

THE BUS+

User Guide



Solid State Logic

O X F O R D • E N G L A N D

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PLEASE READ ALL INSTRUCTIONS, PAY SPECIAL HEED TO SAFETY WARNINGS.

E&OE

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Overview

The Bus Compressor Legacy

If there is a single piece of analogue processing equipment that is synonymous with SSL, it just has to be The SSL Bus Compressor. From the very first commercially released SSL 4000 B console in 1976 and through many generations of SSL consoles that have followed since, the Bus Compressor has always been the stalwart of the console centre section. In 1991, when SSL took its first steps into the analogue outboard world, the FX G384 saw the Bus Compressor put into rackmount form, meaning that studios without SSL consoles could use it. In 2002, the FX G384 received a face-lift, with a new silver front panel taking it into the X Logic era and this was followed by the multi-channel 5.1 version the following year. In 2007, the Bus Compressor became available as double-width module for the X-Rack series and in 2013, the Bus Compressor made it's way into the ever-popular 500-series format. Even if you've never had chance to experience SSL Bus Compressor 'in real life', then you will have undoubtedly come across it in plug-in form, perhaps by using the SSL Native Bus Compressor 2. One thing is for sure, throughout the course of music production history, the Bus Compressor has always been the de facto choice for gluing a mix together.

Creating The Ultimate

For the past two and a half years we've been hard at work engineering The Bus+, on a mission to create the ultimate and most versatile incarnation of the Bus Compressor ever seen. The bedrock of the design remains faithful, as it always has done, to the original circuit and using this base as the starting point, we've built upon it, adding a number of unique colouration options. If you need it to be clean and punchy like the X Logic version, it can be. If you need it to be gritty and grungy like an early 4K, it can do that also. Or, if you need it to do something a little different, we've got you covered. To complement the new feature set, we also sought to bring improvements that would benefit recallability and technical performance. Firstly, this led to a decision to make all of the pots on The Bus+ stepped. Every pot is either an 11 or 31-position stepped control and this has the obvious advantage of making recalls easier... but there's actually more cleverness going on here. Stepped pots on their own may make recalls easier but simply using them instead of continuous pots doesn't lead to any technical advantage per se, as they are still subject to mechanical tolerances that can compromise stereo matching and the overall analogue performance. So we went even further, coming up with an innovative approach to the implementation. On The Bus+, all the stepped pot positions are read by an on-board microcontroller, meaning that no audio actually passes through the pots themselves and by doing this, we are no longer subject to the pot tolerances. The microcontroller's job is to translate the pot positions into the required circuit configuration or electrical parameter. To be clear, The Bus+ is a 100% analogue circuit design, it's just managed in a clever way. This approach is extended to the front panel buttons, providing clean and reliable switching of analogue signals thanks to the use of electronic switches.

In conjunction with the technical and general feature improvements, The Bus+ incorporates an all-new Dynamic Analogue Equaliser section, which we've named the D-EQ. The D-EQ is a powerful 2-band Dynamic EQ that can be placed before or after The Bus Compressor. Many engineers are familiar with Dynamic EQ plug-ins inside the DAW but analogue Dynamic EQs are few and far between. A Dynamic EQ is a more 'intelligent' form of EQ that changes the gain of an EQ band proportionally in response to the signal level once above a set threshold. It allows you to modify the contrast between background material (under threshold) and forward material (above threshold). The D-EQ is built upon a specially adapted version of the Bus Compressor side-chain circuit, which contributes significantly to its powerful, yet musical sonic character. Being able to use the D-EQ in conjunction with The Bus Compressor makes for some very exciting dynamic and tonal options indeed.

To round off the design, we decided to give The Bus+ 4 unique operating modes. Alongside the known and loved Classic Stereo mode, a Σ S/C Stereo mode is available, as found in our Duality console. Mid Side allows you to tailor the final mix/master stereo image and Dual Mono is super useful for tracking purposes or creative stem use. The Bus+ is truly a treasure chest of compression options at your disposal.

Features

The Bus+ (General)

The Bus+ combines a feature-rich analogue SSL Bus Compressor with a powerful Dynamic EQ, all in a single 2U rack unit

- 100% analogue circuit, controlled digitally using the stepped front-panel pots
- 4 modes of operation - Classic Stereo, Σ S/C Stereo, Dual Mono or Mid-Side
- Huge +27.5 dBu headroom
- External side-chain inputs and sends
- Configurable processing order - Bus Compressor pre D-EQ (default) or post
- CH 1 IN and CH 2 IN buttons for global bypass
- Settable Operating Level - 0 dB (nominal), +10 dB, -5 dB
- Sleep and Auto-Sleep modes

Bus Compressor

The ultimate incarnation of the SSL Bus Compressor

- The authentic SSL Bus Compressor circuit utilising high-performance 2181 THAT VCAs
- LOW THD Mode reduces low-frequency distortion caused by compression
- F/B Mode alters the compression characteristics for a more 'relaxed' style of compression
- 4K Mode - single VCA operation with variable harmonic distortion to bring some 'grit' and 'grunge' to the mix
- Negative Ratios - for creative pumping effects and control of particularly loud signals
- New Attack and Release time constant options - more flexibility to shape the Bus Compressor, including the new 'Auto 2' setting
- Precision MDAC-controlled MAKE-UP Gain with two ranges available - 'Coarse' 1 dB steps or 'Fine' 0.5 dB steps
- Variable side-chain High-Pass Filter control up to 300 Hz in 10 Hz steps
- MIX control for instant parallel compression
- Moving-coil gain reduction meters
- Unlockable bonus mode: Transient Expander

D-EQ

An all-new, powerful 2-band analogue Dynamic EQ

- 2-band (LF and HF), parallel Dynamic Equaliser
- Compress/Expand modes
- 3 choices of time constants for each band - Nominal, FAST or AUTO.
- 16 selectable Frequency points per band
- Adjustable Range control per band from 0.5 dB to 15 dB
- HF band can be switched to Bell shape, with selectable frequencies covering High-Mids and Highs
- Frequency band static 'make-up' gain for LF and HF bands (Stereo/ Σ S/C Stereo) or LF band (Dual Mono/Mid-Side)
- G-Series mode changes LF filter to be 2nd order with degree of undershoot/overshoot
- Tri-colour activity LEDs to indicate D-EQ activity
- Individually bypass-able bands

Unpacking

The unit has been carefully packed and inside the box you will find the following items.

- The Bus+
- IEC power cord for your country
- Safety Sheet
- Quickstart Guide

It is always a good idea to save the original box and packaging, just in case you ever need to send the unit in for service.

Rack Mounting, Heat and Ventilation

The Bus+ is a 2U, 19" rackmount piece of equipment designed to sit in the racking of a producer's desk or similar. It is recommended that ventilation space is left above and below the unit so any heat generated by The Bus+ can naturally disperse. The sides of The Bus+ chassis have cut-outs that should under no circumstances be blocked or covered. Always allow The Bus+ to cool down before handling.

Safety Notices

Please read the safety notice information included on the Safety Sheet inside the box before using The Bus+. This information is also available in Appendices section of this User Guide.

Hardware Overview

This page provides a brief overview of The Bus+ hardware. The tutorial section covers each control in more detail.

Front Panel

BUS COMPRESSOR SWITCHES
Special Bus Compressor features, unique to The Bus+ : LOW THD, F/B, 4K MODE.

MODE
Determines the mode of operation. Choose from Classic Stereo, Σ S/C Stereo, Dual Mono or Mid Side.

MOVING-COIL METER
Displays Gain Reduction for the Bus Compressor or Frequency/Range settings when configuring the D-EQ.

BUS COMPRESSOR CONTROLS (BLUE KNOBS)
Bus Compressor side-chain, Mix and Gain Make-up controls.

D-EQ CONTROLS (BLACK KNOBS)
2-Band Dynamic Equaliser. Controls for Compression/Expansion and LF/HF Gain.

D-EQ SWITCHES
The array of 3-switches affect the time constants of the Dynamic Equaliser side-chain (HF FAST, LF FAST). The HF BELL changes the high-frequency band filter from shelving to bell.

Rear Panel

BALANCED XLR INPUTS & OUTPUTS
Connect The Bus+ as a hardware insert across your audio interface or analogue desk.

EXT S/C IN - EXTERNAL SIDE-CHAIN INPUTS
Connect external sources you would like to trigger the side-chain from.

AUTO-RANGING POWER SUPPLY
Simply connect the IEC to a mains power socket and use the rocker switch to power on/off.

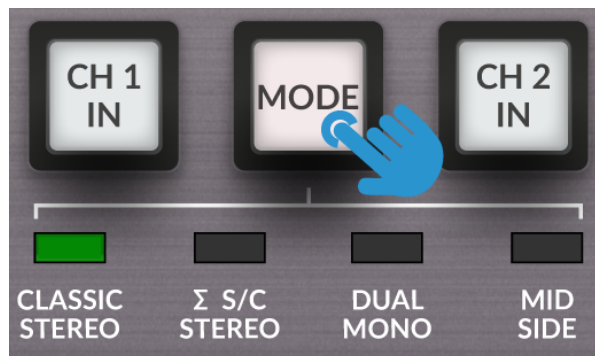
EXT SEND - SIDE-CHAIN SEND
Allows for creative duplication of the input signal. This could be used to feed an external processing unit such as an EQ, returning the processed signal into the EXT S/C IN. Or, it could be used to access the encoded Mid and Side signals, when using the unit in Mid Side mode.

Tutorial

MODE Selection

The Bus+ has four different modes of operation to choose from. Pressing the **MODE** switch will move you through the options.

CLASSIC STEREO - This is the classic mode of operation for the SSL Bus Compressor. Designed to be used on stereo sources, the controls on the left-hand side of the unit determine the settings of both left and right channels. The right hand controls are disabled and have no function associated to them in this mode (with the exception of the **LF/HF GAIN** D-EQ control).



Σ S/C STEREO - An alternative stereo mode of operation. The controls on the left-hand side of the unit determine the settings of both left and right channels. In this mode, the left and right side-chain signals are summed together, as opposed to being individually rectified. The effect of this is that the Bus Compressor becomes 'more sensitive' towards mono content in a stereo source - typically instruments like kick, snare, bass. Have a go at switching between **CLASSIC STEREO** and **Σ S/C STEREO** to see which you prefer on the material you're compressing.

