

USER MANUAL

# MINIBRUTE 2

ANALOG SYNTHESIZER

**ARTURIA**<sup>®</sup>  
YOUR EXPERIENCE • YOUR SOUND

# Special Thanks

---

## DIRECTION

---

Frederic Brun	Nicolas Dubois	Adrien Courdavault	Philippe Vivancos
---------------	----------------	--------------------	-------------------

---

## ENGINEERING

---

Fred's Lab / Frédéric Meslin (lead engineer)	Nicolas Dubois	Luc Walrawens	Yves Usson
Olivier Delhomme	Benjamin Renard	Victor Morello	
Nadine Lantheaume	Valentin Lepetit	Bruno Pillet	
	Pierre-Lin Laneyrie	Thierry Chatelain	

---

## MANUAL

---

Sebastien Rochard	Morgan Perrier	Florian Marin	Randy Lee
-------------------	----------------	---------------	-----------

---

## DESIGN

---

Sebastien Rochard	DesignBox	Sylvain Missemer	Morgan Perrier
-------------------	-----------	------------------	----------------

---

## SOUND DESIGN

---

Victor Morello	Jean-Baptiste Arthus	Jean-Michel Blanchet	
----------------	----------------------	----------------------	--

---

## BETA TESTERS

---

Chuck Capsis	Adrien Kanter	Andrew Capon	Reek Havok
Terry Mardsen	Jean-Philippe Gross	Gert Braakman	Randy Lee
Marco Correia	Ken Flux Pierce	Tom Hall	Simon Gallifet

© ARTURIA SA – 2017 – All rights reserved.

11 Chemin de la Dhuy  
38240 Meylan  
FRANCE  
[www.arturia.com](http://www.arturia.com)

Information contained in this manual is subject to change without notice and does not represent a commitment on the part of Arturia. The software described in this manual is provided under the terms of a license agreement or non-disclosure agreement. The software license agreement specifies the terms and conditions for its lawful use. No part of this manual may be reproduced or transmitted in any form or by any purpose other than purchaser's personal use, without the express written permission of ARTURIA S.A.

All other products, logos or company names quoted in this manual are trademarks or registered trademarks of their respective owners.

**Product version: 1.0**

**Revision date: 7 June 2018**

# Thank you for purchasing the Arturia MiniBrute 2/2S!

This manual covers the features and operation of Arturia's **MiniBrute 2** or **MiniBrute 2S**.

In this package you will find:

- One MiniBrute 2 series analog synthesizer, with a serial number on the bottom. You will need this information in order to register your MiniBrute 2 online.
- One IEC AC power adapter
- One Eurorack cable set
- One preset catalog

**Be sure to register your MiniBrute 2 as soon as possible!** There is a sticker on the bottom panel that contains the serial number of your unit. This is required during the online registration process. You may want to record these elsewhere or take a photo of the sticker in case it becomes damaged.

Registering your MiniBrute 2 series synthesizer provides the following benefits:

- It enables you to download the user manual and the latest version of the MIDI Control Center software
- It allows you to receive special offers restricted to owners of MiniBrute 2 series synthesizers.

## Special Message Section

### Specifications Subject to Change:

The information contained in this manual is believed to be correct at the time of printing. However, Arturia reserves the right to change or modify any of the specifications without notice or obligation to update the hardware that has been purchased.

### IMPORTANT:

The product and its software, when used in combination with an amplifier, headphones or speakers, may be able to produce sound levels that could cause permanent hearing loss. **DO NOT** operate for long periods of time at a high level or at a level that is uncomfortable.

If you encounter any hearing loss or ringing in the ears, you should consult an audiologist.

### NOTICE:

Service charges incurred due to a lack of knowledge related to how a function or feature works (when the product is operating as designed) are not covered by the manufacturer's warranty, and are therefore the owner's responsibility. Please study this manual carefully and consult your dealer before requesting service.

### Precautions include, but are not limited to, the following:

1. Read and understand all the instructions.
2. Always follow the instructions on the instrument.
3. Before cleaning the instrument, always remove the electrical plug from the outlet and remove the power cord and USB cable from the unit. When cleaning, use a soft and dry cloth. Do not use gasoline, alcohol, acetone, turpentine or any other

organic solutions; do not use liquid cleaner, spray or cloth that's too wet.

4. Do not use the instrument near water or moisture, such as a bathtub, sink, swimming pool or similar place.
5. Do not place the instrument in an unstable position where it might accidentally fall over.
6. Do not place heavy objects on the instrument. Do not block openings or vents of the instrument; these locations are used for ventilation to prevent the instrument from overheating. Do not place the instrument near a heat vent or any place of poor air circulation.
7. Use only the provided AC adapter, as specified by Arturia.
8. Make sure the line voltage in your location matches the input voltage specified on the AC power adapter.
9. Do not open and insert anything into the instrument, as this could cause a fire or electrical shock.
10. Do not spill any kind of liquid onto the instrument.
11. In the event of a malfunction, always take the instrument to a qualified service center. You will invalidate your warranty if you open and remove the cover, and improper testing may cause electrical shock or other malfunctions.
12. Do not use the instrument when thunder and lightning is present.
13. Do not expose the instrument to hot sunlight.
14. Do not use the instrument when there is a gas leak nearby.
15. Arturia is not responsible for any damage or data loss caused by improper operation of the instrument.
16. Arturia recommends the use of shielded cables for audio (less than 3 meters long), and ferrite equipped CV/Gate cables.

# Introduction

## Congratulations on your purchase of the Arturia MiniBrute 2!

The MiniBrute 2 is designed to be an exceptionally powerful, modern analog synthesizer with a classic flair.

The roots of this product stem from the greatest synthesizers of all time, all enhanced with Arturia's own modern touch and character. The now famous 'Brute' style oscillators, paired with the classic sounds of the Steiner-Parker filter, give you a wealth of tools and amazing sonic character with which to build your own sounds.

There are many great features, both old and new, in the MiniBrute 2 series synths. But the *pièce de résistance* of the MiniBrute 2 might be the inclusion of a very flexible 48-point patch bay. This physical matrix allows you to route modulation sources in a nearly endless number of ways, both within the MiniBrute 2 and with external devices.

Couple these features with the sheer musicality of the sequencer and arpeggiator and you have an instrument that will become a powerful asset in your creative endeavors, be they on stage or in the studio.

We are excited to bring you this powerful and affordable synthesizer. It is the culmination of many years of research, and is the perfect combination of our passion for the world of synthesizers and our deep appreciation for the the world of music they help to create.

Be sure to visit the [www.arturia.com](http://www.arturia.com) website and check for the latest firmware, download the MIDI Control Center and check out the tutorials and FAQs. You are about to experience a synthesizer of an entirely different breed.

Musically yours, **The Arturia team**

# Table Of Contents

1. Introduction.....	5
2. Installation.....	6
2.1. Usage Precautions.....	6
2.2. WARNING.....	6
2.3. Register your Instrument.....	6
2.4. Connecting the MiniBrute 2 to the World.....	7
2.5. Warm-Up and General Tuning.....	9
3. Quick start.....	10
3.1. Create your first sound: the "basic patch".....	10
3.2. Add some vibrato.....	11
3.3. Add a second oscillator.....	11
3.4. Introduction to envelopes.....	12
3.5. Get to know an LFO.....	14
3.6. The Sequencer and Arpeggiator.....	15
4. Hardware overview.....	17
4.1. Main features.....	17
4.2. The Control section.....	18
4.3. Inputs and outputs.....	20
4.4. Top panel.....	20
4.5. The rear panel.....	21
5. The top panel.....	22
5.1. The LFOs.....	22
5.2. VCO 1.....	25
5.3. VCO 2.....	28
5.4. The Filter section.....	30
5.5. The Amplifier section (AMP).....	34
5.6. The Osc Mixer.....	36
5.7. Legato vs. Retrigger note response.....	40
5.8. The Patch bay section.....	40
5.9. Secondary Shift functions.....	40
6. Basics of synthesis.....	41
6.1. Analog synthesizer architecture.....	41
7. The Patch bay.....	53
7.1. General concepts.....	53
7.2. The VCO 1 section.....	58
7.3. The VCO 2 section.....	63
7.4. The EXT IN section.....	64
7.5. The FILTER jacks.....	65
7.6. The AMP section.....	66
7.7. The INVERTER section.....	66
7.8. The ADSR section.....	67
7.9. The AD section.....	68
7.10. The LFO 1&2 section.....	69
7.11. The VCA section.....	70
7.12. The ATTENUATORS section.....	71
7.13. The Sequencer section.....	73
7.14. The MIDI section.....	76
8. Seq / Arp: shared features.....	78
8.1. Mode selection.....	78
8.2. Timing controls.....	79
8.3. Transport section.....	80
8.4. Playback functions.....	81
8.5. Skip selections: Seq / Arp.....	84
8.6. Skip selections: Time Division.....	84
8.7. Restart Seq / Arp from beginning.....	84
8.8. Synchronization.....	85
9. The Sequencer.....	87
9.1. Basic Operation.....	87
9.2. Transpose / Kbd Play.....	88
9.3. Creating a sequence.....	89

9.4. Modifying a sequence.....	95
9.5. Saving sequences .....	96
10. The Arpeggiator.....	97
10.1. What's an arpeggiator? .....	97
10.2. Arpeggiator features .....	97
10.3. Basic operations.....	98
10.4. Arpeggiator modes.....	100
10.5. Build a multi-octave arpeggio.....	103
10.6. Pausing an arpeggio .....	104
11. Introduction: the MIDI Control Center.....	105
11.1. MCC basics.....	105
12. MIDI Control Center.....	109
12.1. Template Browser .....	109
12.2. Device Memories.....	110
12.3. Local Templates.....	111
12.4. Store To/Recall From.....	112
12.5. Import/Export Device Settings.....	113
12.6. Data entry.....	114
12.7. Device Settings .....	115
13. Shift functions.....	123
13.1. SHIFT + Keys 1-5.....	123
13.2. SHIFT + Keys 6-16 .....	123
13.3. SHIFT + Key 17.....	123
13.4. SHIFT + Keys 18-19.....	124
13.5. SHIFT + Oct down (Seq mode only).....	124
13.6. SHIFT + Oct up (Seq mode only).....	124
13.7. SHIFT + Play.....	124
13.8. SHIFT + Rec (Seq mode only).....	124
13.9. SHIFT + Seq encoder .....	124
13.10. SHIFT + Stop (Seq mode only).....	124
13.11. SHIFT + Sync.....	124
13.12. SHIFT + Tap / Rest (Arp mode only).....	124
13.13. SHIFT + Time Div encoder .....	125
14. Declaration of Conformity.....	126

# 1. INTRODUCTION

Congratulations, and thank you for your purchase of the Arturia MiniBrute 2 analog synthesizer. You now own what many players feel is the best sounding, most versatile, and most powerful analog synthesizer in its class.

The MiniBrute series of synthesizers is the culmination of a lengthy (and very enjoyable!) collaboration between Arturia's engineers and analog synthesizer "guru" Yves Usson.

Since the late 1990s, the French company Arturia has received acclaim from players and reviewers alike for designing state-of-the-art software emulations of the venerable synthesizers from the 1960s to the 1980s. From the Modular V, back in 2004, to Origin, a modular system they introduced in 2010; from Analog Factory Experience, the first hybrid synthesizer ever (debuted in 2008), to the Synclavier V (2016) and the Buchla Easel V (2017), their passion for synthesizers and sonic purity has given demanding musicians the best software instruments for professional audio production.

After recreating so many legendary analog synthesizers by translating "golden" versions of these classic instruments into sophisticated DSP algorithms, the time was right for Arturia to introduce an analog synth of its own. But reproducing analog circuitry is not the same as designing great-sounding analog circuits, so we enlisted the aid of Yves Usson – an extremely talented analog circuit designer and synthesizer enthusiast whose work spans three decades.

Besides being a talented researcher in bio-molecular microscopy, his clones of the modules originally designed by Dr. Robert Moog, as well as ARP or EMS and his own designs, are highly renowned in the "modular" world and continuously produced under license by specialty manufacturers.

What's more, he's always willing to share his considerable experience and pass along his knowledge to others. All his schematics stay open to the Synthesizer-Do-It-Yourself (SDIY) community; most of his works can be found on the [Yusynth](#) ongoing project website, and he casts a long, and welcome, shadow on the major Internet forums devoted to analog fanatics.



*Yves Usson and a couple of wired friends*

Combining Arturia's acclaimed *savoir-faire* in designing innovative musical instruments, and Yves' deep knowledge and experience, the MiniBrute 2 analog synthesizer has its roots in the 1970s yet incorporates the best of the 21st century.



*The Arturia MiniBrute 2 analog synthesizer*

We built the MiniBrute 2 with four goals: peerless analog sound, intuitive operation, affordability – and no compromises, whether with parts, design, or connectivity.

From the smallest capacitor to the potentiometers and the casing, we cherry-picked the very best suppliers, subjected every component to exhaustive testing, and fine-tuned the design for the best possible player experience.

Furthermore, we decided to bring back the fun of creating your own sounds, and controlling them on stage or in the studio. There are no presets: All of the sound-shaping is at your fingertips. This design philosophy also meant we could use true analog oscillators, not digital ones, to provide the purity of sound that is the hallmark of analog synthesis.

But we also wanted you to be able to mangle that sonic purity the way the “big boys” can (you know, those hulking modular synthesizers with patch cables running every which way). So in addition to the powerful voice architecture the MiniBrute 2 provides a 48-point patch bay, which allows you to bypass any pre-conceived notions regarding the signal path. Now you can bring in control signals and audio from the outside world and patch them into the MiniBrute 2 circuitry. This open-ended approach to sound design will open sonic doors you never knew were there. We think it will even make the “big boys” come knocking at the door, wanting to join the fun!

And yet for all its flexibility, the focus of MiniBrute 2 is on music, creativity, and the experience of playing an instrument that is fun, physical, inspiring, and satisfying. What’s more, with its compact size, MiniBrute 2 is ideal for the mobile and desktop musician. Not only will it give you solid basses, amazing effects, and screaming lead lines, but it will give you sounds no other synth on this planet can make.

As everyone knows, analog synthesizers are expensive to produce. But what’s the point in making a synth for everyone, if no one could afford it? So, we made a bet it would be a hit, and geared up to produce MiniBrute 2 in volume – allowing us to obtain quantity pricing on parts, and translate the techniques of a craftsman to industrial manufacturing. The result is analog synthesis without compromise.

MiniBrute 2 is truly a musical instrument. We loved designing it, building it, and now, playing it. We hope you will share our enthusiasm, and find inspiration in its sounds.

Here’s an overview of the features at your disposal:

- Fully analog signal path
- 2 multi-waveform voltage-controlled oscillators (VCOs)
- Sawtooth, square, and triangle waveforms (VCO 1)
- Ultrasaw, Metalizer, and pulse width modulation (PWM)
- Sawtooth, square, and sine waveforms (VCO 2)
- VCO 2 can be used as an additional LFO
- FM modulation between oscillators
- Random noise generator
- Steiner-Parker multimode filter with FM and RM (Resonance Modulation)
- 48-point patchbay
- Hard sync input for VCO1
- Separate VCA for modulation routings
- Two envelopes: ADSR (filter) and AD (amplitude)
- Loopable AD envelope
- Two multi-waveform LFOs with free-run or sync modes
- Brute Factor: overdrive the filter input with the audio output
- External audio can be routed through the Oscillator mixer or directly to the output
- Sequencer and arpeggiator, syncable to external clock: MIDI, USB, or CLK (1 step, 1 pulse, 24/48 ppq)
- MIDI input and output connectors
- USB port for use with a DAW
- Audio and headphone outputs
- Use with Arturia's MIDI Control Center for device configuration and sequence archival

But that's enough talk – plug in your new analog friend, and start shaking the walls!

## 2. INSTALLATION

### 2.1. Usage Precautions

The MiniBrute 2 uses an external power adapter. Do not use any power supply or adapter other than the one provided by Arturia. Arturia accepts no responsibility for damage caused by use of an unauthorized power supply.

### 2.2. WARNING

Do not place this product in a place or position where one might walk on, trip over, or roll anything over power cords or connecting cables.

The use of an extension cord is not recommended. However if you must use one, make sure that the cord has the ability to handle the maximum current needed by this product. Please consult a local electrician for more information on your power requirements.

This product should be used only with the components supplied or recommended by Arturia. When used with any components, please observe all safety markings and instructions that accompany the accessory products.

### 2.3. Register your Instrument

Registering your instrument establishes your legal ownership, which entitles you to access the Arturia Technical Support service, and be informed of updates.

Additionally, you can subscribe to the Arturia newsletter to be informed of Arturia-related news as well as promotional offers.

Connect to your Arturia account via this URL:

<https://www.arturia.com/login>

Go to the section "*My Registered Products*", and add the MiniBrute 2 synthesizer by entering its serial number, as printed on the sticker located under the machine:

## 2.4. Connecting the MiniBrute 2 to the World

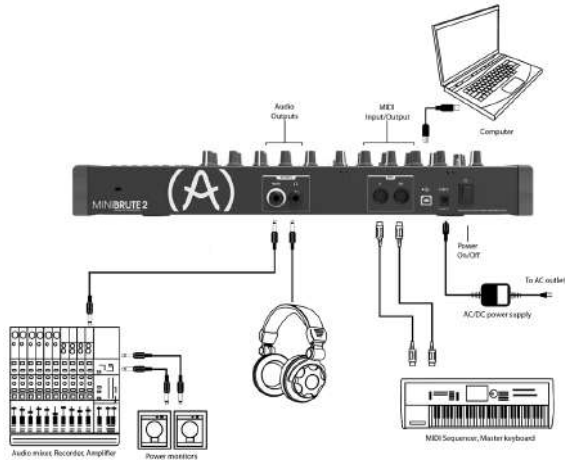
Always power-off all audio gear before making any audio connections. Failing to do so may damage your speakers, the MiniBrute 2 synthesizer, or other audio equipment.

After completing all connections, set all levels to 0. Power on the various devices, with audio amplifier or monitoring system *last*, then raise the volumes to a comfortable listening level.

Here is an overview of the MiniBrute 2 synthesizer's connectors:

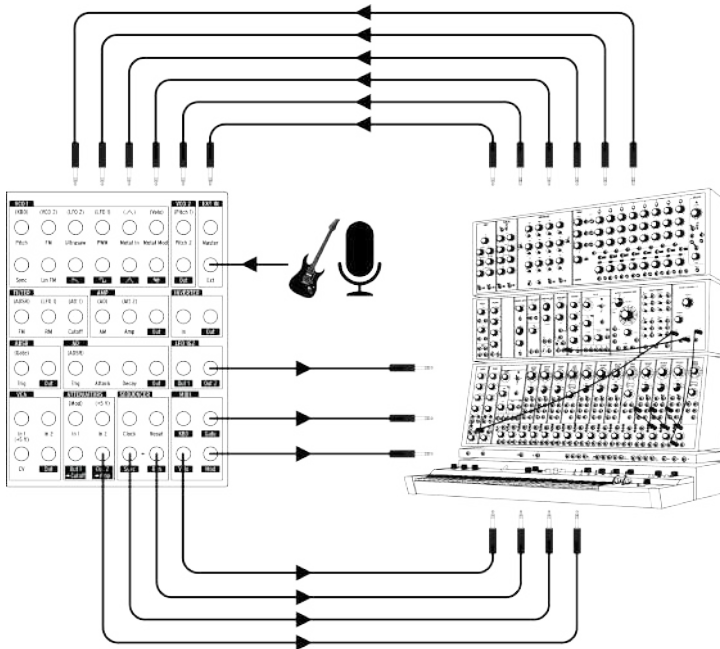
Purpose	Connector type
Audio output	6.35 mm (1/4") mono jack (470 $\Omega$ impedance / line level)
Headphones	6.35 mm (1/4") TRS jack (signal is mono) 2 $\Omega$ impedance (185mW @ 250 $\Omega$ / 60mW @ 80 $\Omega$ / 24mW @ 32 $\Omega$ )
Patch bay (most jacks)	3.5 mm (1/8") miniature mono jacks <b>CV inputs:</b> Eurorack level signals, 100k $\Omega$ , +/-5Vx (Exception: Pitch CV inputs are 6.8M $\Omega$ impedance) <b>CV outputs:</b> Eurorack level signals, 680 $\Omega$ , +/-5V <b>Clocks / Gates inputs:</b> Eurorack level signals, 68k $\Omega$ , OV/+5V <b>Clocks / Gates outputs:</b> Eurorack level signals, 2k $\Omega$ , OV/+5V
Patch bay (sync & clock jacks)	3.5 mm (1/8") miniature TRS jacks <b>Clock inputs:</b> Eurorack level signals, 68k $\Omega$ , OV/+5V <b>Clock outputs:</b> Eurorack level signals, 2k $\Omega$ , OV/+5V
MIDI input & output	Standard MIDI DIN-5
USB	Standard USB type B
Power DC input	Internal 2.1 mm, external 5.5 mm

## 2.4.1. The rear panel connectors



*The MiniBrute 2 rear panel*

## 2.4.2. Patch Bay



*MiniBrute 2 patch bay, modular synth, and external audio sources*

This is only one example of the connections that can be made between the MiniBrute 2 and external devices. The possibilities are as endless as your imagination!

## 2.5. Warm-Up and General Tuning

As with all other true analog synthesizers, after being powered-on the MiniBrute 2 needs a warm-up period of approximately five to ten minutes. This allows it to reach a stable operating temperature, which ensures accurate oscillator pitch. Warm-up time depends on the external temperature; a colder environment will require longer warm-up times, while a hotter environment will result in shorter times. Humidity levels also can affect the length of the warm-up period.

