CDC eight

Digital Mixing Console

User Manual

cadac

IMPORTANT: This manual is applicable to CDC eight consoles using software version CDC-8 V2.0 only.

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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.

- 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.

Conformaties

Declaration of Conformity

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

The Products Covered by this Declaration: CDC eight 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.

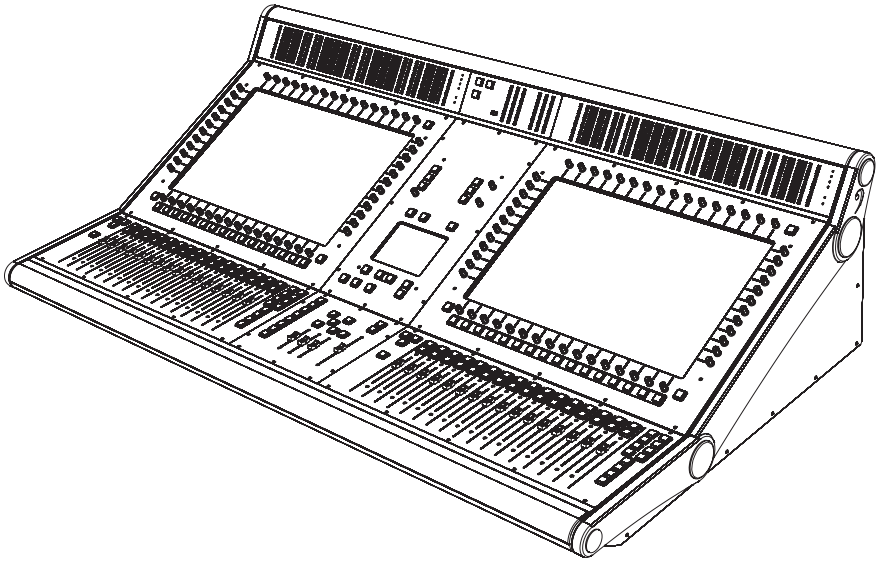
BS EN 61000-4-11:2004 Immunity to voltage dips, short interruptions and voltage variations.

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.

Contents

Introduction



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

From its founding in 1968, Cadac's products have become the benchmark for sound reinforcement consoles. The CDC eight is Cadac's live performance digital production console and is an all new development, based on a proprietary DSP mix platform. It makes available most of the features of our world-famous, large-scale theatre and touring analogue desks in a fully-digital system, with a very intuitive user interface based on large format touchscreens. Professional sound engineers used to working on either traditional analogue consoles, or other digital consoles will find the transition to the CDC eight's operational system quick and easy. However, the attention to detail, high quality audio circuitry and reliability on which the reputation of the Cadac brand is built is still at the core of the CDC eight's design philosophy.

Overview

The basic CDC eight system comprises three physical components: control surface, control surface power supply, and remote I/O MegaCOMMS I/O device(s). The control surface may also be fitted with optional local inputs and outputs; further options are back-up (redundant) power supplies for the control surface and/or remote stagebox(es).

Shipping details

As well as the control surface(s) and remote I/O device(s) specified at the time of ordering, all configurations of the CDC eight are shipped with the following additional items:

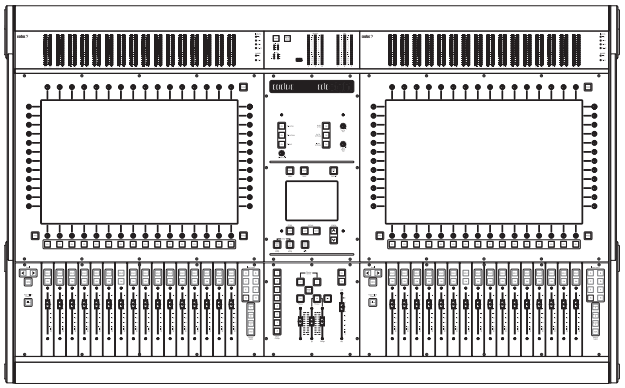
- One or two* PSUs for the control surface (will be shipped in the lid of the surface flightcase if one has been ordered)
- One or two* powerCON TRUE 1 cables
- PSU-to-control surface cable
- Dust cover for control surface
- 2 (CDC eight-16) or 3 (CDC eight-32) console lamps
- User manual

* A second (redundant) PSU may be ordered if wished.

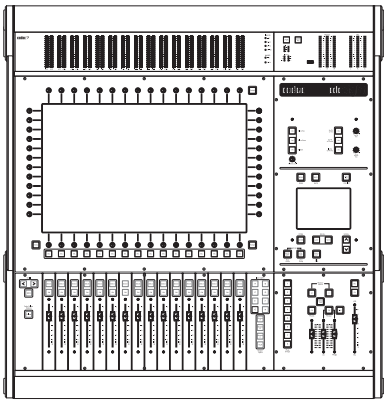
Control Surface:
The control surface itself may be composed of three types of bay:

- a master section (light grey), which carries the CDC eight's 6" Control screen, main output faders and meters, monitor, talkback and other ancillary controls;
- a 16-fader channel section (dark grey), based around a 24" touchscreen display with four sets of rotary encoders mounted around the screen perimeter, and a rear expansion bay for Local I/O cards (see below);
- a 16-fader channel section identical to the above, but without the rear panel expansion slots.

All control surfaces require one master section, but may have either one or two channel sections. Surfaces with one channel section (standard configuration ***CDC eight-16***) will always have Local I/O expansion slots and the master section on the right. Surfaces with two channel sections (standard configuration **CDC eight-32**) will always have the master section fitted centrally between them, and expansion slots at the rear of the left hand channel section.



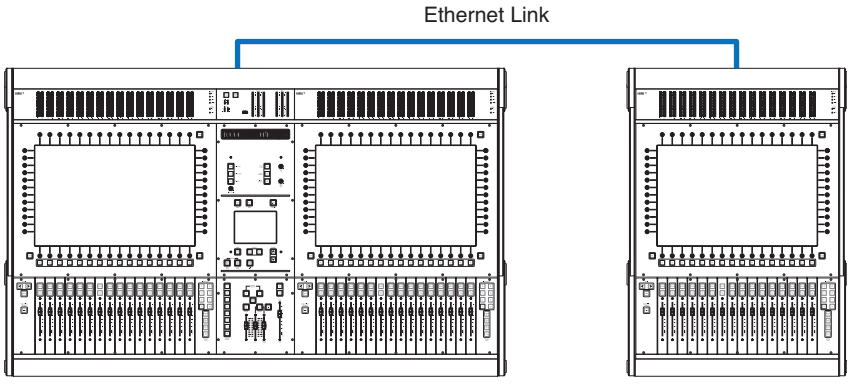
CDC eight-32

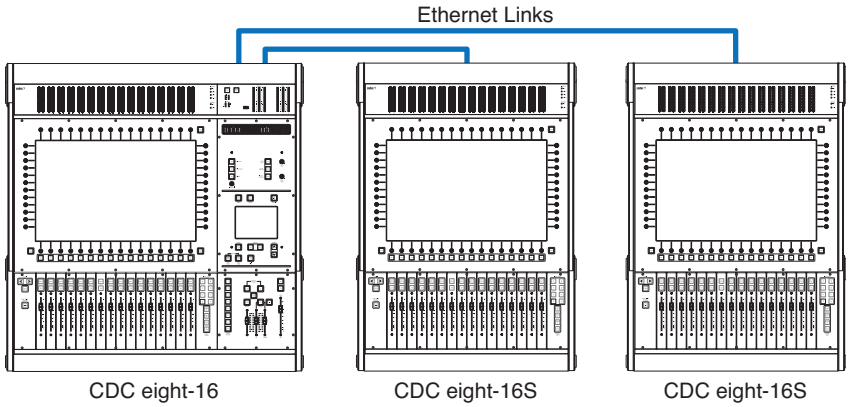


CDC eight-16

One or two additional channel sections may also be added to either of these two basic configurations in the form of **CDC eight-16S** sidecars. Each of these sidecars has its own, internal power supply and is linked to the main frame via an Ethernet connection. Sidecars are not fitted with rear expansion slots. Sidecars may be located wherever they are required; it may be appropriate to use a larger control surface when preparing a show and then using a smaller one in performance. Alternatively, a sidecar could be used on stage as a monitor mixer.

Note that the sidecars have no provision for a redundant power supply.



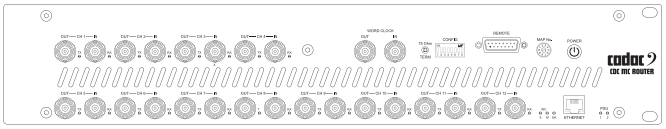


Remote MegaCOMMS I/O Devices:

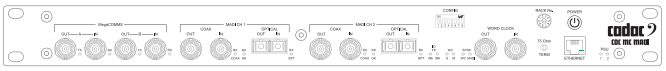
Various versions of remote MegaCOMMS I/O devices are available:

- **CDC MC Router** – up to 3,072 channels of MegaCOMMS routing, including gain tracking
- **CDC MC MADI** – 64 bidirectional channels of MADI I/O, including SRC
- **CDC MC Dante** – 64 bidirectional channels of Dante I/O, including SRC
- **CDC I/O 3216** – 32 mic/line inputs and 16 balanced line outputs
- **CDC I/O 6448** – 64 mic/line inputs and 48 balanced line outputs

CDC MC Router

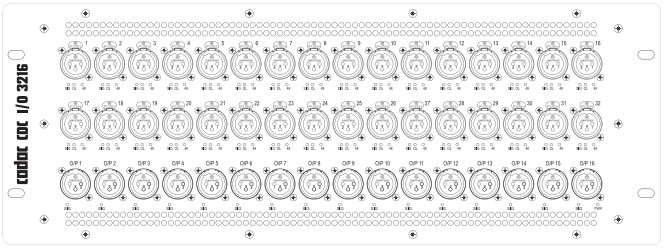


CDC MC MADI

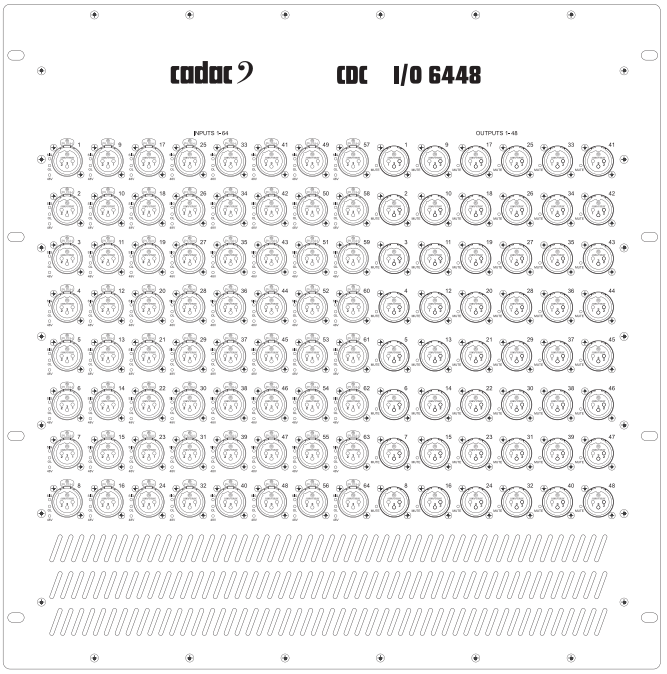


CDC MC DANTE

CDC I/O 3216

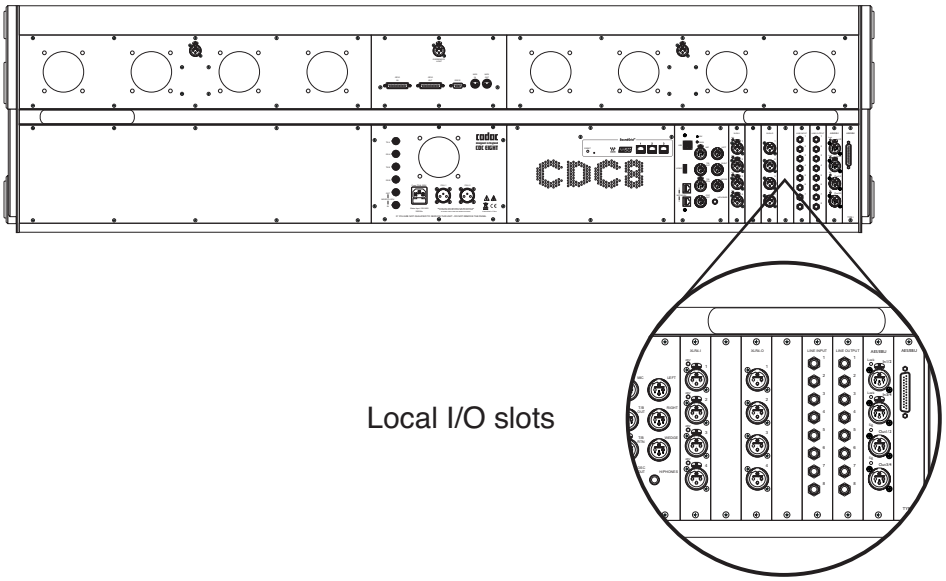


CDC I/O 6448



Either one or two MegaCOMMS remote I/O devices can be connected directly to the console: more may be connected by using the CDC MC Router.

In addition to the I/O provided by the CDC MegaCOMMS remote I/O devices, the control surface's eight rear panel expansion slots may be fitted with I/O cards up to a maximum of 64 inputs and/or outputs. Five card types are available. Standard factory fitment allows for eight local line inputs and eight local line outputs. See "Surface and Local I/O – audio connections" on page 32 for full details.



Local I/O slots

System capability

The control surface contains all the system DSP, and apart from talkback, monitoring and any local I/O cards fitted, all audio signal paths and processing are in the digital domain. The stageboxes contain Cadac high quality analogue microphone preamplifiers with their gain and other parameters being remotely controlled, together with 96 kHz, 24-bit A-to-D and D-to-A conversion.

The CDC eight employs the now-familiar concept of "layering" to reduce the size of the control surface, with normally either 16 (control surface with a single channel section) or 32 (control surface with two channel sections) motorised 100 mm faders able to control a maximum console configuration of 128 input channels mixing into 56 assignable mix busses, plus left, centre and right master busses, and two monitor busses. The touchscreen-based control screens have been designed to present as familiar a layout as possible to operators, and a single touch on an area of the 16 channel strips forming the default display immediately opens a virtual control panel with large, colour-coded buttons and displays. The rotary encoders at the edges of the screen are used to make all parameter adjustments (levels, EQ parameters etc.)

An important feature of the CDC eight is that there is very little distinction between input channels and output channels in terms of features and facilities. The 56 mix busses are freely assignable as groups, auxiliary sends, matrix sends or FX sends: all of these have fundamentally the same facilities as the input channels, and are displayed and controlled in the same way.

On control surfaces with two channel sections, it should be noted that the two sections are operationally identical, and completely independent. Every input and output channel is available to be displayed and controlled in either, or both channel sections.

Data protocol: MegaCOMMS

Communication between the remote MegaCOMMS I/O devices and control surface is via a proprietary Cadac high speed protocol called **MegaCOMMS**, using high-speed 75 ohm coaxial cable terminated in BNC connectors.

Two interconnection paths are provided, A and B, each of which requires a transmit and receive cable. The maximum capacity of each path is 128 audio channels in each direction.

The maximum recommended cable run between any two system components (i.e., surface to I/O device, or between I/O devices) is 150 m (492 ft).

CDC eight – Main Features

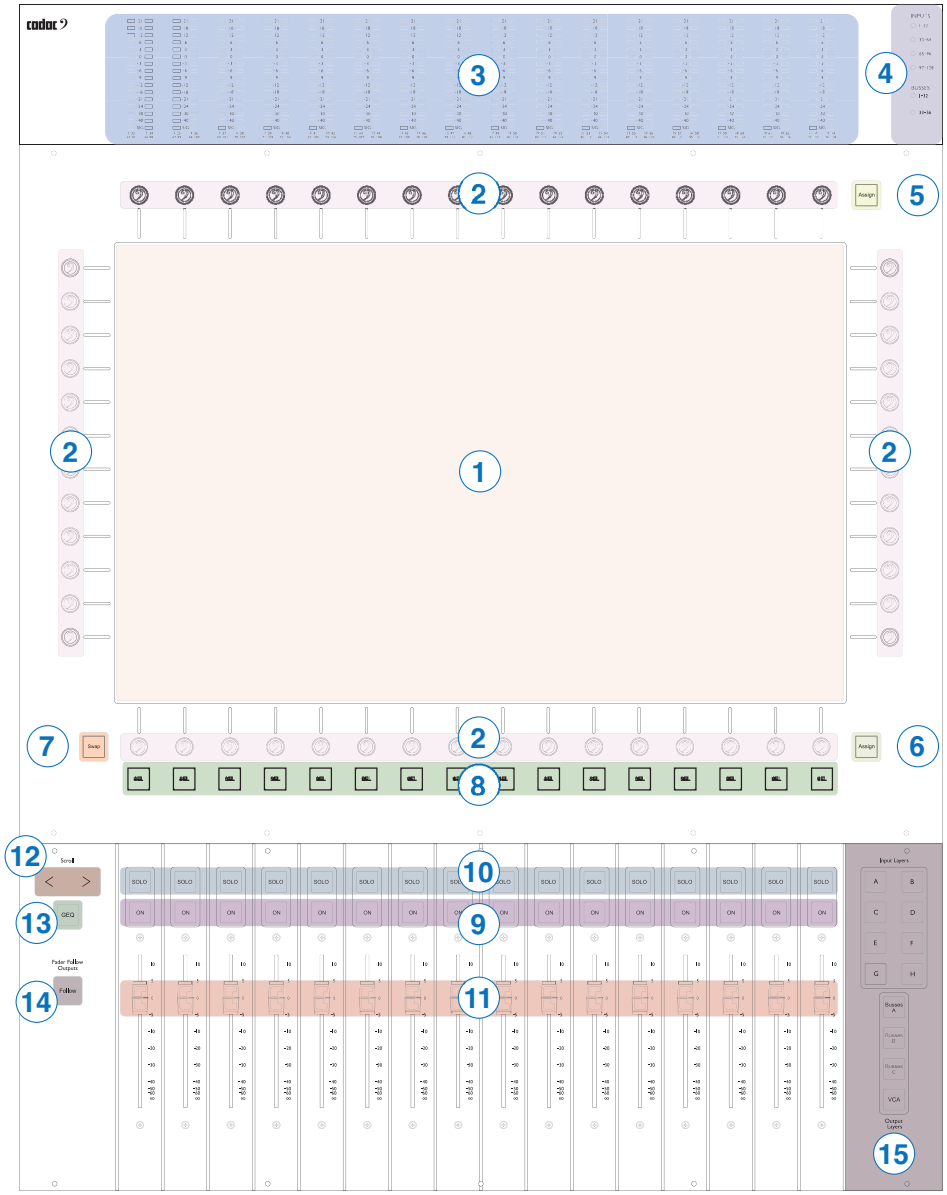
- Up to 128 simultaneous mic/line inputs in the mix
- 56 mix busses, freely assignable as groups, aux sends or matrix sends
- Busses may also be allocated as sends to internal FX processing, with matching stereo returns
- Up to 128 remote and 64 local physical inputs
- Up to 96 remote and 64 local physical outputs
- Unrestricted allocation of physical I/O to input channels and group/aux/matrix outputs
- 16 VCA groups
- Eight user assignable buttons (e.g., Mute groups)
- Input channels may be linked or paired for stereo operation
- All output types – groups, auxes or matrixes - may be mono or linked for stereo operation
- Channel sends to outputs may be pre-EQ, pre-fade or post-fade (switchable pre or post VCA)
- Default display of all primary channel parameters
- Two physical inputs per input channel
- 4-band fully-parametric EQ on all inputs and outputs
- Classic Cadac analogue EQ emulation
- Variable-frequency hi and lo-pass filters on all inputs and outputs
- Compressor/limiter with sidechain filter, plus gate on all input channels
- Compressor/limiter with sidechain filter on all outputs
- Adjustable delay on all inputs and outputs
- 16 stereo FX processors – each may be inserted or configured as send-return loops
- Each FX processor provides reverb, delay and modulation, in any series/parallel combination
- Switchable inserts on all channels
- Switchable LR and LCR panning
- Channel copy function
- Full Monitor, PFL and Talkback facilities
- 24” 16:10 touchscreen display
- Scene automation
- 96 kHz, 24-bit Delta-Sigma A/D and D/A converters
- Low-noise, wide dynamic-range analogue mic pre-amps with remote gain control
- All channel functions immediately accessible by single touch

Hardware components

Control surface

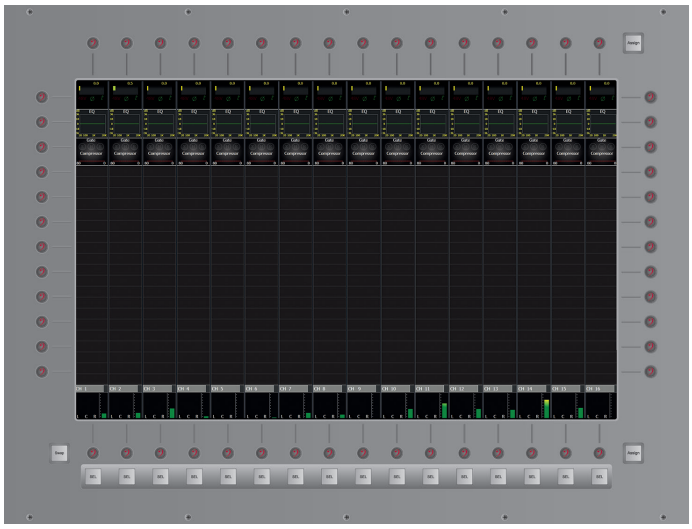
Top view

Channel Section:



1. Main Screen – a 24” touch-sensitive screen. The default display is of a block of 16 consecutively numbered channels; alternative sets of channels may be displayed by using the **SCROLL** [12] or **LAYER** [15] buttons, or by “swiping” the screen horizontally. Touching any area in a channel strip opens a virtual panel with controls for parameter adjustment and enhanced displays. Switch functions are actioned by touching the virtual “button”, rotary controls are mapped to the encoders around the screen edges.

2. Rotary encoders – 56 encoders are provided, 12 on each side of the screen and 16 along the top and bottom (referred throughout this manual as “left”, “upper”, right” and “lower”). By default, the upper set are the remote mic amp gain controls and the lower set are the channel pan controls (when enabled). The left and right sets are inactive until an on-screen panel is opened adjacent to them; the function of each active encoder is then clearly indicated. The function of the upper and lower sets also change when certain channel panels are opened. This is the central functionality of the audio channel paths, and is explained in greater detail elsewhere in the User Manual (see “Using the encoders” on page 44).



3. Meter bridge – each channel section of the control surface includes 32 16-segment LED bargraph meters. The lowest segment – **SIG** – acts as a ‘signal present’ LED, and illuminates at -70 dBFS. The LEDs are colour coded: SIG is green, segments up to 0 dB are white, +3, +6 and +12 dB are orange, +18 and +21 dB are red. The +21 dB segment corresponds to digital clip. A **Meter Options** page on the Control screen allows the user to select various meter source options, including fixed metering of selected layers or “follow” modes, switchable pre or post-fader. See “Meters:” on page 125.

4. Meter source indicators – a set of six LEDs confirming the channels currently being displayed on the meter bridge; use the **Layer** buttons [15] to switch the main screen in blocks of 16 channels and the metering in blocks of 32 channels.

5. Upper **Assign** button – used in conjunction with the **SEL** buttons [8] when placing one or sections of a channel strip into **RECALL SAFE** mode.

6. Lower **Assign** button – used in conjunction with the **SEL** buttons [8] when copying channel settings from one channel to another.

7. **Swap** button – by default, the input blocks of the channel strips are displayed at the top of the virtual channel strip and the pan blocks at the bottom. The upper encoders are always available as per-channel input gain controls and the lower encoders as pan controls (when panning is enabled). Use the **Swap** button to reverse these, making the lower encoders the input gain controls, and the upper encoders the panpots.

8. **SEL** buttons – each fader has a **SEL** button; these are used in conjunction with the lower **Assign** button [6] to select the destination channel(s) when using the **COPY** function.

9. **ON** buttons – each fader has an **ON** button; when the button is unlit, the channel currently displayed on-screen above it is muted. All channels default to OFF on power-up. The ON button allows both 'soft' and 'hard' muting.

   'Soft' mute – a short press mutes the channel's output electronically at the fader; any pre-fade sends in use will remain active. The **ON** button is not illuminated.

   'Hard' mute – a long press activates mute relays in the stagebox for all physical outputs being fed by the channel. The **ON** button flashes red in this state.

10. **SOLO** buttons – perform either a PFL (pre-fade listen), AFL (after-fade listen) or SIP (solo-in-place) function, depending on settings made through the Solo Control page on the Master screen. The default modes for input channels are: mono channels are PFL, stereo channels are AFL; output channels are AFL only. AFL is post the channel panpot (if in circuit), so correctly reflects the stereo imaging of the channel being solo'd; if the panpot is not in circuit, AFL is mono. SIP mode is also available, selected from the Solo Control page. As well as the master modes, the CDC eight also features 'momentary' and 'latching' solo operation:

    'Momentary' solo – press and hold the **SOLO** button; solo is active while the button is pressed and cancels when the button is released.

    'Latching' solo – a short press on a **SOLO** button activates solo mode and the button may be released. Press again to cancel.

    'Block latching' – press and hold one **SOLO** button and press another **SOLO** button while still pressing the first. This will solo the block of channels between the two buttons.

    In use, the **SOLO** button illuminates in a colour that is mode-dependent. See "Solo Control" on page 120 for more details of the Solo system.

11. Faders – 16 touch-sensitive, 100 mm motorised faders; as with the **SEL** and **ON** buttons, the channel the fader controls will be that displayed directly above it on-screen, and will thus be affected by the currently selected layer and any screen swiping or scrolling actions. As the channels displayed on-screen are changed, the faders reposition to follow the new channel set.

12. **Scroll** buttons – the **<** and **>** buttons scroll the currently displayed set of 16 channels one channel down or up respectively. When the leftmost channel is Input Channel 1, the **<** button is disabled and when the rightmost channel is Input Channel 128, the **>** button is disabled (i.e., the channels do not "loop round"). The Scroll buttons work in a similar fashion with the 56 output busses.

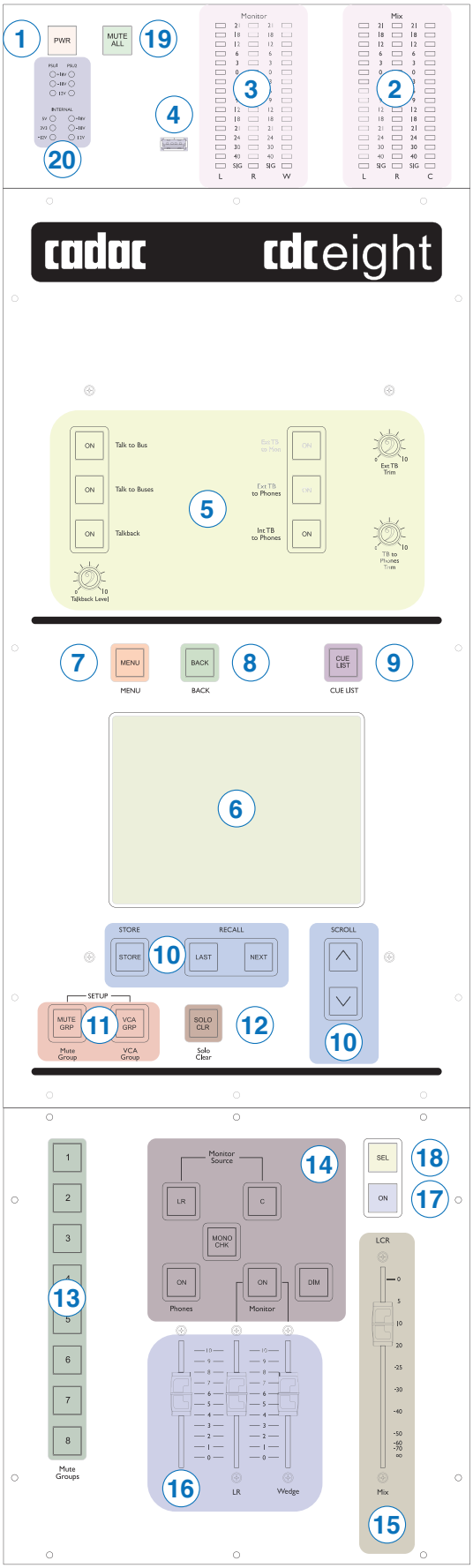
13. **GEQ** button – press this when an output bus is selected (with the SEL button illuminated) to allow the CDC eight's graphic equaliser function for that bus. A 32-band graphic equaliser may be inserted in any or all output channels, in addition to the channel's standard parametric EQ. See "Graphic EQ" on page 102 for full details.

14. **Follow** button – when active, the **Fader Follow Outputs** function allows the engineer to use the faders to control the bus send levels from the currently selected input channel. An input channel layer must be selected for **Fader Follow Outputs** to be available. The left-most channel in the visible set, and busses 1 to 16 (Output Layer A) will be selected by default: the **SEL** buttons select other channels, and the Output Layer buttons select higher-numbered busses for control. While Fader Follow Outputs is active, the screen display and rotary encoders continue to be active for input channels.

15. **Input Layer** and **Output Layer** buttons – a set of twelve buttons controlling which channels are displayed on-screen; the faders, **ON** and **SEL** buttons below them always follow the on-screen channels above.

16. Headphones – either two or three ¼" stereo jacks are fitted under the front armrest; one per Channel Section and another under the Master Section. These carry the console's Phones output.

Master Section:



1. **PWR** button – this is a multi-function “soft” button for starting and closing down the console surface. See “Switching the CDC eight on and off” on page 40 for more details.

2. LRC **MIX** meters – display the main stereo (or LCR) output levels.

3. LRW **MONITOR** meters – display the level of the left, right and mono wedge monitor outputs; these meters also show the level of a signal being soloed.

4. USB port – a type ‘A’ USB socket for firmware upgrades, exporting/importing Projects/Shows or plugging in a keyboard. Many screen displays feature a “virtual” QWERTY keyboard, but a hardware keyboard may be plugged in here and used, if preferred.

5. Routing and level controls for talkback and return talkback. See “Phones/Monitor” on page 119 for full details.

6. Control Screen – a 6.5” touch sensitive LCD screen. The primary function of this screen when the CDC eight is in use is to display the Cue List, but there are also various configuration and “housekeeping” displays. See “Control Screen menus” on page 46 for more details.

7. **MENU** button – when navigating the system menus, use this button to return the Control Screen display to the home page. The **MENU** button is disabled when the Cue List is in use.

8. **BACK** button – used in the menu system; navigates back one “level”. Illuminates red when available.

9. **CUE LIST** button – pressing this displays the currently loaded Cue List on the Control Screen. See “Automation” on page 91 for more details.

10. Cue list controls – the five buttons **STORE**, **LAST**, **NEXT**, ∧ and ∨ are used in Cue List operations. See “Automation” on page 91 for full details.

11. **SETUP** buttons – **MUTE GRP** and **VCA GRP** open the channel assignment displays for the CDC eight’s Mute Groups and VCA Groups respectively, in the Main Screen*. These are toggle functions, and a second press reverts the Main Screen.

12. **SOLO CLR** – used to clear **SOLO** selections from multiple channels. See “Solo Control” on page 120 for more details.

13. **USER ASSIGN 1** to **8** – these buttons are by default the masters for the CDC eight’s Mute Groups. Input Channels may be freely assigned to any group(s). See “Mute Groups” on page 89 for full details. These buttons can also be used for other functions such as ‘global tap’ for the effects section, or as a short-cut to access the FX page. These functions are set up in **User Options** section of the Control Screen.

14. Monitor and phones source controls – source selection, mute and dim buttons. See “Phones/Monitor” on page 119 for full details.

15. LCR master fader – a 100 mm fader controlling the main stereo or LCR output. This is a VCA master fader controlling all three master output channels; the levels of the individual L, C and R legs may be controlled by the **MixLeft**, **MixCentre** and **MixRight** faders of the master channels which are accessed by swiping the display to below Output Channel 1 or above Input Channel 128. This fader is not motorised.

16. Monitor faders – three 60 mm faders controlling the left and right stereo monitor outputs, plus the mono wedge feed. These outputs are available on the rear panel of the control surface.

17. LCR **ON** button – when this button is unlit, the main LCR output is muted.

18. LCR **SEL** button – pressing this button changes the Main Screen* (and the faders, SEL and ON buttons below) to Busses A Layer, but with the three channels of the master output (L, R and C) at the left, and Busses 1 to 13 to their right. This allows gain trim, EQ, dynamics and other functions to be applied to the individual channels of the master output, as well as providing access to the master faders.

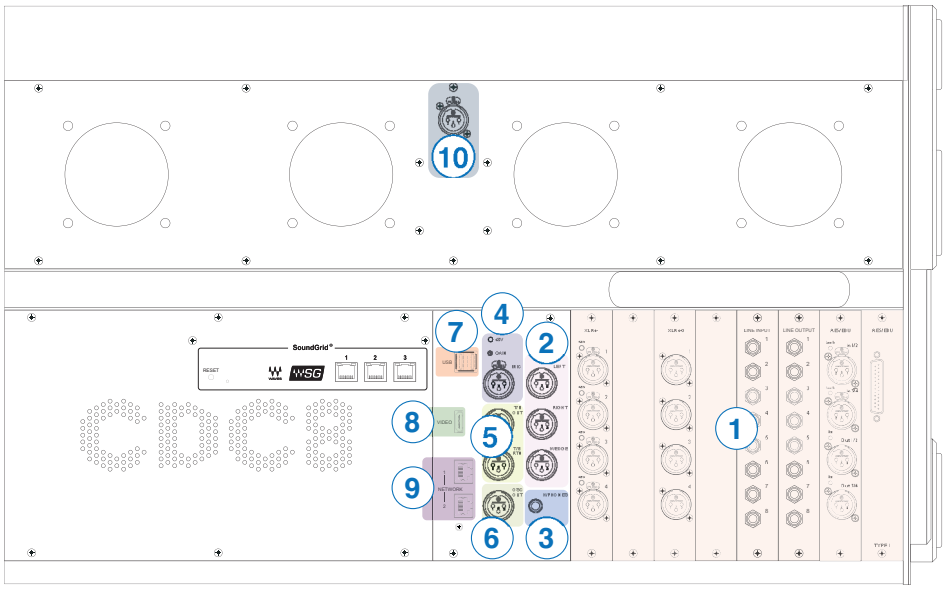
19. **MUTE ALL** – pressing this button will apply a 'hard' mute to all physical outputs from the console, and may be considered an 'emergency' or 'panic' button. The button is not illuminated during the console's normal operation, and flashes red when active. Note that **MUTE ALL** is automatically active when the surface powers up, and must be released by pressing the button.

20. Power Supply and internal power rail LED indicators.

* On control surfaces with two Channel sections, these displays will be on the Main Screen in the left-hand section.