A short press and hold on the MODE switch allows you to 'go backwards' through the modes, useful for A/B'ing between two adjacent options.



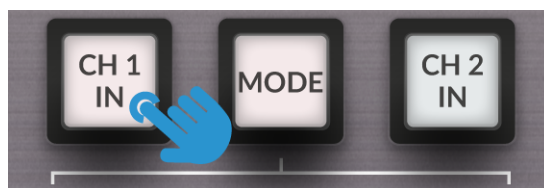
In **CLASSIC STEREO** or **Σ S/C STEREO**, the right-hand side **LF/HF GAIN** control functions as the **High Frequency Gain** control for both left and right (linked) channels. This is indicated by the red LED that accompanies the control (see illustration above). In **DUAL MONO** or **MID SIDE** mode, the right-hand side **LF/HF GAIN** control functions as the **Low Frequency Gain** control for Channel 2. This means that **HF GAIN** is only accessible in **CLASSIC STEREO** or **Σ S/C STEREO** modes.

DUAL MONO - This mode configures the Bus Compressor as two entirely independent mono processing engines. The controls on the left-hand side determine the settings for channel 1 and the right-hand side controls determine the settings for channel 2.

MID SIDE - The Bus+ has built-in Mid-Side encode-decode circuitry that allows the left-hand side of the unit to process the 'Mid' signal and the right side of the unit to process the 'Side' signal. This mode is a great tool for Mastering engineers.

CH 1 IN and CH 2 IN Switches

These switches allow you to bypass all Bus Compressor and D-EQ processing. In stereo modes, the **CH 2** switch is disabled as **CH 1** controls both left and right channels.



Overload (Clipping) Indication

The **CH 1 IN** and **CH 2 IN** switches will indicate if the headroom of the unit has been exceeded by flashing red when the signal passing through the unit registers above 26.5 dBu (i.e. 1 dB below absolute headroom of +27.5 dBu). Overload detection is done at the output of every internal circuit that has potential to introduce gain or to be overloaded, including the **EXT S/C IN**. If this happens you may need to reduce the **MAKE-UP** Gain, or indeed the level coming into The Bus+.



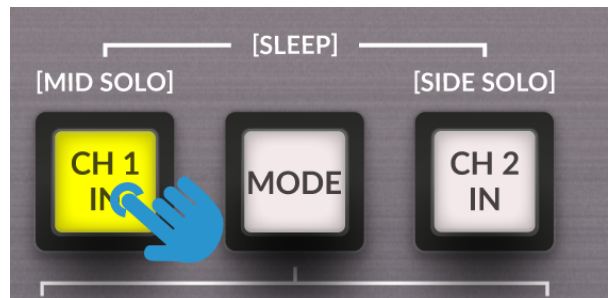
Mid Solo and Side Solo

(Mid Side Mode Only)

When The Bus+ is in **MID SIDE** Mode, pressing and holding the **CH 1 IN** switch will allow you to solo the Mid signal and pressing and holding the **CH 2 IN** switch will allow you to solo the Side signal.

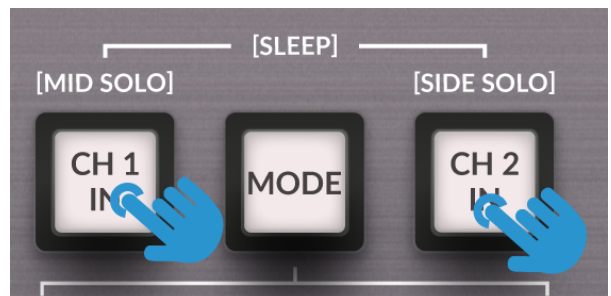
The switch will flash yellow to indicate the solo. Press and hold the switch again to release the solo.

There are two different ways to listen to the solo'd Side signal, depending on your preference. By default, the Side signal is presented on both left and right outputs, in phase when solo'd. This can be changed in the *Settings* menu to be presented after passing through the M/S decoder (i.e. Side signal out-of-phase on right output).



Sleep Mode

You can put the unit into **SLEEP** mode by pressing and holding both the **CH 1 IN** and **CH 2 IN** switches together for 2 seconds or until they start flashing. Sleep mode puts the unit into a very low power state (< 1 Watt), shutting down the audio rails until the unit is woken from sleep. Simply press the **MODE** switch to wake The Bus+ from sleep.

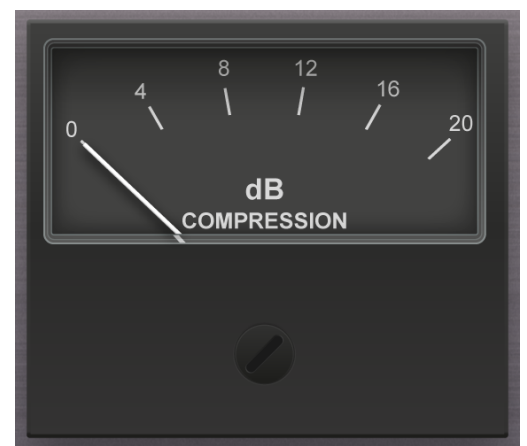


Gain Reduction Meters

The Bus+ features two traditional moving-coil meters. These meters are used to display the gain reduction in dB of the signals being compressed.

When operating the unit in a stereo mode, by default the right-hand side meter is disabled and all activity is shown on the left-hand side meter. However, you can enable the right-hand side meter if you wish via the *Settings* mode.

The meters are also used to indicate the Frequency and Range settings of the Dynamic EQ (D-EQ). Please see the D-EQ section the User Guide for more information.



Bus Compressor Controls

THRESHOLD - Determines the level at which compression occurs. 31-position stepped pot ranging from -20 to +20 dB.

ATTACK - Sets the attack time of the compressor (in milliseconds). 11-position stepped pot ranging from .1 to 40 ms. The Bus+ features a number of Attack time options never before seen on an SSL Bus Compressor, including 6, 15, 20 and 40 ms.

RATIO - Sets the ratio of the compressor. 11-position stepped pot ranging from 1.3:1 to -0.5:1. The last three positions (-2.5, -1.5 and -0.5) are negative ratios. A negative ratio is a setting whereby the output signal level is reduced once it exceeds the threshold, to a level that goes below that of the threshold. Negative ratios can be used to better control material that features extremely loud signals or, they can be used for creative 'pumping' effects.

RELEASE - Sets the release time of the compressor (in seconds). 11-position stepped pot ranging from .05 to 1.2 seconds plus two automatic release settings. For the first time on an SSL Bus Compressor, a fast release time of .05 (50 ms) is offered, as well as a .15 s option. **AUTO** is the same automatic option as found on all other SSL Bus Compressor, suitable for complex material as the release circuitry has a two-stage release (100 ms short, 12 seconds long). This means that louder elements of the signal are released quickly and quieter elements more slowly. **AUTO 2** (50 ms short, 6 seconds long), is a new option, providing a slightly more 'active' automatic setting.



MAKE-UP - A gain make-up control allows for any changes to level introduced by compression to be offset. Unity gain ('0') is marked in a white box on the front panel. The default range of the pot is -10 to +20 dB, controlled via a 31-position stepped pot in 1 dB increments.

MAKE-UP [FINE] - A press and hold of the **MAKE-UP** control, allows for the control to work in finer increments of 0.5 dB, with a range of -5 to +10 dB. The green LED below **[FINE]** lights to indicate this mode is active.

POST D-EQ - By default, the signal process order of The Bus+ is Bus Compressor, followed by the D-EQ circuit. A short press on the **MAKE-UP** control moves the Bus Compressor to be positioned after the D-EQ. The green LED below **POST D-EQ** lights to indicate this mode is active.



A single push for POST D-EQ processing or press and hold to put MAKE-UP into FINE mode



Press and hold MAKE-UP to activate FINE mode



Press MAKE-UP to activate POST D-EQ processing order

S/C HPF (SIDE-CHAIN HIGH-PASS FILTER)

Introduces a 12 dB/oct (2nd order) High-Pass Filter into the compressor side-chain. 31-position stepped pot ranging from **OUT** (fully counter-clockwise) to 300 Hz (fully clockwise). Steps are in 10 Hz resolution.



MIX

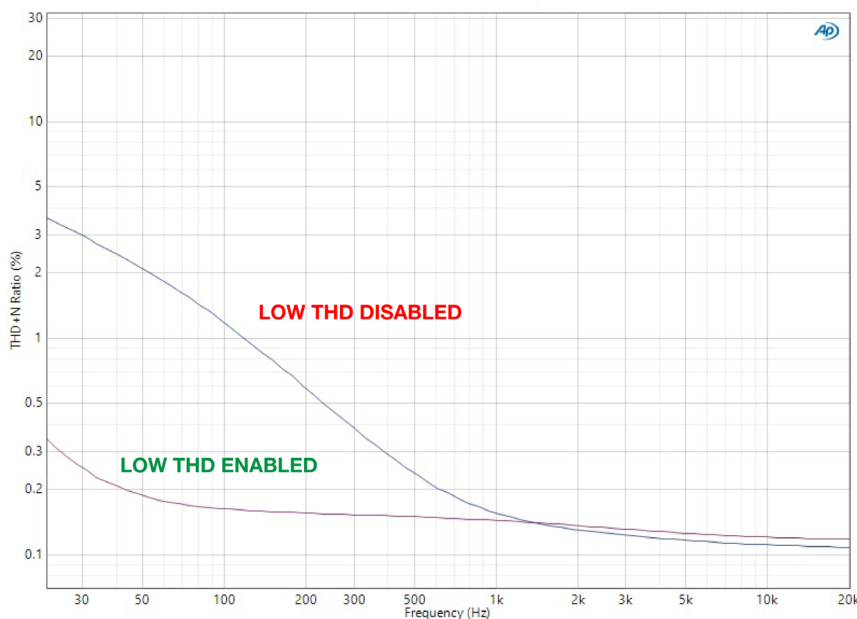
Allows the dry (uncompressed) and wet (compressed) signal paths to be blended together. 31-position stepped pot range from **DRY** (fully counter-clockwise) to **WET** (fully clockwise). By default, the control cross-fades between dry and wet paths but this can be altered in the *Settings* menu to be a parallel control - i.e. the dry level is always kept at 100% and the wet level 'fader' is brought up as you move the control towards **WET**, before switching to fully wet only at the fully counter-clockwise position.