Once the synthesizer has reached its running temperature, tune it to pitch. Use an external tuner to check the instrument's tuning; if needed, adjust the **Global Tune** knob to tune the MiniBrute 2 to the desired pitch.

The MiniBrute 2 has been designed for rock-solid pitch stability when operated in normal temperature and humidity conditions, at external temperatures between 20°C and 32°C in temperate areas. In practice, the MiniBrute 2 provides satisfactory operation over a much wider temperature range, although extreme external temperatures or fluctuations can lead to longer stabilization time or erratic tuning.

## 3. QUICK START

This chapter provides the basics you'll need to create your very first sounds with the MiniBrute 2, so you can start enjoying its rich, full sounds immediately. In subsequent chapters, we'll get deeper into the sound design process so you can create more animated and complex sounds.

### 3.1. Create your first sound: the "basic patch"

Once your MiniBrute 2 has been correctly connected to your sound system, set all the controls to their minimum level: - counter-clockwise for the knobs - lowest position for sliders - center position (12 o'clock) for controls with - and + (FM 1 and RM) - center position for all three Tune controls - center position for the Master Volume knob

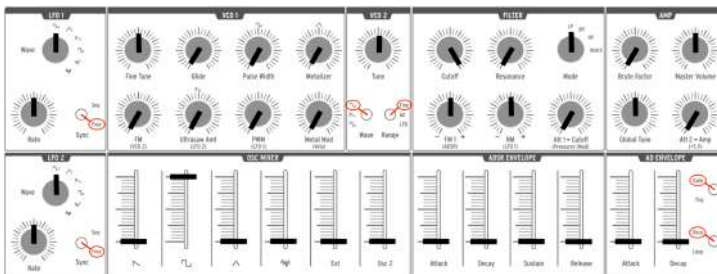
Switch on your MiniBrute 2, and as you [let it warm up \[p.9\]](#), set the following parameters to the recommended values:

- Set the LFO 1 and LFO 2 Sync switches to the Free position
- Set the LFO 1 and LFO 2 Rate controls to the center position
- Set the VCO 2 [Wave \[p.22\]](#) and [Range \[p.29\]](#) switches to their "up" positions (Sine wave and Fine)
- Set the FILTER section's Mode knob to LP
- Set the AD ENVELOPE switches to the [Gate \[p.39\]](#) and [Once \[p.39\]](#) positions
- Set the OSC MIXER section's square wave slider to maximum
- Turn the FILTER section's Cutoff knob fully clockwise
- Set the Control section's [Mod Source \[p.19\]](#) switch to Wheel
- Set the Control section's [Mod Dest \[p.20\]](#) switch to LFO 1 Vib
- Set the Sync setting to Int
- Set the Modulation Wheel to minimum



⚠: No cables should be connected to the patch bay yet.

These settings give us a unified starting point for the following examples. Here's a visual representation of the patch:



*The (basic) patch*

Now, press a key; you should hear your very first MiniBrute 2 sound!

That's a fat square wave... but it sounds a bit static, doesn't it? We'll improve this in the [Basics of Synthesis \[p.41\]](#) chapter. But if you simply want to play the keyboard for a moment, you can use the Down or Up [Octave \[p.19\]](#) buttons to transpose the notes to the range you prefer.



Once the MiniBrute 2 has warmed up, you can [adjust the master tuning \[p.9\]](#) as described in the previous chapter.

### 3.2. Add some vibrato

Press and hold a key on the keyboard, and slowly raise the Modulation Wheel – this will add some vibrato to the sound.

- Return the Modulation Wheel to minimum position.
- Set the Control section's [Mod Source \[p.19\]](#) switch to the AT position.

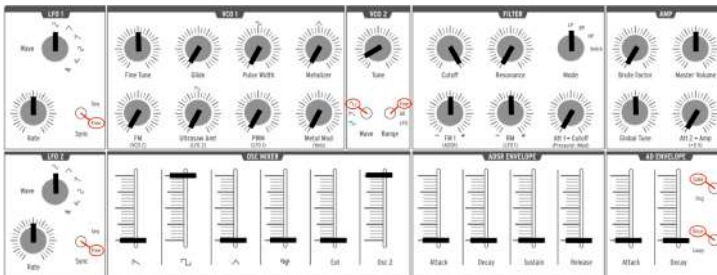
Now play the keyboard and when a key is down, press down on it further. This “pressure sensitivity” is called Aftertouch (AT). And like the Modulation Wheel, it can introduce vibrato to the note you’re holding. This is a great way to add expressiveness to your playing.

### 3.3. Add a second oscillator

Press the Up Octave button to put the keyboard into the +2 Octave range. Now press and hold a key on the keyboard and do the following:

- Raise the Osc 2 slider in the OSC MIXER section to maximum
- Turn the VCO 2 Tune knob counter-clockwise until VCO 2 is an octave lower than the original pitch.
- Play a few notes. VCO 2 has become a sub-oscillator, which beefs up your sound by adding more bass.

Here’s an overview of the patch:



*VCO 2 is being used as a sub-oscillator*

## 3.4. Introduction to envelopes

MiniBrute 2 has two independent envelopes: the AD and the ADSR. The AD ENVELOPE controls the amplitude of the sound, while the ADSR ENVELOPE is dedicated to the Filter; it affects the harmonic content of the sound.

### 3.4.1. The AD envelope

The sound's amplification envelope determines how the level changes over time when you play a note. Up to this point in the chapter the note has only played while you were holding the key, which results in an "electronic organ" sound that has no dynamics. By changing the AD ENVELOPE parameters (Attack, Decay) we can control how the sound fades in and fades out.

Raise the AD ENVELOPE section's Attack slider to its middle position, then press a key. Now the sound rises slowly to the maximum level. As soon as you release the key, the sound stops abruptly. Raise the Decay slider, and the sound will fade out to its minimum level when you release a key.

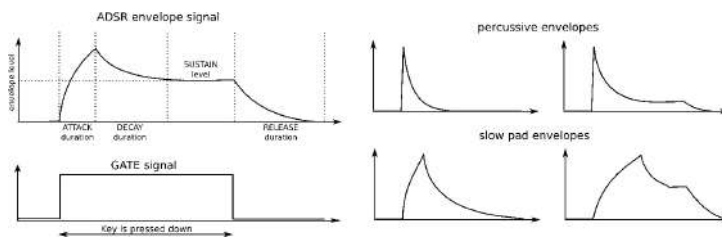
There are two switches inside the AD ENVELOPE section ([Gate/Trig and Once/Loop \[p.39\]](#)). Their functions are somewhat more complex and will be described in the [Top Panel \[p.22\]](#) chapter.

### 3.4.2. The ADSR envelope

This envelope controls the Filter, and it has more sliders than the AD envelope. The ADSR envelope is slightly more complex to use, so we will describe the basic concepts here and cover them more thoroughly in the [Basics of Synthesis \[p.41\]](#) chapter.

Pressing down a key or sending a gate signal provides an evolving modulation signal with up to four different stages:

- The **attack** stage determines how long it takes for the envelope to go from zero to its maximum level. The attack time can be as short as 0.5ms or as long as 4 seconds.
- The **decay** stage begins when the attack stage reaches its maximum value, and determines the time it takes to decrease from this maximum value down to a steady level (set by the sustain parameter; see next). The speed of this decay can vary from 0.5ms to 4 seconds.
- The **sustain** stage starts at the end of the decay phase, and remains at the sustain value long as a keyboard key is held down or a gate signal remains full on. The sustain level is variable between zero (no sustain) and the envelope's maximum value.
- Finally, the **release** stage starts upon releasing the key, and sets the amount of time for the level to decrease from the sustain level down to zero. The release time can be as quick as 0.5ms and as long as 4 seconds.



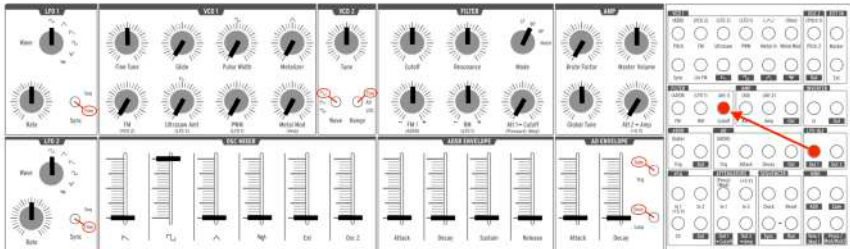
*Examples of the ADSR envelope*

### 3.5. Get to know an LFO

An LFO can do much more than [add vibrato \[p.11\]](#) to the sound. For example, it can be used to modulate the harmonic content also. We will use the patch bay to illustrate this point.

- Set all sliders to minimum
- Set the square wave slider in the OSC MIXER section to maximum
- In the FILTER section, set the Cutoff and Resonance knobs to their middle points (12:00)
- Set the FILTER section FM knob to the 12:00 position
- Also in the FILTER section, set the Mode knob to BP (band pass)
- Set the LFO1 Wave knob to Sine and its Rate to the 12:00 position
- Locate the LFO1&2 section in the patch bay
- Connect a patch cable to the Out 1 jack in the LFO1&2 section
- Locate the FILTER section in the patch bay
- Connect the other end of the patch cable to the Cutoff jack in the FILTER section

It's important that everything is set up properly, so here's how the patch should look:



*LFO 1 modulating the filter cutoff via the patch bay*

Play a note. You should immediately hear timbre sweeps, a bit like a didgeridoo, at the rate indicated by the red LED in the LFO 1 section. Tweak the Rate knob to slow down or accelerate this wah-wah effect, and play with the filter's Resonance to accentuate it.

You also might want to try the various LFO waveforms, which we'll describe in the [LFO section \[p.22\]](#) of the [Top Panel \[p.22\]](#) chapter.

We have barely scratched the surface! Thanks to the patch bay, an LFO can add a cyclical variation to almost any aspect of the MiniBrute 2 sound. To learn more, read the [Patch Bay \[p.53\]](#) chapter.

## 3.6. The Sequencer and Arpeggiator

As if you weren't having enough fun already, let's take a quick look at the Sequencer/Arpeggiator section. To learn more about their features, we recommend starting with the [introductory chapter \[p.78\]](#).



Before you proceed, play a note to make sure you have sound. If not, raise the level on one of the waveform sliders in the OSC MIXER section. If that doesn't help, you may want to revisit the [Basic Patch \[p.10\]](#) section of the manual.

### 3.6.1. The Sync button

Before you can make music with the Sequencer or the Arpeggiator it is important to have the Sync button set to Int (Internal). Look at the right side of the MiniBrute 2 for a large button that says "Sync" right in the middle.



*The Sync button*

The four LEDs to the right of that button indicate the clock source for all of the time-based features of the MiniBrute 2: the LFOs, the Sequencer, and the Arpeggiator. Push the Sync button repeatedly until the LED next to the letters "INT" is lit. This means you have selected the Internal clock and will be able to work with the Sequencer and the Arpeggiator immediately.

## 3.6.2. The Mode switch

There's a switch above the lowest "E" on the keyboard labeled "Mode". It is used to toggle between the Sequencer and Arpeggiator modes. Set that to Arp to select the Arpeggiator.

### 3.6.2.1. Arpeggiator

With the Mode switch set to Arp, adjust the following settings:

- Set the Seq / Arp Mode knob to 1 / Up
- Set the Time Div knob to 1/8
- Set the Rate knob to the center position (12:00)
- If you haven't already done it, press the large Sync button until the INT LED is lit.

Now press the Play button and hold down at least 3 notes. You should hear those three notes repeated in order from lowest to highest. If nothing happens, check the setting of the Sync button again.

### 3.6.2.2. Sequencer

The MiniBrute 2 has eight sequences available and you can record your own sequences into them. But there may be something there already that you could use as a starting point later, so first we'll audition the existing sequences. We'll learn how to record them after we find an empty one.

With the Mode switch set to Seq, adjust the following settings:

- Set the Seq / Arp Mode knob to 1 / Up
- Set the Time Div knob to 1/8
- Set the Rate knob to the center position (12:00)
- If you haven't already done it, press the large Sync button until the INT LED is lit.

Now press the Play button. If the sequence is silent, skip to the next section. If it is not silent, change the Seq / Arp Mode knob to 2 / Dwn; the next time the sequencer loops it will start playing sequence #2. Keep changing the sequence number until you've gone through all 8 sequences.

### 3.6.2.3. Record a sequence

If you've found an empty sequence, or at least a sequence you don't want to keep, let's make a quick real-time recording.

- Enable the metronome by holding the Shift button and then pressing the Sync button. If the Sync button lights up when you press the Shift button, the metronome is already enabled.
- Press the Record button: it will become red
- Press the Play button: it will become green and you should hear the metronome.

When you're ready, play some notes. The default length of a sequence is 2 bars, so the sequencer will loop around after that and replace the first set of notes with new ones.

You can exit Record mode by pressing the Record button again. To disable the metronome, hold the Shift button and press the Sync button until it goes dark.

We'll learn how to change the length of a sequence, erase unwanted notes from the end of a sequence, and use step-time recording in the [Sequencer \[p.87\]](#) chapter.

## 4. HARDWARE OVERVIEW

### 4.1. Main features

The MiniBrute 2 provides a two-octave, piano-type keyboard. Besides offering a way to play notes, this keyboard provides additional controls for adding expressiveness:

- **Aftertouch** generates a signal that corresponds to how hard you press on a key after it's down. You can use this signal to modulate vibrato, filter cutoff, and other parameters.
- **Velocity** corresponds to the dynamics of your playing, and similarly to aftertouch, can modulate multiple parameters.
- **Transposition** allows shifting the keyboard's note range over six octaves.
- The **pitch bend** wheel allows adding real-time pitch changes, like bending strings on a guitar.
- The **modulation** wheel allows applying real-time modulation changes to various parameters. For example, it could add vibrato, or change the filter cutoff as you move it.
- An **arpeggiator** automates the creation of repeating sequences of notes.
- The **sequencer** allows you to trigger musical passages you have created, such as melodies, bass lines, or percussive riffs.

Alternative ways of playing the synthesizer are available through MIDI control and external CV/GATE signals.

## 4.2. The Control section



### 4.2.1. Keyboard

The MiniBrute 2 keyboard covers a two-octave range, which can be extended using the **Octave Down/Up** buttons. The keyboard also provides aftertouch and velocity control, and can also be used as fully polyphonic MIDI controller for other devices via the USB and MIDI out connectors on the rear panel.

### 4.2.2. Wheels

The MiniBrute 2 features the two classic control wheels: Pitch and Modulation.

#### 4.2.2.1. Pitch wheel

The **Pitch** wheel position defaults to the middle of its range, and returns to its default position when released. This wheel creates a pitch bend effect, where the player can shift pitch smoothly up or down while playing a note. The amount of shift is proportional to the rotation of the wheel, with its full range adjustable between +/- one semitone to +/- one octave by the Bend Range knob.

#### 4.2.2.2. Modulation wheel

The second wheel is the **Modulation** wheel (Mod wheel, for short). It is pre-wired to control the cutoff frequency of the filter in the amount set by the **Att 1 -> Cutoff** knob. (You will not hear this if the Att 1 -> Cutoff knob is set to zero, or if the filter cutoff frequency is too high.)

The Mod wheel also sets the overall amount of modulation signal sent to targets selected by the **Mod Dest** switch. Depending on the switch setting, it does one of the following things:

- **LFO 1 Vib:** The Mod wheel controls the amount of LFO 1, which by default will introduce vibrato.
- **Mod CV:** The Mod wheel becomes a modulation source in the patch bay via the Mod jack in the MIDI section.

### 4.2.3. Octave

The **Octave** section transposes the MiniBrute 2 keyboard over a wide pitch range. There are five colored LEDs and each one represents a different amount of octave shift. Only one is lit at a time: red = **-2**, orange = **-1**, green = **0** (center), orange = **+1**, red = **+2**. At the center range (green) the leftmost C key corresponds to C2 (130.81Hz) and the rightmost C key corresponds to C4 (523.25Hz).

For example, pressing the **Down** button once shifts the keyboard down by one octave and the leftmost C is now C1 and the rightmost is C3. Pressing the **Down** button a second time shifts the keyboard down by one more octave.

To shift the keyboard up by one octave press the **Up** button. To shift it back to center immediately, press the Up and Down buttons at the same time.

Using a combination of the Down and Up buttons and the keyboard, the MiniBrute 2 can play notes from CO (32.7Hz) to C6 (2093Hz). The Pitch wheel can extend the frequency range even further.


 When you change the octave with **Down/Up** buttons, transposition occurs only after a key has been pressed.

### 4.2.4. The Shift button

The Shift button is circled in blue to draw attention to the blue letters that are silkscreened in various areas of the Control section: for example, look under the Octave buttons, across the top of the keyboard, and under the Transport section buttons.

When the Shift button is held and the corresponding button or key is pressed, secondary functions are activated or toggled. For example, the Sequencer/Arpeggiator Swing setting can be changed to 59% by holding the Shift button and pressing the lowest A on the keyboard.

For a complete description of the secondary Shift features, see the [Shift functions \[p.123\]](#) chapter.

 The Shift button is not related to the blue letters silkscreened under the synthesizer knobs or inside the patch bay.

### 4.2.5. Bend Range

This knob sets the range of the Pitch Bend wheel. At its minimum setting the pitch bend range will be +/- 1 semitone, and at its maximum setting the pitch bend range will be +/- 12 semitones (+/- 1 octave).

### 4.2.6. Mod Source

This switch determines which hardware control will be defined as the Mod source: the Mod wheel or Aftertouch. By default this signal appears at two locations: the **Att 1 -> Cutoff** knob and the **Press / Mod** output jack in the MIDI section of the patch bay.

The modulation signal is also routed by the Mod Dest switch (see the next section).

## 4.2.7. Mod Dest

Depending on the switch setting, the Mod Source signal is routed to one of the following destinations:

- **LFO 1 Vib:** The Mod Source controls the amount of LFO 1, which by default will introduce vibrato.
- **Mod CV:** The Mod Source is routed to the Press / Mod jack in the MIDI section of the patch bay.

**i** The Mod Source signal is always present at the **Att 1** -> **Cutoff** knob in the Filter section. If you want to defeat this modulation routing, set the Att 1 -> Cutoff knob to zero.

## 4.3. Inputs and outputs

In order to hear the MiniBrute 2, its audio output needs to connect to an audio amplifier either directly or through a mixer console (or use the Headphones output).

As to control, the MiniBrute 2 can accept control voltage signals from devices like a modular synthesizer or a MIDI controller (e.g., a MIDI drum pad or wind controller), or even audio signals from an external sound source such as a microphone or electric guitar.

The means to control other instruments, or be controlled by other instruments, is provided by the collection of inputs and outputs such as USB/MIDI in and out, an external audio input, and the input and output connectors on the patch bay.

**i** It is necessary to use a pre-amplifier to raise the level of an audio source to match the line-level inputs of the Ext In section in the patch bay.

## 4.4. Top panel



*The top panel of the MiniBrute 2*

This is where all of the synthesizing takes place. There are so many powerful features located here that [the top panel \[p.22\]](#) has its own chapter. The [Patch bay \[p.53\]](#) has its own chapter too.

## 4.5. The rear panel



There are several types of connectors on the rear panel. When viewed left to right:

### 4.5.1. Kensington lock

The small hole over the product name is a security feature called a [Kensington lock](#). We want to be sure that your creativity takes flight only when you want it to.

### 4.5.2. Outputs

Connect headphones to the headphone jack for personal monitoring and connect a 1/4" TS (tip-sleeve) cable to the Master jack to run the audio into a mixer or external amplifier.


### 4.5.3. MIDI

Connect a pair of the classic 5-pin DIN cables to the MIDI In and Out ports to interface with other MIDI devices. Clock, control, and note data can be sent and received. The reception of MIDI clock signals is dependent on the [Sync \[p.85\]](#) setting.

### 4.5.4. USB

Connect a standard type-B USB cable to the USB port to interface with a computer. Clock, control, and note data can be sent and received. The reception of USB/MIDI clock signals is dependent on the [Sync \[p.85\]](#) setting.

In addition, the USB port is used to connect the MiniBrute 2 to Arturia's MIDI Control Center. This software is used to configure various settings of the MiniBrute 2.

 Synchronization with non-MIDI devices is done through a connector on the patch bay. For a full description of the CLK setting and the connector types to use, see the [Synchronization \[p.85\]](#) section.

### 4.5.5. Power

Connect only the included power adapter to this jack. It will supply the necessary voltage and current to power the analog circuitry of the MiniBrute 2: 12V DC (center pin positive) and 2A (for Amperes).

## 5. THE TOP PANEL

This chapter covers the synthesizer features of the MiniBrute 2: the oscillators, the filter, the envelopes, etc. Click the following links for descriptions of the [patch bay \[p.53\]](#), the [Control \[p.18\]](#) section, the [Sequencer \[p.87\]](#) and [Arpeggiator \[p.97\]](#), and the [Sync \[p.85\]](#) settings.

### 5.1. The LFOs

An LFO is low frequency oscillator that can produce various waveforms at sub-audio frequencies (0.0625Hz up to 100Hz). The MiniBrute 2 provides two LFOs, each with waveform choices of sine, triangle, sawtooth, square, two types of random waves.

Each LFO has its own Wave selector, Rate control, a switch that determines whether it will run freely or synchronize to the master clock.



