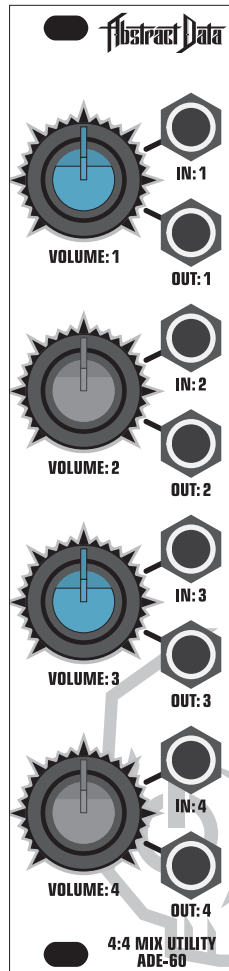


MACHINES FOR HUMANS

## ADE-60 4:4 MIX UTILITY

*4-Channel, Cascading, Mix & CV Utility with user-configurable options for Attenuversion, Gain, Biasing & CV.*



## USER GUIDE

# Contents



## INTRODUCTION:

- 1) **Module Overview** Main module features in brief
- 2) **Front Panel** Front panel hardware controls and connections
- 3) **Rear Connections** Rear panel power connectivity and precautions
- 4) **Quick Start** Your first patch

## OPERATION:

- 5) **Inputs & Outputs** Sockets and input/output cascading functionality
- 6) **Knobs** Knob functions
- 7) **Jumper Connections** Activating per-channel user settings

## FEATURES:

- 8.1) **User Settings: Attenuversion** Attenuversion activation and functionality
- 8.2) **User Settings: Gain** Gain activation and functionality
- 8.3) **User Settings: Bias & CV** Bias and CV output activation and functionality
- 9.1) **Patch Example 1** Basic 4-input / 1-output mixer
- 9.2) **Patch Example 2** Attenuator, attenuverter & sub-mixer
- 9.3) **Patch Example 3** Dual bias/offset & attenuator
- 9.4) **Patch Example 4** Multi-function mix and voltage utility

## SPECIFICATIONS:

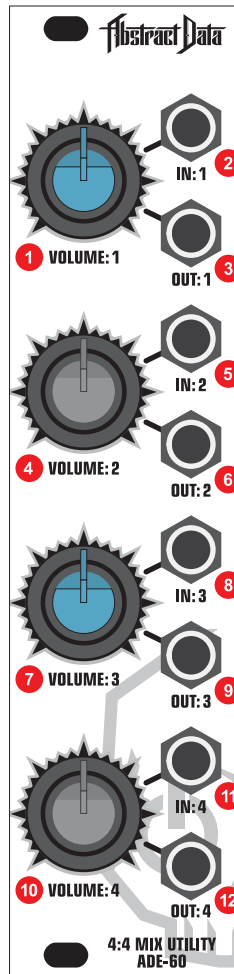
- 10) **Specs** Hardware and power spec, credits and version info

# 1) Module Overview



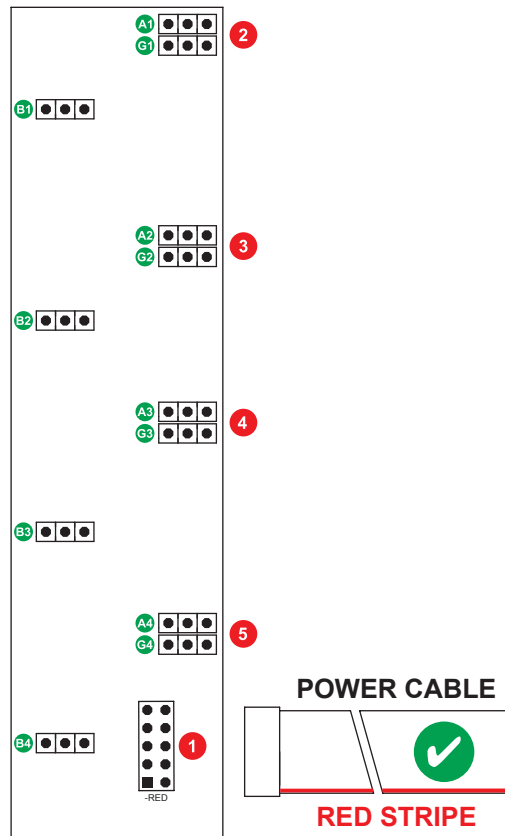
- The ADE-60 is a user-configurable, signal mixing and Control Voltage (CV) utility module.
- The signal path is Direct Current (DC) coupled so it will work in the same way with all signals in the Eurorack environment including CV, Gates, Low Frequency Oscillators (LFO), Envelope Generators (EG) and audio signals like Voltage Controlled Oscillators (VCO).
- Each channel has individual options for Attenuversion, Gain, Bias/Offset and manual CV output.  
>> *For more information on user settings see Sections 8.1, 8.2 and 8.3*
- Each of these options can be turned on or off for each of the 4 channels, using simple, rear-panel jumper connections, allowing users to create a module configuration that suits their own requirements.  
>> *For more information on jumper connections see Section 7*
- The module can be used in any combination from a single 4-input / 1-output summing mixer to 4 individual 1-input / 1-output attenuators or as a mix of signal mixers, attenuators and voltage sources.  
>> *For more information on patch examples see Sections 9.1, 9.2, 9.3 and 9.4*
- The mixer configuration is 'cascading' – plugging a patch cable into any output socket outputs the summed mix of the signal at that channel and all previous channels without connected output sockets and also removes those signals from all outputs that follow it.  
>> *For more information on inputs and outputs see Section 5*
- Used in conjunction with the Attenuversion or Gain options – the Bias/Offset and CV option provides a manual voltage output in the following ranges on any and/or all outputs: 0-5V; 0-10V; +/-5V; +/-10V.  
>> *For more information on user settings see Sections 8.1, 8.2 and 8.3*
- The module is supplied with 2 sets of knobs – 4 grey and 4 blue to allow the user to visually identify different configurations and combinations of functionality via the front panel.
- The ADE-60 is capable of outputting both high-gain audio signals and DC voltage signals – please take care not to damage speakers, headphones – or ears! – with configurations that use these signal types.