Please note that MIX only applies to the Bus Compressor part of The Bus+. D-EQ is unaffected by the MIX control.

LOW THD

Most compressors by their nature start distorting low frequencies before high ones, particularly when set for fast release times. Sometimes this forms part of the desirable 'analogue character' but other times it is counter-productive. Pressing the **LOW THD** switch on The Bus+ introduces a special circuit modification in the side-chain, helping to limit the amount of low frequency distortion. Subjectively, **LOW THD** 'cleans up' the bottom-end, allowing you to achieve 'cleaner' gain reduction than without it. Give it a try on your mix and see if you like it!



The graph to the left compares LOW THD mode disabled vs enabled with a +4 dBu test signal.

Bus Compressor settings:
 Threshold 0 dB, Ratio 10:1, Attack 0.1 ms,
 Release 0.1 s, Make-Up 0 dB.

Note how the distortion at low frequencies is reduced with LOW THD enabled.

F/B (FEED-BACK) MODE

Although the Bus Compressor side-chain per se has a 'feed-back' topology, the signal feeding the side-chain is derived from a feed-forward position. Engaging the **F/B** switch derives the signal feeding the side-chain from a feed-back position (i.e. after the main gain-reduction VCA in the audio path). This results in a more 'relaxed' style of compression, in contrast to the traditional 'grab' of the Bus Compressor.

Usefully, because the MAKE-UP Gain on The Bus+ is implemented using an MDAC gain stage (post feed to side-chain), instead of via the VCA (pre feed to side-chain)



4K MODE

When **4K MODE** is disabled, the main VCA operates in a balanced configuration, optimised for low noise and distortion. This is the approach of all modern SSL SuperAnalogue Bus Compressor designs found in Duality & AWS consoles.

Engaging **4K MODE** does two things. Firstly, it changes the operation of the VCA from balanced to unbalanced (matching how the Bus Compressor in a 4000-series console was implemented) and secondly, it introduces a variable amount of harmonic distortion via the VCA. These two factors combine to allow for a more 'coloured' sound. Adjusting the distortion amount, you'll find there's a certain 'sweet spot' (depending on your mix level) in which your material will become more cohesive, thanks to the added thickness.

Since distortion is not achieved by means of overloading (amplification), there is no inherent noise penalty from using 4K MODE even at the highest distortion settings).



4K MODE - ADJUSTING THE DISTORTION SETTING

There are 9 levels of distortion to choose from. The current distortion setting is indicated by the colour of the switch when **4K MODE** is engaged. The Bus+ ships from the factory set to level 5 of 9.

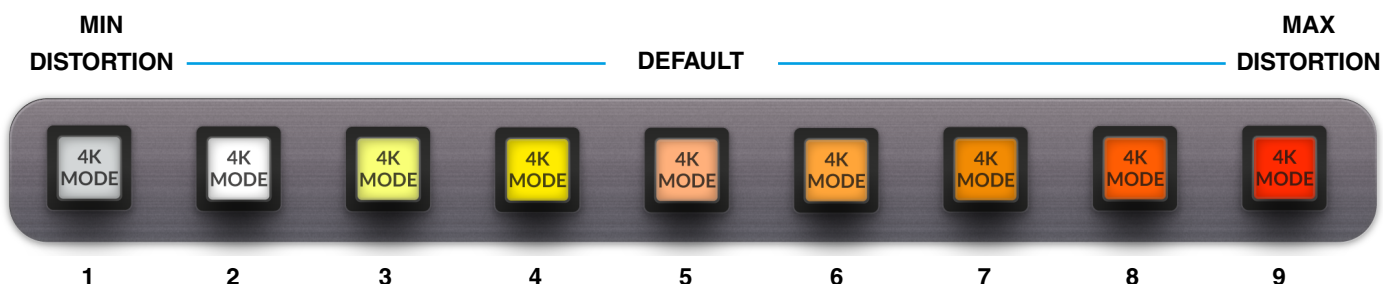
To alter the distortion setting, press and hold the **4K MODE [SET DIST]** switch until it starts flashing. Then, use the - and + switches to decrease/increase distortion. Press and hold the **4K MODE** switch to finalise and return the - and + buttons to their standard functions (**LOW THD** and **F/B**).



Press and hold 4K MODE until it starts to flash



Use the - and + keys to decrease or increase the amount of distortion



Selecting The External Side-chain Input

Pressing the **S/C HPF** control allows the external side-chain input(s) to be sourced for the Bus Compressor, D-EQ or both.

Ext S/C Input - Bus Comp



Press once to select the external input(s) as the source for the Bus Compressor side-chain.

Ext S/C Input - D-EQ



Press twice to select the external input(s) as the source for the Dynamic EQ side-chain.

Ext S/C Input - Both



Press three times to select the external input(s) as the source for both the Bus Compressor and the Dynamic EQ side-chains.

Ext S/C Input - Off



Press four times to return to the default state of internal side-chain for both the Bus Compressor and Dynamic EQ.

Going Further... Selecting the External Side-chain For One Dynamic EQ Band Only

When you select the external side-chain input for the Dynamic EQ, by default it is used for both the **LF** and **HF** bands. However, you can choose to have one band driven from the external side-chain and the other from the internal side-chain.

External S/C Input For LF and HF



Make sure D-EQ is selected as the external side-chain source. Press and hold the S/C HPF control and you'll see the LF and HF Dynamic EQ activity LEDs flashing green (default state) - both bands driven by the external side-chain input.

External S/C Input For HF Only



Whilst keeping the S/C HPF control held down, press the LF control. This will return the LF band to being sourced from the internal side-chain, whilst the HF band remains triggered from the external side-chain input. The HF D-EQ LED turns red to indicate this.

External S/C Input For LF Only



Alternatively, keep the S/C HPF control held down, press the HF control. This will return the HF band to being sourced from the internal side-chain, whilst the LF band remains triggered from the external side-chain input. The D-EQ LED turns orange to indicate this.

Dynamic Equaliser (D-EQ)

Many engineers use regular ('static') EQ in addition to their master bus compression, often feeling that they need to compensate for the psychoacoustic perception of 'dulling' that compression can bring. Also, in general, many engineers apply a static EQ across their mix as part of their mixing template to help achieve the level of bass and presence that modern productions require. A Dynamic EQ, however, is a more 'intelligent' form of EQ which changes the gain of an EQ band proportionally in response to the signal level once above a set threshold. Dynamic EQs allow you to modify the contrast between background material (under threshold) and forward material (above threshold). Whilst putting together the concept for The Bus+, we wanted to build in a Dynamic EQ that could be applied either before or after compression. After a considerable amount of research and development, we came up with a design for the first-ever SSL Dynamic EQ - the D-EQ. The side-chain is a specially adapted version of the Bus Compressor side-chain with additional circuitry such as the gain reduction limiter for the Range parameter. We think the D-EQ is every bit as musical and powerful as the Bus Compressor itself. Some people may think of dynamic EQ as a tool fulfilling a similar role to that of a multi-band compressor (without the cross-over phasing issues caused by band-splits of a multi-band design), which is definitely one way of looking at it. However, through exploring the power of the D-EQ, we are certain you will find many more creative uses beyond this, particularly using the expansion to enhance source material.

D-EQ CONTROLS

The D-EQ is a 2-band (**LF** and **HF**) dynamic EQ, with both engines able to be turned on/off (bypassed) individually. The default frequency of the LF Shelf is 60 Hz. The default frequency of the HF Shelf is 6 kHz. When the HF Shelf is changed to a Bell (using the **HF BELL** switch), the default frequency is 4 kHz. All of these frequency points can be adjusted - see the *D-EQ Frequency & Range Selection* section.

BAND ON/OFF

To turn an engine on/off, simply press the **LF** (low frequency) or **HF** (high frequency) control. It's easy to tell if the band is on as the corresponding D-EQ switches (**LF FAST** / **HF FAST** & **HF BELL**) will become backlit.

COMP/EXP

Each band has a 31-position stepped control labelled with **COMP** and **EXP** at the extremes of the control. As you turn the control clockwise from the centre position '0' (no effect), you start dialling in an expansion effect. Moving the control anti-clockwise, you start dialling in a compression effect. By turning the control in either scenario, you are effectively lowering the Threshold of the D-EQ, therefore how far you need to turn it before either expansion or compression happens will be dependent on the signal level.

D-EQ Activity LEDs

Above the **LF** and **HF** D-EQ controls are tri-colour LEDs, indicating 'how much' dynamic EQ is being added/subtracted by fading between off, green, orange and red colours. The green LED starts to come on with 0.5 dB of activity, reaching full green colour with 5dB. Full orange is recognising 10 dB of activity, whilst full red indicates 15 dB of processing is occurring.



A push on the control will toggle the band on/off.



Think of the activity LEDs as being the equivalent feedback you get from the meter for the Bus Compressor.

D-EQ Switches

By default, the **LF** and **HF** bands are first order (6 dB per/oct) shelving filters with nominal attack and release times set in the D-EQ side-chain. However, the following switches allow for some different options:

HF BELL

Changes the filter type from shelf to bell for the **HF** band. Switching to this also changes the available frequency points, providing the ability to apply EQ in the critical upper-mid-range - see *Frequency Points* page for more information. Switch lights bright white to indicate **HF BELL** is active.

HF FAST

Changes the time constants of the HF D-EQ band to 1 ms attack, 50 ms release. Switch lights bright white to indicate **HF FAST** is active. Nominal settings are 3 ms attack 50 ms release.

Pressing and holding the switch allows for a third **AUTO** setting to be chosen. Switch lights magenta to indicate this. Time constants for **AUTO** are 10 ms Attack, AUTO release.

LF FAST

Changes the time constants of the LF D-EQ band to 10 ms attack, 50 ms release. Nominal settings are 30 ms attack, 100 ms release. Switch lights bright white to indicate **LF FAST** is active.

Pressing and holding the switch allows for a third **AUTO** setting to be chosen. Switch lights magenta to indicate this. Time constants for **AUTO** are 10 ms attack, AUTO release.