*The LFO 1 section*



LFO 1 and 2 are identical, so this section of the manual applies equally to both.

#### 5.1.1. Wave

The LFOs offer several types of modulation waveforms. The selection is made by the **Wave** knob: sine, triangle, sawtooth, square, random stepped (also referred to as Sample & Hold), and random gliding (or smoothed random).

- **Sine** rises and falls smoothly between its minimum and maximum values
- **Triangle** rises and falls in more of a linear manner between its minimum and maximum values
- **Sawtooth** falls to its minimum value in a linear manner and then rises suddenly to its maximum value
- **Square** rises and falls suddenly between its minimum and maximum values
- **Random stepped** rises and falls suddenly between values that are generated at random
- **Random gliding** rises and falls gradually between values that are generated at random



The sampling rate of the Random waveforms is controlled by the **Rate knob**, the same way the rate of the other LFO waveforms is controlled (see below).

### 5.1.2. Sync

The **Sync** switch sets the LFO rate's operating mode. It can be slaved to the Sequencer/Arpeggiator tempo clock (**Seq**) or set to **Free** mode (i.e., the LFO rate depends solely on the **Rate** knob setting).

### 5.1.3. Rate

The Rate knob sets the LFO oscillation rate, and ranges from very slow rates (once every 16 seconds, or 0.0625Hz) up to quite fast rates (100Hz). The red LED located near the knob blinks in time with the rate. Note that the LFO rate may be superseded by the Sequencer/Arpeggiator tempo clock if the **Sync** switch is set to **Seq** (see above).

When set to Sync the LFO rate will always be a multiple or a subdivision of the Seq/Arp tempo. As the LFO Rate knob is turned clockwise:

- Each increase in the LFO rate doubles the LFO frequency
- Each decrease in the LFO rate cuts the LFO frequency in half.

There are nine potential rates when an LFO is set to Sync:

Rate	LFO cycle repeats every:	Periodicity
1	8 bars	8x
2	4 bars	4x
3	2 bars	2x
4	1 bar	1x
5	half note	0.5x
6	quarter note	0.25x
7	eighth note	0.125x
8	sixteenth note	0.0625x
9	thirty-second note	0.03125x

#### 5.1.4. Retrigger the LFOs



*The LFO retrigger options*

There's a secondary Shift function for each LFO that lets you decide if you want an LFO to retrigger when a new note is played. To toggle this function, hold the Shift button and then press the top F key (LFO 1) or the top F# key (LFO 2).

## 5.2. VCO 1

The VCO 1 section has eight controls that form the foundation of the MiniBrute 2 sound.



*The VCO 1 section*

**i** Many top panel knobs have blue letters beneath them. This means there are pre-wired connections between those knobs and the blue-lettered item. For example, (VCO 2) is written beneath the FM knob. That means the second voltage-controlled oscillator (VCO 2) is the default source for the modulation that happens when the FM knob is turned clockwise. Similarly, LFO 2 is the default modulation source for Ultrasaw Amt. Keep this in mind as you look around the top panel for other pre-wired connections.

### 5.2.1. Fine Tune

This knob allows you to make precise adjustments to the pitch of VCO 1. Its range is slightly greater than one octave in either direction. Rotate the knob counter-clockwise to lower the pitch, and rotate the knob clockwise to raise the pitch.

**i** Changing the Fine Tune knob of VCO 1 does not affect the pitch of VCO 2.

### 5.2.2. Glide

Glide is also known as Portamento. The Glide knob determines the amount of time it takes for the pitch to glide from one note to another when notes are played. With this knob fully counter-clockwise, there is no glide and the note pitch transitions instantly to the next note. Turning this knob clockwise increases the portamento effect. At the maximum setting it will take 3 seconds to glide from the first note to the second note, regardless of the distance between them.

**i** By default the pitch of VCO 2 will track the pitch of VCO 1 when the Glide value is increased. The main exception to this rule is when a patch cord is inserted into the [Pitch 2 input \[p.63\]](#) jack in the VCO 2 section of the [patch bay \[p.53\]](#).

### 5.2.3. Pulse Width

This knob affects only the square wave of VCO 1. It has no impact on the saw or triangle waveforms. What it does is alter the width of the square wave from a "round-sounding" 50% to increasingly narrow-sounding pulse waves. See the [Signal enhancers \[p.43\]](#) section of the [Basic Synthesis \[p.41\]](#) chapter for a visual representation of the waveforms.

The Pulse Width can be modulated by an LFO or other sources via the patch bay. See the [PWM \[p.26\]](#) section for more information and related links to other chapters.



⚙️ The setting of the Pulse Width knob does not affect the square wave of VCO 2.

### 5.2.4. Metalizer

This knob affects only the triangle wave of VCO 1. It has no impact on the saw or square waveforms. The **Metalizer** takes the peaks of the basic triangular waveform and "folds" them downward to create very complex jagged waveforms that are rich in high harmonics. See the [Signal enhancers \[p.43\]](#) section of the [Basic Synthesis \[p.41\]](#) chapter for a visual representation of the waveforms.

### 5.2.5. FM

FM stands for Frequency Modulation. This knob affects all three waveforms of VCO 1 at the same time. By default the FM source is VCO 2, so the frequency of that oscillator will modulate the frequency (pitch) of VCO 1 as the value of this knob is increased.

When range switch of VCO 2 is set to LFO the frequency modulation will sound more like vibrato. But when it is set to Fine or All the frequencies of VCO 2 are so high that they will cause a significant disruption to the waveforms being generated by VCO 1. The resultant sound can be clangorous (bell-like) or somewhat noisy depending on the frequencies and waveforms involved.

### 5.2.6. Ultrasaw Amt

This knob affects only the sawtooth wave of VCO 1. It has no impact on the square or triangle waveforms. An increase in its value will mix the original sawtooth wave with two phase-shifted copies of itself, resulting in a fatter sound. The result is different in character than that of detuned sawtooth waveforms being generated by two different VCOs. See the [Signal enhancers \[p.43\]](#) section of the [Basic Synthesis \[p.41\]](#) chapter for a visual representation of the waveforms.

### 5.2.7. PWM

The Pulse Width of the square wave can be modulated by a source such as LFO 1 (the pre-wired default) or another source via the [patch bay \[p.53\]](#). See the [Signal enhancers \[p.43\]](#) section of the [Basic Synthesis \[p.41\]](#) chapter for a visual representation of the waveforms.



⚙️ This knob affects only the square wave of VCO 1. It has no impact on the saw or triangle waveforms of VCO 1 nor the square wave of VCO 2.

### 5.2.8. Metal Mod

The Metal Mod knob sets the modulation range for the Metalizer knob. Velocity is routed to the Metal Mod by default, but the patch bay allows you to use something else to modulate the parameter instead.

## 5.3. VCO 2

MiniBrute 2 has two oscillators that are completely independent: each has its own waveshape and tuning, and can be mixed separately in the OSC MIXER section. They share the filter and amplifier stages.



*The VCO 2 section*

There is a certain level of pre-wired interaction between VCO 1 and VCO 2, though. For example:

- The pitch of VCO 2 will track that of VCO 1 by default, but there is an input on the patch bay that allows the VCO 2 pitch to track another source.
- The pitch of VCO 1 can be modulated by the pitch of VCO 2 through the FM knob in the VCO 1 section. (FM is an abbreviation for Frequency Modulation.) But there is an input on the patch bay that allows the VCO 1 pitch to be modulated by another source.

The output level of the second oscillator is controlled with the slider labeled **Osc 2**. Pulling it down reduces the level of the signal and moving it up increases its level.

The **VCO 2** section contains a Tune knob and two toggle switches:

### 5.3.1. Tune

The **Tune** knob sweeps VCO 2 through the range determined by the Range switch (see below). Generally the middle position will tune it to the same pitch as VCO 1, but some adjustment may be necessary until the oscillators have warmed up.

### 5.3.2. Wave

The **Wave** switch selects the waveshape for VCO 2, which can be either a sine wave, a sawtooth wave, or a square wave.

### 5.3.3. Range

The **Range** switch sets VCO 2 to one of three tuning ranges:

- **Fine:** a full turn of the knob covers a range of more than an octave above and below the center frequency
- **All:** a full turn of the knob will sweep VCO2 through the entire frequency range of the MiniBrute 2
- **LFO:** VCO2 can be used as an additional LFO with a wide frequency range (1Hz to audio range). This is handy if you're already using LFOs 1 and 2 for other modulations through the patch bay, for example.

## 5.4. The Filter section

The filter alters the oscillators' timbre via the four response modes described in the next chapter [p.45] (LP, BP, HP & Notch). Its cutoff and resonance can be adjusted manually. The cutoff can also be controlled by the keyboard and modulated by various modulation generators. The MiniBrute 2 filter is based on Nyle Steiner's *Sallen & Key* architecture (designed in the 70s) and offers -12dB/octave slopes in LP and HP modes, and -6dB/octave slopes in BP and Notch modes.



*The Filter section*

### 5.4.1. Mode

This selects among the four filter modes: **LP** (low-pass), **BP** (band-pass), **HP** (high-pass), and **Notch**. The **LP** mode is the most commonly used, and provides sounds which are full, fat, and round. The **BP** and **HP** modes provide thinner and harsher sounds. When modulated by an LFO, the **Notch** filter mode sounds similar to a phaser effect pedal.

### 5.4.2. Cutoff

This knob adjusts the filter's cutoff frequency. The frequency range goes from below 20Hz when turned fully counter-clockwise up to 18kHz when fully clockwise. For example, in **LP** mode you can adjust a sound's brightness. As an exercise,

- Set all of the OSC MIXER sliders to O (lowest position)
- Adjust the **NOISE** generator slider to midrange
- Set all of the filter envelope and amplifier envelope sliders to O
- Set the filter mode to **LP**
- Play and hold a note
- Adjust the **Cutoff** knob as you listen to the changes in the sound.


**i** You may want to try the same experiment with the other filter settings (BP, HP, and Notch). Since a noise source contains all frequencies, this is a great way to hear exactly which ones are cut and boosted by each filter type. **!** Resonant filters can overload an audio circuit very easily. Be careful with the various levels involved (Noise level, Resonance amount, Master Volume, and the channel settings of your mixer or speaker). **This is especially true when you are working with headphones!**

### 5.4.3. Resonance

This knob lets you create a resonance peak at the cutoff frequency. Turning it clockwise emphasizes the partials at the cutoff frequency, and the sound becomes more aggressive. When the knob reaches its last quarter zone, the filter starts to oscillate on its own. However, this oscillating behavior depends on the cutoff frequency; the MiniBrute 2 filter oscillates within a range beginning around 180Hz up to approximately 8kHz. To extend the oscillation range, use the **Brute Factor** knob.

### 5.4.4. FM knob

The **FM** knob lets you control the amplitude and polarity of the envelope signal sent to modulate the filter cutoff frequency. At the middle position (12 o'clock), no envelope modulation occurs. When turned counter-clockwise (below the center), the FM knob sends an increasing amount of the inverted ADSR envelope. When turned clockwise (above the center) the FM knob sends an increasing amount of the standard, positive-going ADSR envelope.

 If you do not hear the effect of a negative-going filter envelope, try raising the Cutoff frequency. Conversely, if you do not hear the effect of a positive-going filter envelope, try lowering the Cutoff frequency.

#### 5.4.4.1. ADSR (the filter envelope)

The letters "ADSR" are silkscreened under the FM1 knob because this connection has been pre-wired for you. However this connection can be bypassed through the [patch bay \[p.53\]](#). The [ADSR Envelope \[p.50\]](#) is covered extensively in the [Basics of Synthesis \[p.41\]](#) chapter.

## 5.4.5. RM (Resonance Modulation)

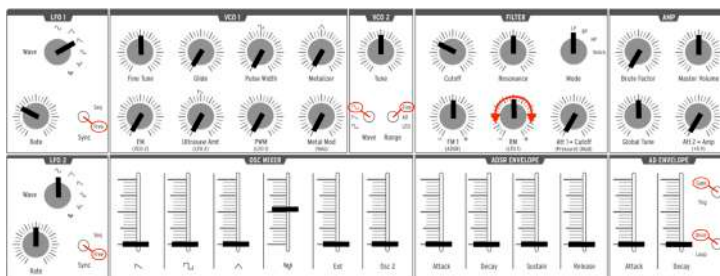
This parameter modulates the level of resonance that will occur at the cutoff frequency of the filter. It is pre-wired to be modulated by LFO 1, but the patch bay can be used to route another input as the resonance modulation source.

This control is bi-polar, which means it allows the modulation to be either positive- or negative-going. It also means that when the knob is set to the center position (12:00) no modulation will occur.

Here's a good experiment to illustrate what the RM parameter does:

- Set all of the OSC MIXER sliders to 0 (lowest position)
- Adjust the **NOISE** generator slider to midrange
- Set all of the filter envelope and amplifier envelope sliders to 0
- Set the filter mode to **LP**
- Set the Cutoff knob to the 10:00 position
- Set the Resonance knob to the middle position (12:00)
- Set the LFO 1 waveshape to Sawtooth and the Rate to the 10:00 position
- Play and hold a note
- Slowly turn the RM knob clockwise (positive). At about the 3:00 position you should hear a falling "chirp" similar to an early electronic drum kit.
- Slowly turn the RM knob counter-clockwise (negative). At about the 9:00 position you should hear that same "chirp" sound, but it will rise instead of fall. It will actually sound like a recording of the same drum is being played backward.

Here's a graphic representation of the RM experiment:



*Experimenting with RM modulation*

**i** For the technically-minded, you may notice that there is a slight deformation of the RM signal due to the threshold in the bipolar attenuator circuitry.

### 5.4.6. Att 1 > Cutoff

This parameter provides another method of modulating the filter cutoff frequency. It is pre-wired to control the amount of pressure-sensitivity that will be applied to the filter, but the patch bay can be used to route another input as the modulation source.

The "Att 1" portion of the label stands for "Attenuator 1". The patch bay has a section labeled "Attenuators", and when a different source is routed to the first pair of connectors there, that input source becomes the modulator for which the Att 1 > Cutoff knob sets the modulation range. There's more to say about using the patch bay and [the Attenuators \[p.71\]](#), and we'll cover that in the [patch bay chapter \[p.53\]](#).

## 5.5. The Amplifier section (AMP)

The amplifier section controls the final stage of the MiniBrute 2 output. Everything else that has happened on the synth will be fed through this section before it reaches the audio output connectors.



*The Amplifier section*

### 5.5.1. Brute Factor

The **Brute Factor** is a special MiniBrute 2 feature inspired by a common patch used on a famous vintage mono-synthesizer that connected the headphone output to the external audio input. The result is a kind of feedback loop that's ideal for raspy and grungy sounds. This patch has been implemented internally to the MiniBrute 2, and is controlled by the **Brute Factor** knob.

This knob's normal position is fully counter-clockwise, which disables the **Brute Factor**; turning up the knob gradually adds distortion to the sound. For low **Brute Factor** settings the distortion is smooth and gentle, but it becomes more harsh as you turn up the knob. When turned up higher than about 75% of the way, the MiniBrute 2 can go berserk and produce barely controllable, crazy feedback sounds.

**i**!: The Brute Factor feature drastically alters the filter characteristics, so expect highly unpredictable results at extreme settings. You have been warned!

### 5.5.2. Master Volume

This knob controls the overall output level of the MiniBrute 2, and also controls the audio that arrives at the Master input in the patch bay. It affects only the rear panel outputs (Master and Headphones).

### 5.5.3. Global Tune

Once the oscillators have warmed up you can use this knob to tune the MiniBrute 2 to other devices. See the [Warm-Up and General Tuning \[p.9\]](#) section of the [Installation chapter \[p.6\]](#) for more information.

### 5.5.4. Att 2 > Amp

Under ordinary circumstances the Att 2 > Amp knob is kept at the minimum position; this allows the AD Envelope generator to open and close completely from silence to silence. However, there may be times when a non-zero setting of this knob is very useful. For example:

- To keep the amplitude at a constant level so you can program a sound with both hands
- To create a drone patch that is constantly evolving as parameters are being modulated via the patch bay
- To create a patch with an infinite decay/release time

The beauty of having a knob to control this parameter, rather than a switch that simply forces the VCA to a never-ending maximum level, is that you can control the level at which the envelope stays open.

## 5.6. The Osc Mixer

The oscillators deliver four basic waveforms: sawtooth, pulse, triangle, and sine (VCO 2 only). These waveforms are accessible through the Oscillator mixer and their respective levels can be adjusted with the sliders. A second oscillator is available to thicken the sound through detuning or setting its pitch to other intervals.

The mixer also controls the level of noise and of external audio (if an external source is plugged into the patch bay's Ext in jack). The mixed signals then feed the filter. The waveforms of VCO 1 can also be modified using signal enhancers (Ultrasaw, Pulse Width Modulation and Metalizer).



*The Oscillator mixer section*

### 5.6.1. Saw / Ultrasaw (VCO 1)

The combined level of the plain Saw (sawtooth) and Ultrasaw signals is controlled with the slider labeled with the saw icon. Pulling it down completely mutes the signals, while moving it up increases their level. When the **Ultrasaw Amt** knob is fully counter-clockwise, only the saw signal is audible. Turning this knob clockwise mixes more Ultrasaw sound in with the plain saw signal.

The Ultrasaw consists of two copies of the plain saw that are independently phase-shifted using LFO 2 (by default). The phase shift of one copy is modulated at a constant rate (1Hz), while the second copy's phase shift modulation rate can be controlled with the **LFO 2 Rate** knob from a rate of 0.1Hz (minimum) for slow-beating frequency effects, increased gradually for chorusing and supersaw effects, and increased further to 100Hz (maximum) for special effect sounds.

The shape of the phase-shifting can also be altered by changing the LFO 2 waveform.

### 5.6.2. Square / Modulated Pulse (VCO 1)

The level of the plain Square wave and Pulse width modulated signals is controlled with the slider labeled with the square symbol. Pulling it down completely mutes the signals and moving it up increases their level. When the **PWM** knob and the **Pulse Width** knob are both fully counter-clockwise, the pure square wave is audible. Turning the **Pulse Width** knob clockwise transforms the square wave into an asymmetrical pulse whose width can be increased up to 98%, giving a very "acid" sound (like an oboe).

The pulse width is also under the control of **LFO 1** by default. The depth of the pulse width modulation can be adjusted with the **PWM** knob in the VCO 1 section, and the shape of the LFO can be changed with the **LFO 1 Wave** knob.

### 5.6.3. Triangle / Metalizer (VCO 1)

The level of the Triangle wave and Metalizer is controlled with the slider labeled with the triangle icon. Pulling it down completely mutes the signals and moving it up increases their level. Turning the **Metalizer** knob from fully counter-clockwise to fully clockwise warps the triangle wave's smooth, flute-like sound into complex, metallic-sounding waves.

The wave warping/folding is also under the control of an additional modulator: the **Metal Mod** knob. Velocity is routed to the Metal Mod by default, but the patch bay allows you to use something else to modulate the parameter instead.

**i** ⚙️: The Metalizer knob sets the minimum amount of waveshaping and the Metal Amt knob sets the modulation range for additional waveshaping. But they share the same amount of warping/folding potential, so if the Metalizer knob is at maximum there is very little headroom left for modulation by the Metal Amt source.

### 5.6.4. Noise

The signal mixer also provides the control of other signals which aren't generated by the oscillators. The Noise slider potentiometer adjusts the amount of white noise signal sent to the filter. Mixing a small amount of noise with oscillator waves creates a kind of breathing, natural quality. For example, mixing the Triangle wave with a small quantity of noise creates a credible flute sound. Noise is also useful on its own to create various special effects or nature sounds such as wind, water streams, and rain, as well as percussive sounds such as cymbals.

### 5.6.5. Ext

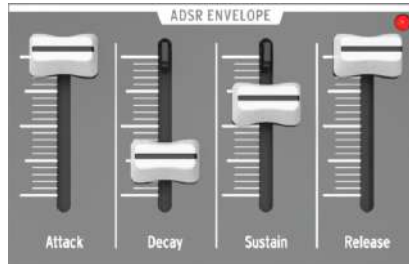
The **Ext** slider adjusts the amount of an external audio source that can be plugged into the MiniBrute 2 signal path via the **Ext** jack in the **EXT IN** section of the [patch bay \[p.53\]](#). This makes it possible to process an external audio signal with the filter and amplifier.

### 5.6.6. Osc 2 (VCO 2)


This slider controls the output level of VCO 2 into the Amplifier section. See the [VCO 2 \[p.28\]](#) section for a full description of the capabilities of the second oscillator,

### 5.6.7. ADSR Envelope sliders

These four sliders affect the Filter by default. Their functions are described extensively in the [Basics of Synthesis chapter \[p.50\]](#).



*The ADSR Envelope section*

**i**  An LED indicator shows the envelope amount that is being sent to the filter. The LED's brightness depends on the envelope signal's amplitude.


### 5.6.8. AD Envelope sliders

These two sliders affect the Amplifier by default. Their functions have been described extensively [here \[p.12\]](#), but here's a quick review:

- The **Attack** slider sets the duration of the envelope's first stage. The Attack time ranges from 1ms to 14s.
- The **Decay** slider sets the duration of the AD envelope's final stage. The Decay time ranges from 1ms to 14s.



*The AD Envelope section*

**i**  An LED indicator shows the envelope amount that is being sent to the amplifier. The LED's brightness depends on the envelope signal's amplitude.

## 5.6.9. AD Envelope switches

Normally the amplifier envelope is triggered by the playing of a note, but it can also be triggered by other sources via the patch bay. Whichever method is used to trigger the envelope, the four switches in the AD Envelope section determine the behavior of the envelope after it has been triggered.

### 5.6.9.1. Gate/Trig

This switch toggles the function of the AD Envelope between two settings: Gate and Trig.

- **Gate:** The AD Envelope starts when a note is played/triggered and proceeds to maximum level at the Attack rate. The amplifier sustains at maximum level until the note is released, and then the envelope enters the Decay stage. The envelope will not reset completely to zero if another note is triggered before the Decay stage has ended; it will resume the attack stage of the amplitude envelope and proceed to maximum level at the Attack rate.
- **Trig:** The AD Envelope starts when a note is played/triggered. There is no sustain stage; the envelope enters the Decay stage after the Attack time has been fulfilled. The full envelope will run unless another note is triggered, at which time the amplitude resets to zero and the envelope starts again.



i: The AD Envelope is normally triggered when the ADSR Envelope is triggered, but a different trigger source may be routed into the AD Envelope via the patch bay.

### 5.6.9.2. Once/Loop

This switch toggles the function of the AD Envelope between two settings: Once and Loop.

- **Once:** When a note is played/triggered the amplitude rises from zero at the Attack rate and returns to zero at the Decay rate.
- **Loop:** When the envelope reaches the end of the Decay stage it will start over from the beginning. It will continue to loop through the Attack and Decay stages until the note is released or retriggered.

The following chart may be helpful in keeping track of what happens when different combinations of these two switches are used.

Switch combination	AD Envelope response
Gate + Once	The envelope rises when it receives a gate signal (note on). It falls when the gate ends (note off).
Gate + Loop	The envelope rises when it receives a gate signal (note on), and loops until the gate ends (note off), at which point it falls from its current position.
Trig + Once	The envelope plays an Attack-Decay cycle when it receives a trigger (note on). The envelope is retriggered when it receives a new trigger, regardless of the current position.
Trig + Loop	The envelope loops indefinitely and is retriggered by a new trigger (note on), regardless of the current position.

## 5.7. Legato vs. Retrigger note response



*The Legato/Retrig response key*

There's a secondary Shift function that allows you to decide how you want the MiniBrute 2 to respond when notes are played in a legato fashion (i.e., a second note is played before the first note is released). There are two possible responses: with the Legato setting the notes do not retrigger, and with the Retrigger setting the notes do retrigger.

Retrig mode will restart the envelopes from their Attack stages unless a cable is plugged into one of the Trig inputs in the patch bay.

To toggle between Legato and Retrigger response, hold the Shift button and press the highest E on the keyboard.

## 5.8. The Patch bay section

For a description of the patch bay features, see the [Patch Bay chapter \[p.53\]](#).

## 5.9. Secondary Shift functions

There are some very useful secondary functions that are activated by holding the Shift button and then pressing a key or a button. For a description of those features, see the [Shift functions \[p.123\]](#) chapter.

## 6. BASICS OF SYNTHESIS

Your MiniBrute 2 is a true analog synthesizer, so all sounds are produced by analog electronic circuits. No digital computer circuitry is involved in the generation, filtering, or basic control of the sound. This is one of the reasons why MiniBrute 2 creates rich, animated, and lively electronic sounds.

### 6.1. Analog synthesizer architecture

The analog sound production chain uses a classical approach called subtractive synthesis. The basic sound generator is a waveform with a rich harmonic content; filtering then “subtracts” harmonics to create new variations on the original timbre. Subsequent circuits (an envelope generator in conjunction with a VCA, or voltage-controller amplifier) alter the level in a precise way to create dynamics.

#### 6.1.1. Signal generators

The signal generators are the circuits that produce the basic waveforms for sound creation. There are two basic categories: pitched signal generators and the unpitched signal generators.

##### 6.1.1.1. Pitched signal generator (oscillators)

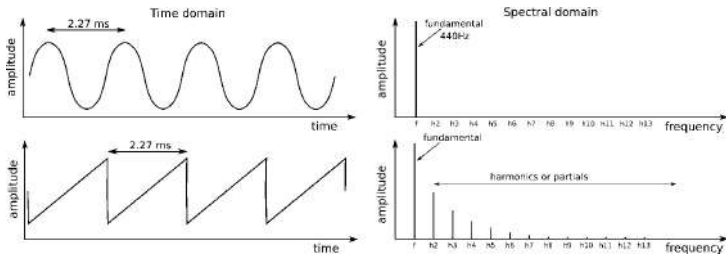
This device, also called an oscillator, produces an electronic signal characterized by a repetitive, shaped pattern (called a waveform). The number of times this pattern repeats in a second determines the signal’s frequency, which determines its pitch. For example, a pattern that repeats every 2.27ms corresponds to a fundamental frequency of 440 cycles per second, or 440 Hertz (a unit of measurement for cycles per second named in honor of Heinrich Hertz, who first demonstrated the existence of magnetic waves, and abbreviated Hz). This frequency is associated with the pitch of middle A on a piano keyboard. In general, oscillators will provide some or all of the following basic waveforms: sine wave, triangular wave, sawtooth wave, square and pulse waves.



*A single cycle of each waveform: sine, triangle, sawtooth, square, and pulse*

If these waveforms have the same frequency, then their pitch is equivalent. However, different waveform shapes have different timbres. For example, the sine wave sounds dark and plain, while the sawtooth wave sounds very bright. The square wave sounds a bit like a clarinet and the pulse wave resembles an oboe.

These complex waveforms are actually made up of multiple sine waves – a fundamental sine wave that determines the base frequency, and sine waves representing higher harmonics (also called overtones or partials) of that frequency which, when added together, produce a unique timbre. These harmonics are an integer multiple of the fundamental frequency, i.e., the second harmonic is twice the fundamental frequency, the third harmonic is three times the fundamental, and so on.

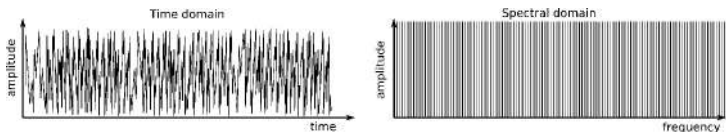


*The fundamental frequencies and harmonics of sine and sawtooth waveforms*

Most importantly, other devices can control an oscillator to set its pitch (keyboard controller), modulate its pitch (vibrato), and modulate the shape of the waveforms (PWM, Ultrasaw).

### 6.1.1.2. Unpitched signal generator

Unlike the previous category, an unpitched signal generator (also called noise generator) has no regular, periodic pattern – the signal's amplitude is always changing randomly. Therefore, it has no fundamental frequency (hence no pitch), and its harmonic spectrum consists of a nearly infinite number of frequencies that have no harmonic relationship.



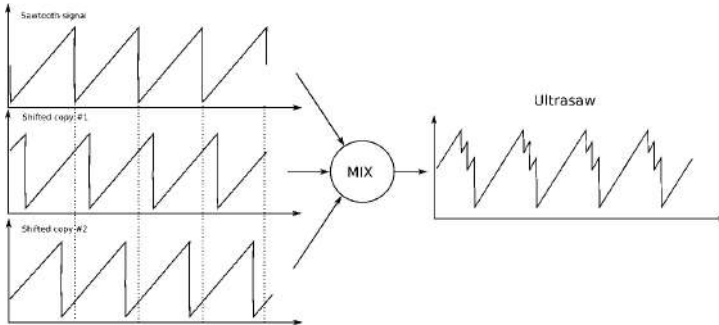
*The output of a random noise generator*

Such signals sound very different from the pitched signals, and are like the sound of wind, a water stream, steam exhaust, rain, waterfall, etc.

## 6.1.2. Signal enhancers

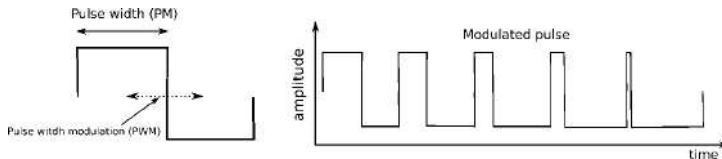
Signal enhancers (or wave-shapers) transform or distort the oscillator's basic pitched signal to increase their harmonic content, and make them sound brighter and richer. The MiniBrute 2 provides three signal enhancers:

- The **Ultrasaw** builds two phase-shifted copies of the basic sawtooth signal. These copies have independent and ever-evolving phase shifts with respect to each other, and are eventually mixed with the sawtooth signal. This results in a lively, rich, and bright ensemble effect whose character depends on the modulation rates of the phase-shifted copies.



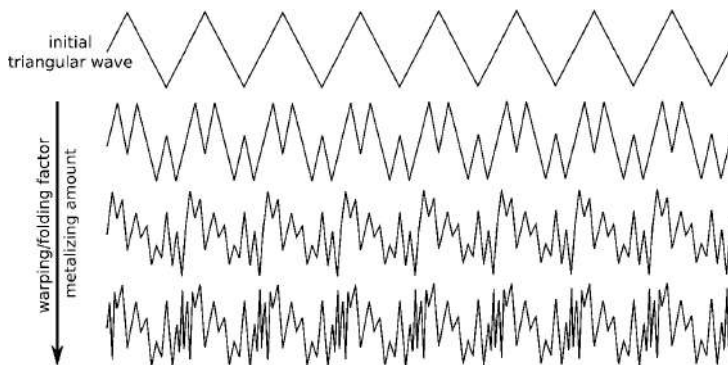
*The generation of an Ultrasaw waveform*

- The **Pulse Width Modulator** (or **PWM**) takes the square wave and changes the ratio between the time the waveform is at maximum or minimum. The square wave corresponds to a 50% PW. The pulse width can be set over a wide range (50% to 90%) making it possible to create a wide variety of instruments that sound "reedy", or like woodwinds.



*The pulse width of a square wave can be modulated*

- The **Metalizer** takes the basic triangular waveform and "warps/folds" it to create very complex jagged waveforms that are rich in high harmonics. This results in "metallic" pitched sounds that are ideal for harpsichord- and clavinet-type tones. Dynamic modulation (LFO or envelope) of the warp/folding parameters opens up a realm of clangorous, spring coil-like sounds.



*The top of a triangle wave is folded over by the Metalizer*

## **6.1.3. Filter**

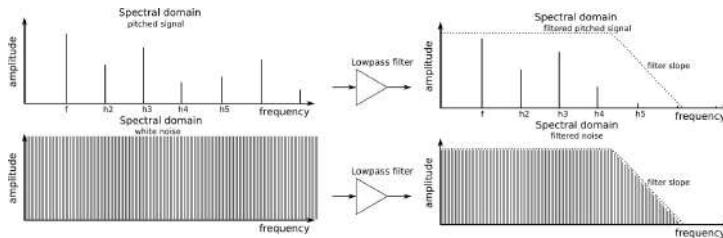
### **6.1.3.1. What is a filter?**

In general, a filter follows the signal generator and signal enhancers, and modifies the spectral content of the signal or signals. This can involve either attenuating (filtering out) or emphasizing (resonating) particular overtones and partials, and these changes can be either static or dynamic. Filters are very important circuits whose design contributes greatly to the a synthesizer's sound and character.

### 6.1.3.2. Filter types: Low-pass, Band-pass, High-pass and Notch

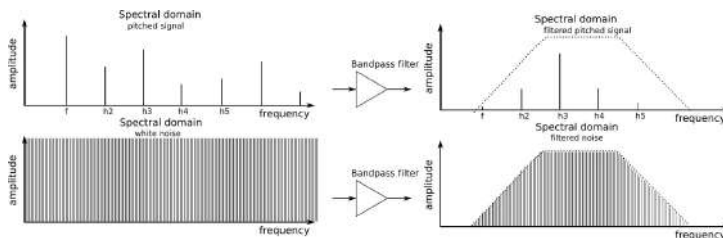
A filter can operate in various ways or modes. These modes are called **transfer functions** or **spectral responses**. In the MiniBrute 2 the filter can operate either as a low-pass filter, a band-pass filter, a high-pass filter, or a notch filter.

In **low-pass** mode, the spectral contents below a given *cutoff frequency* (shortened to *cutoff*) remain unchanged, while partials above the cutoff are attenuated. The attenuation is a function of the frequency where the higher the partial frequency, the greater the attenuation. In other words, it is called a low-pass mode because it passes the low frequencies below the cutoff and reduces the high frequencies above the cutoff. This correlation of attenuation to frequency determines the filter's slope, which is measured in -dB/octave (i.e., the amount of attenuation applied to a partial with a frequency twice as high as the cutoff).



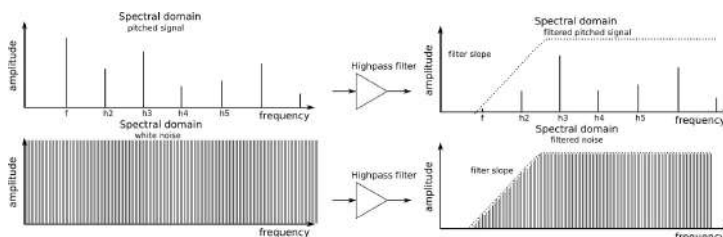
How a low-pass filter affects the sound

In **band-pass** mode, the cutoff frequency becomes a band's center frequency. Partial within this band remain unchanged, while partials below or above the band's range are attenuated strongly.



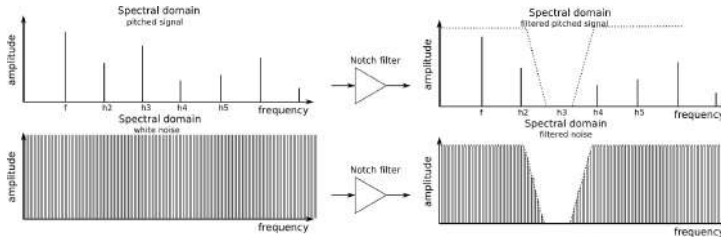
How a band-pass filter affects the sound

In **high-pass** mode, partials above the cutoff frequency remain unchanged, while the partials below the cutoff are attenuated.



How a high-pass filter affects the sound

In **notch** mode (or rejection filter) the cutoff frequency becomes a band's center frequency; partials within this band are attenuated, while partials above and below this band remain unchanged.

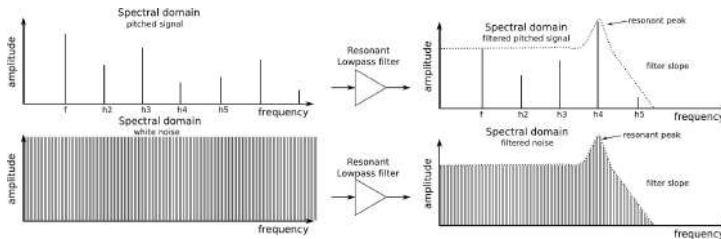


*How a notch filter affects the sound*

The cutoff frequency doesn't have to be static; controlling it with other devices like a keyboard (keyboard tracking), or LFO, envelope generator, or other controllers, creates dynamically-changing, interesting timbres.

### 6.1.3.3. Resonance or emphasis

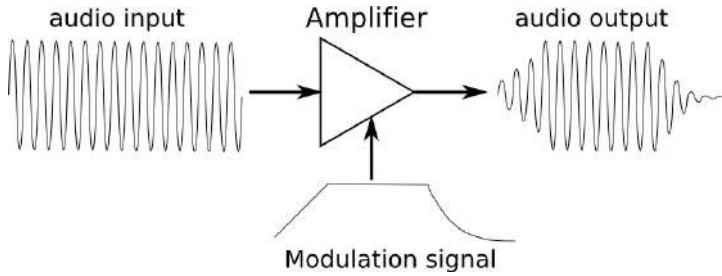
Resonance is a filter's ability to amplify or emphasize partials that are close to the cutoff frequency, thus creating a peak in the spectral response. This parameter can be increased up to a point where the filters no longer acts like a mere filter, but starts to oscillate on its own.



*The resonance emphasizes a particular range of frequencies*

### 6.1.4. Amplifier

The amplifier generally follows the filter, and determines the signal's overall amplitude. Its gain is controllable through various modulation sources such as an LFO, envelope generator, or some kind of external control (like a foot pedal). The amplifier is primarily responsible for shaping a sound's dynamics.



*The Amplifier is the final stage of the signal*

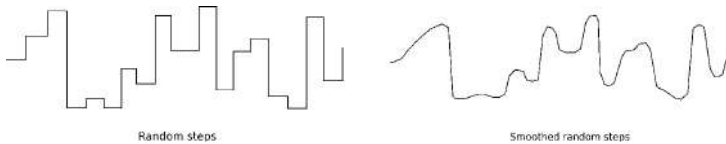
## 6.1.5. Modulators

Modulators provide signals that are designed specifically to control the behavior of oscillators, filters and amplifiers. Unlike audio oscillators, modulators are low-frequency signals. For example, when you sing with vibrato, you are “modulating” your voice with a low-frequency change in pitch, typically around 5Hz or so. The tremolo circuit in a guitar amplifier modulates the amplifier’s level.

Modulators are useful to create dynamic pitch changes (like “wobulation” or creating chirps), timbre sweeps, and level variations. The main modulators are the LFO (low frequency oscillator) and envelope generator, but they can also be provided by external sources that generate *control voltage* (CV) signals that provide modulation, and *gate* signals that turn modulators or notes on and off.

### 6.1.5.1. Low-Frequency Oscillators (LFOs)

An LFO is low frequency oscillator that can produce various waveforms at sub-audio frequencies (0.05Hz up to 100Hz). In MiniBrute 2 the waveform options are sine, triangle, sawtooth, square, random steps, and random waves. These waves’ amount and polarity (i.e., whether they go positive or negative) can be controlled before being fed to the target devices.



*A signal can be modified by random steps or smoothed random steps*

### 6.1.5.2. Envelope generators

Contrary to an LFO, an envelope generator does not provide a repeating pattern but is controlled by the keyboard or Gate input. The AD ENVELOPE controls the amplitude of the sound, while the ADSR ENVELOPE is dedicated to the Filter and affects the harmonic content of the sound.



The patchbay allows the envelopes to be routed to other destinations and triggered by other sources.

## AD (Attack, Decay)

The AD envelope determines how the level changes over time when you play a note. By changing its parameters (Attack and Decay) we can control how the sound fades in and fades out. We experimented with [the AD envelope \[p.12\]](#) in the Quick start chapter.

## ADSR (Attack, Decay, Sustain, Release)

The Attack, Decay, Sustain, and Release sliders control different stages of the Filter envelope. Here's a quick walk-through of each stage.

- Set the AD ENVELOPE Attack and Decay sliders to minimum
- Turn the FILTER Cutoff knob to minimum
- In the OSC MIXER section,
  - Lower the Osc 2 slider to minimum
  - Lower the Osc 1 square wave slider to minimum
  - Raise the Osc 1 sawtooth slider to maximum

The sawtooth wave has more harmonic content than the square wave, which will make it easier to hear the impact each of the ADSR stages has on the filter.

## Attack

Play a note. The sound will be very faint.

- Turn the FILTER section's FM1 knob clockwise to maximum
- Raise the ADSR Attack slider until it is 3/4 of the way up

Now play a note and hold it. The harmonic content of the sound will increase gradually until the sound is very bright, and then it will fall off very quickly because the Decay slider is set to minimum.

## Decay

- Lower the ADSR Attack slider to minimum
- Play a note repeatedly and raise the ADSR Decay slider gradually until it is 3/4 of the way up

Now play a note and hold it. The sound will start quickly and be very bright, but the harmonic content will be reduced gradually until the sound is very faint again. The decay time of the filter envelope makes a major contribution to the character of a sound.

## Sustain

The Sustain stage controls a level, not a rate. It sets the target for the Decay stage, the resting point for the decay of the harmonic content.

- Set the ADSR Decay slider to the halfway point
- Play a note and listen to resting point of the harmonic content
- Raise the ADSR Sustain slider to about 2/3 of the way up

Now play a note and hold it. The harmonic content of the sound will decay as quickly as it did when the first note was played, but it will not decay the same amount this time. The Sustain level tells the filter that it should remain somewhat open as long as the note is held. This allows a certain amount of harmonic content to remain audible.

## Release

Until this point in our ADSR experiments the filter envelope has always cut off quickly after the note has been released. The Release stage controls the amount of time it will take for the filter to die out after releasing the note.

- Raise the AD Decay slider to about 3/4 of the way up
- Set the ADSR Decay and Sustain sliders to about 2/3 of the way up

Play the same note repeatedly and raise the ADSR Release slider gradually. The harmonic content of the notes you play will take longer to die out after the notes are released.

But this part may be more difficult to understand unless we also perform the following experiment.

- Lower the AD Decay slider to minimum
- Play a note and release it. The sound will die out as soon as the note is released.

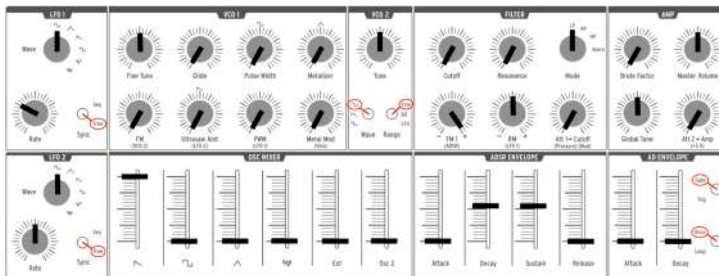
Now play the same note repeatedly as you raise and lower the ADSR Release slider. The slider doesn't seem to be doing anything now. This is because the AD envelope controls the amplitude of the sound; if the amplitude has been reduced to zero by the AD Decay stage upon the release of the note, the ADSR Release stage will not be heard because the sound itself is no longer audible.

### 6.1.5.3. AD Attack vs. ADSR Attack: What's the difference?

Now that we've gone through all of the stages of each envelope type, let's do a quick experiment to illustrate the difference between them.

- In the FILTER section, set the Cutoff knob to minimum and the FM1 knob to maximum (+)
- In the OSC MIXER section, set the sawtooth slider to maximum and all other sliders to minimum
- Set all sliders to minimum in the ADSR and AD Envelope sections as a starting point
- In the ADSR ENVELOPE section, raise the Decay and Sustain sliders to the halfway point
- No cables should be connected in the patch bay.

Here's an overview of the patch at this point, just to make sure we're on the same page:



*Starting point for ADSR/filter envelope example*

When you play a note the sound should start quickly and brightly and die just as quickly when the note is released. While the note is being held its harmonic content should take about 2 seconds to reach the Sustain level.

- Raise the ADSR Attack slider to the halfway point
- Play a note and hold it. The harmonic content of the sound will build gradually.
- Lower the ADSR Attack slider to minimum again.
- Raise the AD Attack slider to about 3/4 of the way up

Now play a note and hold it while listening carefully. The sound will fade in gradually but its harmonic content will remain constant throughout the change in amplitude.

## 7. THE PATCH BAY

The MiniBrute 2 is an impressive synthesizer with a powerful set of analog circuitry that puts it in a class of its own. But with the addition of the patch bay the MiniBrute 2 joins ranks with modular synthesizers many times its size.



*The MiniBrute 2 patch bay*

This manual will focus mostly on the individual sections of the MiniBrute 2 patch bay and how they relate to one another. But there are as many additional ways to use the patch bay as there are external synthesizers that can generate compatible signals.

### 7.1. General concepts

#### 7.1.1. Patch bay sections

A white line is drawn around certain groupings of input/output jacks. This indicates which connections are related to which MiniBrute 2 components.



*White lines mark section boundaries in the patch bay*

In the example above, the first three jacks on the left pertain to the Filter, the three in the middle pertain to the final output stage (AMP), and the two jacks on the route signals to/from the Inverter circuit.

We'll cover the function of each section of the patch bay later in this chapter.

### 7.1.2. Patch points: Inputs vs. Outputs

The connectors in the MiniBrute 2 patch bay fall into two main categories: inputs and outputs. It is easy to know which is which: The output jacks are labeled with white boxes containing text or graphics, and the input jacks only have words under them.



*The input and output jacks have different label types*

Use the output jacks as sources for the input jacks, and use the input jacks as destinations for the output jacks.

### 7.1.3. Outputs are full-scale

The signal at the output jacks is the direct output of whatever source they represent. For example, the waveform output jacks in the VCO 1 section are full-strength; adjusting the sliders in the OSC MIXER section will not control their output levels.



*Direct waveform outputs*

Other examples include the Out 1 and Out 2 jacks in the LFO 1&2 section. If the direct output signal of an LFO is too wide for the desired input destination, it will need to be limited somehow. Fortunately, we have provided two sets of Attenuators in the patch bay for this purpose. We'll describe how to use the [Attenuators \[p.71\]](#) in that section of the manual.

### 7.1.4. Pre-wired connections

Many of the patch points have blue letters silkscreened above the jacks. If you look closely, you will notice that these are all input jacks.



*Blue labels show default input routings*

We'll go over what each one of these labels means as we cover each section of the patch bay. But to use one example from the section pictured above, the label (KBD) means the Pitch of VCO 1 normally tracks the MiniBrute 2 keyboard (abbreviated KBD). If a patch cable is connected to the VCO 1 Pitch jack it will break this connection and tell VCO 1 to expect its modulation signals to come from another source such as an LFO or the output of an envelope.

## 7.1.5. External devices vs. internal routings

Most of the input and output jacks can be connected to others within the patch bay. However, some of the connectors make the most sense in terms of connection to an external device. For example, consider the Sequencer section:



*The Sequencer section of the patch bay*

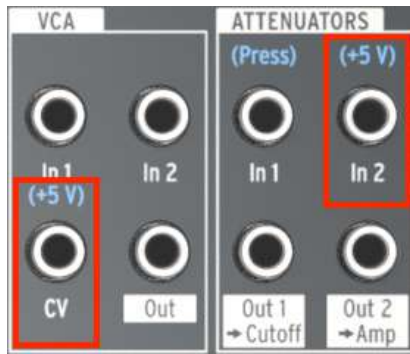
The Clock input jack is intended to receive signals from an external device so that the MiniBrute 2 Sequencer and Arpeggiator can be synchronized to an external clock source.

Likewise, the Sync output jack is intended to transmit signals to an external device so that the MiniBrute 2 can serve as the master clock source for an external device.

**i**: The MIDI Control Center software allows you to specify what sort of clock the MiniBrute 2 should send and receive. A wide range of options is available; see the [MCC \[p.109\]](#) chapter for more information.

### 7.1.5.1. Control voltage inputs

Some labels reveal the default control voltages the MiniBrute 2 is using internally:



*These labels indicate internal voltages*

For example, for the VCA section's CV input and the ATTENUATOR section's Att 2 input, the pre-wired control is the internal +5V source of the MiniBrute 2. But you can patch any control voltage standard into the patch bay here (1V, 2V, 5V, 8V, etc.).

## 7.2. The VCO 1 section



*The VCO 1 section*

### 7.2.1. Pitch

The pre-wired connection into the Pitch of VCO 1 is the keyboard (KBD). Plugging in a patch cable will break that connection and allow the new source to control the VCO 1 frequency.

### 7.2.2. FM

When a patch cable is connected to the FM input jack the pre-wired connection between VCO 1 and VCO 2 is broken. As with VCO 2, the amount of the VCO 1 frequency modulation (FM) is governed by the FM knob in the VCO 1 section of the top panel. That knob must be set to a value higher than zero for FM to occur.

### 7.2.3. Ultrasaw

Normally the intensity of the [Ultrasaw \[p.36\]](#) waveform modifier is based on the settings of LFO 2. Interrupting that connection with a patch cable allows the new source to control the phase shift modulation rate of the second copy of the sawtooth wave.

Remember: the amount of the Ultrasaw modulation is governed by the Ultrasaw Amt knob in the VCO 1 section of the top panel. That knob must be set to a value higher than zero for the Ultrasaw to be heard. The Sawtooth slider in the OSC MIXER section must also be set high enough for the basic sawtooth wave to be heard.

### 7.2.4. PWM

LFO 1 is the source of the Pulse Width Modulation (PWM) by default, but another source can be used to control it through this patch point.

To hear PWM it is necessary to have the PWM knob in the VCO 1 section of the top panel set to a non-zero value. The Square wave slider in the OSC MIXER section must also be set high enough.

## 7.2.5. Metal In

The Metal In patch point allows an incoming source to be wave-folded the same way the VCO 1 triangle wave would be. Inserting a patch cable here bypasses the pre-wired VCO 1 triangle waveform.

To hear the Metalizer effect on the source it is necessary to have the Metalizer knob or the Metal Mod knob set to a non-zero value. The Triangle wave slider in the OSC MIXER section must also be set high enough.

Remember: the Metalizer and Metal Mod knobs affect one another: a combination of the Metal Mod source and the setting of the Metal Mod knob interact to alter the level of the Metalizer effect.



The Metal In jack is AC-coupled, which is a technical term that means that slow LFOs or envelopes are not likely to be wavefolded properly by the Metal In circuitry.

## 7.2.6. Metal Mod

The default source of the Metal Mod parameter is the velocity of a note played on the MiniBrute 2 keyboard. But a different source may be used by connecting its output to this patch point.

For example, try connecting a patch cable from the Out 1 of the LFO 1&2 section of the patch bay to the Metal Mod input. The depth of the LFO 1 modulation of the Metalizer can be adjusted with the Metal Mod knob, while the LFO 1 rate and waveform can be used to shape that modulation in different ways.

Remember: the Metalizer knob sets the initial amount of the Metalizer effect, and the Metal Mod knob determines how much modulation of that amount will occur.

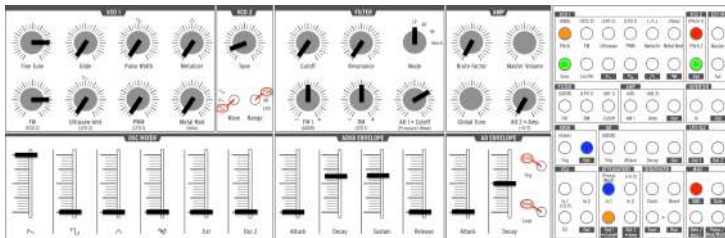
## 7.2.7. Sync

There is no pre-wired connection for this input. It can be used to set up the classic "hard sync" sound by forcing VCO 1 to follow the pitch of VCO 2.

Here's an example patch:

- Tune VCO 2 down one octave
- Set VCO 2 Wave to Square and Range to Fine
- Transpose the MiniBrute 2 down two octaves
- Set all OSC MIXER faders to minimum except Sawtooth
- In the VCO 1 section, set Fine Tune and FM to about the 3:00 position
- Select LP in the Filter section and set FM and RM to center (12:00)
- Set Cutoff and Resonance to zero and Att 1>Cutoff to 2:00
- Set the ADSR Attack and Release to zero
- Set the ADSR Decay and Sustain about 2/3 of the way up
- Make the following connections in the patch bay:
  - MIDI section: KBD (Out) to VCO 2 section: Pitch 2 (In)
  - VCO 2 section: Out to VCO 1 section: Sync (In)
  - ADSR section: Out to ATTENUATORS section: In 1
  - ATTENUATORS section: Out 1 to VCO 1 section: Pitch (In)

Here's roughly how the patch should look. We've omitted the LFOs and other irrelevant settings:



*Hard Sync example patch*

Now play some low notes. You should hear a recognizable sync sweep.

## 7.2.8. Lin FM

Linear (Lin) FM will add harmonics to VCO 1 in a very different way than the exponential FM provided by the FM knob in the VCO 1 section. One of the characteristics of Linear FM is that it is less likely to disrupt the fundamental pitch than Exponential FM.

Here's an experiment that may help show the difference. First, reconstruct the basic [Square Wave patch \[p.10\]](#) from the Quick Start chapter and then:

- Raise the level of Osc 2 in the OSC MIXER
- Set the VCO 2 Range to All and tune VCO 2 an octave higher than VCO 1
- Lower the level of Osc 2 to zero again so you will hear only VCO 1
- Hold a note and listen to the pitch of VCO 1
- Turn the VCO 1 FM knob gradually from zero to about the 4:00 position.

Result: After the FM knob passes the 12:00 point, the original pitch of VCO 1 becomes increasingly difficult to detect. Try sweeping VCO 2 also and you will see that the relationship between the two oscillators is frequently inharmonic. That is exponential FM.

Now let's set up a patch in the patch bay to illustrate the capabilities of Linear FM. Looking only at the patch bay for a moment, make these connections:

- VCO 2 section: Pitch 2 Out to ATTENUATORS section: In 1
- ATTENUATORS section: Out 1 to VCO 1 section: Lin FM (In)
- FILTER section: Connect one end of a cable into the Cutoff input to break the pre-wired Att 1 connection

The patch bay should look like this:



### 7.2.10. Square

This jack provides the full-strength output of the VCO 1 Square waveform. The setting of the Square slider in the OSC MIXER has no effect on this connector. To control its level, route it through one of the [Attenuator \[p.71\]](#) pairs.

### 7.2.11. Triangle

This jack provides the full-strength output of the VCO 1 Triangle waveform. The setting of the Triangle slider in the OSC MIXER has no effect on this connector. To control its level, route it through one of the [Attenuator \[p.71\]](#) pairs.

### 7.2.12. Noise

This jack provides the full-strength output of the Random Noise generator. The setting of the Noise slider in the OSC MIXER has no effect on this connector. To control its level, route it through one of the [Attenuator \[p.71\]](#) pairs.

## 7.3. The VCO 2 section



*The VCO 2 section*

### 7.3.1. Pitch 2 input

Normally VCO 2 will track the pitch of VCO 1, but it is possible to interrupt this connection by plugging another source into the top jack in the VCO 2 section. This allows you to control the VCO 2 frequency with the output of an envelope, for example.

### 7.3.2. VCO 2 Out

This jack provides the full-strength output of the selected VCO 2 waveform. The setting of the Osc 2 slider in the OSC MIXER has no effect on this connector. To control its level, route it through one of the [Attenuator \[p.71\]](#) pairs.

## 7.4. The EXT IN section



*The EXT  
IN  
section*

### 7.4.1. Master

The Master input allows you to run the audio output of another device directly to the outputs of the MiniBrute 2. It does not pass through the filters or any other circuitry; only the Master Volume knob will affect the signal. The level control on the source device might need to be used to balance its level with level of the MiniBrute 2.

### 7.4.2. Ext

The Ext input routes the incoming signal through the entire audio path of the MiniBrute 2: it shows up in the OSC MIXER at the Ext slider, passes through the Filter section, and is processed by the Amplifier section. It could be any sort of audio signal: another synth, a microphone, or a musical passage. Whatever it is, it will be treated as if it were one of the internal VCOs. (Note that you may need to use a pre-amplifier to boost the level of some input signals.)

This also means that In order to hear the Ext input source material you will need to open the MiniBrute 2 gate. This can be done using one of three methods:

- Play a note
- Send a trigger to one of the MiniBrute 2 envelopes (AD Trig input or ADSR Trig input)
- Open the Amplifier with the Att 2 > Amp knob.

## 7.5. The FILTER jacks



*The Filter section*

### 7.5.1. FM input

The ADSR envelope is the pre-wired source for the Filter cutoff Frequency Modulation jack (FM), but another source can be used by plugging a cable into this jack. The new control signal will modulate the Filter cutoff frequency in the amount set by the FM knob in the Filter section.

Remember that in order for modulation of the Filter cutoff frequency to occur, the FM knob must be set to a non-zero value.

### 7.5.2. RM input

LFO 1 is routed to the Resonance Modulation parameter by default, but when another source is plugged into this jack it will become the modulation source instead.

Remember that in order for modulation of the Filter resonance level to occur, the RM knob must be set to a non-zero value.

### 7.5.3. Cutoff

The Filter cutoff frequency can be modulated by any source that is patched into this connection. The depth of the modulation is controlled by the Att 1 > Cutoff knob in the Filter section.

## 7.6. The AMP section



*The AMP section*

If you want something else to control the final output stage of the amplifier instead of the AD Envelope, plug the new source into the AM jack in the AMP section. Doing so will bypass the AD Envelope, so you won't hear any sound out of the MiniBrute 2 until a signal is received at this connector (or the Att 2>Amp knob is raised).

## 7.7. The INVERTER section



*The Inverter section*

The function of this section is simple: whatever signal is plugged into the Inverter section In jack will be inverted at the Out jack.

So for example, if you want to modulate something with LFO 1 but you want the sawtooth wave to ramp upward instead of downward, here's what to do:

- Set the LFO 1 Wave to Sawtooth
- Connect a cable to the Out 1 jack of the LFO 1&2 section in the patch bay
- Connect the other end of the cable into the desired destination (e.g., the VCO 2 Pitch 2 input)

Now instead of the pitch of VCO 2 modulating downward from the peak of the sawtooth LFO wave form, it will modulate upward from the low point of the LFO wave to the peak.



**i**: In cases like the example above you may want to route the output of the LFO through one of the Attenuators first. This will help you to control the depth of the LFO modulation at the destination.

## 7.8. The ADSR section



*The ADSR section*

### 7.8.1. Trig

Normally a gate signal from the MiniBrute 2 keyboard is required to trigger the ADSR Envelope. But you can use a different source instead, such as a trigger signal from a modular synthesizer. To make that happen, plug the new source into the ADSR Trig input jack.

### 7.8.2. ADSR Out jack

The ADSR Envelope is a flexible modulator. If you want to use its stages to control an internal parameter (e.g., VCO 1 FM), connect a cable from the Out jack to the input connector of that parameter.

You can also send that signal to an external device, such as the filter of another modular synthesizer.

## 7.9. The AD section



*The AD section*

### 7.9.1. AD Trig

Normally the AD Envelope is triggered when the ADSR Envelope receives a gate signal. But you can use a different source instead, such as a trigger signal from an external device. To set up this routing plug an appropriate source into the AD Trig input jack.

### 7.9.2. AD Attack

The Attack time of the AD Envelope can be modulated by an external source instead of by the Attack slider in the AD ENVELOPE section. The source can be an LFO, for example. To do this, connect a patch cable from the new source into this patch point.

### 7.9.3. AD Decay

The Decay time of the AD Envelope can be modulated by an external source instead of by the Decay slider in the AD ENVELOPE section. The source can be the Mod wheel, for example. To do this, connect a patch cable from the new source into this patch point.

### 7.9.4. AD Out jack

The AD Envelope is a versatile modulator, able to increase the modulation of a destination gradually (Attack time) or cut it off suddenly (Decay time). If you want to use its stages to control a particular destination (internal or external), connect a cable from the Out jack to the input connector of destination parameter.

## 7.10. The LFO 1&2 section



*The LFO 1&2 section*

### 7.10.1. LFO Out 1

This jack provides the full-strength output of the selected LFO 1 waveform. To control its level, route it through one of the [Attenuator \[p.71\]](#) pairs.

### 7.10.2. LFO Out 2

This jack provides the full-strength output of the selected LFO 2 waveform. To control its level, route it through one of the [Attenuator \[p.71\]](#) pairs.

## 7.11. The VCA section

Like the [External input \[p.64\]](#) section, the VCA section provides an additional way to route internal/external signals through the MiniBrute 2. These signals can be patched to any input jack and used to modulate those destinations.

But unlike the signals that arrive at the Ext In jack, signals sent into the VCA section do not show up at the Ext slider, they do not pass through the filter, and they are not processed by the AMP section. They can be patched to those locations with a patch cable from the [VCA Out \[p.70\]](#) jack into the appropriate input jack, if you like. But their main function is to provide access to the patch bay for incoming control signals.



*The VCA section*

### 7.11.1. In 1 / In 2

In 1 and In 2 are identical in function, so we will cover them both here. Their purpose is to receive up to two input signals, combine those signals into one signal, and send it to a destination from the VCA Out jack.

### 7.11.2. CV

The CV input jack allows an internal/external signal to control the level of the VCA Out jack. The CV signal can be an LFO or some other Control Voltage source.

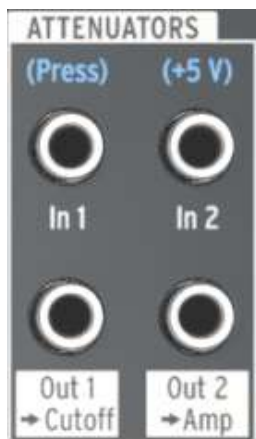
### 7.11.3. VCA Out

This jack will output the combined signals of the In 1 and In 2 jacks at their raw input levels unless they are controlled by an input voltage at the CV jack.

## 7.12. The ATTENUATORS section

The Attenuators provide a way to "tame" the output signal of a source. For example, if you route the output of LFO 2 directly into the Pitch 2 input of VCO 2, the pitch of VCO 2 will sweep the entire frequency range it can generate.

To narrow the modulation range of LFO 2, send its output into one of the Attenuators instead. Then patch a cable from the Out jack of that Attenuator into the Pitch 2 input of VCO 2. After this you will be able to control the modulation amount with the appropriate Attenuator knob (Att 1 > Cutoff or Att 2 > Amp).



*The Attenuators section*

### 7.12.1. Using the Attenuators

There's an important thing to keep in mind: the Attenuator knobs will still control what they are pre-wired to control unless you interrupt the pre-wired connection. This is done by plugging in one side of a patch cable to the appropriate input jack. You could also use a "dummy" TS plug if you prefer to avoid cable clutter.

In practical terms using the same example, if you want to control the output of LFO 2 into the Pitch 2 input:

- Att 1 > Cutoff will control both the output level of LFO 2 and the Filter cutoff at the same time unless you plug something into the Cutoff input jack in the FILTER section of the patch bay.
- Att 2 > Amp will control the output level of LFO 2 and raise the minimum audio output level of the Amplifier unless you plug something into the Amp input jack in the AMP section of the patch bay.

### 7.12.2. In 1 (Att 1)

Patch the output of the signal you want to control into the In 1 jack and then use the Out 1 > Cutoff jack as the source for the desired destination parameter. To control the level of the modulation, use the Att 1 > Cutoff knob in the Filter section.

### 7.12.3. Out 1 > Cutoff (Att 1)

This jack will provide the attenuated output of the source that was connected to the In 1 jack. Route it to the desired destination parameter and then control the amount of modulation with the Att 1 > Cutoff knob on the front panel.



Read the [Using the Attenuators \[p.71\]](#) section for essential information about routing a signal through the Attenuators.

### 7.12.4. In 2 (Att 2)

Patch the output of the signal you want to control into the In 2 jack and then use the Out 2 > Amp jack as the source for the desired destination parameter. To control the level of the modulation, use the Att 2 > Amp knob in the AMP section.

### 7.12.5. Out 2 > Amp (Att 2)

This jack will provide the attenuated output of the source that was connected to the In 2 jack. Route it to the desired destination parameter and then control the amount of modulation with the Att 2 > Amp knob on the front panel.



Read the [Using the Attenuators \[p.71\]](#) section for essential information about routing a signal through the Attenuators.

## 7.13. The Sequencer section



*The Sequencer section*

### 7.13.1. Clock

This jack will receive a clock signal to which the tempo-based components of the MiniBrute 2 can synchronize. To use an external source as the clock, tap the large Sync button until the LED next to the word CLK is lit.

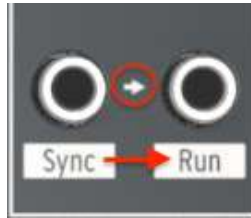
Use the [MIDI Control Center \[p.109\]](#) to instruct the MiniBrute 2 what sort of external clock is being used as the sync reference: 1step (Gate), 1step (Clock), 1pulse (Korg), 24ppq, or 48ppq.

### 7.13.2. Reset

A trigger received at this connector will reset the sequence that is currently playing back to its beginning.

### 7.13.3. Sync & Run

Look closely at the two jacks on the bottom of the Sequencer section. You'll see a small arrow between them:



*Sync > Run are  
interrelated jacks*

The arrow indicates that the Sync and Run jacks are permanently related: When the Sequencer starts it sends clock information to the Sync jack and a trigger voltage to the Run jack.

#### 7.13.3.1. Use a TRS cable between two Arturia products

A single TRS cable is all you need to synchronize the sequencers of two MiniBrute 2 units, or the sequencers of the MiniBrute 2 and another Arturia product such as the MatrixBrute, the BeatStep Pro, or the KeyStep. These products send and receive their Sync and Start signals from a single jack. Simply connect one TRS patch cable from the Sync jack of the master MiniBrute 2 to the Clock input of the slaved Arturia device (or vice versa) and the slave will start, pause, resume playback, and restart from the beginning whenever the master does.

Remember to set the Sync of the slave device to Ext and set both devices to the same clock rate (i.e., 24 ppq). You can specify the clock rate of the MiniBrute 2 with the [MIDI Control Center](#) [p.109].

### 7.13.3.2. Use two TS cables between MiniBrute 2 and other devices

Most modular systems do not use TRS cables or connectors, so when working with those systems you will need to use two TS cables between the MiniBrute 2 and the modular system.

- **MiniBrute 2 as master:** Connect one TS cable from the MiniBrute 2 Sync out jack to the clock input of the slave device, and connect a second TS cable from the MiniBrute 2 Run output jack to the run/reset input of the slave device.
- **MiniBrute 2 as slave:** Connect one TS cable from the Clock/Sync output of the master device to the Clock input jack of the MiniBrute 2 (and set its Sync LED to CLK), and connect the second TS cable from the Run/Reset output of the master device to the Reset input jack of the MiniBrute 2.



Be sure to match the clock rates between the two devices. You can specify the clock rate of the MiniBrute 2 with the [MIDI Control Center \[p.109\]](#).

When the devices are connected as described above and set to the same synchronization standard, the system will sync perfectly:

- If the Master unit is stopped and then restarted, the Reset input on the slave will receive a Run/Reset trigger and the unit will play its sequence from the beginning.
- If the Master unit is paused and then playback is resumed, the Reset input on the slave will not receive a Run/Reset trigger and the unit will continue to play from the middle of its sequence, not from the beginning.

## 7.14. The MIDI section

This section of the patch bay is entirely populated with output jacks. You can use them locally with the MiniBrute 2 or externally with other devices.



*The MIDI section*

### 7.14.1. KBD

This jack provides a pitch output signal that changes its voltage based on which notes are played or received over MIDI.

For example, if you wanted the AD Envelope Decay time to increase as you play higher notes, you could connect the KBD output to the AD Decay input jack.

Depending on how much modulation you want, it may be a good idea to run this output through one of the Attenuators so you can adjust the modulation amount to fit the desired note range.

### 7.14.2. Gate

The Gate jack sends an on/off trigger when a note is played. The gate will stay open as long as the note is held, and close when the note is released.

### 7.14.3. Velo

This output allows you to control a parameter or an external module with the velocity of a note you have played.

For example, if you wanted an increase in velocity to change the pitch of VCO you could connect the Velo output to the VCO 2 / Pitch 2 input jack.

Depending on how much modulation you want, it may be a good idea to run this output through one of the Attenuators so you can adjust the modulation amount to fit the desired pitch range.

#### 7.14.4. Mod

The Mod jack will send a control voltage to the destination of your choice. The source for the control voltage is determined by the setting of the Mod Source switch, which is found in the Control Section of the top panel, next to the Bend Range knob.

If the Mod Source switch is set to Wheel, the Mod wheel will control the destination parameter. If it is set to Aftertouch, then the pressure-sensitivity of the keyboard will be the modulation source instead.



When using the Mod jack in the patch bay you may want to set the Mod Dest switch to the Mod CV position instead of LFO 1 Vib. That way you can control the desired destination without also introducing vibrato as you move the Mod wheel upward.

## 8. SEQ / ARP: SHARED FEATURES

MiniBrute 2 provides a sequencer and an arpeggiator. You can record eight different sequences, each with up to 64 steps. The arpeggiator generates notes based on the keys you have pressed and plays them back according to the setting of the Seq / Arp Mode knob.

The Sequencer and the Arpeggiator share several features. We will focus on those features in this chapter.

They also have distinct features, so we have dedicated a chapter to each one. See the [Sequencer \[p.87\]](#) and [Arpeggiator \[p.97\]](#) chapters to learn more.

### 8.1. Mode selection



*The Mode switch and Seq/Arp Mode knob*

#### 8.1.1. Mode switch

When this switch is set to Seq a sequence can be played or recorded. Use the other controls in this section to select the active sequence and the time division at which the sequence will play back.

When the switch is set to Arp the other controls select the pattern and the time division for the arpeggiator.

#### 8.1.2. Seq / Arp Mode

The function of the Seq / Arp Mode knob changes depending on which mode is selected. In Seq mode it selects which of the eight sequences is active. In Arp mode it selects which pattern will be used to play back the notes you hold on the keyboard.

For a full explanation of these features, see the [Sequencer \[p.87\]](#) and [Arpeggiator \[p.97\]](#) chapters.

## 8.2. Timing controls



*The Time Div encoder, Rate knob, and Tap/Rest button*

### 8.2.1. Time Division

The Time Div encoder determines the rhythmic value of the active sequence or arpeggio. Eight different settings are available.

### 8.2.2. Rate

Use the Rate knob to control the tempo of the sequence or arpeggio. The Tap button can also be used. The tempo can be set between 30-240 bpm (beats per minute).

The MIDI Control Center allows you to choose how the Rate knob responds when it is turned: either immediately (Jump mode) or after you pass through the current value (Hook mode). To learn more, see the [MIDI Control Center \[p.109\]](#) chapter.

### 8.2.3. Tap / Rest

The **Tap** button allows you to set the tempo of the active sequence or arpeggio “on the fly”. All you have to do is tap it in time with the music. The number of taps it takes to adjust the tempo can be defined in the [MIDI Control Center \[p.109\]](#).

This button is also used to [enter rests \[p.89\]](#) or to [tie notes \[p.90\]](#) together when creating a sequence. This is covered in the [Sequencer \[p.87\]](#) chapter.

The word “Hold” is printed in blue under the Tap/Rest button also. This is a secondary Arpeggiator function activated by the Shift button, and we’ll describe it in the [Hold mode \[p.99\]](#) section.

### 8.2.4. Metronome (Shift + Sync)



*Shift + Sync toggles the metronome*

Under the Sync button is the word "Metronome". The blue writing means this is a secondary Shift function, and you'll probably use it often while creating your own sequences. To toggle the Metronome on and off, hold the Shift button and press the Sync button.

### 8.3. Transport section



*The transport section*

The Transport buttons control the sequencer, the arpeggiator, and external devices using MIDI or the Sync/Run jacks in the patch bay. But they also can send other MIDI messages if the external device does not respond to MMC commands. Use the MIDI Control Center to make changes.

All three buttons are active in sequencer mode, while only the Play/Pause and Stop buttons are used with the arpeggiator.

Each button has a secondary Shift function when creating a sequence (Append, Clear Last, and Restart). The Append and Clear Last features are described in detail in the [Modifying a sequence \[p.95\]](#) section; the Restart function is covered [here \[p.84\]](#).

#### 8.3.1. All Notes Off

The Stop button has an additional function. If for some reason you end up with a stuck note, just press the Stop button quickly three times in a row. MiniBrute 2 will then send an All Notes Off command over USB and MIDI.

## 8.4. Playback functions

### 8.4.1. Gate



*Shift + Gate selection keys*

The Gate time of a Seq/Arp note is the percentage of time it stays “on” before the next note happens, with 10% being the shortest time and 90% being the longest. Hold Shift and press the appropriate key to make a selection.

When creating a sequence it is also possible to enter a value of “Tie”, which holds a note into the following step. See the [“Tie notes \[p.90\]”](#) section of the [Sequencer \[p.87\]](#) chapter for information.



♪: Sequencer mode and Arpeggiator mode have independent Gate settings.

## 8.4.2. Swing



*Shift + Swing selection keys*

**i** The Time Div setting must be equal to or lower than the Master Swing setting in order for the Swing to be heard. For example, if Time Div = 1/4 and Master Swing = 1/8, the Seq/Arp will not have a shuffle feel. The Master Swing setting can be changed using the [MIDI Control Center \[p.109\]](#).

Swing introduces a “shuffle” feel to the active sequence or arpeggio. 11 different settings are available, ranging from Off (no swing, or 50%) through varying degrees of swing amount (53-75%). To make a selection, hold Shift and press the appropriate key.

What the Swing setting does is shift the timing of the notes in a sequence, making the first note of a pair longer and the second note shorter. Assuming the time division is set to 1/8, here’s what will happen:

- With Swing set to Off (50%) each note gets ‘equal time’, resulting in a ‘straight 1/8th note’ feel.
- As the Swing value exceeds 50% the first 1/8th note is held longer and the second is played later and shorter. You’ll notice the sequence starts to ‘shuffle’ a bit and perhaps sounds less ‘mechanical’ to your ear.
- The maximum Swing setting is 75%, at which point the 1/8th notes sound more like a 1/16th note figure than ‘shuffled’ 1/8th notes.

Here’s a graphic showing the minimum and maximum Swing values in musical notation:



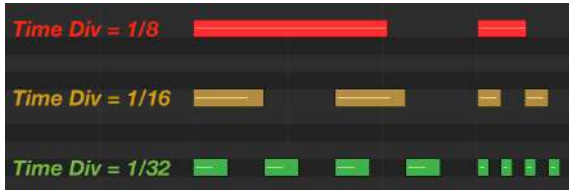
*The extremes of the Swing setting*

**i** Sequencer mode and Arpeggiator mode have independent Swing settings.

### 8.4.3. Master Swing vs. Time Division

As mentioned in the previous section, the Time Div setting must be equal to or lower than the Master Swing setting in order for the Swing to be heard. For example, if Time Div = 1/4 and Master Swing = 1/8, the Seq/Arp will not have a shuffle feel. If you set them both to 1/8 then you will hear the rhythmic figure illustrated above.

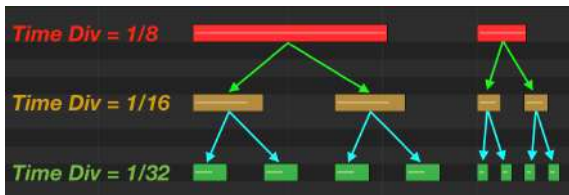
But the results are even more interesting when the Master Swing setting is higher than the Time Div setting. In the following illustration the Master Swing is set to 1/8 and the Time Div to 1/8, 1/16, and 1/32, respectively. The swing amount is set to 75% in each case.



*The three Time Division settings with Master Swing = 1/8*

Technically, the description of what happens is "If a smaller resolution is selected, the swing period will be subdivided in  $2^n$  trigs of equal length."

Maybe the following graphic will help illustrate what is meant by that:



*As smaller resolutions are selected, the swing period is subdivided into two triggers of equal length.*



The smaller resolutions cause the subdivisions to happen very quickly. As you are learning about the interaction between the Master Swing setting and the Time Division settings, it may be helpful to cut the master tempo in half or less temporarily.

The Master Swing setting may be changed using the [MIDI Control Center](#) [p.109].

## 8.5. Skip selections: Seq / Arp

It's possible to switch between non-adjacent sequences or arpeggio modes without launching the interim selections. In other words, if sequence 1 is playing and you want segue smoothly into sequence 3, you can jump over sequence 2 without playing it.

Here's how:

- Hold the Shift button
- Turn the Seq/Arp Mode encoder until you reach the desired sequence / arpeggio mode
- When you're ready, release the Shift button and the new sequence / arpeggio mode will launch.

There's a parameter in the [MIDI Control Center \[p.109\]](#) that controls whether the new sequence will begin immediately or at the end of the sequence. See the [MCC chapter \[p.109\]](#) to learn about that software application.

## 8.6. Skip selections: Time Division

MiniBrute 2 is able to jump over one or more Time Division values without having them affect the rhythm of your sequence or arpeggio. So if you'd like to switch Time Div from 1/4 to 1/16 for a few beats without hearing the 1/8 value, there's a way to do that.

- Hold the Shift button
- Turn the Time Div encoder until you reach the proper value
- Release the Shift button and the new Time Division will take effect.

## 8.7. Restart Seq / Arp from beginning

It's possible to repeat the first half of a sequence or arpeggio manually, or perhaps repeat the first few notes several times, etc., as a spontaneous performance option.

To restart a sequence or an arpeggio pattern from its beginning, hold the Shift button and press the Play/Pause button.



We will cover the [Shift functions \[p.123\]](#) that are used during sequence creation in the [Sequencer \[p.87\]](#) chapter.

## 8.8. Synchronization

MiniBrute 2 can be the master clock for a wide range of musical devices, or it can serve as a slave to any one of several sources. See the [rear panel connectors \[p.8\]](#) section for connection diagrams.

The Sync options are selected using the Sync button on the right side of the top panel.



*The Sync button*

Press this button repeatedly to cycle through the four options: INT (Internal), USB, MIDI, and CLK (Clock). They will configure the MiniBrute 2 to work with many different types of devices and systems.

### 8.8.1. As Master

MiniBrute 2 is the master clock when the INT option is selected.

When this is the case:

- The transport section will control the internal sequencer and arpeggiator
- MIDI clock messages are sent to the MIDI output and to USB MIDI
- Clock signals are sent to the Sync output. You can specify the clock output type with the [MIDI Control Center \[p.109\]](#)
- The tempo can be set using the Rate knob and the Tap button.

## 8.8.2. As Slave

MiniBrute 2 functions as a slave to an external clock when one of those options is selected (USB, MIDI or CLK).

When MiniBrute 2 is in Slave mode:

- The Tempo controls will not control the internal sequencer or arpeggiator while the external source is running.
- The MiniBrute 2 transport section will still perform as usual; you can still stop, start and pause the internal sequences and the arpeggiator, and you can still record sequences.
- When the external source is not running, MiniBrute 2 will function according to its internal clock at the last known tempo.
- MiniBrute 2 will pass the synchronization messages it receives from the external source to all three clock outputs, and will convert all clock types to MIDI clock for the MIDI and USB outputs.

### 8.8.2.1. Sync In/Out types

The MIDI Control Center can be used to configure the MiniBrute 2 to send and receive one of the following types of clock signals at the Sync input and output connectors:

- 1 step (Gate)
- 1 step (Clock)
- 1 pulse (Korg)
- 24 pulses per quarter-note (ppq)
- 48 ppq

The default rate is 1 step (Clock).

### 8.8.2.2. Clock connectors

There are several types of connectors that have been used for musical synchronization purposes over the years. Here's a chart that indicates the best kinds to use when connecting older devices to MiniBrute 2:

<b>Connector type</b>	<b>Signal(s) sent</b>
1/8" mono (TS)	Clock pulse only
1/8" stereo (TRS)	Clock pulse and start/stop
1/8" stereo (TRS)	Clock pulse and start/stop

You can use a MIDI cable to connect to devices which utilize MIDI clock sync messages. Check the owner's manual for your device if you are not sure which sort of sync capabilities it has.

## 9. THE SEQUENCER

An on-board sequencer like the one provided by MiniBrute 2 is an essential tool in today's music world: it can free the performer's hands to adjust other parameters such as filters, envelope settings or pitch while the sequencer keeps looping. You could even plug in more patch cables while a sequence is being played.

MiniBrute 2 allows you to create up to eight unique sequences, and each sequence can be up to 64 steps in length. The MiniBrute 2 even lets you transpose a sequence while it is running by playing a key on the keyboard.

There is another setting that allows you to play live notes from the keyboard while the sequence is looping, which temporarily overrides the sequenced notes until you stop playing the keys.

In this chapter we will cover the front panel features, but there are more parameters available in the [MIDI Control Center \[p.109\]](#).

### 9.1. Basic Operation

#### 9.1.1. Select and play a sequence



The sequencer will not run if the [Sync \[p.85\]](#) selection is set to something other than INT and no external clock is present.

##### 9.1.1.1. Seq / Arp toggle switch

To use the sequencer you must first set the Seq/Arp toggle switch to Seq. The position marked [Arp \[p.87\]](#) selects the arpeggiator, which is covered in a [separate chapter \[p.97\]](#).

##### 9.1.1.2. Seq / Arp Mode encoder

Use the Seq/Arp Mode encoder to select one of the eight available sequences. If the sequencer is already running, the MIDI Control Center allows you to specify when the next sequence should start. See the [MIDI Control Center \[p.109\]](#) chapter for a description.

You can record your own music into any one of the eight sequences; [we'll cover that below \[p.89\]](#).

##### 9.1.1.3. Transport section

Press the Play/Pause button and the sequence will start. Press it again to pause the sequence, and another time to resume playback from where you stopped.

To start a sequence from the beginning, press the Stop button and then press Play again.

#### 9.1.1.4. Set the tempo

Use the Rate knob or the Tap button to adjust the playback tempo. You can also set the desired tempo of the sequence before playback by pressing the Tap button a few times.

With the [MIDI Control Center \[p.109\]](#) you can specify how many taps of the Tap button it takes to adjust the tempo, and also how the Rate knob will respond when it is turned. See the [MIDI Control Center \[p.109\]](#) chapter for more information.

#### 9.1.1.5. Time Div encoder

The Time Div encoder allows you to change the rhythmic relationship of the sequence relative to the tempo: quarter notes (one step per beat), eighth notes (two steps per beat), and so on. Triplet values are offered as well (1/4T, 1/8T, etc.).

## 9.2. Transpose / Kbd Play

These two modes are mutually exclusive so we'll cover them both in this section. You can switch from one to the other by holding the Shift button and pressing the appropriate Octave shift button (Oct- or Oct+).

### 9.2.1. Transpose

When this mode is active you can use the keys to transpose a sequence while it is running. To activate Transpose mode, hold the Shift button and press the Oct- button. It will flash and the Kbd Play button will go dark.

The [MIDI Control Center \[p.109\]](#) lets you specify whether the transposition will latch or return to center when the key is released. See that chapter for details.

### 9.2.2. Keyboard Play

When this mode is active the keyboard can be used to play notes while the sequencer is running. Rather than transposing the sequence, the notes generated by the keyboard will be sent to external devices through the USB, MIDI, and CV outputs. Playing a note on the keyboard temporarily overrides the sequenced notes until you stop playing the keys.

To activate Kbd Play mode, hold the Shift button and press the Oct+ button. It will flash and the Transpose button will go dark.

## 9.3. Creating a sequence



The sequencer will not run if the [Sync \[p.85\]](#) selection is set to something other than INT and no external clock is present.

There are three things you must do when you want to create a sequence:

- Move the Seq / Arp toggle switch to the Seq position
- Select a sequence location with the Seq / Arp Mode encoder
- If a sequence is already running, press the Stop button.

MiniBrute 2 provides two ways to input notes into your sequences: a step at a time or in real time. We'll go through those options next.

### 9.3.1. Step-time recording

This may be the best place to start while you are learning to work with the sequencer. At the most basic level, all you have to do to create a sequence is:

- Press the Record button

**Note: the next step will erase the existing sequence.**

- Play a series of notes, one key at a time
- When you're done, press the Stop button.



You must lift all fingers between each step in order for the sequence steps to advance. If you do not lift every finger first you will keep adding notes to the same sequence step.

To hear your sequence, press the Play button. The results could be something like this:



*An example sequence with no rests or tied notes*



The Time Div value is ignored during step recording; it only affects sequence playback.

#### 9.3.1.1. Entering rests

The spaces that sometimes happen between notes are called "rests". If you want to add rests while creating a sequence, MiniBrute 2 provides an easy way to do it.

Take a look at the Tap / Rest button:



### 9.3.1.3. Legato notes

The process for entering a Legato note is similar:

- Press the Record button
- Hold the Tap / Rest button until the end of this example

**Remember:** the next step will erase the existing sequence.

- Play a series of notes, one key at a time
- When you have reached the end of the legato phrase, release the Tap / Rest button.
- Enter more notes as desired, or press the Stop button to exit Record mode.

On a mono synth such as the MiniBrute 2 the process described above will result in a "legato" response (voltage change without any gate events between the notes).

Press Play to hear your sequence. A combination of tied notes and legato notes might sound something like this:



*An example sequence with tied notes and rests*

## 9.3.2. Real-time record/replace

MiniBrute 2 also allows you to record or replace the notes in a sequence while the sequencer is looping. Here are a few things to keep in mind:

- Real-time recording won't extend a sequence; you must record within the framework of an existing sequence. So you may first want to create a sequence of the desired length using the step record mode.
- It can be helpful to use the [built-in metronome \[p.80\]](#) (hold Shift, press Sync) or have an external drum machine slaved to the MiniBrute 2 via MIDI or the Sync output. That will help you be sure where the downbeat is. There is more information about slaving external devices to the MiniBrute 2 in the [Synchronization \[p.85\]](#) chapter.

There are two methods you can use to record in real time.

- **Sequencer not running** (Stop mode): Press Record and the Rec button will light. Then press Play and the sequence will begin looping. The notes you play 'live' will be quantized to the nearest step.
- **Sequencer running**: If the sequence is already looping, simply press the Rec button and the same thing will happen: MiniBrute 2 will begin recording and replacing notes. If needed, you can punch in and out of record mode by pressing the Record button repeatedly while the sequencer is running.



! Newly recorded notes will replace the notes that currently exist at that step.

### 9.3.2.1. Replacing notes

As mentioned above, the notes you play while recording in real time will be quantized to the nearest step. Any notes that exist in that step will be replaced with the notes you played.

So as the sequence loops you can replace certain notes by playing new ones within the timing range of the appropriate step.

### 9.3.2.2. Restart


A sequence can have up to 64 steps, which can seem like a long time when you want to replace a note near the beginning of the sequence.

There's a shortcut you can take if you don't want to wait for the sequence to loop: use the Restart function.

All you have to do is hold the Shift button and press Play/Pause. You will hear the sequence jump immediately to its beginning. MiniBrute 2 will remain in Record mode, so when the proper step arrives, play the notes you want and they will replace the existing notes.

### 9.3.2.3. Time Div and recording

As mentioned previously, the Time Division setting does not allow you to enter different step values in the middle of a sequence while recording. But you can use it to alter the relative tempo while recording.

 If you are recording a difficult passage you may want to use a different Time Division setting while recording in real time (i.e., use 1/4 instead of 1/8).

## 9.3.3. What does it record?


### 9.3.3.1. Per step

The MiniBrute 2 sequencer will record certain types of data for each sequence step:

- The note played from the keyboard
- The velocity of the note (unless you tell it not to with the [MIDI Control Center \[p.109\]](#))
- Rests entered by pressing the Tap / Rest button or holding it for one or more steps
- If a key is held during real-time recording for two or more steps a tied note will be recorded.

### 9.3.3.2. Per Sequence


The Swing percentage is stored with each sequence. However, if the Swing value is changed while the sequence is playing, it is important to remember to press the Stop button before switching to another sequence or to the Arpeggiator. Otherwise the change in the Swing value will not be remembered.

 Be sure to press the Stop button if you changed the Swing value for the current sequence while it was running. This will allow MiniBrute 2 to store the new Swing percentage value with the sequence.

## 9.3.4. What it does not record

Here are the types of data not captured by the MiniBrute 2 sequencer:

- Differences in the duration of each note: each one will be played back at the gate time that was set for the sequence. However, a note will be tied into the next step if you hold it down long enough.
- Time division changes
- Controller data
- Data that arrives via MIDI or USB. However, incoming note data can be used to transpose a sequence, and the MiniBrute 2 sequencer and arpeggiator can be slaved to incoming clock data.

 The Gate time setting and Swing amount are stored individually per sequence.

### 9.3.5. A note about velocity

MiniBrute 2 will capture the velocity of each note the way it was played by default. But there's an option in the [MIDI Control Center \[p.109\]](#) to make sure every recorded note has the same velocity value. You can also specify exactly what that value will be.

See the [MIDI Control Center \[p.109\]](#) chapter 10 for more information about these features.

## 9.4. Modifying a sequence

Now let's focus on ways to modify an existing sequence.

### 9.4.1. Append

You can extend your sequence by adding (appending) notes, tied notes and rests to the end of the sequence.



This process will not erase the sequence or replace existing notes.

To use the Append function:

- Make sure the proper sequence is selected
- Press Play/Pause to start the sequence



The sequence must be playing or else the note data will be erased in the following steps.

- Hold the Shift button
- Press the Record button (Append). The Record button will light solid.
- To add a note to the end of the sequence, play the appropriate key
- To add a tied note to the end of the sequence, hold Tap / Rest and play the desired key. The note in the previous step will be lengthened, and
  - - A note that matches the previous step will be tied (no new attack)
    - A new note that does not match the previous step will be legato
- To add a rest to the end of the sequence, press the Tap / Rest button.

Each time you perform one of those three functions the sequence will grow longer by one step.

### 9.4.2. Clear Last

This feature allows you to remove the last step of a sequence. It works whether the sequencer is playing or recording, and even works if the sequencer is not running at all.

To clear the last step of a sequence:

- Make sure the proper sequence is selected
- Hold the Shift button
- Press the Stop button (Clear Last)

If the sequencer is running during this process, the next time it loops around to the end of the sequence the last step will have been removed.



The Clear Last function does not undo the last recording you made; it shortens the sequence by removing the last step.

## 9.5. Saving sequences

MiniBrute 2 allows you to carry 8 sequences with you at all times. But you can store an unlimited number of sequences using the MIDI Control Center. So be sure to back up your hard work to your computer often.

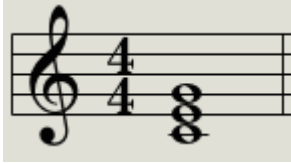
And once the sequences are safely stored on your computer it is possible to hand-pick sets of sequences that are aimed at particular audiences or sessions.

See the [MIDI Control Center \[p.109\]](#) chapter for more information about how to use that software.

## 10. THE ARPEGGIATOR

### 10.1. What's an arpeggiator?

'Arpeggio' is a musical term that basically means 'the notes of a chord played one after the other'. For example, if you play a C chord and then play its component notes C, E, and G independently, you have played an arpeggio in the key of C.



*An example of notes in a chord*



*Those same notes as an arpeggio*

You can play those three notes in any order and still have played an arpeggio in the key of C.

An arpeggiator, then, is a form of music technology that will take a group of notes played simultaneously on a keyboard and turn them into an arpeggio.

### 10.2. Arpeggiator features

The MiniBrute 2 arpeggiator provides lots of different ways to arpeggiate the notes you play on the keyboard. The following features were covered in the "[Shared Features \[p.78\]](#)" chapter:

- [Setting the rate \[p.23\]](#) or tempo
- [Time division \[p.79\]](#) settings
- [Swing \[p.82\]](#) and [gate \[p.76\]](#) settings
- Skip encoder values ([Mode \[p.84\]](#) and [Time Div \[p.84\]](#))
- [Restart arpeggio \[p.84\]](#) from the first note

The following features have not been covered yet, so we'll cover them in this chapter:

- The eight [modes \[p.100\]](#) that determine the note order
- Building an [arpeggio of up to 16 notes \[p.103\]](#)
- [Pause an arpeggio \[p.104\]](#) in mid-stream and then resume the pattern
- The [Hold \[p.99\]](#) function



The Record button is not active in Arp mode.

## 10.3. Basic operations



The arpeggiator will not run if the [Sync \[p.85\]](#) selection is set to something other than INT and no external clock is present.

### 10.3.1. Seq / Arp toggle switch

To use the arpeggiator you must first set the Seq/Arp toggle switch to Arp. The Seq position selects the sequencer, which is covered in a [separate chapter \[p.87\]](#).

### 10.3.2. Seq / Arp Mode encoder

Use the Seq/Arp Mode encoder to select one of the eight arpeggiator Modes: Up, Down, Inclusive, Exclusive, Random, Order, Up x2, and Down x2.

The different Arp Modes are [described later \[p.100\]](#) in this chapter.



It will be more obvious what the different Arp Modes do when you are holding down three or more keys.

### 10.3.3. Transport section

Press the Play/Pause button, hold down some keys and the arpeggiator will start. You can add up to 16 notes to an arpeggio; we'll show you how in the [Build a multi-octave arpeggio \[p.103\]](#) section.

There is also a [Hold mode \[p.99\]](#) for the arpeggiator. It allows you to start an arpeggio, take your hands off the keys, and either add more notes to the arpeggio or tweak parameters while the arpeggio is running.

Press the Play/Pause button again to pause the arpeggio pattern, and another time to resume playback from where you stopped.

To start an arpeggio pattern from the beginning, press the Stop button. Then press Play again and hold down some keys.




In order to hear the Arpeggiator you must first press the Play button before holding down the keys. The Arpeggiator will not play back any notes if you hold down the keys first and then press the Play button.

### 10.3.4. Set the tempo

Use the Rate knob or the Tap / Rest button to adjust the playback tempo. You can also set the exact tempo of the arpeggio pattern before starting the arpeggiator by pressing the Tap / Rest button a few times.

With the [MIDI Control Center \[p.109\]](#) you can specify how many taps of the Tap / Rest button it takes to adjust the tempo, and also how the Rate knob will respond when it is turned. See the [MCC chapter \[p.109\]](#) for more information.

 Tap tempo and the Rate knob will not function when MiniBrute 2 is set to one of the [external sync \[p.85\]](#) sources.

### 10.3.5. Time Division

The Time Division encoder allows you to change the rhythmic relationship of the arpeggio relative to the tempo: quarter notes (one step per beat), eighth notes (two steps per beat), and so on. Triplet values are offered as well (1/4T, 1/8T, etc.).

### 10.3.6. Hold mode

To activate Hold mode, press the Shift button and then press the Tap / Rest button.

When Hold mode is engaged you can lift your fingers off the keys and the arpeggio will keep playing. It will keep running until you play another note or chord, at which point the new note(s) will become a new arpeggio.

You may add as many as 16 notes to your arpeggio as long as you continue to hold down at least one key. The notes you play will be added to the arpeggio at the nearest time division increment.

The same rule applies with large arpeggios: once you release all of the keys the arpeggio you have constructed will continue to run until you play another note or chord.

## 10.4. Arpeggiator modes

All of the following examples involve holding down only 4 notes on the keyboard. But you can add up to 32 notes to your arpeggio through clever use of the Hold function and the Oct Minus / Plus buttons. We'll describe these techniques in the [Build a multi-octave arpeggio \[p.103\]](#) section.

### 10.4.1. Arp mode: Up

With the Arp mode encoder set to **Up** the arpeggiator will play the held notes in order from the bottom to the top. When it reaches the top it will start again from the bottom.

The results will sound something like this:



*Arp Mode: Up*

### 10.4.2. Arp mode: Down

With the Arp mode encoder set to **Down** the arpeggiator will play the held notes in order from top to bottom. When it reaches the bottom it will start again from the top.



*Arp Mode: Down*

### 10.4.3. Arp mode: Inclusive

With the Arp mode encoder set to **Inc** the arpeggiator will play the held notes in order from low to high, then from high to low, repeating the high note and low note.



*Arp Mode: Inclusive*

#### 10.4.4. Arp Mode: Exclusive

With the Arp mode encoder set to **Exc** the arpeggiator will play the held notes in order from low to high, then from high to low, without repeating the high note and low note.



*Arp Mode: Exclusive*

#### 10.4.5. Arp Mode: Random

With the Arp mode encoder set to **Rand** the arpeggiator will play the held notes in a random order. There will not a predictable pattern, so it is possible that a note could be repeated one or more times before a new note is heard.



*Arp Mode: Random*

#### 10.4.6. Arp Mode: Order

With the Arp mode encoder set to **Order** the arpeggiator will play back the held notes in the order they were played on the keyboard, from first to last.

In the example below the notes were played in this order: Middle C, G, E, and higher C. The result is the following arpeggio:




*Arp Mode: Order*



## 10.5. Build a multi-octave arpeggio

Previously we explained that the Hold function allows you to keep the arpeggiator running after you take your fingers off the keys.


But there's a second use for the Hold function: when Hold mode is active, you can keep adding notes to an arpeggio as long as you continue holding down at least one key.

: As you go through the following section, don't forget: after you let go of the keys the arpeggio that's playing will be replaced as soon as you press another key.

### 10.5.1. Add up to 16 notes


You can add as many as 16 notes to your arpeggio. Here's an example of how to do it.

- Move the Seq / Arp toggle switch to Arp
- Press the Play / Pause button to start the arpeggiator
- Activate the Hold function (hold Shift, press the Tap / Rest button)

: Keep at least one key down at all times until the final step.

- Press one or more keys; the arpeggio will play those notes.
- Keep at least one key down and then press the Oct+ button.
- Add more notes the arpeggio from the higher octave.
- Being sure to keep at least one key pressed, press the Oct- button.
- Add more notes the arpeggio from the lower octave, and so on.
- You can keep adding notes to the arpeggio for quite a while: the limit is 16 notes.

When you are done adding notes, you may release all keys. The multi-octave arpeggio will continue until you press another key or stop the arpeggiator.

: It's possible to let go of the original note(s) at any stage in the process as long as you keep holding down at least one of the new notes you add.

## 10.6. Pausing an arpeggio

It is possible to pause an arpeggio in the middle of its pattern. Here's one example:

- Select any mode but Random or Order (it'll be easier to hear what's happening)
- Start the arpeggiator
- Activate the Hold function (hold Shift, press the Tap / Rest button)
- Play a handful of keys to make an interesting pattern
- Once you are familiar with how the pattern sounds, press Play/Pause in the middle of the pattern
- The pattern will pause
- Press Play/Pause again. The pattern will resume and continue playing normally.

Keep in mind: the arpeggio will stop playing that pattern if:

- Hold feature is Off: You let go of all keys
- Hold feature is On: You let go of all keys and play a new note
- You press the Stop button.



ⓘ: If you want to force the arpeggio pattern to start again from the beginning, hold the Shift button and press Play/Pause.

## 11. INTRODUCTION: THE MIDI CONTROL CENTER

The MIDI Control Center (MCC) is an application that helps you to configure your MiniBrute 2 for your system. Use it to define the hardware response, the voltages and triggers that will be used, and the MIDI settings. It works with most of Arturia's devices, so if you have an earlier version of the software you'll want to [download the latest version](#). It will work with those products as well.

### 11.1. MCC basics

#### 11.1.1. The Help file

The built-in MIDI Control Center manual has general descriptions of the features that are common to all Arturia products. To learn how to access the manual, [click here \[p.108\]](#).

This chapter will cover only the MIDI Control Center features that are unique to the MiniBrute 2.

#### 11.1.2. System requirements

PC: 2 GB RAM; CPU 2 GHz (Windows 8 or higher)

Mac: 2 GB RAM; CPU 2 GHz (macOS 10.10 or higher)

#### 11.1.3. Installation and location

After downloading the appropriate [MIDI Control Center installer](#) for your computer from the [Arturia website](#), double-click on the file. Then all you have to do is start the installer and follow the instructions. The process should be trouble-free.

The installer puts MIDI Control Center with the other Arturia applications you have. In Windows, check the Start menu. In macOS you'll find it inside the Applications/Arturia folder.

### 11.1.4. Connection

Connect MiniBrute 2 to your computer using a USB cable. It'll be ready to go within seconds after power-up.

Now launch the MIDI Control Center. MiniBrute 2 will be in the list of connected devices:



*A check mark indicates the selected device*

#### 11.1.4.1. Potential issues: Windows OS

The MIDI driver for the MiniBrute 2 is not "multi-client". That's a technical term that simply means this: If a DAW application is already active on your computer, the MIDI Control Center will not launch. In order to use the MIDI Control Center to alter the parameters of your MiniBrute 2 you will need to exit the DAW application.

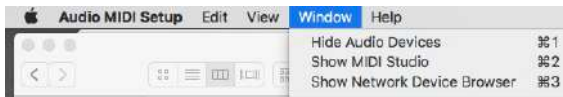
### 11.1.4.2. Potential issues: macOS

If the cable between your Mac and the MiniBrute 2 is connected properly and the Mac is having trouble detecting the unit, your Mac could be experiencing what is known as a "USB port enumeration issue." Here is one potential solution.

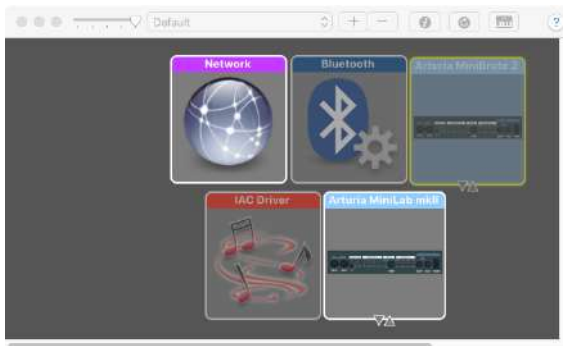
- Launch the Audio MIDI Setup utility. The fastest way to do this is usually to hold the Command key, press the space bar, and type in the letters AMS.



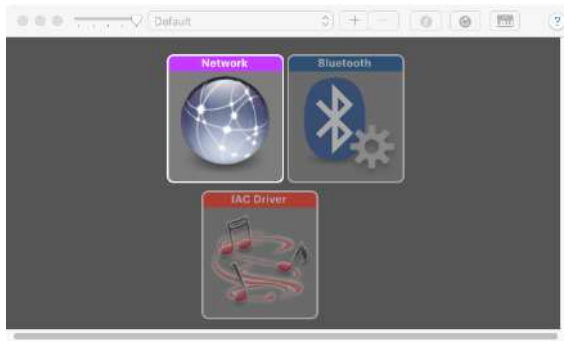
- If you do not see the MIDI Studio window, hold the Command key and press 2.



- Turn the unit off or disconnect its USB cable. You should see the related device icon turn grey.
- Select the greyed-out MiniBrute 2 image and delete it.



- The MiniBrute 2 also might be labeled "MIDI Device" or something else, so you may need to delete all MIDI Device images and restart any connected devices. First you must disconnect any units or turn them off, or else you will not be able to delete the icons.

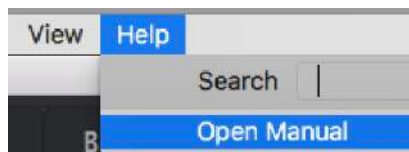


- Restart the MiniBrute 2. It should reappear in the MIDI Studio window.



### 11.1.5. Where to find the manual

There is a built-in help file for the MIDI Control Center in its Help menu, as shown below:



It's a good introduction to the MIDI Control Center, describing each section of the software window and defining important terms you will need to know while using the MIDI Control Center, such as 'the Browser' and 'Template'.

The next chapter explains how to use the MIDI Control Center software to configure the MiniBrute 2 to match your system and enhance your workflow.

## 12. MIDI CONTROL CENTER

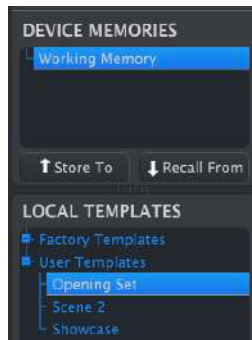
When the MIDI Control Center and MiniBrute 2 are connected, you are able to:

- send a set of eight sequences to the MiniBrute 2 internal memory
- use the Store To and Recall From buttons to transmit an entire set of 8 sequences
- edit the Device Settings
- import/export Device settings
- perform other MCC functions such as file management and Template creation, among other things.

### 12.1. Template Browser

The Template Browser shows a list of all Templates available to you inside the MIDI Control Center (MCC). They have been stored on your computer. These are divided into two main groups of Templates: Factory and User.

The User Templates are the ones you have recalled from your MiniBrute 2 with the MCC. See the [Store To/Recall From \[p.112\]](#) section to learn how to do this.



*The Template Browser window*

A Template contains the 8 patterns from Sequencer mode.

#### 12.1.1. Building a library

You can build a limitless library of sequences and setups in the User Templates area.

Make as many sequences as you like, wherever you are, with or without a computer attached. Then the next time you use the MIDI Control Center, simply press the Recall From button. This will transfer the MiniBrute 2 sequence memory into the Template Browser of the MCC, where it can be saved as a new Template.

The Template will be named automatically with a date/time stamp, but you can give it a more descriptive name if you like.

## 12.2. Device Memories

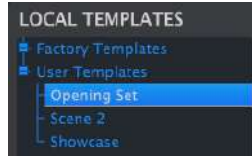
### 12.2.1. The Working Memory



*The Device Memories section*

The upper half of the Template Browser window contains a location called the Working Memory. It functions as a sort of 'target' onto which a group of sequences (i.e., Templates) can be dragged and then transmitted to the MiniBrute 2 internal memory.

## 12.3. Local Templates



*The Local Templates section*

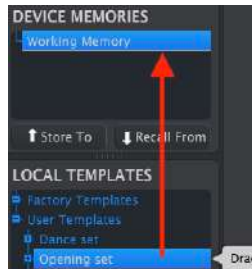
The lower half of the Template Browser window shows a list containing Templates. A Template is a group of eight sequences that has been recalled from the MiniBrute 2 internal memory. You can create a limitless library of sequences by storing them to your computer in this way.

You can also send a Template into the MiniBrute 2 internal memory using the Store To button.

See the [Store To/Recall From \[p.112\]](#) section for more instructions about these procedures.

### 12.3.0.1. Drag and drop

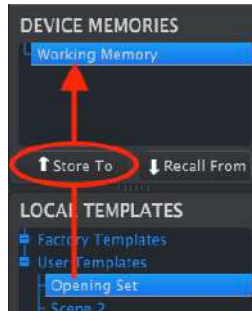
It's possible to drag a Template from the Template Browser onto the Working Memory. When you do, the sequences will be sent to the MiniBrute 2 internal memory.



## 12.4. Store To/Recall From

### 12.4.1. The 'Store To' button

The Template Browser has a button called "Store To". It is used to transmit a Template from the Local Templates window to the MiniBrute 2.



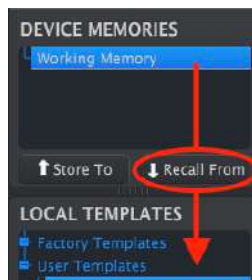
The process is simple:

- Select the desired Template as shown below
- Click the Store To button.

This process will store all eight sequences from the selected Template into the MiniBrute 2.

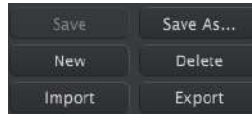
### 12.4.2. Recall edited sequences from MiniBrute 2

If you changed any sequences inside the MiniBrute 2 you need to pull those sequences into the MIDI Control Center to back them up. To do that, click the Recall From button.



A new file containing all eight sequences will appear in the Template Browser with the current time/date stamp for a name. You can rename it if you like.

### 12.4.3. Save, Delete, Import/Export, etc.



*The Template Utility buttons*

These important features have been documented in the MIDI Control Center manual, which you will find in the software Help menu. Look in section 3.4.3 of the [Help file \[p.108\]](#) for information about Save, Save As..., New, Delete, Import and Export.

**i**: The Import / Export buttons pictured above perform a different function from those at the top of the Device Settings window (see the next section). These files have the extension **.MiniBrute2**. They contain all of the internal MiniBrute 2 parameters: a complete set of eight sequences and all of the Device Settings. Use these files to share settings and sequences with other users.

### 12.5. Import/Export Device Settings

Immediately under the Device Settings tab are two buttons labeled **Import** and **Export**. The function of these buttons is to manage files containing only the Device Settings.



*The Import/Export buttons*

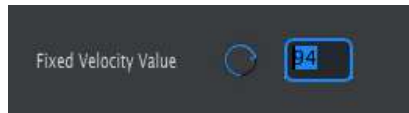
These are different from the buttons described in the [previous section \[p.113\]](#), which are used to generate a file containing both the Device Settings and the Sequences.

The Device Settings files carry the extension **.MiniBrute2\_ds**. You can swap these files with other users or build a library of configurations for the different systems you encounter in different locations.

## 12.6. Data entry

There are two main ways to enter new parameter values in the MIDI Control Center: click something and move it, or type a number into a field.

To edit the Fixed Velocity Value, for example, click and drag the knob graphic or double-click in the value field and enter a new value:



*Editing a knob value*

To edit a parameter such as the Tempo Knob Mode, click its pull-down menu and make a selection:

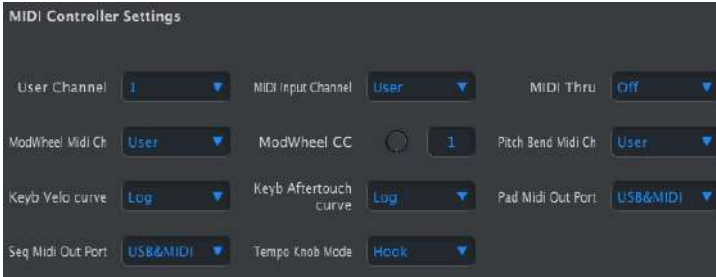


*Selecting a pull-down menu option*

## 12.7. Device Settings


All of the Device Settings are contained within this window. To view them within the MIDI Control Center, use the scroll bar on the right side of the window.

### 12.7.1. MIDI Controller Settings



Here's a quick reference chart for the MIDI Controller Settings:

Parameter	Range/Values	Description/Function
User Channel	1-16	Keyboard MIDI Channel
MIDI Input Channel	1-16, User	USB/MIDI CV channel
MIDI Thru	Off, On	Patch MIDI In to Out
ModWheel MIDI Ch	1-16, User	Fixed/follow User channel
ModWheel CC	0-127	Assign MIDI CC #
Pitch Bend MIDI Ch	1-16, User	Fixed/follow User channel
Keyb Velo curve	Log, Lin, AntiLog	Personalized response
Keyb Aftertouch curve	Log, Lin, AntiLog	Personalized response
Keyb MIDI Out Port	USB and/or MIDI	Send to MIDI, USB, or both
Seq MIDI Out Port	USB and/or MIDI	Send to MIDI, USB, or both
Tempo knob mode	Jump, Hook	Tempo can jump to knob position or wait for pass-through

 The "User" value of a parameter allows its MIDI channel to change automatically whenever the MIDI channel of the keyboard is changed.

Now let's go through the parameters one at a time.

#### 12.7.1.1. User Channel

This sets the keyboard MIDI Channel. When this is changed, any parameter with its MIDI Channel set to "User" will also change its send/receive channel.

### **12.7.1.2. MIDI Input Channel**

This parameter defines the MIDI Channel to which the MiniBrute 2 should respond. It also allows you to perform MIDI-to-CV conversion when the Sequencer and Arpeggiator are stopped. The selected value is the MIDI channel that will be allowed to control an external device through the CV/Gate/Mod connectors.

These MIDI messages can either arrive via USB or the MIDI Input connector.

### **12.7.1.3. MIDI Thru**

This parameter will turn the MiniBrute 2 MIDI Output into a MIDI Thru. Incoming MIDI data will be routed directly to the Output instead of being used to transpose sequences, etc.

### **12.7.1.4. ModWheel MIDI Ch**

This determines whether the ModWheel will send its messages down a fixed MIDI Channel at all times or change MIDI Channels when the keyboard does.

### **12.7.1.5. ModWheel CC**

Ordinarily a mod wheel is assigned to MIDI CC #1. But this parameter allows you to set it to a different MIDI CC number so you can use it as an alternate modulation source.

### **12.7.1.6. Pitch Bend MIDI Ch**

This determines whether the Pitch wheel will send its messages down a fixed MIDI Channel at all times or change MIDI Channels when the keyboard does.

### **12.7.1.7. Keyboard Velocity curve**

Three velocity curves are available so you can choose the one that best matches your playing style.

### **12.7.1.8. Keyboard Aftertouch curve**

Three aftertouch curves are provided so you can choose the one that seems the most responsive to you.

### **12.7.1.9. Keyboard MIDI Out Port**

With this setting the MiniBrute 2 will know if you want the data generated by the keyboard to be sent to the USB port, the MIDI Output, or both.

### **12.7.1.10. Seq MIDI Out Port**

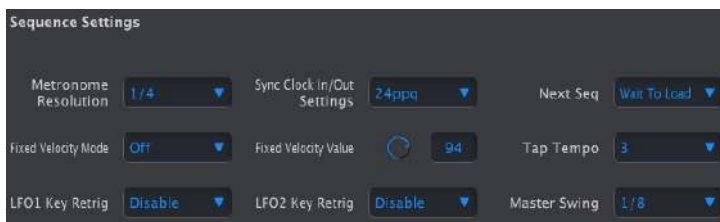
With this setting the MiniBrute 2 will know if you want the data generated by the sequencer to be sent to the USB port, the MIDI Output, or both.

### 12.7.1.11. Tempo Knob Mode

This parameter defines the response of the Tempo knob. Two settings are available:

- Jump: The tempo value will respond immediately when the Rate knob is turned.
- Hook: The tempo will not change until the Rate knob passes through the current value.

## 12.7.2. Sequence settings



Here's a quick reference chart for the Sequence settings:

Parameter	Range/Values	Description/Function
Metronome Resolution	1/4, 1/8, 1/16, 1/32	Selects the resolution for the metronome
Sync Clock In/Out settings	1step (Gate/Clock), 1pulse, 24ppq, 48 ppq	Set Sync input/output type. Refer to external device documentation to determine what the settings should be.
Next Seq	Wait to Load, Instant Change	Selects when the MiniBrute 2 sequences will change
Fixed Velocity Mode	Off, On	Disable/enable velocity sensitivity
Fixed Velocity Value	0-127	Set the preferred value
Tap Tempo	2, 3, or 4 taps	Number of taps to respond
LFO1 Key Retrigger	Disable, Enable	LFO will run freely or retrigger when a note is played
LFO2 Key Retrigger	Disable, Enable	LFO will run freely or retrigger when a note is played
Master Swing	1/8, 1/16, 1/32	Sets resolution for the swing value

Next we'll go through those parameters one-by-one.

### 12.7.2.1. Metronome Resolution

This parameter allows you to select how quickly the metronome will count. If your tempo is slow, a higher resolution may be preferred. If your tempo is fast, a lower resolution such as 1/4 might be best.

### 12.7.2.2. Sync Clock In/Out settings

MiniBrute 2 is endowed with the ability to transmit or receive clocking signals from a huge range of vintage devices. Here's a brief look at each setting:

- 1step (Gate): Interprets the rising edge of the voltage as a Note On command and the falling edge as a Note Off. Then it will advance to the next step.
- 1step (Clock): It is likely the input clock has a fixed period, so MiniBrute 2 interpolates between the edges of the clock signal to derive a steady tempo.
- 1 Pulse (Korg): As the name implies, this is a special sync clock used by Korg devices.
- 24 PPQ: the DIN sync used by Roland and other companies in their devices.
- 48 PPQ: the clock signal used by Oberheim drum machines, et al.

### 12.7.2.3. Next Seq

This parameter decides how quickly the MiniBrute 2 sequences will change after a new sequence has been selected, and whether the new sequence will start from the top or the middle somewhere.

- Wait to Load: MiniBrute 2 will not change sequences until the end of the current sequence.
- Instant Change: The sequence changes immediately and starts at the top of the new sequence.

If the two sequences are not the same length, the current position of the new sequence is calculated as if the new sequence had been played from the beginning.

### 12.7.2.4. Fixed Velocity Mode

This parameter determines whether the keyboard will respond to differences in velocity or play every note at the same value.

### 12.7.2.5. Fixed Velocity Value

If the Fixed Velocity Mode parameter is set to on, this defines the velocity value that will be transmitted by the keyboard.

### 12.7.2.6. Tap Tempo average

This lets you set your preference for how many times the Tap button must be pressed before the tempo will change.

### 12.7.2.7. LFO1 Key Retrigger

The cycle of the LFO 1 waveform will be reset when a note is triggered if this parameter is set to Enable. Otherwise it will run freely, and when a note is played the LFO waveform could be at any point in its cycle.

### 12.7.2.8. LFO2 Key Retrigger

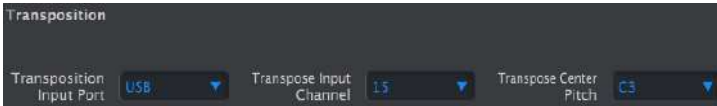
Same as above.

### 12.7.2.9. Master Swing

This parameter sets the resolution for the swing value that has been selected using the Shift button and one of the keys as indicated on the top panel.

**i** The Time Div setting must be equal to or lower than the Master Swing setting in order for the Swing to be heard. For example, if Time Div = 1/4 and Master Swing = 1/8, the Seq/Arp will not have a shuffle feel. See [Master Swing vs. Time Division \[p.83\]](#) for specific information.

## 12.7.3. Transposition



Here's a quick reference chart for the Transposition settings:

Parameter	Range/Values	Description/Function
Transposition Input port	USB and/or MIDI	Sequences can be transposed by external devices. This decides which ones are allowed to do so.
Transpose Input channel	1-16, all	Specifies the MIDI channel to obey for transposition.
Transpose Center Pitch	Full MIDI note range	Notes above/below center transpose the sequence up/down

We'll go through those parameters one-by-one.

#### 12.7.3.1. Transposition Input port

Use this to tell MiniBrute 2 which MIDI port will receive the transposition request.

#### 12.7.3.2. Transpose Input channel

Instructs MiniBrute 2 which MIDI channel will set the transposition amount.

#### 12.7.3.3. Transpose Center Pitch

The Center pitch decides which incoming note means "don't transpose". The default value is MIDI note #60, or C3.

So for example, an incoming C3 won't transpose the sequence, but an incoming D3 will transpose the sequence +2, etc.

## 12.7.4. CV/Gate settings



This is where you select the electrical behavior for the Control Voltage connectors.

Here's a quick reference chart for these parameters.

Parameter	Range/Values	Description/Function
Note Priority	Low, High, Last	Specifies which played note will change the voltage output
Envelope Retrig	Off, On	Toggles between Legato and Retrigger responses
Velocity Range	1-10	Defines the voltage range of the Velo patch bay jack
Pressure Range	1-10	Defines the voltage range of the Mod patch bay jack
V/Oct Base Note Pitch	Full MIDI range	Sets the center reference point for the KBD patch bay jack

Now we'll take a look at each of those parameters.

### 12.7.4.1. Note Priority

In the event that more than one note is played on the keyboard at the same time, this parameter determines whether the pitch will be derived from the highest or lowest note played. This also affects the KBD output at the KBD patch bay connector.

This also tells the MiniBrute 2 which note from a polyphonic sequencer track or keyboard will be interpreted as the one it should play.

The "Last Note" setting is a combination of the two, as it will allow any new note to change the pitch.

### 12.7.4.2. Envelope Retrig

If this parameter is set to Off, notes that are played in a Legato manner will not retrigger the envelopes. The "On" setting means that each new note will retrigger the envelopes from their attack stages.

### 12.7.4.3. Velocity Range

This determines the change in voltage that will be generated by the full velocity range of the keyboard. It affects the Velo patch bay jack.

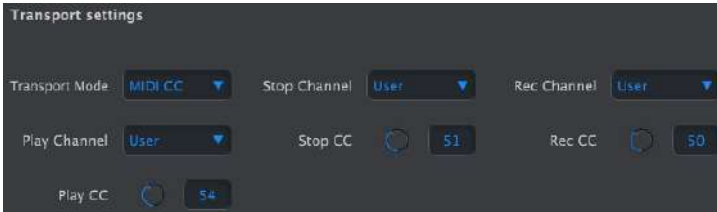
#### 12.7.4.4. Pressure Range

This determines the change in voltage that will be generated by the pressure-sensitivity of the keyboard (i.e., aftertouch), or depending on the setting of the [Mod Source \[p.19\]](#) switch, by the full throw of the Mod wheel. It affects the Mod patch bay jack.

#### 12.7.4.5. V/Oct Base Note Pitch

MiniBrute 2 provides the option to set a center note for its Volt per Octave format.

### 12.7.5. Transport settings



First a quick summary of the Transport settings, then the chart.


#### 12.7.5.1. Transport Mode

This parameter determines whether the controls in the Transport will send/respond to MIDI Continuous Control data (MIDI CC), MIDI Machine Control commands (MMC), or both.

#### 12.7.5.2. Stop/Record/Play

You can define the MIDI channel and CC number for each of the three main Transport commands independently. All three must transmit the same type of MIDI information, though: MIDI CC, MMC, or both.

Parameter	Range/Values	Description/Function
Transport Mode	MIDI CC, MMC, Both	Covers most devices
Stop Channel	1-16, user	Fixed channel or linked to keyboard channel
Record Channel	1-16, user	Fixed channel or linked to keyboard channel
Play Channel	1-16, user	Fixed channel or linked to keyboard channel
Stop CC	0-127	Full MIDI range
Rec CC	0-127	Full MIDI range
Play CC	0-127	Full MIDI range

 The "User" value allows the MIDI channel of that parameter to change automatically whenever the MIDI channel of the keyboard is changed.

## 13. SHIFT FUNCTIONS

Here's a list of all Shift button features. Click the links to read about them:

Combination	Result
SHIFT + Keys 1-5 [p.123]	Seq/Arp gate length
SHIFT + Keys 6-16 [p.123]	Seq/Arp swing amount
SHIFT + Key 17 [p.123]	Note retrigger modes (Retrig, Legato)
SHIFT + Keys 18-19 [p.124]	Reset LFO 1, LFO 2 (respectively)
SHIFT + [Oct down] [p.124]	Seq transpose mode
SHIFT + [Oct up] [p.124]	Seq KBD play mode
SHIFT + Play [p.124]	Restart the sequence/arpeggio to step 1, quantized to the next step of Seq 1
SHIFT + Rec (Seq mode) [p.124]	Sequencer append mode
SHIFT + Seq encoder [p.124]	Wait to load sequence (loads when SHIFT is released)
SHIFT + Stop (Seq mode) [p.124]	Clear last step
SHIFT + Sync [p.124]	Metronome on/off
SHIFT + Tap/Rest (Arp mode) [p.124]	Arp Hold mode
SHIFT + Time Div encoder [p.125]	Wait to change time division (changes after SHIFT is released)

### 13.1. SHIFT + Keys 1-5

Use this combination to select one of the 5 [Gate \[p.76\]](#) settings. Sequencer mode and Arpeggiator mode have independent Gate settings.

### 13.2. SHIFT + Keys 6-16

Use this combination to select one of the 11 [Swing \[p.82\]](#) settings. Sequencer mode and Arpeggiator mode have independent Swing settings.



The Time Div setting must be equal to or lower than the Master Swing setting in order for the Swing to be heard. For example, if Time Div = 1/4 and Master Swing = 1/8, the Seq/Arp will not have a shuffle feel. The Master Swing setting can be changed using the [MIDI Control Center \[p.109\]](#).

### 13.3. SHIFT + Key 17

Switches between [Retrig and Legato \[p.40\]](#) modes of note retriggering. Retrig mode will restart the envelopes from their Attack stages unless a cable is plugged into one of the [Trig inputs \[p.67\]](#) in the [patch bay \[p.53\]](#).

### 13.4. SHIFT + Keys 18-19

Pressing Shift and the tapping the highest F on the keyboard (key #18) toggles [Retrigger mode \[p.24\]](#) for LFO 1. Pressing Shift and the tapping the highest F#/Gb on the keyboard (key #19) toggles [Retrigger mode \[p.24\]](#) for LFO 2.

### 13.5. SHIFT + Oct down (Seq mode only)

Toggles [Sequence Transpose \[p.88\]](#) mode. Playing a note during sequence playback will transpose the sequence. Mutually exclusive with KBD ply mode; it's one or the other.

### 13.6. SHIFT + Oct up (Seq mode only)

Toggles [Keyboard Play \[p.88\]](#) mode. Playing a note during sequence playback overrides the sequencer note data temporarily. Playing the keys will not transpose the sequence. Mutually exclusive with Sequence Transpose mode; it's one or the other.

### 13.7. SHIFT + Play

This will cause a sequence or an arpeggio to start again from the first step (Seq) or the first note (Arp).

### 13.8. SHIFT + Rec (Seq mode only)

Toggles the ability to add ([append \[p.95\]](#)) data to the end of an existing sequence, which makes the sequence longer.

### 13.9. SHIFT + Seq encoder

Also known as [Skip Seq/Arp Modes \[p.84\]](#). Instructs the Sequencer and the Arpeggiator not to change the current sequence or arpeggiator mode until the Shift button is released. This makes it possible to select non-adjacent sequences or modes without having to pass through the items between them.

### 13.10. SHIFT + Stop (Seq mode only)

Whether the sequencer is running or not, this button combination will [remove the last step \[p.95\]](#) from the sequence. The process shortens the sequence by one step. It is not a method for erasing the most recently recorded data, unless that data happens to be at the end of the sequence. In other words, in a 16-step sequence it will remove step 16, resulting in a 15-step sequence, and so on.

### 13.11. SHIFT + Sync

Toggles the metronome on and off. This works in both Sequencer and Arpeggiator modes.

### 13.12. SHIFT + Tap / Rest (Arp mode only)

Toggles [Hold mode \[p.99\]](#) on and off for the Arpeggiator. When on, notes the arpeggiator is playing will continue to play after the keys have been released.

### 13.13. SHIFT + Time Div encoder

Also known as [Skip Time Divisions \[p.84\]](#). Instructs the Sequencer and the Arpeggiator not to change the Time Division until the Shift button is released. This makes it possible to select non-adjacent Time Division settings without having to pass through the settings between them.

## 14. DECLARATION OF CONFORMITY

### USA

#### **Important notice: DO NOT MODIFY THE UNIT!**

This product, when installed as indicate in the instructions contained in this manual, meets FCC requirement. Modifications not expressly approved by Arturia may avoid your authority, granted by the FCC, to use the product.

*IMPORTANT:* When connecting this product to accessories and/or another product, use only high quality shielded cables. Cable (s) supplied with this product **MUST** be used. Follow all installation instructions. Failure to follow instructions could void your FCC authorization to use this product in the USA.

*NOTE:* This product has been tested and found to comply with the limit for a Class B Digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide a reasonable protection against harmful interference in a residential environment. This equipment generate, use and radiate radio frequency energy and, if not installed and used according to the instructions found in the users manual, may cause interferences harmful to the operation to other electronic devices. Compliance with FCC regulations does not guarantee that interferences will not occur in all the installations. If this product is found to be the source of interferences, witch can be determined by turning the unit "OFF" and "ON", please try to eliminate the problem by using one of the following measures:

- Relocate either this product or the device that is affected by the interference.
- Use power outlets that are on different branch (circuit breaker or fuse) circuits or install AC line filter(s).
- In the case of radio or TV interferences, relocate/ reorient the antenna. If the antenna lead-in is 300 ohm ribbon lead, change the lead-in to coaxial cable.
- If these corrective measures do not bring any satisfied results, please the local retailer authorized to distribute this type of product. If you cannot locate the appropriate retailer, please contact Arturia.

The above statements apply **ONLY** to those products distributed in the USA.

### CANADA

*NOTICE:* This class B digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulation.

*AVIS:* Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

### EUROPE



This product complies with the requirements of European Directive 89/336/EEC

This product may not work correctly by the influence of electro-static discharge; if it happens, simply restart the product.