adjusted with the **TALKBACK** rotary control at the top right of the mixer control surface, or the corresponding virtual **TB Level** control in the Talkback module.

The routing buttons allow talkback to be routed to any combination of:

- L & R** – Stereo master buss
- 1 to 4** – Groups 1 to 4
- A1 to A8** – Aux busses 1 to 8

Thus the engineer may speak to the FOH output, individual monitor speakers (when the Aux busses are being used for artist foldback) or to the Group outputs, which may be in use to feed different parts of the stage or auditorium, or a recorder.

The microphone is made active when the **TALK** button is pressed. The **TALK** button is momentary, and thus must be held down while speaking.

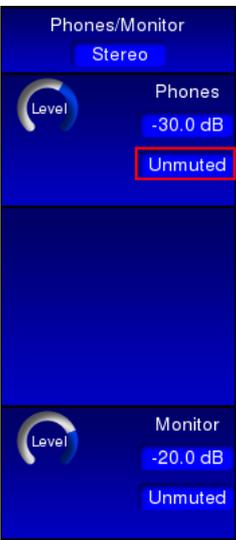


Phones/Monitor

A detailed block diagram of the Phones/Monitor section may be found in the Appendix on page 79.



The CDC FOUR’s monitoring system allows for the connection of either (or both) headphones or a stereo power amplifier and a pair of monitor loudspeakers. The monitor system will carry the Stereo Master output signal, unless a **SOLO** button is pressed somewhere on the mixer, in which case either a mono PFL or a stereo AFL signal from the channel in question will be heard instead.



A standard 3-pole ¼” headphones jack socket is provided at the front of the mixer, under the fader block. The rear panel provides three ¼” jacks for connection of an external stereo (**MON L** and **MON R**) or a mono (**MON M**) power amplifier (useful for an engineer’s local wedge monitor). The front panel headphone socket and the rear panel monitor outputs have their own level controls and may be used simultaneously.

The headphone volume may be adjusted with the rotary **PHONES** control, or its virtual equivalent, **Phones Level**. The headphone output may be muted with the **M** button below the level control or on-screen.

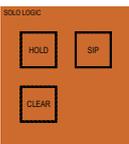
The separate monitor output level is adjusted with the rotary **MONITOR** control, or its virtual equivalent, **Monitor Level**. The monitor output may be muted with the **M** button below the level control or on-screen.

The stereo monitor outputs may be summed to mono with either the **SUM** button, or the **Mono** on-screen button.

Solo control

The CDC FOUR’s solo system is entirely conventional in operation and follows the long-established practices implemented in CADAC analogue consoles. The solo system allows an engineer to monitor any of the various inputs or outputs (individually or in combination) on headphones or loudspeakers, without otherwise altering any signal flows through the mixer.

Any channel in the currently selected Layer may be routed to the solo system by pressing the **SOLO** button above its fader. Alternatively, the channel currently



assigned to the CAM may be soloed with the CAM's **SOLO** button, or the on-screen Solo button using screen navigation in the normal manner.

The action of the **SOLO** buttons in combination may be controlled with the **HOLD** button. When **HOLD** is not selected, the **SOLO** buttons are interlocking, and pressing a second **SOLO** button while one is already active will deselect the first; only one channel may be soloed at a time.

With **HOLD** selected, the **SOLO** buttons become latching and remain selected when pressed until a second press deselects it. Additional channels may be soloed simultaneously, allowing the monitoring of multiple channels. The **CLEAR** button may be used to deselect all **SOLO** buttons currently active with a single button press.

Softkey 6 (Hold) is the on-screen equivalent of the hardware **HOLD** button. **Softkey 7 (Clear)** is the on-screen equivalent of the hardware **CLEAR** button.

PFL and AFL

The on-screen **Solo** module allows the Solo system to be configured to suit individual requirements. The **SOLO** buttons in mic/line channels, stereo channels, Aux channels and Groups may be individually selected to operate in PFL (mono) or AFL (stereo) mode, with the on-screen **Channels**, **St Channels**, **Auxes** and **Groups** buttons respectively.

Channels soloed in PFL mode will route the pre-fade signal to the solo system, thus the fader position and mute button will not affect the signal being monitored. The PFL signal is, however, post all DSP processing, so the effect of EQ, dynamics and delay can be checked. If stereo channels or the FX channels are solo'd in PFL mode, a mono sum of the left and right legs is heard.

Channels soloed in AFL mode will route the post-fade, post-panpot signal to the solo system; thus stereo channels will be heard correctly in stereo, and a mono signal will be heard in its correct position in the stereo image. Fader and mute will affect the solo signal.