LF/HF GAIN

The **LF GAIN** control (left-hand side of the unit) provides +/- 10 dB of boost or cut to the low frequency band of the D-EQ. This is control over the 'static' band of the EQ. The **LF GAIN** can be used to apply a boost/cut of 'regular' EQ to compensate for any dynamic EQ activity. For instance, you may use the dynamic part of the EQ to compress the lows but add back in a bit of **LF GAIN** to compensate. The control is a 31-position stepped control.

Think of LF/HF GAIN being the equivalent to MAKE-UP Gain control you have for the Bus Compressor.

The **LF/HF GAIN** control (right-hand side) is the same as described for the **LF GAIN** (a static EQ control) but the **MODE** of The Bus+ determines whether it is a static gain for the **LF** or **HF** band.

For **CLASSIC STEREO** and Σ **S/C STEREO**, the control acts on the **HF** Band. This is indicated by the **G/HF** LED being **RED**. Please note, this is the only parameter on the right-hand side of the unit that is active in either of the stereo modes.

For **DUAL MONO** or **MID SIDE** modes, the control acts on the **LF** band. The colour of the **G/HF** LED may be either not lit or green in this mode but this is simply reflecting whether the 'G-Series' mode is active or not - see next page.



Red LED indicates the control functions as HF GAIN

G (G-Series) Mode

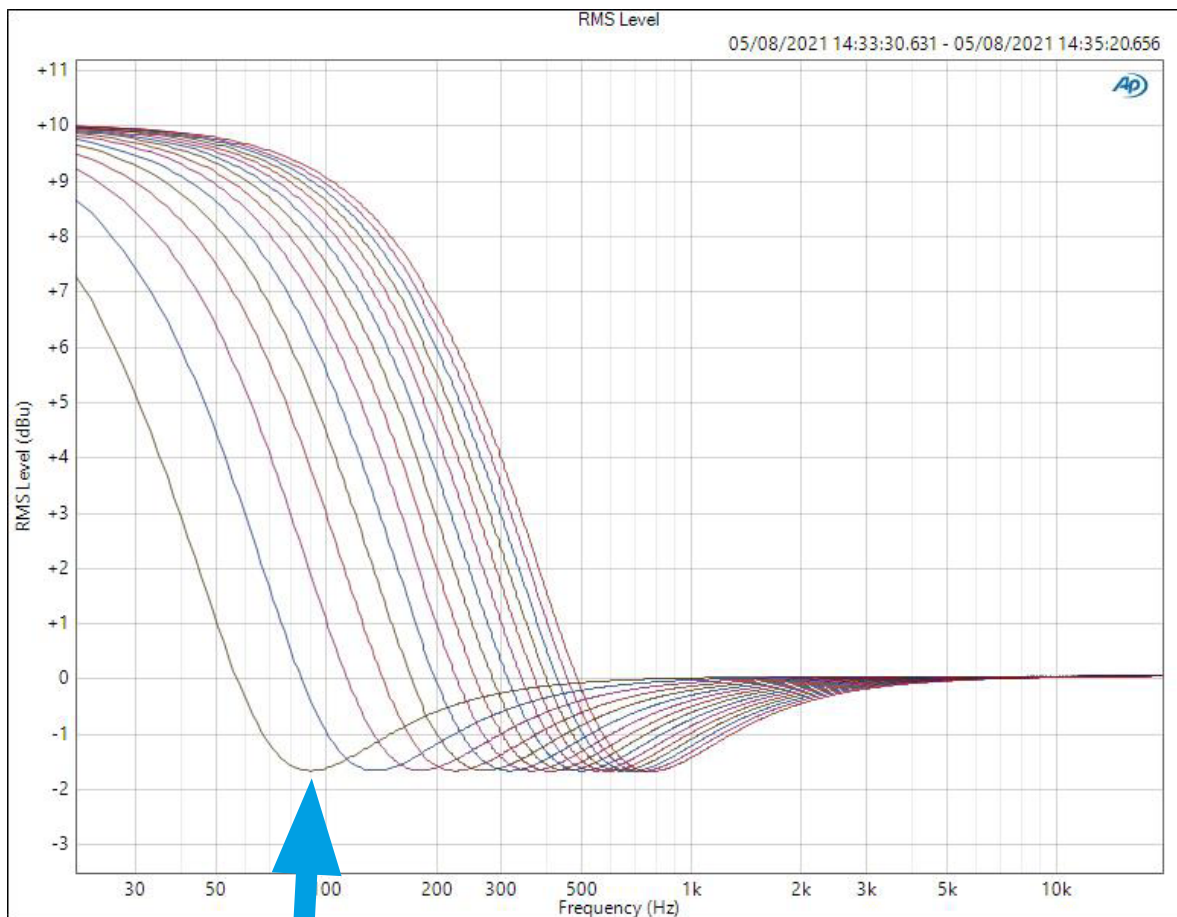
Pushing the **LF GAIN** control will toggle **G** (G-Series) mode on/off for the **LF** band. When active, the LED lights **GREEN**.

When the EQ is in G-Series mode, the filters are changed from 1st order to 2nd order (12 dB per octave) and an amount of overshoot/undershoot is added to the shelving filters above the frequency cut-off point, similar to that found on G-Series SSL EQs. This can provide a slightly different sonic character to the EQ which we have found to be pleasant on sources like drum busses.

Please note this is only available for the **LF GAIN** band, not the **HF** band (stereo modes only).



G-Series Mode Graph



Undershoot at frequency cut-off point with G-Series mode engaged.

D-EQ - Frequency & Range Selection

For each band of the D-EQ, 16 different frequency points can be chosen from, allowing control over which part of the frequency spectrum you want to affect. The D-EQ also allows control over a parameter called **RANGE** for each band. The **RANGE** parameter allows you to restrict the maximum amount of expansion or compression possible, by introducing gain-reduction (or expansion) limiting on the control voltage for the VCA in the D-EQ.

Adjusting the Frequency

Press and hold on the band (**LF** or **HF**) you want to change. The moving-coil meters on the front panel will start pulsing/glowing. The left-hand side meter is used to indicate the selected frequency. Pressing the **HF FAST** switch will move the frequency point upwards, whilst pressing the **LF FAST** button will move it downwards. The left-hand side meter needle shows the current setting. Press and hold the **LF** (or **HF** control if you're adjusting that band) or the **MODE** switch to exit.



Press and hold desired band.



Use + or - keys to change frequency.



The needle indicates the chosen frequency. See next page for frequency points.

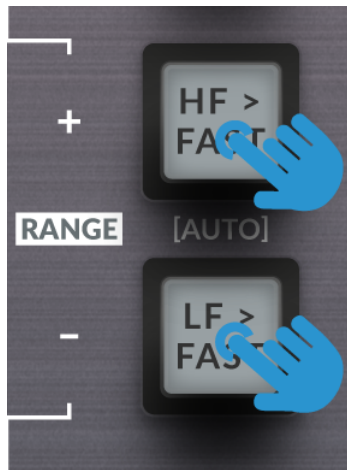
Adjusting the Range

(Presuming you are have already entered the setup mode by pressing and holding the LF or HF control):

Pressing the **HF FAST** switch will increase the Range of the D-EQ, whilst pressing the **LF FAST** button will decrease it. The right-hand side meter needle shows the current Range setting. Press and hold the **LF** (or **HF** control if you're adjusting that band) or the **MODE** switch to exit.



Press and hold desired band.



Use + or - keys to change Range setting.

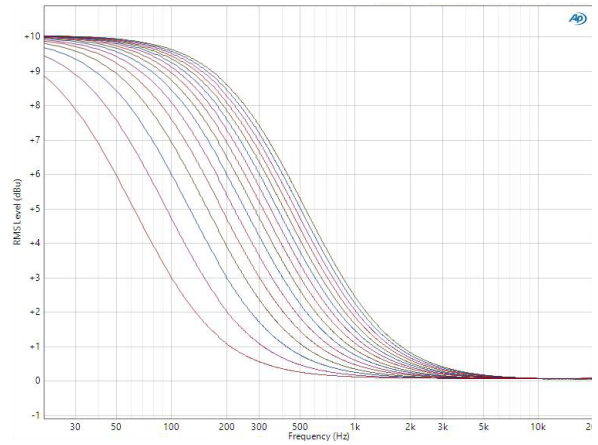
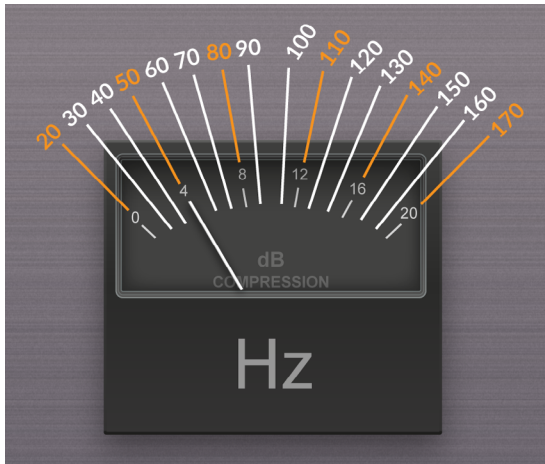


The needle indicates the chosen Range.

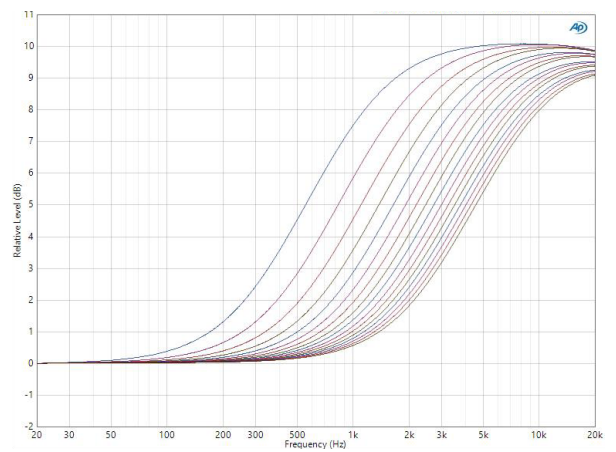
Frequency Points

The illustrations below show you the frequency to which each needle position corresponds to. The default frequency of the LF Shelf is 60 Hz. The default frequency of the HF Shelf is 6 kHz. The default frequency of the HF Bell is 4 kHz.

