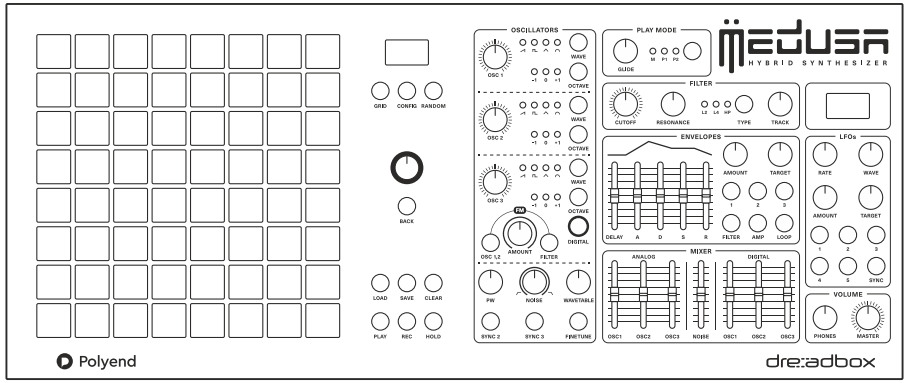
polyend.com dreadbox-fx.com

Made in EU

Polyend | dre::adbox

Medusa

Hybrid Synthesizer
User Manual



Polyend | dre::adbox

Contents

Introduction

The Medusa Hybrid Synthesizer is a fruit of a collaboration between Dreadbox and Polyend companies. It has emerged from both teams unusual approach to integrating analog and digital domains into a new quality. The innovative way of connecting a classic synthesis character with the digital versatility and unique musical controller brings out the best of these two worlds. Medusa is offering you a hybrid analog-digital sound engine, which you can use in monophonic or one of two polyphonic modes, and a Grid controller which can be used for performance or sequencing.

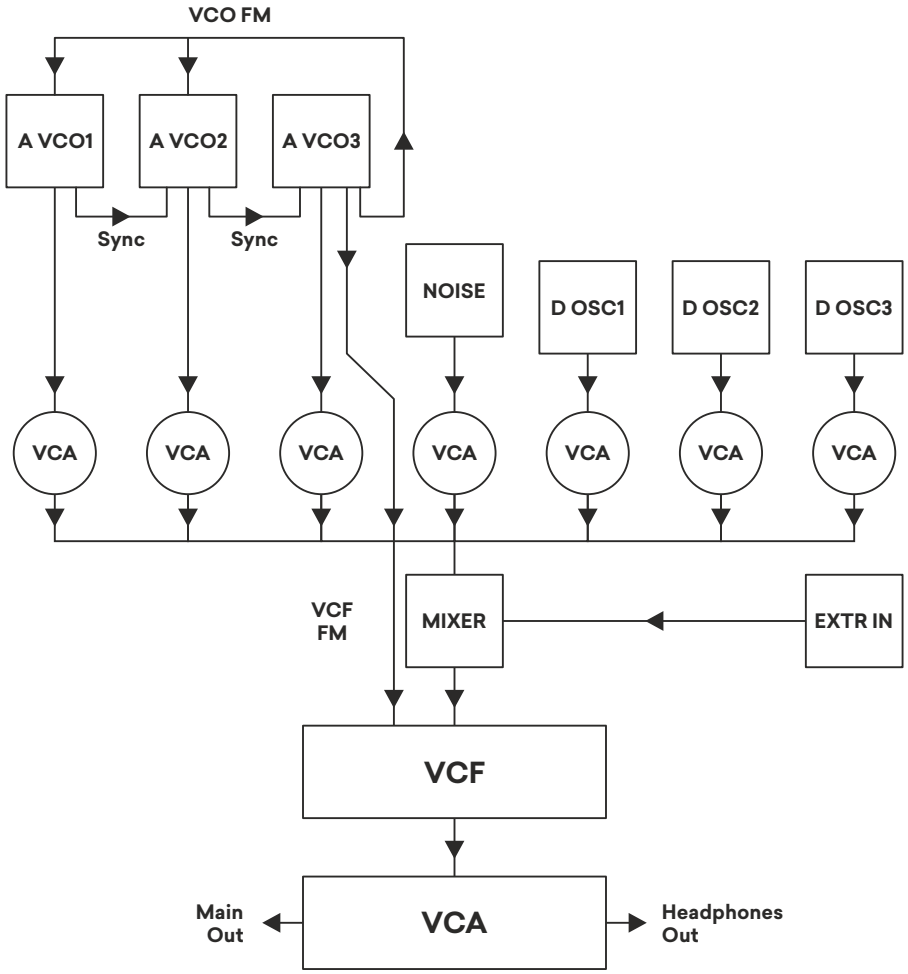
The Grid is what makes Medusa unique. It allows you to not only configure your own pad controller but also store more than a hundred parameter locks per pad. This gives you access to programming your own kits of sounds in a single preset, you can then manually trigger them or easily create complex sounding sequences.