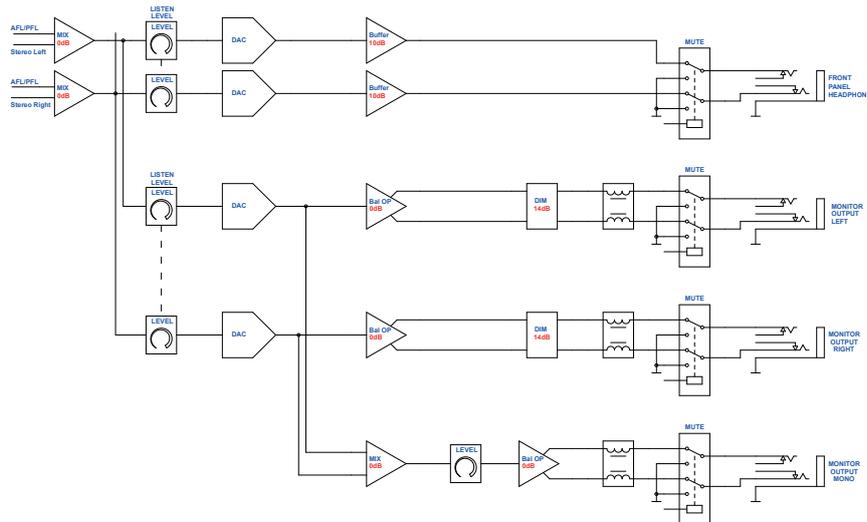
When a Group is soloed in AFL mode, the post-fade, post-panpot signal is routed to the monitor mix.

When an Aux. send is solo'd in either mode, the signal is always mono, but pre-fade in the case of PFL, and post-fade for AFL.





Solo system metering and levels



The solo signals are fed into the mixer's monitoring system, where they are routed to the rear panel Monitor Outputs (both as stereo and as a mono sum), and the stereo headphone socket under the front armrest.

The front headphones output has its own volume control (**PHONES**) and mute (**M**) button.

Signals solo'd in PFL mode will generally be at a higher level than those solo'd in AFL mode, so separate trim adjustments are also provided for the AFL and PFL systems. These are on-screen controls, and can be found in the Solo module of the **SYSTEM** screen page.

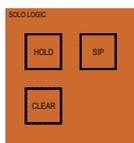
SIP mode

The PFL and AFL modes described above are only monitoring modes, and do not alter any other signal routings through the mixer. They are non-destructive, and can be used safely during performance or recording without endangering any other outputs from the mixer.

A further solo mode, SIP (Solo-in-Place) is available which is destructive. This mode is also often referred to as 'Check Solo'. SIP mode is enabled by pressing the **SIP** button.

In SIP mode, soloing any input channel mutes every other input channel; thus the soloed channel is the only one left feeding the master output (or Group, if applicable). Thus it is 'truly' soloed, by virtue of all other signals being removed. This mode is useful when setting up for performance or recording, but should clearly be used with great caution otherwise!

Solo In Place mode may be selected **On** or **Off** by pressing and holding the **SIP** button for at least 3 seconds, or clicking or its on-screen equivalent. When Solo In Place is **On**, pressing a **SOLO** button anywhere on the mixer mutes all other channels.



Mono PFL and stereo AFL meters are also provided on the **SYSTEM** page.

System Settings

Pressing **Softkey 8** from the **SYSTEM** page opens an “engineering” page, which provides information about the firmware version and Ethernet IP address, and access to further engineering pages via the following softkeys:



Softkey 1 (Fact. Reset) reinitialises the CDC FOUR’s control system. All audio will be muted during reboot, and all mixer settings will be lost. All parameters will be reset to their default values.

Softkey 6 (Maintenance) opens the **CDC 4 maintenance** page allowing mixer and/or scene settings to be saved and recalled from an external USB memory device, and other engineering functions. See page 80 for further details.

Softkey 8 (System) returns to the System page.

Scene Control

The CDC FOUR incorporates a Scene Memory system. This is a “snapshot” automation system, and allows every audio-related parameter* on the mixer to be saved as a Scene, named, and subsequently recalled. A Scene may typically include channels being muted and unmuted, levels being changed, and FX sends being enabled, but may extend to any mixer function, such as EQ and dynamics adjustments, routing, FX parameter changes, etc. Up to 999 Scenes may be saved in this way.

The Scene Memory feature is extremely useful in theatre production work, as entire sound configurations may be set up and optimised in rehearsal, and then saved. During performance, the engineer merely has to step through the consecutive scenes at the appropriate cue to reset the entire mixer to the correct settings.