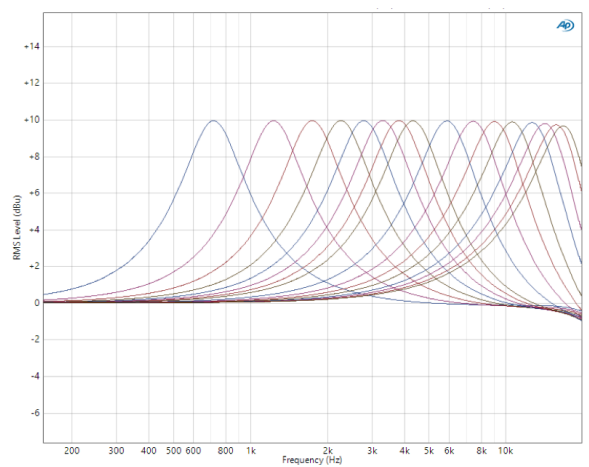
LF



HF



**HF
BELL**



The HF BELL filter is a Proportional Q design, reaching a Q value of 1.87 at maximum boost/cut (10dB). The Q is 1.04 at 5 dB.

Range Points

When setting the Range parameter of the D-EQ band, the right-hand side meter displays the current setting. There are 23 different ranges values that can be chosen from. The minimum is a range of 0.5 dB and the maximum is 15 dB. Between 0.5 and 8 dB the steps are in 0.5 dB and between 8 and 15 dB the steps are in 1 dB. Usefully, the markings already on the meter correspond directly to the equivalent Range values.



For example, the needle is showing that the Range is set to 4 dB here.

Settings

There are a number of configurable settings available for The Bus+. To access these, hold down the **MODE** key whilst The Bus+ is powering on. Read through the information on the following pages to understand which switches affect which particular setting.



Press and hold the **MODE** key whilst The Bus+ is powering on

When you are finished adjusting settings, press and hold **MODE** again and the unit will power cycle back into the normal operating mode.

Brightness

8 levels of brightness are available for the switch lights. Use the **LOW THD** and **FB** switches on the left-hand side of the unit to decrease/increase the brightness. Factory setting: Level 5 of 8.



Relay Feedback

You can enable/disable the relay feedback (audible click when a switch is pressed) of the switches. This affects the startup sequence and normal operation. To switch between enabled and disabled, press the **4K MODE** switch on the left-hand side of the unit.

If **4K MODE** is lit **GREEN**, relay feedback is enabled (default).

If **4K MODE** is dimly lit white, relay feedback is disabled.



Relay enabled



Relay disabled

Mix Control Mode - Classic or Parallel

The **MIX** control can work in two different ways. Classic mode cross-fades between dry and wet signals, whilst Parallel mode keeps the dry signal at 100% and brings up the wet 'fader' as the control is rotated towards the fully-clockwise **WET** position. The Parallel mode allows for NY style parallel compression very easily.

To switch between Classic and Parallel modes, push the **MAKE-UP** control on the left-hand side of the unit.

FINE LED indicator **GREEN** = Classic mode (default).

FINE LED indicator **ORANGE** = Parallel mode.

When the Parallel setting is active, the **MODE** indicator LEDs (Classic Stereo / Σ S/C Stereo / Dual Mono / Mid Side) illuminate orange instead of green in normal operation, to give a useful representation of this option being enabled. Also, with the Parallel Mix option selected, turning **MIX** control fully CW will enable Audition mode (dry 0%, wet 100%). In this position, the currently active **MODE** LED indicator will blink. Audition mode is useful as it allows you to tweak compressor parameters while listening to the wet signal in isolation.



Classic mode



Parallel mode

Operating Level - Input Gain Trim

The **4K MODE** switch on the right-hand side determines if an Input Trim is applied. Press the switch to cycle through the options.

4K MODE = WHITE: 0 dB (default)

This is the standard operating level, generally suitable for most mixing scenarios.

4K MODE = RED: +10 dB

A 10 dB gain is applied to the input stage. This is useful when you are interfacing The Bus+ with an audio interface or DAC that has a lower output level, allowing it to drive The Bus+ correctly. For example, this is recommended if connecting The Bus+ to an SSL 2 audio interface which outputs +12.5 dBu at 0 dBFS.

4K MODE = GREEN: -5 dB

A pad of -5 dB is applied to the input stage. This operating mode might be useful for Mastering engineers dealing with 'hot' mixes, effectively altering the threshold range from +20/-20 dB to +25/-15 dB.



0 dB Input Gain



+10 dB Input Gain



-5 dB Input Gain

Auto Sleep

In addition to putting The Bus+ into Sleep mode manually (by pressing **CH 1 IN** and **CH 2 IN** switches together in normal operation), the unit can enter Sleep mode automatically after a specified amount of time of inactivity. Inactivity can mean either the pots and/or switches have not been operated. It can also mean there has been no audio present above -5 dBu at the Bus Compressor input (with 0 dB input trim).

By default Auto Sleep is disabled. Engaging the left-hand side **HF BELL** switch enables Auto Sleep with a default setting of 20 minutes. Use the **HF FAST** and **LF FAST** switches to increase/decrease the activation time for Auto Sleep. Operating mode LEDs (Classic Stereo / Σ S/C Stereo / Dual Mono / Mid Side) indicate the current Auto Sleep time setting.



	CLASSIC STEREO	Σ S/C STEREO	DUAL MONO	MID SIDE	CLASSIC STEREO	Σ S/C STEREO	DUAL MONO	MID SIDE
AUTO SLEEP OPTIONS 1-8				AUTO SLEEP OPTIONS 9-16				
15 secs	■	■	■	■	■	■	■	■
5 mins	■	■	■	■	■	■	■	■
10 mins	■	■	■	■	■	■	■	■
15 mins	■	■	■	■	■	■	■	■
20 mins	■	■	■	■	■	■	■	■
25 mins	■	■	■	■	■	■	■	■
30 mins	■	■	■	■	■	■	■	■
35 mins	■	■	■	■	■	■	■	■
40 mins	■	■	■	■	■	■	■	■
45 mins	■	■	■	■	■	■	■	■
50 mins	■	■	■	■	■	■	■	■
55 mins	■	■	■	■	■	■	■	■
60 mins	■	■	■	■	■	■	■	■
65 mins	■	■	■	■	■	■	■	■
70 mins	■	■	■	■	■	■	■	■
75 mins	■	■	■	■	■	■	■	■

1) Press **HF BELL** to enable Auto Sleep

2) Use **HF FAST** / **LF FAST** to increase or decrease Auto Sleep activation time

Deep Sleep & Waking Up

If the unit is in Auto Sleep mode, it's possible to make it wake up automatically simply by sending audio above 0 dBu. Alternatively, simply press the **MODE** switch.

The Auto wake up function requires part of the audio circuitry to be still powered. After 1 hour of inactivity while in Auto Sleep, the unit enters "deep sleep" (which is the same as putting the unit into Sleep mode manually) to save the most power (less than 1 watt power consumption).

In Deep Sleep, the only available mean of restoring operation is by manually pressing the **MODE** switch.

In Auto Sleep a brief light animation on the operating mode LEDs occurs every few seconds helping you to identify you are in Auto Sleep and not Deep Sleep.

Input Stage - Low Pass Filter

Some DACs or Audio Interfaces, depending on the implementation, can exhibit excessive out-of-band noise. Whilst you won't directly hear it, it may cause unwanted triggering of Bus Compressor and D-EQ side-chains. When that happens, you'll notice the gain reduction meter being displaced (or the D-EQ indicators lit) with no audio being played. It may also cause increased noise-floor at high 4K MODE distortion settings.

To combat this, The Bus+ allows you to engage a 18 dB/oct (3rd order) Low Pass Filter at 26 kHz. If you have The Bus+ connected to an audio interface that exhibits this issue, you may need to engage this. The filter is applied on every input stage, including External Input(s).

You toggle the LPF by pressing the right-hand D-EQ **LF** control. The activity LED indicates if the LPF is in or out.

If the **LF** control LED is **RED**, then the LPF is disabled (default).

If the **LF** control LED is **GREEN**, then the LPF is enabled.



LPF disabled (default)



LPF enabled

Side Solo Mode

In normal operation, the Side signal when solo'd is presented on both left and right outputs, in phase. This can be changed to be presented after passing through the M/S decoder, which gives in-phase Side signal on the Left output and out-of-phase Side signal on the Right output.

You toggle the Side Solo mode by pressing the **CH 2 IN** switch.

If the **CH 2 IN** switch is **YELLOW**, the Side signal is presented on both left and right outputs, in phase

If the **CH 2 IN** switch is **ORANGE**, the Side signal is presented after passing through the M/S decoder.



Side solo = left and right, in phase



Side solo = presented through M/S decoder

Right-Hand Side Meter On/Off - Stereo Modes

By default, in normal operation if The Bus+ is in Classic Stereo or Σ S/C Stereo modes then the right-hand side gain reduction meter is disabled. However, this can be changed so that both meters light up and operate in these stereo modes.

You toggle the right-hand side meter to be on/off in stereo modes pressing the **CH 1 IN** switch.

If the **CH 1 IN** switch is DIM WHITE, the right-hand side meter is disabled in stereo modes (default).

If the **CH 1 IN** switch is BRIGHT WHITE, the right-hand side meter is enabled in stereo modes. The backlight of the right-hand side meter will also reflect the current setting.



Right-hand side meter disabled



Right-hand side meter enabled

Factory Reset

To return the unit to the factory-shipped state, you can perform a factory reset by following these instructions:

- Press and hold both channels' (left and right) **LOW THD** switches during the power-up sequence.
- When the switches in the centre of the unit start flashing **RED**, release the **LOW THD** switches and the unit will reboot automatically with factory settings restored.



Press and hold both LOW THD switches during boot until central switches start flashing, then release.

Be sure to release the LOW THD switches soon after the central switches start flashing red, or else you might accidentally perform a Deep Factory Reset (see bottom of this page for more information).