All that analog and digital functionality is merged in a one clearly marked layout sealed in a sturdy tabletop aluminium chassis. Handily placed aluminium covered knobs, informative LED buttons for the comfort of use. The Grid low profile pads are made of specially designed silicone, so their immaculately matched density and firmness are providing an instant and precise response. It's all about innovation, revealing new quality and ideas in music. We hope it will encourage you for further exploration of your sonic activities.

The Medusa has a hybrid 3+3 structure coupling the sound of analog with the control of digital: three voltage-controlled analog and three digital wavetable type oscillators with a total of six voices. There's also an additional noise source as well, with adjustable colour. The synthesizer is equipped with:

- A multimode analog filter with 2-pole LP, 4-pole LP, and 1-pole HP settings.
- A unique Grid controller - 8 x 8 grid of side-to-side (X), up-and-down (Y), and pressure sensitive (Z) pads used to play the synthesizer and program the 64-step sequencer, which can be used as a classic keyboard but also allows you to configure it up to your needs almost without limits.
- 3 play modes including: 1-voice, unison mono (up to 6 oscillators), 3-voice (2 oscillators per voice), and 6-voice (1 oscillator per voice).
- 5 loop-able envelopes (3 assignable) and 5 LFOs (all assignable).
- 2 OLED displays providing visual feedback on knob and slider settings; envelopes and LFOs; and menu and configuration settings.
- Ability to save up to 128 programs and sequences.

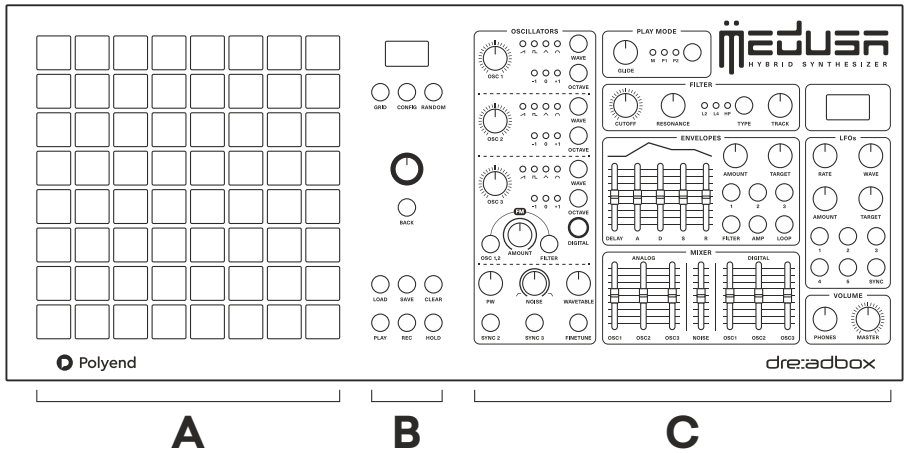
Please visit polyend.com website from time to time in order to make sure that you have access the latest firmware.



Schematic diagram

Overview

Basically the Medusa can be split into three main sections for working with the synthesizer and the Grid controller.