## 2) Front Panel



- |           |                  |  |
|-----------|------------------|--|
| <b>1</b>  | <b>VOLUME: 1</b> | Sets the volume and the level of active user setting options for channel 1     |
| <b>2</b>  | <b>IN: 1</b>     | Signal input for channel 1   |
| <b>3</b>  | <b>OUT: 1</b>    | Signal output for channel 1  |
| <b>4</b>  | <b>VOLUME: 2</b> | Sets the volume and the level of active user setting options for channel 2     |
| <b>5</b>  | <b>IN: 2</b>     | Signal input for channel 2   |
| <b>6</b>  | <b>OUT: 2</b>    | Signal output for channel 2 and mix of signals from previous cascaded channels |
| <b>7</b>  | <b>VOLUME: 3</b> | Sets the volume and the level of active user setting options for channel 3     |
| <b>8</b>  | <b>IN: 3</b>     | Signal input for channel 3   |
| <b>9</b>  | <b>OUT: 3</b>    | Signal output for channel 3 and mix of signals from previous cascaded channels |
| <b>10</b> | <b>VOLUME: 4</b> | Sets the volume and the level of active user setting options for channel 4     |
| <b>11</b> | <b>IN: 4</b>     | Signal input for channel 4   |
| <b>12</b> | <b>OUT: 4</b>    | Signal output for channel 4 and mix of signals from previous cascaded channels |

# 3) Rear Connections



- 1 POWER CONNECTION:** 10-16 pin Eurorack power connection
- 2 CH1 USER SETTING JUMPERS:** On/Off jumpers for channel 1: **A1** Attenuversion **G1** Gain **B1** Bias
- 3 CH2 USER SETTING JUMPERS:** On/Off jumpers for channel 2: **A2** Attenuversion **G2** Gain **B2** Bias
- 4 CH3 USER SETTING JUMPERS:** On/Off jumpers for channel 3: **A3** Attenuversion **G3** Gain **B3** Bias
- 5 CH4 USER SETTING JUMPERS:** On/Off jumpers for channel 4: **A4** Attenuversion **G4** Gain **B4** Bias

**PRECAUTIONS:** **ONLY CONNECT THE POWER CABLE TO THE POWER CONNECTION AS SHOWN!**  
**DO NOT CONNECT THE POWER CABLE TO ANY OTHER PORT!**

The ADE-60 uses the Doepfer standard for power connection and cable orientation.

The RED stripe on the supplied power cable connects to the NEGATIVE (-12V) rail on the ADE-60 with the RED stripe facing DOWN. This is marked on the back of the ADE-60 PCB as “- RED”.

The ADE-60 has diode and polyfuse protection built in but an incorrectly connected cable may still cause permanent damage to the module or the power supply.

The rear panel of the ADE-60 has exposed parts and connections. Please ensure when handling the ADE-60 that the unit is held by the sides of the front panel or the sides of the PCB (Printed Circuit Board).

## 1) BEFORE INSTALLATION

Looking at the back of the module, check that all 12 (4 sets of 3) black plastic jumper connectors are fitted on the two left-hand pins of each of the 3-pin header connectors.

All 12 jumpers are now in the off position and none of the channels will have Attenuversion, Gain or Bias/Offset and CV options active.

Once this has been checked – the module can be installed into your rig and powered up as normal.

>> *For more information on jumper connections see Section 7*

## 2) SET UP A 1-INPUT / 1-OUTPUT ATTENUATOR

Turn all 4 knobs fully counter-clockwise (fully left).

Connect a Eurorack audio signal, e.g. the output of a VCO, to IN:1 and connect OUT:1 to a device that will let you safely listen to the signal using speakers or headphones.

Turn the VOLUME:1 knob clockwise (towards the right). You should hear the volume of the output signal increase from silence (100% attenuation) at the fully counter-clockwise position to 'unity gain', where the output signal is the same volume as the input, at the fully clockwise (fully right) position.

>> *For more information on knob functionality see Section 6*

## 3) SET UP A MULTI-INPUT / 1-OUTPUT MIXER

Turn all 4 knobs fully counter-clockwise.

Connect a Eurorack audio signal (as described in Step 2) to IN:1, connect a different audio signal to IN:2 and connect OUT:2 to an output device (as described in Step 2).

Turn the VOLUME:1 knob towards the 12 o'clock position (centre) – you should now hear the input signal at IN:1.

Turn the VOLUME:2 knob towards the 12 o'clock position – you should now hear a mix of the input signals at IN:1 and IN:2.

Leave the two volume knobs where they are, disconnect the patch cable at OUT:2, re-connect it at OUT:3 and now patch from OUT:2 to IN:3.

This configuration gives you independent control of the mix level of the input signals via VOLUME:1 and VOLUME:2 but also gives you a 'master volume' control of the entire mix via VOLUME:3.

>> *For more information on patch examples see Sections 9.1, 9.2, 9.3 and 9.4*

## 4) ACTIVATE ONE OF THE USER SETTING OPTIONS

Power down the module and carefully remove it from the case it's installed in – trying, where possible, to handle the module by the front panel rather than the PCB.

Each ADE-60 channel has options for Attenuversion, Gain and Bias/Offset and CV output and each of these 3 options can be turned on or off individually using jumper connectors.

Holding the module so you're looking at the rear PCB, carefully remove the top jumper (A1) from the left 2 pins on the header connector and then carefully re-connect it over the right 2 pins.

By moving this jumper from the left off position to the right on position – you have turned on Attenuversion on for channel 1.

Once the module is re-installed into your rig and powered up as normal – channel 1 will have Attenuversion active and channels 2, 3 and 4 will continue to operate as normal attenuators.

>> *For more information on user setting options see Sections 8.1, 8.2, 8.3*

# 5) Inputs & Outputs

## 1) IN: 1-4

The ADE-60 has 4 inputs – 1 for each of the 4 mixer channels.

All inputs and the entire internal signal path is DC-coupled and will work with all standard signals in the Eurorack environment from DC voltages and CV to audio signals.

## 2) OUT: 1-4

The ADE-60 has 4 outputs – 1 for each of the 4 mixer channels.

The module's internal routing is cascaded – so an input signal at any channel (e.g. CH1) will appear at that output and all outputs that follow it (e.g. CH2, 3, 4) until the signal reaches a channel that has its output socket connected to a patch cable.