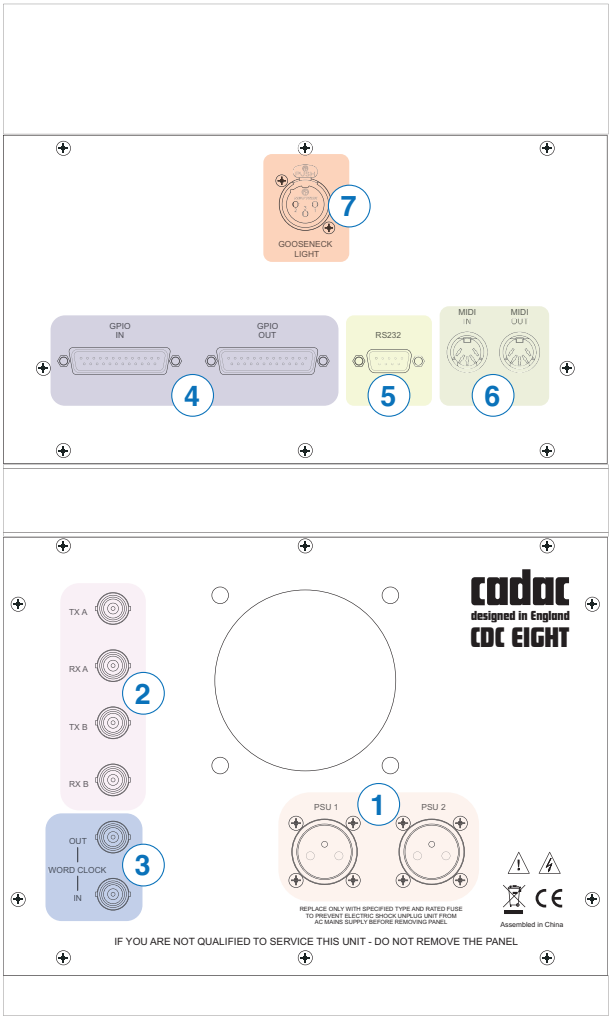
Rear view

Channel Section:



1. Expansion slots – The CDC eight has eight expansion slots for I/O cards, to allow the connection of analogue sources or external processing equipment at the control surface location. Cards with 4 mic inputs, 8 line inputs and 8 line outputs are available, also cards providing AES/EBU I/O. This I/O is referred to by the operating system as “Local I/O”. Local I/O cards may be specified at the time of ordering, or added later. See “System expansion” on page 132 for more details.
2. Monitor outputs – three male XLRs providing balanced outputs of the left, right and mono wedge monitor outputs.
3. **H/PHONES** – a ¼”stereo jack carrying the consoles Phones output. This socket duplicates those under the front armrest.
4. **MIC** – a female XLR for the connection of a talkback microphone. A preset gain control and a phantom power switch are located immediately above the connector.
5. **T/B OUT** and **T/B RTN** – male and female XLRs (respectively) for connection to comms system.
6. **OSC OUT** – a male XLR carrying the test oscillator signal (400 Hz, 0 dBu).
7. **USB** – 2 x type ‘A’ USB 2.0 ports.
8. **VIDEO** – this connector is not currently implemented.
9. **NETWORK 1** and **2** – 2 standard RJ45 Ethernet ports for the connection of sidecars or a wireless access point.
10. **LAMP** – XLR socket for a 12 V DC gooseneck console light.

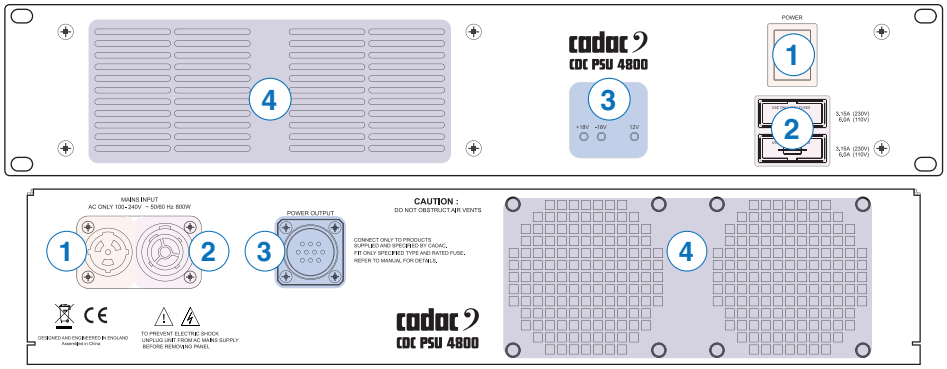
Master Section:



1. **PSU 1** and **PSU 2** – two rugged multipin connectors for primary (**PSU 1**) and backup (**PSU 2**) power supplies.
2. Cadac MegaCOMMS data – 4 x BNC connectors carrying all audio and control data between the control surface and the stage rack(s). See “Connecting the hardware” on page 28 for full details.
3. **WORD CLOCK OUT** – a 96 kHz clock signal is always available at this connector, at TTL level (0 to +5 V). **WORD CLOCK IN** is not currently implemented.
4. **GPIO IN** and **GPIO OUT** – these connectors are not currently implemented.
5. **RS232** – this connector is not currently implemented.
6. **MIDI IN** and **MIDI OUT** – the MIDI IN port can receive commands from external MIDI devices to trigger a Cue for example. The console can also send MIDI data via the **MIDI OUT** port to external MIDI-controlled devices for purposes such as triggering a sound effect or changing a program setting on an effects device.
7. **LAMP** – XLR socket for a 12 V DC gooseneck console light.

Power supplies

The CDC PSU 4800 is a 2U unit supplying all DC voltages required by the control surface via a single multiway cable terminating in a 12-pin Jaeger connector. There are three DC power rails: +18 V, -18 V and +12 V.



Front panel

1. Mains switch – this is the mains disconnect device for the console.
2. Mains fuses – one each in the line and neutral of the AC input. See table below for ratings.
3. DC output LEDs – one red LED for each DC output.
4. Air intakes – do not obstruct.

Rear panel

5. AC mains input – Neutrik powerCON TRUE1 male connector. Max rating 16 A.
6. AC mains output – female connector paralleled to [5]; may be used to link AC mains to a second PSU or other equipment. Total AC current consumption when linking units in this way must not exceed the input connector's current rating of 16 A.
7. **POWER OUTPUT** – locking 12-pin Jaeger connector. Connect to the control surface with the cable supplied.
8. Air exhaust vents – do not obstruct.

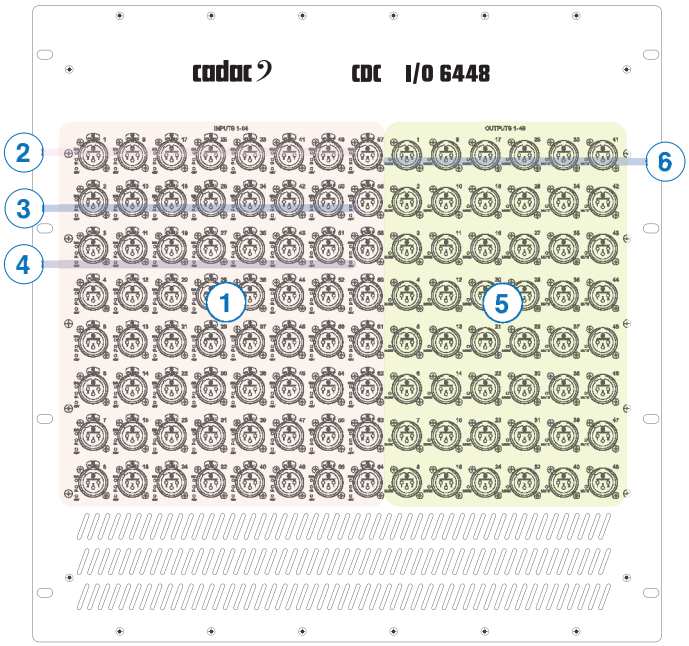
The PSU is of the "Universal" type, and will operate on all mains voltages from 90 to 250 V, 50/60 Hz. The PSU's consumption is 1200 W AC.

Fuse data

	Rating	Type
230 V	3.15 A	20 mm T3.15AL 250V
115 V	6.3 A	20 mm T6AL 250V

Remote Stageboxes

CDC I/O 6448 – front panel



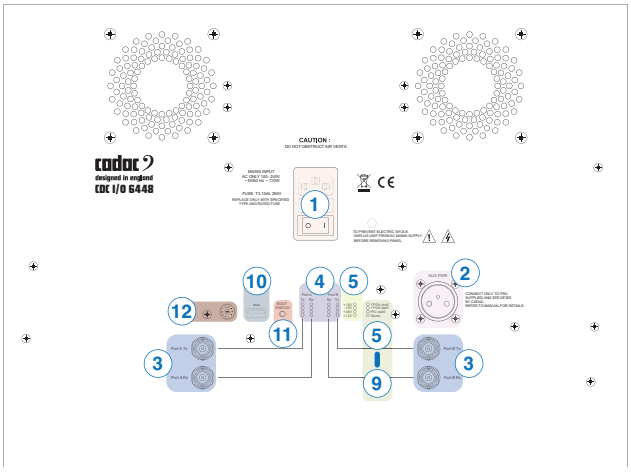
1. Analogue Inputs 1 to 64 – 64 x 3-pin female XLR connectors. See “Remote stagebox – audio connections” on page 30 for connector details.
2. **SIG** – a green LED which illuminates when the input signal level exceeds -70 dBFS.
3. **OL** – a red LED which illuminates when the input signal level exceeds -3 dBFS.

The operation of the **SIG** and **OL** LEDs is independent of the assigned channel’s input gain setting.

The **SIG** and **OL** LEDs flash alternately when an input assignment is made to the connector on the Input Assign panel (see “Input sources” on page 57); this is to aid on-stage input identification while connecting up the console.

4. **48V** – an orange LED, illuminates when phantom power is available at the connector.
5. Analogue Outputs 1 to 48 = 48 x 3-pin male XLR connectors. See “Remote stagebox – audio connections” on page 30 for connector details.
6. **MUTE** – each analogue output connector has an adjacent red LED. This illuminates when the physical output is ‘hard’ muted by the internal relay, either during power-up, when the **MUTE ALL** button is pressed, or if a ‘hard’ mute is applied to an output from a channel **ON** button. See [19] at page 22 and [9] at page 18 for more details.

CDC I/O 6448 – rear panel



1. Power input – IEC receptacle with an integral fuse and rocker switch.
2. **AUX POWER** – 12-pin connector for external backup CDC 4800 PSU
3. Cadac MegaCOMMS data – 4 x BNC connectors carrying all audio and control data between the control surface (or MC Router) and the stagebox. See “Connecting the hardware” on page 28 for full details.
4. Port status LEDs – one yellow and three green LEDs per port. In normal operation one or more green LEDs per port should be illuminated; the number will vary, and depends on the bandwidth in use. The yellow LED flashes when no MegaCOMMS signal is present at the port. Unconnected ports will have no indication on the corresponding LED bank.
5. Power rail status LEDs – four green LEDs, one per internal voltage rail (**18V**, **-18V**, **+48V**, **+12V**). All must be lit for correct operation.
6. **FPGAstat0** – red LED; used in factory testing only, should be unlit in normal operation.
7. **FPGAstat1** – red LED, illuminates to indicate loss of lock to the incoming MegaCOMMS signal. Should be unlit in normal operation.
8. **PICstat0** – red LED, flashes during power-on and firmware updates only. If on otherwise, a boot failure is indicated.
9. **Spare** – red LED; not currently implemented
10. **USB** – type ‘A’ USB 2.0 port, used for firmware updates. **NOTE:** this port is ONLY intended for the connection of memory sticks. Do not connect any other type of USB device to this port.
11. **BOOT SWITCH** – for factory use only. Do not press.
12. Hex switch – set according to how the stagebox is being connected:
    - Set to ‘1’ when connecting the stagebox to a CDC MC Router.
    - Set to ‘2’ when connecting the stagebox to a CDC eight surface, and it is to be used as RACK 1.
    - Set to ‘3’ when connecting the stagebox to a CDC eight surface, and it is to be used as RACK 2.

    All other hex switch positions are unused.

Connecting the hardware

Power supplies – control surface

The external CDC 4800 PSU power supply (or supplies) for the control surface should be connected using the supplied cable(s). Two 12-pin Jaeger connectors are fitted to the rear of the surface master section. If only PSU is being used, either connector may be used. Note that sidecars do not require a CDC 4800 PSU; these chassis sections have an internal PC-type PSU, and only require an AC mains supply via an IEC cable.

Power supplies – remote stageboxes

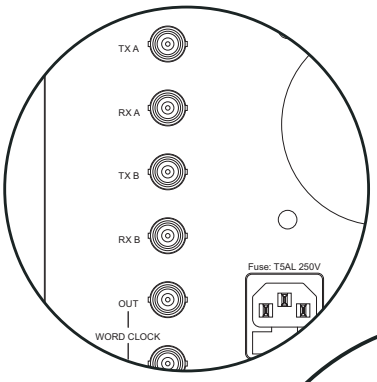
Each remote stagebox has an internal power supply. Connect the rack to AC mains via the supplied IEC cable. The internal power supply is a 'Universal' type, and will operate on any AC mains voltage between 100 and 240 V, 50/60 Hz.

The CDC I/O 6448 rack may have a second (redundant) power supply (CDC 4800); this is connected to the dedicated **AUX POWER** connector on the rear panel. Note that there is no provision for a redundant power supply on the CDC I/O 3216 remote stagebox.

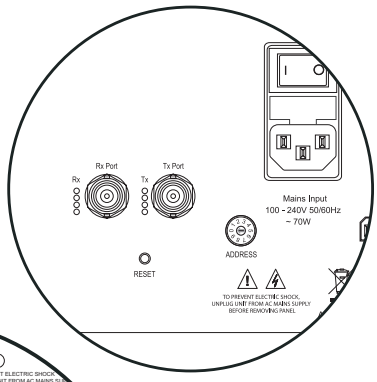
Data communications: MegaCOMMS

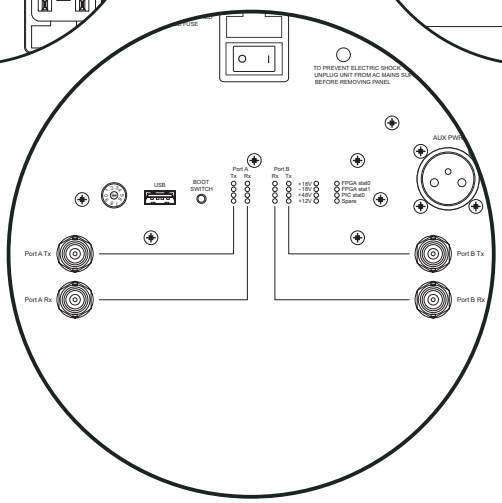
Cadac's proprietary MegaCOMMS hi-speed data protocol is used to interconnect the CDC eight control surface and stage rack(s). The control surface and each stagebox each have four BNC sockets to provide the main system data interconnection, labelled TX A, RX A, TX B and RX B.

CDC eight



CDC I/O 3216

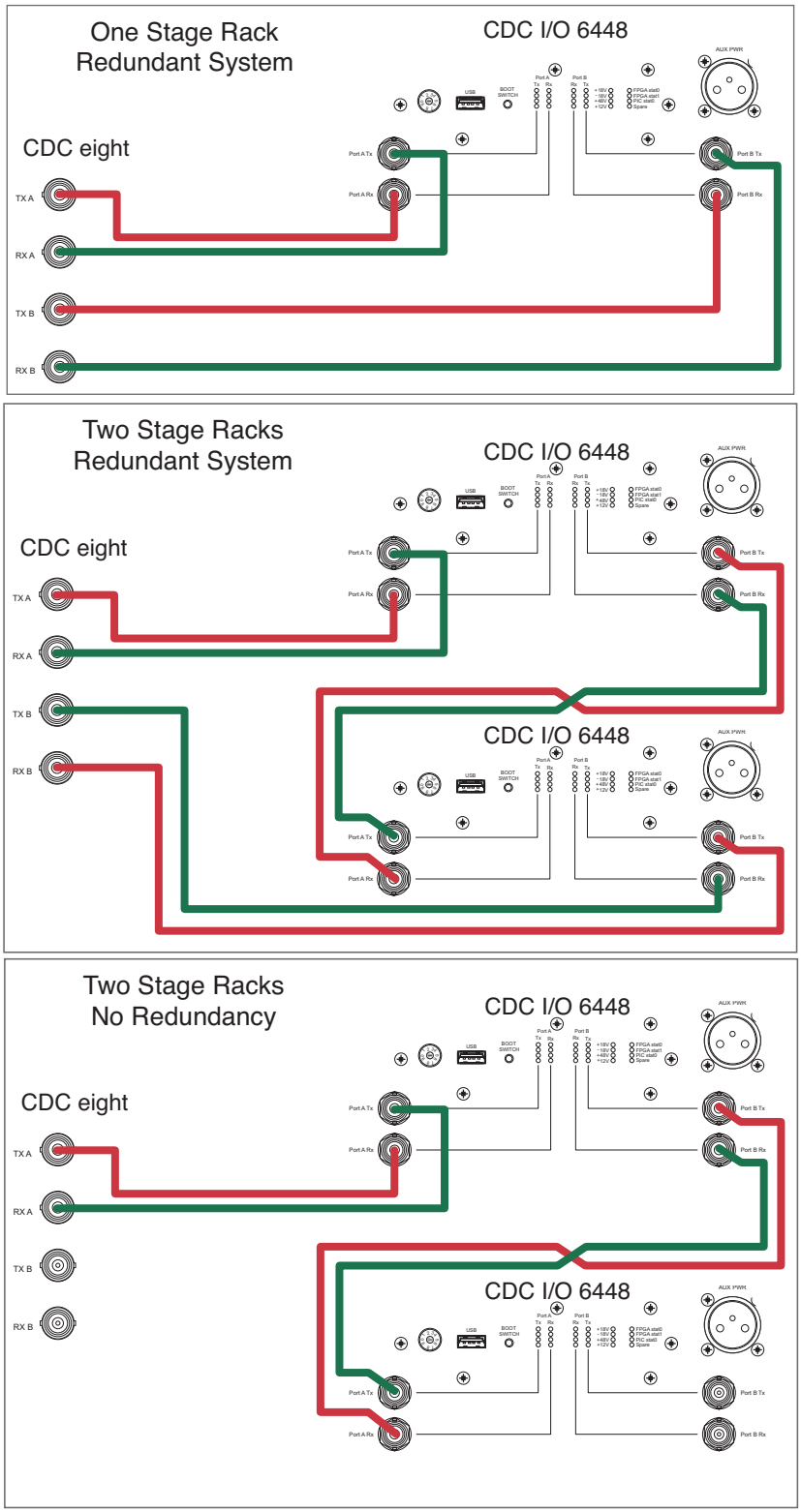




CDC I/O 6448

The two paths A and B carry identical and synchronous data, and can be used in various ways, depending whether system redundancy is required. Providing a redundant path gives greater system robustness, as the CDC eight will automatically switch its comms to Path B if communication is lost on Path A, such as might occur if a cable is damaged. Note that the CDC eight system is fully functional in all respects if only one Tx/Rx Path is connected.

The control surface and stage rack(s) should be interconnected using one of the configurations shown below, depending whether there are one or two stageboxes in the system, and whether redundancy is deemed necessary.



Only RG6 video cable suitable for 3G HD-SDI (High Definition Serial Digital Interface) should be used for the Cadac MegaCOMMS connections. The cables should be terminated in BNC connectors of the appropriate type, and no cable run should exceed 150 m (surface-to-stagebox or stagebox-to-stagebox). An example of a suitable cable is Kramer bulk Type BC-1X.

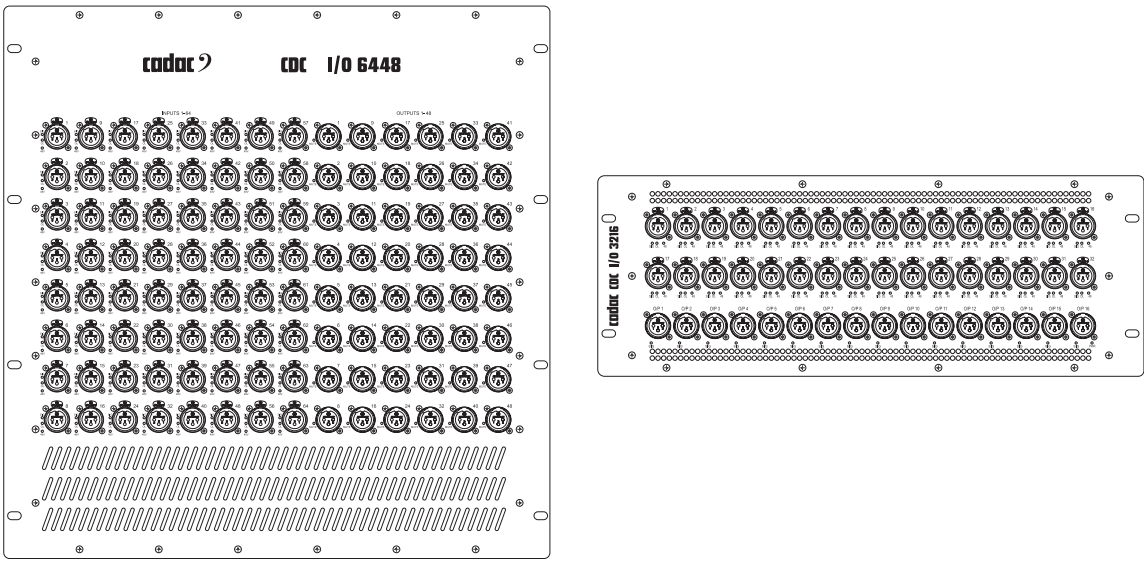
Word Clock Out

The CDC eight's internal wordclock is fixed at 96 kHz, and a clock signal is always available at the rear of the console at the **WORD CLOCK OUT** connector.

The only digital I/O on the CDC eight will be on the optional **CDC-AES4-I/O** or **CDC-AES8-Y I/O** local I/O cards; these are fitted with sample rate conversion (SRCs) on all inputs and outputs and a wordclock sync input is also provided on each card.

Remote stagebox – audio connections

The stageboxes provide the (non-local) audio inputs and outputs for the system, and are intended to be located remotely from the control surface, typically stage-side. Audio equipment to be used at the FOH position can be connected to the control surface's Local I/O (when fitted) on the rear panel.



The CDC I/O 6448 stagebox has a total of 64 inputs and 48 outputs, while the CDC I/O 3216 stagebox has 32 inputs and 16 outputs. The CDC eight can support one or two stageboxes of any type via direct connection; in these circumstances the maximum remote I/O connectivity the system can provide is 128 inputs and 96 outputs, using two CDC I/O 6448 stageboxes. However, these totals can be increased further if Local I/O cards are also installed in the control surface (see "Surface and Local I/O – audio connections" on page 32).

It should be noted that higher I/O counts are possible by using more than two stageboxes; this can be achieved with a Cadac CDC MC Router.

Note that the number of any connector on a stagebox is unrelated to its function. Any input (or output) connector can be assigned in software to a system input (or output) of any type – channel input, aux send, channel insert, matrix output, etc. – anywhere in the console's architecture. It should also be noted that the overall

I/O physical connectivity provided by the system is unrelated to the CDC eight's maximum processing capacity of 128 simultaneous input channels mixing onto 56 assignable output busses. Some additional connectors will be required in all installations for channel or bus insert sends and returns, and for 'B' inputs to input channels. See "Output destinations" on page 59 for more information.

Default routings:
By default, Input A of Input Channels 1 to 32 (3216 I/O rack) or 1 to 64 (6448 I/O rack) are assigned to Rack 1 Inputs 1 to 32 or 1 to 64 respectively, in numerical order. Similarly Outputs 1 to 13 (3216 I/O rack) or 1 to 45 (6448 I/O rack) are assigned to Rack 1 Outputs 1 to 13 or 1 to 40. The LCR Master channel outputs are assigned to the three highest-numbered output connectors: 46, 47 & 48 in the case of the 6448 IO Rack, or 14, 15 & 16 on a 3216 I/O Rack.

Any of the above default routings may be modified at will using the on-screen Input and Output Assign functions.

Connector details

Analogue inputs – 3-pin female XLR connectors. The inputs are electronically balanced, and are suitable for connection of either microphones or line level sources. Input impedance is 1.2 kohms in Mic Mode, or 10 kohms in Line Mode, Mic or Line mode being selected from the assigned channel's Input Gain panel. The maximum input level is +40 dBu (with pad enabled). When an input connector is assigned as the input of a channel in Mic mode, 48 V phantom power is available, also switched from the channel's Input Gain panel. The connector should be wired as follows:

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

Analogue outputs – 3-pin male XLR connectors. The outputs are electronically balanced with an source impedance of 50 ohms. The maximum output level is + 21 dBu. The connector should be wired as follows:

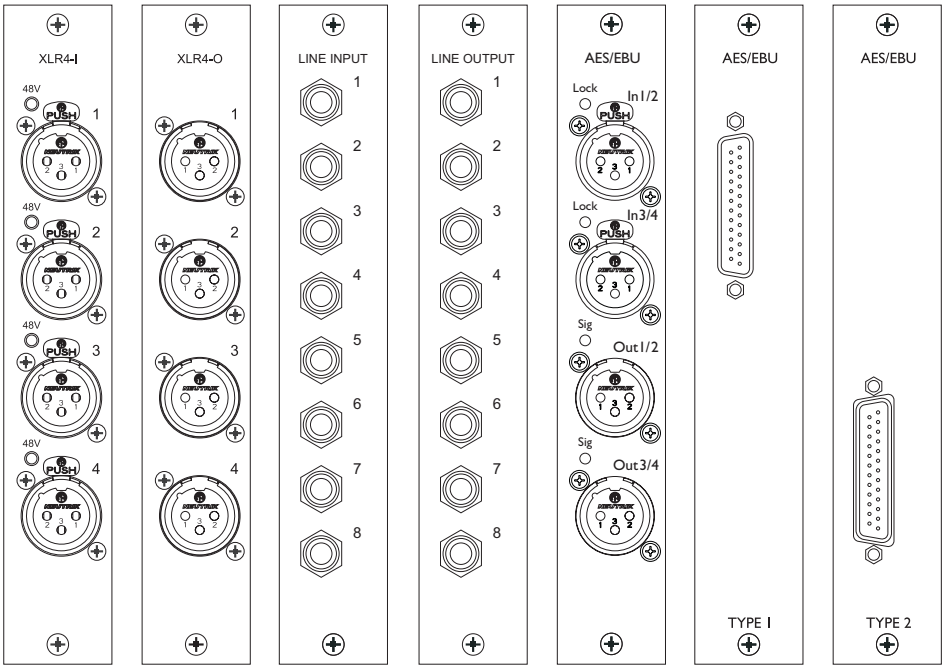
Pin	Connection
1	Screen
2	Signal 'hot' (phase)
3	Signal 'cold' (antiphase)

Surface and Local I/O – audio connections

Expansion slots

The control surface has an expansion bay in the rear panel for additional inputs and outputs – these are referred to as 'Local I/O'. The expansion bay will always be at the rear of the LH console channel section, regardless of the surface configuration. The bay has eight 'slots' ('A' to 'H'), and any slot may be fitted with any of following types of card (viewed left to right below):

- CDC-XLR4-I: four mic/line inputs (4 x XLR3F)
- CDC-XLR4-O: four balanced line outputs (4 x XLR3M)
- CDC-TRS8-I: eight balanced line inputs (1/4" TRS jack sockets)
- CDC-TRS8-O: eight balanced line outputs (1/4" TRS jack sockets)
- CDC-AES4-I/O: two AES/EBU inputs and two AES/EBU outputs (i.e., 4-in/4-out), including SRCs (2 x XLR3F, 2 x XLR3M)
- CDC-AES8-Y I/O: four AES/EBU inputs and four AES/EBU outputs (i.e., 8-in/8-out), including SRCs (25-pin female Dsub wired to Yamaha standard)
- CDC-AES8-T I/O: four AES/EBU inputs and four AES/EBU outputs (i.e., 8-in/8-out), including SRCs (25-pin female Dsub wired to Tascam standard)



The expansion bay can thus provide up to 64 inputs, 64 outputs, or any combination of the two up to a maximum of 64 inputs and 64 outputs. Any quantity of cards may be fitted. All card types occupy a single card slot.

NOTE: all CDC eight consoles include one CDC-TRS8-I card and one CDC-TRS-8O card as standard.

Connector details

CDC-XLR4-I Mic input cards – four 3-pin female XLR connectors. The inputs are electronically balanced with an impedance of 1.2 kΩ, and are suitable for connection of either microphones or line level sources. The maximum input level is +21 dBu, without the 19 dB pad enabled. When an input connector is assigned as the input of a channel, 48 V phantom power is available, switched from the control surface via the touchscreen. The connectors should be wired as follows:

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

CDC-XLR4-O Line output cards – four XLR3M connectors. The outputs are electronically balanced and the output stage has been designed to drive long cable runs with minimal signal loss. The nominal level is 0 dBu; maximum output level +21 dBu, output impedance 50 ohms. The connectors should be wired as follows:

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

CDC-TRS8-I Line input cards – eight ¼" (6.35 mm) 3-pole (TRS) jack sockets. The inputs are electronically balanced with an impedance of 22 kohms and are intended for the connection of line level sources (though all CDC eight inputs are capable of accepting either mic or line level signals), but note that the **Line** button on an assigned channel's Input Gain Panel is unavailable (greyed out). The maximum input level is +21 dBu. The connectors should be wired as follows:

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

CDC-TRS8-O Line output cards – eight ¼" (6.35 mm) 3-pole (TRS) jack sockets. The outputs are electronically balanced; nominal output level is 0 dBu, max. output level is +21 dBu. The connectors should be wired as follows:

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

CDC-XLR4-O Line output cards – four XLR3M connectors. The outputs are electronically balanced and the output stage has been designed to drive long cable runs with minimal signal loss. The nominal level is 0 dBu; maximum output level +21 dBu, output impedance 50 ohms. The connectors should be wired as follows:

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

CDC-AES4-I/O 4-channel AES/EBU I/O cards – two XLR3F connectors (inputs) and two XLR3M connectors (outputs). This card provides two AES3 inputs and two AES3 outputs (four channels of audio in each direction). Both inputs and outputs handle digital audio signals conforming to AES3 at nominal sample rates of 44.1, 48, 96 or 192 kHz. The inputs are balanced with an input impedance of 110 ohms. Sample rate converters (SRCs) are fitted to both inputs and outputs; wordclock reference for the output SRCs is derived from Input 1 on the card. This may be a 3.3 – 5 V clock signal or an AES3 input.

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

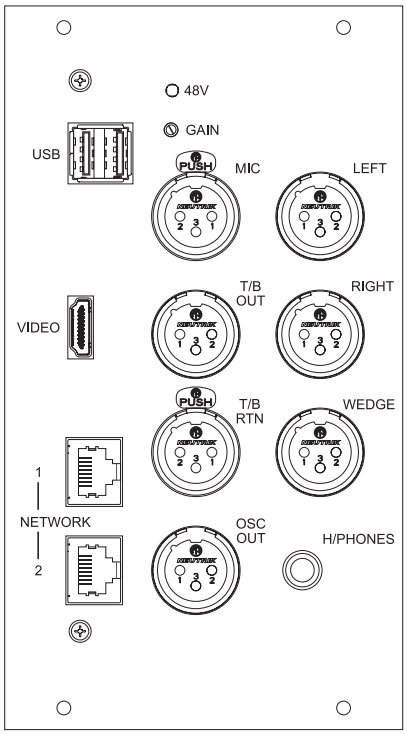
CDC-AES8-Y I/O 4-channel AES/EBU I/O cards – 25-pin female Dsub connector. This card provides four AES3 inputs and four AES3 outputs (eight channels of audio in each direction). The card's electrical characteristics are the same as the **CDC-AES4-I/O** above. The Dsub connector is wired to the "Yamaha" standard, as below:

Pin	Signal
1	Chs. 1 & 2 In 'hot' (phase)
2	Chs. 3 & 4 In 'hot' (phase)
3	Chs. 5 & 6 In 'hot' (phase)
4	Chs. 7 & 8 In 'hot' (phase)
5	Chs. 1 & 2 Out 'hot' (phase)
6	Chs. 3 & 4 Out 'hot' (phase)
7	Chs. 5 & 6 Out 'hot' (phase)
8	Chs. 7 & 8 Out 'hot' (phase)
9	n/c
10	GND
11	n/c
12	GND
13	GND
14	Chs. 1 & 2 In 'cold' (antiphase)
15	Chs. 3 & 4 In 'cold' (antiphase)
16	Chs. 5 & 6 In 'cold' (antiphase)
17	Chs. 7 & 8 In 'cold' (antiphase)
18	Chs. 1 & 2 Out 'cold' (antiphase)
19	Chs. 3 & 4 Out 'cold' (antiphase)
20	Chs. 5 & 6 Out 'cold' (antiphase)
21	Chs. 7 & 8 Out 'cold' (antiphase)
22	GND
23	GND
24	GND
25	GND

CDC-AES8-T I/O 4-channel AES/EBU I/O cards – 25-pin female Dsub connector. This card provides four AES3 inputs and four AES3 outputs (eight channels of audio in each direction). The card's electrical characteristics are the same as the **CDC-AES4-I/O**. The Dsub connector is wired to the "Tascam" standard, as below:

Pin	Signal
1	Chs. & 8 Out 'hot' (phase)
2	GND
3	Chs. 5 & 6 Out 'cold' (antiphase)
4	Chs. 3 & 4 Out 'hot' (phase)
5	GND
6	Chs. 1 & 2 Out 'cold' (antiphase)
7	Chs. 7 & 8 In 'hot' (phase)
8	GND
9	Chs. 5 & 6 In 'cold' (antiphase)
10	Chs. 3 & 4 In 'hot' (phase)
11	GND
12	Chs. 1 & 2 In 'cold' (antiphase)
13	n/c
14	Chs. 7 & 8 Out 'cold' (antiphase)
15	Chs. 5 & 6 Out 'hot' (phase)
16	GND
17	Chs. 3 & 4 Out 'cold' (antiphase)
18	Chs. 1 & 2 Out 'hot' (phase)
19	GND
20	Chs. 7 & 8 In 'cold' (antiphase)
21	Chs. 5 & 6 In 'hot' (phase)
22	GND
23	Chs. 3 & 4 In 'cold' (antiphase)
24	Chs. 1 & 2 In 'hot' (phase)
25	GND

Other control surface audio I/O



Normally, all main programme inputs and outputs in the system will be via the Stageboxes and the Local I/O will be used for additional local audio sources, plus send/return loops to external signal processing equipment co-located with the console. Inputs and outputs for talkback and local monitoring are also fitted to the control surface rear panel.

Monitor outputs – these are for the connection of local monitor loudspeakers, should the console be installed in a location that permits them. The monitoring system will normally carry the AFL/PFL output of the mixer for check purposes. As AFL is stereo, separate left and right outputs are provided. A third (L + R) mono sum of the stereo monitor signal is provided; this output will normally be connected to the engineer's local powered wedge monitor. The **LEFT**, **RIGHT** and **WEDGE** outputs each have their own fader on the surface for level control (see [16] on page "Master Section:" on page 20). All three outputs are electronically balanced on 3-pin male XLR connectors. Nominal output level is 0 dBu, maximum level +21 dBu. The connectors should be wired as follows:

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

Headphones – the stereo monitor signal is also available on two ¼" (6.35 mm) 3-pole (TRS) jack sockets, for the connection of a pair of headphones. One socket is on the rear panel, the other under the front armrest. Both sockets should be wired as follows:

Pin	Connection
Tip	Left monitor output
Ring	Right monitor output
Sleeve	Screen (common)

Talkback connections – provision is made on the rear panel for the connection of an engineer's talkback mic, and send and return talkback feeds to the venue comms system.

