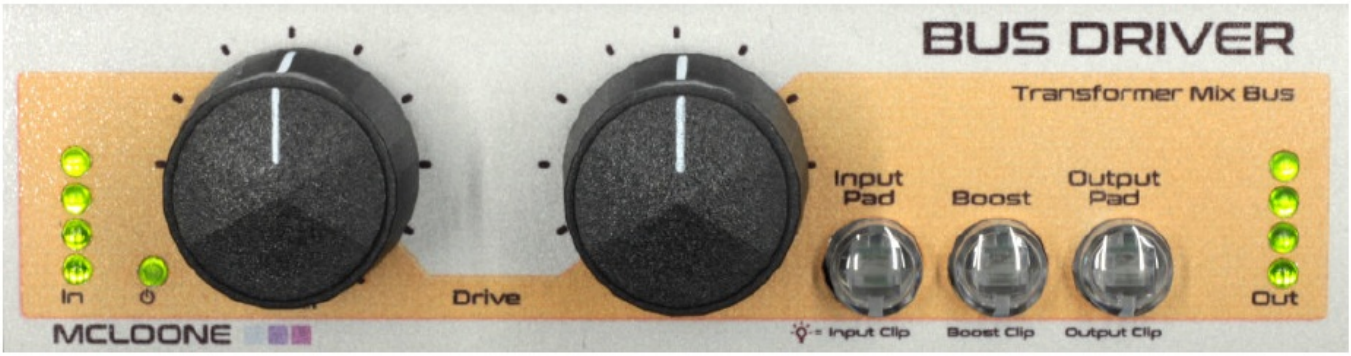
MCLOONE R3_4 Audio Bus Driver

MCLOONE R3_4 Audio Bus Driver User Guide

Contents

MCLOONE

MCLOONE R3_4 Audio Bus Driver



Specifications

- Inputs: 2x Balanced Combo XLR & 1/4 TRS
- Outputs: 2x Balanced XLR
- Power: DC input jack for the supplied 24V PSU

Safety

- Do not open the enclosure! No user serviceable parts. Please refer servicing to a qualified service centre or the manufacturer.
- Do not expose the unit or power supply to rain or moisture.
- The external surfaces of the enclosure may become hot during operation. If the unit is mounted in a rack or enclosed compartment, please ensure there is adequate ventilation. Do not place the unit in direct sunlight.
- Service or repair by unauthorized persons shall void the warranty.
- Use only the power supply which comes with the unit.

Introduction

- Thank you for choosing the Bus Driver!
- This is a unique device which will bring classic “big-console” analogue sound to your recordings. Operation could not be easier. Simply pass stems or entire mixes through the Bus Driver, and enjoy a rich and deep saturation effect. An effect which is subtle, and with matched stereo channels, it is immediately usable for mastering purposes.
- Until now, this standard of audio magic has only been available in esoteric studio processors and consoles, which remain unattainable for many audio engineers. We are proud to be able to bring such a processor to a new price-performance ratio.
- We had a lot of fun designing the Bus Driver. We hope you enjoy it!

Box Contents

- Bus Driver
- 24V Power Supply

Requirements
Audio playback or output device with a minimum of one (mono operation) or two (stereo processing) free balanced

analogue outputs (e.g. audio interface, tape unit, passive summing device or similar). Since the Bus Driver is able to provide ample gain (40dB+) to an incoming signal, there is no effective minimum signal level which is required.

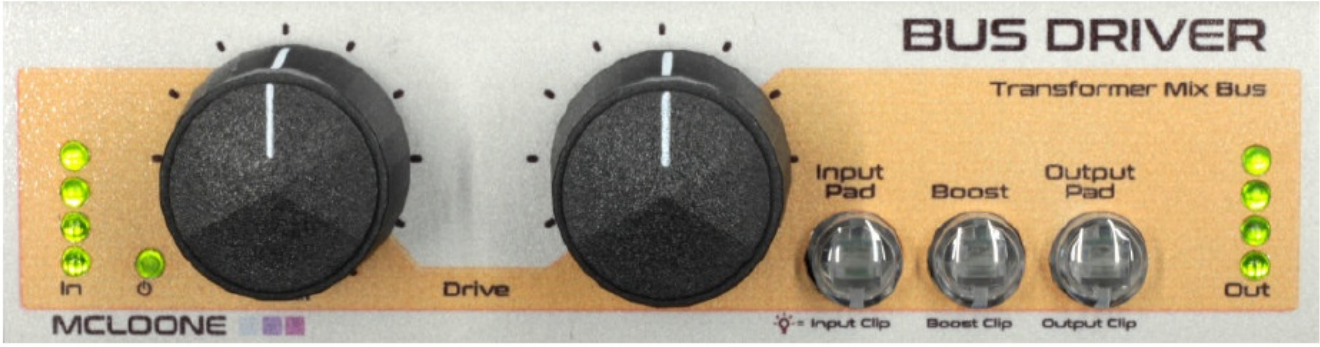
A minimum of one (mono operation) or two (stereo processing) free balanced analogue inputs are required to connect the Bus Driver for recording or listening purposes, capable of +4dBu or +22dBu signal levels.
Mains AC power socket, 90-264V, 47-63Hz. Adapters are provided for EU, UK, US and AU plug sockets.