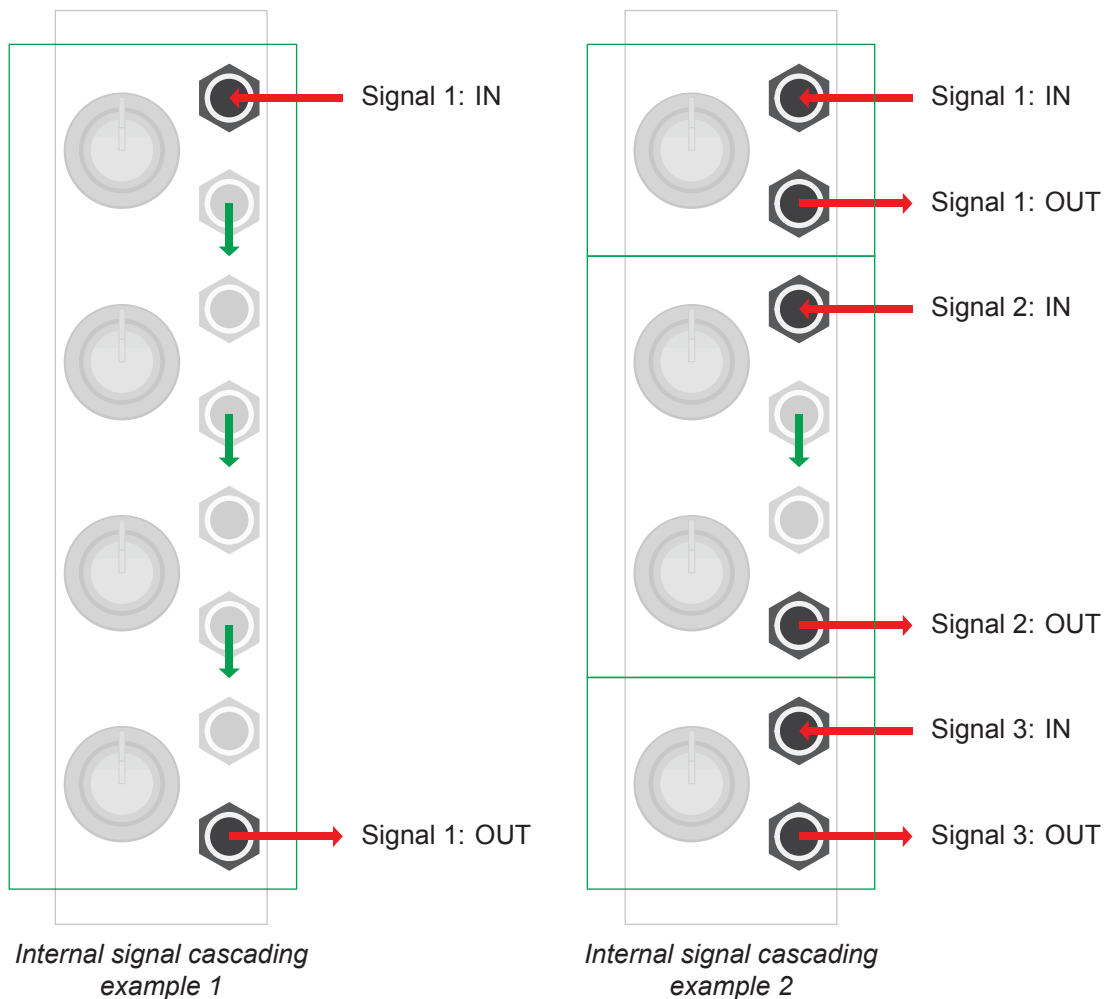
An output socket that is connected to a patch cable will output the summed signal of its own channel and all previous channels with patched inputs but unpatched outputs.

This cascading design allows for any configuration from a single 1-input / 1-output summing mixer to 4 individual 1-input / 1-output attenuators or any combination in between.

Cascading is also used in patches that require 2 channels to implement e.g. the bias and attenuation combo that uses 1 channel (e.g. CH1) for the bias/offset and one (e.g. CH2) for attenuation.

>> For more information on patch examples see Sections 9.1, 9.2, 9.3 and 9.4

## 3) SIGNAL CASCADING



## 1) VOLUME: 1-4

Each knob provides manual control over the increase or decrease (attenuation) in volume of the signal at that channel's output.

This can be the input signal at that channel's input e.g. for a 1-input / 1-output attenuator or the summed signal of that channel's input plus any previous inputs. e.g. for a 4-input / 1-output summing mixer.

Each knob can also provide alternate functionality when any of the 3 user-configurable settings are activated.

This functionality includes control over Attenuversion (non-inversion or inversion of input signals), Gain (amplification of input signals), Bias/Offset (negative or positive offset of input signals) or CV output (manual output of DC voltages).

>> *For more information on user settings see Sections 8.1, 8.2, 8.3*



# 7) Jumper Connections

## 1) CONNECTORS 1-12

Each of the 4 channels of the ADE-60 have 3 user setting options: Attenuversion, Gain and Bias.

Each of these 3 user settings, per channel, can be turned on or off using the black plastic jumper connector fitted to the 3-pin headers on the rear of the module. The jumpers operate independently – moving 1 jumper only affects that 1 user setting.

Looking at the rear of the module you will see 4 sets of 3-pin headers – that's 1 set of 3-pin headers for each of the user setting options for each of the 4 mixer channels.

Each of the headers has a black plastic jumper connecting 2 of the 3 pins for each of the headers. When a jumper connector is on the left-hand side of a 3-pin header – that user setting option is off and when a jumper connector is on the right-hand side of a 3-pin header that user setting option is on.

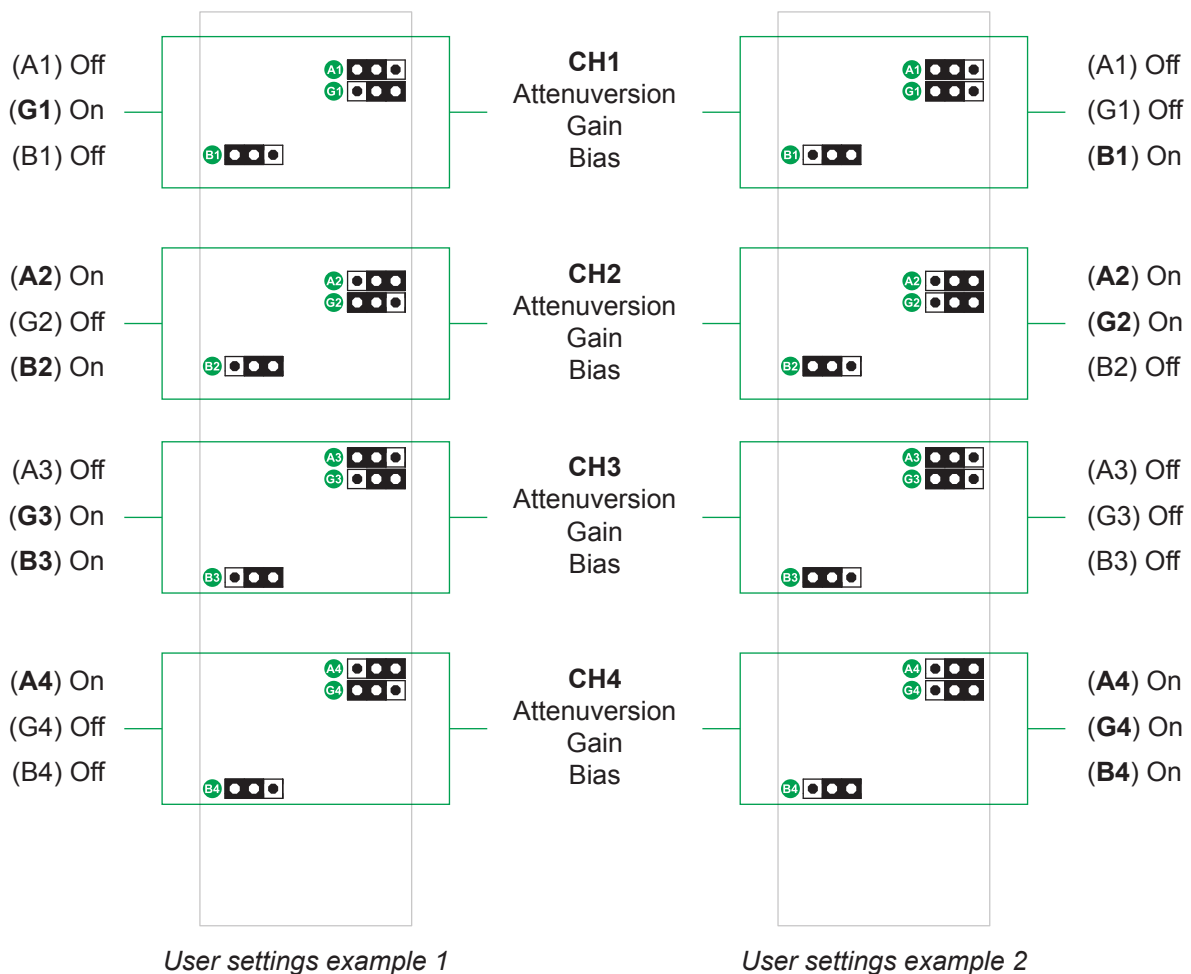
Individual user settings are turned on by carefully removing the black plastic jumper from the left side of the header where it connects the left-hand and middle pins and replacing it on the right side so the jumper connects the middle and right-hand pins.