Three connectors are fitted:

- A balanced mic input (**MIC**) on a 3-pin female XLR connector. A recessed preset **GAIN** control with a range of 60 dB and a phantom power switch (**48V**) are accessible through holes in the rear panel immediately above the connector. Mics connected at this connector may be routed to the engineer's headset (see below) using a button in the console master section ([5] at "Master Section:" on page 20).

- Talkback system output (**T/B OUT**), on a 3-pin male XLR connector. This is a balanced line level output, and carries the signal from the talkback mic when selected.

- Return talkback input (**T/B RTN**), on a 3-pin female XLR connector. This is a balanced line level input from the venue comms system, and may be routed to the console monitor outputs or headphone outputs from the talkback control section.

All three connectors (inputs and output) should be wired as follows:

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

Oscillator – the balanced output of the console's internal test oscillator is available at a rear panel 3-pin male XLR connector marked **OSC OUT**. The connector should be wired as follows:

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

The oscillator frequency is fixed at 400 Hz and the output level at 0 dBu.

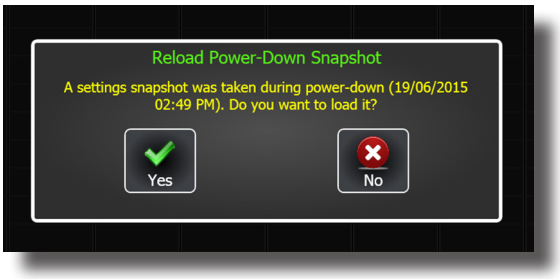
Lamp – 3-pin female XLR connector providing 12 V DC for a gooseneck console light.

Pin	Connection
1	0 V
2	+12 V DC
3	0 V

Principles of Operation

Switching the CDC eight on and off

The PWR button ([1] at “For US and CANADA only:” on page 3) is a “soft” button for starting and powering-down the surface. When the surface is connected to a source of AC mains but not operative, the button illuminates red. A short press initiates the console boot sequence, the internal computers run standard BIOS and diagnostics routines and power is applied to the internal audio DSP section. The PWR button then illuminates green. At the end of the power-on sequence, a dialogue box appears on the Main Screen as shown below:



Touching **OK** in answer to the question will reload the snapshot saved during the last power-down and reinstate the console to the last-known settings. Touching **Cancel** will result in the console operating in its ‘default’ state, without a scene loaded – i.e., no channel names, routing or processing will be active.

A ‘long’ press on the **CUE LIST** button at any point after initial boot-up will re-invoke the power-on snapshot window: this is useful if the **Cancel** button has been pressed inadvertently.

For safety reasons, the CDC eight boots up with the **MUTE ALL** function active: all console outputs from the stagebox(es) are ‘hard’-muted. However, note that outputs from any Local I/O cards installed in the surface are not muted. Press the **MUTE ALL** button ([19] at page 22) to cancel this mode and activate the outputs.

To shut the surface down, press the **PWR** button again, and a dialogue box will be displayed asking if the console should be powered down, or restarted while continuing to process the audio. Alternatively, the surface can powered down via the Control Screen using the **Shutdown** button in the **Settings** menu, which opens the same dialogue box. This initiates a shutdown sequence, ensuring that the computer(s) are shut down correctly. When the surface shuts down, a snapshot is taken of the current console status: this includes all input and output channel settings.

Main screens – touch operation

All audio operations on the CDC eight are performed using the main touchscreen(s). The display(s) show sixteen consecutive virtual channel strips, and include the most important information about the channels’ configuration and parameters. More detailed information and access to controls for any channel is obtained by a single touch on the appropriate area of the screen.

On CDC eight control surfaces with two or more main screens, each screen can show different sets of channels – inputs, outputs or VCAs - or indeed, the same set.

Before configuring the inputs and outputs, and understanding the various channel features in detail, this section of the User Manual describes the basic principles of screen navigation and parameter control in general.

Layers and metering

The CDC eight uses the now-familiar concept of “layers” to allow a relatively small number of faders and virtual channel strips to control a much larger number of audio channels. The CDC eight’s 128 input channels and 59 output channels (busses, including the LCR masters) are arranged into twelve layers of 16 (adjacently-numbered) channels. The currently selected layer determines which set of channels is displayed on-screen; the faders, **ON** and **SEL** buttons in the fader section are always related to the virtual channels immediately above them on the screen:

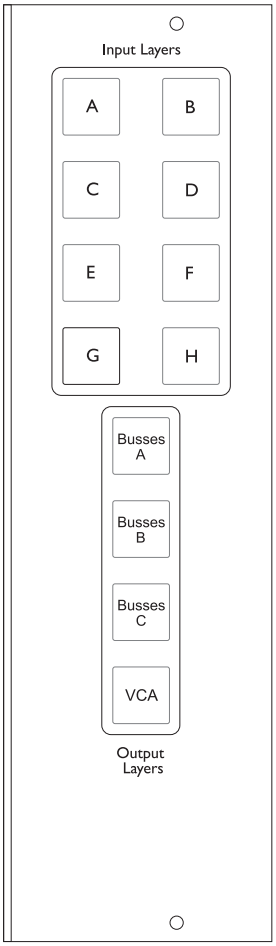
- Input Layer A: Input channels 1 to 16
- Input Layer B: Input channels 17 to 32
- Input Layer C: Input channels 33 to 48
- Input Layer D: Input channels 49 to 64
- Input Layer E: Input channels 65 to 80
- Input Layer F: Input channels 81 to 96
- Input Layer G: Input channels 97 to 112
- Input Layer H: Input channels 113 to 128
- Output Layer Busses A: Output channels 1 to 16
- Output Layer Busses B: Output channels 17 to 32
- Output Layer Busses C: Output channels 33 to 40
  (Note: a second press gives access to Output channels 49 to 56)
- Output Layer VCA: VCA group masters 1 to 16

Note that the Input channel layers listed above will be modified when stereo input channels are in use, as the even-numbered channel of a stereo pair is not displayed on-screen. This does not apply to stereo output channels however, where both left and right “legs” are displayed.

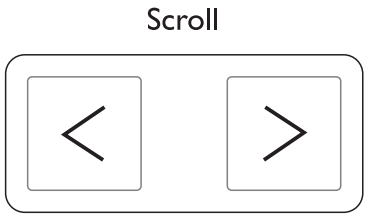
Note also that the layers defined as above do not include the LCR master output channels. These may be displayed on the main screen either by “swiping” (see below), or pressing the LCR output’s **SEL** button (see [18] at page 19).

The CDC eight provides three methods of changing layers:

1. **Layer buttons** – the current layer is selected by the Input Layer and Output Layer buttons to the right of the fader block ([15] at page 23):

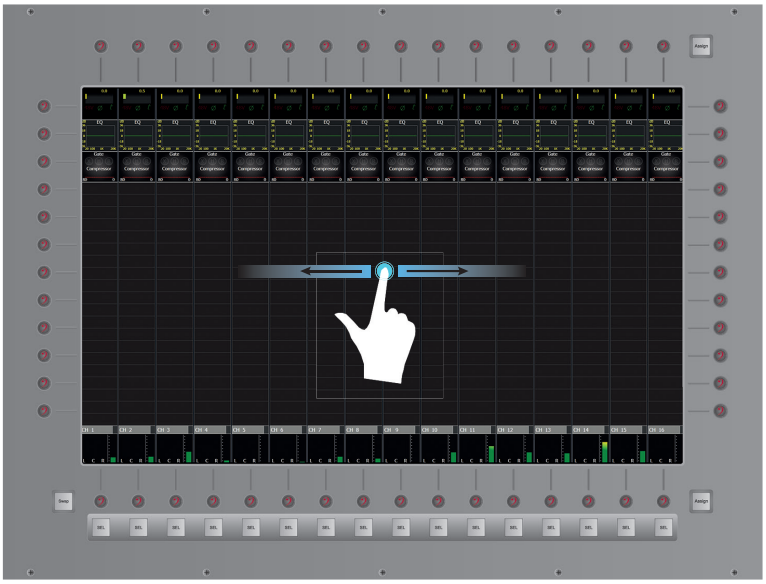


2. **Scroll buttons** – pressing the **<** or **>** buttons to the left of the fader block will step the displayed set of channels up or down one channel at a time. The scrolling does not “loop”; when Channel 1 is the leftmost channel on-screen, the **<** button is disabled and similarly, when Channel 128 is the rightmost channel on-screen, the **>** button is disabled.



Input and output channels are treated separately for the purpose of scrolling; one of the output layers must be selected with the **Layer** buttons before scrolling through the output channels is possible.

3. **Swiping** – a “swipe” action horizontally across the screen will shift the displayed set of channels a number of channels proportional to the “length” of the swipe. This is a very powerful feature of the CDC eight, and allows very rapid access to channels not currently displayed.

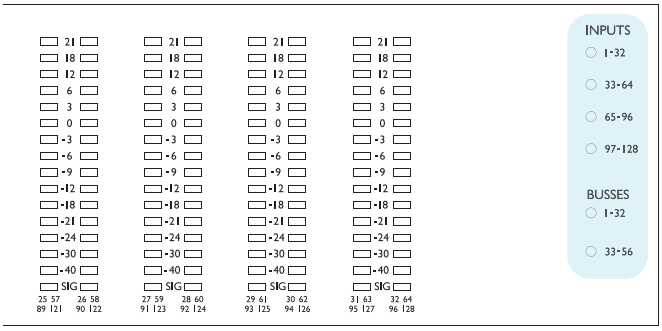


Unlike scrolling, swiping “above” Channel 128 will display the main mix busses, followed by the 56 output channels. Swiping does not “loop” below Input Channel 1 or above Output Channel 56.

Note that two **Layer** buttons will be lit simultaneously (with a change of colour) if the layer boundary has been moved on-screen by scrolling or swiping to indicate that members of two adjacent layers are currently displayed.

Note that each Channel Section of a CDC eight surface with two or more Channel Sections operates autonomously; any layer may be selected on each channel section independently of what is selected on another.

Channel meters:
Each Channel Section’s meter bridge has 32 bargraph meters, the source for the meters being confirmed by the LEDs at the right-hand end of the meter bridge ([4] at page 23). By default (**Auto** mode), the CDC eight’s channel meters always follow the last manually selected layer in their own Channel Section. Note that scrolling or swiping the displayed channels does not affect the channels being metered.



The bargraphs have 20 segments: the lowest segment illuminates green at a signal level of -60 dBFS and the top segment illuminates red at 0 dBFS, indicating digital clipping. This segment has a peak hold function, and it remains lit for approximately one second after being triggered. The four segments below are coloured amber and the remainder white.

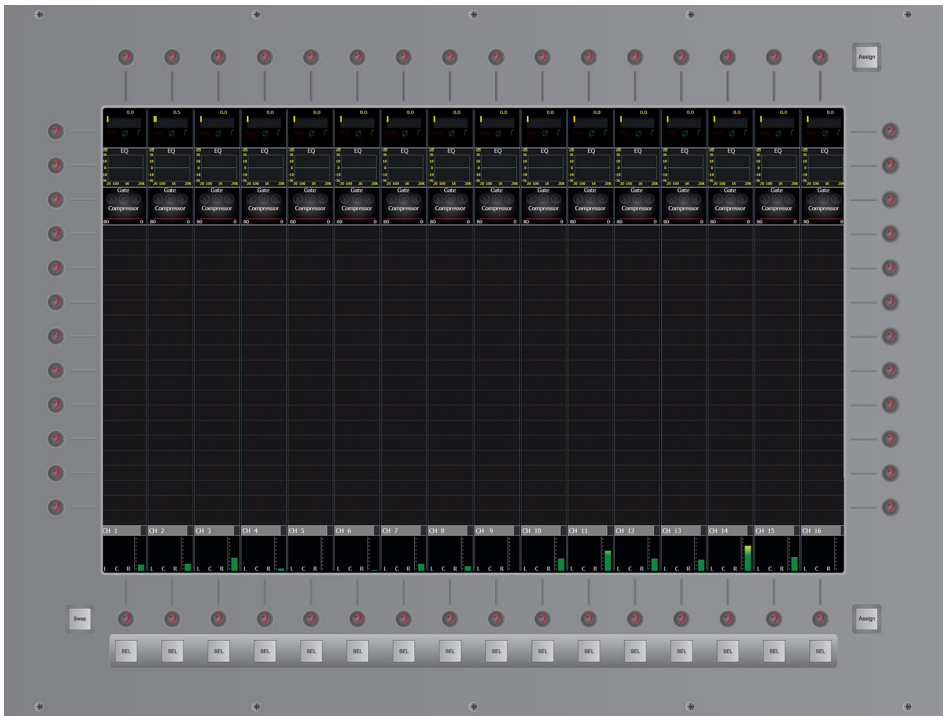
As there are 32 meters but only 16 channels per layer, the meters change source between “alternate” layers; thus the meters will display Input Channels 1 – 32 when either Input Layer A or Input Layer B is selected, but will switch to Input Channels 33 – 64 if either Input Layer C or Input Layer D is selected.

The default source for the bargraph meters is Post Fader, but this may be changed to Pre Fader on the Control Screen’s **Meter Options** page; where alternatives to **Auto** mode may also be found. From here, it is possible to select the meter source to be fixed to any of the input or output layers, independent of the layer selected. There is also a **16 Screen Follow** option, which disables every alternate meter, leaving 16 meters vertically aligned with the on-screen channel strips and sourced from the 16 channels currently displayed, whether they are inputs or outputs. See page 122 for full details.

In addition to the meter bridge, each channel strip input or output on the Main Screens includes a small virtual bargraph (dual on stereo channels). The source for these may also be selected as Pre Fader or Post Fader on the **Meter Options** page as described above, so the engineer can see both pre-fade and post-fade signal levels simultaneously. The meters are at the bottom of the channel strip, immediately above the lower encoders.

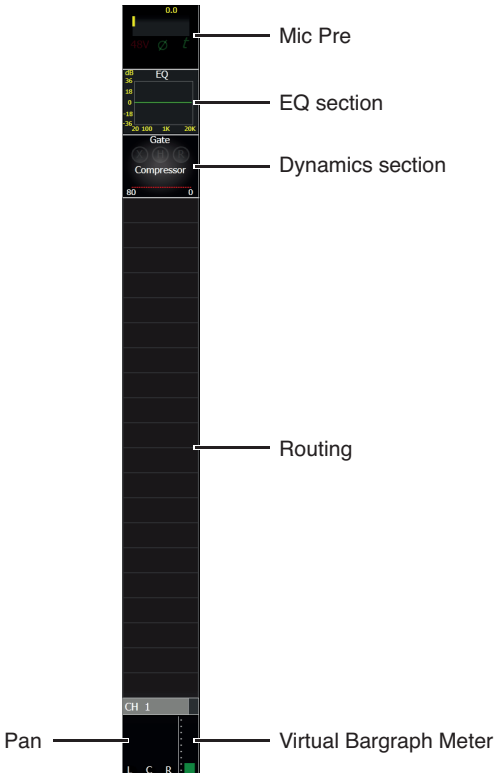
Using the encoders

Each main screen has 56 rotary encoders around its perimeter – 2 x 16 horizontally and 2 x 12 vertically.



Channel blocks:

Touching a channel block opens a virtual panel with all controls relevant to the block.



Touching in any of the areas shown above will open the corresponding virtual panel. The specific channel functions are described in detail at page 61 and page 78.

Panels always open on the same edge of the display; e.g., the Input Gain Panels for any of the first eight channels of the current set of 16 always open on the left-hand edge of the display and the functions in the panel are then controlled by the left encoder set. The second eight channels open their Input Gain Panels on the right; these are laid out as “mirror images” for reasons of clarity.

The left and right sets of encoders have no function until a panel is opened. However, the upper set of encoders is always active, and by default, are assigned to act as the (coarse) input gain control for the currently displayed channel set. If a digital input is patched to an input channel, its upper encoder acts as a gain trim control. Opening an EQ panel will re-assign them as EQ controls while the panel is open. Similarly, the lower set of encoders may always be active as input channel pan controls (or matrix output time delays), though in this case, panning (or delay) has to be enabled for the channel before its lower encoder is active. Opening a dynamics panel will reassign them as controls for the channel dynamics section while the panel is open.

Example – Input Gain block:

The various panels are designed so that each variable parameter is displayed immediately next to the encoder that adjusts it. The diagram above shows how five of the 12 encoders are assigned to the five parameters available for control. All switch functions are actioned by directly touching the screen. Any function which is unavailable for some reason (e.g., an input needs to be assigned to an input port before it can be used) is greyed-out. All panels are closed by the familiar red button with a white cross.

Control Screen menus

During performance, the Control Screen will normally be used to display the Cue List, which is the default display on power-up. Pressing **MENU** (see [7] at page 21) will display the Home Page; pressing **CUE LIST** ([9] at page 21) will revert the display to the Cue List.

The Control Screen Home Page provides four menus – **Projects**, **Config**, **Settings** and **User Options**. Touching any of the icons at the top of the screen opens a further menu at the bottom. Press **MENU** from within any of the menus to return to the Home Page; the MENU button illuminates green when it is available. Press the **BACK** button to go back up the menu "tree" one level only. The **BACK** button illuminates red when it is available.

The **Projects** menu is effectively part of the CDC eight's automation system: it enables file creation and management functions, and is used when starting a new project or loading a previously stored one. See page 90 for more details.

The **Config** menu is used to configure the basic architecture of the mixing console. Three options are provided (see above):

- **Channel** – selecting this option opens the **CHANNEL SETTINGS** page on the left-hand* Main Screen. This page is used to define Input Channels as Mono, Stereo, or Linked, and to name the channels. This topic is covered in detail at page 51.

- **Bus** – selecting this option opens the **BUS SETTINGS** page on the left-hand Main Screen. This page is used to set up the basic bus structure of the console; busses may be defined as groups, auxiliary sends or matrix sends, as mono or stereo, and named. This topic is covered in detail at "Defining the bus structure" on page 47.

- **Solos** – this option opens a Control Screen page allowing adjustment and settings to be made to the console's Solo system. See "Solo Control" on page 120 for full details.

* On surface configurations with a single Channel section, this will be the only Main Screen.

Details of the **Settings** and **User Options** menus can be found at "Settings Menu" on page 122 and "User Options Menu" on page 125.

Console configuration

The CDC eight's default assignment on power-up is for 128 mono input channels mixing to 56 mono auxiliary busses (plus the LCR master busses).

Defining the bus structure

The CDC eight has 56 main mix busses, plus the LCR master bus and PFL/AFL monitoring busses. The master and PFL/AFL busses cannot be changed, but the user may decide how many of the 56 main busses will be used as auxiliary busses, and how many as group busses, matrix busses or FX send busses. This decision will obviously be dictated by the requirements of the show; once a console configuration has been defined, it may be saved and recalled at a later date, e.g., to provider a starting point for configuring the CDC eight for another show.

The CDC eight offers three methods of defining the bus structure:

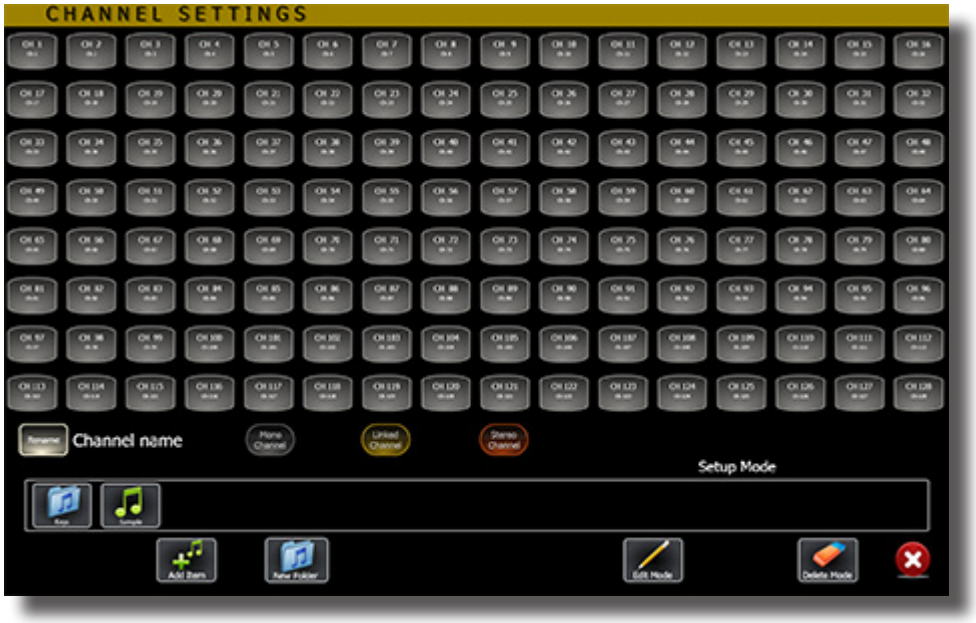
a. by using the **Auto Bus Configuration** function
b. from the **BUS SETTINGS** page
c. from the Input Block of each Output Channel

a) Bus definition using Auto Bus Configuration

This is a "Quick Start" method of bus definition, and is most useful when beginning a new Project. Creating and managing Projects and Shows is covered in full detail at "Project management" on page 91.

Briefly, to define the bus structure used in the example when starting a new Project:

1. From the Control Screen Home Page, select **Projects**, and then **New Project**.



2. The Auto Bus Configuration window allows a very rapid allocation of mix bus resources. Touch the **Group** button and move the slider to set the value required in the button. You can also use the **+/-** buttons, or the **<<** and **>>** buttons on the numeric keypad above.

3. Similarly, set the value in the **Matrix** button to the required number.

4. Enter a name for the new Project in the upper (QWERTY) window and touch **OK**. The **New Project** and **Auto Bus Configuration** windows close. Touch the icon (in the **Projects** pane) for the new Project just created. Touch **Close**.

5. The CDC eight will now reconfigure the bus structure to incorporate the bus allocation just defined.

Mono/stereo definition will now need to be made as a separate operation, using one of the other two methods, and that channel source selection and bus naming will have to done from the **BUS SETTINGS** page, as in *Method b*).

When busses are allocated using **Auto Bus Configuration**, Matrix sends will always be allocated to the highest-numbered busses, followed by Groups in the next lower-numbered block. Any FX Sends assigned will use the lowest-numbered busses. The remainder, numerically in between FX Sends and Groups, will be Aux Sends.

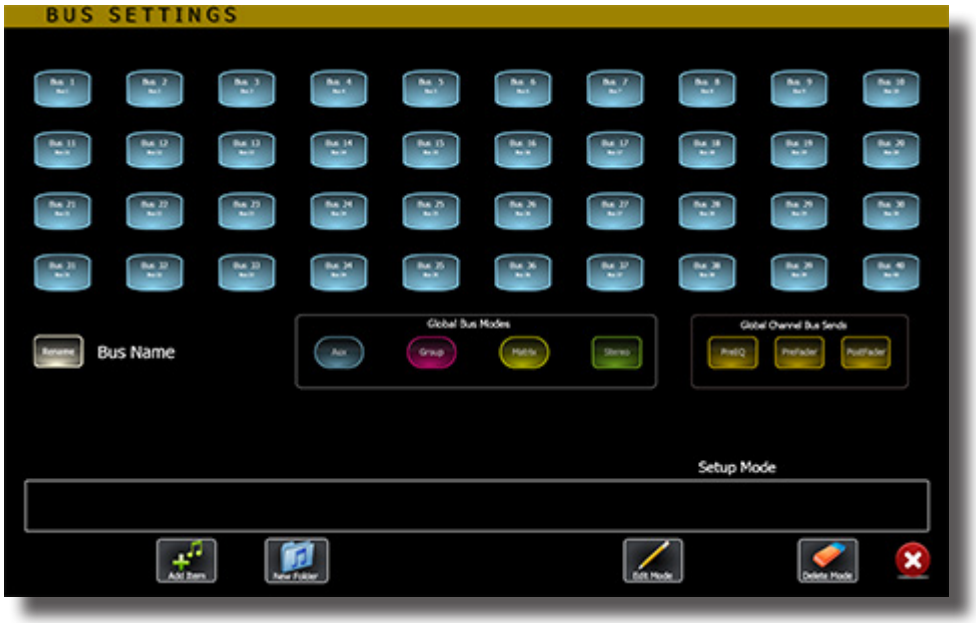
Note: defining busses as FX Sends is discussed in detail at “The FX Units” on page 103.

Restore Defaults – press this button at any time to cancel the allocation and reset the bus assignment to 56 aux busses.

Current Setup – press this button to cancel any bus allocation in the process of being entered and allocates the busses to the new project with their current configuration.

b) Bus definition using the BUS SETTINGS page

Press the **MENU** button to return the Control Screen to the Home page, and select **Config**, then select **Bus** from the options offered. This opens the **BUS SETTINGS** page on the left-hand Main Screen.



Each of the 56 large buttons represents a mix bus. For each bus that will be required for the job, there are now four settings to be made:

- each bus may be one of three types: **Aux**, **Group** or **Matrix**;
- each bus may be mono or stereo (two busses are used for stereo);
- the point in the Channels from which the send to the bus is derived may be defined;
- each bus may be given a name.

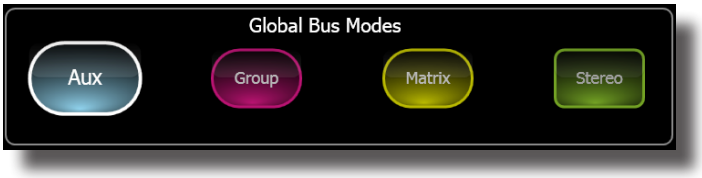
Initially, all 56 busses are **Aux** type, mono, sourced Post Fader and un-named; the default 'names' that will be used throughout the system if they are not renamed will simply be '**Bus n**', etc.

Note that the three bus types are colour coded – blue for **Aux**, pink for **Group** and yellow for **Matrix**. These colours are retained in all the other touchscreen displays, so it is very easy to see how Input Channels are routed to Output Busses.

Note also that any initial bus definition may be freely changed subsequently.

To make these allocations, proceed as follows:

1. Touch the **Bus 1** button; a border appears around it and the **Global Bus Modes** panel confirms that Bus 1 is already an **Aux**.

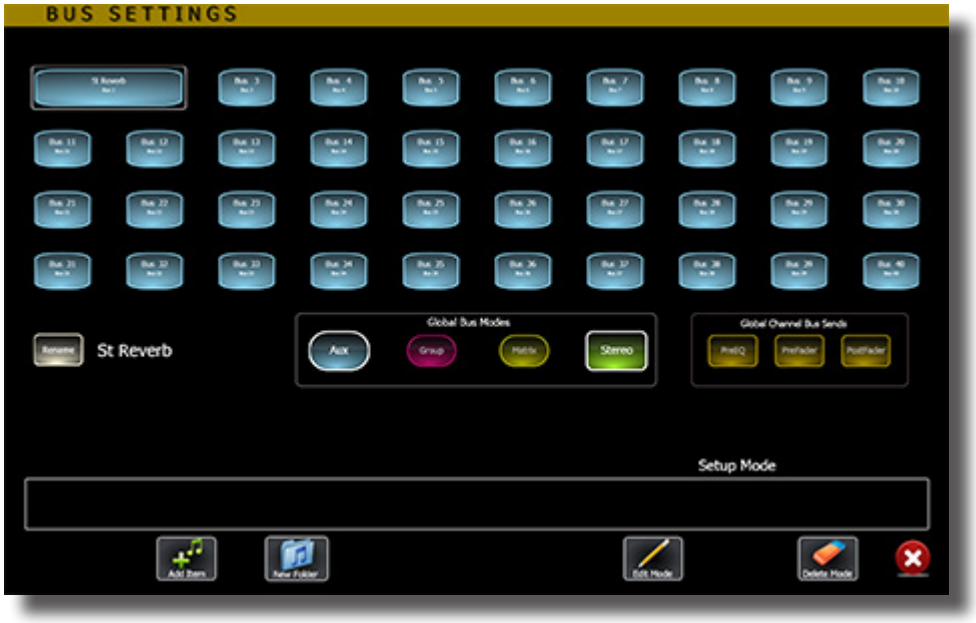


2. Touch the **Stereo** button to define Bus 1 as stereo. This will combine Busses 1 and 2 as a stereo pair. The CDC eight always allocates two consecutive busses to be a stereo pair; the odd numbered bus will always be the left channel, and the even bus the right channel.

3. Touch the **Rename** button (initially displaying the default name **Bus 1**); this opens a QWERTY keyboard. Use the **Bksp** key to delete the default name, and then enter a name for the bus. Note that it is also possible to use the QuickName Bar of preset names for naming busses. See "Using the QuickName Bar" on page 55 for details of how to use the QuickName Bar. Touch **OK** to close the keyboard.

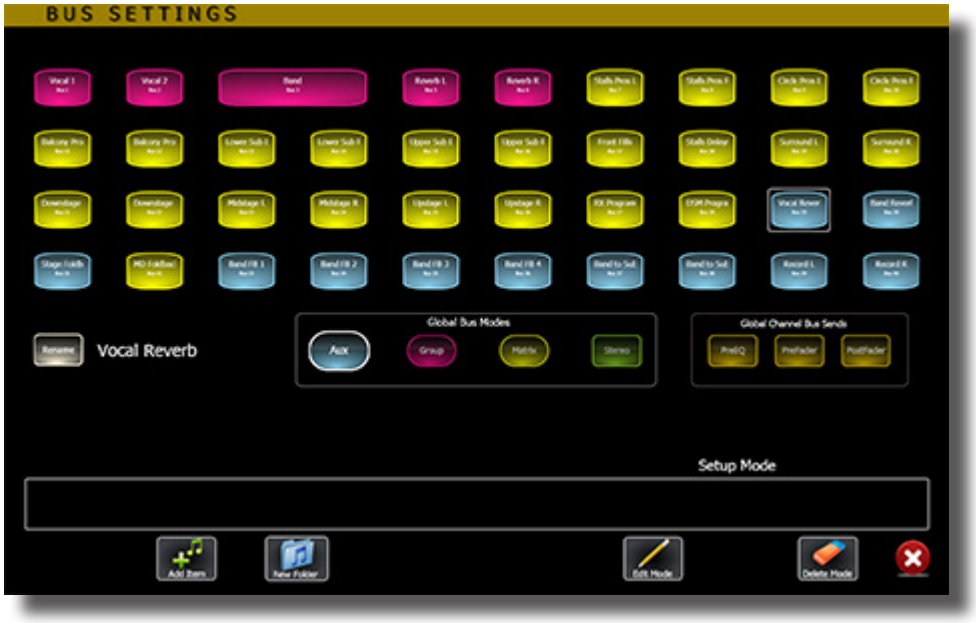
The stereo bus now has a double-size button, and both the name and the original name **Bus 1** (small) are displayed. The source within the channel paths for this bus is Post Fader (the default): depending on the project, it may be that a prefade send would be more appropriate, in which case touch the **PreFader** button in the **Global Channel Bus Sends** panel to change the source.

The **BUS SETTINGS** page will now look like this:



4. Repeat the above process for all the busses that need to be configured.

Bus definition is now complete, and the **BUS SETTINGS** page should look like this:



Note that it is also possible to use the **BUS SETTINGS** page's Setup Mode feature to give commonly used names to Busses. This operation is discussed at "Using the QuickName Bar" on page 55.

Close the **BUS SETTINGS** page to return the Main Screen to the channel display, and select Output Layers A, B and C in turn; you will see that the output channels are now clearly labelled and colour-coded, the Aux and Group Busses also have (initially greyed-out) blocks in the routing block which will allow variable level routing to the four matrix sends we have defined.

Note that the adjacent channels forming stereo pairs are now "linked": the faders move in tandem, either **ON** button opens the channel, and the Input Gain Block is a stereo type which can be opened from either channel.

c) Bus definition from Output Channels

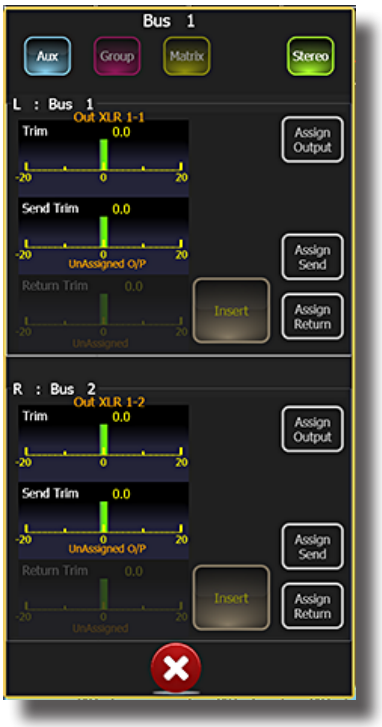
1. Press the **Output Layer** A button to display Busses 1 to 16 on the Main Screen. All Busses are initially mono Aux Busses.

2. Touch the Input Gain Block for Bus 1 to open the Input Gain Panel for the channel. Bus type assignment and mono/stereo definition is available from this panel.

3. Touch the **Stereo** button if the selected bus needs to be stereo.

Note that it is not possible to rename busses, nor alter the channel source for the send from the default Post Fader using bus definition c). These operations can only be done through the **BUS SETTINGS** page described in method b).

4. Repeat the above process to configure each of the busses required.

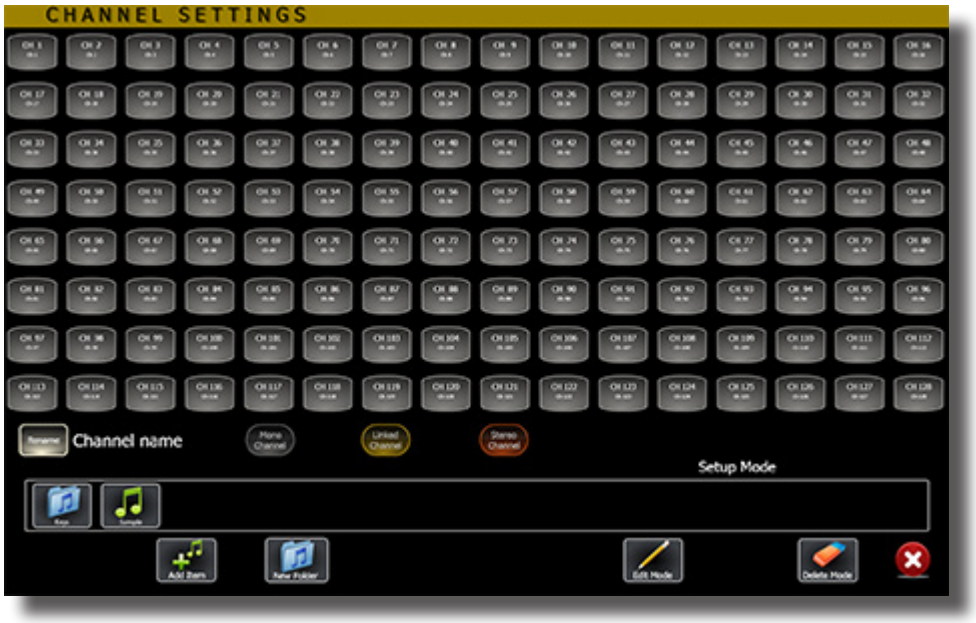


Input channel type definition

Setting up the input channels is a similar procedure to Methods a) and b) for the busses.

a) Input channel type definition using the CHANNEL SETTINGS page

From the Control Screen's Home page, select **Config**, then **Channel** from the options offered. This opens the **CHANNEL SELECT** page on the left-hand Main Screen.