- **Section A**

The Grid performance pads – the 8 x 8 grid of buttons that can be used to play the synth, program the sequencer, and select storage locations for Grid data and Medusa programs. Unlike conventional keyboard synths, the use of the Grid allows you to lock parameters and musical scales to steps in the sequencer, and then also to use elaborate scale mappings and expression options to put sounds beneath your fingertips. The Grid and one-press modulation and envelope assignment make the Medusa a portal to sound design, composition, and performance.

- **Section B**

That section of the Medusa is used to program, play, and edit the sequencer as well as to configure various settings for the sequencer and the synth. The screen at the top of this section (referred to as the seq screen in this manual) displays the assorted menu choices for configuring the sequencer and synth.

- **Section C**

This section of the Medusa is used to program the various parameters and settings for the synth engine. The screen in this section (referred to as the synth screen in this manual) displays various information about patch settings (including knob and slider values) while they are being changed or edited. As for modulation, there are two fixed envelopes (filter and amplitude), plus three easily assignable envelopes. You also get five assignable LFOs. The concept was to mix analog with digital and noise in different combinations, which you can layer as monophonic lines or chords, or trigger in turn, with always-accessible mixer controls for each voices.

You can clearly see that the workflow fits spatially. On your left, the Grid which can be configured for sequencing and performance. You can also use its sequencer as a kind of sketchpad for ideas, since all the sequences and modulations are saved into presets. On your right, you can sculpt sounds and make on-the-fly assignments of LFOs and envelopes with just one press. Mix oscillators and shape envelopes, then dial modulation live atop that.

Medusa might be needy for some at first, and it surely takes some time to get into it. But as you start to feel comfortable with the sound engine, and adapt to our way of thinking about the Grid pads (as a performance controller and separate note and parameter sequencer), it starts to be amazingly rewarding. Once you get there, you'll gain access to a capable and sometimes wild (especially with the randomisation functions) instrument beneath your fingertips. We feel that the result of our collaboration is something that's really unique and creative. The combination of deep digital and analog sound engine combined with the superb Dreadbox filter. Additionally all its modulation, sequencing and performance possibilities makes the whole new sonic territory – something we hope you will want to learn how to practice and play. It's a suitable choice both for sound designers and instrumentalist.

Our goal was not to compete with great gear made by other manufacturers. We wanted the Medusa to be unlike any of the existing tools, both with its unique and expressive controller and its copious controls and access to sound. Our plan was to make some new field for synth innovation by merging all this functionality into a desktop form factor and give you a full digital control over it in order to bring you inspiration.

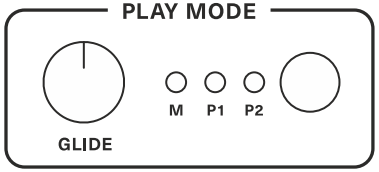
The Synthesizer

After toggling on, your Medusa unit will welcome you with an initial auto-calibration process, the pads will pulse and there will be a progress bar visible on the top of the middle screen. If for any reason you feel that the initial calibration takes too much time, you can break it with a press of the ENV1 button.

The synth engine is versatile, the Polyend digital oscillators stack give you metallic edge and a sonic wavetable enhancement on top of a thick 3-oscillator analog sound. The copious modulation and multiple envelopes provide loads of sound design possibilities. Since basically everything is assignable to LFOs or envelopes, you can really go deep with this. Combining digital control and wavetables with Dreadbox supplied classic analog vibe make the Medusa as much an all-in-one tool as a polyphonic synthesizer.

1. Play modes and Voice Priority

The Medusa offers 3 different play modes:



M monophonic – this mode runs all 6 oscillators (3 analog and 3 digital) through the filter in one thick, mono voice.

P1 polyphonic one – this mode lets you play up to 3 voices, with 2 oscillators per voice (pairing A OSC1 with D OSC1 for voice 1, A OSC2 with D OSC2 for voice 2, etc)

P2 polyphonic two – this mode lets you play up to 6 voices, using 1 oscillator per voice, assigning oscillators to chordal voices in sequential order (the first 1st note in a chord will start with A OSC1 and continue to the 6th note using D OSC3).