* An important exception is the position of the Stereo Master fader; being non-automated, this remains manual at all times.

Current Scene

An important aspect of the Scene Memory system is that the current status of the mixer at all times – i.e., the settings of all mixer controls - is constantly being written into a single memory location, referred to as the Current Scene. This is a non-volatile memory, and during the mixer’s boot procedure, the contents of the Current Scene are recalled. This means that if the mixer suffers a temporary power failure, its last-known state will be automatically reinstated in all respects when power returns.

When a Scene is saved, the contents of Current Scene is copied into the selected Scene Memory.

Pressing the **SCENE** button adjacent to the screen opens the Scene page:

No	Name	Action	Event
1	Default		
2	Scene 1		

The scenes which have been saved in the mixer’s internal Scene Memory are displayed in tabular form.

Default Scene

Initially, the only scene in the list is Default. This scene is constant, and cannot be deleted, altered or over-written. Recalling this scene will return the entire mixer to a factory default state, with all channel parameters effectively “reset”. This function is useful when resetting the mixer for a new project, but should be used with caution otherwise!

Insert a Scene

New Scenes may be added to the Scene list by pressing **Softkey 1 (Insert)**. This copies the contents of the Current Scene memory (see above) into a new Scene in the list. This Scene will be named NEW_SCENE, but may be subsequently renamed (see below).

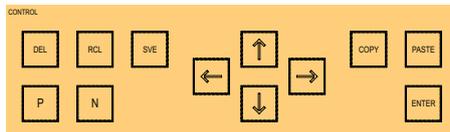
Renaming Scenes:

To rename a Scene, move the red box to the Scene name in the second column (Name) – e.g., NEW_SCENE. Press **ENTER**, and a pop-up list will appear, enabling the Scene name to be changed. Press **Softkey 5 (Reset Name)** to clear the field. Use the **ADJUST** knob to scroll to the first character of the new name from the pop-up list and then press the RIGHT cursor key and repeat. Continue this process until all the characters have been entered as required. Note that both upper and lower case letters, numbers and other characters are available; a space character can be found after the upper case letters.

Overwriting Scenes:

To save the mixer’s current settings into an existing Scene, select the required Scene by moving the red box in the displayed list, and press either the **SAVE** key, or **Softkey 4 (Save)**. This will over-write the existing Scene.

Recalling Scenes:



To recall a previously saved scene, use the **ADJUST** control to move the red box to the required scene in the Scene List (any column), and press either **RCL** or **Softkey 3 (Recall)**. This will replace the mixer’s current settings with those from the memory. Any channel level differences in the currently-selected layer will be implemented by movements of the motorised faders.

The sequence of scenes making up the Scene list may be stepped through one at a time by pressing the green **N** button (Next). At any time, the previous scene in the list may be recalled by pressing the red **P** button (Previous).

Deleting scenes

A Scene may be deleted from the Scene list by selecting, and pressing either the **DEL** button or **Softkey 2 (Delete)**.

Shortcut Scene Recall

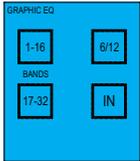
User keys **U1** to **U4** may be assigned as shortcut triggers, which will recall any Scene in the list, removing the necessity to scroll through the list. To assign a Scene to one of the User keys, move the red box to Column 3 (Action) for the required Scene, and press **ENTER**. Scroll to one of the four User keys in the

displayed pop-up list (USR 1 to USR 4), and press **ENTER** again.

If a User Key previously had a Scene assigned to it, that assignment will be cancelled, and the key will now recall the new Scene.

MIDI commands

Column 4 in the list – Event – is not currently implemented.