You can turn as many user setting options on or off as you require, at any time and in any order and you can combine multiple user settings across channels to create your own custom mixer configuration.

If you're using individual channels e.g. as a single 1-input / 1-output attenuator – then the user setting options will work only on that channel but if you're using multiple channels then some user settings e.g Bias – can be used to interact with other channels.

>> For more information on user settings see Sections 8.1, 8.2, 8.3

## 2) CONNECTION EXAMPLES



# 8.1) User settings: Attenuversion

## 1) OVERVIEW

Attenuversion combines 'Attenuation' – the control of an input signal's volume – and 'Inversion' – a reversal in the polarity of an Alternating Current (AC) waveform.

This user setting converts the functionality of a normal volume knob that controls the attenuation of a single, non-inverted, waveform where fully counter-clockwise (fully left) outputs silence (100% attenuation) and fully clockwise (fully right) outputs maximum volume – to one that controls the attenuation of both a non-inverted and an inverted version of the waveform.

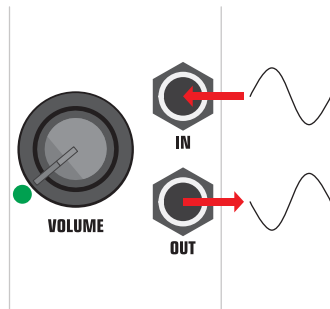
When this setting is activated the knob rotation starts at fully counter-clockwise with the inverted version of the input signal output at full volume, then, as the knob rotates clockwise, it decreases the volume of the inverted version of the input signal to silence (100% attenuation) once it reaches the 12 o'clock (middle) position.

As the knob continues to rotate past 12 o'clock it starts to increase the volume of the non-inverted version of the input signal, reaching maximum volume at the fully clockwise position.

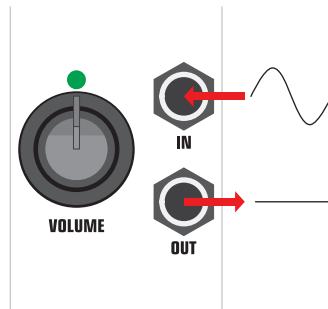
The Attenuversion user setting is activated via the 3-pin header on the rear PCB that is marked 'Ax' where 'x' is the channel number e.g. the header marked A1 is the Attenuversion header for channel 1.

>> For more information on jumper connections see Section 7

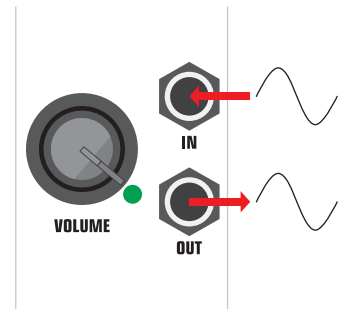
## 2) KNOB SETTINGS



*Knob at counter-clockwise outputs inverted signal*

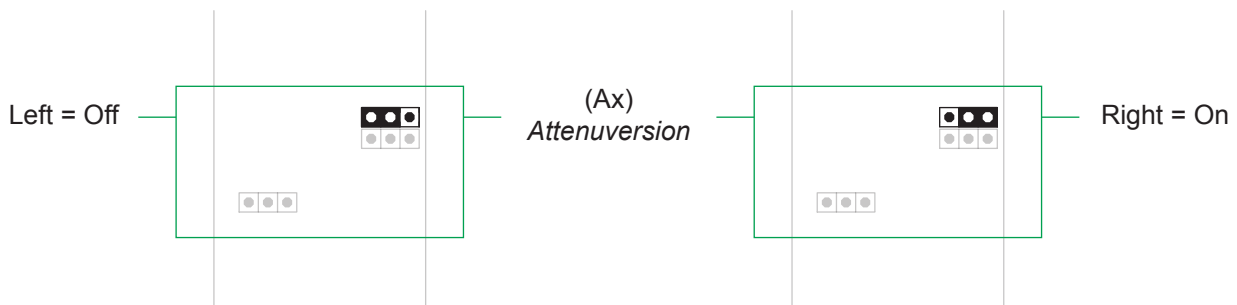


*Knob at 12 o'clock outputs silence*



*Knob at clockwise outputs non-inverted signal*

## 3) JUMPER SETTINGS



*Jumper position for Attenuversion (Off)*

*Jumper position for Attenuversion (On)*

# 8.2) User settings: Gain

## 1) OVERVIEW

Gain is generally described as the 'input volume' of a signal going into a circuit like a mixer or a pre-amplifier.

In the context of the ADE-60 this setting refers to the increase in volume, or the 'gain', in amplitude of that signal between the input and the output.

This user setting can increase the output of a signal by up to 2x – i.e. up to 2x Gain.

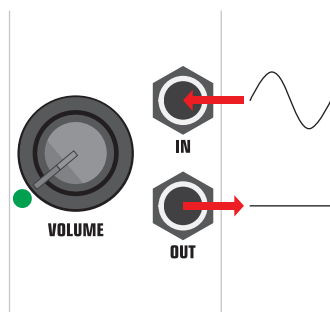
When this setting is activated, at full volume, a +/-5V AC waveform will output at +/- 10V, a +5V DC input will output at +10V and a -5V DC input will output at -10V.