Overview

- Two perfectly matched super clean pre-amplifiers, each with British made VTX output transformers
- Add big console analogue warmth and definition to single instruments, buses or complete mixes
- Boost circuit, can be used to overdrive the output stage for true analogue stereo distortion
- Dual rotary switches with eleven drive steps each (4dB per step), allow quick & precise gain matching between channels
- Enough clean gain (40dB+) to bring the output of analogue summing devices back to line level of +4dBu or +22dBu
- Input pad to allow line level input signals up to +22dBu to be used
- Output pad to allow switchable +4dBu and +22dBu maximum output levels

Front Panel
Analogue VU style input & output meter. These meters shows the average signal level, of both channels 1 and 2, combined. There is still plenty of headroom when all sections are lit.
Power LED – Indicates that the unit is on

- **Drive Rotary Encoders** – These rotary switches with eleven drive steps each (4dB per step), allow quick & precise gain matching between channels



- **Input Pad** – Switches a reduction of around -30dB. Use this when connecting to equipment which has a +19dBu or +22dBu output level, to avoid distortion.
- **Boost** – Switches an extra gain circuit with around +19dB in or out. Useful for adding extra colour or grit to the signal path. Or when deliberately over-driving the output stage.
- **Output Pad** – Toggles a reduction on the outputs of around -18dB. Use this to take the maximum output level from +22dBu down to +4dBu, depending on the connected equipment.
- **Peak Clip Warning** – LEDs in the push-buttons will let you know you have run out of headroom. Indication is for both channel 1 and channel 2 combined. Clip warning resets automatically.
- **Input Clip** – Clipping after Drive stage

- **Boost Clip** – Clipping after Boost stage
- **Output Clip** – Clipping on main outputs

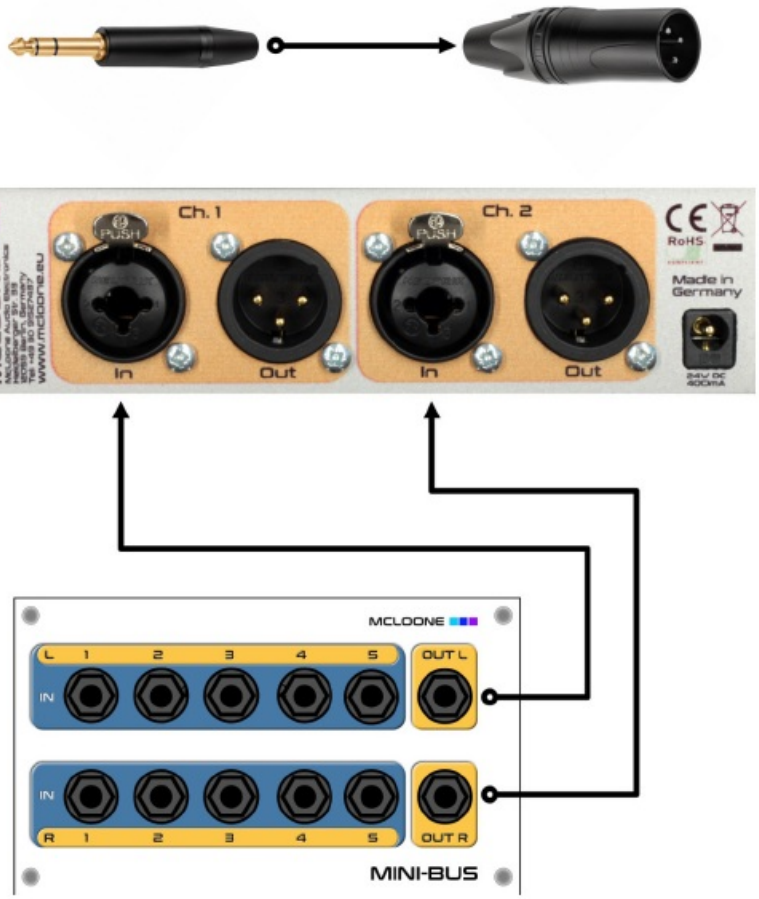
Rear Panel
Inputs – 2x Balanced, Combo XLR & 1/4″ TRS
While the Bus Driver features combination XLR and TRS (1/4″ jack) inputs, these are both only suitable for balanced (3-conductor) TRS jack connections. The TRS (1/4″ jack) input allows connection to the output of an audio interface or Mini-Bus, using standard TRS to TRS cables.

- **Outputs** – 2x Balanced, XLR
- **Power** – DC input jack for the supplied 24V PSU