The table below compares the different modes:

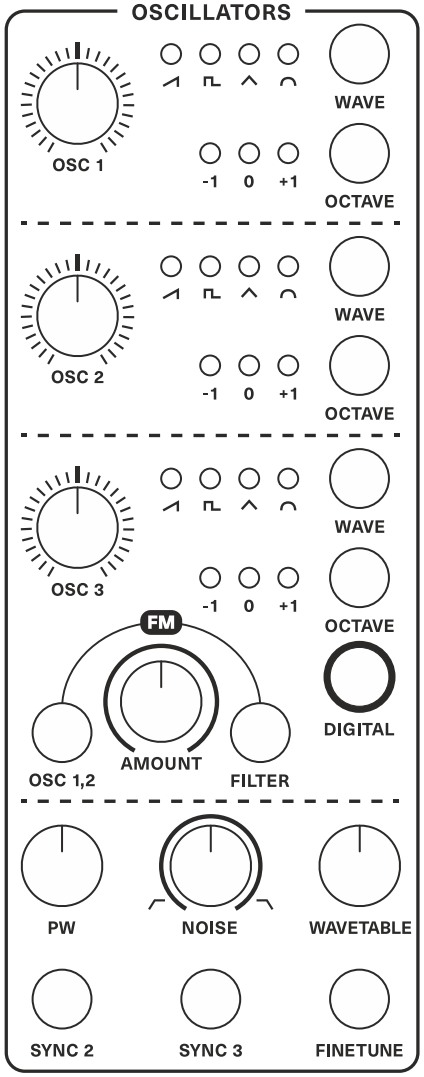
Mode	Voices	OSCs/Voice	Filter Config	Amp Config
M	1	6	1 shared filter and envelope	1 shared amp envelope
P1	3	2	1 shared filter and envelope for all voices	1 shared amp envelope
P2	6	1	1 shared filter and envelope for all voices	1 amp envelope per voice (6 total)

For both P1 and P2 modes you can also toggle the **Voice Priority** between **First** and **Next**. With the First setting whatever note is played will grab the first available A OSC, D OSC or pair of OSCs. If you play monophonically in P1 or P2 (one note at a time), it will only use that first oscillator. With the Voice Priority set to Next, Medusa will rotate through the available oscillators, allowing longer releases to sound. These settings are accessed through the Config menu.

The **Glide** knob lets you adjust how quickly a note or notes will glide to their intended pitch.

2. Oscillators

The Medusa is equipped with 3 analog oscillators and 3 digital oscillators (referred to as A OSC1, A OSC2, A OSC3 and D OSC1, D OSC2, D OSC3 for this manual and the menu options in the Medusa). The OSC 1, 2, and 3 knobs let you tune either oscillator 12 semitones (an octave) up and down, or with the **Fine-tune** button pressed and lit, the knobs will tune 100 cents up and down.



The oscillator section does double duty as both analog and digital controls, so it will be helpful to understand how those relate. There's a button labeled **Digital** in the oscillator section. With digital mode off you get control over the three analog oscillators, plus a **PW** (pulse width) control, and a frequency modulation control for **FM** between oscillators 1 and 2. You can select from the saw, pulse, triangle, and sine waves for each oscillator. You can also hard sync oscillators 1 to 2 (**Sync 2**) and 2 to 3 (**Sync 3**).

When the digital mode is on, you control the three digital oscillators, and get an access to wavetables in addition to the four classic wave shapes. The fifth setting when the wavetable mode for an oscillator is selected is indicated when all four of the LEDs next to the wave illustrations will light up. You can select one from the 64 wavetables per all three digital oscillators via the Preset menu. Wavetable position can be automated with envelopes and/or LFOs or modulated manually with the use of a dedicated **Wavetable** control knob. Notice that there's no FM between digital oscillators 1 and 2, and you don't get the pulse width for them either. All the the other controls are doubled as well.