Settings affected by Factory Reset:

- Switches states
- Shaft switches states
- Frequency and Range settings for LF/HF/HF BELL
- Brightness (default: 5th level over 8 total)
- Relay feedback (default: ON)
- Input trim (default: 0 dB)
- Autosleep On/Off (default: Off)
- Autosleep timeout (default: 20 min)
- LPF (default: disabled)
- Parallel Mix mode (default: disabled)
- Side Solo mode (default: in-phase)
- Right-hand side Meter On/Off in Stereo Mode (default: Off)

Deep Factory Reset

The Bus+ offers a 'Deep' Factory Reset, which is the same as the standard Factory Reset described above but it also resets the Transient Expander to be unavailable/locked out. To unlock the Transient expander, you must once again win the built-in 'Code-Break Master' game.

To perform a 'Deep Factory Reset', perform the same actions described for the standard Factory Reset but keep the switches held for a few seconds longer, until the central switches start flashing **GREEN**, then release the **LOW THD** switches and the unit will reboot automatically.

Please note that performing a Deep Factory Reset means that you will have to win a game of 'Code Break Master' once more to unlock and be able to use the Transient Expander feature.

Code-Break Master Game

Can you break the code to unlock the Transient Expander?

Introduction

In true SSL tradition, the engineering team are pleased to bring you the **Code-Break Master** game built into The Bus+.

Aim Of The Game

The Bus+ randomly picks a sequence of 4-colours (from a palette of 6). You have 12 rounds to guess correctly (i.e. break the code!). The number of guessing rounds you have remaining is indicated by the position of the left-hand side meter needle.

Entering The Game

Press and hold the left-hand side **CH 1 IN**, **HF BELL**, **HF FAST** and **LF FAST** switches whilst The Bus+ is powering on.



Press and hold these 4 switches whilst The Bus+ is powering on to enter the Code Break Master Game Mode.

Starting The Game

The **MODE** switch will be pulsing red and the front panel LEDs swiping left and right, like a familiar 80's TV car's headlights. Press the **MODE** switch to start the game.



How It Works

STEP 1 - Pick your colours

1. At the start of each game, The Bus+ randomly picks (but does not show!) a sequence of colours for the **CH 1 IN**, **HF BELL**, **HF FAST** and **LF FAST** switches. Each of these switches could be one of a six possible colours - Orange, Red, Green, Blue, Magenta and White.
2. Each round, you pick colours for each of these switches by toggling them to the ones you *think* The Bus+ has picked. To change the combination of colours, simply press on any of the four switches. A press and hold allows you to select the previous colour in the sequence.
3. Finalise your decision for that round by pressing the **MODE** switch.

STEP 2 - Hint (See how you did)

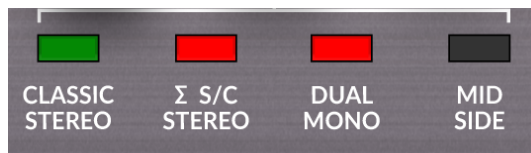
After finalising your decision for the round, The Bus+ will feedback information on how close (or not!) you were to guessing the correct colour combination, using the 4 LEDs above **CLASSIC STEREO**, **Σ S/C STEREO**, **DUAL MONO** and **MID SIDE**:

Off LED = You have picked a colour which is not present in the solution.

Red LED = You have picked a correct colour but it is in the wrong position.

Green LED = You have picked a correct colour AND it is in the correct position.

For example, 2 Red LEDs would mean you have correctly guessed the colour of 2 of the 4 switches but they are both in the wrong position. Another example would be 1 Green LED and 3 Red LEDs, meaning that one of the colours you have picked is correct (both for the colour and the position) and the other 3 colours are correct but all in the wrong position. No LEDs lit means none of the colours you have picked are present in the solution, in any position.



The image above shows what would be displayed if you had correctly guessed the colour and position of one switch (green) and correctly guessed two other switches colours but in the wrong position.

Note: The position of the feedback LEDs *is not* related to the position of current guess.

STEP 3 - Use the Feedback to adjust the colours you pick in the next round

Press the left-hand side **F/B** switch to move onto your next round of guessing, once again toggling the **CH 1 IN**, **HF BELL**, **HF FAST** and **LF FAST** switches to the colours you think The Bus+ has picked as the secret code.

Again, finalise your choices for this round by pressing the **MODE** key.



Press the F/B switch to begin your next round of attempting to break the code.



Guess the colour code The Bus+ has set for these four switches by toggling their colours each round.

Top Tip - Using the LOW THD and F/B Switches to Review Previous Guess Rounds

After the first round of guessing is complete the **LOW THD** switch becomes available, allowing you to go back through previous guess rounds, to help make more informed decisions as the game progresses.

After the second round of guessing is complete, the **F/B** switch becomes available, which means you can then move backwards (using the **LOW THD**) and forwards (using the **F/B** switch) to review the choices you have made in every round as the game progresses. Use the **F/B** switch to get back to your latest round of guesses - the **MODE** key will once again become available to finalise your choices in the current round.



Use the **LOW THD** and **F/B** switches to review previous rounds of guesses.

Winning

If you manage to correctly match the combination of colours across the 4 switches in 12 rounds or less, then The Bus+ will flash all front-panel LEDs **GREEN**.

Losing

If you fail to correctly match the combination of colours across the 4 switches before 12 rounds of guessing run out, then The Bus+ will flash all front-panel LEDs **RED**... but do not fear, simply press the **MODE** key twice to have another go!

Exiting The Game

Press and hold the right-hand side **LOW THD** switch to reboot the unit into normal operation.

The Prize - Unlocked Transient Expander Feature!

Congratulations on breaking the code. As a reward, you have unlocked the **Transient Expander** feature. Returning The Bus+ to normal operation (press and hold the right-hand side **LOW THD** switch), you will now be able to press and hold the **HF BELL** switch to engage the Transient Expander feature turn it **GREEN**.

When active, the **HF** control is no longer associated with the D-EQ (The D-EQ HF band is temporarily sacrificed and instead, the **HF** control functions as a Transient Expander control. Rotate the control from '0' (12 o'clock) position means (no transient expansion) to fully clockwise 'EXP' (maximum expansion). Push the **HF** to toggle the Transient Expander in/out. The **HF** LED lights green-orange-red, to give you an indication of how much expansion is taking place when active.



Press and hold the **HF BELL** switch until it turns green and then rotate the **HF** control clockwise to start expanding.

Bus Compressor Meter Calibration

The Bus+ can be put into Meter Calibration Mode. This mode allows the meter needles to be calibrated for optimal alignment against the 4, 8, 12, 16 and 20 marks, when being used to display the Frequency and Range settings of the D-EQ. To enter Meter Calibration Mode, hold down the left-hand side **LF FAST** and **HF FAST** switches whilst The Bus+ is powering on.

Please note: Calibration only affects the D-EQ Settings mode (Frequency and Range) and not the meter's normal operation/compression.



Press and hold LF and HF FAST switches to enter Meter Calibration Mode whilst The Bus+ is powering on.

'0' Mark Calibration

Upon entering Meter Calibration Mode, the needle of both meters will be resting near the 0 position. For this '0' position only, you should use the front panel flat-head screwdriver adjustment to move the needles closer to their 0 positions if necessary.



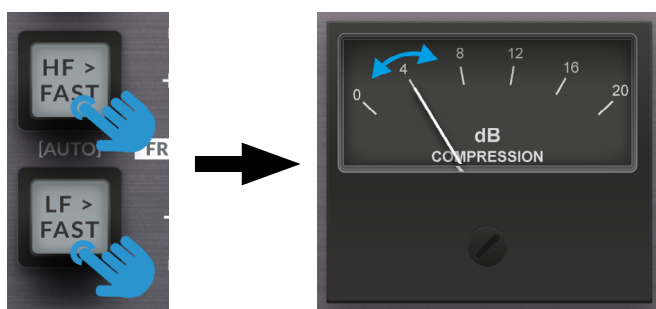
Use a flat-head screwdriver to adjust needle position for the '0' marking only.

'4' Mark Calibration

When you are happy with the '0' mark calibration, press the left-hand side side **F/B** switch to move onto the calibration for the '4' mark, the meter needles move towards '4'. Next, use the left-hand side **LF FAST / HF FAST** switches to move the left-hand side needle as close to the '4' marking as you can. **LF FAST** moves the needle down and **HF FAST** moves the needle direction up. Do the same for the right-hand side meter, using the right-hand side **LF FAST / HF FAST** switches.



Use the F/B switch to move to the next calibration point.



Use the LF FAST or HF FAST switches to move the needle towards the mark.

Calibration Marks '8', '12', '16', '20'

When you are happy with the '4' mark calibration, repeat the same process to line up marks '8', '12', '16' and '20' as closely as you can using the **LF FAST** and **HF FAST** switches. Use the left-hand side **LOW THD** and **F/B** switches to go to the previous or next line-up positions, should you want to make any changes.



Use the LOW THD and F/B keys to move to the previous or next calibration mark.

Calibration Marks Indication

In addition to the Bus Compressor Meter Needle moving towards each mark, the following LEDs light red to indicate which mark is currently being calibrated:

- EXT S/C D-EQ Left LED = 0 dB mark mechanical alignment
- Classic Stereo = 4 dB mark calibration
- Sum SC Stereo = 8 dB mark calibration
- Dual Mono = 12 dB mark calibration
- Mid Side = 16 dB mark calibration
- EXT S/C Comp Right = 20 dB mark calibration

Saving The Calibration

Important: To save the current calibration and exit, press and hold the **MODE** key and the unit will power cycle. If you simply power cycle the unit from the mains switch, the calibration will **not** be saved!



Press and hold the MODE key to save the calibration.

Troubleshooting

UID Display

UID Display Mode displays the UID number of the firmware currently in use and the hardware revision of both main card and front panel card. To enter UID Display Mode, press and hold the left-hand side **F/B** switch during the power-up sequence.



Number of digits for each item:

- Firmware UID: 5 digits number
- Mainboard HW revision: 1 digit number
- Frontpanel HW revision: 1 digit number

Digit selection is performed via dedicated switches:

FW UID 1st digit: Low THD Left

FW UID 2nd digit: FB Left

FW UID 3rd digit: 4K MODE Left

FW UID 4th digit: 4K MODE Right

FW UID 5th digit: FB Right

Main board HW revision: LF FAST Left

Front panel HW revision: LF FAST Right

Once the required digit is selected, the information is obtained by counting the number of indicator LEDs lit up **GREEN**.