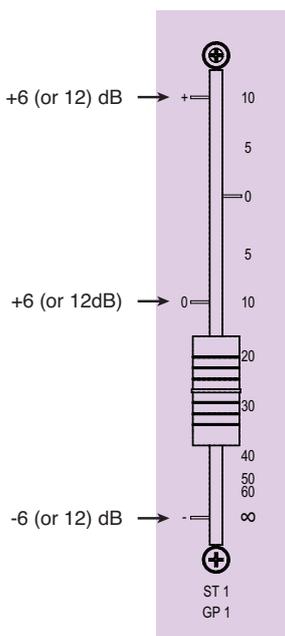
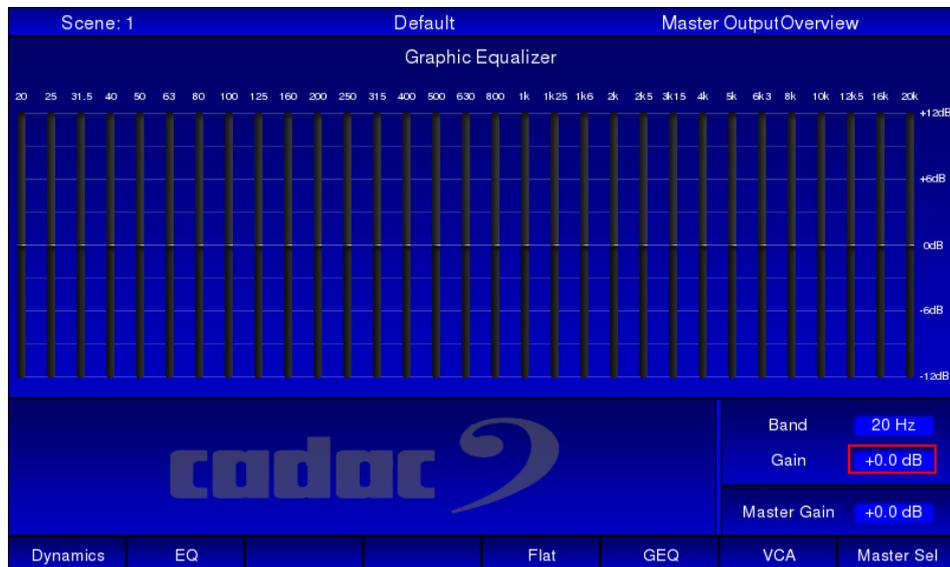
Other mixer functions

Graphic Equaliser

The CDC FOUR is equipped with a stereo 32-band graphic equaliser in the main output signal path. It is pre-fade and pre-dynamics, but post the main output channel's standard parametric EQ.

The equaliser settings are controlled by the channel faders, and effectively constitute a sixth control Layer. As there are only 16 faders, the audio frequency band is split into two, and the faders used to control either the sixteen frequencies below 1 kHz, or above 1 kHz, respectively.

A graphical representation of the equaliser may be obtained by pressing **Softkey 6 (GEQ)** from the **Master Sel** screen page. Pressing **Softkey 8 (Master Sel)** from this page will return to the previous page.



Control of the graphic equaliser is assigned to the faders by pressing the **IN** button and one of the **1-16** or **17-32** buttons. If the equaliser has not already been placed in circuit and adjusted, the 16 motorised faders will jump to their mid-position; otherwise, they will assume positions corresponding to the EQ curve previously set. Note that Fader 16 has no function when **17-32** is selected.

Pressing any Layer Select button will revert the faders to control of another layer, but the graphic equaliser's settings will remain applied to the main output.

The equaliser can cut or boost bands of frequencies (centred on the ISO standard frequencies) by either 6 dB or 12 dB, according to the setting of the **6/12** button. When the button is lit, 12 dB of cut/boost is selected.

The centre frequency of the band which each fader controls is as follows:

Fader	1-16	17-32
1	20 Hz	800 Hz
2	25 Hz	1 kHz
3	31 Hz	1.25 kHz
4	40 Hz	1.6 kHz
5	50 Hz	2 kHz
6	63 Hz	2.5 kHz
7	80 Hz	3.15 kHz
8	100 Hz	4 kHz
9	125 Hz	5 kHz
10	160 Hz	6.3 kHz
11	200 Hz	8 kHz
12	250 Hz	10 kHz
13	315 Hz	12.5 kHz
14	400 Hz	16 kHz
15	500 Hz	20 kHz
16	630 Hz	(not used)

Note that pressing **Softkey 5 (Flat)** from the **Graphic Equalizer** page will remove the EQ curve and flatten the frequency response.

USB port

The Type 'A' USB port on the top panel is for the connection of a USB memory device or USB QWERTY keyboard.

A memory device connected here enable console configurations and scene data to be backed-up and restored. See "Maintenance page" on page 80.

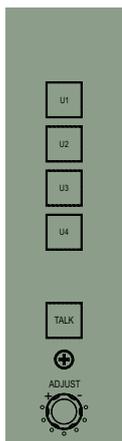
Ethernet port

Used specifically for updating the CDC FOUR's operating system when software updates are available. See "Maintenance page" on page 80.

MIDI

The CDC FOUR is equipped with a standard MIDI interface, consisting of three rear panel 5-pin DIN sockets: MIDI, IN, OUT and THRU.

The MIDI interface will be implemented in a future software release.



User buttons (U1 – U4)

Four programmable soft keys are provided for the operator's use. These are **U1** to **U4**, to the right of the TFT screen.