Note that there are three channel types – **Mono**, **Stereo** and **Linked**.

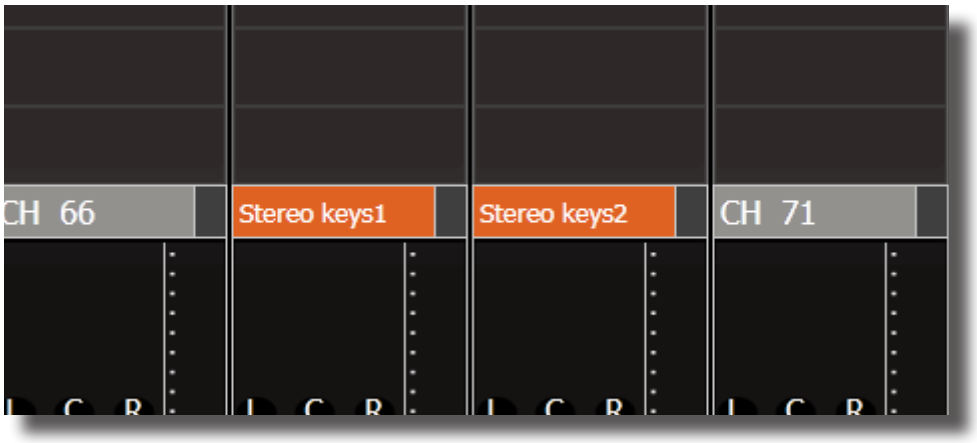
Each of the 128 buttons represents an input channel. All channels are initially mono, but can be redefined as stereo or linked, and named. Colour coding is employed to denote the three types: mono channels are grey, stereo channels are orange and linked channels are yellow.

Stereo channels:
To create a stereo channel, touch the **Stereo Channel** button, and then touch a channel button. Note that the **Stereo Channel** button remains 'active', so that further input channels may be defined as stereo if wished. Touch it again to deselect it, or select either of the other two Channel Type buttons.

To give the channel a name, first touch the channel button, then touch the **Rename** button to open the **Rename** window. Delete the default channel name in the name field (touch the field and use **Bksp**) and enter the new name using the keyboard using the same procedure as naming the busses. Close the window with **OK**.

As with stereo busses, a stereo input channel uses two adjacent channels, with the odd-numbered channel always being the left path of the stereo pair. Touch **OK** to close the page; the **CHANNEL SETTINGS** page will now show the stereo channels as large buttons, in the same manner as the stereo busses on the Bus Settings page.

Stereo channels are indicated on the Main Screen by an orange channel name block.

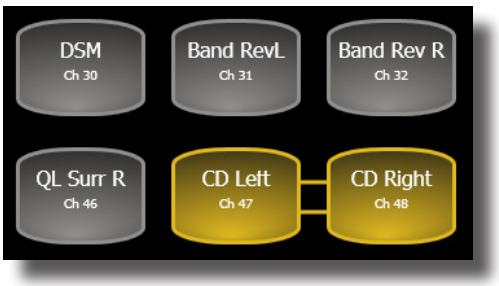


When a stereo channel is created, the channel strip for the even-numbered channel of the pair disappears from the Main Screen; all adjustments are made to the odd-numbered channel and affect the left and right signal paths equally.

Linked channels:

The CDC eight also allows two adjacent channels to be linked as a pair so that their parameters are always identical. Unlike stereo channels, both channels remain visible on the Main Screen, and adjustments to any of the linked channel settings can be made on either channel; most parameters, including fader position, are replicated on the other channel. Note that Input Gain and Bus Send levels are not replicated in this way. Linked channels can only be an odd-even pair in the same way as stereo channels.

Linked channels may be defined from the **CHANNEL SETTINGS** page in exactly the same way as stereo channels; they appear on the Main Screen with yellow channel name blocks.



Using the QuickName Bar

The CDC eight comes pre-loaded with a library of commonly-used instrument and vocal names, which can be used to quickly name channels or busses. It is also possible to create your own folders with custom names; once created, these remain available for future use.

Channel/bus names are denoted by the quaver icon.

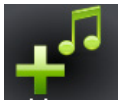
A normal hierarchical folder system is used for name storage. Names may be in the root, in folders, in folders within folders, etc.

To name a channel or bus from the QuickName Bar:

First select a channel or bus by touching its button. You can now rename it by simply touching the required name icon in the **Setup Mode** area. Select the relevant folder by touching its icon first.

You can “back up” the folder hierarchy one level by touching the **Up** icon.

Adding a name to the QuickName Bar



If you want to store a channel/bus name in the QuickName Bar for future use, navigate to the folder in which you want to store the new instrument/bus, touch the **Add Item** icon, and enter the new name (max. 15 characters) with the keyboard from the **Add Item** window which opens. Touching **OK** adds the new item to the folder currently open.

Note that if a channel/bus button is currently selected during this operation, the channel/bus will be given the new name at the same time.

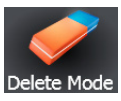
Creating a new folder

Navigate to the QuickName Bar folder in which you would like it to be created (if not the root), and touch the **New Folder** icon. The new folder may be created in the same way as adding an instrument/bus above.

Editing a name

Touch the **Edit Mode** icon; note that a pencil symbol appears in all the visible name icons and a yellow border around the selected icons. Touch the icon for the name to be edited; the **Rename** window opens, and the name may now be edited with the keyboard. When ready, touch **OK**; the mode may be cancelled by touching **Edit Mode** again.

Deleting a name



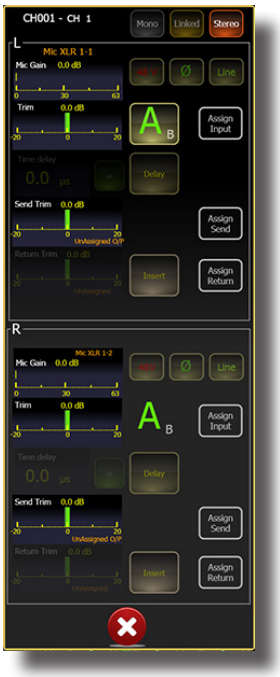
Touch the **Delete Mode** icon; note that an eraser symbol appears in all the visible name icons and a red border around the selected icons. Touch the icon for the name to be deleted; the name may now be deleted by touching its icon. The mode may be cancelled by touching **Delete Mode** again.

b) Input channel type definition from Input Channels

1. Press an Input Layer button to display a set of input channels on the Main Screen. All channels are initially mono.

2. Touch an Input Gain Block to open the Input Gain Panel for the channel. Channel type definition is available from this panel.

3. Touch the **Stereo** button; this assigns Channels 1 and 2 as a stereo pair.



4. To assign a pair of channels as linked pair, repeat the above procedure, but touch the **Linked** button. Note that in Linked mode, the Input Gain block remains the same size, because the purpose of Linked mode is to create two identical mono channels.

Note that it is not possible to rename channels using channel type definition Method b). This can only be done through the **CHANNEL SETTINGS** page as described above.

Input sources

On the CDC eight, any physical input connector on either a Remote Stagebox or Local I/O card may be connected to an input of any channel in the console, or to the return input of a channel insert point. (It is also possible to connect either a channel input or insert return to the output of one of the on-board FX processors; this procedure is covered in detail at “The FX Units” on page 103.)

Default assignments

The CDC eight initially powers up with a default set of input assignments, which are summarised in full for reference in the Appendix.

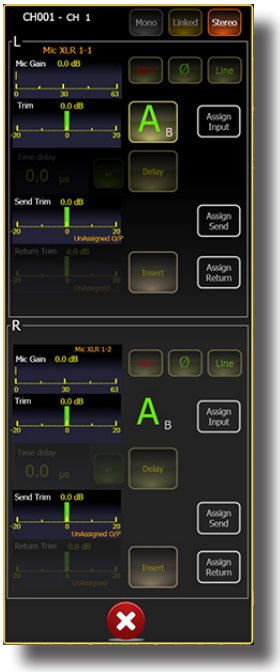
Rack to Channel allocation is always in two blocks of 64 channels, one block per rack, regardless of size.

Thus, with two CDC I/O 6448 Remote Stageboxes in use, the ‘A’ inputs (see “Input Gain Panel” on page 61) of Input Channels 1 to 64 are assigned in numerical order to the 64 inputs in Rack 1 and the ‘A’ inputs of Input Channels 65 to 128 to the 64 in Rack 2. All ‘B’ inputs are initially unassigned, as are all Insert Returns. With only one CDC I/O 6448 Remote Stagebox, only the ‘A’ inputs of Input Channels 1 to 64 are routed; those of Input Channels 65 to 128 are unassigned.

Reassigning input sources:

The input assignment matrix is accessed via Channel Input Gain Panels. To assign a different input connector to a channel, touch the channel’s Input Gain Block on the Main Screen (see “Channel blocks:” on page 45). This opens the channel’s Input Gain Panel.

If the channel has been defined as stereo, the Panel looks like this:



In common with traditional Cadac analogue theatre consoles, every channel has two inputs, ‘A’ and ‘B’; you can switch between the two by touching the **A/B** button. The default input assignment only provides a physical input for Input A; Input B is unassigned. The panel confirms which physical connector (female XLR) is currently assigned – Input A is sourced from XLR 1 on Stagebox 1 – **Mic XLR 1-1**. The first number identifies the Stagebox, the second the XLR in that rack. Touching the **Input Assign** button opens the Input Assign Panel for that input – A or B, depending which is currently selected by the A/B button.

The Input Assign Panel confirms again that **Mic XLR 1-1** is currently assigned as the input source; you can select any other input connector on either Stagebox or on any Local I/O input cards by touching its button. The four buttons at the top of the Panel switch the Panel between the three sets of hardware and the outputs of the internal FX processors.

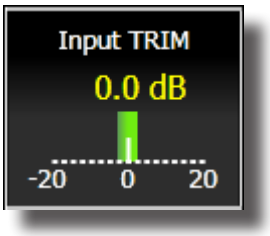
Note that when source assignment is made to an input on a remote stagebox, the **SIG** and **OL** LEDs adjacent to the selected input connector flash alternately to aid identification. The LEDs flash while the Input Assign panel is open.

This procedure can be repeated for as many of the channels as wished. The CDC eight can accommodate up to 192 physical inputs if needed (64 in each of two 6448 Stageboxes plus 64 Local I/O inputs) without the use of a router. In addition to channel inputs - possibly two per channel - physical inputs are also required for channel and bus insert returns, giving a theoretical maximum number of system inputs of 427. On a large show with many sources, it is clearly advisable to plan carefully and consider what sources are needed at different points in the show, to allocate input connectivity in a logical and organised manner.

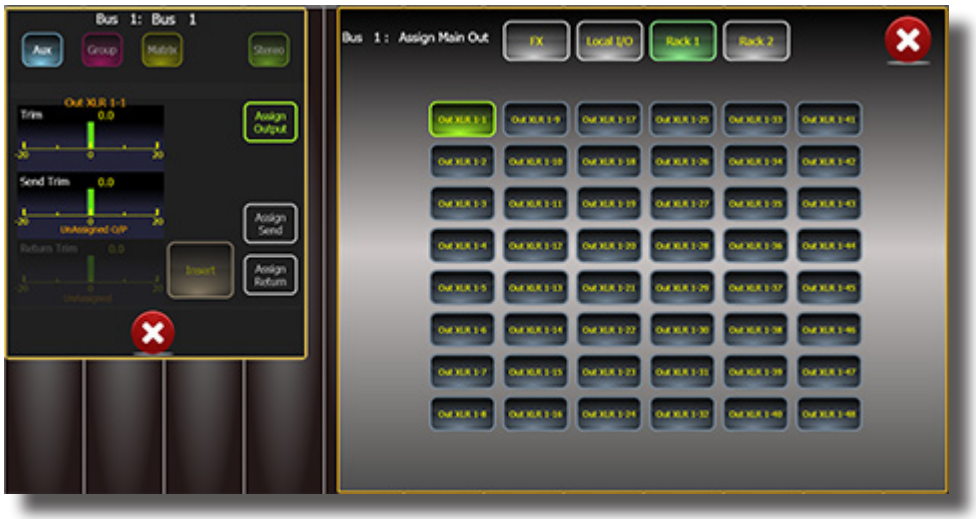
Output destinations

The principles outlined above also apply to the console's outputs. The default assignment of the CDC eight's 56 busses (outputs) is to the first 45 of the 48 output XLRs in Stagebox 1, in numerical order. The LCR Master busses are assigned to Output connectors 46, 48 and 47 (respectively) on Stagebox 1.

Reassigning output destinations:
This is essentially the same procedure as reassigning input sources. To reassign Bus (Output) 1 to a different output connector (male XLR), select Output layer A on a Main Screen and touch the Input Trim block for Bus 1.



Touch the **Assign Output** button; the Assign Main Out Panel for Bus 1 opens. The default routing – to **Out XLR 1-1** – is confirmed. (As with the input channels, the first number refers to the Stagebox, the second to the XLR position in that rack.) Select an alternative output connector for Bus 1 by touching the required connector's button, using the Rack Select buttons at the top of the Panel if necessary. Note that it is also possible to assign a Bus output to the input of one of the internal FX processors.



The CDC eight can accommodate up to 160 physical outputs if needed (48 in each of two 6448 Stageboxes plus 64 Local I/O outputs) without the use of a router, though most configurations will use considerably less than this (that's why

it's called a mixer!) In addition to Bus outputs, which may be Aux Sends, Group Outputs or Matrix Sends, physical outputs are also required for channel and bus insert sends, giving a theoretical maximum number of system outputs of 214.

Note: It is only possible to assign a Channel Input (or Insert Return) to a single source. Similarly a Channel Output (or Insert Send) can only be assigned to a single destination. Attempting to assign a second source of destination will override the first.

Input channel facilities

This section of the User Manual describes the facilities available on each input channel in more detail.

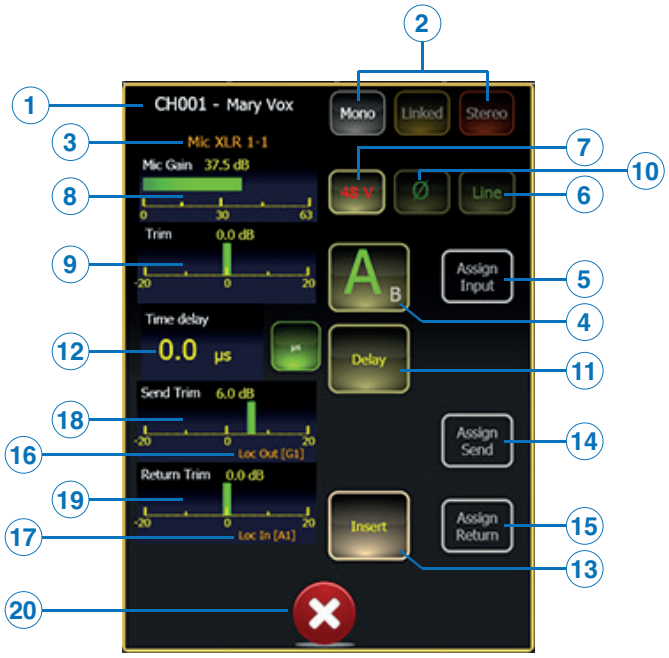
Signal Path diagram

Apart from the remote mic amps, the signal path of a CDC eight input channel is entirely implemented in DSP.

The signal path is split into five sections, Input Gain, EQ, Dynamics, Routing and Panning. On the Main Screen, these are arranged in descending order on the channel strip (see “Channel blocks:” on page 45).

Input Gain Panel

Touch the Input block on a channel strip to open this Panel. Channels on the left-hand half of the Main Screen (i.e., in the first 8) open on the left-hand side of the screen and use the left encoders, the second eight on the right, using the right encoders. The Panel provides all the input stage controls for the channel.

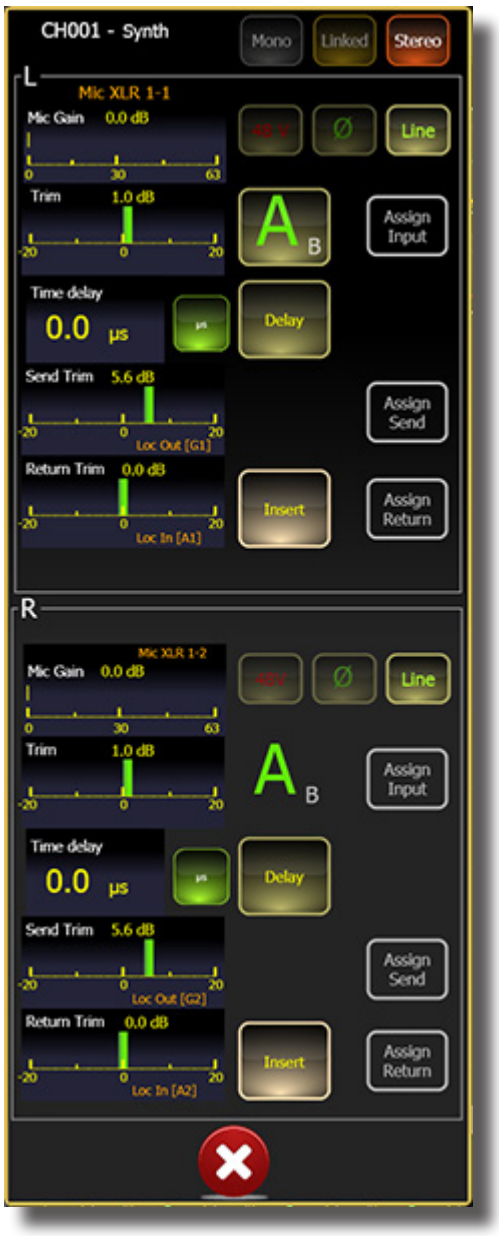


1. **Channel label** – in two parts – **CHnnn** is the absolute channel number (1 to 128); channel name is shown after the hyphen. The name will be **CH x** (1 to 128) if the channel has not been renamed. The channel name also appears on the Main Screen (above the pan section).
2. **Mono**, **Linked** and **Stereo** – define and indicate the channel Type.
3. **Input connector** – confirms the location of the physical input connector or internal FX processor output currently assigned to the input. See “Console configuration” on page 47 for details.
4. **A/B select** – this button toggles the channel source between Inputs A and B.
5. **Assign input** – touch this button to open the Input Assign Panel for Input A or B as selected by [4].
6. **Line** – inserts a 20 dB pad in the input, and increases the input impedance. Note that this button is greyed out if the channel’s input is assigned to a connector on a Local I/O card.
7. **48V** – touch this button to enable phantom power at the XLR input connector currently assigned to the selected input. This will be either A or B, as selected by [4]. It is not possible to select phantom power if Line is selected by [6].

8. **Mic Gain** – this shows the gain of the remote mic pre-amp. The gain is adjusted with encoder 5, and the range is 0 to 63 dB. At a setting of 0 dB, the input is suitable for line level signals.
9. Input Trim – this shows the fine gain trim, with a range of ±20 dB; adjust with encoder 6.
10. **Ø** – reverses the phase of the input. The button highlights when phase reverse is active.
11. **Delay** – delay can be added to each channel for time alignment purposes. The delay is adjusted with encoder 7. The range is 0 to 0.5 s, equivalent to 170 metres or 47,988 samples.
12. Delay units – scrolls between **Samples**, time (**µS/mSec**) and distance* (**M**).
13. **Insert** – this enables the channel insert point. The insert is post mic amp, pre-EQ. The insert cannot be enabled until the send and return have been allocated physical connectors (see below).
14. **Assign Send** – touch this button to open the Assign Send Panel for the channel Insert Send. This Panel is identical to the Assign Main Out Panel (see “Output destinations” on page 59).
15. **Assign Return** – touch this button to open the Assign Return Panel for the channel Insert Return. This Panel is identical to the Input Assign Panel (see “Input sources” on page 57).
16. **Insert Send connector** – confirms the location of the output connector currently assigned to the Insert Send.
17. **Insert Return connector** – confirms the location of the input connector currently assigned to the Insert Return.
18. **Insert Send Trim** – the nominal level at the Inset Send output is 0 dB, but can be adjusted over a range of ±20 dB with encoder 8.
19. **Insert Return Trim** – the nominal sensitivity at the Inset Return input is 0 dB, but can be adjusted over a range of ±20 dB with encoder 9.
20. **Close** – closes the Panel.

* calculation based on speed of sound at 340 m/s.

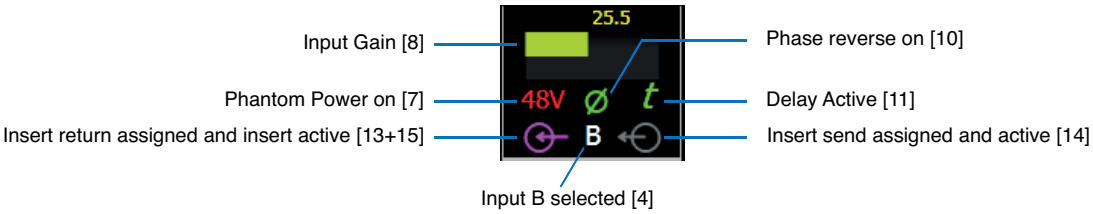
Stereo channels:



The Input Gain Panel for a stereo channel is a “double” version of the mono Panel. All routings and parameters can be set independently for the left and right paths of the stereo signal. Note that now ten of the left/right encoders are used for variable parameter adjustment – encoders 2 to 6 control the upper (Left) section of the Panel, and 8 to 12 the lower (Right).

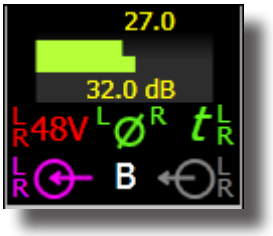
Main Screen display – Input Gain block:

Unless an EQ Panel is open (see “EQ Panel” on page 65), the upper set of encoders is always available to the engineer as a second set of Input Gain controls (or Input Trim if the channel is assigned to a digital input). Confirmation of the Input Gain, and certain other settings made in the Input Gain Panel, are duplicated in the Input Gain block below the upper encoder, so that they are always readily visible to the engineer. Pressing the SWAP button (see [7] at page 17) exchanges the entire Input Gain block and upper row of encoders with the Pan Block and lower encoder row; some engineers may prefer the Input Gain controls to be ‘nearer to hand’ in this way.



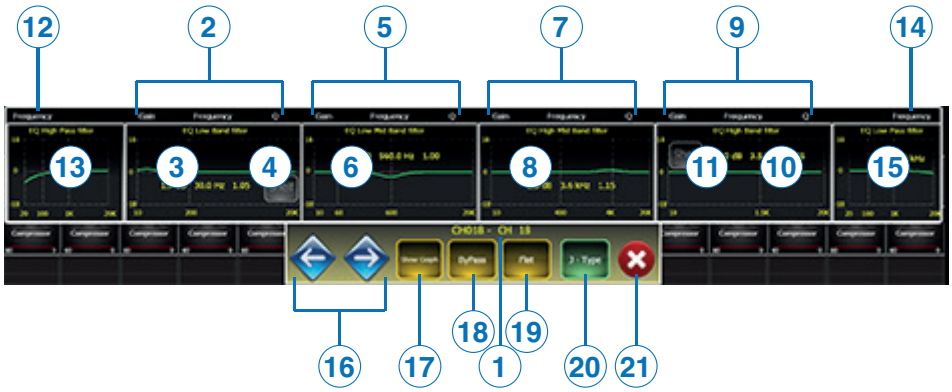
The numbers in square brackets refer to the functions of the Input Gain Panel.

If the channel is stereo, both Input Gains are displayed on the Input block, and the Phantom power, Phase reverse, Delay and Insert indicators confirm the settings made in each path separately.



EQ Panel

Touch the EQ block on a channel strip to open the EQ Panel. The EQ Panel opens at the top of the screen for all channels, and uses the upper encoders for adjustments.



The EQ section has four bands; all are parametric, bell/shelf switching is included for the HF and LF bands. There are also separate, swept hi-pass and lo-pass filters. Each of the six sections may be switched in and out individually, by touching anywhere in the area of the band display.

1. **Channel label** – as Input Gain panel.

LF EQ section:

2. The parameters are adjusted by upper encoders 3 to 5:
   - 3 – frequency range 20 Hz – 200 Hz (Classic Cadac mode) or 20 Hz – 20 kHz (20kHz mode)
   - 4 – gain ±18 dB
   - 5 – Q range 1.0 to 3.0 (only available in Bell mode)
3. Frequency response curve, with numerical display of parameter values
4. **Shelf** – the LF EQ section defaults to Bell mode, touch **Shelf** to switch to a shelving response. Touch again to return to Bell mode.

LMF EQ section:

5. The parameters are adjusted by upper encoders 6 to 8:
   - 6 – frequency range 60 Hz – 600 Hz (Classic Cadac mode) or 20 Hz – 20 kHz (20 kHz mode)
   - 7 – gain ±18 dB
   - 8 – Q range 1.0 to 3.0
6. Frequency response curve, with numerical display of parameter values.

HMF EQ section:

7. The parameters are adjusted by upper encoders 9 to 11:
   - 9 – frequency range 400 Hz – 4 kHz (Classic Cadac mode) or 20 Hz – 20 kHz (20 kHz mode)
   - 10 – gain ±18 dB
   - 11 – Q range 1.0 to 3.0
8. Frequency response curve, with numerical display of parameter values.

HF EQ section:

9. The parameters are adjusted by upper encoders 12 to 14:
   - 12 – frequency range 1.5 kHz – 20 kHz (Classic Cadac mode) or 20 Hz – 20 kHz (20kHz mode)
   - 13 – gain ±18 dB
   - 14 – Q range 1.0 to 3.0 (only available in Bell mode)
10. Frequency response curve, with numerical display of parameter values.
11. **Shelf** – the LF EQ section defaults to Bell mode, touch **Shelf** to switch to a shelving response. Touch **again** to return to Bell mode.

Hi-pass filter:

12. Upper encoder 1 adjusts the turnover frequency; range is 10 Hz to 400 Hz, slope is 12 dB/oct
13. Filter section response curve, with numerical display of filter frequency

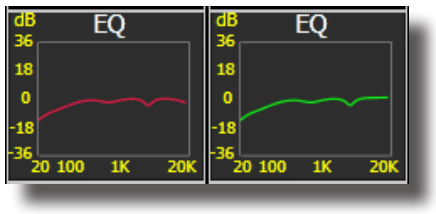
Lo-pass filter:

14. Upper encoder 16 adjusts the turnover frequency; range is 20 kHz to 1.18 kHz, slope is 12 dB/oct
15. Filter section response curve, with numerical display of filter frequency

Other controls:

16. Channel scroll buttons – touch these to move control of EQ to the next channel up or down.
17. **Show Graph** – touch this button to open a larger frequency response graph which shows the combined effect of all EQ and filter sections. Note that the vertical scale extends to ±36 dB to allow for the additive effect of cut/boost in multiple frequency bands. Touch **Hide Graph** to close.
18. **ByPass** – touching this button removes the EQ and filter sections from the signal processing, but retains all settings so that a second press can reinstate them. While the section is bypassed, the upper six-section area of the EQ Panel is greyed-out.
19. **Flat** – touching this button cancels all current settings in the four main EQ sections, producing a flat frequency response. The two filter sections are turned off, but their last frequency settings are retained, so that the filters may be reinstated simply by touching the filter section(s) of the Panel.
20. **J-Type/20 kHz** – alters the frequency range of the four EQ bands; in 20 kHz mode, all bands can be swept over the full audio frequency range of 20 Hz to 20 kHz. In Classic mode, the frequency range of each band is restricted, to emulate the EQ sections of the analogue Cadac J-Type console.
21. **Close** – closes the Panel.

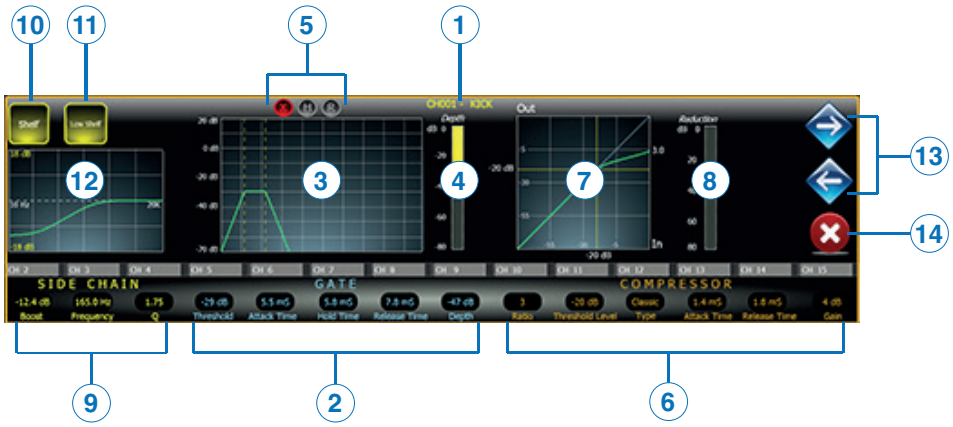
Main Screen display – EQ block:
A thumbnail version of the main EQ graph depicting the combined frequency response of all sections is duplicated in the EQ block on the Main Screen.



If the EQ section is bypassed, the curve is displayed in red.

Dynamics Panel

Touch the Dynamics block on a channel strip to open the Dynamics Panel. The Dynamics Panel opens at the bottom of the screen for all channels, and uses the lower encoders for adjustments.



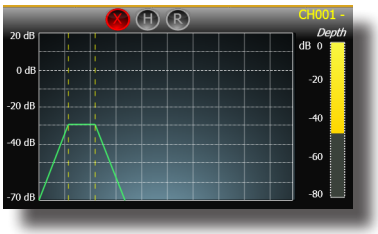
The Dynamics section consists of two primary sections: a Gate and a Compressor-Limiter. The two sections share a side chain, whose filter parameters are also available, thus the Panel is divided into three areas. The side chain filter has several modes, and can be used to provide frequency-conscious gating and/or compression. The gate, compressor-limiter and side chain filter may be switched in and out of circuit independently in the same manner as the EQ sections, by touching anywhere in their respective Panel areas. The three areas are colour coded: blue (Gate), orange (compressor-limiter), yellow (side chain).

Note that when the Dynamics Panel is open, the idents of the channel strips “below” are still visible to aid channel identification.

1. Channel label – as Input Gain panel

Gate section

2. The parameters are adjusted by lower encoders 5 to 9:
   - **Threshold** – adjustable in the range -70 to +20 dB by encoder 5
   - **Attack Time** – adjustable in the range 0.1 ms to 400 ms by encoder 6
   - **Hold Time** – adjustable in the range 0.1 ms to 5 s by encoder 7
   - **Release Time** – adjustable in the range 0.1 ms to 5 s by encoder 8
   - **Depth** - adjustable in the range -80 dB (max gating) to 0 dB (no gating) by encoder 9
3. Gate characteristic display: this provides a representation of the gate’s time settings. The vertical axis is level, the horizontal is time. The scales, however, are arbitrary.



4. Gate depth display – bargraph giving a visual indication of the setting of the Depth control.

5. Gate phase display – three indicators indicate the gate's status:
    - **X** – shows red while the gate is closed, green while it is open
    - **H** – illuminates yellow while the gate is in its Hold phase
    - **R** – illuminates purple while the gate is in its Release phase

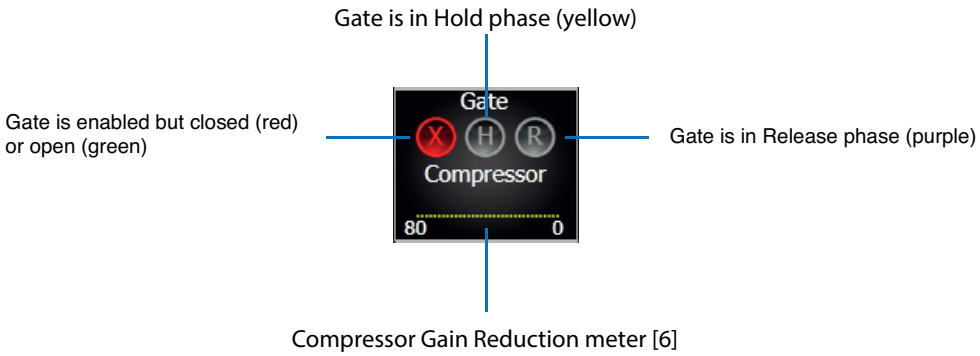
Compressor-limiter section

6. The parameters are adjusted by lower encoders 10 to 15:
    - **Threshold Level** – adjustable in the range -70 to +20 dB by lower encoder 11
    - **Attack Time** – adjustable in the range 0.1 ms to 400 ms by encoder 12
    - **Ratio** – adjustable in the range 1:1 (no compression) to 25:1 (severe limiting) by encoder 10
    - **Release Time** – adjustable in he range 0.1 ms to 5 s by encoder 14
    - **Gain** – standard compressor gain make-up, adjustable in the range 0 to 20 dB by encoder 15
    - **Vintage/Standard** – the compressor's transfer characteristic has two possible "shapes" around the threshold. Standard mode maintains a linear 1:1 characteristic below the threshold, while Vintage provides a slight degree of expansion as signal levels approach the threshold. The shape is selected by encoder 13.
7. Transfer characteristic display – this graph plots output level against input level and thus provides a representation of the compressor's ratio and threshold settings. The 45° line represents no compression; when line tends towards the horizontal, compression is occurring.
8. Gain reduction meter – this dynamically indicates the amount by which the gain is being reduced by the compressor-limiter action. The bargraph indicates "downwards"; the longer the column, the more compression is being applied.

Side Chain section

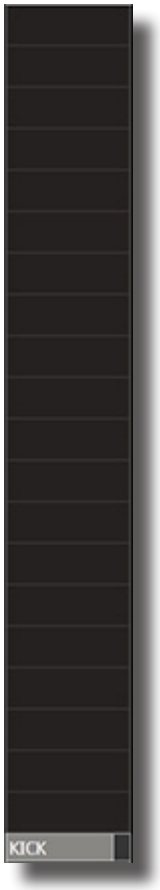
9. The parameters are adjusted by lower encoders 2 to 4:
    - **Frequency** – adjustable in the range 20 Hz to 20 kHz by encoder 3. This will be the centre frequency when the filter is in Bell mode and the turnover frequency in Shelf mode
    - **Boost** – applies cut or boost in the selected frequency range; adjustable in the range ±16 dB by encoder 2
    - **Q** – adjustable in the range 1.0 to 15.4 by encoder 4 (only available in Bell mode)
10. **Shelf** – switches the filter between Bell (default) and Shelf modes. Touch **Shelf** again to return to Bell mode.
11. **Low Shelf** – this button is only available in Shelf mode – it configures the filter as either hi-pass or lo-pass.
12. Filter section response curve.
13. Channel scroll buttons – touch these to move control of dynamics to the next channel up or down.
14. **Close** – closes the Panel.

Main Screen display – Dynamics block:
A display of Dynamics section activity is also available in the Dynamics block on the Main Screen, so the engineer has a real-time view of gating and compression for all the channels in the current layer.