E.g. if the current digit is “3”, this will be indicated by **POST D-EQ** , **MAKEUP FINE** , **EXT S/C COMP** LEDs all lighting green.

The indicators involved in this process are as follows (in increasing order):

- POST D-EQ L (1)
- MAKEUP FINE L (2)
- EXT S/C COMP L (3)
- EXT S/C DEQ L (4)
- CLASSIC STEREO (5)
- SUM SC STEREO (6)
- DUAL MONO (7)
- MID SIDE (8)
- EXT SC COMP (9)

If no indicator is lit, the current digit is “0”.

To exit, press and hold the **MODE** key and the unit will power cycle.

Soak and Potentiometer Test Mode

Soak mode is used to check the correct operation of all lights and indicators on front panel. It cycles through the phases listed below. To enter Soak mode, hold down the left-hand side **4K MODE** switch whilst The Bus+ is powering on.

1. All switches lights bright white
2. All switches lights red, if available (otherwise dim white)
3. All switches lights green, if available (otherwise dim white)
4. All switches lights blue, if available (otherwise dim white)
5. All indicators lit up green
6. All indicators lit up orange
7. All indicators lit up red
8. Left VU Meter back light pulse + needle sweep
9. Right VU Meter back light pulse + needle sweep



In this mode it's also possible to test the correct operation of the potentiometers. A position change on any of the pots will trigger the relay to click as a confirmation feedback.

To exit, press and hold the **MODE** key and the unit will power cycle.

Power Check

The Bus+ has a built-in system to self-check most of the internal power supply rails. If a fault is detected at any time, all the rails are shutdown for safety and a user warning is triggered on the front panel via the 4 center section indicators:

CLASSIC STEREO blinking red: detected a fault on the +16V rail

SUM SC STEREO blinking red: detected a fault on VPOT rail

DUAL MONO blinking red: detected a fault on +15V rail

MID SIDE blinking red: detected a fault on negative rails (combination of +/- 16V_RAW, -15V, -16V)

Once a fault is detected, it's possible to manually trigger the reboot of the unit by pressing **MODE** for 1 second. If the unit keeps failing the power check, please get in contact with SSL support.

Specifications

General and Bus Compressor

Default test conditions (unless otherwise stated):

Source impedance of test set: 40 Ω

Input impedance of test set: 100 kΩ

Reference frequency: 1 kHz

Reference level: 0 dBu

All unweighted measurements are specified as 20 Hz to 20 kHz bandwidth limited, expressed in dBu

Onset of clipping (for headroom measurements) should be taken as 1% THD

Measurements taken with default input trim setting (0 dB)

All levels are intended balanced

Mode set to Classic Stereo

D-EQ modules bypassed

Mix pot set fully wet

LPF disabled

4K Mode, LOW THD, F/B: disabled

Threshold +20 dB

Unless otherwise quoted all figures have a tolerance of ±0.5dB or 5%.

Audio Performance

Measurement	Value	Conditions
Input Impedance	10 kΩ	-
Output Impedance	60 Ω	-
Maximum Input & Output Level	+27.5 dBu	Operating Level Modes 0 dB/-5 dB, 1% THD
Frequency Response	±0.025 dB < 1 Hz > 200 kHz	Bypassed, 20 Hz to 20 kHz Bypassed, -3 dB low cut-off Bypassed, -3 dB high cut-off
	±0.01 dB < 2 Hz > 180 kHz	Compressor In, 20 Hz to 20 kHz Compressor In, -3 dB low cut-off Compressor In, -3 dB high cut-off
THD+N	-95 dB / 0.0017% typical	Bypassed, 1 kHz @ 0 dBu
	-106 dB / 0.0004% typical	Bypassed, 1 kHz @ +20 dBu
	-88 dB / 0.004% typical	Compressor In, 1 kHz @ 0 dBu
Noise	-95 dBu typical	Bypassed
	-90 dBu typical	Compressor In
	-89 dBu typical	4K Mode In (any intensity)
Dynamic Range	122.5 dB	Bypassed
	117.5 dB	Compressor In
Crosstalk	< -118 dB	Bypassed, 20 Hz @ +24dBu
	< -110 dB	Bypassed, 1 kHz @ +24 dBu
	< -90 dB	Bypassed, 10 kHz @ +24 dBu
Make-Up Gain Precision	< 0.003 dB	- 10 dB to + 20 dB
Stereo Matching	< 0.05 dB	Bypassed
	< 0.02 dB	In, 1 kHz @ 0 dBu
	< 0.1 dB	Dual Mono, any setting gain reduction <8 dB

D-EQ

Default test conditions (unless otherwise stated):

Source impedance of test set: 40 ohm

Input impedance of test set: 100 kOhm

Reference frequency: 1 kHz

Reference level: 0 dBu

All unweighted measurements are specified as 20 Hz to 20 kHz bandwidth limited, expressed in dBu

Onset of clipping (for headroom measurements) should be taken as 1% THD

Measurements taken with default input trim setting (0 dB)

All levels are intended balanced

Mode set to Classic Stereo

D-EQ modules bypassed

Mix pot set fully dry

LPF disabled

LF/HF Gain pot set to center

LF/HF pots set to center

LF maximum frequency

HF minimum frequency

Unless otherwise quoted all figures have a tolerance of ± 0.5 dB or 5%.

Audio Performance

Measurement	Value	Conditions
Frequency Response (20 Hz - 20 kHz)	± 0.05 dB	LF In, 20 Hz to 20 kHz
	< 2 Hz	LF In, -3 dB low cut-off
	> 200 kHz	LF In, -3 dB high cut-off
	± 0.05 dB	HF In, 20 Hz to 20 kHz
THD+N	-88 dB / 0.004% typical	LF In, 40 Hz @ 0 dBu
	-81 dB / 0.008% typical	HF In, 10 kHz @ 0 dBu, 40 kHz BW
Headroom	> 27 dB	LF In, HF In
Noise	-90 dBu typical	LF In
	-87 dBu typical	HF In
LF Gain Accuracy	± 0.05 dB typical	LF In, 40 Hz @ 0 dBu: -10 dB to +10 dB
HF Gain Accuracy	± 0.05 dB typical	HF In, 10 kHz @ 0 dBu: -10 dB to +10 dB
Stereo Matching	< 0.05 dB	LF/HF In, 20 Hz to 20 kHz @ 0 dBu
	< 0.1 dB	LF In, 40 Hz, any gain change
	< 0.1 dB	HF In, 10 kHz, any gain change

Unit General

Power

Power Supply	Auto-Ranging 100-240 VAC
Operating Power	38 Watts
Sleep Power	< 1 Watt
Auto-Sleep Power	10 Watts

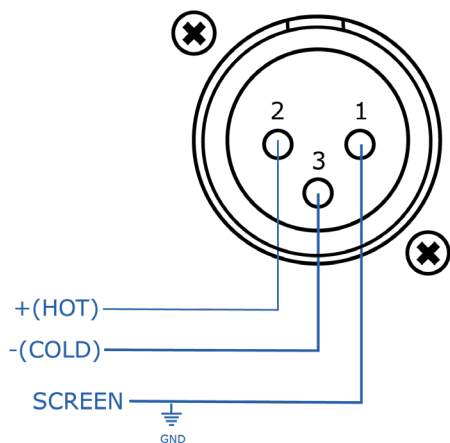
Physical

Width	480 mm / 19 inches
Height	88.9 mm / 3.5 inches (2 RU)
Depth	303 mm / 11.9 inches (chassis only) 328 mm / 12.9 inches (total including front panel controls)
Weight	5.92 kg / 13.1 lbs
Boxed Dimensions	550mm x 470mm x 225mm (21.7" x 18.5" x 8.9")
Boxed Weight	8.68 kg / 19.14 lbs

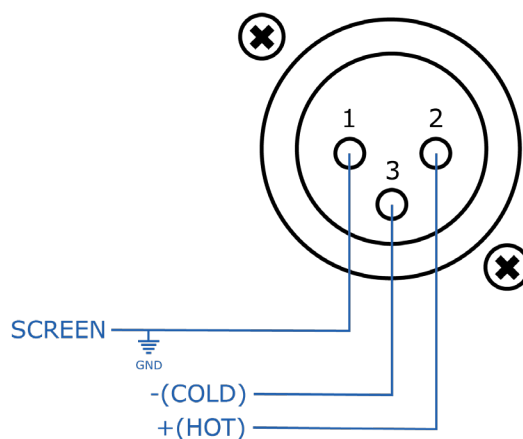
Connectors

Inputs	Female XLR x2
External Inputs	Female XLR x2
Outputs	Male XLR x2
External Sends	Male XLR x2