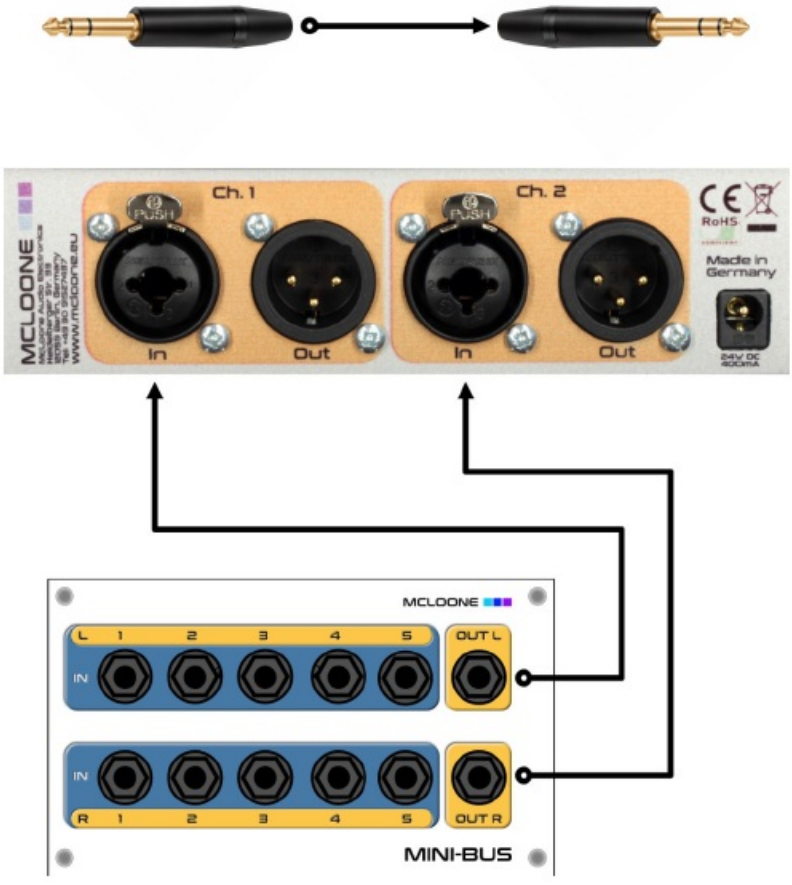
The use of unbalanced (e.g. RCA) connections to the Bus Driver inputs is not supported.

Connections

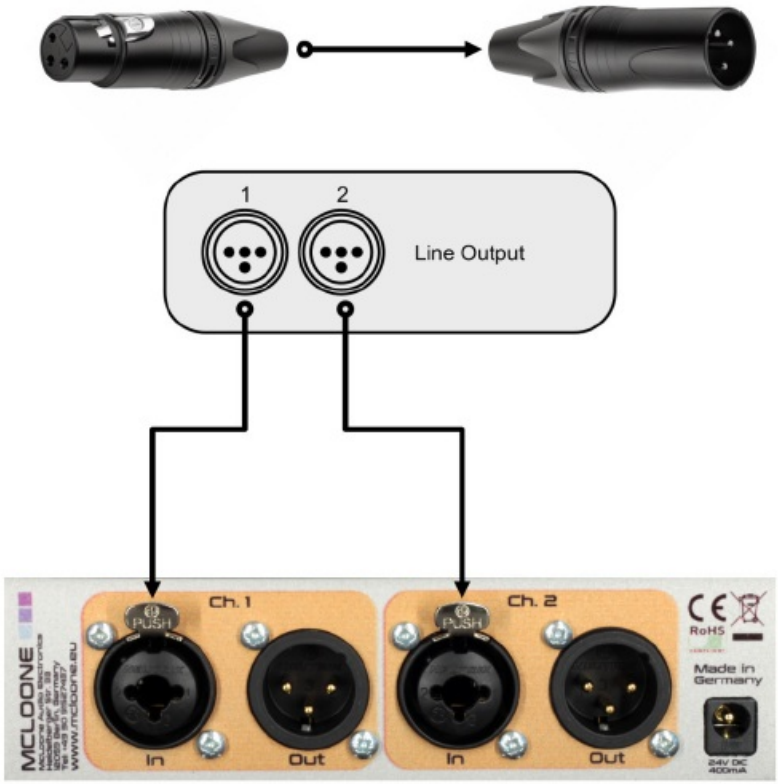
Mini-Bus to Bus Driver (XLR)
Cable: 1/4” (6.35mm) TRS Jack to XLR Male



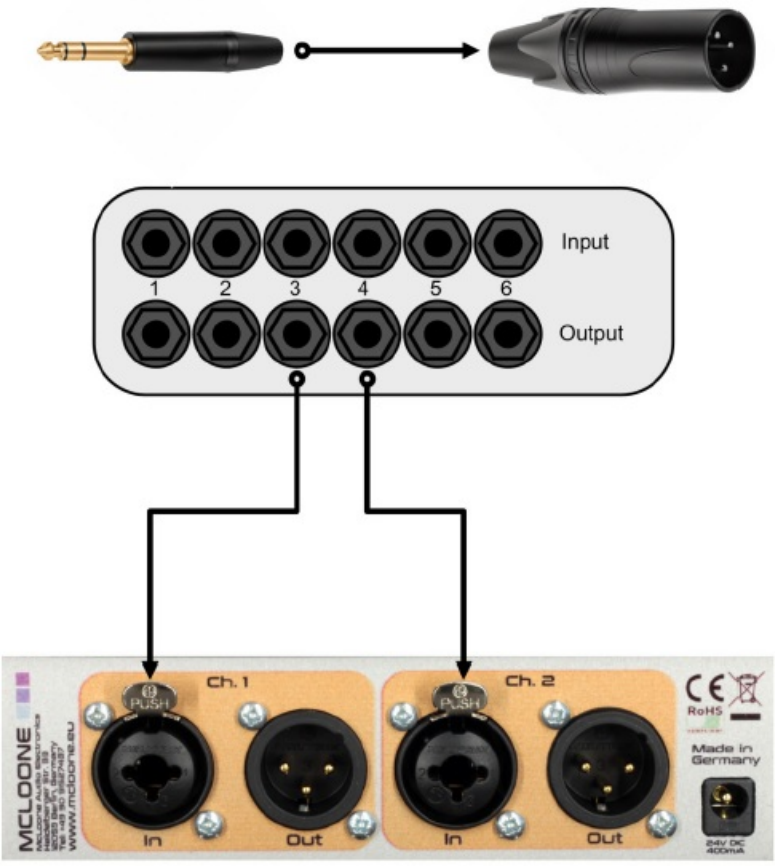
Mini-Bus to Bus Driver (Jack)
Cable: 1/4” (6.35mm) TRS Jack to 1/4” (6.35mm) TRS Jack