The Gain Reduction display changes colour from red to yellow when the compressor-limiter is enabled, and duplicates Item [7] in the Dynamics Panel.

Bus Routing Panel

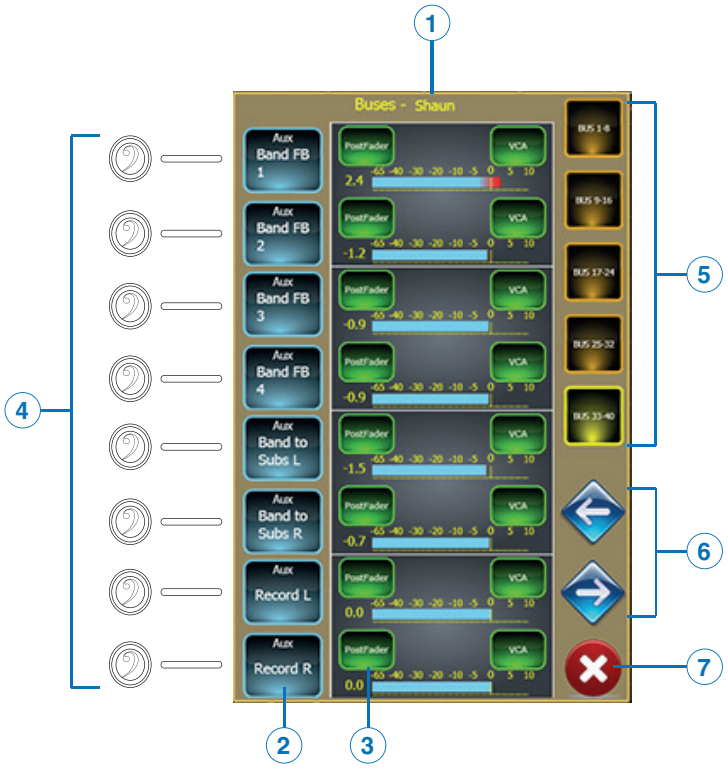


It is impractical to visualise routing and send controls for all 56 busses simultaneously, so the CDC eight's Bus Routing Panels allow access for eight consecutively-numbered busses at a time. The routing area of the Main Screen channel strip has five active touch areas, so it is easy to access the bank of eight busses that is required by touching at the top, middle or bottom of the routing area, or in the two intermediate areas, as shown above. Channels on the left-hand half of the Main Screen (i.e., in the first 8) open on the left-hand side of the screen and use the left encoders, the second eight on the right, using the right encoders.

Once the selected channel's **Busses** Panel is open, any of the other banks can be accessed by selecting a different **Bus** button (**1-8**, **9-16**, **17-24**, **25-32**, **33-40**, **41-48** and **49-56**), or by swiping the Panel vertically; in this case, the set of 8 busses displayed is not limited to the banks, and any set of 8 consecutively-numbered busses can be displayed.

The **Busses** Panel reflects the bus type – Aux, Group or Matrix - by colour coding, and the routing facilities for each bus vary slightly with type, and for stereo busses. Any names assigned to the busses are also reflected in the Panel.

Examples of Aux, Group and Matrix busses.



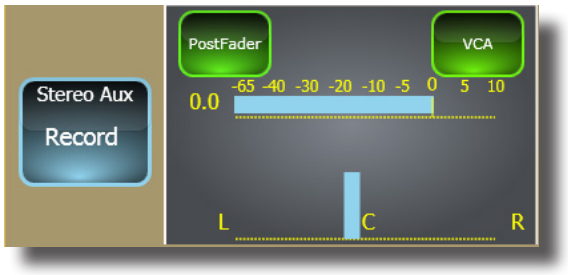
Aux Send routing (mono):

1. **Channel label** – as Input Gain panel
2. **Bus On** – touch these buttons to enable the routing from the selected channel to the Aux Send. These may be used as Send Mutes when the send is in use.

3. Bus Source buttons – these define the point in the signal path that feeds the send. The default is **PostFader**, touching the button selects **PreEQ** and **PreFader** in turn (both of which are pre-fade, of course). If PostFader is selected, and the channel is a member of a VCA Group, an additional **VCA** button is enabled, which allows the send to be sourced pre or post the VCA fader (i.e., if the **VCA** button is illuminated, the VCA master fader will affect the send level.) Note also that Bus Source may be adjusted even when the send is not enabled (i.e., **Bus On** [2] is off).
4. Send level – left (or right) encoders 5 to 12 are used to control the send levels for each of the eight busses currently in the Panel. The range is -∞ (off) to +10 dB. Note that send levels may be adjusted even when the send is not enabled (i.e., **Bus On** [2] is off).
5. Bank select – touch these buttons to move to a different bank of eight busses.
6. Channel scroll buttons – touch these to move control of send levels to the next channel up or down.
7. **Close** – closes the Panel.

Stereo input channels route an (L+R) sum to mono aux busses, and maintain stereo balance when routing to a stereo bus (i.e., L -> L, R -> R).

Aux Send routing (stereo):



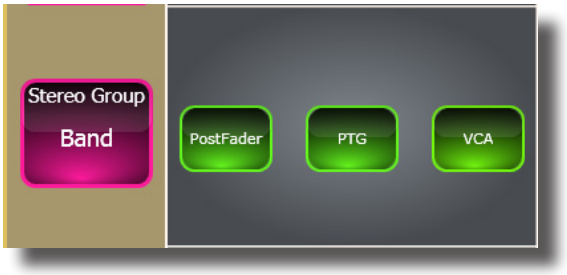
If the Aux Send has been defined as stereo, a single **Bus On** button replaces the two for mono sends, and the separate send level controls are replaced by a single stereo level control and a pan control. If the input channel is stereo, a ±45º balance control appears instead of a pan control.

Group bus routing (mono):

If the bus has been defined as a mono Group, the send level control is omitted, and the channel will route its signal to the bus at full level. The three Bus Source options – **PostFader** (default), **PreEQ** and **PreFader** – are still available.

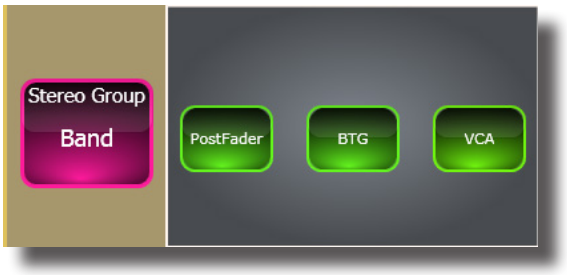
Stereo input channels route an (L+R) sum to mono Group busses.

Group bus routing (stereo):



The **PTG** button - Pan to Group – allows the LR stereo image placement of the input channel to be maintained in the send to the stereo bus. When **PTG** is enabled, the channel's panpot position is taken into account when setting the send levels to each path of the stereo Group.

If the input channel is stereo, the **PTG** button is replaced by a **BTG** (Balance to Group) button. This reflects the re-assignment of the channel panpot as a balance control when a channel is defined as stereo, and when enabled, functions in the same manner as the PTG mode for mono channels.



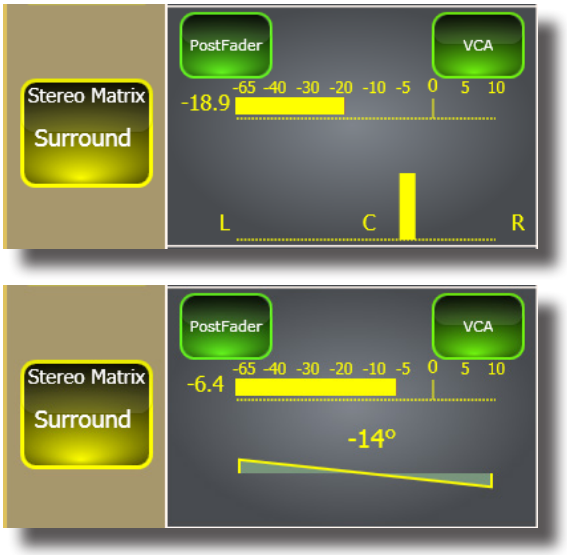
Note that use either the PTG or BTG functions, LR stereo master bus routing must be selected for the panpot to be enabled (see page 75). If LCR routing is selected, the C path is ignored and the stereo imaging taken from the panpot position in the same way as for LR routing. If L, C or R mono routing is selected, a mono feed is sent to both L and R legs of the stereo bus.

Matrix bus routing (mono):

The facilities available are the same as those for mono Aux Sends.

Stereo input channels route an (L+R) sum to mono Matrix Busses.

Matrix bus routing (stereo):



The facilities available are the same as those for stereo Aux Sends, for both mono and stereo input channels.

Main Screen display – Bus Routing block:
All active routings are displayed for every channel in thumbnail form on the Main Screen channel strips. Note that the routing block is divided into 20 areas; each displaying the send levels for two busses.

Points to note:

- Send levels to Aux and Matrix Busses are displayed as horizontal bars, with colour coding to assist bus type identification (blue = Aux, yellow = Matrix).
- Stereo Aux and Matrix Sends display level and pan/balance settings.
- Group routings are displayed by the Group name (in pink); stereo Groups have the name displayed centrally in the block.

Pan Panel

Touch the Pan block on a channel strip to open the Pan Panel. The Pan Panel opens within the relevant channel strip; the lower row encoder for the selected channel is the Channel Pan control (unless **SWAP** is active).

The Pan Panel for a mono channel provides five buttons controlling routing to the LCR master bus.

- **L** – routes the channel signal to the L bus of the master output.
- **R** – routes the channel signal to the R bus of the master output.
- **C** – routes the channel signal to the C bus of the master output.
- **LR** – routes the channel signal to the master output via the pan control, allowing stereo panning between the L and R busses.
- **LCR** – as **LR**, but when centrally panned, the signal is routed to the C bus; anticlockwise encoder rotation pans between C and L, clockwise rotation pans between C and R. In LCR mode, the encoder has a second function; after a single press on the knob, the encoder adjusts pan depth. (A greater depth increases the signal level sent to the C bus as the signal is panned centrally.)

It is possible to select **L**, **R** and **C** routings simultaneously in any combination; in this case, the channel signal is sent to all selected busses at equal level. It is also possible to select both **LR** and **C** routings; this combination enables the pan control to pan between the L and R busses, but routes the full level signal to C regardless of the panpot position.

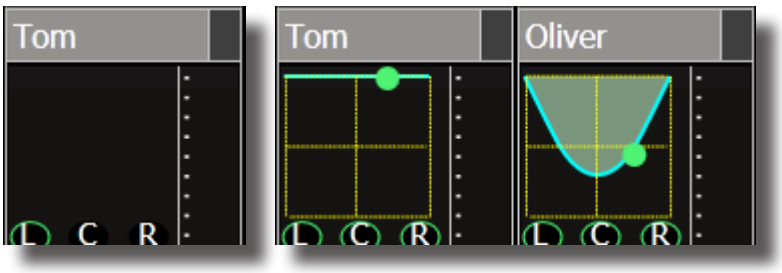
Stereo channels:

If an Input Channel has been defined as stereo, the LCR option is removed from its Pan Panel. The four remaining options operate as follows:

- L – routes an (L + R) mono sum of the stereo channel signal to the L bus of the master output.
- R – routes an (L + R) mono sum of the stereo channel signal to the R bus of the master output.
- C – routes an (L + R) mono sum of the stereo channel signal to the C bus of the master output.
- LR – the L and R legs of the stereo channel are routed to the L and R busses of the master output respectively. The encoder is configured as a stereo balance control.

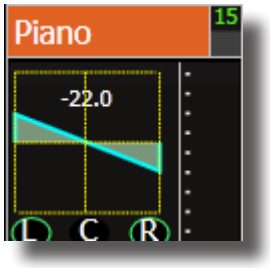
Main Screen display – Pan block:

Unless a Dynamics Panel is open (see page 67), the lower set of encoders are always available to the engineer as Pan controls (or balance controls in the case of stereo input channels), provided that LR or LCR routing mode has been selected in the Pan Panel.



The master output routing selected is always displayed in the Channel Pan block by circles around the L, C and R symbols. LR mode adds a vertical bar to show pan position. When LCR mode is in use, the pan control's divergence function is displayed as a parabola, indicating the degree of attenuation in the centre position.

When LR mode is selected for a stereo channel, the Pan block shows the effect of the stereo balance control:



Pressing the SWAP button (see [7] at page 17) exchanges the entire Pan block and lower row of encoders with the Input Gain Block and upper encoder row.

Virtual meters:
The Pan block also includes a virtual bargraph meter showing the pre-fade signal level in the channel. In a stereo channel, two meters are displayed, showing separate left and right signal levels.

Copying Input Channel settings

The CDC eight provides a method of copying some or all the parameter values and settings of a channel to another channel. The “destination” channel(s) need not be on the same layer as the “source” channel. To copy a channel’s settings:

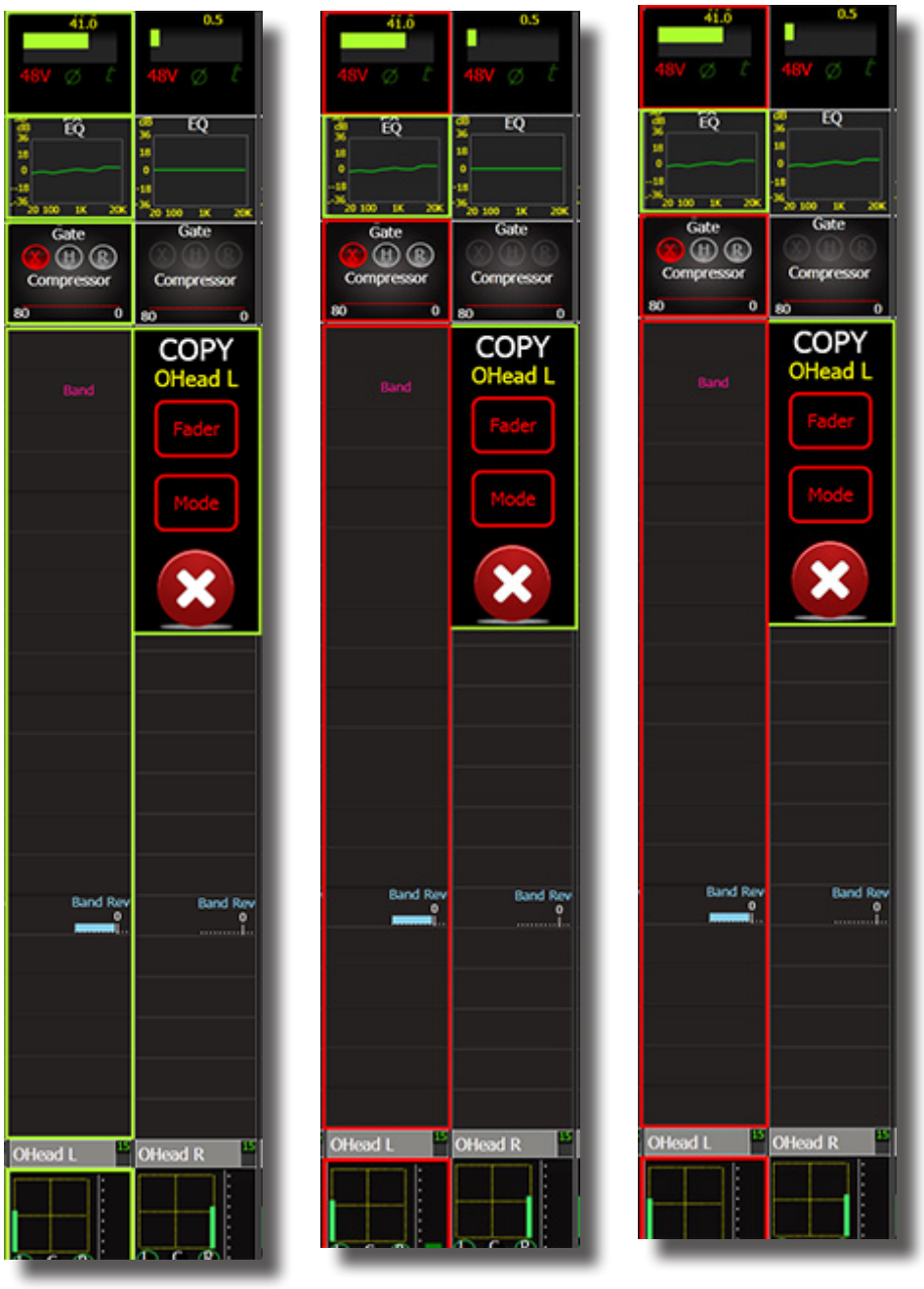


Image A Image B Image C

1. Select a layer (or swipe) so that the channel to be copied is within the visible channel set.

2. Hold down the lower **Assign** button (see [6] at page 17), and press the **SEL** button [8] of the channel to be copied. The channel blocks are outlined in green and the Copy function is confirmed. Release the **Assign** button. See above Image A.

3. Select which Channel settings are to be copied; the channel is divided into individual channel blocks – Input Gain, EQ, Dynamics, Routing and Pan – any may be selected or deselected by touching anywhere in the blocks. Deselected blocks are outlined in red. Thus to copy only an EQ curve elsewhere, deselect all the blocks except the EQ. See Image B.

   Note that the Copy function retains the 'last-used' set of channel settings; typically some blocks will be displayed as selected on initiating Copy, others will be displayed as deselected.

4. You can also copy the channel's fader position and mode (Mono, Stereo or Linked) to the destination channels. To add either of these settings to the channel settings to be copied, touch the **Fader** and/or **Mode** buttons; these turn green to confirm selection.

5. Press the **SEL** button on the "destination" channel. This channel will now assume the selected parameter values and settings that were copied. The destination channel may be on another layer if wished. The selected settings may be copied to as many channels as wished, as long as the Copy function remains open on the source channel. See Image C.

Note that the set of selected channel elements is stored by the Copy function when it is closed; when the source channel is changed, the elements to be copied will the last set used.

Copying from/to Stereo and Linked channels:
The settings of a mono channel may be copied to a stereo channel, in which case both L and R paths of the stereo channel adopt the copied settings. Conversely, the settings of a stereo channel may be copied to a mono channel; as the settings in each path of the stereo channel will be the same, there is no conflict.

The only exception to the above rules is in the case of mono Input Channels with LCR master routing assignments; as LCR panning is available to stereo channels, a mono-to-stereo copy results in an LR + C routing assignment in the destination channel.

If **Mode** is selected at the source channel, copying settings from a Stereo or Linked channel will create a pair of channels if the destination channel is Mono; this will always be an odd-even pair, regardless of whether the destination channel is numbered odd or even.

Conversely, copying the Mode of a Mono channel to a Stereo or Linked channel will deselect the pairing already in place and create two mono channels.

Output channel facilities

This section of the User Manual describes the facilities available on each output channel in more detail.

Signal Path diagram

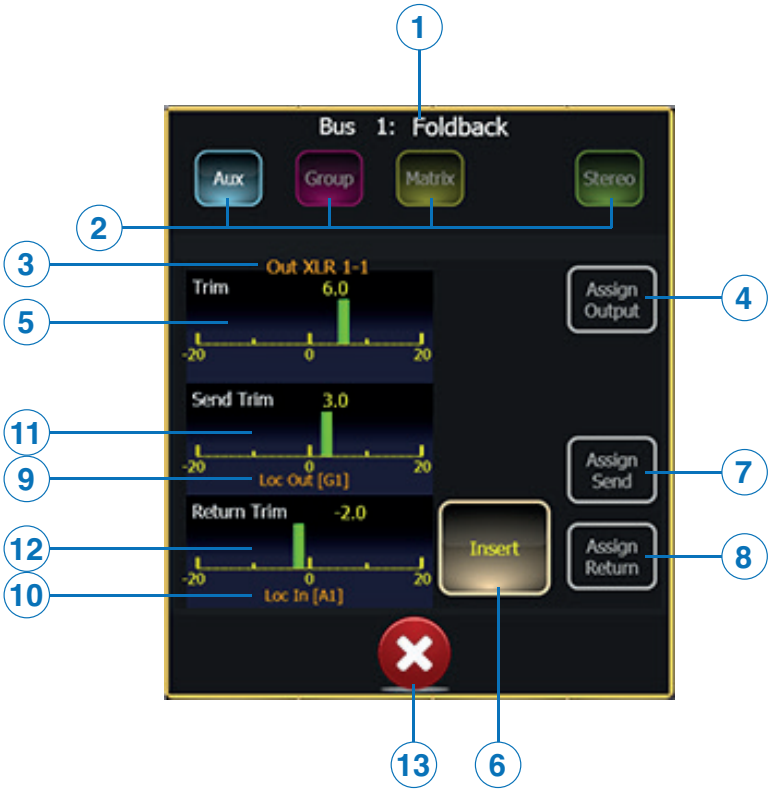
The CDC eight's 59 Output Channels (56 busses plus LCR master) have very similar facilities as the Input Channels. There are certain exceptions, and these are generally related to the bus type forming the Output Channel source.

For the purposes of brevity, this section of the User Manual will concentrate only on the differences between the facilities available on an Output Channel and those on an Input Channel.

The Output Channel signal path is split into the same five sections as the Input Channels: Bus Trim, EQ, Dynamics, Routing and Pan/Delay (the Output Channels have an additional time delay option not available on the Input Channels).

Bus Trim Panel

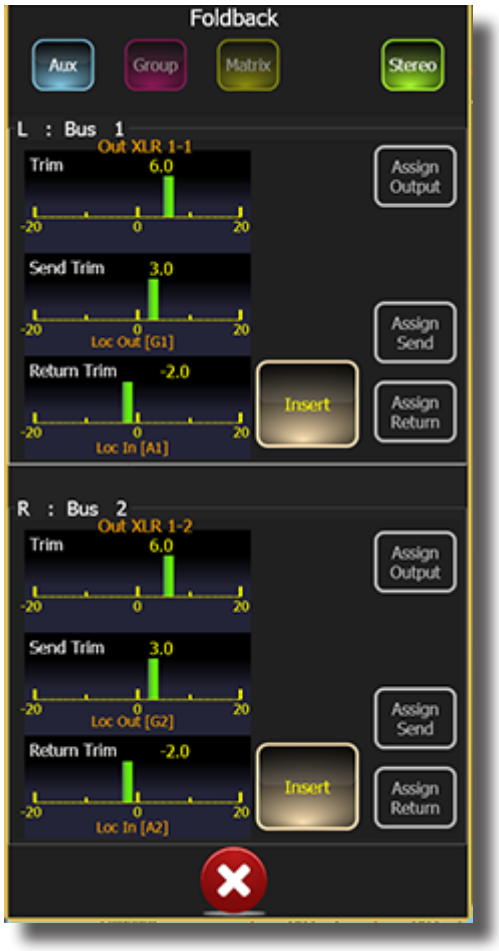
All types of Output Channel (Aux, Group, Matrix and Master) have the same Bus Trim Panel (corresponding to an Input Channel's Input Gain panel). Touch the Input block on a channel strip to open it.



1. **Bus label** – in two parts – **Bus nn** is the absolute bus number (1 to 56); bus name is shown after the hyphen. The name will be Bus **x** (1 to 56) if the output has not been renamed. The output name also appears on the Main Screen (above the pan section).
2. **Aux**, **Group**, **Matrix** and **Stereo** – define and indicate the bus type.
3. Output connector – confirms the location of the output connector currently assigned to the output. See "Output destinations" on page 59 for details.

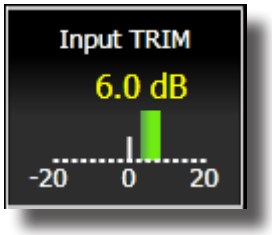
4. **Assign Output** – touch this button to open the **Assign Main Out Panel**. See page 59.
5. **Bus Trim** – this allows the gain of the bus mix (summing) amplifier to be adjusted in the range ±10 dB; adjust with encoder 6.
6. **Insert on/off** – this enables the Output Channel insert point. The insert is post bus summing amp, pre-EQ. The insert cannot be enabled until the insert return has been allocated a source – either a physical connector or an FX processor output (see below).
7. **Assign Send** – touch this button to open the Assign Send Panel for the channel Insert Send. This Panel is identical to the Assign Main Out Panel (see page 59).
8. **Assign Return** - touch this button to open the Assign Return Panel for the channel Insert Return. This Panel is identical to the Input Assign Panel (see “Input sources” on page 57).
9. **Insert Send connector** – confirms the location of the output connector currently assigned to the Insert Send.
10. **Insert Return connector** – confirms the location of the input connector currently assigned to the Insert Return.
11. **Insert Send Trim** – the nominal level at the Inset Send output is 0 dB, but can be adjusted over a range of ±10 dB with encoder 7.
12. **Insert Return Trim** – the nominal sensitivity at the Inset Return input is 0 dB, but can be adjusted over a range of ±10 dB with encoder 8.
13. **Close** – closes the Panel.

Stereo channels:



The Bus Trim Panel for a stereo Output Channel is a “double” version of the mono Panel. All routings and parameters can be set independently for the left and right paths of the stereo signal. Note that now six of the left/right encoders are used for variable parameter adjustment – encoders 5 to 7 control the upper (Left) section of the Panel, and 9 to 11 the lower (Right).

Main Screen display – Bus Trim block:



Unless an EQ Panel is open, the upper set of encoders are always available to the engineer as Bus Trim controls while an Output Layer is displayed. Confirmation of the Trim setting is duplicated in the Input Gain block below the upper encoder, so that they are always readily visible to the engineer. Note that the **Swap** button operates on Output Channels in the same manner as Input Channels, exchanging the Pan and Trim locations and encoders.

EQ Panel

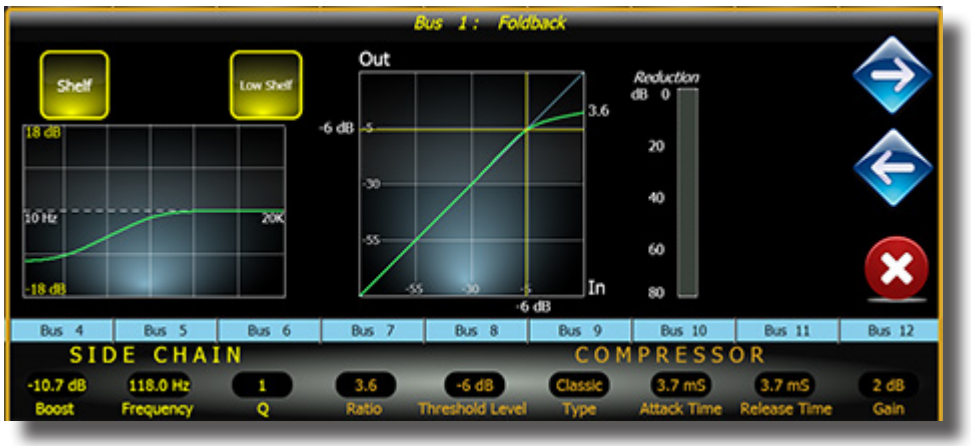
All types of Output Channel (Aux, Group, Matrix and Master) have the same EQ facilities as Input Channels. The EQ Panel opens in the same screen position, uses the same encoders and operation is identical. (See “EQ Panel” on page 65 for a full description.) The EQ block in the Main Screen channel strip displays the assigned EQ curve in the same way as the Input Channels.

Dynamics Panel

All types of Output Channel (Aux, Group, Matrix and Master) have the same Dynamics facilities. The Output Channel Dynamics Panel is the same as that for Input Channels, except that the Gate section is omitted. Operation of the Compressor-Limiter and Side Chain sections is identical to those in the Input Channels. The Panel opens in the same screen position, but the encoder allocation is slightly different due to the reduced Panel facilities:

Compressor threshold:	Encoder 8
Compressor Type (Vintage/Classic)	Encoder 9
Compressor attack time:	Encoder 10
Compressor ratio:	Encoder 7
Compressor release time:	Encoder 11
Compressor Gain:	Encoder 12
Side chain frequency:	Encoder 5
Side chain cut/boost:	Encoder 4
Side chain bandwith (Q):	Encoder 6

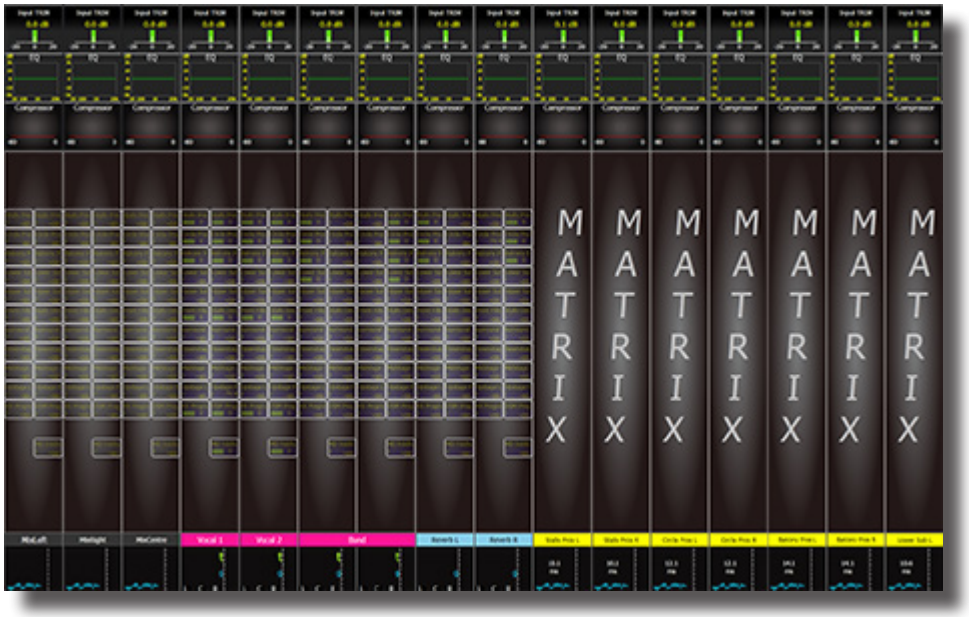
See “Dynamics Panel” on page 67 for a full description of operation. The Dynamics block in the Main Screen channel strip displays the Gain Reduction meter in the same way as the Input Channels (but the Gate indicators are absent).



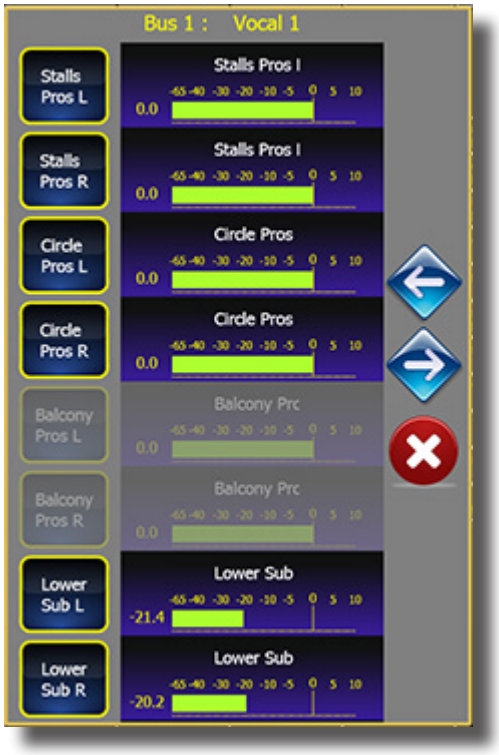
Bus Routing Panel

The CDC eight's architecture allows any Aux Send, Group or Master output to be routed to any Matrix output; they cannot be routed elsewhere (apart from the LCR master, see Pan Panel below). Matrix outputs themselves cannot be routed anywhere else.

When any of the CDC eight's assignable 56 busses have been defined as matrix sends, an active area corresponding to it appears in the channel strip for every Aux, Group and Master output channel.



Initially, all matrix sends are off (muted); touching a block opens the Bus Routing Panel for that Output Channel. The size and on-screen location of this panel will depend on how many matrix busses have been defined and which is selected. The maximum size of the Panel allows for eight matrix sends; if more than eight have been defined, then the Panel can be vertically swiped to reveal the additional sends. The Panels open on the left or right sides of the Main Screen and use the corresponding set of encoders. As the size of the panel is proportional to the number of matrix sends being displayed, the number of encoders enabled varies; a single matrix send uses encoder 5, and additional sends up to eight use the successive encoders down to encoder 12.



Initially, the sends are muted (the Panel is greyed-out); touch a **Bus n** button (where n is the bus number) to enable the Send. As with the Input Channels, a matrix send level may be adjusted while the Send is muted. Note that the **Bus n** buttons and the send level displays carry the names given to the matrix busses when the bus structure was defined.

In all other respects, the Send Panel is identical in operation to the Bus Routing Panel for the Input Channels (see “Bus Routing Panel” on page 70 for full details). When matrix sends from Aux, Group or Master Output Channels have been set up, the Main Screen Channel display confirms the matrix sends and their levels:

The send level range is -∞ (muted) to +10 dB.

Note that stereo matrix sends appear as two separate mono matrix sends, both on the Bus Routing Panel itself and the thumbnail image on the Main Screen.

Stereo Aux or Groups outputs send an (L + R) mono sum of their signals to the matrix send; the Panels are identical.

Pan/Delay Panel

Output Channels have two types of Pan/Delay Panel, reflecting the different facilities available to the various types of output. It is possible to route to the LCR master bus from both Aux and Group Output Channels, but not from Matrix Outputs, nor from the three legs of the Master Output itself. All Output Channels include variable time delay up, with a maximum of 500 ms.

Touch the Pan block on an Output Channel strip to open the Pan/Delay Panel. The Panel opens within the channel strip; as with Input Channels, the lower row encoder for the selected channel is the Channel Pan control. This is also the case when the Pan Panel is not open, unless **Swap** (see [7] at page 17) has been selected; this exchanges the entire Pan Block and lower encoder row with the Bus Trim block and upper row of encoders.

Aux and Group Outputs:
The routing options to the Master output are the same as those available on Input Channels. The Main Screen Pan block display is also identical. See page 75 for full details.

Because stereo Aux and Group busses retain separate L and R Output Channels, each path of a stereo Output Channel has full master bus routing and panning.

Time Delay:
It is possible to insert a sample-accurate time delay into any of the CDC eight's Aux, Group, Matrix or Master outputs. Touching the **OFF** button in the Time Delay area of the Panel enables the delay, which re-assigns the channel's lower encoder (or upper encoder if **Swap** is in use) as the time adjustment control. When the Pan Panel is closed, the encoder reverts to its Pan function.

For speaker alignment purposes, the delay value can be entered in distance (metres or feet) or micro/milliseconds (**µS/mSec**) as well as the default **Samples** setting. Touching the lower button in the Time Delay are steps the units through the four available options. Time/distance calculations are based on the standard speed of sound of 340 m/s. The maximum delay is 499.9 ms (equivalent to 170 m/557.6 ft, or 47,988 samples). At low delay settings, the delay can be set in increments of one sample, but at longer delays, the increments increase to match the longer delay.

When the time delay is enabled a green '**t**' symbol appears in the Pan block of the channel strip.

Matrix and Master outputs:

The Pan Panels for the CDC eight's three Master outputs (L, C and R), and any Matrix outputs, have no routing options. However, Time Delay may be inserted into any of these outputs as required. The delay function operates in an identical manner to that described above for Aux and Group outputs.