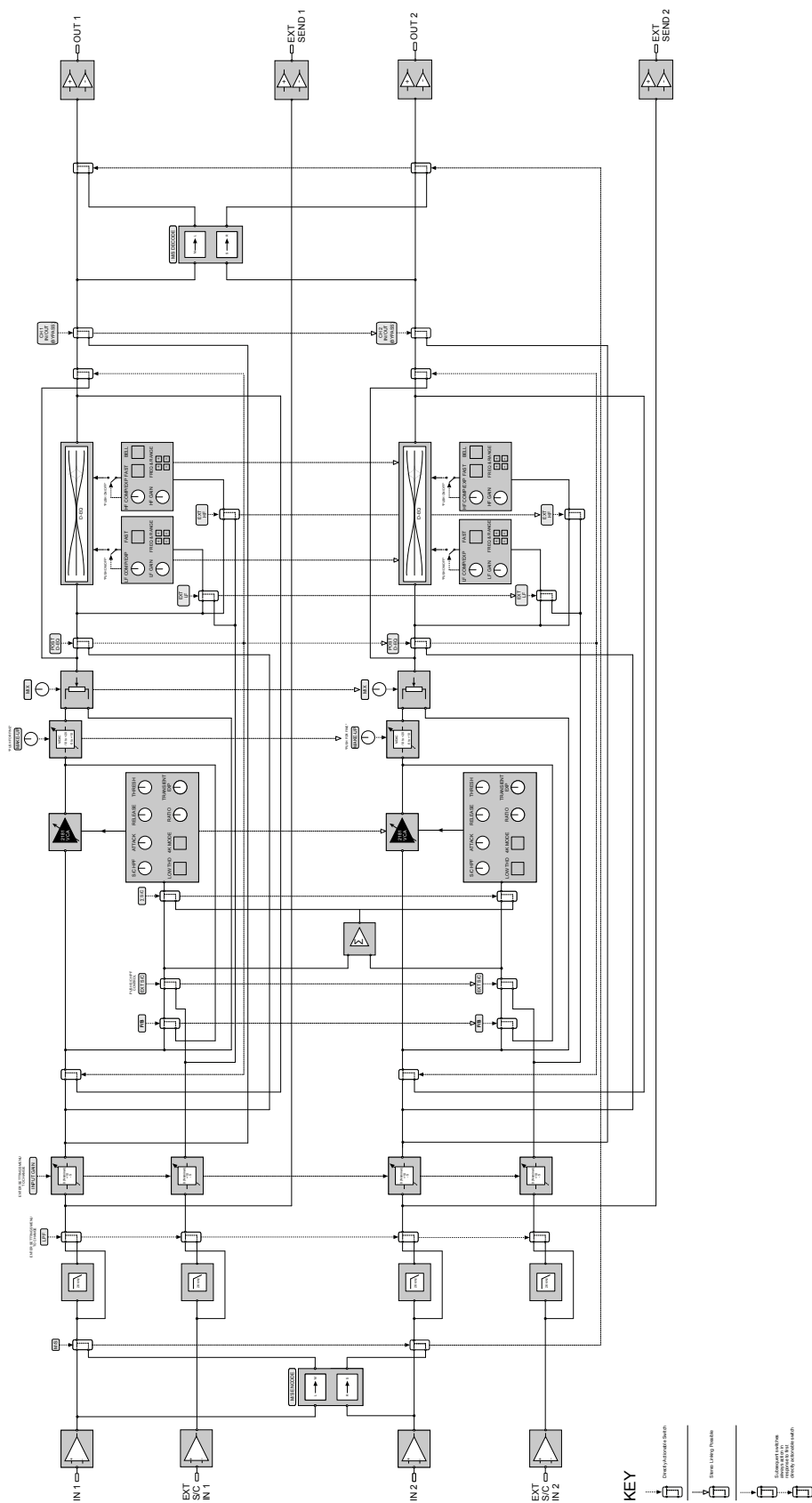
XLR - INPUT (FEMALE)



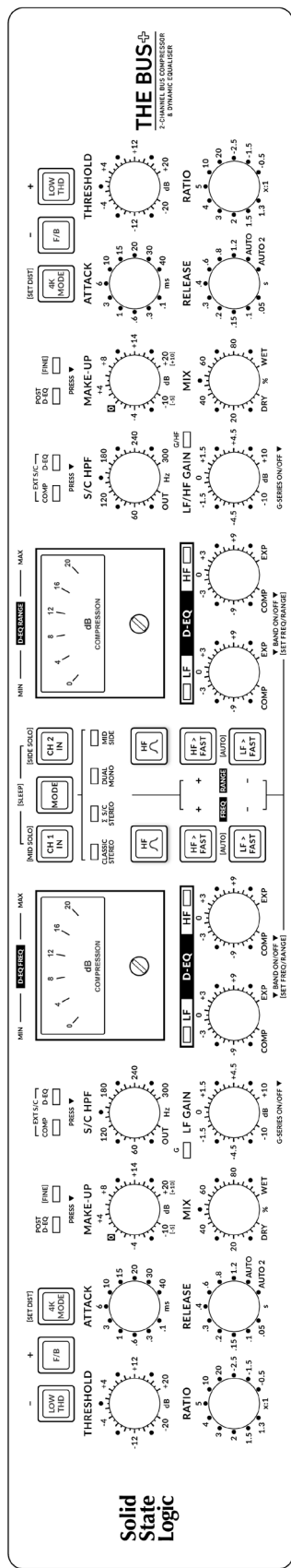
XLR - OUTPUT (MALE)



Block Diagram



The BUS+ Recall Sheet



Track

Artist

Producer

Notes

Code-Break Master Game - Cheat Code

Unlock the Transient Expander (Cheat)

Desperate to try the Transient Expander but don't have the patience to win a game of Code-Break Master? Read on to discover how to unlock the Transient Expander without having to win the Code-Break Master game...

Power on the unit whilst holding the **MODE** key down to enter **SETTINGS** mode.

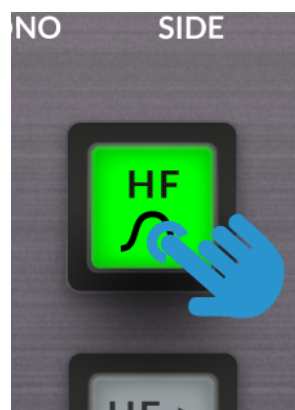


Press and hold the MODE key whilst The Bus+ is powering on

Press and hold the right-hand side **HF BELL** key for 2 seconds to toggle Transient Expander Mode on/off.

If **HF BELL** is lit **GREEN**, then Transient Expander Mode is enabled.
If **HF BELL** is dimly lit white, Transient Expander mode is disabled.

[See the bottom of Page 27](#) for more details on this mode.



Press and hold the right-hand side HF BELL key for 2 seconds to turn on Transient Expander Mode.

Safety Notices

General Safety

- Please read and keep this document.
- Adhere to all warnings and follow instructions.
- This electrical equipment should not be used near water, rain or moisture.
- Clean only with dry cloth or products compatible with electrical devices and never when the unit is powered.
- Keep the unit free of dust and use in a clean environment.
- Do not use near any heat source, indirect sunlight or naked flames.
- Do not place heavy objects on the unit.
- Only use attachments/accessories recommended by the manufacturer.
- Unplug the device during lightning storms or long periods of non-use.
- The unit can only be serviced by qualified personnel – seek immediate service if:
 - The unit has been exposed to moisture
 - The unit has been dropped
 - The unit does not operate normally
- Do NOT modify this unit, alterations may affect performance, safety and/or international compliance standards.
- SSL does not accept liability for damage caused by maintenance, repair or modification by unauthorised personnel.

Installation Notes

- When installing this apparatus either fix it into a standard 19" rack or place it on a secure level surface.
- If the unit is rack mounted, fit all rack screws. Rack shelves are recommended.
- When rack mounting, allow a 1U gap above and below the unit for cooling.
- Ensure that no strain is placed on any cables connected to this apparatus. Ensure that all such cables are not placed where they can be stepped on, pulled or tripped over.

Power Safety

- Bus+ is supplied with a mains lead however if you wish to use a mains cables of your choice it must comply with the following standards:
 - Refer to the rating label on rear of the unit and always use a suitable mains cord.
 - The unit should ALWAYS be earthed.
 - Please use-compliant 60320 C13 TYPE SOCKET. When connecting to supply outlets ensure that appropriate sized conductors and plugs are used to suit local electrical requirements.
 - Maximum cord length should be 4.5m(15').
 - The cord should bear the approval mark of the country in which it is to be used.
- The appliance coupler is used as the disconnect device, ensure that it is connected to an unobstructed wall outlet.
- Connect only to an AC power source that contains a protective earthing (PE) conductor.
- Only connect units to single phase supplies with the neutral conductor at earth potential.

DEN Apparatets stikprop skal tilsluttes en stikkontakt med jord, som giver forbindelse til stikproppens jord.

FIN Laite on liitettävä suojamaadoituskoskettimilla varustettuun pistorasiaan.

NOR Apparatet må tilkoples jordet stikkontakt.

SWE Apparaten skall anslutas till jordat uttag.

**CAUTION!**

This equipment must be Earthed. Refer to the manual for installation instructions. Disconnect all power sources before removing any panels. No user-serviceable parts inside - to be serviced only by qualified personnel.

**WARNING!**

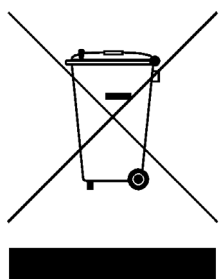
Un-earthed metal parts may be present inside the enclosure. Check for hazardous voltages before touching.

**UKCA & EU Compliance**

This product complies with the following European Union Harmonisation Legislation:
Electromagnetic Compatibility directive (EMC) 2014/30/EU.
Low Voltage directive (LVD) 2014/35/EU.

RoHS notice

Solid State Logic has conformed and this product has conformed to European Union's Directive 2011/65/EU on Restrictions of Hazardous Substances (RoHS) as well as the following sections of California law which refer to RoHS, namely sections 25214.10, 25214.10.2, and 58012, Health and Safety Code; Section 42475.2, Public Resources Code.

**Instructions for disposal of WEEE by users in the European Union**

The symbol shown here, which is on the product or on its packaging, indicates that this product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste equipment by handing it over to a designated collection point for recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or where you purchased the product.

FCC Certification

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For USA – to the user

- **Do not modify this unit!** This product, when installed as indicated in the instructions contained in the installation manual, meets FCC requirements.
- **Important:** This product satisfies FCC regulations when high quality shielded cables are used to connect with other equipment. Failure to use high quality shielded cables or to follow the installation instructions may cause magnetic interference with appliances such as radios and televisions and will void your FCC authorisation to use this product in the USA.
- **Note:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Industry Canada Compliance

- This Class A digital apparatus complies with Canadian ICES-003.
- Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Electromagnetic Compatibility

EN 55032:2015+A11:2020, Class A.

EN 55103-2:2009, Environments E1 - E4.

FCC 47CFR Part 15, Sub Part B.

ICES-003:2016.

Initial average half-cycle inrush current: <6.0 A.

Typical Peak inrush current: <10.0 A.

WARNING: Operation of this equipment in a residential environment could cause radio interference.

The audio input/output ports are screened cable ports and any connections to them should be made using braid-screened cable and metal connector shells in order to provide a low impedance connection between the cable screen and the console.

Safety

EN IEC 62368-1:2020+A11:2020.

BS EN IEC 62368-1:2020+A11:2020.

UL 62368-1, 3rd Ed. 2019.

CAN/CSA C22.2 No. 62368-1:19, 3rd Edition

This equipment is not suitable for use in locations where children are likely to be present.



WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov

Environmental

Temperature: Operating: +1 to 30 degrees Celsius.

Storage: -20 to 50 degrees Celsius.

Further information

For additional information, product downloads, knowledge base and technical support visit the www.solidstatellogic.com.