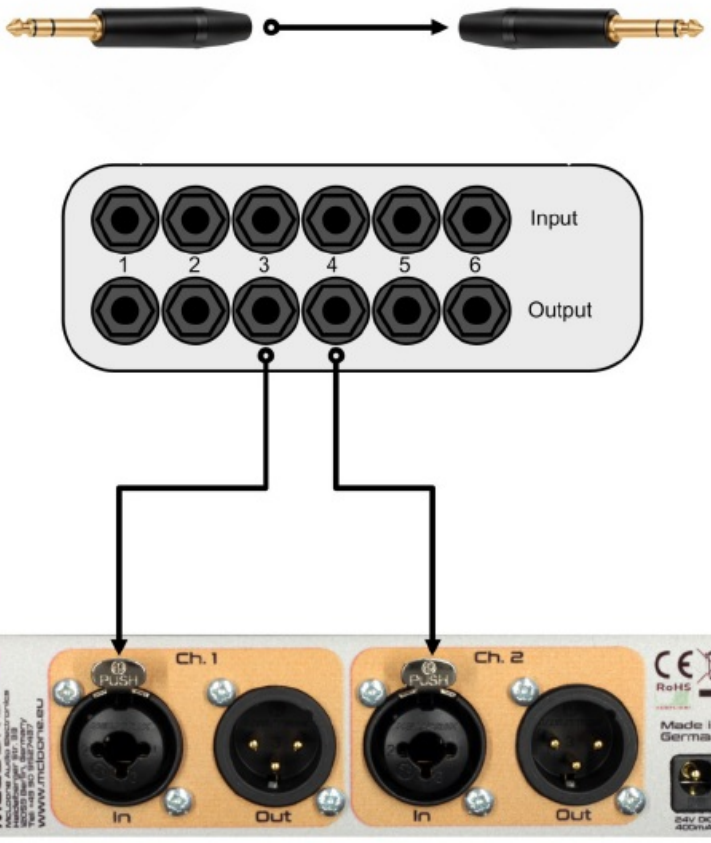
Audio Interface to Bus Driver (XLR-XLR)
Cable: XLR Female to XLR Male



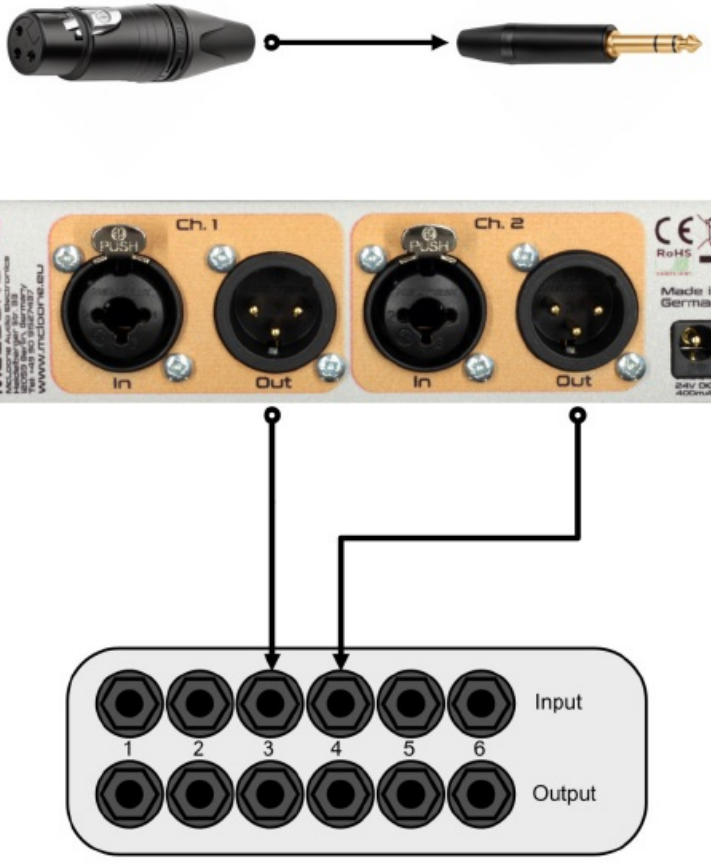
Audio Interface to Bus Driver (Jack-XLR)
Cable: 1/4” (6.35mm) TRS Jack to XLR Male



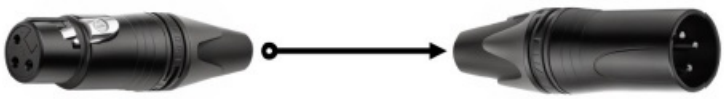
Audio Interface to Bus Driver (Jack-Jack)
Cable: 1/4” (6.35mm) TRS Jack to 1/4” (6.35mm) TRS Jack