Virtual meters:
As the Input Channels, Output Channels include a virtual signal level meter in the channel's Pan block. A dual bargraph is displayed for stereo channels. The meter's source may be the channel's pre-fade or post-fade signal, as selected on the **Meter Options** page of the Master screen.

Copying Output Channel settings

Output Channel parameter values and settings may be copied from one channel to others in the same manner as described for copying Input Channel parameter values and settings. See "Copying Input Channel settings" on page 77 for full details.

On Output Channels, there are two additional channel elements that can be copied:

- **Source**: selecting **Source** copies the Global Channel Bus Send setting for the Bus (Post-fade, Pre-fade or Pre-EQ) to the destination channel.
- **GEQ**: copies the source channel's current graphic equaliser curve to the destination channel(s).

If the destination channel is a Matrix Output Channel, any matrix send settings present in the source channel are ignored.

It is not possible to copy Input Channel data to an Output Channel, or vice-versa.

VCA Groups

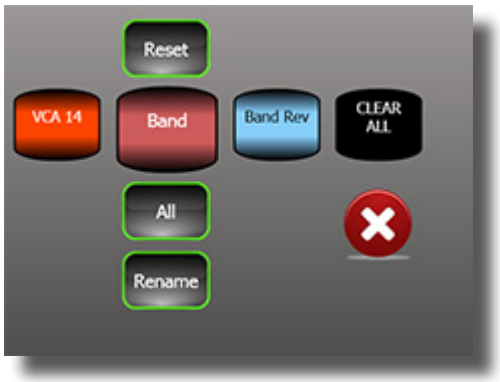
Although the CDC eight, as a digital mixer has no actual VCAs – these being a purely analogue concept – the term 'VCA Group' is retained for reasons of familiarity.

16 VCA Groups are available; any Input Channel can be a member of any VCA group; membership of multiple VCA Groups is allowed. Output Channels cannot belong to VCA groups. The CDC eight's Channel Sections have a dedicated VCA layer, which assigns the 16 faders and **ON** buttons as VCA masters.

Assigning channels to a VCA Group:

Press the **VCA GRP** button in the console Centre section (see [11] at page 21). This opens the **VCA SETUP** page in the left-hand Main Screen.

All 128 input channels are displayed as buttons (identified by name as well as channel number if they have been assigned), along with 16 colour-coded VCA Group buttons. Stereo input channels have double-size buttons. Touch the required VCA Group button; this enlarges it and opens three other buttons:



The VCA Group may be named; touch **Rename** to open a QWERTY keyboard window; use the **Bksp** key to delete the default name and enter the new one.

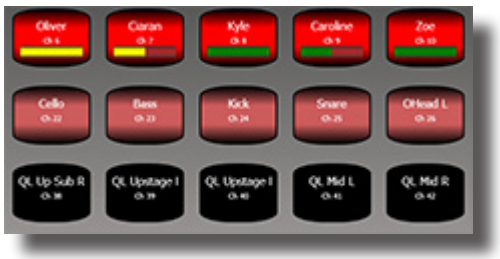
Touch **OK** (or **Cancel**) to close the window.

To assign channels to the selected VCA Group, simply touch the channel buttons; the buttons adopt the colour of the VCA Group, the channels' faders (if on the currently selected Layer) will move to the 0 dB position and the channels' **ON** buttons illuminate. A Channel may be de-assigned by touching its button again; or all channels may be de-assigned by touching **Reset**. Similarly, every channel can be assigned to the VCA Group by touching **All**.

To close the **VCA SETUP** page, touch the Cancel button or press the **VCA GRP** button again.

When a Channel has been assigned to a VCA Group, the number of the VCA Group appears in green in the Channel name block on the Main Screen.

Assigning to multiple VCA Groups:
Any Channel may be a member of any number of VCA Groups. To assign a Channel to an additional VCA Group, simply select the Group, and assign the Channel in the way described above. When a Channel is assigned to more than one VCA Group, the Channel's button on the **VCA SETTINGS** page uses the colour coding for the lowest-numbered VCA Group it is assigned to, and the other VCA Group assignments are superimposed as a (multi-)coloured bar on the button.



When a channel is assigned to more than one VCA Group, only the number of the lowest Group is displayed in the Pan Block on the Main Screen.

VCA masters:

Press the **VCA** Layer button on any Channel Section (see [14] at page 16). The faders in that Channel Section are now the 16 VCA Group masters and the **ON** buttons are the VCA Group Mutes. The **ON** buttons illuminate mauve when the corresponding VCA Group has Input Channels assigned to it, and turns red when muted. The **ON** buttons of the Input Channels now under the control of the VCA Group will also turn red in this state.

On the Main Screen, the 16 channel strips now represent the VCA Groups and list the Input Channels assigned to each, including a post-fade meter of each channel within each VCA group, thus showing the channel's actual contribution to the mix. Channel and VCA Group names are displayed when in use.

In addition, when the **SEL** button for a VCA channel is pressed, the input channels assigned to the VCA will 'unfold' onto the input faders starting from the left-most fader. The channel names are displayed on the screen above each input channel, but the VCA names also persist above the channel names, and allow the user to 'unfold' each VCA group directly without the need to de-select the VCA group before selecting another VCA group.

Mute Groups

The CDC eight also provides up to eight Mute Groups; these are independent of the VCA Groups. Assignment of Input Channels to Mute Groups is the same procedure as assignment to VCA Groups. Output Channels cannot be assigned to Mute Groups. Input Channels may be members of any number of Mute Groups; membership of VCA Groups has no bearing on membership of Mute Groups, and vice-versa.

Unlike VCA Groups, there is no Mute Group “layer”; instead the eight **USER ASSIGN** buttons are used as Mute Group masters; these are located in the console Centre section (see [13] at page 21). The USER ASSIGN buttons have additional functions, but these must be selected via the User Options page on the Control Screen. They act as the Mute Group Masters by default.

Assigning channels to a Mute Group:

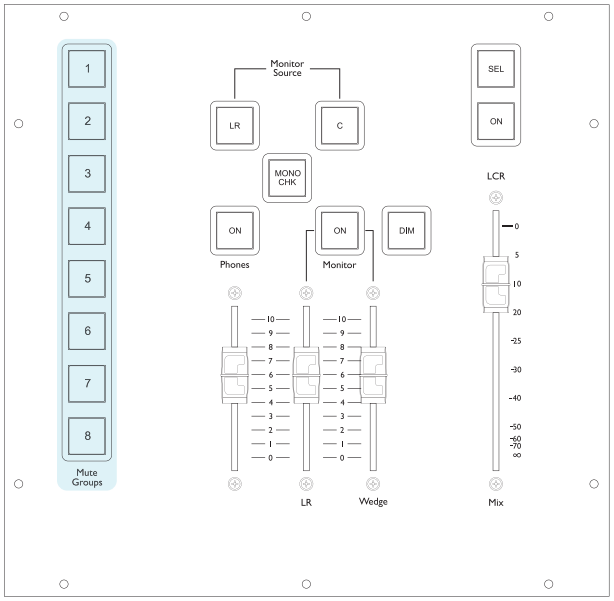
Press the **USER ASSIGN** button in the console Centre section (see [11] at page 21). This opens the **MUTE GROUPS SETUP** page in the Main Screen.

The assignment (and de-assignment) procedure for single or multiple Mute Groups is identical to that described above (see “VCA Groups” on page 86) for the VCA Groups.

To close the MUTE GROUPS SETUP page, touch the Cancel button or press the **USER ASSIGN** button again.

When a Channel has been assigned to a Mute Group, the number of the Mute Group appears in red in the Channel name block on the Main Screen.

Mute Group masters:



Once Input Channels have been assigned to a Mute Group, the **USER ASSIGN** buttons illuminate yellow.

Pressing any of the eight Mute Group Masters (i.e., the **USER ASSIGN** buttons) will mute the all the Input Channels assigned to that Mute Group and illuminate red.

None of the channels assigned to the Mute Group need be in the currently-selected layer, however the ON buttons for any channels in the Mute Group that are displayed will turn from green (on) to red (muted) when muted by the Mute Group Master.

Assignable Buttons

The Mute Group buttons are ‘soft’, and any of them can be assigned to an alternative function, such as a ‘global tap’ button for the internal FX rack, or as a fast navigation button to open the internal FX window.

This is done from the Control Screen by selecting **Menu** > **User Settings** > **User defined**, which displays a window depicting the 8 buttons. Touch the button you wish to re-assign, and then select one of the options **Global tap**, **FX window** or **Mute Group**.

The different modes colour code the buttons: the global tap function will cause the assigned button to blink blue at the current tempo rate, while assignment of the FX Window option causes the button to illuminate white.

Automation

The CDC eight incorporates a cue-based automation system to facilitate rapid switching between console settings or configurations. Each Cue contains every setting and parameter value for every Input and Output Channel in the console, and Cues may differ by as little as one Aux Send on a single channel being unmuted, or a total change of channel parameters and levels throughout the console.

As well as settings and parameter values of all the Input and Output Channels, Cues also include Input Channel assignments to VCA Groups and Mute Groups. However, they do not include Mute Group Master Statuses, mono/stereo Input Channel definitions and Bus type definitions, as these will generally be determined for the duration of the show and remain unchanged throughout. Any active Solos are also ignored.

VCA Master fader positions and mutes are stored as part of Cues by default, but the settings ignored on Cue recall if made “safe” from the Recall Safe page of the Control screen (see “Additional Recall Safe options” on page 99).

Project management

The CDC eight’s automation system allows Cue Lists to be stored and subsequently recalled. Before using the automation system, it is important to understand how the CDC eight stores this data.

A simple hierarchical filing structure is used. A Cue List is stored as a file called a **Show**, and Shows are stored in folders called **Projects**. A Project folder may contain any number of Shows. The default provision in the CDC eight is a single Project called **New Project**, which contains a single show, called **New Show**. These default files cannot be renamed and it will obviously be desirable to create new Projects and Shows in the real world.

To manage the Project and Show files, press **MENU** to display the Control Screen Home Page, select **Projects**, then **Editor**. This will open the **PROJECT & SHOW MANAGER** page in the left-hand Main Screen.

The upper **Active Project** pane always displays the currently loaded Project (blue icon) and the Shows available in that Project (green icons). The active Show is indicated by the icon having a yellow tick and green background. (Note in the example shown, there are some additional files available on a USB memory stick.)

All available Projects will be listed in the larger **Projects** pane below. Note this includes the currently loaded one.

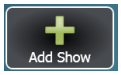
Creating Projects:
To create a new Project, touch the **Add Project** icon at the bottom of the screen.

This opens the **NEW PROJECT** window.

Enter a name for the new project (max 20 characters, may include numbers, but must start with a letter). If the requirements are known at this stage, make the bus allocations in the **Auto Bus Configuration** pane. The method of bus assignment from this page is fully described at “Defining the bus structure” on page 47. Touch **OK**. This closes the **NEW PROJECT** window and adds a new project folder to the **Projects** pane in the **PROJECT & SHOW MANAGER** page.

Note that New Project may be selected directly from the **Projects** page of the Control Screen. This opens the **PROJECT & SHOW MANAGER** page with the **NEW PROJECT** window already overlaid.

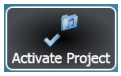
Creating Shows:
Touch a Project icon in the **Project** pane to reveal the Shows it contains.



To create a new Show in a selected Project, touch the **Add Show** icon. This opens the **NEW SHOW NAME** window. Enter the name for the new Show (same naming restrictions as for Projects) and touch **OK**. A new Show icon will be added to the **Shows in Project** pane.

The Projects button will revert the pane to the Projects pane.

Loading a Project and Show:

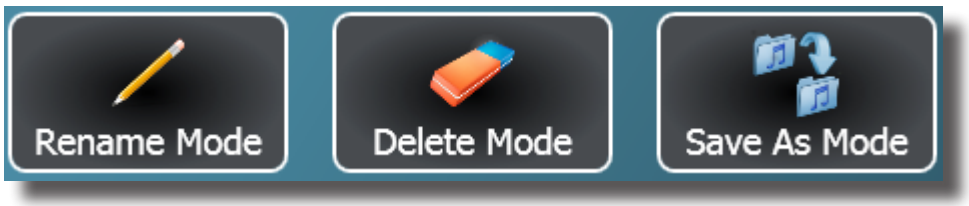


With the Projects pane displayed, touch the Activate Project icon; this puts the pane into **Project Activate Mode** (border colour code: Cyan). Touch the icon for the required Project and then **OK** in the confirmation box. This will replace the currently loaded Project with the selected one, and its icon appears in the **Active Project** pane, together with those of its Shows.

The Show whose name has the lowest alphabetical weighting will be loaded. Activating the required Show will load the Cue List for the Show, and the Control Screen will display the list of Cues previously saved for that Show.

Other project management actions:
The **PROJECT & SHOW MANAGER** page allows various other common file actions to be performed.

In addition to creating new Projects and/or Shows (described above), it is also possible to **Delete**, **Save As Mode** and **Rename** them by touching the appropriate button.



Each of these operations selects the **Project** or **Shows in Project** pane with a coloured border: red for Delete, yellow for Rename and green for Save Mode. Touch the icon for the Project or Show on which to perform the selected action. **Rename** opens a **RENAME PROJECT** or **RENAME SHOW** window as appropriate; **Delete** opens a confirmation dialogue box before deleting the file(s).

Note that it is not possible to delete or rename the active show or project; the active Project/Show will be loaded into the automation sequence as the current Cue List. The active Project/Show is denoted in the **Project** and **Shows in Project** panes with a yellow tick in its icon.

Importing and exporting Shows and Projects

It is obviously advisable to back up Show data; the CDC eight provides a very simple method of exporting and importing data to/from an external USB memory device.

Import/export is carried out on the **PROJECT & SHOW MANAGER** page.

The USB memory device (which should be USB 2.0-compliant) should be plugged into the socket in the surface Centre Section. Note that the **USB Drive** pane of the **PROJECT & SHOW MANAGER** is greyed-out until a memory device is plugged in.

Touch the **Export** Mode button (note the **Projects** or **Shows in Project** pane border becomes blue). Touch the icon of the Show to be backed up, and the Project or Show icon appears in the **USB drive** pane as the data is copied.

The export procedure creates a `CadacExports` folder in the root of the memory device; Show files have a `*.csf` filename extension and Project files have a `*.cpf` filename extension.

Importing Show and Project data is the reverse process; Shows and Projects saved on the memory device are displayed in the **USB Drive** pane; select the **Import Mode** icon followed by the icon of the Show or Project to be imported. However, it should be noted that to import a Show, the **Shows in Project** pane must be open, and to import a Project, the **Projects** pane must be open. It is not possible to import a Show into “Project level”, or vice-versa.

Cue List basics

In performance or rehearsal, the Control Screen in the console master section will normally display the Cue List for the show. This will be a list of Cue names; there is no practical limit to the number of Cues a Cue List can contain. The Control Screen can be swiped vertically when there are more Cues that can fit on the screen.

Six buttons are used in conjunction with the Cue List:

- **CUE LIST** – pressing this this will always return the Control Screen to the current Cue List, if it is not already displayed. The button illuminates blue when the Cue List is not displayed, and goes out when pressed.
- **STORE** – opens the Store Options page giving options of how the New Cue can be stored (see “Saving and Recalling Cues” on page 95).
- **SCROLL** ∧ and ∨ – these buttons move the cursor (a yellow border) up and down the Cue List. This allows a Cue anywhere in the List to be selected and subsequently recalled if wished.
- **RECALL NEXT** – this loads the Cue that currently has a green rectangle showing at the right-hand end (normally, but not necessarily the Cue at the cursor position).
- **RECALL LAST** – this loads the Cue that currently has a red rectangle showing at the left-hand end.

Saving and Recalling Cues

Saving a Cue:
To save the console’s current settings, press the **STORE** button. This opens the Store Options page (shown below) on the Control Screen:

The page confirms the Project and Show names and the *currently-selected* Cue (Cue Name). This will be the Cue in the Cue List where the cursor is positioned; it is not necessarily the currently-active Cue. Selecting any of the options saves the current console settings as the Cue, with the provisos outlined below for each. This page can be exited by pressing **MENU**.

Six options are available:

- **Add to End** – appends the New Cue to the end of the Cue List. The Cue will be named **NewCue (n)**, where n is the next available number.
- **Update Cue** – this will overwrite the currently-selected Cue with the New Cue. The name of the currently-selected Cue will be retained.
- **Insert Cue** – it is possible to add the New Cue anywhere in the Cue List. Before pressing **STORE**, use the **SCROLL** buttons to move the cursor up/down the Cue List to the Cue immediately preceding where the New Cue should go in the list. When Insert Cue is selected, the New Cue will be inserted at that point, and will take the name of the currently-selected Cue, but will have the name extended by the addition of a full stop and a number; e.g., if the currently-selected Cue is named **Margaret enters**, the New Cue will be inserted immediately after it and will be named **Margaret enters.1**.

- **Rename Cue** – selecting this option inserts the New Cue at the same position in the Cue List as **Insert Cue**, but first opens a **RENAME** window on the Main Screen, permitting it to be given a more meaningful name.

There are two further options which do not save the console settings as a Cue:

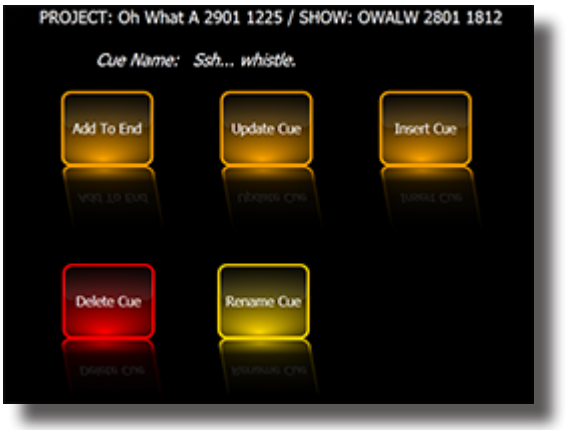
- **Save Config.** – instead of saving the current console settings as a Cue, this option stores the settings in a “scratchpad” memory which does not form part of the Cue List. This provides a method of temporarily saving current console settings without committing them to the Cue List.
- **Load Config.** – selecting this option loads the console settings saved by **Save Config.** (above). Again, the Cue List is not altered in any way.

Recalling a Cue:
Normally, in performance, the Cue List will contain Cues arranged in the correct sequence, and a single press of the **NEXT** button will step through the list one Cue at a time.

The currently-active Cue will display a green arrowhead symbol against the Name. When stepping through the Cue List consecutively, each press of **NEXT** will advance the arrowhead down the list and loads that Cue; note also that the cursor (the yellow border) and a green rectangle (at the right-hand end of the name field) move down as well. The green rectangle always marks the Cue that will be recalled when **NEXT** is pressed (note the button is also green) when using the **SCROLL** buttons. Similarly, the red rectangle at the left-hand end of a name field marks the previous Cue. This will be recalled again if the **LAST** button is pressed (note that this button is also red).

It is possible to recall a Cue out-of-sequence by moving the cursor up or down the list with the **SCROLL** buttons, or by touching a Cue name (if it is visible). When **NEXT** is pressed, the selected Cue – the one a yellow border - is loaded, and the green rectangle moves to the Cue following it.

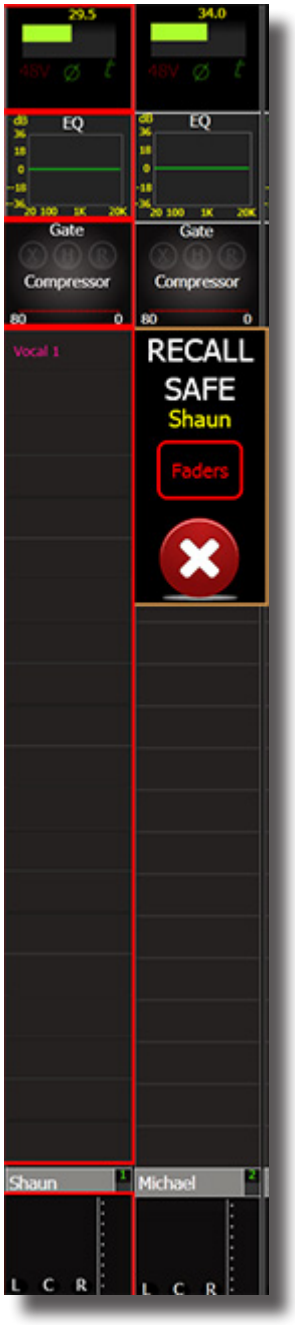
Selecting a Cue for editing:
Double-tapping a Cue in the Cue List opens the Cue Options page shown below:



This page offers the same four options as the Store Options page already described (see “Saving and Recalling Cues” on page 95) – **Add to End**, **Update Cue**, **Insert Cue** and **Rename Cue**. From this page, however, these actions are performed on the selected Cue – i.e., one already in the Cue List, as opposed to a New Cue which has just been stored.

One additional option is available from this page – **Delete Cue**; selecting this option deletes the Cue which was double-tapped (its name is confirmed at the top of the page) from the Cue List.

Recall Safe Mode



By default, a Cue will contain all parameters for every input and output channel in the CDC eight. Sometimes it will be desirable to recall fewer parameters, an obvious example being the desirability of recalling the fader levels that were stored with the Cue, so that the engineer retains hands-on control of the channel levels during performance.

To allow this, the CDC eight has a Recall Safe Mode, which allows the individual blocks of any input or output channel to be made safe, which prevents the parameters currently set in that block from being overwritten by any subsequent Cue recall. The channel blocks follow the standard subdivision of the channels, and are:

- Input Gain (Input Channels) or Bus Trim (Output Channels)
- EQ section
- Dynamics section
- Routing section
- Pan/delay section
- Faders
- GEQ (Output channels only)

Recall Safe Mode is selected on the Main Screen by pressing the upper **Assign** button (see [5] on page 17) and then pressing the **SEL** button [8] of the channel that is to have some or all of its parameters selected in Recall Safe mode. It is obviously necessary to have the correct Layer selected first. The channel blocks appear outlined in red:

Touching any of the channel blocks while the **RECALL SAFE** window is open places them in Safe Mode, and their borders turn light brown; this border colour is maintained after the window has been closed, so that the operator has a permanent visual reminder that the Recall Safe function has been applied to the channel.

For example, if it is wished to ensure that no alterations are made to Input Gain during performance as a consequence of different Cues containing different Input Gain settings, the engineer should place the Input Gain blocks of the channels to be thus protected into Recall Safe Mode. The Input Gain blocks of those channels will be permanently outlined in light brown.

It is important to appreciate that Recall Safe Mode only isolates the selected channel parameters from changes within the Cue List. The operator still has full manual control of the settings at all times.

Fader positions may be made safe by touching the **Faders** button that appears alongside the channel strip. **Faders** encompasses both the fader itself and the channel **ON** button. Note that there is no visual indication on the channel strip of this safe function being enabled.

In addition, once the Recall Safe parameters have been set for a particular input or output channel, they can be quickly and easily copied to other channels by leaving the **RECALL SAFE** window open on the screen, and then pressing the **SEL** button on each channel that you wish to copy the parameters to. It is also possible to copy the safe parameters to a multiple channels (provided they are a contiguous block of channels), by pressing and holding the **SEL** button on the first channel you wish to copy the settings to (the **SEL** button will remain lit), and then press the **SEL** button on the last channel in the block.

On the output channels only, the Recall Safe function has an additional button, **GEQ**. Selecting this for an output channel has the effect of protecting the settings of a graphic equaliser inserted in the channel from any graphic equaliser changes that might exist between Cues.

Additional Recall Safe options

Further refinements to the operation of Recall Safe are available to the engineer through the Recall Safe page on the Control Screen. This is accessed by selecting User Options from the Home Page.

Most of the functions on the **Recall Safe** page are contained within the Input Gain block (Input Channels) or Bus Trim block (Output Channels). Selecting this block to be “safed” protects all the channel settings and parameters within it, including Input Channel Type (Mono, Stereo or Linked), Input source assignment and Input Gain. These are particularly important functions, and they may be put into Safe mode from the Recall Safe Control Screen page individually instead of using the “whole block” Recall Safe function, giving the engineer the flexibility of retaining the remainder of the block parameters under automation control.

The individual settings which may be isolated in this way are:

Input Channel settings:

- **I/O Patching Inputs** – this isolates all assignments made for Input Channels' physical I/O (or FX Unit inputs/outputs). This includes the channel inputs themselves and Insert Sends and Returns
- **Channel Modes** – this isolates the Input Channel from any redefinition of Channel Type – **Mono**, **Stereo** or **Linked**
- **Channel Head Amp** – this prevents any setting of **Input Gain** or **Trim** being altered by Cue List changes

Output Channel settings:

- **I/O Patching Outputs** – this isolates all assignments made for Output Channels' physical I/O (or FX Unit inputs/outputs). This includes the Bus Output destinations and Insert Sends and Returns
- **Bus Modes** – this isolates the Output Channel from any redefinition of Channel Type – **Aux**, **Group**, **Matrix** plus Mono/Stereo
- **Outputs** – this prevents any Trim settings being altered by Cue List changes

Other:

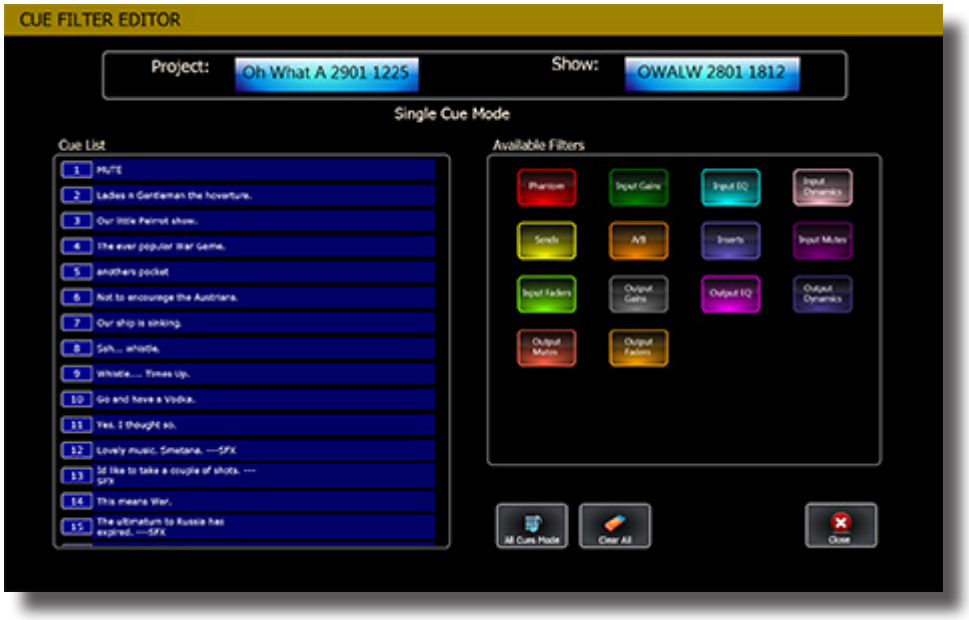
- **Brightness** – this prevents any alterations to the brightness of the various surface illuminations (screens, meters, buttons, etc.) from Cue List changes.
- **VCA Fader/Mute** – selecting this option retains all current VCA master fader settings and VCA Mute statuses.

Cue Filters

An alternative approach to protecting sections of the CDC eight from parameter changes that may be contained within successive Cues is to employ the console's Cue Filtering feature.

Cue Filtering works at Project Level, and can be considered a "global" – i.e., console-wide – function, effective on all input and output channels.

Touch the **Filters** button on the Control Screen's **Projects** page; this opens the **CUE FILTER EDITOR** on the Main Screen.



The currently-loaded Project and Show are confirmed at the top of the screen. The left-hand **Cue List** pane displays the current Cue List for the Show, while the right-hand **Available Filters** pane lists various channel functions in the form of buttons.

Cue Filtering can operate in two modes – **Single Cue Mode** or **All Cues Mode**, selected by a button at the bottom of the screen.

The active Mode will be the last selected.

A filter may be applied to individual Cues (Single Cue Mode) or to the entire Cue List (All Cues Mode). In Single Cue Mode, the Cue to have the filtering applied should first be selected by touching the Cue in the Cue List.

The channel functions to be retained (i.e., unaffected by Cue recall) can then be selected from the Available Filters List. Note that the buttons are colour-coded, and the colours are repeated as vertical bars in the relevant Cue(s) as the filters are applied. The filter options are:

- **Phantom** – 48 V phantom power on/off
- **Input Gains** – Mic Gain and Trim controls
- **Input EQ** – EQ section, inc. HF/LF filters (input channels only)
- **Input Dynamics** – compressor and gate settings (input channels only)
- **Sends** – bus send assignments and levels from input and output channels
- **A/B** – selection of Input A or Input B (input channels)
- **Inserts** – Insert in/out switches
- **Input Mutes** – input channel **ON** buttons
- **Input Faders** – input channel fader positions
- **Output Gain** – input gain (bus trims) of output channels
- **Output EQ** – (EQ section, inc. HF/LF filters (output channels only)
- **Output Dynamics** - compressor and gate settings (output channels only)
- **Output Mutes** – output channel **ON** buttons
- **Output Faders** – output channel fader positions

The **Clear All** button clears all filter settings from all Cues.

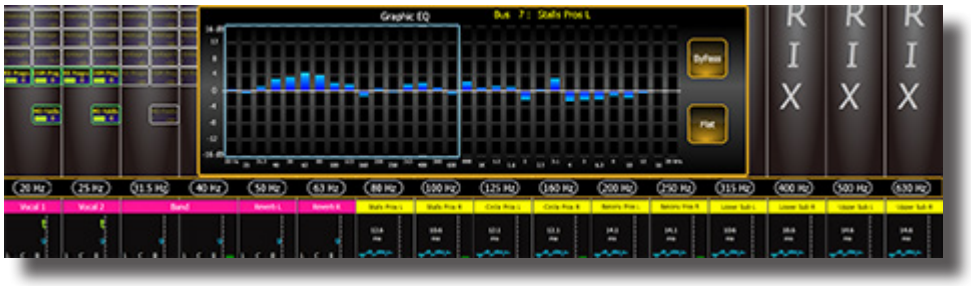
After assigning the filters, touch **Close**; a dialogue box opens to confirm whether the current Show should be re-loaded with the filters applied. Touch **OK**.

Note that the filters do not affect the operation of the ‘scratchpad’ memory accessed by the **Save Config.** and **Load Config.** functions.

Graphic EQ

A 31-band Graphic Equaliser is available to any or all of the CDC eight's 59 Output Channels (56 Main Busses plus the LCR Master Output). Each Channel section of the console surface has its own Graphic Equaliser control and display.

To enable the Graphic Equaliser for an Output Channel, select an Output layer on the Main Screen, and press the **GEQ** button (see [13] at page 18). A Graphic EQ Panel opens in the screen. Initially it is assigned to the lowest-numbered Output Channel currently visible on the Main Screen, but can be re-assigned to any other visible channels by pressing **SEL** buttons.



The faders in the Channel Section displaying the Graphic EQ Panel move to the centre of their travel; the faders can now be used to adjust the EQ curve. Because there are 31 frequency bands but only 16 faders, the audio spectrum is split; the set of 16 frequency bands currently assigned to the faders is depicted on the Panel by the blue rectangle. The rectangle – and consequently the set of frequency bands being controlled – can be shifted elsewhere in the spectrum by touching anywhere in the frequency display.

When first opened for an output channel, the graphic equaliser is by-passed with the frequency display greyed-out. Touch the **ByPass** button to enable it. A blue '**g**' illuminates in the output channel's pan block to remind the engineer of where a graphic equaliser has been inserted.

In GEQ Mode, moving a fader away from its centre position causes the fader's **ON** button to illuminate blue. Pressing an **ON** button when it is lit will turn the light off, cancel that frequency band's contribution to the overall GEQ response curve, and return the fader to its central position.

The **ByPass** and **Flat** buttons on the GEQ Panel perform the same functions as their counterparts in the channel EQ sections – **ByPass** is a toggle function which temporarily removes the GEQ curve from the signal path; **Flat** cancels the GEQ curve and returns the faders to their centre position and turns the **ON** lights off.

A second press on the **GEQ** button removes the equaliser display from the Main Screen and the faders revert to the levels pertaining to the selected Output Layer.

The FX Units

The CDC eight's on-board DSP incorporates 16 two-channel effects (FX) processors. Each of these can be introduced into any input or output channel and allow various combinations of reverb, delay and modulation effects. They can also be accessed from the console as if they were traditional external FX devices, with their input being fed from an Aux Send, and their output brought back into the mix via a spare channel as an "FX return". It is also possible to create dedicated FX Sends from Output Channels and corresponding stereo FX Returns from Input Channels using the **Auto Bus Configuration** feature of the **New Project** page.

Access to the FX Units' control screen is normally only possible once at least one Unit's input and output has been assigned somewhere in the console architecture. This restriction can be avoided by assigning one of the eight 'soft' buttons (controlling Mute Groups by default) the alternative **FX Window** function.

Connecting an FX Unit to a Channel Insert

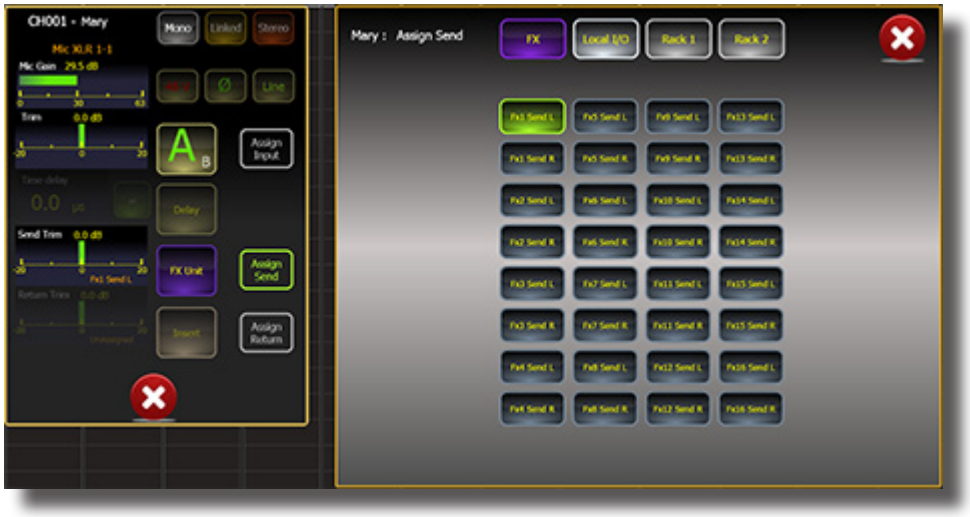
An FX Unit may be "wired in series" at any Input or Output Channel Insert. This is directly analogous to patching in an external device on an analogue console; the Channel Insert Send feeds the device input and the device output feeds the Insert Return of the same channel. Activating the Insert "diverts" the signal through the FX Unit; "Wet/Dry" Balance is provided within the FX Unit to control the "magnitude" of the effect.

Connection is achieved through the normal Send/Return assignment procedure already described at page 57 and page 59.