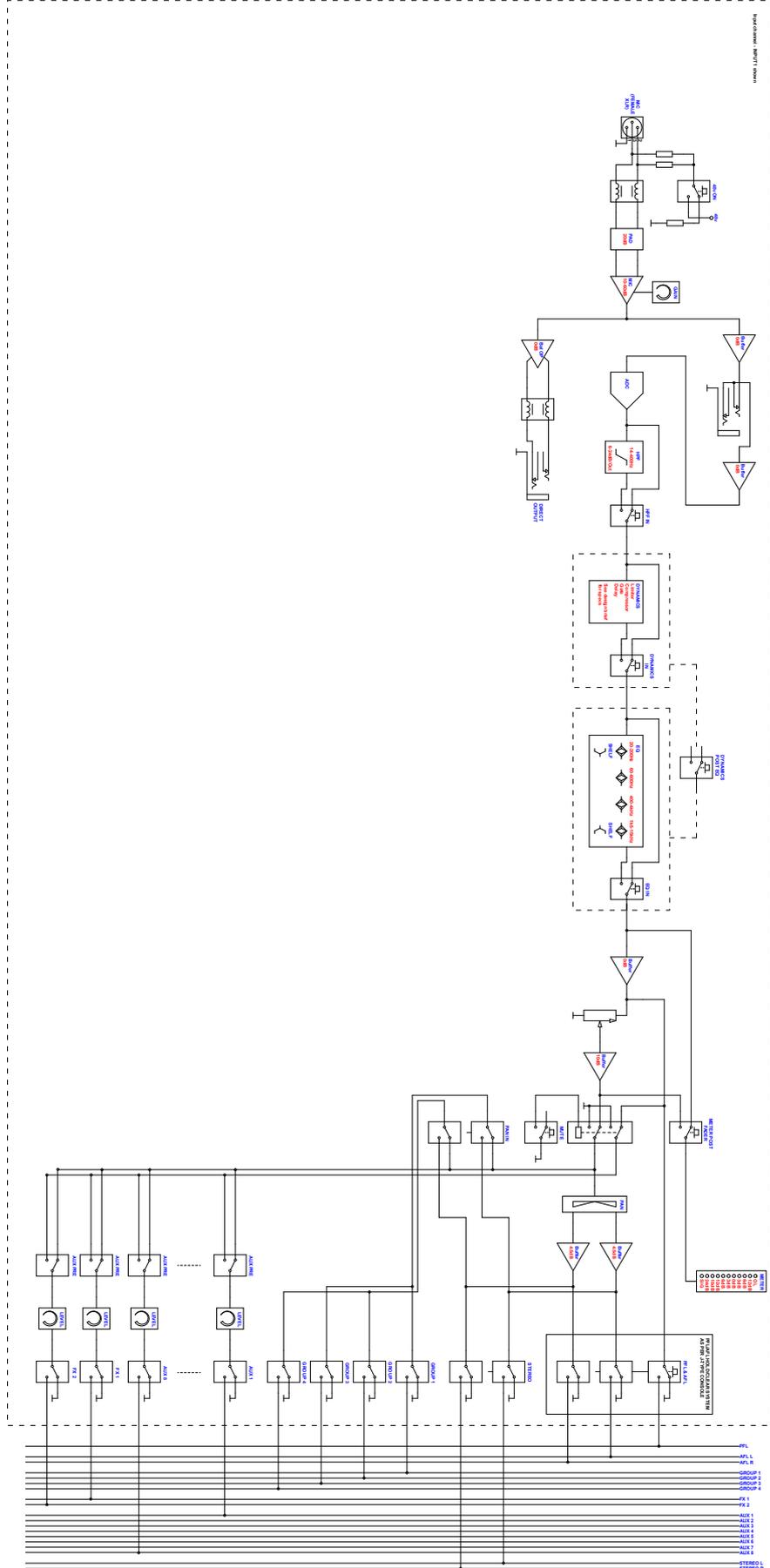
The User buttons can be programmed from the Scene page. They allow immediate Scene recall without the necessity of using the Scene page. See "Shortcut Scene Recall" on page 68.