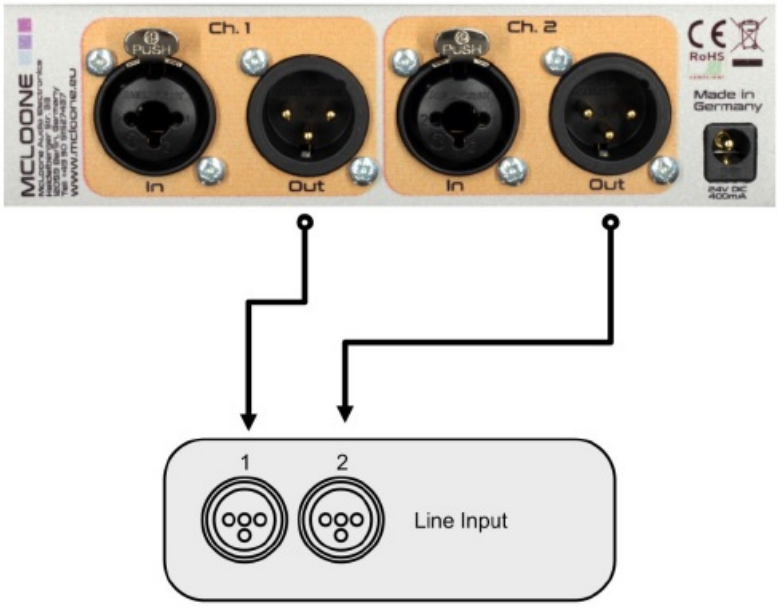


Bus Driver to Audio Interface (XLR-Jack)
Cable: XLR Female to 1/4” (6.35mm) TRS Jack



Bus Driver to Audio Interface (XLR-XLR)
Cable: XLR Female to XLR Male

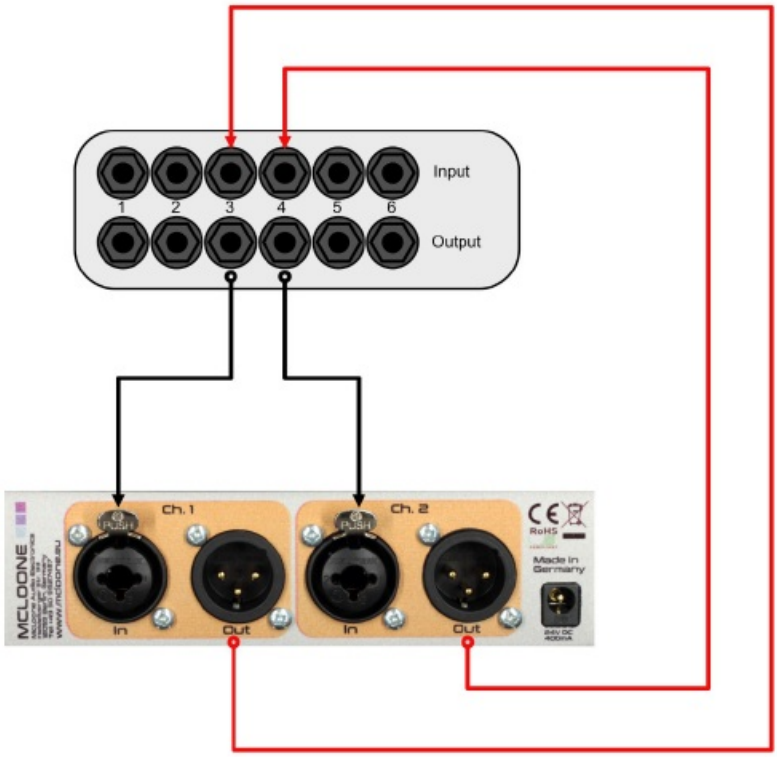




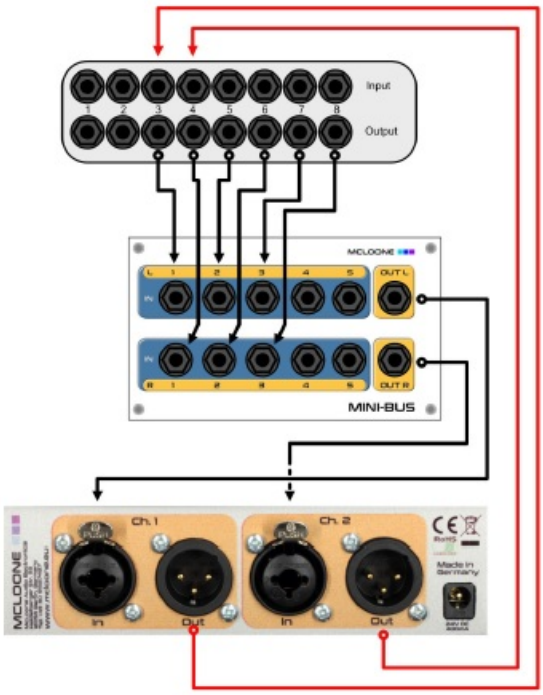
Setup

Stand-alone

Connection to an audio interface



Analogue Summing



In Use

Stand-alone Processing
To use the Bus Driver as an effect, connect it directly to an audio interface as shown in “Stand-alone”. This allows any number of channels to be routed to the Bus Driver. A single element such as a vocal could be processed, an entire bus will all the vocals, or an entire mix, for example.