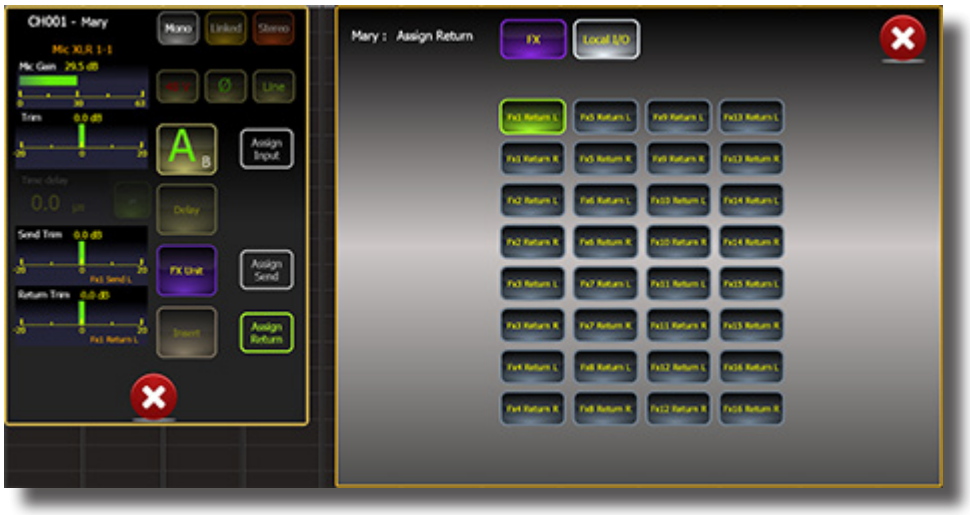
The procedure for an Input Channel is shown below as an example; patching an FX Unit into the Insert of an Output Channel is identical, except that the Output Channel's Bus Trim panel is used.

Touching the **Assign Send** button opens the **Assign Send** panel for the channel: As well as assigning the Insert Send to a physical output connector - either in a Stagebox or any Local I/O installed - it may alternatively be connected to the input of an FX Unit. The 16 processors each have two channels, designated L and R, so an Insert Send can be assigned to any of 32 processor inputs. The inputs are designated **FXn Send L** and **FXn Send R** (where n = 1 to 16).

Once an assignment is made, an **FX Unit** button is added to the Input Gain panel:



As with physical connectors, the Insert cannot be activated until the Return has been similarly assigned. Touching the **Assign Return** button opens the **Assign Return** panel for the channel:



As with the Insert Send, an Insert Return may be connected to the output of an FX Unit instead of a physical output connector in a Stagebox or Local I/O. Because the processors each have two channels, there are 32 processor outputs. The outputs are designated **FXn Return L** and **FXn Return R** (where n = 1 to 16).

Note that the **FX Unit** button is added to the **Input Gain** (or **Bus Trim**) panel when either the Send or Return is assigned: the order is unimportant.

Note also that when an Insert Send or Return is assigned to an FX Unit, a visual indication of this is permanently visible in the Input Gain (or Bus Trim) channel block once the panels have been closed. The indicator symbol is illuminated when an Insert Send is assigned to an FX Unit input. The symbol is illuminated when an Insert Return is assigned to an FX Unit output and the Insert is enabled.

If the channel is a stereo (see **Configuring an FX Unit as a Send/Return loop** below), additional L and R symbols confirm that either or both signal paths are assigned in this way.

Configuring an FX Unit as a Send/Return loop

Depending on the type of effect being employed, it may be more suitable to set up an FX Unit in the form of a Send/Return loop, with the Unit's input being fed from a console bus output (typically a bus configured as an Aux Send), and its output being returned to a spare channel.

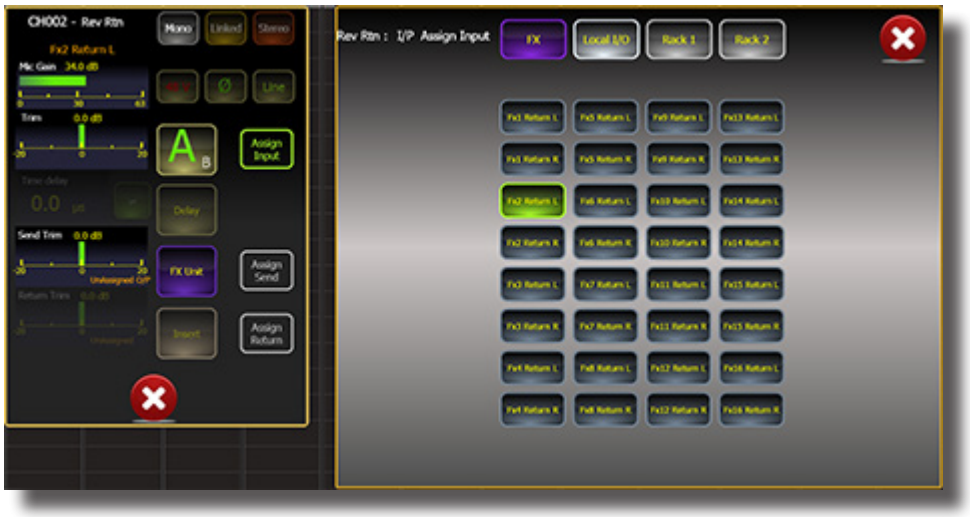
This is a very simple process; the FX Units' inputs are available for assignment to any Output Channel and their outputs are available for assignment as the source to any Input Channel.

To set up the FX Unit input, touch **Assign Output** on the Bus Trim panel of the Output Channel to be used as the Send:

This opens the **Assign Main Out** panel.

Once the Bus Output has been assigned to an FX Unit input, an **FX Unit** button is added to the Bus Trim panel:

Routing the FX Unit's output to an Input Channel (so that the channel may be used as an FX Return) is a similar procedure. Touching the **Assign Input** button on an Input Channel's **Input Gain** panel opens the **Assign Input** panel:



Select the output of the FX Unit being used. The chosen Input Channel can now be used as a dedicated FX Return channel.

Stereo sends and returns:
Because each of the 16 processors has two channels, using them to process stereo signals can be simply accomplished using either of the two patching methods described above.

To patch an FX Unit into a stereo channel's (Input or Output) Insert point, simply assign the Inserts in the L and R paths independently to the L and R inputs and outputs of the FX Unit.

To configure an FX Unit as stereo when using it in a Send/Return loop, both the Bus Output Channel and the Input Channel for the return will need to be configured as Stereo. Each will now have separate L and R outputs and inputs (respectively), and these will be assigned to the L and R inputs and outputs of the FX Unit. The Output Channel used in this way will typically be a Stereo Aux, and the return channel can now be operated as a Stereo FX Return. (Stereo configuration of channels is not essential; there is no reason why the L and R inputs of an FX Unit cannot be fed from two separate mono Output Channels; the converse applies to the outputs.)

Using FX Send and Return Channels

The use of **Auto Bus Configuration** to allocate the CDC eight's 56 assignable busses as Group, Aux or Matrix type has already been described (see xxx). Using this feature, it is also possible to assign busses as dedicated mono FX Sends; these can be considered as a fourth bus type option. These FX Sends automatically route the bus signals directly to one of the FX Units. Creating FX Sends using this method also creates a matching set of stereo FX Returns by redefining Input Channels.

Note that it is not possible to assign busses as FX Sends by using the **BUS SETTINGS** Page, nor from the Bus Definition buttons on the Bus Trim panels of Output Channels.

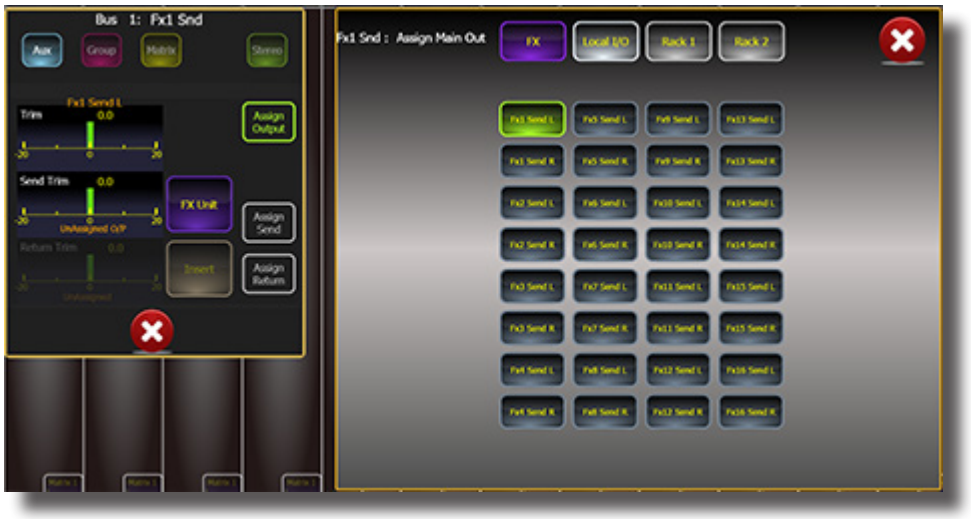
Creating FX Sends and Returns using Auto Bus Configuration:
When defining a new Project, FX Sends can be allocated from the "pool" of 56 assignable busses using Auto Bus Configuration. The **Auto Bus Configuration** window can be opened either by selecting **New Project** from the **Projects** page of the Control Screen, or by selecting **New Project** from the **PROJECT & SHOW MANAGER** Page.

For example, to include four FX Sends in the bus allocation, touch the **FX** button and use the slider or **+/-** buttons to enter **4** in the button. This will decrease the number of available busses (initially all Auxes) to 52. Enter values for the numbers of Group and Matrix busses required in the same way. An example is shown below:

Enter a name for the new Project using the keyboard in the normal way. (The CDC eight cannot create a new Project until it is given a name). Touch **OK**; the console will now reconfigure the bus structure. Close the **PROJECT & SHOW MANAGER** Screen.

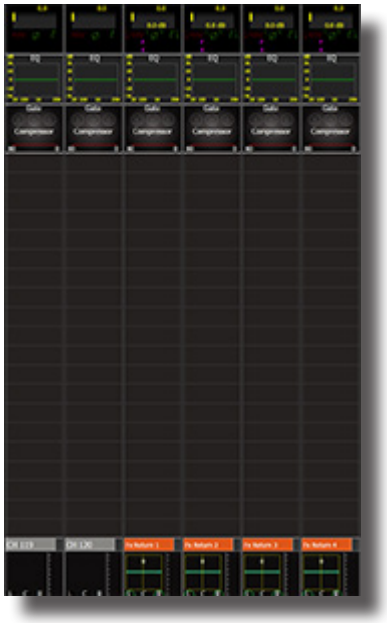
Select **Busses A** using the **Output Layer** buttons. It can be seen that the first four output busses have now been renamed as **FX1 Snd** to **FX4 Snd**.

Busses assigned as FX Sends will always occupy the lowest bus numbers. These four Output Channels route signals directly to the left (**L**) inputs of FX Units 1 to 4 respectively. This can be seen by opening the Bus Trim panel; an **FX Unit** button is present, and the **Assign Main Out** panel confirms that these output assignments have been made.



Note that the **Assign Main Output** panel is still active; the Output Channel may be re-assigned to a physical output if wished.

Now select **Input Layer H**. It will be seen that Channels 121 to 128 have been reconfigured as four stereo channels (colour-coded orange), and labelled as **FX Return 1** to **FX Return 4**.



When a number of busses are assigned as FX Sends in Auto Bus Configuration, the same number of stereo FX Return channels are created from the highest-numbered Input Channels. This leaves a number of channel strips on the Main Screen blank. The Input Gain panels are reconfigured as stereo, and each path has its **FX Unit** button enabled. Opening the **Assign Input** panels for the L or R path confirm that the channel inputs are now fed from the L or R FX Unit output respectively.

Note that the **Assign Input** panel is still active; either path of the stereo Input Channel may be re-assigned to a physical input if wished.

Accessing the FX Units

Once one FX Unit has had its input or output assigned in the console architecture, the FX Unit system can be accessed by touching an **FX Unit** button. Each FX Unit has a separate Control Page. The FX Unit whose controls will be displayed will be that assigned to the Input or Output Channel where the **FX Unit** button is touched. However, once the FX Unit Control Page is open, it is possible to scroll up and down through all 16 FX Units, even if some of them are not in use.

It can be seen that it is possible to open the FX Control Pages from several different places around the console, depending on how many FX Units are in use and how they have been configured: connecting an FX Unit to a channel Insert creates a single **FX Unit** button, whereas connecting one in a Send/Return loop creates buttons on two different panels, one on the Bus Trim panel of the send, another on the Input Gain panel of the channel used for its return.

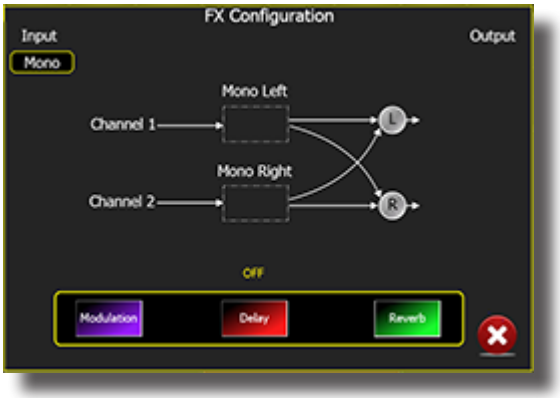
The FX Control Page can also be accessed by creating a short-cut via the assignable buttons (the eight Mute Group buttons by default). If an assignable button is selected as **FX Window** (see “The FX Units” on page 103) then pressing this button will immediately open the FX Control Page, with FX Unit 1’s settings displayed as default.

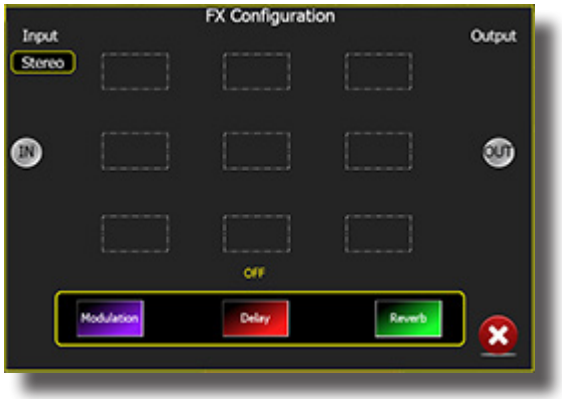
The FX Unit Control Page

Each FX processor comprises three separate FX “elements”: Reverb, Delay and Modulation. These are colour coded on the Control Page: green (reverb), red (delay) and purple (modulation).

The large pane on the left is the control panel for the selected element; the three smaller panels are “mimic” displays of the currently parameter values for each element. If an element is not currently in use for the FX unit, its panel is greyed-out.

Processor configuration:
At the top right of the Control Page is the **FX Configuration** diagram, which shows how the three elements are currently connected to each other, in either a mono or a stereo configuration. Touching this diagram opens a larger, active version. Note that the diagram is different for mono and stereo configurations.





The FX unit's processing elements are represented by the colour-coded blocks at the bottom of the diagram: delay (red), reverb (green) and modulation (purple). Each FX unit has one element of each type available.

Each element has one input and two outputs. This applies whether the FX unit is being used in a mono or stereo configuration.

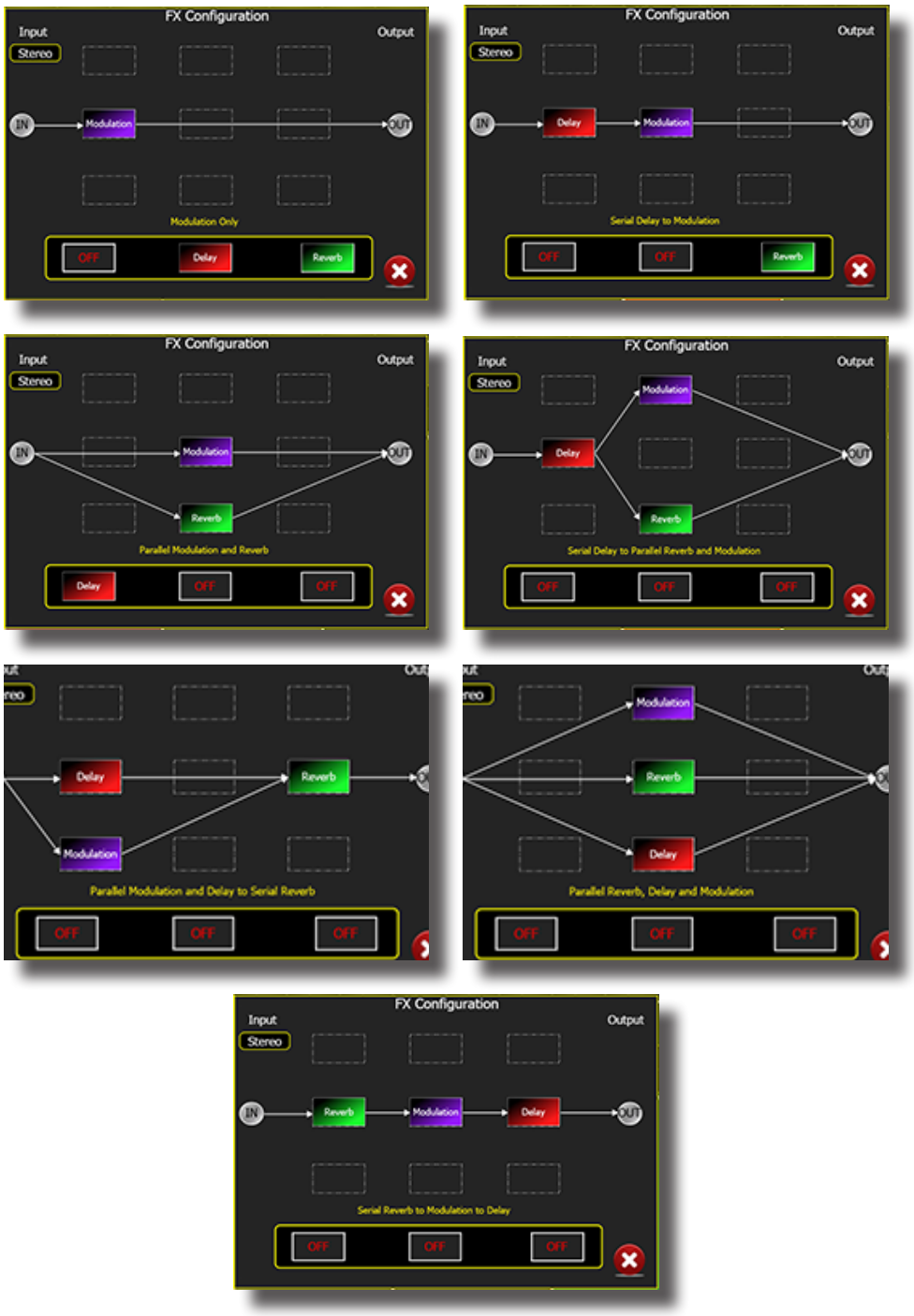
Stereo configurations:

In the stereo configuration, the **In** and **Out** nodes of the FX Unit (at the left and right sides of the diagram respectively) have two channels. The **In** node will be fed by both the left and right FX sends for the current FX Unit: e.g., **FX1 Send L** and **FX1 Send R** in the case of FX Unit 1. (Note that this numerical matching is only the default routing, and can be altered from the **Assign Main Out** panels accessed from the Bus Trim block of the FX Send's Output Channel.) The two FX Unit inputs are summed to mono at the inputs of the individual processing elements.

Any of the three elements can be dragged to any of the empty locations. The processor will interconnect the elements in a series/parallel configuration, depending on where each of the elements is placed in the diagram. The selected elements may be "in parallel", "in series", or – when all three elements are combined – in a combination of both series and parallel. The options are:

- A single processor
- Any two processors in series, in either order
- Any two processors in parallel
- Any one processor feeding the other two in parallel
- Any two processors in parallel, their combined outputs feeding the third
- All three processors may be in parallel
- All three processors may be in series

For example, the Modulation element may feed either the Delay or Reverb elements, or all three elements may be cascaded. The signal processing will then occur in a logical, “left-to-right” order. Some examples are shown below:



Note that the actual location of any particular element on the diagram is irrelevant; it is its relationships to the **In** and **Out** nodes and to other elements that defines the FX Unit’s configuration.

When a configuration comprising multiple elements is in use, the mimic panels for the active elements become visible, and one will be in its background colour; the left-hand control panel will assume the operational controls for this element. To alter the parameters of another element, touch the mimic panel to assign its functions to the control panel. The left and upper encoders are used to alter the FX element parameters, while the lower and right encoders are used to adjust the mix and balance between multiple elements.

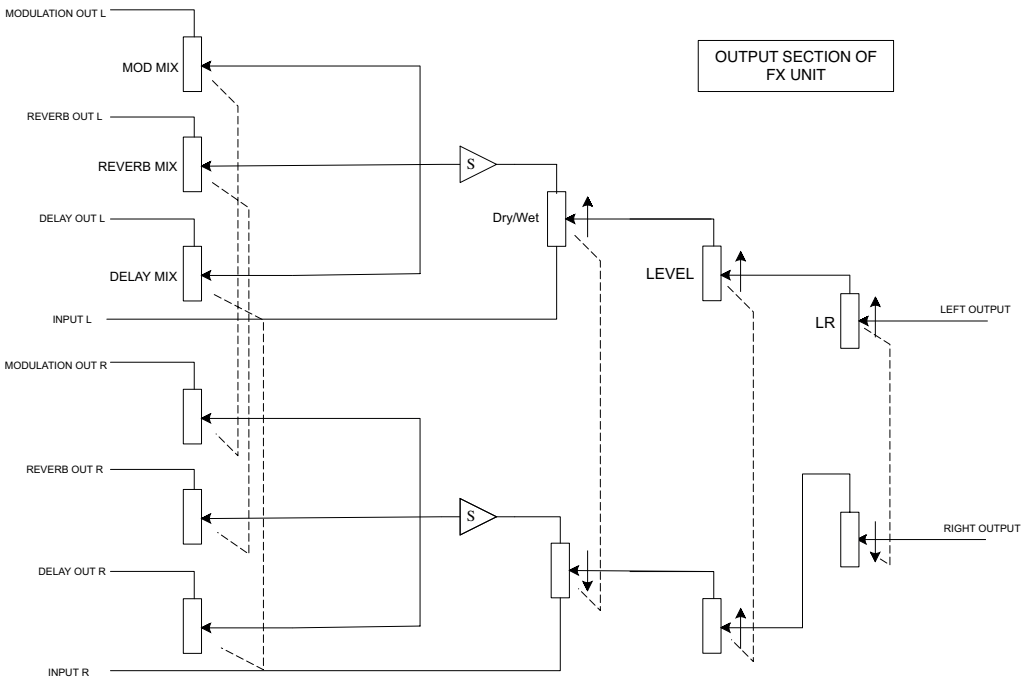
The bottom **Main Mix** section of the FX Control Page contains controls (operated by the lower encoders) for setting the output levels of each element and controlling the summed mix. The controls are as follows (numbers in square brackets refer to the lower encoder set):

MOD MIX Modulation element output level [6]
DELAY MIX Delay element output level [9]
REVERB MIX Reverb module output level [12]

The three mix controls adjust the element output levels over a range of -80 dB to +10 dB. The default parameter value is 0 dB when a single element is in use, but this is reduced to -3 dB when two elements are in parallel and to -6 dB with all three. Mix level controls are only enabled for elements feeding the output node, thus when elements are configured in series, only the mix output level control for the final element is visible.

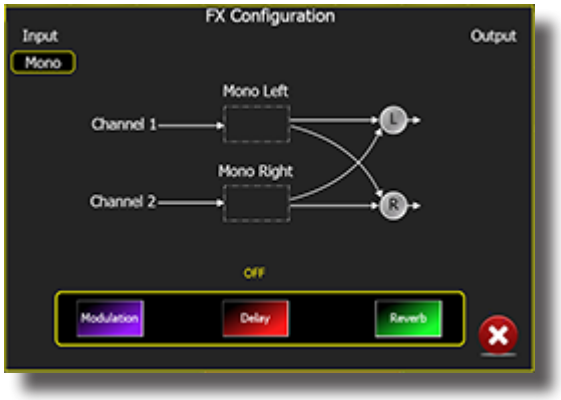
Dry/Wet Balance between processed and unprocessed signals [14]. The default value is 100% wet.
LR Pans the elements' summed outputs between left and right channels [15]. The default setting is centre-image.
LEVEL FX Unit Master output level 16]. This control has the same range as the mix controls, and the default setting is 0 dB.

The diagram below illustrates the interconnection of the **Main Mix** controls:

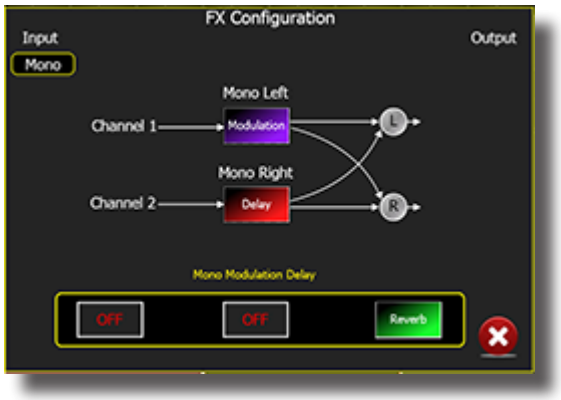


In either of the three-element configurations with a series/parallel interconnection, two additional controls are enabled: these are always right encoders [9] and [10]. These two controls will be labelled according to how the three elements are arranged in the configuration diagram, but will control the relative output levels of the two paralleled elements, as they feed either the output node or a third element. Examples are shown below:

Mono configurations:



In mono configurations, the configuration diagram (and its mimic) illustrates the L and R inputs and outputs of the FX unit independently. Only two elements may be utilised in mono configurations, and their interconnection is fixed, as defined in the diagram. Any two elements may be selected.

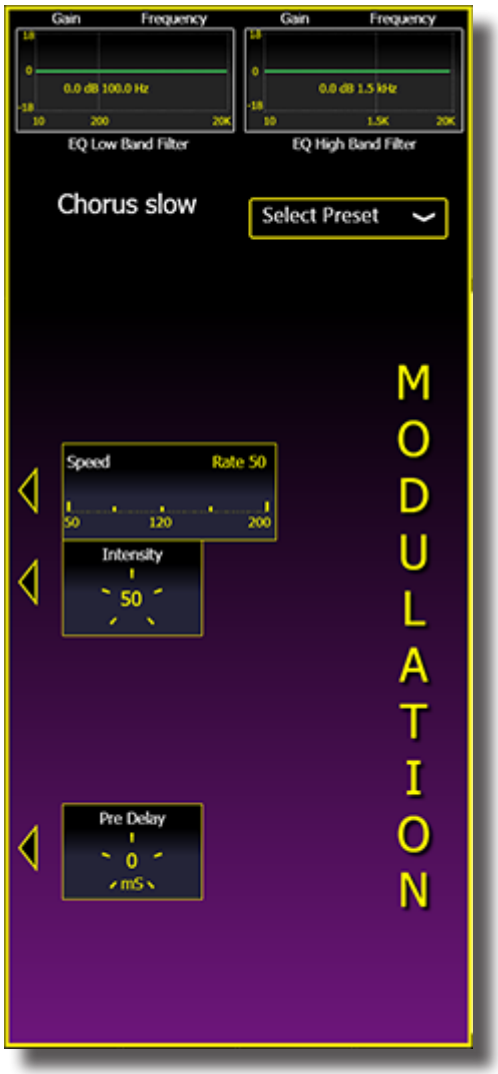


The single input of each element is fed by either the left or right channel of the current FX Send, thus in FX Unit 1, one element (the upper in the diagram) is fed by **FX1 Send L** and the other (the lower) by **FX1 Send R**, assuming the default I/O assignment is retained.

The two outputs of the two selected elements are both routed to the left and right channels of the FX unit, as shown above. Thus the stereo output of the FX Unit is a mix of the stereo outputs of each element.

The **Main Mix** controls have the same functions as in stereo configurations.

The Modulation Element



The Modulation element may be used to generate a range of time-variant "phasing" effects of various kinds. Eight standard modulation presets are provided, which may be selected from the **Select Preset** dropdown list. These are:

- **Chorus Slow** and **Chorus Fast** – traditional ADT "thickening" effect
- **Flanger Slow** and **Flanger Fast** – traditional comb filtering effect
- **Celester Slow** and **Celester Fast** – a combination of flanging and rotor effects
- **Rotor Slow** and **Rotor Fast** – "Leslie" speaker simulation: a combination of amplitude modulation and Doppler shifting

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

Filtering – the Modulation element 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 **EQ Lo Band Filter** turnover **Frequency** is adjusted with upper encoder 2, which has a range of 20 to 200 Hz, with a default value of 100 Hz. The **Gain** is adjusted with upper encoder 1, and has a range of ±18 dB. Similarly, the **EQ Hi Band Filter** controls affect the higher frequencies; **Frequency** has a range of 1.5 to 15 kHz with a default value of 1.5 kHz and is adjusted with upper encoder 4; **Gain** is adjusted with upper encoder 3; the range is also ±18 dB.

Modulation – the Modulation **Speed** (left encoder 6) and **Intensity** controls (left encoder 7) adjust the frequency and degree of modulation respectively. The controls' ranges are in arbitrary units, from 50 to 200, with default values of 50.

Pre Delay – an input delay specific to the Modulation element; adjusted with left encoder 10; range 0 to 100 ms.

The Delay Element

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

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 Reflections

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

Filtering – the Delay element is provided with the same variable-frequency hi-pass and lo-pass shelving filters as the Modulation element. The **Frequency** and **Gain** controls use the same upper encoders and have the same functions, parameter ranges and default values, except for the default frequency of the Hi Filter, which is 6.3 kHz.

Delay time – may be set as a BPM value, using the **Tempo** control (left encoder 6) in conjunction with the **Factor** control (left encoder 5). The Tempo control has a range of 40 to 240 BPM and the **Factor** control has a range of 1/32 to 8 with a default value of 1. The Factor control is essentially a multiplier: with **Factor** set to 1, the **Delay Time** (adjusted by left encoder 7) is based on one repeat per beat; i.e., with a **BPM** of 120 and **Factor** set to 1, the delay time will be 500 ms. Setting Factor to 2 doubles the delay time to 1 s; setting it to 1/2 halves it to 250 ms. The maximum delay available from the Delay Element is 2 s.

Alternatively, a delay time may be set directly by adjusting the **Delay Time** control with left encoder 7.

Feedback – Additionally, the output of the delay line may be fed back to its input with the **Feedback** control (left encoder 9) to create multiple echoes with decaying amplitude. The control has a range of 0 to 90 (arbitrary units).

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

The Reverb Element

The Reverb Element offers six basic room/plate simulations, which may be selected from the **Select Preset** dropdown list:

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 element is provided with the same variable-frequency hi-pass and lo-pass shelving filters as the Modulation element. The **Frequency** and **Gain** controls use the same upper encoders and have the same functions, parameter ranges and default values.

Reverb – the **Time** parameter is adjusted with left encoder 8, and sets the basic "size" of the space being simulated, i.e., its RT60 value. The range of available reverb times is preset-dependent:

PRESET	MIN	MAX	DEFAULT
Hall Bright	0.8 s	12.0 s	4.0 s
Hall Warm			
Room Bright	0.4 s	6.0 s	2.0 s
Room Warm			
Plate Bright	0.4 s	8.0 s	2.0 s
Plate Warm			

Pre Delay – an input delay specific to the Reverb element; adjusted with left encoder 10; range 0 to 100 ms.

Note that the parameters of all active elements are always visible in the three reduced-size panes in the main area of the screen.

Master functions

Oscillator

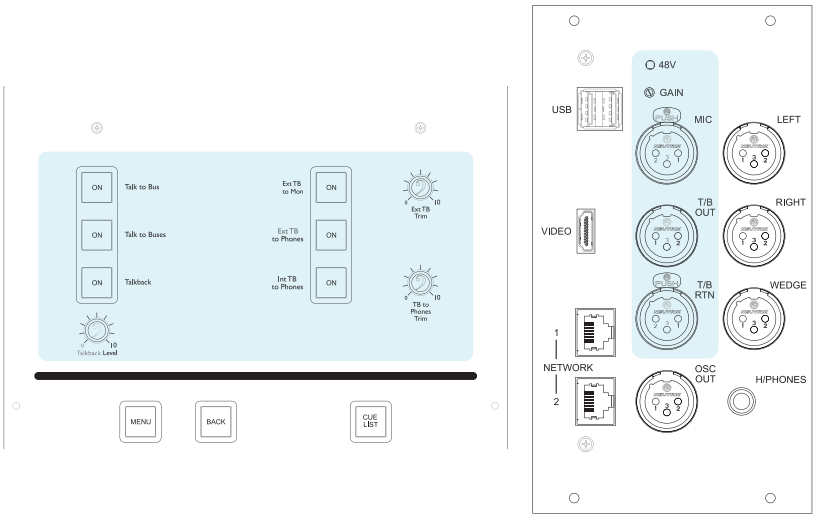
The CDC eight includes an analogue sine wave oscillator for test purposes. The oscillator output is available at the rear of the console master section, on the XLR connector **OSC OUT**. The oscillator is permanently on, so the signal is always present.

The oscillator has no user controls. The frequency is fixed at 400 Hz, and the output level is fixed at 0 dBu.

Comms

The CDC eight is provided with the normal comms facilities found on most live performance consoles.

The audio connections and controls are on the control surface and are basically of conventional analogue design.



Talkback:

An engineer's talkback mic (or headset mic) can be plugged into the rear panel **MIC** XLR connector. The gain of the mic can be adjusted with the recessed preset-type **GAIN** control immediately above the socket (use a trimming tool, not a screwdriver). If the mic in use requires it, 48 V phantom power may be enabled at the **MIC** socket by the **48V** switch above the **GAIN** control.

The mic signal may be routed to any (or all) of three destinations with the routing buttons:

- **Talk to Bus** – this button is not currently implemented
- **Talk to Busses** – this button is not currently implemented
- **Talkback** – the mic signal is routed to the rear panel **T/B OUT** XLR connector, where it is available as a balanced line level signal for connection back into the venue comms system.

The talkback signal may also be routed to the engineer's own headphones (or earpieces of a headset) with the **Int TB to Phones** button; it can be mixed with the return talkback signal (see 'Return Talkback' below).

The outgoing comms volume can be adjusted by the **Talkback Level** control below the routing buttons.

Activating talkback dims the console's monitor outputs to prevent feedback into the comms system (see "Phones/Monitor" on page 119).

Return Talkback:
The incoming talkback signal feed from the venue comms system can be routed to the engineer's headphones, or a pair of monitor speakers if they are in use.

The return talkback signal should be plugged into the rear panel **T/B RTN** XLR connector. This is a balanced, line level input. To route the signal to the engineer's headphones, select **Ext TB to Phones**; to route to the console's monitor outputs, select **Ext TB to Mon**.

Two level trim controls are provided adjacent to the routing buttons:

- **Ext TB Trim** – adjusts the level of the return talkback signal
- **TB to Phones Trim** – adjusts the volume of the outgoing (engineer's) talkback that is heard in the console's headphone outputs. This allows a balance between Talkback and Return Talkback to be set; it is generally desirable to have the Return Talkback at a higher level.

NOTE: The small fader controlling the engineer's monitor level in the master section (**Phones**, **LR** or **Wedge**, depending on the monitoring method in use) must be open in order for return talkback to be heard.