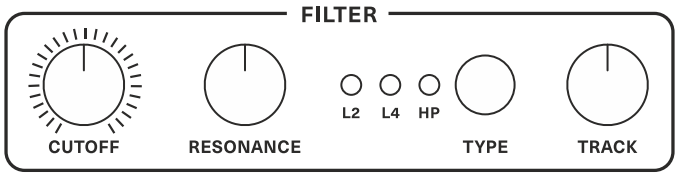
The **FM** knob has two functions, also via switches. When the OSC 1, 2 button is pressed, the **FM** knob controls the amount of exponential frequency modulation for A OSC 1 and A OSC 2 with A OSC 3. When the **Filter** button is pressed, the **FM** knob controls the amount of frequency modulation of the filter cutoff by A OSC 3.

The **PW** knob lets you manually adjust the pulse width of the pulse wave for the 3 analog oscillators, from 50% to 95%. This same value is applied to each oscillator, but doesn't affect the digital oscillators. The pulse-width can also be modulated by both envelopes and LFOs.

The **Noise** knob lets you mix a balance between brown noise (low-pass 6db/oct) and violet noise (high-pass 6db/oct). In the middle position it offers grey noise (notch filtered) equally mixing both the low-pass filtered noise and the high-pass filtered noise.

Note that you will need to give the Medusa some warmup time for these analog oscillators to be in tune. There's also an automated calibration to tune up. When you're not touching the pads an auto-calibration routine is launched, tuning the analog oscillators. This is indicated by a small dot in the top of the sequencer screen in section B of the Medusa. From the Config menu, calibration can also be manually started if required.

3. Filter



The Medusa comes with a switchable, 3 state filter, offering 2-pole (12dB/oct) low pass (LP), 4-pole (24dB/oct) LP filter, and 1-pole (6dB/oct) high pass (HP) settings. Both resonance and tracking settings offer further control of the filter, and the filter can self-oscillate.

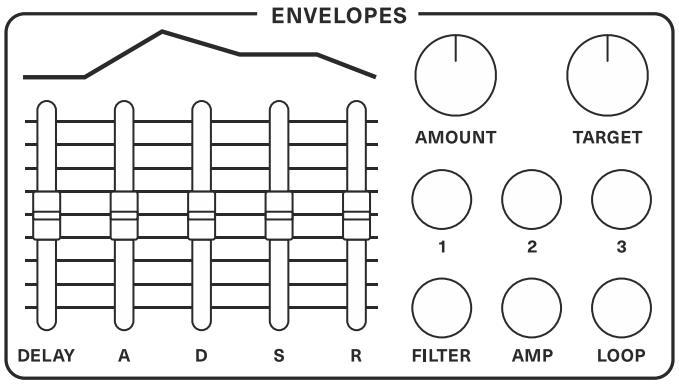
Use the **Cutoff** dial to control the cutoff frequency of the filter, the **Resonance** knob to apply resonance to the filter, and lastly use the Track knob to adjust how much or how little the filter tracks to the keyboard.

The self-oscillating analogue filter can really scream, especially paired with frequency modulation. If you turn up resonance and handle the **Track** on the filter, you'll get self-oscillation that's mapped to the pitch range (you might want to turn down master volume here).

4. Modulation

The Medusa is offering a lot of modulation options. Five separate envelopes, and five separate LFOs. Since there's only one set of knobs and sliders, you choose which envelope or LFO you want to target. You can toggle that modulation on and off by double-clicking the controls for each and choosing the modulation target (by browsing a list or simply holding down an envelope or LFO button and twisting the parameter you want to target, which is probably much more fun than using the menus). The LFO shapes morph between square, sine, ramp, and triangle. The envelope is capable of shaping the drum sounds as well as long soft pads.

Envelopes



The Medusa offers 5 loop-able, Delay-A-D-S-R envelopes, with the 4th (Filter) and 5th (AMP) envelopes being dedicated to the filter and amplifier respectively. All the envelopes can be assigned to modulate a list of targets (see Appendix A: List of Modulation Destinations).

To activate and use envelope 1, 2, 3, or the Filter envelope (the AMP envelope is always on), double click the corresponding button, and the synth side screen will show the word “ON”. To turn off an envelope, simply double click it again.

To link the slider controls to a particular envelope, press and release the button for that envelope (1, 2, 3, Filter, or AMP). When you adjust the sliders, the light for the envelope you are controlling will blink, and the shape of the envelope will be displayed in the synth screen.