When this setting is activated, the volume knob at the fully counter-clockwise (fully left) position outputs silence (100% attenuation), rotating clockwise to the 12 o'clock (middle) position outputs 'unity gain' where the volume of the output equals the volume of the input and a fully clockwise (fully right) knob position outputs a signal that is twice the amplitude (for AC waveforms) or twice the voltage (for DC voltages) of the original input signal.

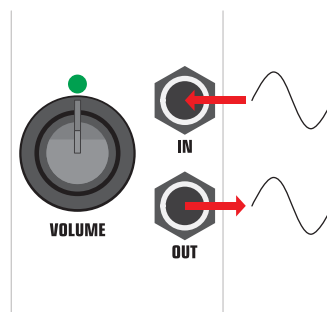
The Gain user setting is activated via the 3-pin header on the rear PCB that is marked 'Gx' where 'x' is the channel number e.g. the header marked G2 is the Gain header for channel 2.

>> For more information on jumper connections see Section 7

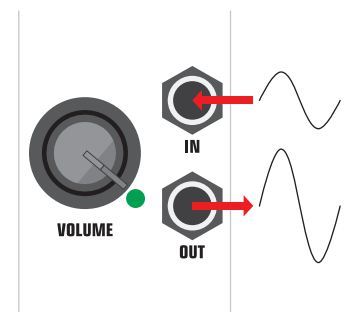
## 2) KNOB SETTINGS



*Knob at counter-clockwise outputs silence*

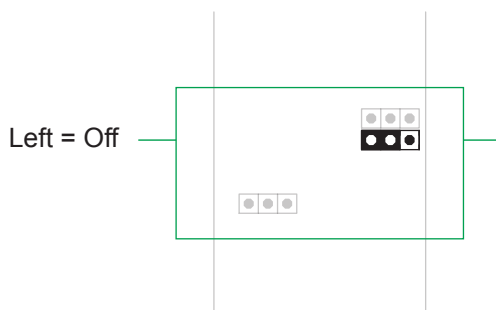


*Knob at 12 o'clock outputs unity gain*



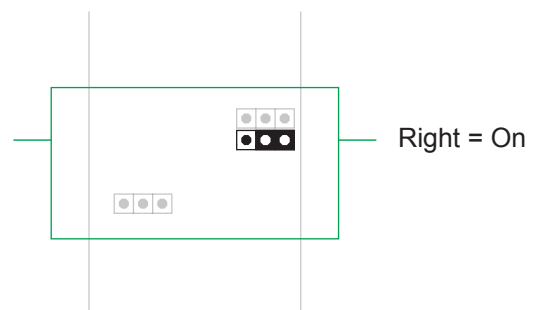
*Knob at clockwise outputs 2x gain*

## 3) JUMPER SETTINGS



*Jumper position for Gain (Off)*

(Gx)  
Gain



*Jumper position for Gain (On)*

# 8.3) User settings: Bias & CV

## 1) OVERVIEW

Bias or 'offset' refers to changing the voltage value at the point where a signal starts or resets.

In Eurorack, it is often used to change AC waveforms with positive and negative-going voltages to DC waveforms for use as modulation sources for modules that require only positive voltages as their CV input e.g. 0-5V.

Please note – this user setting changes functionality based on whether the input or the output of an activated channel are connected or unconnected.

When this setting is activated, if the input socket is connected – the Bias functionality is bypassed.

When this setting is activated, if both the input and output sockets are not connected – the volume knob for this channel (e.g CH1) controls the amount of offset for all following channels (e.g CH2, 3, 4) until the signal reaches a channel where an output socket is connected.

When this setting is activated, if the input socket is not connected and the output socket is connected – the volume knob will control the output of a DC voltage at that output between 0-5V.

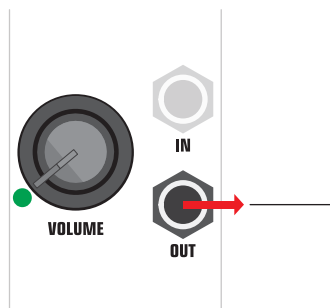
When this setting is activated in conjunction with the Attenuversion user setting it provides both positive ( $\leq +5V$ ) and negative ( $\geq -5V$ ) offsets or output voltages.

When this setting is activated in conjunction with the Gain user setting it provides offsets or output voltages of up to 10V.

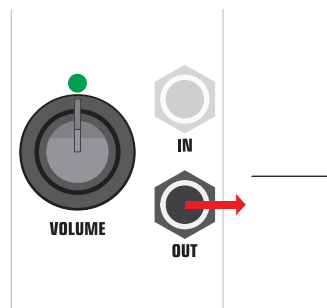
The Bias user setting is activated via the 3-pin header on the rear PCB that is marked 'Bx' where 'x' is the channel number e.g. the header marked B3 is the Bias header for channel 3.