Technical Specification

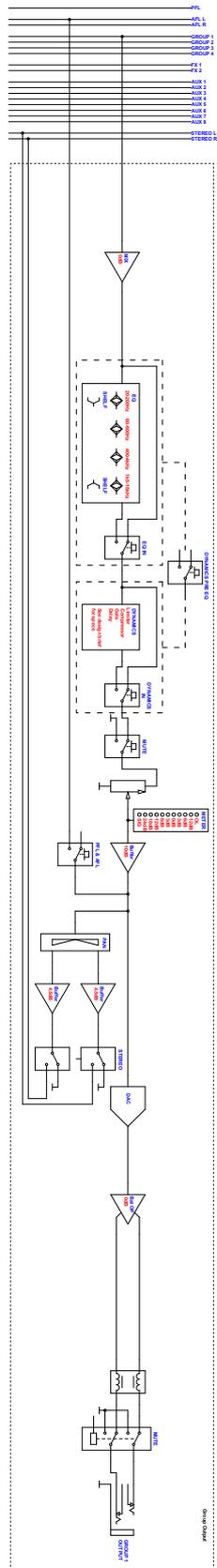
Channels	32 (16 mono 8 stereo)
Auxiliaries	8 mono (Switchable pre/post fader) + 2 FX (Switchable pre/post fader)
Sub groups	4 mono, route and pan to Main LR
Input impedance	1k2 ohm mic input on XLR of combi connector
Equivalent Input Noise	Better than 128 dB
Input impedance	10k ohm electronically balanced on jack of combi connector
Nominal input level	-21 dBFS (0 dBu)
Max. input level	0 dBFS (+21 dBu) balanced -11 dBFS unbalanced (+ 10 dBu)
Max. output level	+21 dBu (0 dBFS)
CMRR	-70 dB (50 Hz – 10 kHz)
Signal to noise	-100 dB
Dynamic range	114 dB A weighted
THD	-100 dB
Frequency response	20 Hz to 35 kHz \pm 0.5 dB
Crosstalk	Better than -80 dB at 10 kHz
Phase response	\leq 10° @ 20 Hz
ADC	24 bit, 96 kHz
DAC	24 bit, 96 kHz
Internal	40 bit floating point