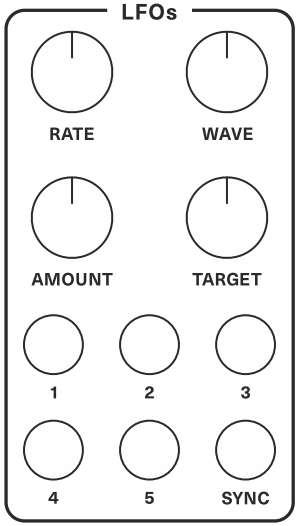
The **Amount** knob lets you control how much the envelope affects or modulates the target, and the **Target** knob lets you choose what the envelope will modulate (see Appendix A: List of Modulation Destinations).

A shortcut for linking an envelope with a target is to press and hold the desired envelope button, and move the knob or slider associated with the parameter. This also works for LFOs. Please, notice that in order to add the FM modulator as a target for ENVs and LFOs you need to use the choice of OSC 1,2 or Filter buttons instead of the Amount knob.

Offering even more flexibility, by pressing the Loop button, the envelopes can be set to repeat or loop, behaving more like shapeable LFOs, where the LFO shape and rate is defined by the Delay-A-D-S-R values and how fast or slow the envelope cycles through each stage.

Low Frequency Oscillators (LFOs)

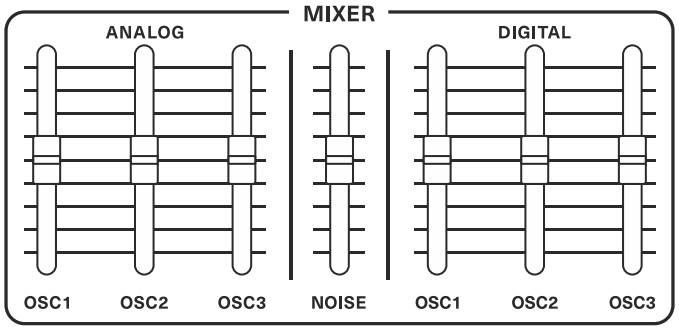
The Medusa has 5 LFOs, with each LFO capable of variably sweeping through sine, pulse/square, saw (ramp up), triangle, and reverse saw (ramp down) waveforms. As you adjust the Wave knob to sweep through the waveforms, the synth screen will display the shape. LFO rates range from .01Hz to 30Hz and can be assigned to a list of parameters (see Appendix A: List of Modulation Destinations) selected with the Target knob or using the assigning shortcut.



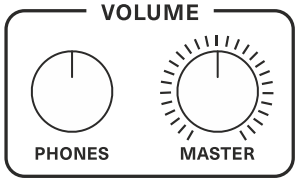
The buttons numbered 1 through 5 let you quickly select each of the independent LFOs, and the 4 knobs let you control the LFO RATE, the LFO Wave, the LFO Amount (amplitude), and the modulation Target for each of the LFOs. When lit, the Sync button will force the LFOs to synchronise with the overall clock setting of the sequencer and change the values displayed with the Rate knob from Herz to note values.

5. Mixer and Volume

The Mixer lets you balance the output levels of the 3 Analog oscillators OSC1, OSC2, and OSC3; the Noise source; and the 3 Digital oscillators OSC1, OSC2, and OSC3. When the Mixer amplitude is turned down to minimum for any oscillator, that oscillator is actually switched off not just muted.



The **Phones** knob lets you control the volume for headphones plugged into the headphone jack, and the **Master** dial lets you control the volume from the line out on the back of the Medusa.



The Grid as a sequencer and controller

The Grid in general was made to be expressive and inspiring. The low profile pads are nicely sensitive and allow you to easily strum your fingers across pads. They work great for playing live, with the option of applying up to three pressure axis for an additional expression (X and Y for position, Z for pressure, only the last pad adds modulation). You might try one of the 39 included scales, which include both various exotic options and some classic modes like the Japanese and Engimatic scales. You can also change not only the scale but the layout (the relationship of notes on the pads). As an external controller, Medusa does support an MPE mode, so you can also use it as an MPE controller with compatible devices. But if you'd just simply use the pads as a keyboard and sequencer, you'd really miss the power of the instrument.