>> For more information on jumper connections see Section 7

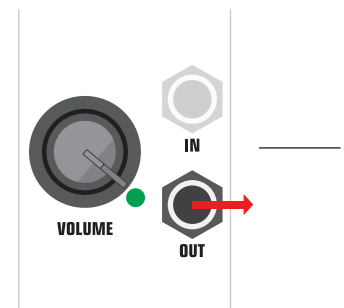
## 2) KNOB SETTINGS



Knob at counter-clockwise outputs 0V

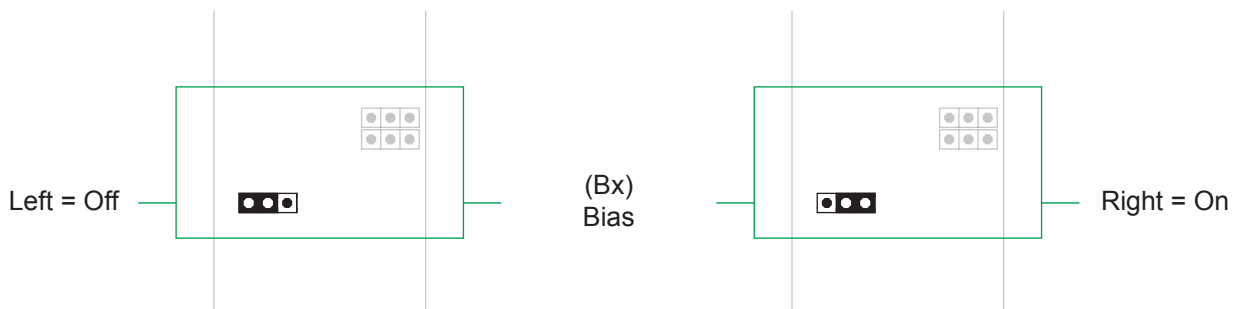


Knob at 12 o'clock outputs 2.5V



Knob at clockwise outputs 5V

## 3) JUMPER SETTINGS

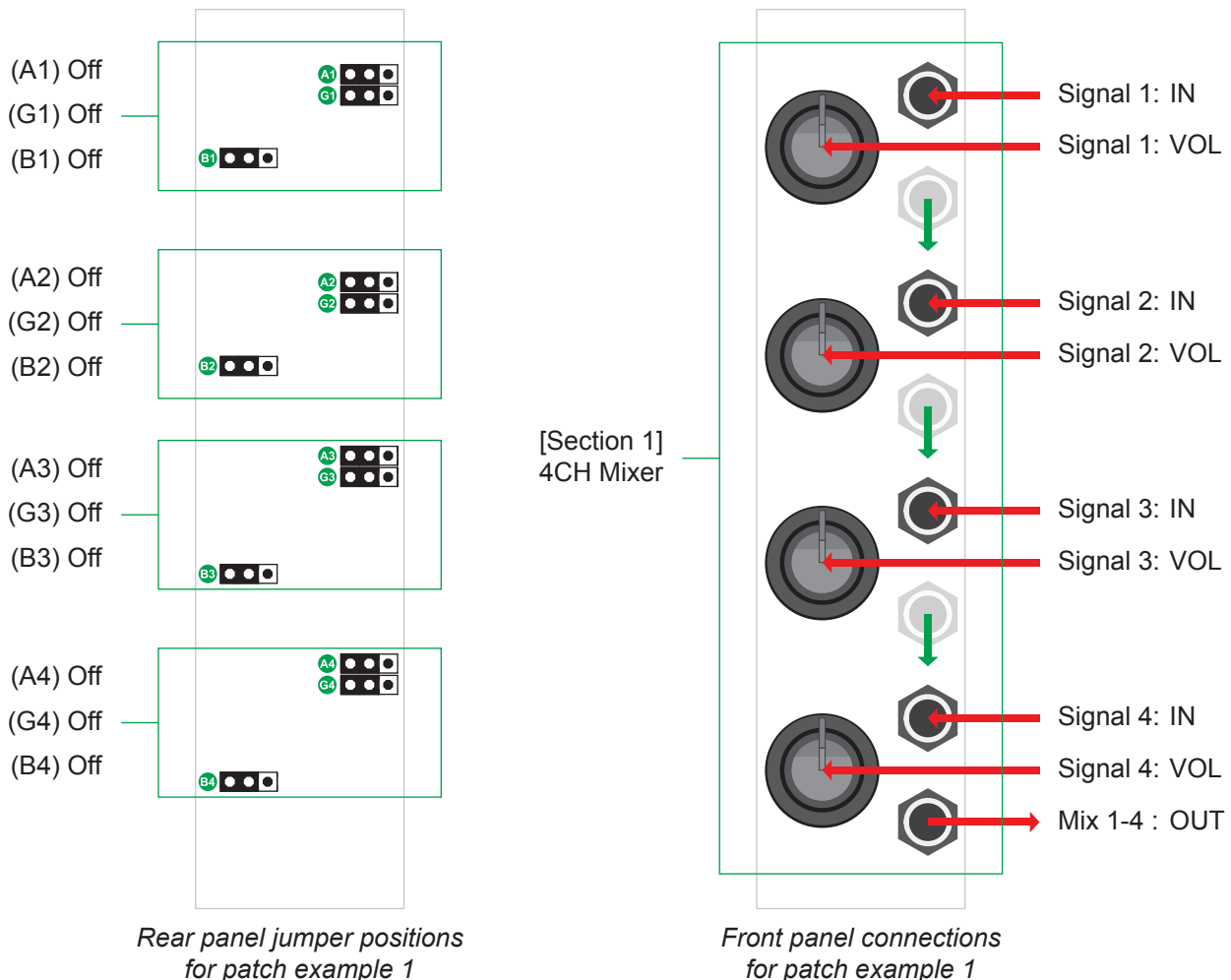


Jumper position or Bias (Off)

Jumper position for Bias (On)

# 9.1) Patch Example 1

## 1) BASIC 4-INPUT / 1-OUTPUT MIXER



## 2) PATCH EXPLANATION

This patch example shows a basic, multiple input, single output summing mixer.

The rear panel user settings have all been turned off but adding e.g. Attenuversion to any combination of channels could be implemented by moving the relevant jumpers to their on position as required.

Input signals 1-4 enter the module via the input sockets for each channel and in this configuration, any combination of input channels can be used or left unplugged with no change in basic functionality.

Input signals 1-3 do not have their outputs connected so those input signals cascade to the final output.

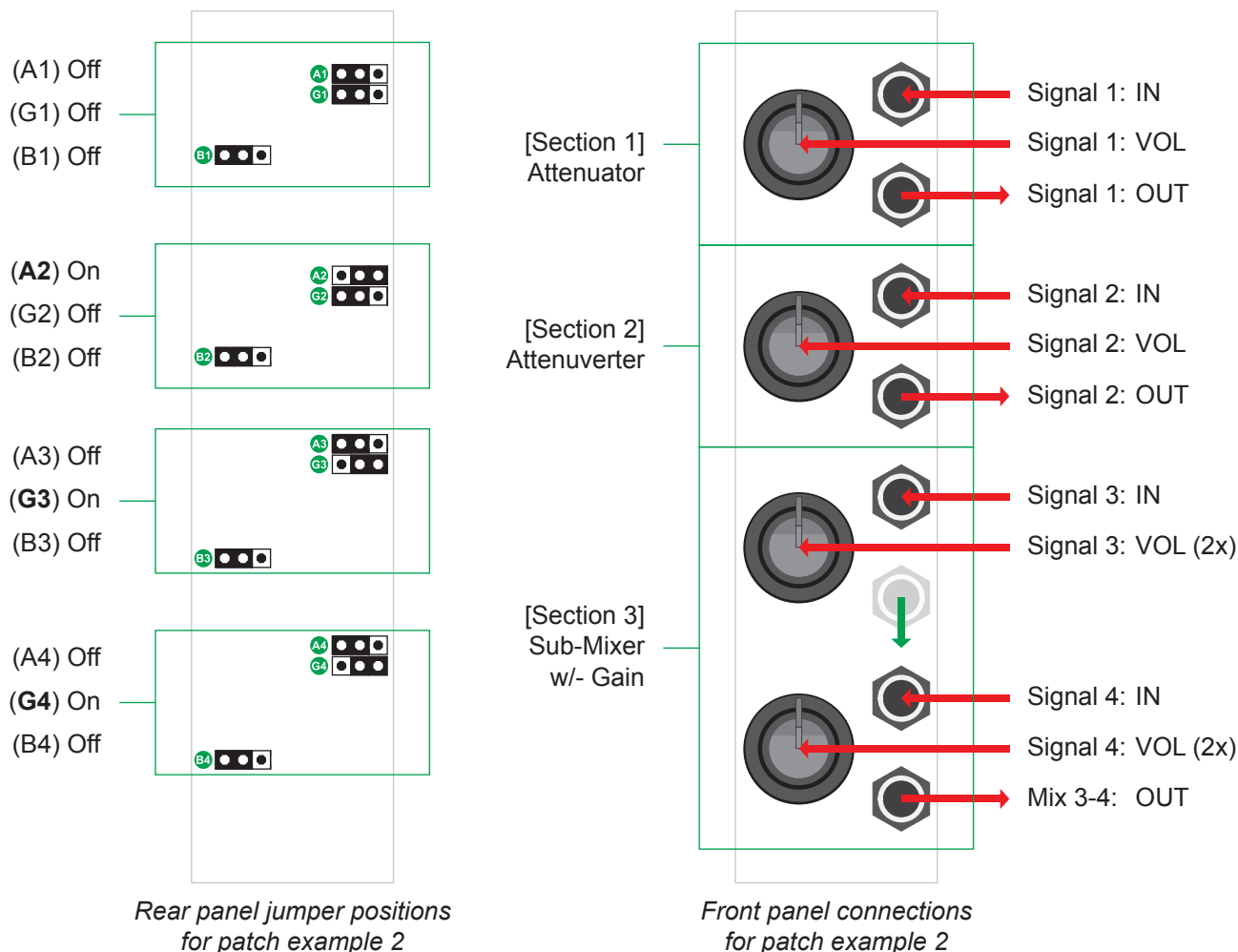
The final mix is taken from the output of channel 4 and consists of the summed mix of all 4 inputs.