Stereo Operation

- The Bus Driver is designed to allow simple and efficient processing of stereo sources. To this end, the pad and boost controls have been grouped and affect both channels 1&2 simultaneously. Important only is that the Drive rotary controls be at the same position (one of 11 steps) between channels 1 and 2, in order that the channel gains be matched for stereo operation.
- Keep in mind that the metering (input bar-graph, clip warning in push-buttons and output bar-graph) show the combined sum of channels 1&2. If there is a clip warning, for example, it may be necessary to adjust both the Drive controls for channels 1&2 repeatedly, until a position is found where the sum of the channels no longer triggers the clip warning, and both Drive controls are at similar positions.
- The input and output pads, as well as the Boost circuit, affect both channels, and are therefore always stereo in nature.

Example – Stand-alone Processing

- Let us take a simplified example of processing an entire mix (e.g. during mastering). Let’s assume the connections are similar to those shown in the connection diagram “Stand Alone”. We send the entire mix in stereo to a bus, the output of which goes to physical outputs 3/4 on an audio interface. These are connected to the Bus Driver inputs 1/2.
- If the outputs of the audio interface set for an output gain stage of +4dBu or less, we will not use the input pad on the Bus Driver. If the audio interface outputs are driving at +18dBu or +22dBu, then we will engage the input pad on the Bus Driver in order to prevent clipping.

- For this example, we will put both rotary Drive controls to the fully counter-clockwise position (minimum gain). This results in a total system gain of around 2dB (1.9dB to be exact).
- Finally, if the audio interface or device we are recording into can accept levels above +4dBu, such as +18dBu, then we may leave the output pad in the out position. If we find the recording device inputs are being driven into distortion, we can engage the output pad to lower the output stage to around +4dBu.
- Once the unit is connected and we are happy that the signal is present and not clipping, we may go ahead and record the output of the device back into the DAW. To accommodate this, a new stereo track will have been created in the DAW, it's input being, in this example, channels 3/4 of the connected audio interface. It therefore receives the output of the Bus Driver, when recording is enabled and the DAW is put into record mode.
- The resultant audio track may have to be normalized in the DAW, to get it to the same level as the original which was played, should an A/B comparison be desired.

Example – Analogue Summing
A simple example of analogue buses and analogue summing could be as follows (this is the setup used to create the audio examples on the website, for example):

Using an 8-channel audio interface:

- Main/Master -> Channels 1-2 -> Output to main monitors
- Bus 1 -> Channels 3-4 -> "Kick & Bass"
- Bus 2 -> Channels 5-6 -> "Synths"
- Bus 3 -> Channels 7-8 -> "Vocals"

The physical outputs 3-4, 5-6 and 7-8 can then be brought into an analogue summing unit, or fed into an analogue mixing console for summing (this time all routed to the same bus). The output of the summing unit or console then fed back into the audio interface for recording.

Tips

- If you are used to "offline" bouncing in the DAW, you will have to change this to "real time". Going to or from analogue outboard, it is necessary to use the "real time" mode. However, once parts have been processed, and there is no longer any routing to or from analogue hardware, the much faster "offline" bounce can be used again.
- Remember to turn off any click or metronome in the DAW, otherwise this may show up in the recording.
- Make sure the audio track used for recording into the DAW has it's output muted during recording, and that any monitoring of the recorded signal is turned off or not routed to the bus outputs being processed. Otherwise a several versions of the incoming signal may get printed on top of one-another.

Delay Compensation

- It may be noted, that unless a compensation has been configured in the DAW, there will be a slight offset in the timing of the original and processed recordings. This due to the audio interface latency/buffering, D/A and A/D conversions and not-quite-light-speed-but-almost, analogue trip through the Bus Driver.
- For a single stereo master, this delay can be disregarded. Also for a full mix into analogue summing and Bus Driver, we can also ignore the time taken. However, if some, but not all, of the stems/instruments in a track are

processed in this way, it will result in a timing offset between those which are processed, and those which have not been.

- Many DAWs will provide a mechanism to automatically measure and compensate for this, using a test tone. Alternatively, the manual playback and recording of a percussive or similar sound with easily identifiable transients, through the D/A and A/D converters to be measured, can be inspected in the DAW window under a high zoom level, to see now many milliseconds of difference there are between the original and recorded tracks. Once this has been measured, it can be noted and the offset value applied to compensate for future recordings.
- Also of note, is that changing the audio interface sample rate will also affect this offset value. A new offset may have to be measured for each sample rate.

Dual-Mono

- Although the pad and boost controls of the Bus Driver are shared between channels, it is technically possible to use it as a dual-mono device. In other words, to process two individual stems in one pass. If you wish to process all the elements of a recording through the Bus Driver, and many of these are mono tracks, then such an approach could save time.
- The usefulness of this approach will depend on your DAW and how it works with mono/stereo buses.

Surround
While we're at it, if you wish to process a 5.1 surround mix, you can run three passes through the Bus Driver, L-R, LS-RS and C-LFE, for example. Or, if time is an issue, use three Bus Drivers as a dedicated 5.1 processing rig. The stepped drive controls and tight tolerances between units, mean the gain between all six channels is aligned by default. aligning each channel is a trivial matter.