Appendix

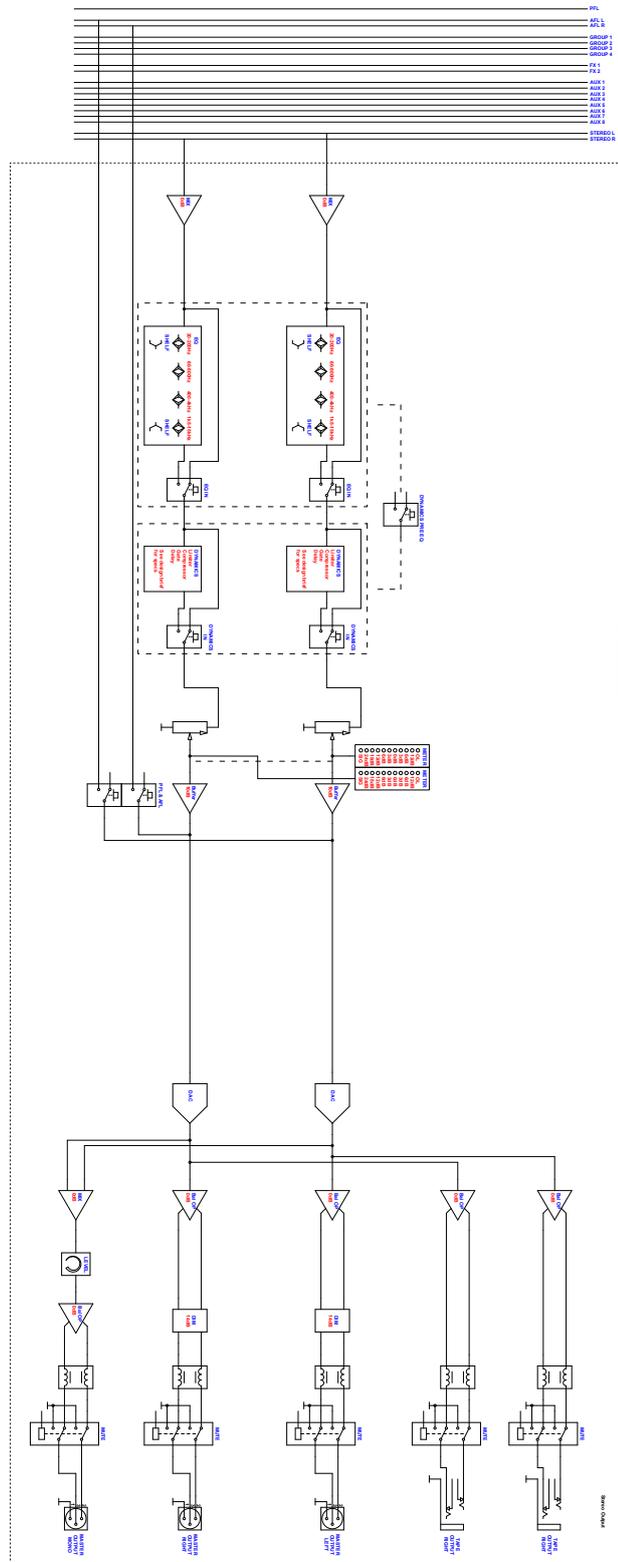
Input Channel Block Diagram



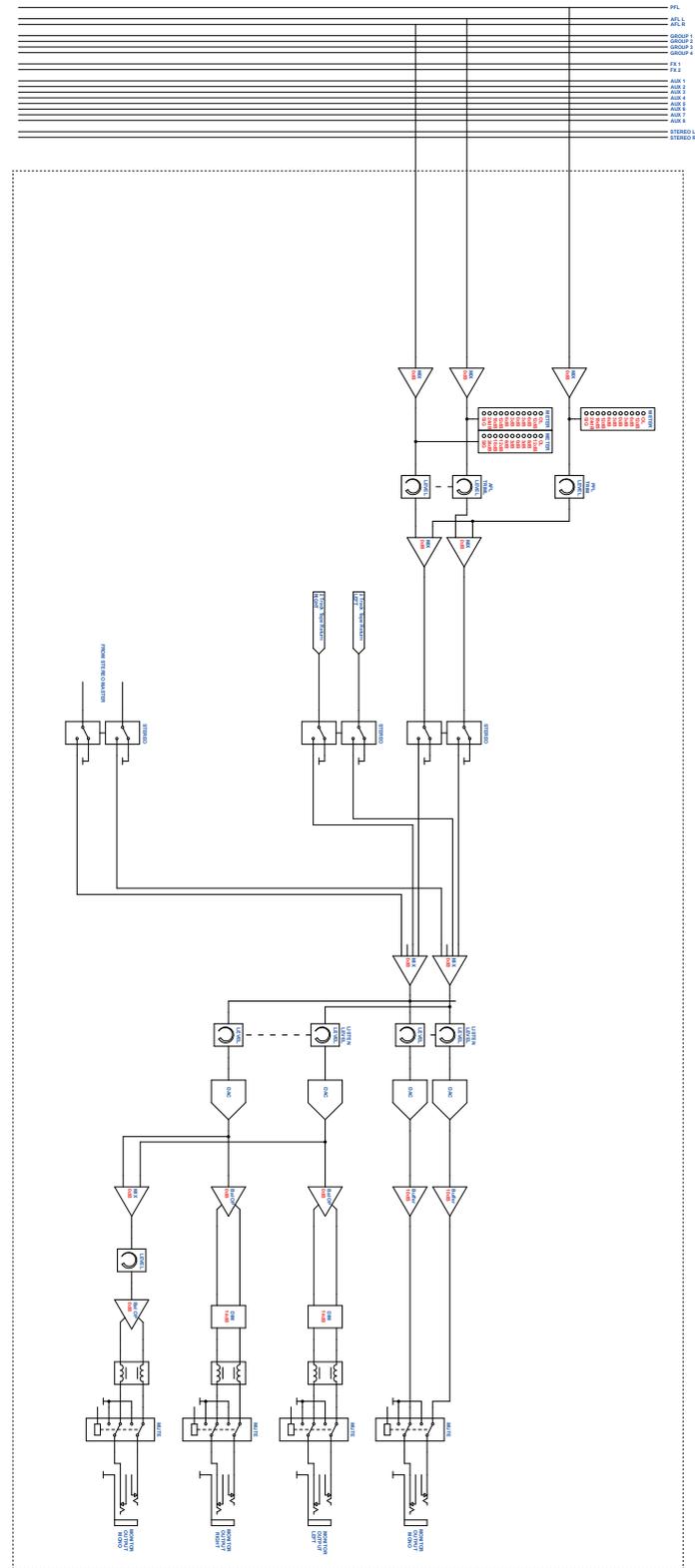
Groups block diagram



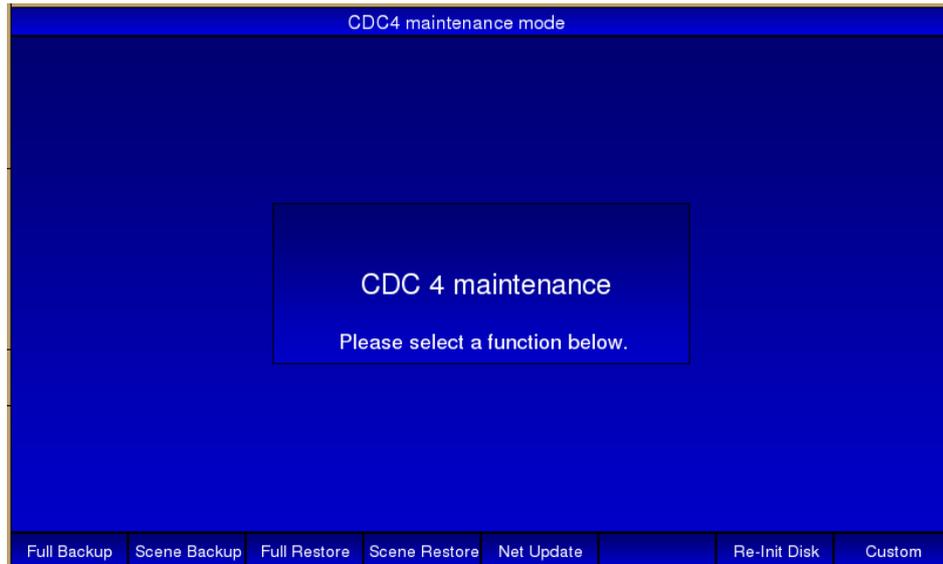
Stereo master block diagram



Phones/Monitor block diagram



Maintenance page



NOTE: Selecting the Maintenance page from the System Settings page stops the CDC FOUR’s main operating program and starts a separate software routine. Audio is muted in Maintenance mode, so this page should not be opened during performance. Loading the maintenance page takes approx. 20 seconds.

The following options are available from the Maintenance page via the Softkeys:

Softkey 1 (Full Backup): This permits all settings, parameters and firmware in the CDC FOUR to be saved to an external memory device connected to the USB port in the Central Control Module. It effectively creates a full “image” of the console for security purposes.

A full backup creates a zip file `cdc4-update.zip` in the root folder of the memory device. The size of the file is approx. 2MB.

Softkey 2 (Scene Backup): This allows the current Scene List to be backed up to external memory. A zip file `cdc4-scene.zip` is created in the root folder of the memory device. **Note** – any subsequent Backup will overwrite the previously-saved file, as the filename is unique.

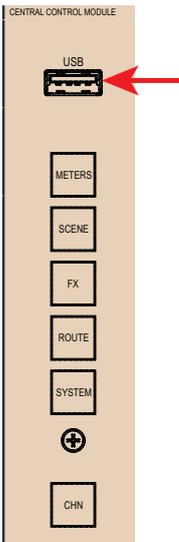
Softkey 3 (Full Restore): Selecting this option will allow all the CDC FOUR’s settings to be restored in full to a previously-saved state. The Full Restore procedure looks for a backup zip file on the memory device, and will automatically restore all settings without further operator action.

Softkey 4 (Scene Restore): This option loads a previously-saved Scene List into the CDC FOUR, thus allowing the “running order” of a show to be restored.

Softkey 5 (Net Update): Select this option to perform a remote software update. The CDC FOUR will automatically download the latest software directly from Cadac’s support server.