The volume knob for each channel controls the volume of the input signal at each channel.

This patch could be developed further by running it as a pair of 2-input / 2-output sub-mixers with outputs taken from channel 2 and channel 4 or by activating the Attenuversion user settings for any of the channels.

# 9.2) Patch Example 2

## 1) ATTENUATOR, ATTENUVERTER & SUB-MIXER



## 2) PATCH EXPLANATION

This patch example shows the module split into 3 sections that include a 1-channel attenuator, a 1-channel attenuverter and a 2-channel sub-mixer with input gain on both channels.

The rear panel user settings are shown on the left and include Attenuversion for channel 2 (A2) and Gain for channels 3 and 4 (G3) and (G4).

Input signals 1-4 enter the module via the input sockets for those channels and in this configuration, any combination of input channels can be used or left unplugged with no change in basic functionality.

Channel 3 (section 3) does not have its output connected so this signal cascades to the output of channel 4.

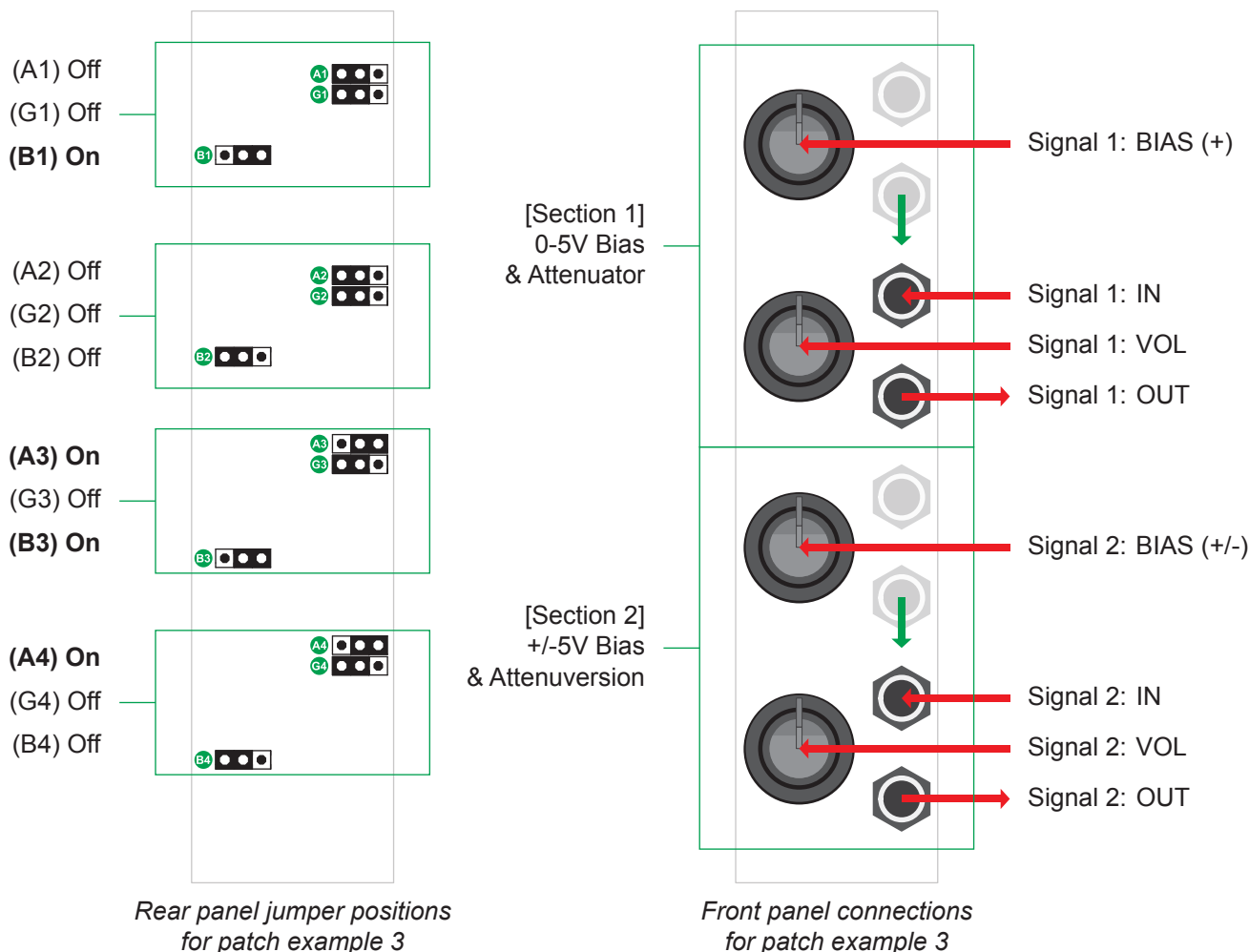
The sub-mix output for section 3 is taken from channel 4 and consists of the summed inputs 3 and 4.

The volume knob for channel 1 controls volume for section 1, channel 2 controls attenuversion for section 2 and the volume knobs for channels 3 and 4 controls the volume of the input signals at those 2 channels for section 3.

This patch could be developed further by adding Attenuversion to section 1 or Gain to sections 1 and 2 and taking a single output from channel 4 would give you a 4-input / 1-output sub-mixer.

# 9.3) Patch Example 3

## 1) DUAL BIAS/OFFSET & ATTENUATOR



## 2) PATCH EXPLANATION

This patch example shows the module split into 2 1-input / 1-output sections. The first has unipolar 0-5V bias/offset and standard attenuation and the second has unipolar +/- 5V bias/offset and attenuation.