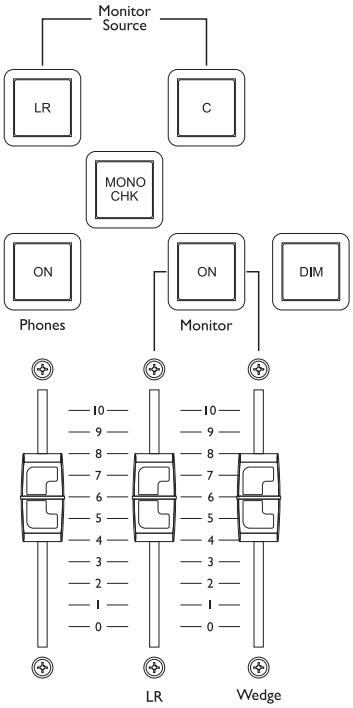
Phones/Monitor

The control surface of the CDC eight has monitor outputs for both headphones and the connection of external monitor/amplifier speakers, if needed.

Two or three standard ¼" headphone jack sockets are fitted under the front armrest (dependent on frame size), another is fitted to the rear panel (**H/PHONES**). All sockets can be used simultaneously, if needed.

Three balanced, line level outputs are provided on rear panel XLR sockets (**LEFT**, **RIGHT** and **WEDGE**), for connecting amplifiers and/or powered monitors should the console's location allow these to be used. The **WEDGE** output is always a buffered, mono sum of the signals at the **LEFT** and **RIGHT** monitor outputs, and is provided for situations where the engineer is using a single mono powered speaker for his/her personal monitoring use.

The audio heard via the headphone and monitor outputs will normally be the output of the console's Solo system (see "Solo Control" on page 120). The two **Monitor Source** buttons **LR** and **C** route the console's Master Output to the headphones and monitors instead. **LR** routes the left and right legs of the Master Output as a stereo pair, while **C** routes the C signal as a centrally-imaged mono signal. **LR** and **C** can be selected together to facilitate monitoring when working in LCR mode. In addition, any Talkback and/or Return Talkback signals selected to Phones or the monitor outputs will be mixed with to the audio being monitored; the levels of these can be adjusted separately (see "Comms" on page 118). The **MONO CHK** button can be used to collapse the signal being monitored into mono, to check for stereo phase compatibility, etc.



The output level at the headphone sockets is adjusted with the **Phones** fader, and can be muted/unmuted with the associated **ON** button. Similarly, the output level at the stereo monitor outputs (**LEFT** and **RIGHT**) is adjusted with the **LR** fader, while the **WEDGE** output has its own separate fader. The Monitor **ON** and **DIM** buttons affect all three monitor outputs. The **DIM** button reduces the level at the monitor outputs by a predetermined amount; the default value is 20 dB, but this may be set to anything between 0 and 90 dB by adjusting the **Monitor Dim** control on the Solo Control Page of the Control Screen (see 'Solo Control' below).

Solo Control

The Solo system in the CDC eight largely follows that found in traditional Cadac analogue live sound consoles. Every fader in a Channel Section has an associated **SOLO** button ([10] at page 18); any one will solo the Input or Output Channel currently displayed above it on the Main Screen (or that to which it was last assigned in the case of a alternative Main Screen page being displayed). The exceptions to this are the LCR Master Outputs, which cannot be soloed. The **SOLO** buttons light when active, the colour indicating the Solo Mode in use. Pressing a **SOLO** button a second time cancels the Solo.

Note that any Solo activated remains active if the Channel Section is switched to a different layer, and also that the Solo system is transparent across different layers on multiple console Channel Sections.

The **SOLO CLR** button (see [12] at page 21) illuminates red when a Solo is active anywhere on the console; pressing it clears all active Solos.

Solo Modes:

The console's Solo Mode are set up by selecting **Solos** from the **Config** page of the Control Screen.

There are four Solo Modes on the CDC eight, selected by the buttons on the **Solos** Page:

- **PFL** – in this mode, soloing an Input Channel routes a mono, pre-fade signal to the Phones/Monitor system. The **SOLO** buttons illuminate magenta; multiple Input Channels may be soloed to check several sources together (unless **Auto Cancel** is enabled – see below). The **SOLO** buttons on Output Channels remain in AFL mode (see below).
- **AFL** – soloing any channel (Input or Output) routes a post-fade, post-panpot (i.e., stereo) signal to the Phones/Monitor system. The **SOLO** buttons illuminate cyan; multiple channels may be soloed.
- **Auto** – this is the default setting; if a single Input Channel is soloed the Solo function is PFL, but if multiple Input Channels are soloed it becomes AFL. Output Channels remain AFL-only. The **SOLO** buttons light either magenta or cyan to confirm the active Mode.
- **SIP** – Solo-in-Place is “destructive” solo; when an Input Channel is soloed, every other Input Channel is muted, to allow the soloed channel to be monitored in isolation. SIP is by definition post-fade, so the **SOLO** buttons light cyan to show AFL status, and all other Input Channels’ **ON** buttons light red to confirm muting. Multiple Input Channels may be soloed in SIP Mode. Output Channels cannot use SIP, and remain in AFL Mode.
- **Input Priority** – this option can be selected in any of the four Solo modes described above. When active, input channels have solo priority over output channels. Thus if an output channel is already soloed and then solo is selected on an input channel, the output channel’s solo is temporarily overridden. When the input channel’s solo is released, the output channel’s solo is reinstated. Note that Input Priority is independent of both Solo mode selection (PFL/AFL/Auto/SIP) and the various momentary/latching solo options (see Item [10] at see page 18).
- **Auto Cancel** – this option can also be selected in any of the Solo modes. When enabled, it automatically removes the Solo function from any channel where it is already selected if another **SOLO** button is pressed elsewhere on the console. Thus it ensures that the engineer only hears one channel at a time.

The Solo Control page also provides a **PFL Trim fader**; this allows the level of PFL feeds from Input Channels to be adjusted (if fader settings are low, soloing a channel in PFL Mode can produce unexpectedly high volume in headphones or in the local monitors). The default setting is 0 dB, but it can be set in the range -90 to +10 dB.

Because the PFL/AFL signals are routed through the console's monitor system, engineers will often need to retain the ability to monitor the console output while soloing channels. On some occasions – typically in rehearsal – this may not be important, and in other situations, the engineer may wish to hear the solo'd channel(s) mixed at full level with the normal monitor output. The **Monitor Dim** fader is set to reduce the normal monitoring level by 20 dB while Solo system is active, but this may be set to any value between 0 dB (no dimming) and 90 dB (effectively muted).

Assign buttons

Each console Channel Section has two **ASSIGN** buttons ([5] and [6] at page 17).

The lower **ASSIGN** button [6] is used in conjunction with the channel **SEL** buttons when copying a channel's settings to other channels. See "Copying Input Channel settings" on page 77 for full details.

The upper **ASSIGN** button [5] is used in conjunction with the channel **SEL** buttons when placing some or all of the channel's signal processing blocks into Recall Safe Mode. See "Recall Safe Mode" on page 98 for full details.

Other Control Screen menus

The **Projects** and **Config** menus of the Control Screen are all covered in detail elsewhere in the User Manual. The two remaining Home Page options – **Settings and User Options** – allows access to some 'housekeeping' functions:

Settings Menu

Reset:

The Reset page contains various options for resetting the CDC eight to a known state.

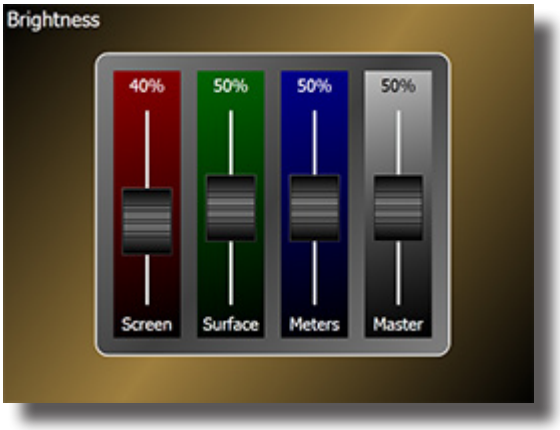
Three options are available:

- **User Settings** – selecting this option will cancel the following settings made by the user:
    - Selection of **Assign Auto VCA On** and/or **Assign Auto VCA Off** and any other options on the **Settings** sub-page of the **User Options** Menu (see "User Options Menu" on page 125).
    - Meter pre/post source selection (resets all options set on the **Meters** sub-page of the **User Options** Menu.
    - Any selections made on the **Solo Configuration** page

- **Safe Settings** – selecting this option cancels all automation system **Recall Safe** selections; this applies to both specific channel blocks that have been made safe per-channel using the upper **Assign** and **SEL** buttons and to individual function selections made through the **Recall Safe** sub-page of the **User Options** Menu.
- **Factory** – selecting this option reverts the console to the ex-factory state:
    - All user input and output assignments are cancelled and go back to the default “one-to-one” mapping.
    - All input channels’ bus assignments are cleared.
    - All faders are closed.

IMPORTANT: Selecting the Factory Reset option also powers the console down!

Brightness:



Selecting this option opens the **Brightness** Page, with four faders:

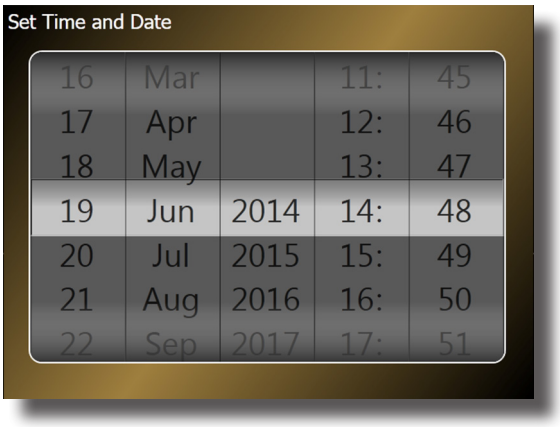
- **Screen** – sets the brightness of the Main Screens and the Control Screen
- **Surface** – sets the brightness of the surface buttons’ internal illumination
- **Meters** – sets the brightness of the LED bargraph meters and the meter source LEDs
- **Master** – adjusts all the above light sources, maintaining any difference in brightness set by the other three faders

The faders are scaled in arbitrary units from 0% to 100%; the default setting for all is 50%. Adjustment may be made either by dragging the virtual fader knob, or by tapping the fader “slot” above or below the knob to alter the setting by 1% at a time.

About:

The **About** Page displays a large real-time clock (with date), and details of the software in the console. (Be sure to check these details before contacting Cadac if you are experiencing difficulties with the CDC eight.)

Setting the clock: Touch the time display to set the time/date setting page:



The year, month, day, hour and minute may be set individually by scrolling vertically.

The CDC eight has four software programs which communicate with one another to control the console's operation. Each may be updated if necessary (though normally all four will be updated at the same time).

- **Audio Rack** – this is the audio DSP making up the 'virtual console'
- **Centre Surface** – this controls the surface master section, including the control screen and automation functions
- **Auto Surface** – this controls communications between the control screen and main screen(s), and generates main screen pop-up windows that are commanded form the control screen
- **Main Surface** – this controls the main screen(s) and associated hardware.

The **About** Page displays a further software version at the bottom of the screen; this is the primary CDC eight version information, which the user should quote to Cadac if technical assistance is required.

Shutdown:
Selecting this option forces a power-down of the console. Before completing the shutdown process, a dialogue box appears on the Main Screen (the left-hand one only on consoles with multiple channel sections) asking for confirmation of shutdown.

User Options Menu

This page provides additional console configuration options which allow the engineer to define how some particular aspects of the console operate.

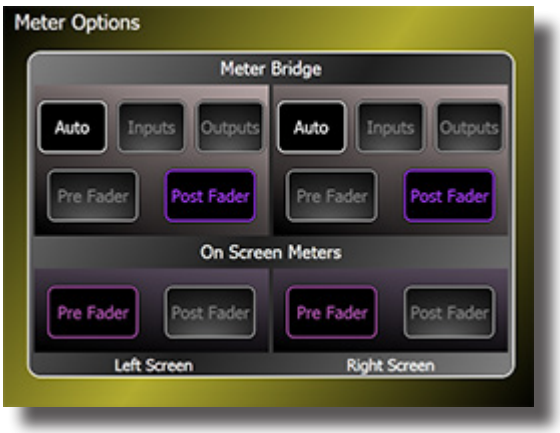
Three sub-pages are available:

Recall Safe:
This page is concerned with isolating specific settings and parameters of Input and Output Channels (and some other functions) from changes between Cues. See “Additional Recall Safe options” on page 99 for a full description.

Settings:
This opens the User Settings page, which has two buttons concerned with how the VCA system operates.

- **Assign VCA Auto On** – selecting this option automatically opens member channel faders when a VCA group is defined. If enabled, when input channels are assigned to a VCA group via the **VCA SETUP** screen (see “VCA Groups” on page 86), the individual channel faders are set to the 0 dB position and the channel turned on. (This can be seen by selecting the relevant fader layer after making the assignments.)
- **Assign VCA Auto Off** – this has a similar function to **Assign VCA Auto On**, but applies to channel de-assignment. If enabled, channels are automatically turned off as they are de-assigned from a VCA group, though the fader remains at its last–set position.

Meters:
This opens the Meter Options page. This provides numerous options for altering the default sources for the CDC eight’s various meters.



Options are provided for both the LED bargraphs in the meter bridge and the virtual meters at the bottom of the Main Screen channel strips.

Meter Bridge Source:
The default setting for the meter bridge bargraphs is **Auto** mode. In this mode, the meters follow the currently-selected Layer in the Channel Section. As there are 32 meters, but each Layer only consists of 16 channels, the meter source selection changes on “alternate” layers – e.g., between Input Layer B and C.

Note that the meter selection does not follow channel scrolling on the Main Screen, unless it is set in **16 Screen Follow** mode. This mode is provided to physically align bargraphs with the on-screen channel strips.

The other two buttons on the top row force the meter bridge to a fixed source. The middle button scrolls through four sets of 32 Input Channels: **Inputs 1 – 32**, **Inputs 33 – 64**, **Inputs 65 - 96**, **Inputs 97 -128**. The right-hand button scrolls through two sets of Output Channels: **Outputs 1 – 32** and **Outputs 33 – 56**. When any of these options are selected, the meter bridge bargraphs no longer follow Layer selection.

Meter Bridge Pre/Post:
By default, the signals to the meter bridge bargraphs are derived post-fader in the selected source channels. The **Pre Fader** button changes the metering point to pre-fader.

On Screen Meters:
These two buttons refer to the virtual bargraph meters at the bottom of the on-screen channel strips. The default source for these is pre-fade, but these may be changed to post-fade if required.

Thus the engineer has the option of monitoring signal levels both pre- and post-fader on all the currently-selected channels, and to decide which meters display which source.

System functions

USB ports

The CDC eight is equipped with several Type 'A' USB 2.0 ports; the actual number depends on the frame configuration. All consoles have a USB port in the meter bridge of the Master Section, and the left-hand Channel Section of all consoles has two USB ports on the rear panel.

The location of the ports is illustrated at page 21 (Item [4]) and page 23 (Items [7] and [17]).

The USB ports are intended for the connection of an external memory device (USB stick or similar), on which Show files can be saved or backed-up, and also for performing software upgrades. They also allow the connection of a standard USB QWERTY keyboard for channel name entry, etc., if this is preferred to the on-screen "virtual" keyboards.

Sidecar chassis sections also have two USB ports on the rear panel, but note that these *cannot* be used for saving or loading of show or project data.

Ethernet Ports

Each Channel Section of the CDC eight is equipped with two standard RJ45 Ethernet Ports. **NETWORK 2** is a console expansion port, and is dedicated to the connection of additional Sidecars (see page 12). If Sidecars are being used in conjunction with a 32-fader control surface, the expansion ports on either Channel Section may be used. However, if more than one Sidecar forms part of the CDC eight, an external Ethernet hub must be used to interface all Sidecars to the console itself.

Note that in standard surfaces with two Channel Sections, no external Ethernet connection is required, as this is provided internally.

Cat 6 cable suitable for 1000base-T use is recommended for the interconnection of Sidecars.

The second Ethernet port on each Channel Section is a standard PC network Gigabit Ethernet port.

The location of the ports is illustrated at page 23 (Items [9] and [19]).

Video ports (HDMI)

These ports are not implemented at present.

RS232 ports

At the present time, these are for factory use only.

GPIO ports

These ports are not implemented at present.

MIDI I/O

Used for sending or receiving MIDI data for control of external hardware, or for receiving MIDI data from an external source to control various parts of the control surface, such as scene management.

Full MIDI implementation will be available in a future release.

Updating system software

The CDC eight's operating system undergoes a programme of continuous development. The console may be updated by loading new versions of software as they become available. Please contact Cadac to check for current software versions.

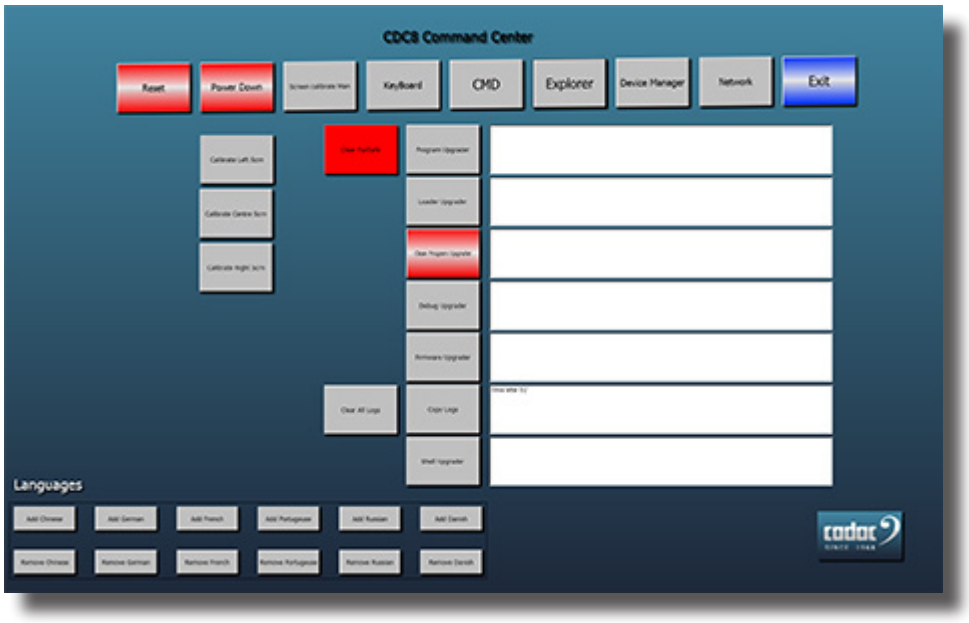
Software will be made available in the form of two files:

- The software itself, in the form of a compressed .rar file, e.g., `140107_2.0.rar`.
- An `.exe` file, `cdc8upgrader.exe`, which performs the upgrade procedure.

The `.rar` file should first be unpacked. Copy the contents, plus the `cdc8upgrader.exe` file to the root directory of the USB memory stick used to import the software. Plugging the memory stick into the front panel USB port will launch the CDC eight Command Center, which has numerous facilities in addition to the installation of software updates. See the following section for full details.

The Command Center

The Command Center is a software routine which runs when a firmware update is available to the system by plugging in a USB memory device containing the appropriate files (see "Updating console software" on page 129).



IMPORTANT

The Command Center should only be accessed by experienced engineers who have had training in the CDC eight's software components and systems. It is possible to make changes on this page which will prevent the CDC eight from operating as a mixing console!

Some Command Center buttons are coloured red. This is to warn you that they are particularly dangerous, in the sense that the functions they activate may reset primary console settings and/or overwrite user-entered information.

The Command Center's functions may conveniently be divided into groups:

System Commands
The top row of buttons allow access into the CDC eight's Windows 7 operating system.

- **Reset** – this is effectively a "Restart" button, which reboots the console. Note that it does so without opening a "Save Current Configuration" dialogue box. For this reason, extreme caution should be exercised in its use!
- **Power Down** – the console may be powered down from the Command Center by touching this button. This button should not be used unless you are confident that all Project and Show information is backed up.
- **Screen calibrate Man** – allows manual touchscreen calibration of any of the CDC eight's touchscreens. Touching this button opens a dialogue box for the Windows touchscreen calibration routine, from which the screen to be calibrated may be selected.

WARNING
Incorrect use of the **Screen Calibrate Man** command will disable the touchscreen operation altogether, resulting in almost all console control functions becoming unavailable. The command should NOT be used by anyone uncertain of the correct procedure.

- **KeyBoard** – opens an on-screen QWERTY keyboard, allowing data entry into various screens and fields elsewhere in the Command Center.
- **CMD** – opens the standard Windows DOS emulation window.
- **Exit** – press this button to exit the Command Center. This button also makes it safe to remove a USB memory device.

Screen Calibration
In addition to the manual screen calibration button in the System Commands, there are three buttons for automatic touchscreen calibration. These should always be used in preference to the **Screen Calibrate Man** command. Each screen

- **Calibrate Left Scrn** – calibrates the screen in the left-hand Channel Section
- **Calibrate Centre Scrn** – calibrates the Control screen in the Master Section
- **Calibrate Right Scrn** – calibrates the screen in the right-hand Channel Section, if fitted.

Each of these buttons invokes a proprietary touchscreen calibration routine and a script (a macro) which takes a few seconds to load and prepare. Do not touch the screen while this is in progress.

On the Main Screens, a red symbol with blinking arrows appears in the bottom left-hand corner, with a countdown timer adjacent to it. As accurately as possible, touch and hold a finger in the centre of the symbol until the countdown timer displays **OK!** This procedure is repeated in 24 further locations around the screen (in a 5 x 5 matrix) to achieve accurate calibration. The calibration routine closes automatically; touch the **OK** button on the remaining dialogue box.

Updating console software
From time to time it will be appropriate to update the CDC eight's software. The update procedure has been designed to be as simple as possible. Software will generally be made available to users in the form of a `.zip` file. This should be unzipped into the root of a USB memory device.

Two types of software updates will be available: a program update, or an update of both program and the loader routine. The user will be made aware of which update type is contained on the `.zip` file.

To perform an update, plug the memory device into a console USB port (the one in the meter bridge will generally be the most accessible). This opens the Command Center. If the update includes a Loader update, press the **Loader Upgrader** button, and wait until all the files have been transferred (this can be seen in the windows on the right of the screen). Then press the **Program Upgrader** button, and wait for the file transfer to complete.

Press the **Reset** button, and remove the memory device. This will reboot the console and install the new software.

Other Command Center functions:

- **Clean Program Upgrader** – this button has the same action as **Program Upgrader** (above), but additionally erases all user-entered Cues, and must therefore be considered as “dangerous”. It should not be necessary to use this button under normal circumstances.
- **Debug Upgrader** – strictly for factory use only. Under no circumstances should this button be pressed.
- **Firmware Upgrader** – strictly for factory use only. Under no circumstances should this button be pressed.
- **Copy Logs** – the CDC eight maintains a constant log of primary console activity. If you have an operating system problem that necessitates getting in touch with Cadac’s technical staff, you may be asked to provide a copy of the log file. Pressing Copy Log will create a new folder in the root of the USB Memory device containing all log files. This can be easily transferred to another computer and e-mailed to Cadac to assist with debugging.
- **Clear All Logs** – deletes all the current log files.
- **Shell Upgrader** – strictly for factory use only. Under no circumstances should this button be pressed.

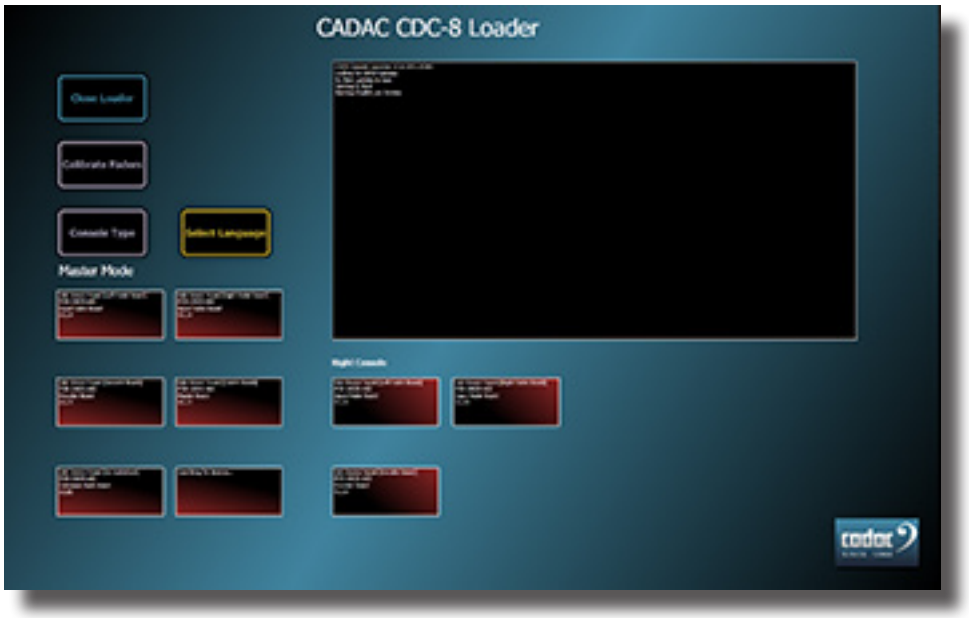
Alternative Languages

An important feature of the CDC eight is its support for languages other than English. It will allow user-definable labelling to be rendered in one of the following languages, if desired (list correct at the time of writing): Chinese, German, French, Portuguese, Russian and Spanish. Each language dictionary can be installed and removed with the set of buttons at the bottom of the screen.

Once an additional language has been installed, it can be selected as the language to be used by pressing the **Select Language** button on the **CDC8 Loader** screen during the next power-up (see below). This opens a window with a list of available languages (i.e., those that have been installed via the Command Center); select the one you wish to use.

Note that you can type (using the virtual keyboard on the CHANNEL SETTINGS or BUS SETTINGS pages) in a different language from that selected.

The CDC8 Loader



The CDC8 Loader screen is displayed for a few seconds as the console boots up. In addition to the Select Language button described above, three further commands area available, two of which interrupt the boot process:

Close Loader
This button closes the Loader screen. It does not disturb the boot process, which continues in the background in the normal way.

Calibrate Faders
Pressing this button opens the **Calibrate Faders** routine.

The sub menu which appears offers a button corresponding to the faders associated with each of the mixer's screens: two or three, depending on frame size. Select the set of faders to be calibrated. The calibration procedure differs for the faders on Channel sections and the master faders on the Master section:

For Channel sections: press the **Calibrate Faders** button. The faders will move to the top and bottom of their travel in turn, and then a **'Faders calibrated'** message will be displayed.
For the Master section: press the **Calibrate Faders** button. As the faders in the master section are not motorised, you will be asked to move the faders to the top of their travel, confirm, and then move them to the bottom of their travel and confirm again. After the **'Faders calibrated'** message is displayed, the calibration routine can be exited by pressing **Faders calibrated**.

Console Type
This button opens the **CDC8 Console Configurator** screen. If the CDC eight control surface has been modified or expanded – typically by the addition of a sidecar, it is necessary to confirm the presence of the new hardware.

The various control surface configuration options are displayed as images; tap the one that matches the hardware in use.

The boot procedure is suspended while the CDC8 Console Configurator is open; it continues when type selection has been made.

System expansion

Adding Sidecars
To connect a 16-channel sidecar to a control surface, simply connect it to the host surface's dedicated system expansion Ethernet port **NETWORK 2** (see [9] at page 23) using Cat 6 cable.

On powering the system up, the sidecar screen will display its own CDC8 Loader page; select Console Type to open the **CDC8 Console Configurator** page. Select the **CDC8 - Sidecar A** icon corresponding to the host surface (i.e., on the same row) to which it is connected. You will then be asked to make a selection from a list of PCs found on the network. In the vast majority of cases, only one PC will be listed: this will be the PC running the host surface.

This procedure only needs to be followed the first time a sidecar is connected; subsequent reboots will be seamless across the expanded surface.

If a second sidecar is to be daisy-chained to the first, follow the same procedure, but select the **CDC8 – Sidecar B** icon on the second sidecar's Configurator.

Adding a second Stagebox
This is a simple and transparent procedure. Observe the appropriate MegaCOMMS network wiring method to be followed – see page 28 for details.

Each stagebox must have a unique address; this is set by the hex switch on the rear panel. On a second stagebox, this switch should be set to '3'. Note that the first stagebox's hex switch should be set to '2'.

Adding Local I/O Cards
Each CDC eight is shipped with one CDC-TRS8-I 8-channel line input card and one CDC-TRS-8O 8-channel line output card fitted in the surface Channel Section

rear expansion bay as standard. The expansion bay has a total of eight slots, and any empty slots may be filled at any time with further inputs and outputs. See “Surface and Local I/O – audio connections” on page 32 for more details of card options.

Additional cards will be automatically recognised by the console at the next reboot, and the extra inputs and outputs will appear on the Input and Output Assignment pages.

Please note that Local I/O cards should only be changed, added or removed when the power to the surface is disconnected. Fitting or removing cards whilst power is present will damage them, and also potentially damage the control surface.

Adding Redundant Power Supplies

A second surface PSU may be added to provide redundancy. The surface is fitted with two rear panel PSU connectors; the second PSU is simply connected to the second socket.

A CDC I/O 6448 remote stagebox may also have second PSU added for redundancy purposes. The stagebox has an internal PSU; a second PSU is connected to the rear panel multi-way connector. Note that the PSU used in this case is the same PSU as used to power the control surface.

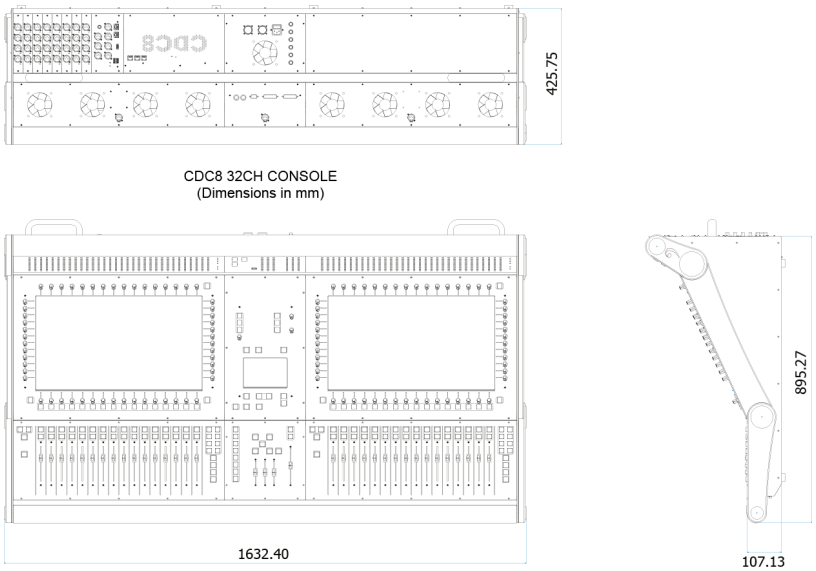
Appendix
Technical Specifications

General Specifications CDC8 32	
Faders	32 x 100 mm motorised faders
Screens	2 x 24” HD Touchscreens
PSU	2 x external 19” 2U rackmount PSU with full redundancy
Inputs	Up to 310 (including Local IO)
Channels	128 with full DSP processing
Busses	56 mix busses, freely assignable as groups, aux sends or matrix sends
Matrix	Up to 32 x 32 with full processing
Outputs	Up to 196 (including Local I/O)
Graphic EQ	32 band +/-16 dB on all busses
Internal FX	Up to 16 stereo FX units
Local I/O	Up to 8 I/O cards in any combination
Comms	2 x Cadac Megacomms

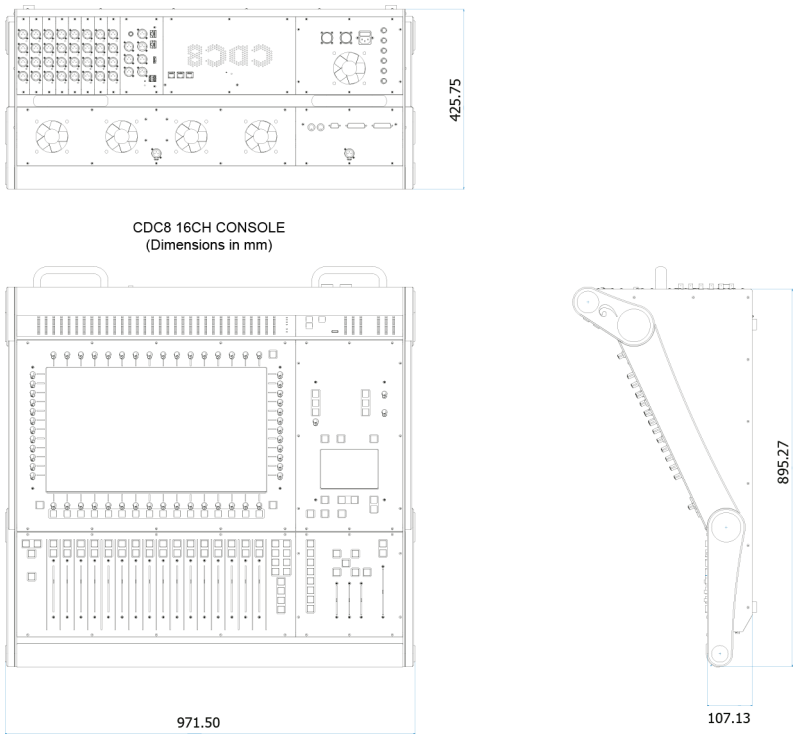
Audio Specifications	
Sample Rate	96 kHz
Processing Delay	Less than 1 ms through complete signal chain
Internal Processing	40 bit floating point
ADC/DAC	24 bit
Frequency Response	20 Hz to 44 kHz +0.5/-1.5 dB
THD+N	Better than 0.005% @unity gain, 10 dB input at 1 kHz
Channel Separation	Better than 90 dB
Residual Output Noise	< -90 dBu (20 Hz-20 kHz)
MIC EIN	< -127 dB with 200 ohm source impedance
Maximum Output	21.8 dBu
Maximum Input	21.8 dBu

Dimensions and weights

System Component	Description	Dimensions (mm) (w x d x h)	Net Weight
CDC eight-32	32-fader surface	1631.9 x 900.4 x 425.7	110 kg
CDC eight-16	16-fader surface	971.7 x 900.2 x 425.7	75 kg
CDC eight-16S	16-fader sidecar	716.9 x 900.2 x 425.7	41 kg
CDC PSU 4800	External PSU	482.6 x 400.0 x 88.0	10 kg
CDC I/O 6448	64/48 remote stagebox	482.6 x 259.1 x 398.3	13.5 kg
CDC I/O 3216	32/16 remote stagebox	482.6 x 435.9 x 177.8	10.9 kg



CDC8 32CH CONSOLE
(Dimensions in mm)



CDC8 16CH CONSOLE
(Dimensions in mm)

Connecting the CDC eight to unbalanced sources and destinations

Although the CDC eight will generally be used exclusively with balanced (analogue) audio sources and destinations, it may be occasionally be necessary to connect unbalanced devices. Cadac recommends that the following wiring protocols are followed:

Unbalanced sources – connect to a balanced input by joining pins 1 and 3 of the mating XLR connector. The signal 'hot' should go to pin 2, and the cable screen to pins 1 and 3.

Unbalanced destinations – connect signal 'hot' to pin 2 and the cable screen to pin 3. Do not connect pin 1.