Buses in Mixing

- Coming from the days of analogue mixing consoles, a set of sub-mix buses are an invaluable aid in managing and balancing complex recordings with many individual tracks or instruments. Once a suitable balance has been found between all lead and backing vocal tracks, for example, all may be routed to a single stereo bus. This bus then provides a single location (fader or pair of faders), with which the entire vocal level may be adjusted, but still preserving the lead/backing/ad-lib level balancing and panning set up before.
- Another useful aspect is the ability to then place an effect or processor on this bus channel, and affect all the individual stems together. Usually, a bus compressor can be applied here, to gently glue all the elements together. The advantage being, for example with our vocal bus as described above, that other elements such as the drum kit or bass, will not affect (trigger) the compressor used on the vocal bus.
- In theory, using more compressors with smaller gain reductions along the signal chain, will result in a more polished result than applying the same total gain reduction in one fell swoop at the end, for example on the master output.

Groups, Aux or Bus

- Buses should be differentiated from mix groups in a DAW (although the terminology may differ, the principle is the same). Grouping channels in a DAW generally means to link them, with an invisible rubber band, so that when one fader is moved, all the grouped channels follow this movement.

- The difference to a bus is that the audio output of grouped channels may be routed to the master output (1/2), another bus or several buses, or somewhere else. The grouping describes the linkage of the channels, but not their destination. A bus, on the other hand, is a destination, and audio channel in itself.
- Auxiliary sends are generally used on analogue consoles to as an effect send, for example to a reverb or echo processor. The return of the effect will be routed back into the console as a normal input channel, or effect return channel.
- The difference to a bus routing is that auxiliary sends are usually on a rotary potentiometer, to allow a selective amount of the signal to be routed out of the console into the effect device. A bus routing on the channel is an “all or nothing” switch. The channel is either routed to bus 1/2, or not at all. To 3/4 or not. And so on.

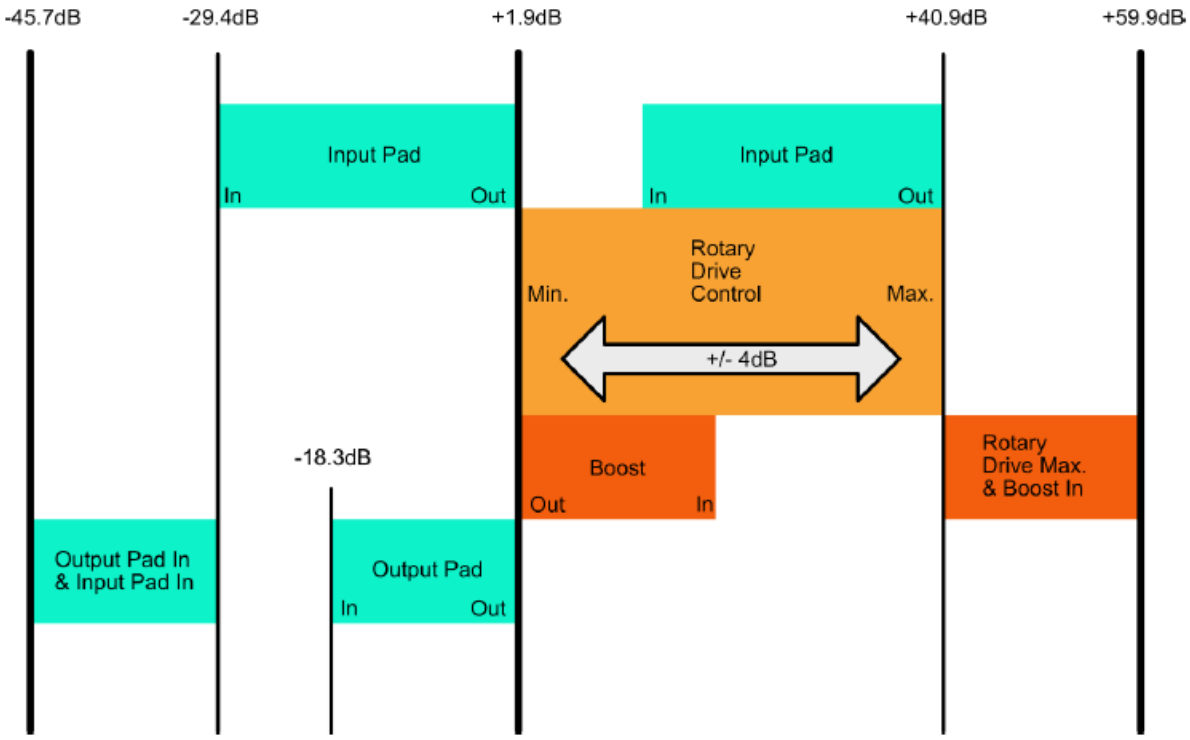
Fader Groups Vs Buses

- Since the advent of the DAW, and the ability to create fader groups and automation, one might imagine the days of the bus are over. But that is not the case. It still remains infinitely useful to be able to process a combination of elements in a mix using the same processor or tool.
- For moderate to larger mixes (100+ stems or instruments), buses are a practical necessity, even in a DAW. We may have linked the level controls of say 15 vocal stem tracks using a group (invisible rubber band), but now we want to add a little bit of air at 10kHz to these?Do we add 15x plug-ins, one to each vocal stem? We can try, CPU power is cheap.
- And now we want to adjust that plug-in slightly, we have to open 15x instances and copy/paste the settings over. If we had just routed the vocals to a dedicated bus instead, we could have put one instance of our air EQ on the vocal bus, and have one set of controls to deal with.

How many buses?