The rear-panel user settings are shown on the left and includes Bias for channels 1 (B1) and 3 (B3) and Attenuation for channels 3 (A3) and 4 (A4).

Channels 1 and 3 do not have their outputs connected – these are used to control the bias/offset of the channels that follow them. The DC voltage that these channels produce cascades to the next channel with a connected output (Channels 2 and 4).

Input signals 1 and 2 (Channels 2 and 4) enter the module via the input sockets for those channels as per previous examples.

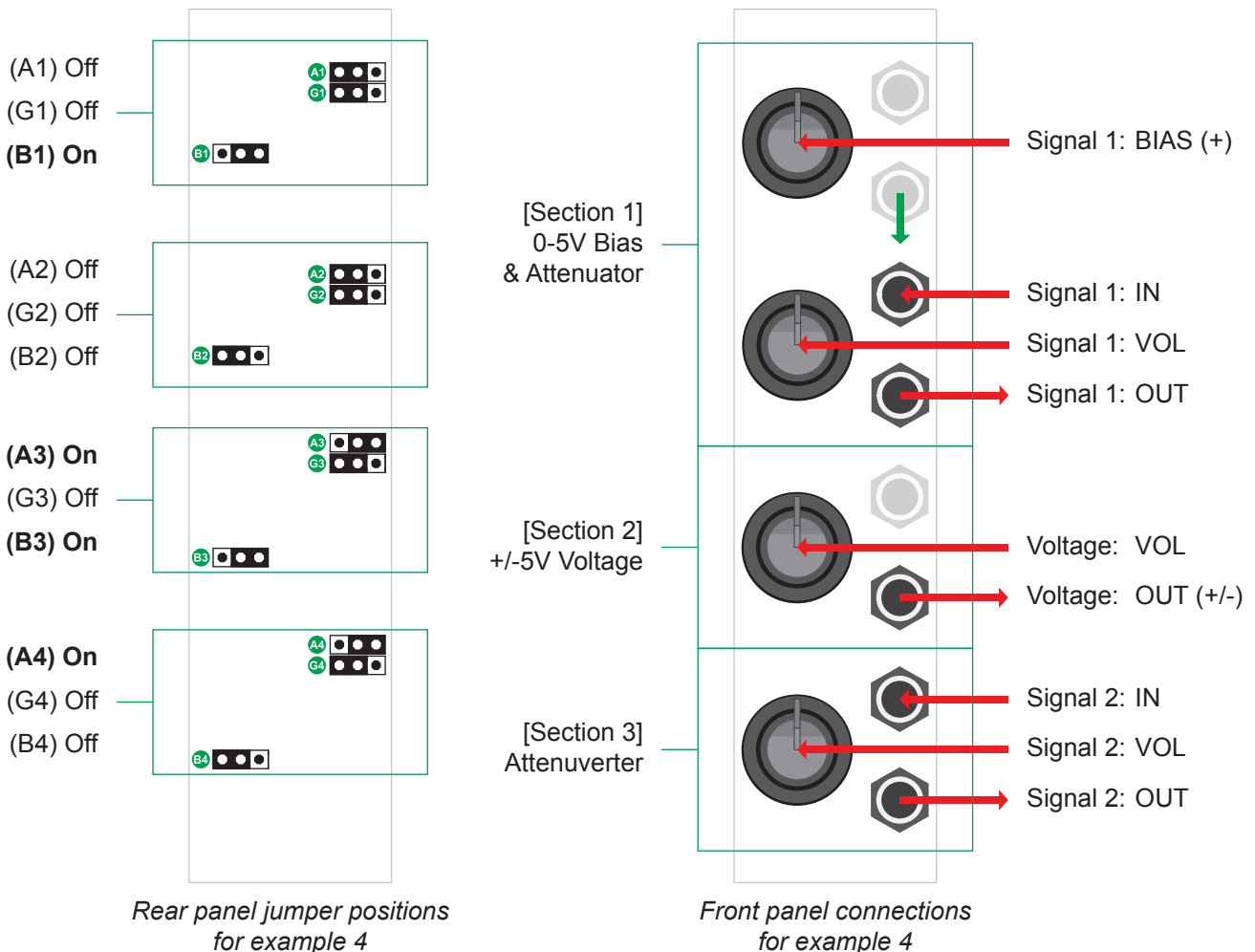
The output for each section is taken from channel 2 and channel 4 and is a summed signal that includes the input signals (Channels 2 and 4) plus any bias/offset voltage (Channels 1 and 3).

The volume knobs for channels 1 and 3 controls the bias/offset amount for the input signals at channels 2 and 4 and the volume knobs for channels 2 and 4 controls the volume of the signal at those channels.

This patch could be developed further by activating Attenuation for both bias/offset channels or increasing the potential bias/offset amount by activating Gain for both bias/offset channels.

# 9.3) Patch Example 4

## 1) MULTI-FUNCTION MIX & VOLTAGE UTILITY



## 2) PATCH EXPLANATION

This patch example is intended to show some ideas for using the module as a multi-function mix and voltage utility.

As with the previous patch examples, the rear panel user settings are shown on the left and are turned on by moving the black plastic jumper from the left position to the right position as required.

The input signals for sections 1 and 3 are shown on the right.

Section 2 (Channel 3) does not have an input signal as it is being used in this patch example as a manual, output-only, voltage source.

Connecting an input signal to this channel bypasses the CV user setting and returns that channel to its function as a single channel attenuverter.

The volume knobs for the first section controls bias/offset (Channel 1) and attenuation (Channel 2), the knob for section 2 (Channel 3) controls the amount of DC voltage at that channel's output and the knob for section 3 (Channel 4) controls the attenuation of the input at that channel.

This patch could be developed further by removing the output from channel 3 and using that channel as a bias/offset source for channel 4 and the user configuration settings could be changed to adjust the order of the 3 sections.



# 10) Specs



<b>HARDWARE:</b>	<b>Inputs (Signal):</b>	4x @ +/- 12V maximum
	<b>Outputs (Signal):</b>	4x @ +/- 12V maximum
	<b>Power Requirements:</b>	+/-12V: 10-16-pin IDC connector
	<b>Current Draw:</b>	+12V: Approx. 55mA average
		-12V: Approx. 45mA average
		+5V: NA
	<b>Dimensions:</b>	Width: 6HP
Depth: 28mm [Panel to IDC connector]		
<b>Supplied Accessories:</b>	Cable: 1x 10-16-pin, IDC	
	Screws: 2x M3	
	Jumpers: 2x spare connectors	
	Knobs: 2x Blue / 2x Grey	
<b>CREDITS:</b>	<b>Concept &amp; Hardware:</b>	Justin Owen
	<b>Thanks &amp; Gratitude:</b>	Radek Rudnicki Ben Wilson
<b>VERSIONS:</b>	<b>Manuals:</b>	v1.0.0 10/2017
		v1.0.2 03/2018
		v1.1.0 06/2020