WARNING: Performing a Net Update will delete **ALL** console settings, including all stored Scenes. Before proceeding with the update procedure it is strongly recommended that either a Full Backup or Scene Backup is performed.

Proceed as follows:



Ensure that an Ethernet cable with Internet connection is plugged into the CDC FOUR's rear panel RJ45 socket.

Reboot by power-cycling the mixer, then return to the **Maintenance** page and select Net Update.

The CDC FOUR will automatically download and install the current version of software.

NOTE: The CDC FOUR will always download and install the latest version of software irrespective of whether it is already installed in the console or not.

Upon completion, the CDC FOUR will display the following message, "Software successfully updated to the latest version!"

To re-boot the CDC FOUR it is necessary to power-cycle the console twice. After the first power-cycle wait until all the LEDs on the console are lit, then perform the second power-cycle. The console will then boot with the latest version of software installed.

To check which version of software the console is running, press the **System** button and then the System Settings softkey (Sys.Settings).

If console scenes were backed-up prior to updating the software then restore these into the CDC FOUR by using the Scene Restore function above.

NOTE: It is not possible to return to the CDC FOUR's normal operating system from the Maintenance page. To exit this page, please re-boot the console by power-cycling.

Connecting the CDC FOUR to unbalanced sources and destinations

All inputs and outputs on the CDC FOUR are electronically balanced. Balanced interconnections to external equipment are recommended, as they will minimise noise pickup, hum problems, and generally use superior quality connectors.

Most current professional audio equipment is equipped with balanced inputs and outputs, but it may occasionally be necessary to interface the CDC FOUR with equipment having unbalanced inputs and/or outputs. Cadac's recommended method of connecting balanced and unbalanced terminations is shown below:

