_MINIFREAK

ARTURIA
_The sound explorers

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Thank you for purchasing the Arturia MiniFreak !

This manual covers the features and operation of Arturia's **MiniFreak**, the powerful hybrid desktop synth and big brother of MicroFreak.

Be sure to register your product as soon as possible! When you purchased MiniFreak you were given a serial number and an unlock code. These are required during the online registration process.

Do not hesitate to visit the Arturia website for information about all of our other great hardware and software instruments. They have become indispensable, inspiring tools for musicians around the world.

Musically yours,

The Arturia team

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 relating 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：

- Read and understand all the instructions.
- Always follow the instructions on the instrument.
- Before cleaning the instrument, always remove the electrical plug from the outlet, as well as the USB cable. 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 a cloth that's too wet.
- Do not use the instrument near water or moisture, such as a bathtub, sink, swimming pool, or similar place. Do not place the instrument in an unstable

position where it might accidentally fall over.

- 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.
- Use only the provided AC adapter, as specified later in this manual.
- Make sure the line voltage in your location matches the input voltage specified on the AC power adapter.
- Do not open and insert anything into the instrument, as this could cause a fire or electrical shock.
- Do not spill any kind of liquid onto the instrument.
- 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.
- Do not use the instrument when thunder and lightning are present.
- Do not expose the instrument to hot sunlight.
- Do not use the instrument when there is a gas leak nearby.
- Arturia is not responsible for any damage or data loss caused by improper operations to the instrument.
- Arturia recommends the use of audio cables with proper shielding, less than 3 m (10') in length.

Table Of Contents

1. WELCOME TO MINIFREAK

1.1. What's MiniFreak?

Building on the MicroFreak's legacy, the MiniFreak takes freakiness to the next level in many different ways.

It sports two digital Oscillators (Osc) with expanded capabilities. One offers 16 different oscillator types, from simple synthesizer waveforms and virtual analog modeling to speech synthesis and much more. The other has 21 different modes, not only various oscillators but other processing such as ring modulation, digital filter modes and wavefolder, crusher and distortion.

The oscillators are fed into an analog signal chain, with a multi-mode Voltage Controlled Filter (VCF) and Voltage Controlled Amplifier (VCA), the latter with its own dedicated 4-stage envelope. The signal is further enhanced with a set of three independent digital effects processors (FX), each with a selection of multiple effect types.

A Cycling Envelope can be used as either an extra three-stage envelope or as a looping waveform with a variety of complex shapes. This is in addition to a set of two Low Frequency Oscillators (LFO) with multiple waveshapes and the ability to sync to a global tempo. Modulation sources can be assigned to multiple destinations with different amounts, thanks to an easy-to-use Modulation Matrix.

All this is contained in a portable package with a 37-note Arturia Slim Keys keybed with velocity and pressure (aftertouch/AT) sensitivity. Two capacitive Touch Strips have multiple assignable functions for intuitive real-time control, and a powerful built-in arpeggiator and sequencer top off the package.

The MiniFreak can connect to your studio with stereo audio outs, a mono audio in, analog clock signals, MIDI In/Out/Thru, and class-compliant USB MIDI. That makes it a perfect companion to your favorite VSTs but also to your Digital Audio Workstation (DAW) running MiniFreak V, a virtual instrument version of MiniFreak with seamless control from the hardware and much more.

1.2. Firmware 4.0: Added content and features

1.2.1. New Effects : Vocoder EXT In and Self

Version 4.O of MiniFreak's firmware adds 2 new effects the Vocoder EXT In and Self.

What's Vocoder Synthesis?

Vocoder synthesis is a technique used in speech and audio processing to analyze and reproduce human speech or other sounds by separating and then re-synthesizing the sound's characteristics. It works by analyzing the spectral features (like the shape of the sound wave) of a voice signal and then using that information to reconstruct or modify the sound using a separate excitation signal (like a synthesizer).

In simpler terms, a vocoder breaks down the voice into its essential components—such as pitch and formants—and then rebuilds it, often allowing for manipulation (like robotic effects or voice transformations).

1.2.1.1. Vocoder Ext In

This Vocoder effects processes the signal from the MiniFreak Synth Patch as the carrier, and the External Input as the Modulator.

Here is how the knobs work for the Vocoder Ext In effect :

- **Time**: Define how long the sound takes to decay when Vocoder processes sound.

- **Intensity** Shift the frequency content of your sound. In Gated subtype, this is replaced by the gate Threshold.

- **Amount**: Blend your dry voice with the processed one.

- **Subtypes**: Clean, Vintage, Narrow and Gated.

1.2.1.2. Vocoder Self
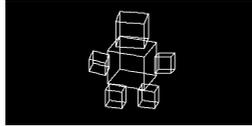
This Vocoder effects processes the signal from the MiniFreak as the carrier as well as the modulator. In this mode, the Vocoder behaves a bit like a filter bank

Here is how the knobs work for the Vocoder Ext In effect :

- **Spectrum**: Define how wide is the frequency content analyzed by the Vocoder. Provides a drastic change to the sound.

- **Formant Shift** Shifts the frequency content of your sound. In Gated sub-type, this is replaced by the gate Threshold.

- **Amount**: Blend your synth signal with the vocoded synth.

- **Subtypes**: Clean, Vintage, Narrow and Gated.

1.2.1.3. Vocoder EXT in and Self Sub-Types :

Both Vocoder Types have 4 different Sub-Types accessible with Shift + Type, here's a quick overview of each :

- Clean : The most clean/modern vocoder presets. Focus on high-definition sounds and voice intelligibility.

- Vintage : Aim to reproduce old vocoder gear from the 70s/80s which have a tasty sound coloration.

- Narrow: Allow for very resonant sounds, perfect for creative sound design

- Gated : Generate plucky or droplet sounds based depending on the signal you fed on.

1.2.2. Refinements :

1.2.2.1. Audio In Mode :

The Utility/Audio/Input menu now features a mode selection allowing you to switch easily between Line and Microphone Modes.

The Microphone Mode works with any Dynamic Microphone connected to the Input at the back. It provides the extra gain required for these microphones.

> ℹ Note that Condenser Microphone are not supported as the MiniFreak's Input does not offer Phantom Power.

1.2.2.2. Audio In Gain

This allows you to set the MiniFreak's Input Gain to better suit the type of instrument connected.

2. SETUP AND INSTALLATION

2.1. Powering the MiniFreak

The MiniFreak 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.

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 (12V / 1A). 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.

2.2. Notice

The manufacturer's warranty does not cover service charges incurred due to a lack of knowledge relating to how a function or feature works (when the unit is operating as designed); reading the manual is the owner's responsibility. Please study this manual carefully and consult your dealer before requesting service.

2.3. Register your Instrument

Registering your instrument establishes your legal ownership, which entitles you to access the Arturia Technical Support service, and to 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, go to the section "My Products", and click on "Register New Product" to add the MiniFreak synthesizer by entering its serial number and unlock code, as printed on the sticker located under the machine. It will also allow you to download and activate your MiniFreak V software bundled with the hardware unit for preset management and DAW integration.

2.4. Connecting the MiniFreak to the outside world

Always power-off all audio gear before making any connections. Failing to do so may damage your speakers, the synthesizer, other audio equipment or your ears. After completing all connections, set all levels to zero. Power-on the various devices, with the audio amplifier or monitoring system last, then raise the volumes to a comfortable listening level.

Here is an overview of the MiniFreak's rear-panel connectors:

Purpose	Connector type
MIDI In/Out/Thru	5-pin DIN
USB	Standard USB Type B
Sustain Pedal Input	1/4" (6.35 mm) TS
Clock In/Clock Out/Reset Out	3.5 mm TRS for Clock In/Out, TS for Reset Out
Audio In	1/4" TS
Audio Left Out/Right Out	1/4" TRS (balanced)
Headphones Out	1/4" TRS (stereo unbalanced)
Power	DC input: 12V/1A

2.5. Upgrade to the latest firmware

The MiniFreak's *firmware* contains the instrument's Operating System (OS), its "brain". Upgrades to the firmware allow Arturia to add new features or fix problems. It's worth checking the latest firmware version against the currently installed firmware version on your MiniFreak.

- First make sure that you have the latest revision of the MiniFreak V software installed, to do so, open the Arturia Software Center and check for available MiniFreak V updates. If you are running the latest version of the software, you may proceed to the next step :

Using the MiniFreak V software, simply click **FW Update** on the bottom bar :

- If your firmware is not up to date (version is older than used MiniFreak V) : → MiniFreak V will prompt you, on opening, with a pop up telling you to update, simply click on the "Upgrade to latest" Green button

- If your firmware is already up to date (or compatible with MiniFreak V : → There is no opening popup, to update, click in the bottom right section FW Update then the pop up will open.

Also note that the pop-up window allows you to update from a file if you are offline. To do so, download the latest Firmware, put it on your desktop, click on 'FW update', 'upload from file', select the path to the '.mnf' file on your desktop, and voilà !

3. MEET THE MINIFREAK: AN OVERVIEW

Now it's time to learn our way around the MiniFreak!

In this chapter, we'll take a look at the front and rear panels of the MiniFreak. In later chapters, we'll explain what the controls in each section do, and how to use them, but we'll start with a basic understanding of the different control types.

3.1. The Front Panel

We'll start at the top left of the front panel and work our way across, section by section and row by row.

We'll name the controls in **bold**; when a control has two names separated by a slash, e.g. **Tune/Oct**, the second function is applied while **Shift** is held down (shown in blue on the panel of your MiniFreak).

An *encoder* steps through specific settings, one by one. Usually encoders have a second "click+turn" or "click+push" function activated by pressing the encoder; often these will have an indicator LED to show their status.

Buttons are pretty self-explanatory; some are active only when held down (*momentary*), while others have to be pushed once to enable them, then again to disable them (*toggle*). Usually button status is indicated with a white LED; the **Sound Edit/Utility** button lights blue when the Utility menu is selected.

Another type of button is the *capacitive button*, which senses your touch but has no moving parts. Each of the 30 capacitive buttons on the Touch Strip has a multicolor LED to indicate activation or function type.

3.1.1. The Modulation Matrix

The Modulation Matrix

The top section of the MiniFreak begins with the **Modulation Matrix**, which lets you connect a variety of sources and destinations together in order to form *modulation routings*, where one part of the MiniFreak controls another.

There are seven rows of modulation sources, shown on the left and with a row for each. There are up to thirteen modulation destinations in the seven columns, four hardwired and up to nine assignable via the three **Assign** pages.

The Matrix encoder lets you browse through the modulation points. After clicking on it, it allows you to edit the Amount. Once a modulation amount is set, the connection is made. You'll clearly see if a modulation amount is set to anything other than zero since the LED for that connection will be lit.

Learn more in the Modulation Matrix chapter [p.10].

3.1.2. Oscillators

Digital Oscillator controls

These controls give you rapid access to the different properties of the two Digital Oscillators (**Osc 1** and **Osc 2**).

- **Select** chooses whether the other controls affect Osc 1 or Osc 2.

- **Tune/Oct** selects the tuning in semitones (±48). Shift-clicking jumps by octaves. Clicking the encoder lights the **Fine** LED and lets you fine-tune by *cents* (100 cents = 1 semitone).

- **Type** selects the Oscillator Engine.

- **Wave**, **Timbre**, and **Shape** have different functions depending on the Oscillator Type. These are shown on the Display.

- **Volume** adjusts the level of each Oscillator.

Check out The Digital Oscillators [p.24] to learn more.

3.1.3. Analog Filter

Analog Filter controls

Arturia's analog synthesizers are famous for their filters, and the Analog Filter on the MiniFreak is no exception. Its warm and clean timbre is adding some character to the digital Oscillators with a few twists of a knob.

- **Type** selects the filter mode: Low Pass, Band Pass, or High Pass.

- **Cutoff** and **Resonance** set the filter's *cutoff frequency* (or simply *cutoff*) and the resonance of the filter at that frequency.

- **Env/Velo** sets the amount of envelope modulation on the cutoff, or how much the keyboard velocity controls that envelope amount. Because cutoff modulation can be positive or negative, the knob has a center detent for O modulation.

We'll go into more detail in the Analog Filter chapter [p.49].

3.1.4. Digital Effects

Digital Effects controls

The **Digital Effects** section is quite similar in operation to the Oscillators section:

- **Select** chooses whether the controls affect FX1, FX2, or FX3.

- **Type/Sub** selects the Type of effect, or the Subtype – for example, there are six Subtypes of the Phaser FX Type, each with its own character. Clicking the encoder enables or disables the selected FX.

- **Time**, **Intensity**, and **Amount** have different functions depending on the Type of effect selected.

Lastly on the top section of the panel's controls, you can find the **Master** knob which controls the overall volume of the MiniFreak's main and headphone outputs.

There's a lot to learn about these powerful effects – check out the Digital Effects chapter [p.11].

3.1.5. General controls

General controls

Moving to the center section of the panel's controls, the far left starts with some functions you'll use all the time while playing and programming:

- The **Shift** button, when held down, accesses extra functions on the knobs and buttons that have a blue label.

- The **Octave** buttons transpose the keyboard range by one octave per press, which becomes brighter as you move up or down by up to three octaves. Press both buttons together to reset the keyboard transposition.

- The **Hold/Tie** button, when toggled On, input notes are sustained. When programming the Sequencer [p.94], this button puts a rest into a given step.

- The **Chord [p.89]** plays a programmed chord based on whatever note you play; Shift-click to access the **Scale [p.88]** configuration page on the display.

- The **Glide** knob sets the glide (or *portamento*) time, the amount of time it takes for the pitch to change between the last played note and the next played one.

3.1.6. LFO

LFO controls

The **LFO** section offers a lot of power in only a few controls!

- **Select/Edit** either chooses LFO 1 or LFO 2, with a white indicator LED. The LFO Edit function will be described in detail in the LFOs chapter [p.68].

- **Rate/Trig** sets the LFO rate, and when shift is pressed lets you choose the way in which the LFO can be triggered to restart its cycle.

- **Wave/Load** lets you choose an LFO waveform from a selection of basic types.

Directly above the **Wave/Load** knob is a pair of LEDs that pulse at the rates of the two LFOs, feedbacked through color changes from yellow when positive and red when negative.

3.1.7. The Display
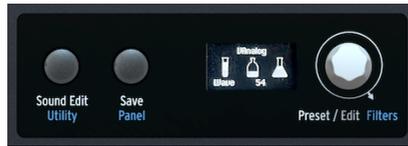
The Display and associated controls

The center of the MiniFreak has an **OLED display** that shows both static information and animations. This is where you navigate function-menus, choose presets, see graphical displays of parameter changes, details about parameters without front-panel labels, and much more.

To the left of the display are the **Sound Edit/Utility** and **Save/Panel** buttons. Sound Edit [p.82] brings up a menu of extra functions for many parts of the MiniFreak, going beyond those with their own buttons and knobs on the front panel. Utility [p.107] accesses a menu of global functions. The button lights white for Sound Edit and blue for Utility.

Save allows you as labelled to save your presets, name them and tag them. For more information refer to the Managing Presets chapter [p.18].

Panel makes all the parameters' values jump to their current physical position.

Since digital knobs and encoders can automatically update their values when you change patches but analog knobs can't, this function lets you hear and adjust where your analog knob settings differ from what's stored in memory.

The knobs affected by Panel include **Glide**, **Cutoff**, **Resonance**, **Env**, **Rise/Fall**, **Hold/Sustain**, **Attack**, **Decay**, **Sustain**, and **Release**.

> ℹ Pressing the Panel button can't be undone; it's meant to be used as soon as you select a sound and before you start editing it. If you select a patch, edit it, and then hit Panel, you lose your previous editions, so be careful!

The **Preset/Edit** encoder selects presets and is used as a central editing controller for all kinds of parameters. Shift-turning lets you **Filter** presets by category, as explained in Managing Presets [p.18].

3.1.8. Cycling Envelope

The Cycling Envelope controls

The **Cycling Envelope** is a multi-function modulation source. It can act as a second envelope, or as an extra LFO with an array of waveform options that differ from those of the other two LFOs.

- The **Mode** button selects between Env, Run, and Loop modes.

- **Rise/Shape**, **Fall/Shape**, and **Hold/Sustain** control the different stages of the cycle and the way each behaves.

We'll detail these parameters in the Envelopes chapter [p.76].

3.1.9. Envelope

The Envelope controls

The **Envelope** section has controls for a traditional 4-stage ADSR envelope: **Attack**, **Decay**, **Sustain**, **Release**. The Envelope defaults to controlling the VCAs for amplitude control, but it's also available as a source in the Modulation Matrix. See The Envelopes [p.76] for more.

The **Mode** button lets you select between different types of polyphony, cycling between Monophonic, Polyphonic, Paraphonic, and Unison modes. Which will be described further in the Envelopes [p.76] chapter.

3.1.10. Arpeggiator/Sequencer

These 30 capacitive buttons are grouped into four sections.

- Selecting the **Arp** or **Seq** or turn them **Off**

The Arpeggiator and Sequencer Controls

- **Play/Stop**, **Record**, and **Mods**

The Arpeggiator and Sequencer Controls

- A set of 16 *Touch Buttons* that can select sequence steps, set the mode and modifiers for the Arpeggiator or a variety of other functions, including LFO Edit [p.68].

Transport Controls

- Controls for sequence length and selecting 'pages' of longer sequences as well as the Shapes for the LFO Edit [p.68]

Sequencer length and Shaper slopes controls

There's a lot to go over here; we'll save the fine details for the Arpeggiator and Sequencer chapter [p.94].

3.2. The Touch Strips

The Touch Strips and their associated controls

The three capacitive buttons select between three different operating modes:

- **Keyboard Bend/Wheel** (white LEDs) sets the Touch Strips to function as common bend and mod controls. The **Vibrato** control selects a vibrato function rather than using the Wheel as a generalized modulation source, use shift-touch to enable the vibrato.

- **Macros M1/M2** (blue LEDs) lets the strips control two Macros [p.91], which collect multiple control movements into one; shift-touch takes you into Macro Assign mode.

- **Seq/Arp Gate/Spice** (orange LEDs) sets the Touch Strips to control Gate time and Spice in the Arpeggiator and Sequencer [p.94]. Shift-touching this button will enable the **Dice**.

3.3. The Rear Panel

Let's now review the MiniFreak rear panel inputs and outputs,

The Rear Panel

From left to right, the MiniFreak's rear-panel connectors are as follows:

Function	Connector type
MIDI In/Out/Thru	5-pin DIN
USB	Standard USB Type B
Sustain Pedal Input	1/4" (6.35 mm) TS
Clock In/Clock Out/Reset Out	3.5 mm TRS for Clock In/Out, TS for Reset Out
Audio In	1/4" TS
Audio Left Out/Right Out	1/4" TRS (stereo balanced)
Headphones Out	1/4" TRS (stereo unbalanced)
Power	DC input 12V / 1A

3.4. Onward!

There's a lot to cover, as you can see – so let's get going!

4. MANAGING PRESETS

A *Preset* is a collection of almost all different (sound) parameters settings on the MiniFreak, kept together in one place for instant recall. While there are a few functions that are global for the MiniFreak no matter which Preset is loaded, most of which you'll find in the Utility Menu [p.107], the vast majority of the elements that make up a MiniFreak sound – and all of the performance tools to get the most out of it – are stored in a Preset.

The MiniFreak has space for 512 Presets on board, and comes out of the box with a curated list of fine presets to get you started. Because it's important to be able to customize and save your own sounds easily, the Preset management system on the MiniFreak has been kept simple and easy to navigate, while giving you tools to quickly find the sounds you want.

4.1. Preset controls

The center of the MiniFreak's front panel has all needed controls for Preset management: The **Save** button and the all-important **Preset/Edit/Filters** encoder.

Because it does so much, the Preset/Edit/Filters encoder has a bewildering number of names. To simplify this manual, we will use only the name of the function the encoder is currently performing:

- **Preset** when managing Presets
- **Edit** when editing parameters
- **Filters** when Shift-turned to work with Preset Filters

4.2. Selecting and loading Presets

Finding and loading Presets is the simplest of the Preset operations – just turn the Preset encoder until you find the one you want, then click to load it.

The Display shows four pieces of information:

- The Preset Number
- The Preset Name
- The Preset Type
- ...and a small asterisk near the Type name to indicate if the Preset has been edited since it was recalled.

4.3. Saving Presets

When you've edited a Preset and like the results, you can save it. Here's the workflow:

- Start by clicking the **Save** button.
- Display shows "Preview Slot"
- Underneath the preset name, the message "Click to Save" is shown.
- Press the **Save** button.

Your preset will then be saved.

When the **Save** button is lit, pressing it again will save the Preset immediately. You won't get an "Are You Sure?", so be sure you've done everything you need to do and that the save will be to the right Preset number!

If you want to cancel the Save process :

- Click the **Sound Edit** button.
- The Save button will go dark and Display will read "Save Cancelled".

> ℹ️ Lastly, note that when powering your MiniFreak back on, the last saved preset will be reloaded.

4.3.1. Updating a Preset

If you only want to save your edits to the same Preset in the same slot, just click Save again and you're done. The Display will say "Preset Saved" for a moment.

If you want to do more than just update your preset, you have the following optional operations, in this order:

- Choose a new destination slot for the edited Preset, leaving the current Preset as it was when it was last saved
- Change the Preset Type
- Rename the Preset

You move to the next operation by clicking the Preset encoder.

> ℹ️ Note that you can't go back to a previous operation once you've left it. For example, once you've selected a new destination slot for the edited Preset and clicked the encoder to change its Type, you can't go back and choose a different destination slot. At that point, your only option is to cancel the Save (press the Sound Edit button) and start the process over again.

4.3.2. Saving to a new Preset number

Turn the Preset encoder to choose a destination slot. The Display will show the destination and the name of the Preset that's there already, which will be overwritten. That Preset will now be heard when you play the MiniFreak, so you can make sure you're not overwriting something you want to keep.

Once you've selected your destination slot, you can click Save to complete the operation, or click the Preset encoder to proceed to the next step.

4.3.3. Choosing a new Preset Type

Once you've chosen a destination slot for your edited Preset, you can change its sound type if you wish. Types are groups of patches, organized by sound type or intended purpose.

To change the Preset Type, click the **Preset** encoder (Display will show "Select Type"), then turn it to select a new category. Available categories include:

- Bass
- Brass
- E.Piano
- Piano
- Keys
- Lead
- Organ
- Pad
- Percussion
- Sequence
- SFX
- Strings
- Template
- Ext In

> ℹ️ Tip : Templates are useful for storing Presets that you feel will be a good starting point for other Preset designs. For example, if you create a great sweeping pad sound, but you'd like to try it with different effects or filter settings, save the original as a Template so you can find it quickly later.

Once you've selected your new Type, you can click Save to complete the operation, or click the Preset encoder to proceed to the next step.

4.3.4. Renaming a Preset

To change your Preset's name, click the Preset encoder. You'll be shown the Rename Preset screen.

The currently edited character will have small arrows above and below it.
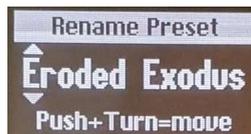
Edit shortcuts :

- turn = browse characters
- click = move to next index
- click + turn = browse index
- shift + turn = shortcut to the first element of the characters' list

Available characters are:

- space
- A to Z, capitalized
- a to z, lower case
- 0 to 9
- Punctuation marks: period (.), underscore (_), hyphen (-)

Preset names can be up to 13 characters long.

When you've renamed your Preset, click the Save button. It will confirm with a message prompt "Preset Saved".

4.4. Filters

The Preset Type setting is also useful for searching for Presets using the **Filters**. If you turn on a Filter, hold down **Shift** and turn the encoder to select a Filter Type. All of the above Preset Types are available, plus

- All (no filtering)
- User

Once you've set a Filter Type, scrolling through Presets will only show those of that Type, skipping the rest. When you're going through over 500 Presets, this will save a lot of time!

4.5. Sound Edit operations

The Sound Edit button gives access to a Preset function menu, with two available functions:

- **View Snapshots**: shows a list of Snapshots of previous edits, which can be reloaded to recover from mistakes you couldn't fix otherwise. Snapshot takes a "picture" of the current state of the machine, a bit like a save state. These are time stamped, meaning if you see one that says " 1:22:26" it means that 1h22min26s after the machine has started, a snapshot has been taken. Loading a snapshot will take you back to the state of the machine according to the time selection.

- **Details**: displays Type, the Sound Designer's name (yours, if you introduced your name as the user of the MiniFreak), and the Revision number for the Preset.

4.6. Utility Menu Preset Operations

The Utility menu [p.107] has a submenu called **Preset Operations**. These include some useful ways to work with parts of a Preset rather than the whole Preset.

4.6.1. Preset Copy

Click **Utility > Preset Operations > Preset Copy** to copy all parameters or a particular part of a Preset.

- Osc 1 or 2
- FX 1, 2, or 3
- Sequence
- LFO 1 or LFO 2 User Curve (the Shaper Waves [p.70] stored in the current Preset rather than in the global libraries of Factory and User Shaper Waves)

4.6.2. Preset Paste

Click **Utility > Preset Operations > Preset Paste** to paste previously copied settings into a Preset. This menu also allows you to swap all the settings for any two of the Digital Effects [p.11] without having to do it by hand.

- Osc 1 or 2
- FX 1, 2, or 3
- Sequence + Mods
- LFO 1 or LFO 2 User Curve
- Swap FX 1 with FX 2
- Swap FX 2 with FX 3
- Swap FX 1 with FX 3

4.6.3. Preset Erase

Click **Utility > Preset Operations > Preset Erase** to perform selective erasures of parts of a Preset in order to start over :

- Preset Init
- Reload Preset
- Matrix
- Seq
- Reload Seq
- Mods
- Macro 1 or 2
- LFO 1 or LFO 2 User Curve

4.6.4. Favorites Panel

Firmware 2.0 adds the ability to save favorite presets. It lets you to get back to your preferred patches more easily, and to sort them faster for performance purposes.

You can store up to 64 presets on the steps slots. This is solely available on the hardware unit.

The workflow operates as follows :

> ℹ Make sure to toggle the Favorite panel in the Utility > Preset Operation > Panel Mode > Favorite Panel. This mode is ON by default, but note that you can still access the original panel mode by toggling the setting back to "Panel".

- Enter the Favorite Panel using **Shift + Panel**.

- Select your preset you want to save on a favorite slot.

- Hold **Save**, and press the **Step Button** you want to store the preset on.

- Your preset is then stored, the corresponding Step LED will turn red when the said preset is loaded.

- To exit the Favorite panel, press Sound Edit.

You can also browse the different pages of the steps to access more slots, up to 64.

> ℹ Please note that if you want to erase a slot, you can do it with Erase + pressing the slot in question.

Once the presets are saved on the slots of the Favorite Panel, the slot will be indicated by a blue led, you can then reload them by simply pressing the corresponding step in the Favorite panel mode. The Led will turn red for the selected slot. If you have multiple instances of the same preset saved, all the slots containing this preset will turn red.

If you have multiple instances of the same preset saved, all the slots containing this preset will turn red.

5. THE DIGITAL OSCILLATORS

Every subtractive synthesizer starts with a raw waveform and then shapes it over time, whether in frequency content (using a filter) or in loudness (using an amplifier). While filters are of paramount importance in shaping analog tone and amplifiers of various sorts appear everywhere inside a synthesizer, the sound always starts with an oscillator, and the more flexible the oscillator, the more versatile the sound.

Unlike analog oscillators, which have a rich harmonic character but usually a fairly limited number of basic waveforms, a digital oscillator can create a waveform in many different ways. Some digital synthesizers use physical modeling to emulate basic synthesizer waves. Others use frequency modulation (FM), or the Karplus-Strong mathematics of a plucked string, or sums of harmonics, or...

The core of MiniFreak's freakiness is its pair of **Digital Oscillators**, which provide all of the synthesis types mentioned above and many more. Some of them are familiar from the synthesizers that made them famous, and others are exciting and new.

While the MicroFreak could create a wide variety of sounds from its single Digital Oscillator, the MiniFreak has two of them. That greatly expands the possibilities, because now it's not only possible to use them as two oscillators, but also for one Oscillator to modulate the other one, or do even more cool tricks. Osc 2 takes advantage of this by providing some extra models that are designed to complement Osc 1 in various ways.

> ℹ Arturia would like to extend its thanks to Mutable Instruments, who granted permission to include several different oscillator Types from Mutable's amazing Plaits Eurorack Macro-Oscillator module. These include: VAnalog, Waveshaper, Formant, Chord, Speech, Modal and Two Operator FM.

> ℹ Three of the models – BASS, SAWX, and HARM – were contributed by Noise Engineering, taken from their Vert Iter Legio Eurorack module.

5.1. The Controls

The Oscillators section starts with the **Select** button and the **Tune/Oct** encoder. Note that long pressing the **Select** button refreshes the display with the current Osc parameters. This prevents you to from having to edit a value to be able to monitor the current state of the controls. With these, you can choose the oscillator you're editing, then tune it up or down by ±48 semitones in steps of one semitone, one octave, or one cent (100 cents = 1 semitone).

The four knobs in the middle are colored orange for a reason: they're the heart of the Oscillators, and therefore the heart of the MiniFreak.

- **Type** chooses the model that the Oscillator will use to generate sound. We'll discuss them all, one at a time, in just a moment.

- The other three knobs – **Wave**, **Timbre**, and **Shape** – do something different for every Type. When you turn one of these knobs, check the Display:

The graphic shows a test tube (Wave), bottle (Timbre), and flask (Shape), with the "fluid level" indicating the parameter value. (Hey, why not? The MiniFreak can turn anyone into a mad scientist!) When turning a knob, the display will offer a corresponding feedback along with a numerical value which is updated in realtime.

5.1.1. Mod Quantize

One other important Osc feature can be found in the **Sound Edit [p.82] > Pitch** menu: *Mod Quantize*, where pitch modulation can be set to step through notes in a particular scale rather than be smoothly continuous. This is great for creating melodies that never stray outside of a particular scale or mode.

Mod Quantize can be set to Chromatic, Octaves, Fifths, Minor, Major, Phrygian Dominant, Minor 9th, Major 9th, minor pentatonic, or Major pentatonic. Quantize can be different for the two Oscillators.

5.1.2. Volume

On the right side you can find a **Volume** control allowing you to set the overall level of each Oscillator.

Using **Shift+Volume** you can set the mix between both Oscillators.

Lastly when the Osc2 is used as a filter, the **Volume** control becomes a Dry/Wet balance.

5.2. Oscillator Types

Osc 1 and Osc 2 have fourteen Types in common; in addition, Osc 1 has two of its own (Audio In & Wavetables) and Osc 2 has six unique Types that are designed to process the sound of Osc 1 rather than create a sound of their own as well as an additional chord Engine.

5.2.1. BasicWaves

This Type blends the characteristics of the two traditional analog synthesizer waveforms: the sawtooth wave and the square wave. Simple yet harmonically rich, BasicWaves mimics the oscillator modifications possible with early modular synthesizers.

Morph: smoothly changes the waveform from a square wave (0) to a sawtooth wave (50) to a double sawtooth that sounds an octave higher (100).

Sym: When Morph = 50 (a pure sawtooth), this control has no effect. When Morph is set below 50, Sym changes the pulse width of the square wave; above 50, it creates phasing between the two sawtooth waves.

> Modulating Sym with an LFO when Morph = 0 creates classic analog-style Pulse Width Modulation (PWM), but when Morph is set to another number, this modulation creates sounds that would have been tricky to create on a 1960s lead synthesizer!

Sub: adds a sine wave one octave down. This extra sound source, a *sub oscillator*, adds low-end girth to waveforms. It could be generated on 1970s/1980s analog synthesizers at a much lower cost than adding an entire extra oscillator.

5.2.2. SuperWave
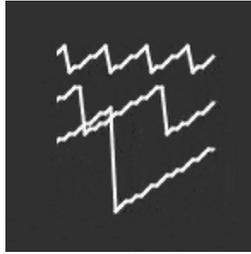
One of the easiest ways to add thickness to a digitally-generated synth waveform is to make multiple copies of it and detune them against one another. Originally this was done with sawtooth waves, with the Roland JP-8000's pioneering Super Saw wave becoming a sonic icon.

Wave: selects the base waveform. In addition to the usual sawtooth, this Type also provide with a square, triangle, or sine wave.

Detune: sets the amount of detuning between the copies, from nearly none to way too much.

Volume: sets the volume of the copies vs. the original waveform. (The black Volume knob sets the overall level of the Oscillator, base wave and copies at once.)
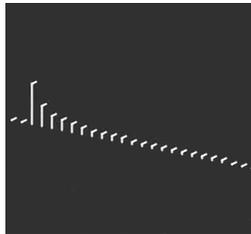
5.2.3. Harmo

The Harmonic Oscillator applies a form of *additive synthesis*, where an evolving sound is made up of multiple *harmonics* that get louder or softer over time. Every sound we hear, whether natural or electronic, is made up of a very large number of sine waves that change their individual volumes in relation to one another.

The earliest additive synthesizers, such as the Digital Keyboards Synergy used by Wendy Carlos in the 1980s, required that each harmonic and its evolution over time to be set individually, a fiddly and time-consuming process. Harmo provides a choice of relative harmonics (up to eight) that can quickly be set, thanks to a large number of preset "tables" of harmonic relationships.

Content: chooses a particular table of harmonic relationships. Higher numbers choose tables with more harmonics in them.

Sculpting: gradually morphs the individual harmonics from the traditional sine wave to a triangle wave, providing a different character impossible on older additive synths.

Chorus: subtly widens and thickens the sound.

5.2.4. KarplusStr

The Karplus-Strong Oscillator generates sounds from one of the earliest *physical models* for sound generation. Developed by Kevin Karplus and Alex Strong at Stanford University, the Karplus-Strong model loops a burst of noise through a filtered delay. This can create a realistic model of a plucked or bowed string or a struck drumhead. These are two combinations of an *exciter* and *resonator*: the bow excites the string, as the strike excites the drumhead.

KarplusStr starts with a combination of Bow and Strike, with each component controlled by different knobs:

Bow: sets the amount of bowed or plucked sound added to the Strike sound – a continuous bowed tone vs. a decaying drum-like tone. (This knob doesn't affect the Position sound.)

Position: sets the position for where the drum head is hit. Any drummer can tell you that striking the center of a drumhead vs. near the edge will produce a very different sound – Position simulates that effect. (This knob doesn't affect the Bow sound.)

Decay: controls how quickly the resonator's vibrations die away.

5.2.5. VAnalog

VAnalog is a virtual analog waveform model. It simulates two analog waves – pulse and sawtooth – each with highly variable waveshape. Its parameters also provide that classic analog feel with subtle or more extreme detune.

Detune: changes the pitch of the sawtooth with respect to the pulse wave. This pitch interval can be very subtle, or up to ±2 octaves.

Shape: changes the waveshape of the pulse, from a very narrow pulse to a square wave to intense high harmonics as heard in hard oscillator sync (where one oscillator forces another oscillator's waveform to reset its phase).

Wave: changes the shape of the sawtooth, from a triangle through a sawtooth with increasing harmonic content.

5.2.6. Waveshaper
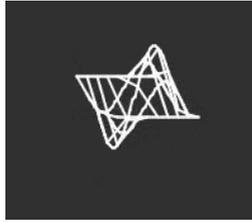
The Waveshaper Oscillator combines two techniques for waveform manipulation, once again with the goal of creating interesting harmonic content.

A *waveshaper* alters the rise and fall time of a waveform's cycle. For example, applying a waveshaper to a triangle wave and shortening the rise time of each cycle turns the triangle wave into a falling sawtooth wave. Further, a waveshaper can affect the curvature of a rising or falling signal, producing even more unusual harmonic changes.

A *wavefolder*, pioneered by Don Buchla in the 1970s, does what it sounds like: it takes the top and bottom of a waveform and folds it back on itself, rather than simply clipping it off as one might hear on a wave being run at too high a level. This is a different sort of harmonic creation.

Wave: controls the waveform coming out of the waveshaper.

Amount: sets the amount of wavefolding.

Asym: sets the asymmetry of the waveform.

> ℹ Freak Out: each of the three knobs causes a wide and distinctive change in timbre over its range. Try modulating all three of them at once, with control signals that all repeat at different rates – for example, the two LFOs and the Cycling Envelope set to Loop.

5.2.7. Two Op. FM

The Two Op. FM Oscillator is a two-operator frequency modulation source. That's all fine... but what's an 'operator'?

FM synthesis is based around one oscillator changing the phase of another in a controlled way, using frequency relationships that could be harmonic or inharmonic, meaning not part of the usual series of harmonic overtones. Dr. John Chowning of Stanford University developed FM using collections of sine wave oscillators (called operators) controlling one another. The technology was licensed to Yamaha, who created a wide variety of FM synthesizers that could easily create realistic bell-like tones that were difficult for analog synths to make. One of these was the DX7, one of the most popular synthesizers in history.

While this Oscillator uses only two operators controlling each other's phase (the most common Yamaha synths used either four or six operators), it's still capable of a wide variety of tones ranging from rich organs to clangorous bells.

Ratio: sets the frequency ratio between the two operators. Ratios like 2:1 (an octave) or 1.5:1 (a perfect fifth) will produce relatively clean sets of harmonics, while other ratios will create inharmonic timbres.

Amount: changes the *modulation index*, which is the amount of modulation sent to the Operator 1. All you need to know is that turning it up will add more overtones, creating a distinctive bright timbre. Experimentation is key here.

Feedback: sets how much of Operator 2's output is fed back into itself to modulate its own phase. Feedback loops like this are another fundamental part of FM synthesis, and they can add all types of extra overtones and even detuning effects. Again, experiment!

> ℹ️ Freak Out: a combination of operators controlling one another in a certain way is called an *algorithm*. One of the most common and useful algorithms in 4-operator FM is a simple mix of two pairs of operators, one in each pair modulating the other.

If you set both of the MiniFreak's Oscillators to Two Op. FM and mix them together, you'll have created this exact algorithm, with one important difference: the traditional algorithm has only one feedback loop, but this arrangement on the MiniFreak gives you two of them!

5.2.8. Formant
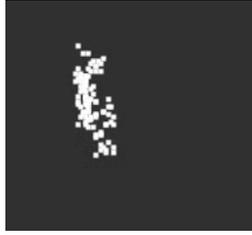
The Formant Oscillator uses granular synthesis to manipulate sound through a pair of formant filters, in order to create filtered waveforms and other effects.

Granular synthesis chops up sounds into tiny slices called *grains* or *particles*. These grains can then be rearranged and manipulated in many different ways – just as one example, granular synthesis is one way to time-stretch or compress an audio sample.

A *formant* is a resonant frequency that remains fixed, even when the pitch of the overall sound changes. Formants are the reason why male and female voices sound fundamentally different, and banks of fixed formant filters have been used on many famous synthesizers since the 1960s.

Combine these two ideas, and the Formant Oscillator creates a variety of harmonically rich tones with a definite "vocal" quality to them.
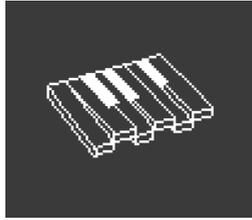
Interval: sets the ratio between the two formant frequencies.

Formant: Sets the base formant frequency.

Shape: Sets formant width and shape.

5.2.9. Chords (Osc 2 only)

The Chords Oscillator turns every note you play into, well, a chord. You can set up chord voicings with two, three, or more voices, and select pitch range and inversions as well.

Interval: selects the type of chord a note on the keyboard will play, with that note as the root of the chord. The following intervals and chords are available above the root:

- Octave
- 5th
- sus4
- minor (m)
- m7
- m9
- m11
- 6th + 9th (69)
- Major9 (M9)
- M7
- Major (M)

Inv/Trsp: transposes the notes in the chord up or down through a range of pitches, while maintaining the chord type itself. This is done with *inversions*.

For example, if you set the Interval to M, a Major chord, and play a low C, you will hear a C Major chord: C, E, G. As you turn up Inv/Trsp, the lowest C will be moved on octave higher to a C above the E and G – the first inversion of the chord. Turn the Inv/Trsp up more, and the low E will be moved one octave higher to an E above the high C (second inversion), and so on. The chord will always be a C Major, but the order of the notes will change.

Waveform: selects the waveform of the Oscillator. From O to about 5O, this knob goes through a set of waveforms. Above 5O, there's a wavetable that smoothly morphs between 16 different waveforms.

Note that like any other Osc 2 Type, the Chord Oscillator can't be used in .

> ℹ Freak Out: Applying modulation to any of these parameters will produce cool and unusual results. If you modulate Interval, you can create some pretty crazy chord progressions depending on how you do the modulation: setting a different amount for each step of a sequencer is quite controllable, while using something like a random LFO or Cycling Envelope will push you into the land of chaos. Somewhat more musically, you can modulate the Inv/Trsp to keep chord inversions moving through high and low pitches, or modulate Waveform between 5O and 1OO to create wavetable sweeps.

5.2.10. Speech

The Speech Oscillator borrows from the technology of the Texas Instruments Speak & Spell, a toy from the 1970s that could talk intelligibly. That's not easy to do; human speech combines *vowel* sounds like "aaaa" or "oooo" with *consonants* that shape words, like *plosives* ("p" and "b" sounds), *nasals* ("mmmm" and "nnnn"), and so on. Getting a circuit to do this was a pretty neat trick, and circuits like these were used everywhere from toys to Kraftwerk albums like *Computerwelt*.

This Oscillator does a lot of the hard work for you; the settings required to synthesize simple sounds and entire words are stored in libraries and sub-libraries, so you can simply choose what you want to speak/sing.

Type: chooses the library of sounds. These include several sets of formants, creating vowels and *diphthongs* ("ai", "ow", etc), followed by lists of colors, numbers, letters, and some synth-related words like "modulator" and "waveform". (Kraftwerk, remember?)

Timbre: shifts the formants of the words up and down to control overall tonality.

Word: selects specific sounds or words inside the library chosen by the Type knob. (Not the Type knob that selects the type of Oscillator – the Type knob for this Oscillator, which says Wave on the front panel.)

As an example: if you set Type to around 80, then play notes as you turn the Word knob up, you'll hear the MiniFreak say "Alpha, Bravo, Charlie" up to "X-Ray, Yankee, Zulu" at the pitch you're playing. It's a lot of fun!

Freak Out: Assign one of the Matrix modulations to Shape, then modulate it with an LFO set to SnH. This will cause the notes you play to select random items from the chosen library, regardless of what pitch you play.

5.2.11. Modal
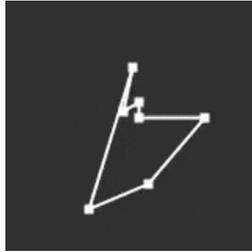
The Modal Oscillator offers a simple way to obtain beautifully clear and realistic percussion tones. It's based around the physical modeling of an object being excited with an energy burst and then resonating – the KarplusStr Oscillator [p.28] works in a similar fashion.

Every acoustic musical instrument relies on *excitation*: the player applies energy by hitting a drum, bowing or plucking a string, blowing into a flute, and so on. The sound of the instrument depends on its shape, size, and materials: Middle C on a guitar won't sound like the same note on a cello – it even sounds different on two different guitars!

The Modal Oscillator creates sounds like this, then adds the function of *damping*: shortening the length of time the sound continues resonating after being excited. Examples include a palm mute on a guitar, or touching a drumhead to shorten the sound of a hit.

Naturally, these parameters can be modulated, giving the effect of resonance that changes within a single note. Acoustic instruments can do this only in a very limited way, but the Modal Oscillator can go from a bass guitar to a xylophone to church bells with just a couple of knob twists.

Inharm: controls how many inharmonic resonances are excited, taking the sound from "woody" to "metallic".

Timbre: sets how bright the exciter is – its balance of low and high frequencies. This affects which harmonics are excited.

Decay: how quickly the resonance is damped.

5.2.12. Noise
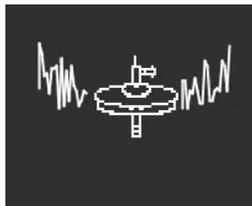
Noise is a vital component in many sounds. A broad spectrum of frequencies, it can do everything from providing grit to the attack of a sound to creating effects like wind or ocean waves. The MiniFreak's Noise Oscillator provides a variety of noise types, including *particle noise*, made up of tiny fragments created by sampling noise and turning down the sample rate.

Noise can be mixed with an oscillator providing several different basic waveforms, so the same Oscillator can provide both noise and a tonal signal at once.

Type: tunes the noise from particle noise, through white noise (which has an equal distribution of all frequencies), into high-pitched metallic noise.

Rate: reduces the noise's sample rate. For metallic noise, it controls the pitch of the square waves in the noise output.

Balance: adds other waveforms to the noise. From 0 to 100, the mix goes from pure noise to noise + sine wave, through noise + triangle wave, to noise + square wave.

5.2.13. Bass
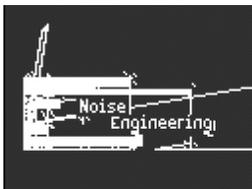
The BASS Oscillator models a pair of waves – a sine wave and a *cosine* wave (a sine wave that's been moved in phase so that when the sine is at 0, the cosine is at maximum or minimum, and vice versa). These waves are put into a set of two modeled circuits: a balanced modulator for the sine wave, and a quadrature oscillator that mixes it with the modulated cosine wave.

This circuit, while simple to build with analog components, is tremendously versatile. The BASS Oscillator provides some very cool ways to tweak the model.

Saturate: sets the saturation of the cosine wave. While a pure cosine wave has only one harmonic, saturation (a form of overdrive) creates more harmonics to play with.

Fold: The BASS Oscillator includes a two-stage asymmetric wavefolder, as described in the Waveshaper [p.29]. This adds yet more harmonics to the signal.

Noise: adds a noise signal in between the two stages of the wavefolder, in order to phase-modulate the sine and cosine oscillators. This adds a gritty and somewhat random element to the tone.

5.2.14. SawX

The SAWX Oscillator model demonstrates that the good old sawtooth wave can still learn new tricks. In this oscillator, a sawtooth wave has its phase modulated with white noise that's been reduced in sample rate, then thickened with a chorus. This produces harmonically rich variations with a variety of different characters.

SawMod: sets modulation intensity, producing drastic changes in harmonics.

Shape: sets the amount of chorus.

> ℹ️ Freak Out: modulate the Shape with a slow LFO to produce a rich sweeping timbre that's unlike traditional width modulation.

Noise: controls how much the noise signal modulates the sawtooth. At higher values, this adds a faint "radio noise" randomness.

5.2.15. Harm
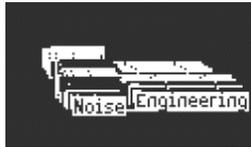
The HARM Oscillator starts with a fundamental frequency and adds harmonics, using a different model than the Harmo Oscillator [p.27].

Spread: sets the relationship of the generated harmonics to the fundamental. At a setting of 50, they are in unison; at 0 or 100, they are one octave lower or higher. In between, a dramatic effect somewhat like a balanced modulator is generated.

Rectify: adjusts the rectification of the harmonics. The rectifier is a well-known analog circuit that creates an effect somewhat like wavefolding

Noise: adds phase-modulated noise and clipping.

5.2.16. Audio In (Osc 1 only)
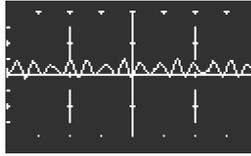
Osc 1 can route any audio signal from the Audio In Jack into MiniFreak's signal flow. This audio is digitalized, then processed by a wavefolder and a decimator, with digital noise added.

A *decimator* throws away input samples at a designated ratio, for example saving one sample out of every five or ten.

Fold: controls the depth of the wavefolder effect. Note that when Decimate is set to O, this acts strictly as an input level control.

Decimate: controls the amount of decimation and also follows the keyboard tracking.

Noise: sets the level of added noise.

You can then adjust the audio input level in the **Utility/Audio/Audio In Gain** to avoid clipping. When set correctly the **Fold** knob can be used as level control. If you can't hear your input signal make sure that a key is pressed to open the VCA and let the audio through to the Master output.

> ℹ️ You can set the MiniFreak out as an input source to use feedback modulation.

> ℹ️ The Audio Input is especially fun to use with drumloops and **shaper** + **modulations** + **fx**. Or with Multi mode or comb filters.

> ℹ️ Lastly do note that the audio input cannot be accessed in Paraphony mode.

5.2.17. Wavetable (Osc 1 only)
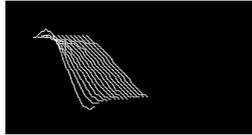
What's Wavetable Synthesis?

Wavetable Synthesis has been discovered in the 80s, and allowed for sound manipulation that was previously not possible with a single cycle waveform. A Wavetable is a series of waveform cycles.

On MiniFreak, you can use the following knobs to control the wavetable engine:

- **Wave** : Scans through the cycles and alter the waveform.

- **Timbre** : Controls the Symmetrical Pulse Width.

- **Shape** : Controls the LPF/HPF 1 pole filter.

> ℹ️ Please note that the Wavetable engine is only available on the first engine.

Selecting a Wavetable

You have two ways to browse through the factory wavetables:

1) By using Shift + Type encoder.

When using this method, the list of wavetables is displayed on the first encoder tick, and directly loads the next wavetable.

The wavetable is also automatically loaded when the encoder is turned.

2) Using the Sound Edit menu.

You can either hold Sound Edit + press the Osc button, or follow this path: Sound Edit > Osc > Wavetable Select.

In the Sound Edit menu, Wavetables can be browsed with the Preset / Edit encoder.

If the Wavetable Engine is loaded, the currently hovered Wavetable is immediately loaded.

5.2.18. Sample (Osc 1 Only)

On MiniFreak, you can use the following knobs to control the Sample engine:

- **Start** : Sets the Start Point of the Sample.

- **Length** : Allows you to set the length of the sample and how it plays back.

At 50 and above it will play the sample forward, ranging from short around 50 to longer around 100.

From 49 to 0 the sample will play backwards, ranging from short around 49 to longer around 0.

- **Loop** : Controls the Loop start point of the sample, relative to the Sample start position.

> ℹ️ When playing the sample in reverse do remember that the start control will condition its starting point, so in order to get the full sample playback in reverse, Start should be set at max value. The Sample engine is only available on the first oscillator slot.

Selecting a Sample

You have two ways to browse through the factory Samples:

1) By using Shift + Type encoder.

When using this method, the list of Samples is displayed on the first encoder tick, and directly loads the next sample.

2) Using the Sound Edit menu.

You can either hold Sound Edit + press the Osc button, or follow this path: Sound Edit > Osc > Sample Select.

In the Sound Edit menu, Samples can be browsed with the Preset / Edit encoder.

If the Sample Engine is loaded, the currently hovered Sample is immediately loaded.

5.2.19. Granular Engines (OSC 1 Only)

Besides the Sample Engine, the V3 update introduces 7 Granular Synthesis based engines, which we will look into further now.

What's Granular Synthesis?

Granular synthesis is a synthesis method that processes samples by splitting them into smaller fragments called grains, which in turn creates a new sound depending on the playhead position, density (how many grains is generated by second or synced to the clock), length of each grains, shape of the grains, their pitch, and the forward/reverse playback. Including all these factors, new sounds are endless from a single sample. Various modulations can also be applied to either disrupt each of these factors and bring in more chaos.

We will now go through the different Engines using Granular based synthesis :

5.2.19.1. Cloud Grains (OSC 1 Only)

The Cloud grains engine is ideal for making textural grain effects.

On MiniFreak, you can use the following knobs to control the Cloud Grains engine:

- **Start** : Controls the Start Point of the Sample.

- **Density** : Defines the speed at which the grains are being generated.

- **Chaos** : Introduces grain randomization.

5.2.19.2. Hit Grains (OSC 1 Only)

The Hit grains engine has a sharp volume envelope. It's been designed to generate rhythmic stutter or rapid-fire bursts of grains for a blasting sound effect.

On MiniFreak, you can use the following knobs to control the Hit Grains engine:

- **Start** : Controls the Start Point of the Sample.

- **Density** : Defines the speed at which the grains are being generated.

- **Shape** : Controls grain length, attack length and hold.

5.2.19.3. Frozen (OSC 1 Only)
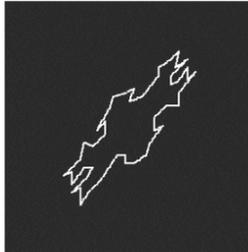
This Engine relies on fast grain generation to create an Ice-like effect where the size and shape of the grains plays a huge part on this ethereal and icy feeling.

On MiniFreak, you can use the following knobs to control the Frozen engine:

- **Start** : Controls the Start Point of the Sample.

- **Size** : Defines the length of the grains.

- **Chaos** : Introduces grain randomization.

5.2.19.4. Skan (OSC 1 Only)

The Skan engine scans through the sample while generating grains around the playhead, playing it from start to finish at a user-definable speed. Ideal for stretch like effect.

On MiniFreak, you can use the following knobs to control the Skan engine:

- **Start** : Controls the Start Point of the Sample.

- **Scan** : Sets the speed of the playhead.

- **Chaos** : Introduces grain randomization.

5.2.19.5. Particles (OSC 1 Only)
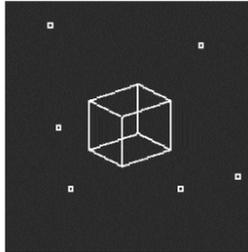
Particles generates intricate layers of random sound particles creating hypnotic and psychedelic effects.

On MiniFreak, you can use the following knobs to control the Particles engine:

- **Start** : Controls the Start Point of the Sample.

- **Density** : Defines the density of the grains being generated.

- **Chaos** : Introduces grain randomization.

5.2.19.6. Lick (OSC 1 Only)
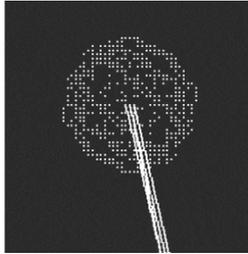
The Lick engine is aimed at creating fast-paced percussive rhythmic groove grains synced to your music.

On MiniFreak, you can use the following knobs to control the Lick engine:

- **Start** : Controls the Start Point of the Sample.

- **Size** : Lengthens the size of the grains while the grain generation is synced to tempo at 1/16

- **Chaos** : Introduces grain randomization.

5.2.19.7. Raster (OSC 1 Only)
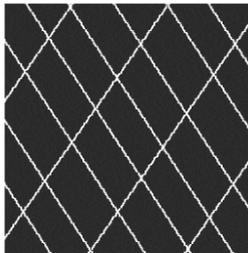
The Raster engine is aimed at more rhythmical approaches, with grain generation being tempo synced. Perfect for creating beat repeat/chopping and hypnotic randomized sequence.

On MiniFreak, you can use the following knobs to control the Raster engine:

- **Start** : Controls the Start Point of the Sample.

- **Density** : Defines the rate of the generated grains, which is a sub division of the tempo which goes from 1/2 to 1/32 rates.

- **Chaos** : Introduces grain randomization.

5.2.20. FM/RM (Osc 2 only)
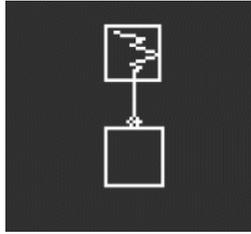
Frequency Modulation (FM) occurs when one audio signal modulates the frequency of another. A simple but powerful implementation can be found in the Two Op. FM Oscillator [p.30]; here, Osc 1 modulates a waveform generated by Osc 2.

Ring Modulation (RM) is a form of amplitude modulation, where the frequencies of two audio signals are replaced by sums and differences of their two frequencies. For example, if you put two sine waves at 200 and 500 Hz, through a ring modulator, you will hear two sine waves at 300 Hz (500 - 200) and 700 Hz (500 + 200). This produces hollow, inharmonic effects that replace the original audio signal.

Wave: selects the waveform of Osc 2 to be modulated by Osc 1.

FreqMod: selects the amount of FM.

RingMod: selects the amount of RM.

5.3. Osc 2 Audio processor Types

Aside from FM/RM, Osc 2 features a number of Types that feeds the output of Osc 1 through a signal processor that does digital tricks the conventional signal flow can't do.

When this signal flow is selected, the LED for Osc 2 by the Select button turns pale blue. The **Volume** knob for Osc 1 controls the level of Osc 1 going into Osc 2, and the **Volume** knob for Osc 2 sets the Dry/Wet mix for Osc 1 alone and the Osc 1-through-Osc 2 processed sound.

5.3.1. Multi Filter

The Analog Filter [p.49] is a great-sounding VCF, but there are lots of other kinds of filtering. For example, there are *notch* filters, which reduce rather than boost a particular range of frequencies.

Another variable is the filter's *slope*, which determines how drastically frequencies beyond the cutoff are reduced. Slopes are measured in decibels of level reduction per octave past the cutoff. Some examples: a 6 dB/oct slope is very gentle, while the steeper 12 dB/octave slope of the Analog Filter is a common choice among subtractive synths.

However, there are also steeper slopes – 24 dB/oct (also a common choice), 36 dB/oct, and so on. One extreme example: the anti-aliasing filters used on digital audio recorders and players have very steep slopes – 48 dB/oct and more.

For most filter circuits, the steeper the slope, the more intense the resonance can be.

Since a variety of these extra filters can be very handy, the Multimode Filter lets Osc 2 provide those to the output of Osc 1.

Cutoff: controls the cutoff frequency.

Resonance: controls the filter's resonance at the cutoff frequency.

Mode: sets the filter type (Low, Middle, or Band Pass, or Notch) and slope in dB/oct (12, 24, 36). Examples: LP36 is Low Pass with 36 dB/oct slope, and N12 is Notch with 12 dB/oct slope.

In addition to the above, there are Low Pass and High Pass filters with a gentle 6 dB/oct slope. Note that these filters have no Resonance control.

Also note some of these filter's cutoff are not mapped to follow the keyboard by default. Assign cutoff to the Matrix, and modulate it with the Keyboard source with an amount of 50 to get perfect Keyboard tracking.

5.3.2. Surgeon Filter

Sometimes you need a scalpel to cut out frequencies you don't want, such as unwanted resonant spikes ("wolf tones") in your sound. Other times you'll want to add greatly boosted frequencies for dramatic effect. In a professional studio or in a DAW, this is done with a parametric equalizer, but in the MiniFreak, you can use the Surgeon Filter.

Cutoff: sets the cutoff or center frequency of the filtering.

Spread: sets the width of the filter peak or cut, from broad to very narrow. Note that this parameter is only available when mode is : BP and Notch.

Mode: sets the filter type. Available types are low pass, band pass, high pass, and notch. Band pass and notch work similarly to how a traditional parametric equalizer will boost or cut frequencies. Low pass and high pass filters, when they appear on parametric EQs, are usually set to drastically eliminate very high or very low frequencies.

5.3.3. Comb Filter
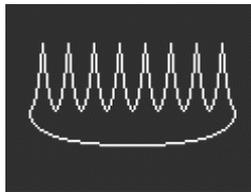
A *comb filter* gets its name from the fact that it creates a series of equally spaced notches in frequency response that look like the teeth of a comb when drawn on a graph. It does so by combining the input signal with a copy of itself that has been delayed by a few milliseconds. Those two signals are then combined, and cancel each other out at regularly spaced frequencies. This produces a distinctive hollow tonality.

Cutoff: sets the overall frequency balance of the signal by varying the time delay. Longer delays emphasize lower frequencies and shorter delays emphasize higher frequencies. Note that unlike the other OSC's 2 filters, the Comb filter is hard mapped to follow the Keyboard tracking.

Gain: controls the amount of delayed signal mixed with the original signal. When Gain is set to O, no comb filtering occurs.

Damping: adds a low pass filter before sending back the signal to the feedback loop. More damping produces a gentler and less dramatic effect.

5.3.4. Phaser Filter

A *phase shifter* (or *phaser*) creates an effect similar to comb filtering, but different in sonic character. It's created by running an input signal through a series of *all pass filters*. These filters don't remove any frequencies, but they do shift the phase of the signal. Recombining these phase-shifted signals with the original creates unevenly spaced notches. The more of these filters the circuit contains (called the number of *poles* or *stages*), the more notches are created.

Sweeping the phase shift over time produces the classic Phaser effect that's available in the Digital Effects chapter [p.11], but because the Phaser Filter only sweeps when and how modulated, a wider variety of unusual effects are available.

Cutoff: controls the frequency range of the phaser's notches, emphasizing high vs. low frequencies.

Feedback: intensifies the effect by feeding back some of the filtered content into the filters again.

Poles: defines how many notches will be created by the Phase Filter. Each pair of poles adds a notch, so 2 poles gives one notch and 12 poles creates six notches.

5.3.5. Destroy
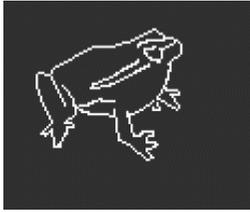
Destroy does just that: it destroys your incoming signal by subjecting it to three outrageous signal processes: a wavefolder, a decimator, and a bit crusher. Oh, the pain!

Fold: controls the amount of wavefolding, where extremes of the waveform are folded over rather than clipped. Higher values produce noise and sharp resonances – which are often way cooler than clipping.

Decimate: throws away more and more samples out of the digital data stream. This produces crackling and other offensive noises, especially at higher Fold settings. Note that this parameter is hard mapped to the Keyboard tracking.

Bitcrush: lowers the number of bits of each sample. This creates a number of uniquely nasty artifacts.

> ℹ Put all of these together, modulate each one differently, and – well, listen for yourself. Sometimes you need a little ugliness in your sound.

6. THE ANALOG FILTER

For most subtractive synthesizers, the *Voltage Controlled Filter* (VCF) is the heart of the signal flow. In the days of early analog synths that had a fairly limited range of available raw waveforms, sound designers relied on the VCF to alter the overall timbre over time. The all-important VCF Cutoff knob is considered by many to be the most important control on a synth's front panel... so much so that many synths make the knob a unique color or larger in size, so you can find it quickly!

6.1. History: Signposts along the way

Every filter circuit has its own character, producing a sound that is distinctive, which in many cases defines much of the sonic signature of a given synth.

Many companies are known for their filters' sound and capabilities, and for designs (and happy accidents) that led to unmistakable tones:

- Many analog synths used *ladder filters*, a term used to describe a circuit with multiple components arranged like the rungs on a ladder. However, doing this with transistors was a method patented by Robert Moog, so other companies made this with diode ladders instead, providing them with a unique sound of their own.

- The Steiner-Parker Synthacon used a Sallen-Key filter circuit. This filter sounded like no other: it distorted in a distinctively gritty way when overdriven, and unlike most other filter designs, it didn't lose its low-end punch as the resonance was turned up. After being nearly forgotten for decades, the circuit was rediscovered, modified and updated with input from Nyle Steiner, the designer of the Synthacon – and named the Arturia Brute filter, becoming a vital element of every Arturia Brute synthesizer.

One famous filter design deserves a special mention: the resonant 12/dB multimode filter used in the Oberheim Synthesizer Expander Module (SEM). Known for its smooth and rich character, the SEM filter has inspired many new filters over the years since its invention... including the **Analog Filter** in the MiniFreak.

6.2. Elements of filter design and their controls

6.2.1. Filter type

A filter's *type* or *mode* determines where in the frequency spectrum it does its work. With a few exceptions, filters are named for the types of frequencies they allow through (pass), not for the frequencies they remove (cut). These include:

- **Low Pass**: The most common filter in synthesizers, the Low Pass (LP) filter allows lower frequencies through, while attenuating higher frequencies. This mimics how objects and materials in the acoustic world absorb higher frequencies more rapidly than lower ones, so it sounds very natural to our ears.

- **High Pass**: A High Pass (HP) filter lets higher frequencies through and attenuates lower frequencies. When a filter like this is used in audio equipment like microphones and preamplifiers to remove low-frequency rumble and handling noise, it is sometimes given the more practical name "low cut".

- **Band Pass**: Made by combining LP and HP circuits, the Band Pass (BP) filter allows a certain range of frequencies through, and attenuates above and below that range.

Like the original SEM filter, the MiniFreak's Analog Filter can be set to three types: Low Pass, High Pass, and Band Pass. These are chosen with the Analog Filter's Type button, with white LEDs to indicate the current choice.

The Type button and its LEDs

If you need more filter options be sure to check the filters available on OSC 2 in the MiniFreak, but note that these are digital.

6.2.2. Cutoff

The *cutoff frequency*, or simply *cutoff*, is where the filter begins to do its work. It can also be called the corner frequency or center frequency or sometimes even just frequency. As mentioned above, the cutoff knob is the single most used filter control, and often the most used control on any analog synth.

The **Cutoff** knob on the MiniFreak Analog Filter ranges from roughly 20 Hz to 20 kHz. Depending on the filter type, extreme settings can eliminate all of the audio signal, muting the synth.

6.2.3. Slope

A filter's *slope* or *rolloff* is a measure of how much audio is attenuated at a certain frequency beyond the cutoff.

A filter doesn't just mute all audio past the cutoff; there are filters like that, but they're not very musical. Instead, as you move past the cutoff, audio is steadily attenuated more and more. This is measured in how many decibels quieter an audio signal is when you go one octave past the cutoff, written *dB/octave*.

Here's an example: a Low Pass filter is set to a cutoff frequency of 1 kHz. We measure that one octave above that (2 kHz), a given signal is 12 dB quieter than at the cutoff frequency, and two octaves beyond it (4 kHz), it's 24 dB quieter. That means our filter has a slope of 12 dB/octave.

MiniFreak's Analog Filter has a fixed 12 dB/octave slope, but the digital Multimode Filter [p.45] in Osc 2 has a wide variety of available slopes, including some that are quite unusual in analog synths.

6.2.4. Resonance

Nearly every synth's filter circuit will resonate at the cutoff frequency, even if only an inaudibly tiny bit. The steeper the slope, the greater the possibility for high amounts of resonance, which can be very useful for a variety of tonalities. Resonance is sometimes called *emphasis* or simply *Q*, an audio engineering term that describes the *quality factor* (width) of a peak.

As the **Resonance** control on the Analog Filter is turned up, a resonant peak around the cutoff frequency will form. The higher the peak, the narrower it becomes; the sound is perceived as becoming more aggressive and sharper. The tonality of the peak will change with the cutoff frequency.

On many filters, if the resonance is turned up all the way, the filter will start to *self-oscillate*, making a sound even with no input signal. The filter itself becomes a sound source, with the peak width so narrower and louder that it's effectively one frequency: a sine wave. This adds a hollow, whistling tone to whatever the oscillators are doing, or can be used on its own.

> ℹ Try this yourself: turn the Resonance all the way up and turn down the Volume for both Oscillators to 0. You'll hear a whistle every time you press a key. However, it will be the same pitch for every note, which isn't that useful... fortunately there's a solution to that.

6.2.5. Filter modulation

The Envelope can easily be routed to modulate the filter using the Modulation Matrix [p.10]. Because envelope modulation is so common, there's a dedicated knob for the amount in the Analog Filter section.

The **Env/Velo** knob is detented. It lets you choose between a range of negative and positive values, with 0 found at the center of this range. When at 0, there is no envelope modulation.

Another common control path is for the amount of the envelope modulation to be controlled by key velocity, so playing harder creates brighter sounds. This amount can be adjusted by Shift-turning the knob.

On the MiniFreak, the filter cutoff can also be controlled with LFOs, Aftertouch, Velocity, Cycling Envelope, Modwheel, Macros and Mod Seq and one more important source: the note played on the keyboard, high or low. If the filter is modulated by the keyboard, it gets brighter at higher notes, which is common for many acoustic instruments. This is called *keyboard tracking* or *key tracking*.

Key tracking is adjustable; when it's set to 50%, the filter cutoff perfectly tracks the pitch of the played note. A self-oscillating filter can then follow what you're playing. This is easily set up in the Modulation Matrix; here's how.

Start with a sound that has only one Oscillator playing, and turn Resonance all the way up. Verify that you can hear the resonant whistle by itself when you turn the Osc Volume all the way down. Then go to the Matrix and set Keyboard modulation of Cutoff to about 50, and fine tune the cutoff frequency to match the OSC frequency.

If the filter sounds out of tune, with the KBD Amount set to 50 on cutoff, in that case it maybe is time to perform a cutoff calibration [p.109].

6.3. Developing a feel for the filter

There are only a few controls on the Analog Filter, but they offer so many possibilities: take some time to really appreciate what the Analog Filter can do, preferably with the Digital Effects turned off and a fairly simple Osc Type like BasicWaves to start with. The character of this filter is magical, and easily overlooked with everything else the MiniFreak can do – so be sure to give it plenty of attention.

7. DIGITAL EFFECTS

The MiniFreak can make all kinds of great sounds just using the Digital Oscillators and the Analog Filter with multiple modulation options in the Matrix, but sometimes it's nice to put a finishing touch on a sound with a little something extra... or a *lot* extra.

The MiniFreak includes a set of three Digital Effects at the end of its signal path, and they offer a wide variety of tones that can be called up rapidly or tweaked to taste.

7.1. The Digital Effects section

Digital Effects controls

As noted in our front panel tour [p.9], the **Digital Effects** section is set up to work similarly to the Oscillators section. There are a few basic controls, their function vary depending on the selected effect.

- **Select** chooses whether the four knobs are controlling FX1, 2, or FX3. A bright white LED indicates that FX is selected for editing. If an FX LED is dimly lit, that means it is turned ON but not being edited; if an LED is off, it means that FX is OFF.

- **Type/Sub** selects the kind of effect, or the Sub Preset for that specific effect – for example, there are six presets of Distortion FX, each with its own character. Clicking the encoder lights the **On** LED and turns that particular FX on. Click again to turn that FX off.

- **Time**, **Intensity**, and **Amount** have different functions depending on which Type of FX you've chosen. These are shown on the Display with exactly the same "test tubes" as seen when editing the Digital Oscillators; turning the knobs pops up the actual parameters being adjusted.

7.1.1. Insert and Send routings

The three FX are always handled in the same order: FX 1 into FX 2 into FX 3. However, in the case of the Delay and Reverb, there are two available routings: **Insert** and **Send**.

Pressing **Sound Edit** and selecting **FX** from the menu gives you the option of changing the **Delay Routing** and/or the **Reverb Routing**. Each Routing can be set to Send or Insert, and those settings will be saved with the preset.

> Remember that each effect has a Dry/Wet control, letting you set how much dry signal gets through each FX in the chain.

With Send mode, the FX routing allows you send a specific amount of each signal to each effect separately, then brought together at the end.

7.1.2. An example of how Routings work

Let's say FX 1 is Reverb, FX 2 is Delay, and FX 3 is Flanger.

If the Delay Routing and Reverb Routing are both set to Insert, then you will hear a reverberant sound with echoes, all of which are flanged. It's just like running a reverb pedal into a delay pedal into a flanger pedal.

If you now change the Delay Routing to Send, now you hear a mix of two separate signals: the reverb through the delay, and the reverb through the flanger.

If you set Delay Routing back to Insert and Reverb Routing to Send, you will hear a mix of two separate signals: the reverb on its own, and the delay through the flanger with no reverb.

If you change both the Delay *and* Reverb Routings to Send, then you hear a mix of *three* separate signals: the original audio through the reverb alone, the original audio through the delay alone, and the original audio through the flanger alone.

By choosing your FX order carefully and setting up the Delay and Reverb Routings accordingly, you can decide which FX or combinations of FX treat your original signal. You get even more flexibility when you realize that each effect can have its own Dry/Wet mix.

7.1.3. Subtypes

A Subtype is a specific FX preset that includes not only the three User parameters attached to the **Time**, **Intensity**, and **Amount** knobs, but also several other parameters that can't be adjusted by the user through the hardware. When you call up a Subtype, those hidden parameters are loaded, controlling the parts of the FX that are "under the surface."

For example: the Multi Comp has adjustable User parameters for Time, Input (gain), and Amount... but it also has five Subtypes – OPP, Bass Control, High Control, All Up, and Tighter – each of which has its own combination of settings for multiple parameters ranging from crossover frequencies and individual compression attack and release times for both bands to gain settings, thresholds, ratios, knee width, and more.

There are plug-ins that give you individual control of each of these parameters if you really want them. That's not the point of the MiniFreak's effects – the Subtypes makes it extremely easy to change the effects character in a fast way.

7.2. The Effects Types

There are ten Types in total; each one has its own set of three adjustable User parameters using the Time, Intensity, and Amount knobs, and its own set of Subtypes.

Any FX slot can run any Type of effect. If any FX slot has been set to a Type that can only be used once – Reverb, Delay, or Multi Comp – those choices will disappear from the menus for the other FX slots.

7.2.1. Chorus

A chorus takes the input signal and makes one or more copies of it, each with a slight time delay, and then changes those delay amounts slowly (or quickly) with an LFO. When recombined with the dry signal, the effect is a wider, thicker version of the sound, one that gives the impression of several instruments playing at once.

The MiniFreak Chorus has the following controls:

- **Rate**: the rate at which the LFO changes the time delay: slower for a richer chorus sound, faster for a vibrato-like pulsing.

- **Depth**: the intensity of the effect.

- **Dry/Wet**: Dry/Wet mix.

> Dry/Wet is not the same as the Depth! Depth mixes the dry and delayed signals to produce the chorused signal; Dry/Wet mixes *that* signal with the dry signal. Play with both to help you understand the difference.

- **Subtypes**: Default, Lush, Dark, Shaded, Single

> Try turning the Dry/Wet mix all the way wet and speeding up the Rate to create a stronger sense of vibrato.

7.2.2. Phaser

A phaser combines the dry signal with copies that have their phase shifted by running them through a series of All Pass Filters [p.49]. This produces frequency notches that have a different character than the evenly spaced ones from a flanger or chorus. An LFO controls the filter behavior to produce a slow sweeping effect.

- **Rate**: controls the speed of the sweep, from a very slow and majestic change to a seasick quasi-vibrato.

- **Feedback**: adds more resonant character and brightness to the signal. The traditional thick phaser sound requires a higher Feedback amount; less Feedback produces a much more subtle effect.

- **Dry/Wet**: Dry/Wet mix.

- **Subtypes**: Default, Default Sync, Space, Space Sync, SnH, SnH Sync.

> ℹ The Sync variations synchronize the Rate to the master Tempo set on the MiniFreak. They also synchronize to external clocks and MIDI clocks.

7.2.3. Flanger
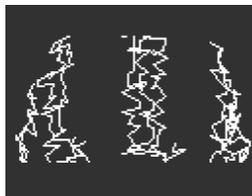
A flanger creates an intense comb filtering effect. It works the same way as a chorus, but usually has only one delayed signal to mix with the dry signal, and its delay time is very short, only a few milliseconds.

- **Rate**: controls the speed of the sweep, from a very slow and majestic change to a seasick quasi-vibrato.

- **Feedback**: adds more resonance and high-frequency content. Very high settings produce an intense effect rather like cranking the filter resonance.

- **Dry/Wet**: Dry/Wet mix.

- **Subtypes**: Default, Default Sync, Silly, Silly Sync

7.2.4. Super Unison

The Super Unison is a Chorus type effect, with up to 6 copies of the source signal stacked over the dry signal.
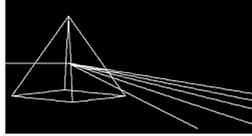
They are being modulated with an LFO to vary the detune, and create a chorus-like unison-style effect.

Here is how the knobs work for Super Unison:

- **Detune**: Detunes the copies of the signal in relation to the dry sound.

- **LPF/HPF** Manages the Low Pass and High pass filtering.

- **Dry/Wet**: Dry/Wet mix.

- **Subtypes**: Classic, Ravey, Soli, Slow, Slow Trig, Wide Trig, Mono Trig, Wavy.

The Super Unison presets conditions how certain controls operates and their ranges. The presets labelled Trig will for instance reset the phase of all the copies of the signal in a Legato fashion.

> ℹ️ Did you know ? Detune affects the speed of LFO and the amount (some presets only affects the amount). For Filter, some fx presets have different ranges for different results.

7.2.5. Reverb
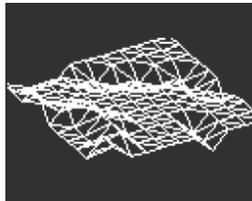
A reverb places the sound in a simulated reverberant space to give it a sense of presence, whether in a realistic room or the inside of a gigantic cathedral. The sound of a reverb is affected by many different properties, giving the ear hints of how large the space is and even how absorbent the walls are.

- **Decay**: Sets the overall size and shape of the space.

- **Damping** controls how quickly high frequencies fade away, to give the impression of a less reflective space.

- **Dry/Wet** or **Send Level**: depends on whether the Reverb Routing is Insert or Send. In Insert it sets the Dry/Wet mix, while in Send, controls the Send Level.

- **Subtypes**: Default, Long, Hall, Echoes, Room, and Dark Room

7.2.6. Delay

A delay is an audio processing effect which records an input signal into a memory and plays it back after a period of time. The delayed signal is mixed with the dry audio creating an echo-like effect.

- **Time**: sets the timing between repeats, either in milliseconds or in subdivisions of a bar, depending on the Subtype.

- **Feedback**: adds more repeats to the signal by feeding the output back into the input. Setting Feedback to 100 produces repeats that take several minutes to die away; turning it down to 0 produces a single echo, which at shorter delays evokes the *slapback* used on many records by early recording artists like Elvis Presley.

- **Dry/Wet** or **Send Level**: depends on whether the Reverb Routing is Insert or Send. In Insert it sets the Dry/Wet mix, while in Send, controls the Send Level.

- **Subtypes**: Digital, Stereo, Ping-Pong, Mono, Filtered, and Filtered Ping-Pong – each one also available in a Sync version.

7.2.7. Distortion

The word "distortion" covers a lot of territory, but usually includes *clipping*, where an input signal has higher amplitude than the circuit can handle, and the top and bottom of the waveform are "clipped off." It can refer to overdriven analog circuits of various kinds, signal saturation on analog recording tape, or any number of digital processes such as wavefolding. These can create anything from warmth to grit to all-out screaming chaos.

- **Gain**: sets how powerful the effect is, but also how its overall character changes, since each type of distortion will react differently as the gain increases, note that this effect offers an auto-gain to compensate for the rise in volume when increasing the gain.

- **HPF/LPF**: shapes the overall tone of the distorted signal. Turning it to negative values controls the cutoff of a low pass filter, whereas positive values do the same for a high pass filter.

- **Dry/Wet**: Dry/Wet mix.

- **Subtypes**: Classic, Soft Clip, Germanium, Dual Fold, Climb, Tape

7.2.8. Bit Crusher

A bit crusher reduces the resolution of a digital signal, for example from 16 bits (CD quality) to 8 bits (very early samplers) to even lower numbers. Bit reduction takes away clarity and dynamic range, for tones ranging from "vintage" to "disgusting".

This effect also includes a decimator, which further wrecks the sound by throwing away a lot of the samples in the audio stream. It might keep one out of every five samples, or ten, or twenty...

- **Decimate**: sets how much the signal is decimated. Higher values introduce all kinds of digital garbage.

- **BitDepth**: sets the resolution of the signal. Higher knob values equal more crushing, i.e. fewer bits.

- **Dry/Wet**: Dry/Wet mix.

- **Subtypes**: none

7.2.9. 3 Bands EQ
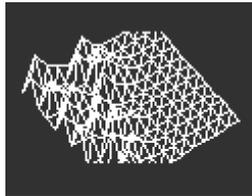
Equalization is one of the classic tools in professional audio. An EQ can sculpt the frequency response of a signal to bring out certain sonic traits and suppress others. This can be done by boosting (amplifying) a certain range of frequencies, or cutting (attenuating) them.

This effect simulates the simple but useful EQ on a mixer with three knobs for **Low**, **Mid**, and **High** bands, each with a single control for gain (-15 dB to +6 dB).

This EQ provides a few Subtypes to cover a surprisingly useful set of basic cases.

- **Subtypes**: Default, Wide, Mid 1K

7.2.10. Peak EQ

This EQ differs from the 3 Band EQ, in that it provides controls for only one EQ band, but includes all three common parameters: **Frequency**, **Gain**, and **Width**.

- **Frequency**: Sets the frequency of the band from 30Hz to 15000 Hz.

- **Gain**: Sets the Gain of the Band from -15 dB to +6 dB.

- **Width**: Sets the Width of the Band, also named Q on other EQ, a high value will set a very precise width and a higher value will allow for a broader range.

Because the user has full control over these parameters, there is no need for Subtypes.

A common use for this type of EQ is to cut a very narrow frequency range in order to remove an unwanted effect such as an undesired resonance or external hum.

7.2.11. Multi Comp
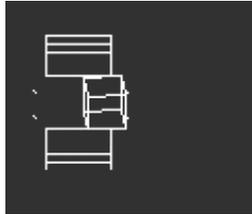
A *compressor* controls the dynamic range of a signal. In a traditional compressor, you set a *threshold*, above which signals are attenuated by a given *ratio*. The behavior right around the threshold can sometimes be adjusted so the onset of compression isn't so abrupt; this is called the *knee*. A compressor will have *attack* and *release* times, controlling how fast the compressor kicks in and then relaxes after the threshold is passed. A compressor can also be set to increase dynamic range.

A *multiband compressor* does all of this, but first the input signal is split into two or more frequency bands. Being able to compress low-frequency signals in a different way than those at higher frequencies can be incredibly useful.

Put it all together and you can have more than 30 different parameters to keep track of. Fortunately, the MiniFreak's Multi Comp effect comes with a careful selection of useful Subtypes, and provides three useful User parameters for each.

The range of each User parameter depends on the Subtype. Turning one knob controls various parameters at once, with ranges and proportions kept to scale so the essential character of the Subtype isn't lost.

- **Time**: controls attack and release.

- **Tone**: controls the range and effect of the three frequency bands the compressor uses.

- **Amount**: controls the intensity of the effect.

- **Subtypes**: OPP. Bass Ctrl, High Ctrl, Tighter

> ℹ️ Learning to use compression is like learning to play chess: you can get started once you learn the rules, and take a lifetime to master all the nuances. Even for audio engineers used to getting the most out of single-band compressors, multiband compression has its own level of complexity.

When using Multi Comp, let your ears be your guide rather than worrying about specs. If you really feel you're missing out on a lot of control possibilities, you can learn more about compression from any number of resources... but remember that for the MiniFreak, the idea is always ease of use with musical results. Enough said.

7.2.11.1. Vocoder Ext In

What's Vocoder Synthesis?

Vocoder synthesis is a technique used in speech and audio processing to analyze and reproduce human speech or other sounds by separating and then re-synthesizing the sound's characteristics. It works by analyzing the spectral features (like the shape of the sound wave) of a voice signal and then using that information to reconstruct or modify the sound using a separate excitation signal (like a synthesizer).

In simpler terms, a vocoder breaks down the voice into its essential components—such as pitch and formants—and then rebuilds it, often allowing for manipulation (like robotic effects or voice transformations).

This Vocoder effects processes the signal from the MiniFreak Synth Patch as the carrier, and the External Input as the Modulator.

Here is how the knobs work for the Vocoder Ext In effect :

- **Time**: Define how long the sound takes to decay when Vocoder processes sound.

- **Intensity** Shift the frequency content of your sound. In Gated subtype, this is replaced by the gate Threshold.

- **Amount**: Blend your dry voice with the processed one.

- **Subtypes**: Clean, Vintage, Narrow and Gated.

7.2.11.2. Vocoder Self
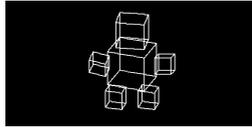
This Vocoder effects processes the signal from the MiniFreak as the carrier as well as the modulator. In this mode, the Vocoder behaves a bit like a filter bank

Here is how the knobs work for the Vocoder Ext In effect :

- **Spectrum**: Define how wide is the frequency content analyzed by the Vocoder. Provides a drastic change to the sound.

- **Formant Shift** Shifts the frequency content of your sound. In Gated sub-type, this is replaced by the gate Threshold.

- **Amount**: Blend your synth signal with the vocoded synth.

- **Subtypes**: Clean, Vintage, Narrow and Gated.

7.2.11.3. Vocoder EXT in and Self Sub-Types :

Both Vocoder Types have 4 different Sub-Types accessible with Shift + Type, here's a quick overview of each :

- Clean : The most clean/modern vocoder presets. Focus on high-definition sounds and voice intelligibility.

- Vintage : Aim to reproduce old vocoder gear from the 70s/80s which have a tasty sound coloration.

- Narrow: Allow for very resonant sounds, perfect for creative sound design

- Gated : Generate plucky or droplet sounds based depending on the signal you fed on.

8. THE MODULATION MATRIX

The **Modulation Matrix** extends the MiniFreak's sound design power well beyond the range of many synthesizers. It allows you to specify which signals are in control, where they exert their control, and how much.

In effect, the Matrix is a compact version of the one on the MatrixBrute. It uses simple controls to pack a lot of modulation capability into a very small space.

The word *modulation* (often abbreviated "mod") means "change". When you modulate a signal, you're changing it. That basic definition takes us a long way, as you'll see.

8.1. Select a Routing

When loading a preset the selected routing per default is the top left CycEnv > Pitch 1+2

Your **Matrix** encoder is in **Mod Browse** mode indicated by the absence of light on the **Amount** led.

Turning the **Matrix** encoder will allow you to browse the routings row by row, left to right, from the top to the bottom row.

Using **Shift+Matrix** encoder will allow you to browse the routings vertically while staying on the current column.

The currently selected routing LED blinks and shows you where the selection is on the matrix.

Once you are on the correct position, press the **Matrix** encoder to select this routing.

8.2. Set an Amount

Once you have selected your routing and pressed the **Matrix** encoder, the control will switch to **Amount** mode reflected by the LED being lit on its right and the MiniFreak screen showing you the **Amount** for that routing.

Displaying the amount of a particular modulation routing

Turn the **Matrix** encoder clock-wise to increase or anti clock wise to decrease the amount set.

Once you have set the desired amount for that routing make sure to click the Matrix encoder again to jump back into **Mod browsing** mode.

8.3. Activate/Deactivate a Routing

While you have set your modulation, you can always go back and disable or re-enable it as follows :

- Setting any modulation routing to a zero value will disable the LED and show it on the matrix as not connected.

- Setting a modulation routing to a non-zero value will enable the LED and show it on the matrix as connected.

- Pressing the encoder for 1s, in Mod Amount or Mod Browse mode will reset the currently selected Modulation Routing to O and exit Amount editing.

8.4. Quick Amount Editing

If you are in a hurry and wish to gain some time while setting routings and amounts note that you can set an amount directly while in **Mod browsing** mode by picking the routing slot and **Press+turn** the **Matrix** encoder.

> Note that when you are in **Amount** mode, using the quick edit will exit this mode and return the encoder to **Mod Browsing** when released.

8.5. Assign a Destination

There are nine available custom destinations organized in three Matrix Pages. Those are saved in the preset. We will now dive further into the specificity of the MiniFreak Matrix and its capabilities.

8.5.1. Matrix Pages

In addition to the four hard-wired modulation destinations, there are three columns labeled **Assign**.

Shift-clicking one of the Assign buttons lets you choose a Page. Each Page has its own set of three Assign modulations, making for a total of 9 possible Assign destinations.

Now let's dive into how to assign a custom destination to one of the available slots.

8.5.2. Destination Assign

Press and hold a Matrix Assign button:

- The screen will change and show the current destination for as long as the button is pressed.
- While the button is held, you can turn the knob you want to assign.
- Upon release the assignment will take place on the last moved control that can be assigned.
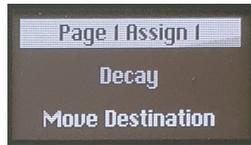
Displaying the current destination

8.5.3. Mod Amount Assign

If you wish to push the modulation further, it is key to know that you can assign a Matrix Point as a destination which allows you to modulate the Amount of that specific modulation.

- Select a Page with **Shift + Assign** Button
- Press and hold the **Assign** button for the column you want to change.
- Turn the **Matrix** encoder to select the point you want.
- Turning the Matrix Encoder will instantly jump to Matrix Browse mode
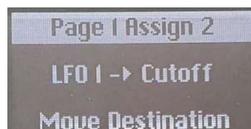
Displaying a mod amount assign

8.5.4. Custom Destinations with no physical control

Use the Preset/Edit encoder to scroll through the list and choose a destination:

- **Uni Spread**

- **CycEnv AM**: The amount of modulation the Cycling Envelope provides.

- **LFO1 AM**: The amount of modulation provided by LFO 1.

- **LFO2 AM**: The amount of modulation provided by LFO 2.

- **VCA**: The VCA level, i.e. the overall loudness of the sound.

- **Vib AM**: The amount of modulation provided by the Vibrato LFO; see the LFO chapter [p.68] for details.

- **Vib Rate**: The rate of the Vibrato LFO.

- -**Empty**-: no destination assigned – useful for keeping things neat when you're not using a particular column, as you can quickly verify it's disconnected.

If you're wondering why you have, say, an LFO 1 modulation source *and* an Assign for LFO 1 Amount, there's a good reason for it – it lets you modulate the modulation!

Let's say you want to control the Timbre knob on Oscillator 1 with LFO 1. That's easy, there's a dedicated routing for it on the Matrix. But once you've set the amount of modulation, it doesn't change unless you go back into the Matrix and tweak it. What if you wanted that amount to *change* in real time – for example, controlling the range of Timbre tweaking with the Wheel?

The Assign modulation destination makes that easy. Set Assign 1 (or 2 or 3) to LFO1 AM, then route Wheel to Assign 1 and set the amount. You now have something modulating the amount of modulation! This sort of routing, sometimes called *sidechaining*, is incredibly useful for getting more hands-on with playing your sounds.

Once you've selected a destination, you can let go of the Assign button, and the routing you've chosen is in place. At any time, you can touch the Assign button to remind yourself of what's currently there.

8.5.5. List of all available Destinations

Parameter
Glide
Oscillator X Type
Oscillator X Wave
Oscillator X Timbre
Oscillator X Shape
Oscillator X Volume
Filter Cutoff
Filter Resonance
Filter Env Amt
VCA
FX X Time
FX X Intensity
FX X Amount
Envelope Attack
Envelope Decay
Envelope Sustain
Envelope Release
CycEnv Rise / Attack
CycEnv Fall / Decay
CycEnv Sustain
CycEnv Amp
LFO X Rate
LFO X Wave
LFO X Amp
Macro 1
Macro 2
Matrix Mod Amount

9. THE LOW FREQUENCY OSCILLATORS

A Low Frequency Oscillator (LFO) is an oscillating and periodic control signal that is applied to parameters or other signals. At very slow rates, an LFO causes gradual changes depending on the waveform or more drastic ones; the nature of these changes can take on a very different character.

9.1. LFO parameters

LFO controls

The front panel controls in the LFO section are the following :

- **Select/Edit** either chooses LFO 1 or LFO 2 for editing, with a white LED showing which one you're working on at the moment. Shift-clicking accesses the **LFO Edit** function, which we'll describe in detail below.

- **Rate/Trig** sets the LFO rate. If you click the encoder, the **Sync** turns on and off to indicate whether the LFO rate is set to a specific time value, or if it's locked to the beat of the MiniFreak's **Tempo** setting. Shift-clicking lets you select how the LFO is triggered to start the beginning of its wave cycle. We'll get into that in a moment.

- **Wave/Load** lets you choose the LFO waveform. Shift-turning this knob lets you load a complex waveshape from an internal library of selections (with 16 factory + 8 user waveforms).

9.1.1. The LFO display LEDs

Directly above the **Wave/Load** knob is a pair of LEDs that flash at the rates of the two LFOs, with color changes that hint at the wave shape.

To understand why this is such an important visual reference, we need to understand that there are two ways in which an LFO can affect the signal:

- a *bipolar* LFO's waveform is centered around O, and cycles through both positive and negative values.

- a *unipolar* LFO's waveform can't go any lower than O, and only creates positive modulation throughout its cycle.

The LEDs reflect this: Yellow indicates a positive signal at any given moment, and Red indicates a negative signal. If a signal spends any time at O, its LED will go dark.

9.1.2. LFO Rates and Sync

Each LFO can have its own Rate setting, which can either be *unsynchronized* or in *sync* with the MiniFreak's Tempo or with the external tempo to which MiniFreak is slaved.

If the Sync LED isn't lit, the LFO Rate can be set between 0.015 Hz (one cycle takes a bit over 66 seconds) to 100 Hz.

When the Sync LED is lit, the LFO Rate is set from a menu of bar and beat subdivisions. This includes options from 12 bars ("dotted" 8 bars) down to 1/32 note triplets, with every straight, triplet, and dotted interval in between. This list of choices can be thinned down a bit - for example only straight time, only triplets, only dotted - by setting the **Sound Edit > LFO > LFO Sync Filter** for either or both LFOs.

9.1.3. LFO triggering

Sometimes it's useful for an LFO to start its cycle only when something else happens. For example, a sawtooth wave LFO controlling filter cutoff can give a note an extra punch on the attack if it starts when you play a note. An LFO will give a more precise effect in a sequence if it starts when the Sequence does. Or you might want both LFOs to stay in phase with one another. For any of these cases, you'll want to set up *retriggering*.

The LFOs have the following Triggering options, accessed by Shift-turning the Rate/Trig encoder:

- **Free**: The LFO runs on its own and doesn't retrigger. Each voice will be affected by the LFO at exactly the same time in exactly the same way. This to the exception of a sequence first play or external play message (SPP) as to ensure that your sequence always sound the same on playback.

- **Poly Kbd**: When you play a key, that voice's LFO will trigger. This will happen for any voice played, independently of what all the other voices are doing.

- **Mono Kbd**: The LFO retriggers for all voices at once whenever any key is played.

- **Legato Kb**: The LFO retriggers for the first note played. It does not retrigger for any notes played while the first note is still held down. When all keys are released, the next note will retrigger.

- **One**: The LFO plays one cycle and then stops. When this mode is selected, the sawtooth and square waves become unipolar: they play one cycle and stop at 0 rather than going negative. The sine and triangle waves remain bipolar.

> ℹ Note that LFO modulation will always return to 0 at the end of the cycle, even if the waveform is bipolar. In other words, after the single LFO cycle is finished, the note will sustain as if there is no modulation.

- **LFO**: The LFO will retrigger when the other LFO starts its cycle. LFO 1 can be retriggered by LFO 2, and vice versa.

- **CycEnv**: The LFO is triggered by the start of the Cycling Envelope [p.14].

- **Seq Start**: The LFO is triggered on first step of the Sequencer [p.99].

9.1.4. LFO Waveforms

The **Wave/Load** knob selects from the following waveforms:

- **Sin**: Sine

- **Tri**: Triangle

- **Saw**: Sawtooth

- **Sqr**: Square

- **SnH**: short for *Sample and Hold*, which refers to a waveform that randomly changes its value.

- **SlewSnH**: like SnH, but with *slew*, meaning each new cycle's voltage change happens with a slight "glide" to the new value rather than changing instantly.

- **ExpSaw**: a sawtooth wave where the wave falls on an exponential curve rather than a straight line – the initial drop is slightly quicker, but slows at the end. This waveform is unipolar.

- **ExpRamp**: as above but a ramp wave. Also unipolar.

- **Shaper**: a waveform determined by the Shaper (see below) or loaded by the Load knob.

If you're having trouble imagining these waveforms and what they do, just check the Display while choosing a wave. The illustrations are very helpful.

> ▌ As shown in the graphic on the Display, a sawtooth wave is usually defined as starting with a vertical jump followed by a gradual drop until the start of the next cycle. Sometimes this is called a "falling sawtooth". On the other hand, a cycle that begins with a gradual rise, followed by a vertical drop at the end of the cycle, is known as a *ramp* wave, or "rising sawtooth". If you want to use a ramp wave as a modulator, use the sawtooth but apply a negative modulation.

9.2. The Shaper and LFO Wave Edit

Sometimes it can really benefit the sound design of a particular program to have a waveform that's more complex than the usual choices. On the MiniFreak, you can create, save, and load your own custom LFO waveforms using the Shaper.

9.2.1. Storing and loading Shaper Waves

The MiniFreak contains a library of Shaper Waves that can be loaded for instant use. There are 16 Factory and 8 User Shaper Waves; storing a User Shaper Wave makes it available for any preset. Before storing and loading those shaper waves, please first turn the Wave knob clockwise until you reach LFO1 Wave Shaper.

Shift-turning the Wave/Load encoder scrolls through the list of Shaper Waves. The first one shown is the one for that Preset (if any), then the 16 Factory waves, then the 8 User waves. Each wave's shape is shown in the Display for quick reference. To load a chosen wave, just release the Shift button.

In addition, you can create and store two Preset Shaper Waves, one for each LFO, inside each Preset. That's useful if you have a Preset that needs a really unusual Shaper Wave that you won't want to use anywhere else. It also prevents you from being forced to modify a User Shaper Wave – which will change every preset you've used it in! These two Shaper Waves can be copied and pasted into other Presets using the Utility Menu's Preset Copy [p.22] and Preset Paste [p.22] functions.

9.2.2. LFO Wave Edit

To enter shaper edit, press and hold Shift, and then click on the Select/Edit button. The 16 Sequencer steps will blink in purple and ask you to press them to create a step.

The workflow for creating your own Shaper Waves makes use of the Touch Strips and the Sequencer Step and Pattern Length buttons. These controls let you quickly define the shape of each stage of the wave, up to 16 steps in all; taken together, these stages form a Shaper Pattern.

9.2.2.1. Shape Pattern step properties

As you create a Shaper Pattern, you will sculpt the behavior of each step, one step at a time. This isn't as hard as it sounds, thanks to some clever editing tools.

> ℹ️ Make sure you are in Shaper edit mode by pressing and holding shift and clicking the Select/Edit button.

Each step in the Shaper Pattern has three properties:

Amplitude: how high or low (positive or negative) the step reaches at its maximum value.

Slope: the shape of the step itself. The choices are:

- **Rise**: Over the course of the step, the value goes from 0 to the set Amplitude
- **Fall**: Over the course of the step, the value goes from the set Amplitude back to 0
- **Triangle**: Over the course of the step, the value goes from 0 to the set Amplitude and back to 0
- **Join**: Over the course of the step, the value from the previous to the next step.

> ℹ️ Note that "Rise" and "Fall" refer not to values up or down, but to values leaving 0 or returning to 0. In other words, going from 0 to a negative Amplitude is still a Rise slope.

- **Curve**: the curvature of the Slope, from exponential to logarithmic, with linear as a center default. An exponential curve changes slowly at first, but then the rate of change speeds up; a logarithmic curve changes quickly at first, but then the rate of change slows down.

9.2.2.2. Selecting a given step

To shape a step in the Shaper pattern, select it by touching the appropriate Sequencer Step pad.

There are two ways to edit a step :

Quick edit : Hold a step and quickly change amp and curve.

Step edit : If you hold a step longer it will change to **step edit** mode, white led is blinking and you must press another step to change or press the current step to exit this mode.

The LED on any given step will be:

- Dark if the step hasn't been edited yet or is being left at 0
- White (flashing) if the step is being edited
- Purple if the step has been edited and Lit / Dim for the segment start / tail.

Note that when the shaper is empty, all steps will blink in purple and the screen will ask you to add a step.

When you first touch a pad, the step will flash white. After you edit the step to your liking, you can touch it again or choose another step to edit, and the LED will turn purple.

After a step has been edited, you can tap its pad to turn it on and off (purple vs. dark). Long-pressing the pad will cause the LED to flash white, and then you're editing again.

9.2.2.3. Editing a given step

When a step is selected for editing, the Touch Strip LEDs on your left will turn red, and one of the first four Pattern Length pads' LEDs will turn purple.

The Display will show the shape of the Pattern so far; if you're just getting started, it will be a flat line.

You can now set the Amplitude, Slope, and Curve of the step:

- **Amplitude** is set using the Bend Touch Strip, with 0 at the center. As Amplitude for a step is being set, the Display will show its value from -100% through 0% to +100%, and also show the step number, which is handy when you're working with a complicated pattern.
- The **Slope** of a given step is set with the first four Pattern Length pads.
- **Curve** is set with the Wheel Touch Strip, from -100% to 0% to 100%.

9.2.2.4. Segments

A Shaper pattern with Segments of varying lengths

If you select a number of adjacent pads at once (by holding the first pad and touching the last), those steps become a single long step called a Segment. When you have selected a Segment, the first step's LED will flash white, and the remaining steps in the Segment will be solid white.

You can then edit the Segment as usual, and the Amplitude, Slope, and Curve values will apply to the whole Segment.

9.2.2.5. Set the Shaper Pattern Length

Setting the Last Step of the Shaper pattern

Enter LFO Wave Edit mode by Shift-clicking the **Edit** button. All 16 of the Sequencer Step pads will turn purple, and one of the 4 slopes that you can select is lit by default (ramp down/saw). The **Sound Edit** button will be lit dim white to allow you to exit this mode when pressed.

Hold down the **Last Step** pad and touch the Sequencer Step pad that will be the last stage of the Shaper Pattern, if you want fewer than 16. While the Last Step pad is held down, the LED for the last step will turn red.

Note that if the LFO is in Sync, each step will be equal to the Sync subdivision, so a 5-step Shaper Wave set to 1/8 notes will repeat in 5/8 time. You can create interesting polyrhythms if the two LFOs are using Shaper Waves with different lengths, say 5 against 7 or 3 against 13.

9.2.2.6. Saving a Shaper Wave

To save a Shaper you need to ensure to be Shaper Edit mode, by pressing Shift + LFO edit. From there hold **Save** , press the **LFO edit** button to enter **Saving Mode** for the currently selected LFO slot's Shaper. Then turn the preset encoder to select a slot where you want to store your Shaper Wave. It will show the destination User Shaper Wave number and Name.

The destination should default to the first User Shaper Wave if a LFO Wave or a Factory Shaper Wave was selected prior to editing. If a User Shaper Wave was selected prior to editing, the destination defaults to this Shaper Wave.

The **SAVE** button should blink.

You can now turn the Preset / Data encoder to choose a different destination. Only User Shaper Wave slots are shown.

Press the Encoder knob to **SAVE**.

To exit LFO Wave Edit, simply press the **Select/Edit** or **Sound Edit** button again. You've now created a Shaper Wave for that LFO!

When you save the Preset, the Shaper Wave will be saved as that LFO's Preset Shaper Wave. (There's one for each of the LFOs.)

When you Shift-turn the **Wave/Load** encoder, it will display that wave. You can select a different Shaper Wave from the Factory or User Shaper Waves, but the Preset Shaper Wave you just created remains in the menu and you can always get back to it.

Now, what if you want to use that Shaper Wave in another Preset? You can save it in one of the 8 User Shaper Wave slots shared by all Presets.

9.2.3. Shaper Rate

The rate set on a shaper was determined by the rate knob, and it was per step. It meant that a 16-step shaper at 1/16 each step is played at 1/16 (meaning the whole shaper is actually 1 bar).

All steps means the rate of the shaper is now on all steps. With a 16-step shaper at 1/16, the whole shaper is actually 1/16 (16x times faster).

This setting can be found in the Sound Edit > LFO menu.

9.3. Vibrato

The MiniFreak has a third LFO called **Vibrato**. It doesn't have nearly as many features as the others, but it serves a very important purpose.

> ℹ Note that any modulation assigned to the modwheel will be added on top of the vibrato.

Vibrato is a free-running triangle wave LFO whose rate and amount (depth) are controlled either by the Modulation Matrix using an Assign routing, or directly by the Touch Strips [p.85].

To turn Vibrato on or off, Shift-touch the **Keyboard Bend/Wheel** pad. When Vibrato is off, the LEDs next to the Wheel that show the amount are all white; when Vibrato is on, the top LED is blue.

If you hold down the Keyboard Bend/Wheel pad while in Vibrato mode, both Touch Strips' LEDs turn blue. While holding down the pad, use the Touch Strips to quickly set the Vibrato Rate with the Bend Strip and the Vibrato Depth with the Wheel. It's very easy to do!

To set the rate and depth of the Vibrato, don't forget to raise the modwheel to maximum value in order to monitor the parameter change on the vibrato and use the **Sound Edit > Pitch > Vibrato Depth/Vib Rate** menu.

9.4. A few final tips

Modulations from different sources sent to the same destination add together for a combined effect. If you've turned all your modulation routings off but still hear an effect, go through your patch modulations and make sure that there isn't a modulation happening somewhere else. Remember, not all mod routings require the Matrix to set up, with the Analog Filter Env/Velo knob being a good example.

If you're sidechaining modulations and the overall effect isn't working the way you think it should, remember that you've got *two* modulation amounts to adjust. Messing with one might not do the job until you get the other one set properly!

Finally, remember that if you ever get totally lost in your modulations and want to just start over, maybe long press on preset encoder to start from an init preset, or clear the entirety of the mod matrix through the "Erase" menu.

Sometimes it's OK to return to a clean slate.

10. THE ENVELOPES

The *envelope* is a fundamental modulation source, perhaps the most important one there is. Without envelope control, a synthesizer's notes would just drone without stopping, or simply turn on at full volume when a key was pressed and cut off the moment the key was released. Not all that interesting (with apologies to pipe organ players).

Envelopes allow events like notes to have a distinct shape, letting them imitate a wide variety of acoustic instruments as well as sounds only possible on a synthesizer. The MiniFreak offers two envelopes: one is simply called the Envelope, and the other is the Cycling Envelope. These two envelopes have similarities, but are defined by very different modes of operation.

10.1. Envelope stages

10.1.1. Envelope stages: ADSR

The way an envelope changes over time is described by sections called *stages*. While there are many different ways to define an envelope, the vast majority of synths uses envelopes made up of a few basic stages.

The most common envelope is the *ADSR*, so named for its four stages:

- *Attack*, which starts when a note is played, and runs from the start of the envelope (usually O) up to the maximum value;

- *Decay*, which drops from the maximum value to the sustain value;

- *Sustain*, a value that holds steady for as long as a note is held down;

- *Release*, which drops from the sustain value back down to O when the note is no longer pressed.

Note that the attack, decay, and release are all time values, but the sustain is a level.

The attack time differentiates between the sharp onset of a drum hit or string pluck and the rising volume of a bowed string or timpani roll. Decay time determines how percussive the initial part of a sound is when compared to the sustain level, and release time simulates how long an instrument resonates after it's no longer being excited.

10.1.2. Envelope stages: other types

Some envelopes are designed for simpler uses. For percussive sounds played with a short trigger pulse, an *AR* envelope is enough to describe the shape of the "hit". However, AR envelopes are a bit limited, and if you need one, it's easy to create that behavior with a slightly more complex (and much more useful) envelope.

An *AHR* envelope has three stages: attack and release, with a stage called *Hold* between them. The Hold setting is a time, not a level; during the Hold time, the envelope stays at maximum. (An AR envelope is just an AHR with zero Hold time.)

We use the terms *Rise* and *Fall* for the Cycling Envelope... making it an *RHF* envelope. This terminology is chosen so that when you talk about "attack" vs. "rise" or "release" vs. "fall", it's obvious which envelope you're referring to.

> **i** This naming convention works because the term "AHR" is nowhere near as universally accepted as "ADSR" or even AR. The AHR envelope has also been called an ASR, AHD, or even a Trapezoid! (The pioneering EMS Synthi VCS3 used that term for its Envelope Shaper.)

Despite all of this, the simplest envelopes remain the most popular and easy to use, and the MiniFreak's envelopes are based on these designs.

10.2. Envelope

The Envelope controls

The MiniFreak Envelope is an ADSR, with four dedicated knobs for its four stages: **Attack**, **Decay**, **Sustain**, and **Release**. Remember that Sustain sets a level while the other three knobs set times.

As you turn each knob, the Display will show an envelope curve reflecting the current settings. It will change shape as you adjust the stages, with parameter values shown underneath the curve.

10.2.1. The VCA

The Envelope has one hard-wired modulation destination: the *Voltage Controlled Amplifier* (VCA), which controls the volume of the audio signal. It can modulate other things, but those modulation routings have to be set in the Modulation Matrix [p.10] as needed.

While the VCA is the necessary third part of the classic VCO > VCF > VCA routing, it often needs no controls of its own besides a volume envelope. That's why it doesn't have its own big chapter in this manual to go with the Digital Oscillators [p.24] or the Analog Filter [p.49].

10.2.2. Sound Edit > Envelope extras

In addition to these four important knobs, the Envelope has some hidden capabilities found in the **Sound Edit** [p.82] > **Envelope** menu.

Click the Sound Edit button and scroll down to Envelope, then click the Preset/Edit encoder to open up the Envelope menu. You can then select and edit which parameter you're interested in, by scrolling and clicking.

10.2.3. Velocity modulation

The first four items on the menu give you the ability to adjust the effect that keyboard velocity has on how the Envelope affects other parameters.

It's handy to be able to adjust each of these modulation amounts separately, as a setting that works for one might not work for the others.

- **Velo > VCA**: controls how much velocity adjusts the Envelope's control of the VCA – in other words, how loud a note gets.

- **Velo > VCF**: controls how much velocity adjusts the Envelope's control of the VCF Cutoff – in other words, how bright a note gets. This can also be accessed using the shift + Env Amount shortcut.

- **Velo > Env**: controls how much velocity adjusts the Envelope's modulation amount in the Modulation Matrix. This will affect both the VCA and VCF, in *addition* to whatever settings you have for the previous two Velocity modulations.

- **Velo > Time**: controls how much velocity adjusts the Decay and Release of the Envelope - higher velocity extends the Decay and Release times.

10.2.4. Retriggering

The **Retrig Mode** setting controls how the Envelope is triggered by the keyboard, depending on how you play.

There are two options:

- **Env Reset**: Every time you play a note, the Envelope restarts from the beginning. This is often termed *multiple triggering*.

- **Env Continue**: If you play a note while another note is still playing, the envelope will start from the current value of the old note's envelope, rather than dropping back to O first. This is often termed *single triggering*.

The distinction might seem kind of strange – how can playing one note affect another note's envelope? That depends on the Voicing Mode [p.79].

It's true that in Polyphonic mode, where notes don't retrigger unless you play one more note than the number of voices you have (and the MiniFreak has to "steal" one of the voices from a previous note), retriggering might not seem important. However, Retrig Mode is vitally important in the Monophonic, Paraphonic, and Unison voicing modes, as it has a powerful effect on what the sound does as you play.

10.2.5. Curve options

Sometimes, it's handy to alter the curve of an envelope stage itself, to give an envelope a different "feel" – perhaps more or less punchy and immediate. The last three functions on the **Sound Edit > Envelope** menu give you the option of a slightly different curve shape:

- **Attack Curve**: Selects Default or Quick

- **Decay Curve**: Selects Default or Percussive

- **Release Curve**: Selects Default or Percussive

10.3. Polyphony and Voicing Modes

You've probably noticed that we've skipped one Envelope control: the **Mode** button, which selects from four different *voicing modes* and indicates the current choice with a white LED.

The voicing mode controls how playing notes affects what the MiniFreak does. This can make a huge difference in how a given preset reacts musically to what you play.

- **Mono**: Only one voice plays at a time, cutting off the previous note's envelope.

- **Poly**: One voice plays for each note you play, allowing conventional notes and chords.

- **Para**: activates Paraphonic mode. See below for an explanation of this mode.

- **Uni**: Unison mode, where a single note can trigger multiple voices. This can create simply huge sounds!

10.3.1. Unison parameters

The **Sound Edit > Voice** menu has parameters to specify the way in which Unison works for your preset:

- **Uni Spread**: lets you dial in an amount of detuning between the voices, from a nearly-tuned 1/1000 of a semitone to a full octave.

- **Unison Count**: selects how many of the MiniFreak's voices will play when you press one key, from two to the full six.

- **Unison Mode**: specifies whether Unison is used in monophonic (you can play legato on the keybed), polyphonic (similar to the Poly/Unison on the PolyBrute), or paraphonic mode (a new note trigs the N voices of unison. When there's no more available, it steals from the previous ones) for this Preset; whichever you select will have its LED dimly lit when Uni is selected.

- **Legato Mono** applies to Mono and Unison Mono modes; it sets whether or not the Envelope retriggers when played legato.

10.3.2. Paraphony

Like Arturia's MicroFreak, the MiniFreak has a *Paraphonic* voicing mode, which allows the MiniFreak to have its voices extended from six to twelve. Unlike the other voicing modes, Paraphonic mode actually changes the voice structure of the MiniFreak, creating some new options while limiting others.

So what's this all about?

10.3.2.1. Paraphonic voice structure

When you select Paraphonic voicing mode on the MiniFreak, the following changes are made:

- Osc 2's is deactivated. The Oscillator Select LED are lit and the button is disabled.

- Instead of six voices of polyphony, now the MiniFreak has twelve.

- the twelve voices are organized into *Voice Pairs*. As you play more notes, one voice in each pair will play. When you get to playing seven or more notes, the other voices in each pair will join in.

- Each voice has its own amplitude control: a *Voice Envelope* that's set by the Envelope ADSR controls. These are the envelopes that are used as sources in the Modulation Matrix.

- In addition, each Voice Pair shares a *Master Envelope*. It's an AHR (in case you were wondering why we explained AHR envelopes early on!) that stays open as long as either one of the voices in a pair is being played.

The end result is a twelve-voice synthesizer with certain limitations on articulation, offering an interesting alternative to the usual sort of polyphony. Pretty cool, huh?

10.4. Cycling Envelope

The Cycling Envelope controls

The other envelope on the MiniFreak is the **Cycling Envelope**. It can work as a traditional envelope, but also has the capability of working in ways that almost make it a kind of LFO.

> i If you stop to think about it, LFOs and envelopes aren't all that different in design. The primary difference is that LFOs repeat over and over, and envelopes don't. But what happens if an LFO is set to only play once per key press [p.69], or an envelope can be set to repeat in a loop? The lines get blurry... and we like blurry lines, they leave lots of room for creative exploration!

10.4.1. Stages and shapes

The three Cycling Envelope knobs are **Rise**, **Fall**, and **Hold/Sustain**, and set the rise and fall times and either the Hold time or Sustain level, depending on the Mode (see below).

Shift-turning the Rise or Fall knobs sets the **Shape** of those stages. At 5O, the stage is linear; at lower numbers, the stage curves so it has a slower start and faster end (*exponential*), and at higher numbers, the curve has a faster start and slower end (*logarithmic*).

10.4.2. Modes and Retriggering

The **Mode** button determines how the Cycling Envelope operates within a given Preset. The three modes are **Env**, **Run**, and **Loop**, and the active mode is indicated with a white LED.

In Env mode, the Cycling Envelope functions as an ADSD envelope. The Rise knob sets the attack time, the Fall knob sets the decay *and* release times to the same amount, and the Hold/Sustain knob sets the sustain level.

In Run and Loop modes, the Cycling Envelope is a 3-stage envelope, with Rise, Fall, and Hold times. It retriggers itself at the end of any envelope cycle... but in the **Sound Edit > Cycling Env > Stage Order** menu, you can select *which* stage that is!

In *RHF* order, the envelope retriggers at the end of the Fall, and the Hold stage is at maximum. In *RFH* or *HRF* modes, the envelope retriggers at the end of the Hold or Fall, but the Hold stage is at O. This choice means that instead of a series of conventional RHF shapes, the Cycling Envelope creates a series of Rise/Fall spikes separated by the Hold time... like an automated AR envelope.

In Run mode, the Cycling Envelope is *monophonic*, affecting all voices at the same time. It will always be in phase for every voice, which is a very useful option. Normally it's meant to run freely and never be retriggered. The only way to force it to retrigger is by sending the MiniFreak a MIDI [p.112] Start command.

In Loop mode, the Cycling Envelope retriggers itself at the end of every cycle, but the retriggering is *polyphonic* and can be set up in various ways, which are set via **Sound Edit > Cycling Env > Retrig Src**:

- **Poly Kbd**: When you play a key, that voice's Cycling Envelope will trigger. This will happen for any voice played, independently of what all the other voices are doing.

- **Mono Kbd**: The Cycling Envelope retriggers for all voices at once whenever any key is played.

- **Legato Kb**: The Cycling Envelope retriggers for the first note played. It does not retrigger for any notes played while the first note is still held down. When all keys are released, the next note will retrigger the Cycling Envelope.

- **LFO 1 or LFO 2**: The Cycling Envelope retriggers when the selected LFO does.

Last but not least, **Sound Edit > Cycling Env > Tempo Sync** sets the Cycling Envelope to follow the MiniFreak's Tempo if desired.

11. SOUND EDIT

When designing the MiniFreak, we gave some careful thought to which controls were more important for easy access, and which ones could be set aside for only occasional use. With only a limited amount of space for knobs and buttons, the MiniFreak had to be designed to offer the vast majority of its regular functions in ways that are easy to get to and easy to use.

For functions that are still important but don't require immediate control, the **Sound Edit** button serves as an access point to menus covering most sections of the MiniFreak that need a bit more attention.

11.1. Menu structure and controls

Clicking the **Sound Edit** button opens the top level of a series of menus and submenus. Basic navigation is the same for all of them, and only requires the **Preset/Edit/Filters** encoder next to the Display.

> ▌ The Sound Edit button is also used to cancel a Save operation as well as to exit the Shaper edit, Macro edit or Mod Seq.

11.2. Sound Edit menus

Throughout the manual, we refer to functions in the Sound Edit menus with arrows to show where they're found:

For example, **Sound Edit > FX > Delay Routing**

The first item under Sound Edit is **Preset Volume**. This isn't a menu; it's just a handy place to store a volume offset for the current Preset to quickly bring in line with other Presets. The offset ranges from -12 dB to +6 dB.

The remaining items are the Sound Edit menus:

- **Osc**
- **FX**
- **Envelope**
- **Voice**
- **Cycling Envelope**
- **LFO**
- **Keyboard**
- **Seq**
- **Scale Config**
- **Preset**

We'll now list the parameters in each menu, with a quick description and a link to the relevant section of this manual for more details.

11.2.1. Sound Edit > Osc

- **Osc1 and Osc2 Mod Quant**: chooses a scale for the Digital Oscillators' Mod Quantize [p.25] function, with separate settings for each Osc.

- **Glide Mode**: specifies how the Glide [p.88] will behave for this Preset.

- **Vibrato Depth and Vib Rate**: sets the depth and rate of the Vibrato LFO [p.68].

- Shortcut : Sound Edit + Osc select

11.2.2. Sound Edit > FX

- **Delay Routing** and **Reverb Routing**: set the Delay and Reverb FX to operate using Insert or Send Routings [p.53].

- Shortcut : Sound Edit + FX select

11.2.3. Sound Edit > Envelope

- **Velo > VCA**
- **Velo > VCF**
- **Velo > Env**
- **Velo > Time**
- **Retrig Mode**
- **Attack Curve**
- **Decay Curve**
- **Release Curve**

This set of functions is deeper than what's common for other sections of the MiniFreak, and they need a detailed set of explanations. You can find all the information you need in the Envelopes chapter [p.76].

- Shortcut : Sound Edit + Env mode

11.2.4. Sound Edit > Voice

- **Legato Mono**: specifies retriggering of a monophonic voice depending on legato playing.

- **Uni Spread, Unison Count, Unison Mode**: determine how the MiniFreak's Unison [p.79] will be applied.

- **Poly Allocation and Poly Steal Mode**: determine how the MiniFreak's six voices are allocated during Polyphonic [p.79] play.

- **Osc Free Run**: Enables or disables Free Run mode for the Digital Oscillators.

- Shortcut : Sound Edit + Env mode

11.2.5. Sound Edit > Cycling Envelope

- **Retrig Src**: specifies how the Cycling envelope will be retriggered.
- **Stage Order**: specifies ordering and retrigger point for the Cycling Envelope's Rise, Fall, and Hold stages.
- **Tempo Sync**: turns sync for the Cycling Envelope on and off.

These functions are all detailed in the Cycling Envelope Chapter's Modes and Retriggering [p.81] section.

- Shortcut : Sound Edit + Cycling Env mode

11.2.6. Sound Edit > LFO

- **LFO 1 and LFO 2 Retrig**: determines the LFO Triggering [p.69] for the LFOs, with separate settings for each.

- **LFO 1 and LFO 2 Sync Filter**: lets you filter the list of available LFO Sync subdivisions [p.69] for easier selection.

- Shortcut : Sound Edit + LFO Select

11.2.7. Sound Edit > Keyboard

- **Matrix Scr VeloAT**: selects between velocity or aftertouch [p.87] or a combination of both is used in the Modulation Matrix.
- **Kbd Src**: determines how keyboard notes [p.85] are presented as modulation information in the Modulation Matrix

- **Bend Range**: sets the range of pitch bend messages from MIDI [p.113] or the Touch Strips [p.90], in semitones.

- Shortcut : Sound Edit + Pitch/Mod wheel

11.2.8. Sound Edit > Seq

- **Smooth Mod 1/2/3/4**: turns smoothing off for each of the Sequencer's Mods [p.104].
- **-1 semi-tone, +1 semi-tone**: click to transpose the sequence up or down.

11.2.9. Sound Edit > Scale Config

- **Scale**: chooses the desired Scale quantization for the keyboard.

- **Root**: specifies the root note for the scale.

- Shortcut : Shift + Chord

11.2.10. Sound Edit > Preset

- **View Snapshots**: shows a list of Snapshots of previous edits, which can be reloaded to recover from mistakes you couldn't fix otherwise.
- **Details**: displays Type, the Sound Designer's name (yours, if you created it on your MiniFreak), and the Revision number for the Preset.

12. KEYBOARD FUNCTIONS

The most obvious difference between the MiniFreak and its sibling the MicroFreak is the keyboard. Where the MicroFreak has a 25-note capacitive touch keyboard, the MiniFreak comes with a traditional 37-note slim keyboard. This makes the MiniFreak immediately comfortable and familiar to players with a knowledge of keyboard technique, and combines with the two left-hand Touch Strips for a wonderful playing experience.

12.1. Keyboard Notes

The most basic information sent by the keyboard is which note you're playing. Believe it or not, even this simple bit of data can be used by the MiniFreak in a variety of ways.

The pitch of the note being played is a common modulation source for various synth parameters. For example, if the filter cutoff tracks the keyboard in a linear manner, a self-oscillating resonance can play in tune. (See the Analog Filter [p.49] chapter for more.)

However, the MiniFreak can take things even further. In the **Sound Edit > Keyboard** menu [p.84], there's a parameter called **Kbd Src**, which provides a choice of several different output modulations based on keyboard position relative to the center which is C3.

- **Linear**: a modulation signal that goes from incrementally as you play up the keyboard.

- **S Curve**: a slightly curved modulation response, like Linear but more sensitive to changes in the center of the keyboard range and less sensitive at the high and low extremes.

- **Random**: a random value sent with every keypress.

- **Voices**: a specific value that is determined by which of the MiniFreak's voices is being played.

12.2. Velocity and Aftertouch

The MiniFreak keyboard senses *velocity* (how fast you hit the keys) and *aftertouch* (how hard you press down on a key after playing it). The keyboard sends *monophonic aftertouch* messages, where all sounding voices are modulated by the same amount.

> ℹ️ When receiving external MIDI, the MiniFreak's sound engine is compatible with *polyphonic aftertouch* MIDI messages, where aftertouch modulation is applied in different amounts to each note individually. The MicroFreak's touch keyboard can produce polyphonic aftertouch data due to its unique design.

The **Utility > Controls** menu [p.109] has several parameters controlling how the keyboard's velocity and pressure response relates to musical expression:
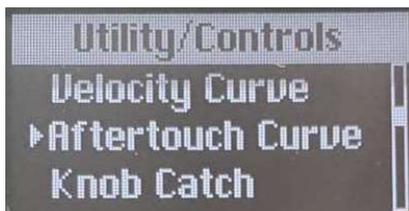
Linear, Log, and Exponential response curves

- **Velocity Curve**: determines how the keyboard responds to lighter vs. heavier playing:
    - **Linear** is the default; it provides an even response to playing dynamics from light to heavy.
    - **Log** (Logarithmic) provides a lighter touch; you can play very lightly and still get louder notes, but soft playing can sound uneven because small variations can yield big changes.
    - **Expo** (Exponential) is a heavier touch; difficulty in hitting really loud notes is your tradeoff for a more uniform velocity response when you play softly.
- **Aftertouch Curve** offers the same choices for how much pressure is required to send higher aftertouch values.

In addition, there are two more aftertouch settings in the Utility menu:

- **AT Start Sens**: sets how much pressure is required to get the keyboard to send any aftertouch at all. It can be set to Low, Mid, or High sensitivity.
- **AT End Sens**: sets how much pressure is required to have the keyboard send maximum pressure data. It can also be set to Low, Mid, or High.

Everybody's favorite "feel" for aftertouch is different. Don't be surprised if you find yourself playing around with these settings a lot in search of the perfect feel for your playing style.

12.2.1. Velocity and aftertouch in the Modulation Matrix

The Modulation Matrix [p.10] has a row for velocity and aftertouch as a modulation source, labeled **Velo/AT**. You can choose which of the two you want as a modulation source for any given Preset, or use both at once.

In the **Sound Edit > Keyboard** menu [p.84], the parameter **Matrix Src VeloAT** lets you choose whether Velocity, Aftertouch, or both are used as modulation sources in the Matrix.

> ℹ️ **Both** allows you to define on a key trig, the modulation start value with the velocity, then you can use the aftertouch to modulate between the hit velocity and the max value.

12.3. Polyphony

The **Sound Edit > Keyboard** menu also has settings for how playing the keyboard triggers the MiniFreak's voices. The articulation of a Preset will depend on how voices are reassigned as notes are played.

- **Poly Allocation** defines how the MiniFreak looks for which voices to play next. The options are:

    ◦ **Cycle**: The MiniFreak takes the next voice available, regardless of what has been played previously.
    ◦ **Reassign**: If you replay a note, it cuts off the previous voice and retriggers it rather than choosing a new one. (Think of a piano and what happens to a note if you replay it.)
    ◦ **Reset**: On every new keypress, the MiniFreak plays note one on voice one, note two on voice two and so on.

- And what happens when you run out of voices? That's determined by the **Poly Steal Mode** setting:

    ◦ **Oldest** steals the oldest voice.
    ◦ **Lowest Velo** steals the voice that was played with the lowest velocity (since you're less likely to notice the loss of softer notes).
    ◦ **None**: no new notes will sound until one of the currently sounding ones is released.

> ℹ️ Important : We never steal the lowest note, no matter what mode is selected. This allows you to keep playing a bass notes while playing higher register notes with the right hand.

12.4. Glide

Glide, also called *portamento*, is a gradual shifting of pitch from one note to the next. In other words, if you play a C and then the E above it, the pitch will rise from C to E slowly rather than jumping immediately. How quickly the pitch makes the change is set with the **Glide** knob.

Glide can be used in many expressive ways, and the MiniFreak Glide function has several options that you can set to get the most out of any particular preset.

The **Sound Edit > Pitch** menu has a parameter called **Glide Mode**. It offers three different types of Glide behavior, each of which is available with and without Legato control.

- **Time / Time Legato**: The Glide knob sets the glide *time*. It doesn't matter how close or far apart two notes are, the glide between them will always take the same amount of time.

- **Rate / Rate Legato**: The Glide knob sets the glide *rate*. A glide of four semitones will take twice as long as a glide of two semitones, for example.

- **Sync / Sync Legato**: Same as Time mode, but glide time is quantized to subdivisions of the Tempo.

In each of these, Legato means that releasing a note completely and then playing another will not glide, but notes played legato will glide.

12.5. Scale configuration

Sometimes it might be handy to make sure you can't play a wrong note. The MiniFreak can be set to play only notes in a particular key and scale, no matter which keys you play. (Out of scale keys will play the nearest correct pitch.)

This is done in the **Sound Edit > Scale config** menu or **Shift+Chord/Scales** button:

- **Scale** selects the scale you want to restrict the keys to.

- **Root** lets you choose the key, from C up to B in semitones.

12.5.1. Factory and User scales

The following preset scales are available to choose from: Major, Minor, Dorian, Mixolydian, Blues, and Pentatonic.

In addition, there's an Off option, a Global option (which uses the Global Scale and Global Root in the **Utility > Global Scale** menu), and a User option.
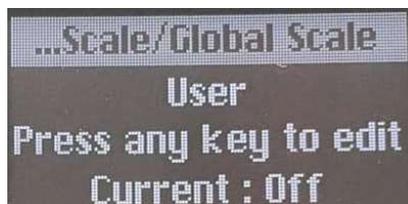
Setting a User Scale

When you select User, the Display prompts you to play a key. When you do, the Display will show a keyboard octave. Press keys to turn notes on (white) or off (black). In this way, you can build any scale you want, from variations like harmonic and melodic minor to exotic scales from world music.
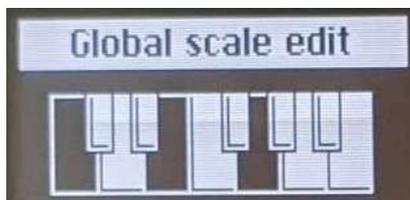
Setting a User Scale

> ℹ Every time you re-enter the User Scale display, your current settings will be shown, and you can further edit them from there.

User scale cannot allow scales with less than one note. If only one note is selected, it cannot be edited, to be able to do so, add new notes first.

12.6. Chord Mode

The MiniFreak offers a Chord mode which allows you to play multiple notes from a single key press.

- To enter this mode press the **Chord**/**Scale** button which will be then lit white.
- To change the chord stored hold the **Chord** button and press the desired interval on the keys.

Once set this chord is saved along with the preset.

- To exit the Chord mode, simply press the **Chord** button again.

To note :

- In Mono Mode, it is still possible to use the Chord mode.
- In unison mode each note of the chord will be detuned by the amount set on the unison spread.

12.7. Touch Strips

The keyboard is supplemented by an important pair of hands-on performance controls: the **Touch Strips**. These are capacitive strips that can be assigned to multiple uses.

Each Touch Strip has its own "ladder" of colored LEDs to show the strip's current setting and mode of operation.

Above the Touch Strips, you will find a set of three pads that set the current mode for their operation.

12.7.1. Keyboard Bend/Wheel (Vibrato)

This is the classic bender-and-modulation setup. The Bend strip shows travel with white LEDs and snaps to center when released; the Wheel strip has a ladder of white LEDs that shows the position, which does not return to O when released.

Shift-touching the Keyboard Bend/Wheel pad selects or deselects Vibrato mode. This is indicated by the top Wheel LED being blue rather than white. More information on this special LFO and how to set it up can be found in the Vibrato [p.75] section. (The Bend strip works the same way as before.)

By the way, the **Sound Edit > Keyboard** menu has a **Bend Range** parameter that can be set from 1 to 12 semitones.

12.7.2. Macros M1/M2 (Assign)

Pressing the second pad turns the Touch Strips into a pair of unipolar Macro controllers. The pad LED will illuminate blue, as will the LED ladders for both Touch Strips. Shift-touching the pad activates Macro Assign mode.

These powerful multi-function controls offer a huge number of creative options, and you can learn about how to create and use them in the Macros [p.91] Chapter.

12.7.3. Seq/Arp Gate /Spice (Dice)

The third pad turns the Touch Strips into hands-on controllers for the Arpeggiator and Sequencer [p.94]. The left strip controls Gate length for steps in the arpeggio or sequence, and the right strip controls the amount of Spice [p.96] applied to the playback.

Shift-touching the pad rolls the Dice [p.96].

13. MACROS

With all of the cool things the MiniFreak can do in real time, you might find yourself wishing that you had more than two hands to play and work the controls. Wouldn't it be cool to be able to simultaneously raise the Cutoff, lower the Resonance, change the Envelope attack a tiny bit, and sweep the Timbre knob, all in one motion?

Of course it would... and that's why the MiniFreak offers **Macros**.

13.1. Macro basics

Each Preset can store two Macros, **Macro 1** (M1) and **Macro 2** (M2). Once a Macro has been set up using **Macro Assign** mode (see below), using it is as easy as playing with the Touch Strips [p.90].

Each Macro can contain up to four parameter destinations. Each of the changes works as follows:

- When the Macro is at 0, the parameter is at its stored setting in the Preset.
- When the Macro is at 100, the parameter is offset by a certain amount from the stored value.

These offsets work like those in the Modulation Matrix [p.10], but are separated from them. In other words, a Macro has the effect you set it up for, even if there's nothing at all patched up in the Matrix.

13.2. Using Macros

To use Macros while playing a Preset, just touch the **Macros M1/M2** pad above the Touch Strips. The pad's LED will light up blue, and the LED ladders beside the Touch Strips will also turn blue.

Once you've done that, moving the left Touch Strip will sweep Macro 1 from its minimum to its maximum and moving the right Touch Strip will do the same for Macro 2. Simple and fun!

13.3. Macro Assign

To set up a Macro, Shift-touch the Macros M1/M2 pad. Its LED will pulse white, as will the LED ladder for the Bend Touch Strip. That indicates you're working with Macro 1. If you want to set up Macro 2, just touch the Wheel Touch Strip so its LED ladder pulses white. The Display will tell you which Macro you're editing, and the **Sound Edit** button will light dim white.

The Display will prompt you to choose a control and change it. You can just grab the appropriate knob or encoder and give it a tweak; it will immediately be assigned to one of the four modulation slots in the Macro.
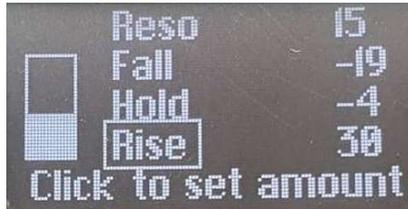
Macro Assign display for browsing modulation slots. The current slot is framed with a box.

Now set the amount of modulation you want the Macro to add. You can either click the **Preset/Edit** encoder to jump from the name of the current modulation to its amount, and tweak it that way, or simply use the knob or encoder on the front panel that controls that parameter.
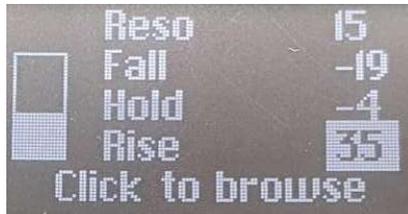
Macro Assign display for setting modulation amounts

Modulation amounts can be set from 0 to either -100 or +100. Remember, that is an offset to the stored value of the parameter.

> ℹ When you're working with Macros, it's a good idea to occasionally stop editing the Macros, turn them both down to 0, and then save your Preset. That way, you can always be sure that the Preset will be recalled just as you need it to be, and you will always have a "safe place" to come back to if your Macros get out of hand.

The Macro Assign page will not record button presses, so you can select which Osc, LFO, FX, etc., you want to work on. It won't record the movements of encoders that scroll through selections, such as **FX Type/Sub**. Even so, it's a good idea to make sure *which* control you want to add to a Macro, and how much, before you enter Macro Assign mode and set it up. Basically you're practicing what the modulation will do, before you add it to the Macro. (Practice makes perfect!)

To add a second modulation, just grab a second control. The Macro Assign Display will automatically add it. You can click the Preset/Edit encoder to jump back and forth between source and amount, and turn it to set the modulation amount or scroll between modulation slots.

13.3.1. Adding a modulation with no knob to a Macro

Some worthwhile modulations don't have front-panel control. You can still add them to a Macro! While in Macro Assign mode, scroll to an empty slot, then click the Preset/ Edit encoder. You'll be shown a Custom Assign menu, where you can select a variety of other modulation destinations. (This is the same list that appears when you Assign [p.65] modulations in the Matrix.)

13.3.2. Macro Assign to Mod Amounts

Using this feature, you can now assign the Macros to control modulation amounts in the matrix. This will help navigate modulation, and create more lively patches by dosing the amount of mod applied to the destination.

In order to assign a Macro to control a modulation amount, you will need to :

- Enter the Macro Assign Mode with one Empty Slot.

- Use the Matrix Encoder to browse modulation routings.

- Click the Matrix encoder to start the assignation.

- Click the Matrix or Preset encoder to enter the macro amount edition and set by how much the macro should control the amount of modulation applied.

13.3.3. Removing a Macro modulation slot

If you don't like a particular modulation and you just want to remove it entirely, scroll to it and then long-press the Preset/Edit encoder. The slot will be cleared.

13.3.4. Saving your Macro edits

Macro Assign mode has no special Save function. You can simply exit by touching the Macros M1/M2 pad again, or the Sound Edit button, and all of your changes will be saved automatically.

14. THE ARPEGGIATOR AND SEQUENCER

14.1. Common Features

The MiniFreak provides both a Sequencer mode as well as an Arpeggiator mode which offer shared features, let's take a look at them :

14.1.1. Transports

You can find them on the left side of your unit's touch buttons.

These control the playback of the Arp and Seq according to internal tempo.

14.1.2. Tempo

The **Tempo** Encoder allows you to set the internal tempo of the MiniFreak, if no clock is provided.

The range of the supported tempos are from 30 BPM to 240 BPM.

> ℹ When using an external clock source, do note that the tempo cannot be edited.

The MiniFreak stores the tempo on a per preset basis so recalling a Seq or Arp to the original tempo is super easy !

14.1.3. Time Division

You can set the time division of the Sequencer or Arp playback using the Tempo/Swing encoder. To activate Time division, click the encoder and set the desired value.

Those are as follows :

- 1/2D
- 1/2
- 1/4D
- 1/4
- 1/8D
- 1/4T
- 1/8
- 1/16D
- 1/8T
- 1/16
- 1/32D
- 1/16T
- 1/32
- 1/32T

> ℹ Tip, to quickly navigate between the same time signature, pick a Dotted, Binary or Triplet value like 1/2 and maintain the **Tempo** encoder pressed while browsing through the values, this will only show divisions with the same time signature.

14.1.4. Swing

The MiniFreak also provides Swing on both the Arp and Seq modes, you can set it using Shift + **Tempo** from 50% (no swing) to 75%. This only affects playback; it does not alter the location of the original notes.

14.1.5. Metronome

To use the metronome you can either enable it from the **Utility > Sync > Metronome**. Or use Shift + click the **Tempo** encoder to activate it. To set the metronome level use the utility menu.

14.1.6. Hold

The **Hold** function can allow you to have the Seq transpose or Arp content to keep playing after releasing the keys. This can be activated with either the **Hold** button on the panel or using a sustain pedal connected to the corresponding pedal input.

In Seq Mode :

Hold in Seq mode works as a transpose hold feature, it will keep the sequence transposed for as long as hold is enabled.

In Arp Mode :

- Releasing a key doesn't remove the note from the held notes.
- If all keys are released, pressing a new note will retrigger the Arp on this note or chord.
- Disabling Hold clears all notes.

14.1.7. Gate

The Gate parameter controls the duration of all steps. The range is 1% up to 99% of the Time Div setting.

14.1.8. Spice and Dice

Spice and Dice is an already classic feature from the MiniFreak's little brother, the MicroFreak. The aim of this feature is to generate a variation that will be applied on the arpeggiator and sequencer going from "simple arp pattern with a trig on every step with same gate length" to a "random sequence that gets modified with Spice".

Spice is the global amount that gets applied at the end.

Dice is like throwing dices on the affected parameters playback. It generates a new random sequence whenever activated, that said, it is only applied on the playback data, so it is not destructive for the sequence or arp being played. You can gradually transform the sequence or arp by applying more or less Spice.

The effected parameters are :

- Velocity
- Octave (+/- 1 octave)
- Gate length
- Step On/Off
- Envelope Decay & Release time

The **Spice** sequence has the same length as the playing pattern. In Seq mode, the Seq Length, while in Arp mode, the number of notes pressed combined to the octave setting.

14.2. The Arpeggiator

An arpeggiator breaks chords into individual notes played in succession. On the MiniFreak the concept of Arps has also seen a few expansions and performance tools to provide easy manipulation and variations of playback and mutations.

To activate the Arpeggiator press the Arp button.

Arp and Seq buttons

14.2.1. Arp Modes

From there you can pick a playback mode for the arp from standard to more probabilistic using the capacitive buttons 1 through 8 which are implemented as follows :

The Arp Modes buttons

- **Up** : Lowest to Highest Note
- **Down** : Highest to Lowest Note
- **UpDown** : Lowest to Highest then Highest to Lowest Note
- **Random** : Uniform random pick
- **Order** : First to Last Note pressed
- **Walk** : First to Last, starts on 1st note, 25% chance to play the previous or current one, 50% chance to play the next one.
- **Poly** : Plays all held notes simultaneously. This will pulsate a chord.
- **Pattern** : Notes that are pressed legato are used to generate a X step note sequence.
    - The sequence can pick notes within the available octaves as defined by the Octave parameter.
    - Every time a new note is pressed, a new random array of notes is generated.
    - The lowest note you play on the keyboard will appear twice as often in the sequence. In other words, the root note of the chord is emphasized.
    - The length of the Pattern is defined by using Last Step and the step buttons.

14.2.2. Octave Range

The MiniFreak allows you to decide on the range of the currently played Arp between one and four octaves, using the Octave buttons.

The Octave buttons

When you hold notes that span more than an octave, the overall range of an arpeggio can be much greater.

14.2.3. Arp Modifiers

The MiniFreak extents the regular Arpeggiator concept to provide a more organic and fun way to interact with the arp content using a modifier section which you can find at the far right of the arp modes capacitive touch buttons, including Repeat, Ratchets, Random Octave and Mutate. Let's take a look to the following and their specificity :

The Arp Modifiers

- Repeat : Repeats the content of the arp playing each note twice in a row.
- Ratchets : Doubles the triggers while pressed.
- Rand Oct : Adds random octave variations.

  - 75% chance to play the correct octave
  - 15% chance to play 1 octave higher
  - 7% to play 1 octave lower
  - 3% to play 2 octaves higher

  Note that this is an ON/OFF button unlike the others which are momentary.

- Mutate : Gradually changes the notes in the pattern, evolving from the current pattern. Each note can be transformed with one of the following transformations :

  - 75% chance to keep the same note
  - 5% chance to play a fifth above
  - 5% fourth below
  - 5% octave above
  - 5% octave below
  - 3% chance to permutate with the note right after
  - 2% chance to permutate with the second note right after

Note that the mutations are cumulative so once a note has been mutated the following mutation will apply to the mutated version. Also, to reset a mutation on a note, the key must be released and trigged again (and won't reset the mutation for the other notes).

14.2.4. Copy Arp to Sequencer

The Arpeggiator is a fun and creative way to come up with new ideas for melodies and the MiniFreak allows you to expand on that by transferring the Arp content to the sequencer to tailor it further to your liking or recall it on a later occasion.

To do so, long Press the **Record** button while in Arp mode to clear the Sequence and replace it with the current content of the Arp. Note that you need to have notes currently playing on the Arp mode to be able to use this feature.

14.3. Sequencer

Such a powerful polyphonic synthesizer as the MiniFreak would not be truly complete without an equally capable sequencer allowing you to integrate the Freak in a live setting as well as facilitate its operation in larger setups. Running from either internal or external clock the sequencer offers many possibilities to push your MiniFreak into new territories.

The MiniFreak can store one sequence per preset in which the tempo, time division, swing, as well as Gate and Spice are also saved.

In **Stop Mode** the sequencer can also be used and here's a few things to note :

- Pressing a key will start the seq and transpose it to the key.
- Play button blinks.
- Pressing another key will change the transposition.
- Releasing all keys will stop the playback.
- If pressing Play button while it blinks, it will light solid and you can let the keys go.

Now let's take a look to the Sequencer in **Play mode**.

To activate the sequencer press the **Seq** button in the mode section :
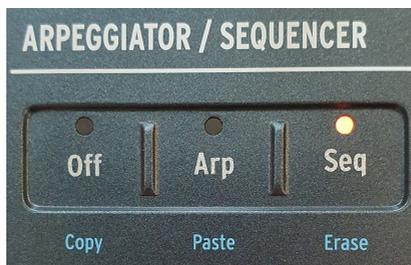
Arp and Seq buttons

Once the Seq is in Play mode, using Shift + Key will transpose the pattern to the key. The transposition is however not saved within the preset.

14.3.1. Setting a Sequence Length

The Sequences on the MiniFreak are up to 64 steps long. To set a sequence length hold the **Last Step** button and press either a page or a specific step within the page to set the exact length of the sequence. The currently selected page of the sequence will be lit in red, while the active pages in the sequence's length are dim white. Finally the currently playing Page is blinking in sync to the tempo.

Now that we have seen how to activate and set the length of a sequence, let's dive into the different recording modes to create, populate, alter then save a Seq on the MiniFreak.

14.3.2. Step Recording

Step recording allows you to enter notes from the MiniFreak's own keybed, or any external keyboard to the sequencer in a step-by-step manner, suited for more precise control over the steps content and modification of existing patterns.

When the sequencer mode is engaged and the MiniFreak is in stop mode you can enter step-record mode by pressing the record button (like shown below).

Step Recording display

When Step recording, the display shows:

- the step index
- the sequence length
- the step status (On / Off)
- the notes within the step
- the notes' length (L)
- the notes' velocity (V)

> When notes' length or velocity are different, the display will show the minimum and the maximum only.

As shown above, the Sequencer will be placed on step one and you may begin:

- Enter one or multiple notes (up to 6) for the data to be stored within the step.
- Release all of pressed keys and the sequencer will move to the next step.
- Repeat the operation until you have entered notes for all desired steps.

To create a silent step press the **Hold/Tie** button. The sequencer will then move to the next step without recording note data. If the step previously had note information stored, pressing Hold/Tie will clear its content regardless of whether Overdub is ON or OFF.

The **Hold/Tie** button also allows to extend Steps' length:

- Press Keys then press **Tie** N times: it will extend the currently pressed notes over N steps.
- Press **Tie** then press the same Keys N times: it will extend the notes over N steps.

You can then enter again the Step Recording mode to alter or add on to the sequence once recorded. If Overdub is ON the new notes will be added to the previous content, if Overdub is OFF the notes will replace the previous content of the step.

You can also jump to any step while in step recording mode by pressing the corresponding step in the grid.

14.3.3. Real-Time Recording

While step recording is requiring the unit to be in Stop mode, the Real-time recording mode will allow you to play the sequence manually while in Play mode, to populate the steps of the sequencer. While more immediate, this can also be a less precise way to record your sequences.

To enter Real-time recording, make sure that the unit is in Play mode with the sequencer activated and press **Record**. The unit will then be in record mode and any note pressed will be added to the grid, this mode will record Pitch, Note length and velocity for each note that is pressed.

Once your sequence is recorded, you can exit record mode and play it back.

14.3.4. Editing your sequence

Once your sequence has been recorded or programmed, you can still manually edit it.

Action wanted	To do	Results
Enable a step	Press an unlit step button	If the step was empty, the step is filled with a default C3 note
Disable a step	Press a lit step button	The step is muted. Pressing it again will recover its previous content
Page navigation	Press a Page button	Page is selected and its steps are accessible on the step buttons
Extend sequence	Press Shift + Page button	Copies the current sequence until the last step of the selected page

Action wanted	To do	Results
Copy / Paste / Erase a step	Hold Off/Seq/Arp button, then select one or multiple steps	Copies / Pastes / Erases the selected steps
Copy / Paste / Erase a page	Hold Off/Seq/Arp button, and press one of the Page buttons	Copies / Pastes / Erases the selected page

14.3.5. Editing individual steps

Edition is only available when the sequencer is in Step Recording mode or in Quick Edit mode (when holding down a step).

The screen should display such images:

Step Recording display

Here is a table summarizing the different editing options:

Action wanted	To do	Results
Browse Step (in Step Recording)	Press and hold a step	The cursor jumps to this step (only in Step Record)
Select Note	Turn the Preset Encoder	The Note Selection will cycle through the Notes from lowest to highest
Erase Note	Long click the Preset Encoder	Whichever note is selected gets removed from the step
Erase Step	With no Notes selected on the current step long click the Preset Encoder	The step is turned off and all notes are erased
Edit one Note Length	With one note selected on the current step Touch the first slider to edit the note length	Changes the length of the selected notes while leaving the other notes of the step untouched. Does not erase steps beyond the current step
Edit one Note Velocity	Select a Note on the current step, and touch the second slider	Changes the Velocity of the currently selected Note
Offset all notes Length/ Velocity in a Step	With no Note selected on the current step, touch one of the sliders	Offsets Velocity or Length for all notes in the currently selected step

14.3.6. Overdub

While in Step or Real-time recording the **Overdub** feature conditions the way the notes are added or replace the content already present in the steps.

To activate this feature press Shift + **Rec** the **Rec** LED will turn blue.

Overdub OFF (default state):

Rec LED is lit in red

- Steps are cleared only in area where new notes are played.
- Any note that begins while a note is being recorded gets killed.

Overdub ON :

Rec LED is lit in blue

- Notes are added to the existing content. If a note that is being recorded overlaps another active step that triggers the same note, it will clear this previously active note.
- A same note can't be entered twice. It will override data content (velo, note length,..) with the last trig properties.

14.4. Modulation sequence lanes

On top of Pitch, Note length and Velocity sequencing, the MiniFreak also offers four lanes of Parameter sequencing. To access the modulation sequencing lanes, press the **Mods** button next to **Record**.

Mods button

14.4.1. Add a Modulation

To add a modulation make sure to :

- Enter Mods view by pressing the Mods button

- Enable step record, or real-time recording

- Move one of the Seq Mod-recordable parameters.

Once done the parameter in question will be added to the Mod destinations list.

If you have already 4 modulation destinations set in the patch adding a new modulation destination will show the « Seq Mod Full » message.

14.4.2. Step-Record a Modulation

When the sequencer is stopped and the **Rec** button is lit, the unit is, as explained above in step-record mode. Either there is an available Seq Mod Slot or you turn a parameter that was already part of the four Modulations. From there while in step-record mode turn one of Seq Mod recordable parameters.

This will create an offset to the given step, The range of the offset depends on the parameter's initial position. If the parameter is at x (between 0 and 1), the range is (-x, (1-x)).

The parameter's initial position remains the reference point for as long as you are recording some modulations onto steps. It is not modified by the modulation editing.

Example : knob at 0.5, step record on, turn the knob fully clockwise on step 1 then move to step 2 turn the knob to the center. First step will have +50%, second step will have 0% in the modulation.

The Knob catch-up mode doesn't apply here, the offset between parameter initial position and current physical knob position is stored in the step. Once Step-Recording is exited, the parameter jumps back to the preset value.

14.4.3. Real-Time Record a Modulation

While in Real-Time record mode (Play On, Rec On, Mods On), you can turn encoders, potentiometers or wheels. It will record that parameter's movement and populate the data into the mod sequencing lane corresponding to that parameter.

Recording will occur from the first step where a movement was recorded until it reaches the step just before this one (it always does one full loop) Once the loop is finished, the Record button turns off, it exits Real-Time Recording.

14.4.4. Editing your Modulation

Once you enter the mod sequencer you can see all 4 lanes with the names according to their destinations. To edit a modulation on a specific step, select a lane using the Preset encoder. The display will show the modulation value for all 16 steps from the currently selected page. Hold down the step to edit, it will be highlighted on the display. Then either turn the control on the interface, or use the Preset encoder to edit its value.

Once you have edited the step click on the encoder again to get back to browsing the destinations.

When recording, the transitions are smoothed by default. You'll find a setting per modulation lane in Sound Edit > Seq to enable or disable the smoothing for all steps

Here is a table summarizing all the editing options available:

Action wanted	To do	Results
Mute steps	Press a lit step	Modulation playback will ignore this step
Unmute steps	Press an unlit step	If there was an active modulation in this step, it will be playback
Browse steps	With Step record ON, Press a different step	It will move the cursor.
Copy / Paste / Erase modulation on a step	With Mod On, hold the Off/Seq/Arp button, then one or multiple steps.	Copies / Pastes / Erases Modulation steps on the selected modulation lane
Copy / Paste / Erase modulation on pages	With Mods On, hold the Off/Arp/Seq button and press one of the Page buttons	Copies / Pastes / Erases on pages. Applies only to Modulations on the selected lane
Erase modulation track	Long click the Preset/Edit encoder while in Mods Page	Currently focused modulation will be reset

14.4.5. List of the Seq Mod Recordable Parameters :

Recordable parameter's name
Glide
Pitch X
Oscillator X Type
Oscillator X Wave
Oscillator X Timbre
Oscillator X Shape
Oscillator X Volume
Filter Cutoff
Filter Resonance
Filter Env Amt
FX X Time
FX X Intensity
FX X Amount
Envelope Attack
Envelope Decay
Envelope Sustain
Envelope Release
CycEnv Rise / Attack
CycEnv Fall / Decay
CycEnv Sustain
LFO Rate
Macro 1
Macro 2
Pitch Bend
Mod Wheel

15. THE UTILITY MENU

With everything that's going on inside the MiniFreak – especially with so many functions and settings that can be customized for every Preset – it's handy to have a central place to find things that are intended to be *global*, applying to the entire synthesizer. That's what the **Utility** menu is for!

15.1. Control and navigation

To access the Utility menu, Shift-press the **Sound Edit/Utility** button. It will light up pale blue to show that you're in Utility, not Sound Edit (which has a white LED).

Navigation uses the same workflow as with the Sound Edit menu and other similar menus in the MiniFreak, and only requires the **Preset/Edit/Filters** encoder next to the Display.

- Turn the encoder to scroll to the Utility menu you want to access, then click the encoder to select it;

- Turn the encoder to scroll through the menu to the function you want to edit, and click the encoder to access it;

- Turn the encoder to set the function as you want it, then click the encoder to save the selection and jump up to the menu.

> ℹ At the top of every menu there is a choice labeled with a ... symbol. Click-select it to jump up to the previous menu. (This function works the same way, everywhere the ... appears.)

When you're finished, just click the Utility button to exit.

15.2. The Utility menus

In this manual, we refer to functions in the Utility menus with arrows to show where they're found:

For example, **Utility > Sync > Metronome**

Here are the Utility menus:

- **MIDI**
- **Sync**
- **Audio**
- **Controls**
- **Global Scale**
- **Preset Operations**
- **Misc**

We'll now list the parameters in each menu, with a quick description and a link to the relevant section of this manual for more details.

15.2.1. Utility > MIDI

- **Input and Output Channels**: sets the MIDI Channels the MiniFreak will respond to and transmit.

- **MIDI From and MIDI To**: sets whether incoming and outgoing data use USB, 5-Pin MIDI DIN jacks, or both.

- **Local Control**: sets whether or not the MiniFreak responds to its own keyboard and user interface or only to external MIDI messages.

- **MIDI Seq/Synth**: determines routing of keyboard data vs. external MIDI data for the Arpeggiator/Sequencer vs. the MiniFreak's synth engine.

- **Knob Send CC**: sets whether or not the MiniFreak's front panel knobs send MIDI Control Change data.

- **Program Change**: sets whether or not the MiniFreak sends and receives Program Change messages via MIDI when you select a new Preset.

Further information about all of these settings can be found in the Chapter on MIDI and External Control [p.112].

15.2.2. Utility > Sync

- **Metronome**: turns the Metronome on and off. Can also be activated using **Shift + Click** on the **Tempo** knob.

- **Rec Count-In**: sets whether recording begins immediately, or after a 1-bar count-in.

- **Metronome Level**: sets the loudness of the Metronome click.

- **Clock Source**: determines the source of clock sync data, whether internal or via USB, MIDI, or the rear-panel Clock In jack – or a prioritized auto-sensing routine.

- **Clock Send**: sets whether or not the MiniFreak sends out clock signals.

- **Transport Receive**: sets whether or not the MiniFreak accepts external transport control.

- **Transport Send**: sets whether or not the MiniFreak sends out transport control.

- **Clock In and Clock Out Type**: determines the number of pulses per quarter note (PPQ) the Clock In and Clock Out jacks receive and send.

- **Global Tempo**: determines whether a Preset change also changes the Tempo to the new Preset's value, retains a global value, or changes when the transport is stopped.

Further information about all of these settings can be found in the Chapters on the Arpeggiator and Sequencer [p.94] and External Control [p.112].

15.2.3. Utility > Audio

- **Audio In Gain**: sets the input gain of the rear-panel Audio In jack, from -9 dB to +24 dB.

- **Audio In Mode**: The Utility/Audio/Input menu now features a mode selection allowing you to switch easily between Line and Microphone Modes.

The Microphone Mode works with any Dynamic Microphone connected to the Input at the back. It provides the extra gain required for these microphones.

> **i** Note that Condenser Microphone are not supported as the MiniFreak's Input does not offer Phantom Power.

- **Master Tune**: adjusts the MiniFreak's tuning by up to ±50 cents.

- **Stereo to Mono**: changes the Left and right + headphones outputs to be Mono.

- **Calib Cutoff**: calibrates the cutoff frequencies of the Analog Filter for each of the MiniFreak's voices.

- **Calib Analog**: calibrates the analog audio path components for each of the MiniFreak's voices.

The calibration process will show a progress bar as it proceeds; while it's running, the MiniFreak can't be played, sequenced, or edited. When it's done, you'll be shown a "calibration successful" message, and clicking the Preset/Edit/Filters encoder will exit the menu.

The process can't be stopped once started, but it takes less than a minute (cutoff) to two minutes (Analog) to complete.

15.2.4. Utility > Controls

- **Velocity and Aftertouch Curves**: set velocity and aftertouch response to linear, logarithmic, or exponential curves. Discussed further in the Keyboard Functions [p.85] chapter.

- **Knob Catch**: determines how a parameter will react if its stored value doesn't match the physical setting of an analog knob, and the knob is turned. Options include:

    - **Jump**: As soon as the physical knob is turned, the stored parameter value instantly jumps to where the physical knob is set.
    - **Hook**: The parameter value doesn't change until the physical knob is turned past the stored value.
    - **Scale**: When the physical knob is turned, the parameter goes from the stored value to the physical knob position in such a way that the parameter smoothly "catches up" to the knob.

- **Sustain Polarity**: used to set the Sustain Jack to respond to a pedal with a normally-open or normally-closed switch.

- **AT Start Sens and AT End Sens**: sets the sensitivity of how quickly the aftertouch sensor under the keyboard begins to send aftertouch data, and how quickly the keyboard pressure reaches maximum aftertouch value.

- **Touch Button Sens**: Provides three level of sensitivity for the touch buttons (to the exception of the touch wheels) allowing you to adjust the touch response to your liking.

15.2.5. Utility > Global Scale

- **Global Scale and Global Root**: set the Scale and Root [p.88] for any Preset that doesn't have its own stored Scale and Root.

15.2.6. Utility > Preset Operations

- **Preset Copy**: allows the user to copy parts of a Preset.

- **Preset Paste**: pastes copied data into a new Preset.

- **Preset Erase**: erases or initializes parts of Presets or entire Presets.

- **Panel Mode**: allows to switch between Favorite and Panel modes.

The detailed description of these functions can be found in the Managing Presets [p.21] chapter.

15.2.7. Utility > Misc

- **LED Intensity**: sets the LEDs on the front panel to Full or Dim level.

- **FW Version**: displays the current firmware version.

- **Reset Settings**: Resets all settings to their default values. Note that it doesn't erase your presets.

15.2.8. Your Name in lights!

There's one last item on the Utility Menu, but it's not a menu itself: it's a function called **Your Name**.

You can personalize your MiniFreak, which will label any patches you create with your name as "Sound Designer"... and give you a personalized "hello" when you power it up.

Setting your name is just like setting a Preset name. Click the Preset encoder to enter the Sound Designer name display.

The currently edited character will have small arrows above and below it.

Turn the encoder to change that character. Available characters are:

- space
- A to Z, capitalized
- a to z, lower case
- O to 9
- punctuation marks: period (.), underscore (_), hyphen (-)

To move to the next character, push and turn the encoder.

Sound Designer names can be up to 13 characters long.

When you've given yourself a grand and impressive title, just click the Utility button twice to save it... then turn your MiniFreak off and on again, just to see it greet you for the first time!

16. EXTERNAL CONTROL: MIDI AND CLOCK SIGNALS

As much fun as the MiniFreak is to use on its own, it's amazing as part of a larger musical world. In this chapter, we'll look at the ways in which the MiniFreak sends and receives various kinds of data for use with other hardware synthesizers, sequencers, and computers.

As noted in the Setup and Installation [p.7] chapter, the MiniFreak has three different types of rear-panel connections for control signals:

- Clock In, Clock Out (3.5mm TRS jack)
- Reset Out (3.5mm TS jack)
- MIDI In, Out, and Thru (5-pin DIN)
- USB (Type B)

16.1. Sync Signals

Synchronization (or *sync*) is the act of making two or more devices respond together to a common clock reference.

The Clock In and Clock Out jacks look for +5V pulses occurring at a certain resolution, which is measured in *pulses per quarter note* (PPQ). There are many different PPQ settings, and the MiniFreak accommodates all of the most popular ones.

> ⓘ Consult the Owner's Manuals for your other gear to determine which resolution they're expecting.

16.1.1. Clock and Reset jack settings

The **Utility > Sync** menu [p.108] is where these settings can be found. They offer the following options:

- **Clock In Type**: The default is 4PPQ (one pulse per 16th note), but can also be set to 2PPQ, 24PPQ, or 48PPQ.

- **Clock Out Type**: The default is 4PPQ, and other options include 2PPQ (specifically designed for Korg devices with a short pulse), 24PPQ, and 48PPQ as above. In addition, the Clock Out can send much slower signals, which can be used to clock an LFO or regularly reset a sequencer or timer: one pulse per quarter note (1PPQ), half note (1PP2Q), or whole note (1PP4Q).

> ⓘ The higher PPQ numbers allow for a pulse to represent an ever-smaller note value. At 24PPQ, the smallest note that can be resolved (one pulse) is 1/24 of a quarter note, or a 32nd-note dotted.

The Reset Out jack sends a +5V pulse that lasts 5 ms when the **Arp/Seq** starts, whether it comes from internal play or external start. This can be used to make sure the MiniFreak's Arpeggiator and Sequencer [p.94] stay in control of other devices when synchronizing sequences.

16.2. MIDI

The MiniFreak has an extensive set of MIDI capabilities, allowing it to synchronize, control, and be controlled by a wide variety of MIDI-compatible gear. MIDI data can be sent and received via the 5-pin DIN MIDI jacks or via the USB connection.

> Many of the global settings relating to how the MiniFreak handles MIDI are set up in the **Utility > MIDI** menu [p.108]. We'll note them as we go along.

16.2.1. MIDI inputs and outputs

The MiniFreak uses both DIN jacks and USB for MIDI communication. While the USB port can do things that the DIN connections can't such as bi-lateral communication from a single cable. That said, the vast majority of MIDI features work the same way on both.

> On the **Utility > MIDI** menu, the **MIDI From** and **MIDI To** settings control whether the MiniFreak accepts and transmits MIDI data via the USB port, the 5-Pin DIN jacks, or both... or neither, if you wish to isolate the MiniFreak from your MIDI network temporarily.

16.2.2. MIDI Channels

A single stream of MIDI data can contain 16 separate *MIDI Channels*. Each Channel controls only the devices that are set to receive data on that Channel, unless that device is set to *Omni* mode, in which case it accepts data from any and all channels equally.

> On the **Utility > MIDI** menu, the **Input Channel** and **Output Channel** can be set from 1-16. The Input and Output Channels do not need to be identical. In addition, the Input Channel can be set to All (for Omni mode).

16.2.3. MIDI Local Control and data routing

The MiniFreak's keyboard can be used to play the synthesizer or other synths connected via MIDI. The same is true for the Sequencer. However, sometimes you might want to defeat those connections, so you can decide (for example) to use the keyboard to play an external device but not the MiniFreak.

MIDI allows for this with a setting called *Local Control*. In simple terms, Local Control turns the connection between the keys and the sound engine on and off. That's what the **Local Control** setting on the **Utility > MIDI** menu does.

However, with everything going on inside the MiniFreak, it's handy to have a bit more precise control than that. So the **Utility > MIDI** menu also has a parameter called **MIDI Seq/Synth**, which controls exactly how internal and external MIDI data are routed to and from the keyboard, synthesizer, and Arpeggiator/Sequencer. There are two options:

- **MIDI > Synth**: External MIDI is routed directly to the synthesizer;
- **MIDI > ArpSeq**: External MIDI is routed directly to the Arpeggiator/Sequencer.

Between Local Control On/Off and the two MIDI Seq/Synth options for each, the MiniFreak can be set up to handle MIDI data connections in four different configurations:

Local Control On, MIDI > Synth

1. With Local Control ON and MIDI > Synth selected, the keyboard controls the Arp/Seq and both together control the synth. Keyboard and Arp/Seq data are also sent out via MIDI, and MIDI input can control the synth as well. This is the default setup.

Local Control Off, MIDI > Synth

2. With Local Control OFF and MIDI > Synth selected, the connection between the Arp/Seq and synth is removed. Now the synth is only played by external MIDI input, while the keyboard and Arp/Seq are used to control external gear.

Local Control On, MIDI > ArpSeq

3. With Local Control ON and MIDI > ArpSeq selected, the keyboard still controls the Arp/Seq and both together control the synth. However, now MIDI input controls not only the synth but also the Arp/Seq as well. For example, you could use this to automate sequence transpositions from a DAW.

Local Control Off, MIDI > ArpSeq

4. With Local Control OFF and MIDI > ArpSeq selected, the keyboard only sends MIDI out, and the Arp/Seq and synth only receive external MIDI data. This splits the MiniFreak into a silent MIDI controller keyboard and a sequencer/synth module run via MIDI input.

16.2.4. MIDI Program Change

The MiniFreak's 512 Presets are organized, in MIDI terminology, into four Banks of 128 Programs each. They can be selected externally by sending the MiniFreak an appropriate MIDI *Bank Select* message, immediately followed by a MIDI *Program Change* message.

For example, Preset 242 is selected by Bank Select = 2 and Program Change = 114. The first Bank covers Presets 1-128, and we add 114 to 128 to get 242.

Your external DAW or other gear will have ways to figure these numbers for you, so you don't have to do the math every time!

On the **Utility > MIDI** menu, **Program Change** sets whether or not the MiniFreak sends MIDI Bank Select and Program Change messages when you select a new Preset.

16.2.5. MIDI Control Change Messages

MIDI *Control Change* (CC) messages are used to "turn knobs" over MIDI. Physical controls are associated with specific MIDI CCs, and touching those controls will send a message that first identifies which CC it is, and then what the parameter value is.

Here is the MIDI implementation chart:

Section	Parameter	CC
MIDI	Mod Wheel	1
Pedals	Sustain	64
	Glide	5
OSC 1	Tune	70
	Wave	14
	Timbre	15
	Shape	16
	Volume	17
OSC 2	Tune	73
	Wave	18
	Timbre	19
	Shape	20
	Volume	21
Analog Filter	Cutoff	74
	Resonance	71
	VCF Env Amt	24
	Velocity Env Mod	94
Cycling Env	Rise Shape	68
	Rise	76
	Fall	77
	Hold	78
	Fall Shape	69
Envelope	Attack	80
	Decay	81
	Sustain	82
	Release	83

Section	Parameter	CC
LFO 1	Rate	85
LFO 2	Rate	87
Effects	FX1 Time	22
	FX1 Intensity	23
	FX1 Amount	25
	FX2 Time	26
	FX2 Intensity	27
	FX2 Amount	28
	FX3 Time	29
	FX3 Intensity	30
	FX3 Amount	31
Sequencer	Gate	115
	Spice	116
Macros	M1	117
	M2	118

The Wheel Touch Strip, the Sustain pedal, and most of the front-panel knobs send unique CC messages. These can be recorded into a sequencer or DAW, and replayed to automate control movements on the MiniFreak.

On the **Utility > MIDI** menu, **Knob Send CC** sets whether or not the MiniFreak's front panel knobs send MIDI Control Change data when they're turned.

Incoming Control Change messages are always accepted, unless the MiniFreak is currently in communication with the MiniFreak V software.

16.3. USB

In terms of MIDI commands, the USB port works the same way as a pair of MIDI cables, sending and receiving MIDI messages from a connected computer. In addition, the USB connection also allows for high-speed communication between the MiniFreak and connected MiniFreak V software. All MIDI commands and settings will work the same way as with Midi Din over USB.

17. DECLARATION OF CONFORMITY

17.1. FCC

WARNING: DO NOT MODIFY THE UNIT!

Any modifications or other changes to this unit not approved by the party responsible for compliance could void the user's authority to operate this equipment.

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

Responsible Party in USA: Zedra, 185 Alewife Brook Parkway, #21O, Cambridge, MA O2138, United States T: +1 857 285 5953

Trade Name: ARTURIA, Model Number: MiniFreak

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

17.2. CANADA

This class B digital apparatus complies with Canadian ICES-OO3.

Cet appareil numérique de la classe B est conforme à la norme NMB-OO3 du Canada

17.3. CE

This device has been tested and found to comply with the limits of the European Council Directive on the approximation of the laws of the member states relating to Electromagnetic Compatibility according to 2O14/3O/EU, and Low Voltage Directive 2O14/35/EU.

17.4. ROHS

This device has been produced with lead free solder and fulfills the requirements of the ROHS directive 2O11/65/EU.

17.5. WEEE

This symbol indicates that the electrical and electronic equipment should not be disposed of as general household waste at its end-of-life. Instead, the products should be handed over to the applicable collection points for the recycling of electrical and electronic equipment for proper treatment, recovery, and recycling in accordance with your national legislation and the Directive 2012/19/EU (WEEE – Directive on Waste Electrical and Electronic Equipment). For more information about collection points and recycling of these products, please contact your local municipal office, your household waste disposal service, or the shop where you purchased the product.