- How many buses you set up will greatly depend on the material you are mixing, the target output and your own preferences or style. Without any modifications, most DAWs will already have a master mix bus (1/2). So if we do not change anything, we are already mixing into this master bus.
- A simple place to start may be to create 3 stereo buses. We can label these “Drums & Bass”, “Instruments” and “Vocals”, if we are dealing with recorded rock/song type material.
- For electronic music we can get creative, however this can also be a hindrance to completing anything! “Kick&Bass”, “Kit”, “Background synths/pads”, “Lead synths”, just as a starting point. In general, we will put the kick and bass into the same bus, since we want these to glue together. Their interactions on a bus compressor (if set up correctly), will help to strengthen both in the final mix.
- If we are dealing with an orchestra, we could have a bus for each section, “Woodwind”, “Brass” “Strings” etc. It is not uncommon to see many more buses in professional productions, 16 stereo buses even, in electronic music. Just be aware, eventually the concept of reducing the amount of faders and control to deal with for the final mix-down will be negated if we create more and more buses!

System Gain



Specifications

Audio Specifications

- **Inputs:** 2x Balanced, Combo XLR & 1/4″ TRS
- **Outputs:** 2x Balanced, XLR
- **Maximum Input/Output:** Greater than +23dBu
- **Dynamic range:** 114dB
- **Dynamic range** (A): 115.5dB
- **Noise RMS** (A): 115.5dB
- **THD (unweighted):** 0.005%
- **THDN (unweighted):** 0.006%
    - Frequency Response (20-20kHz): -0.3, +0.05dB
    - Frequency Response (20-70kHz): -0.5, +0.05dB
    - Frequency Response (20-85kHz): -1, +0.05dB
    - Crosstalk at 10kHz: -65dB
- **Rotary Drive Gain:** Min. +1.9dB, Max. +40.9dB
- **Input pad:** -29.4dB, Output pad: -18.3dB, Boost: +19dB
- **Power Requirements:** Mains power, 90-264V AC, 400mA (10W).

General

- **Weight:** 801g
- **Dimensions:** 155 x 195 x 50mm
- **GTIN:** 04170000185437
- **SKU:** MFBDNA111BK

Audio Measurements Details: All results given are round-trip values, from device input to output. DNR (input pad on, drive control 8 steps CW), THD/THDN (1kHz, input pad on, drive 4 steps CW, +18dBu test tone), Frequency Response (1kHz, input pad on, drive 4 steps CW, +18dBu test tone)

Company

Certifications

Manufacturer:

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- This document: Rev. 1.3

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15.04.2024
Michael McLoone Geschäftsführer/Engineering

FAQ / Troubleshooting

Dynamic Range

A similar characteristic is known as dynamic range, this is the absolute maximum difference between the noise floor of the device (with no signal), and the maximum signal level possible. So in theory, the maximum usable range of amplitude or signal in the device, which is not affected by noise (e.g. Area above the noise floor).

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THD

The THD or Total Harmonic Distortion is a yardstick of the amount of distortion artefacts, or harmonics, which are created in a system when a pure tone, such as a sine tone, is played through it. The original test sine tone is removed using a sharp notch filter, and the amplitude of the remaining harmonic components is measured. This gives a figure in dB (often converted to a percentage), which is an indication of the tonal clarity of the system.

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THDN

Combining the THD measurement and a noise floor measurement, we arrive at a figure known as Total Harmonic Distortion & Noise. This in itself is an excellent yardstick with which to compare the performance of audio systems.

Can I use a different power supply?

The external PSU supplied with the Bus Driver exhibits an extremely low ripple characteristic, and is perfectly suited to the use with this analogue device. We strongly advise against using a different PSU than that which is supplied with the unit.

16, 24 or 32bit?

We recommend using 24-bit depth for recording purposes. This covers the dynamic range capability of human hearing as well as most recording & playback devices. Using 32-bit will produce much larger files, the extra dynamic range in most recording or mixing scenarios being unused.

44.1, 48, 96 or 192kHz?

The Bus Driver is 0.26dB down at 50kHz, and only -0.5dB down at 71kHz. This allows it to process material at higher sample rates, such as 96kHz or 192kHz, without undue attenuation of the material. We recommend 96kHz for most recording applications. This gives a good balance of file size whilst ensuring that the higher frequency transients such as cymbals, are not adversely affected by the low pass filters of converters running at 44.1k or 48kHz. These tend to be very steep filters, at 22.05kHz and 24kHz respectively, which will can have a small impact on the very high frequency components of the audio band. Since these filters, and indeed no filter, can be infinitely steep in reality, their attenuation reaches down slightly into the audible band. To avoid this, running at 96kHz will ensure the filter is at 48kHz, well out of the audible band.

What level should I record at?

In general, we want to record with as high a level as possible, whilst still leaving some headroom to allow for the unexpected peaks during a performance. If the recording level is too low, when we amplify the signal later to a usable level (e.g. Normalize in the DAW), we will bring up the noise by the same amount. The difference between the noise of the recording device (microphone & pre-amplifier & audio interface, for example), and the signal we want to capture, is called signal to noise ratio. By ensuring we have a good signal to noise ratio whilst recording, we avoid excessive noise later on when the project is mixed down.

Documents / Resources

	MCLOONE R3_4 Audio Bus Driver [pdf] User Guide R3_4 Audio Bus Driver, R3_4, Audio Bus Driver, Bus Driver

References

- Home - McLoone
- User Manual

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