As this is an updated 2.0 version of the manual, we've noticed that users might get easily confused with Medusa's Grid controller because they assume that its main function is sequencing. We're suggesting to think of the Grid as a performance and editing interface as much as a sequencer. Sequences themselves can have a length from 1 and 64 steps (by using a 1-step sequence, you get basically a repeat function, and with a few steps, a sort of fixed phrase arpeggiator). Steps are fixed to the rhythm, there's no sub-steps divisions. You can set tempo from 1-300 bpm or use an external clock source. There's a swing control, plus different sequence playback directions. With the Grid sequencer ability of parameter locking per pad, not only do you have an access to a powerful step sequencer page dedicated to parameter control, but you can start thinking of presets as something you can play live. We're not sure if there's another sequencer that's offering such workflow. But first things first, let's start from the very basics.

1. How it's all organised

To understand the Medusa, it is important to understand how it organises, stores and works with data.

When you save a Program on the Medusa, you're actually saving:
1. Data related to the sound the synthesizer makes (the Patch Data shown in the illustration at the right) and
2. The Medusa Grid Data (also shown in the illustration to the right).

Conceptually, the Grid on the Medusa consists of 3 things:
1. The 8 x 8 matrix of pads used to play notes and store parameters,
2. Note data determining what the sequencer plays,
3. Parameter locks that lets you modulate the Medusa sound on the fly or program parameters to modulate the synth patch with each step of the sequencer.

Each pad/step on the Grid matrix can contain note data (chord,TIE, RND), preset Modifying Data, both, or neither.

The sequencer of the Medusa can be programmed, controlled, and edited by the 8 x 8 grid of silicon pads and the collection of knobs and buttons positioned to the left of the grid.

The pads are numbered 1 to 64, starting in the top left corner (pad 1) and ending in the bottom right corner (pad 64). When a sequence is built or recorded, the first step or note value is stored in pad 1, the second step or note value is stored in pad 2, the third in pad 3, and so on. An eight step sequence would have the note values stored in pad 1 through pad 8. A sixty-four step sequence would have the notes stored in pad 1 through pad 64.

2. Two modes: Grid and Notes

There are 2 modes to work with the 2 types of Grid data: Grid mode and Notes mode. The Grid mode is used to program and edit any Patch Modifying Data, and the aptly named Notes mode is used to program and edit the notes of the sequences you create. By default the Medusa starts in Notes mode, and this mode is indicated by the sequencer oled screen displaying "Notes Mode" in the top left corner. To enter the Grid mode, simply press and release the Grid button. The Grid button will now be lit, and the sequencer screen will display "Grid Mode" in the top left corner.

While the Note mode works more in a classic keyboard controller manner, the Grid mode is by default empty and pressing pads won't produce any sounds unless you'll program them first or you've already recorded something in the Note mode. As each of the steps/pads in the Grid mode can hold up to 118 parameter locks and store from one note to six note chords, users are able to configure the Grid totally up to their needs. You can program a chord progressions and then manually trigger or sequence them. It can hold both steps with and without notes which can just modulate the synth engine in real time. The Grid is a really powerful and versatile tool which one can adjust freely.

You can use the Grid mode for triggering in many different ways. Use the individual pads to trigger different sounds, or even map an ensemble of sounds. Set up particular pads for percussion, and others for bass notes or chord progressions for instance). Grid mode also allows other features, like making your own musical scales with the ability to store fine-tuned pitches per pad. You can also bend between notes by targeting Pitch with the X-axis for example. Just make sure to keep its adjustable range manageable and slide between notes (in this case we suggest a value of just 1 or 2 instead of the full 100, this way it will slide over the whole pitch range as you wiggle your finger). In the Grid mode not only can you trigger modulation live over a sequence, you can also use those triggers to modulate X, Y, and Z targets of your choice while the sequence plays.

The Grid mode also offers a way to see where notes, tie and patch modifying data are stored. In GRID mode, if a pad is lit:

- 75% - contains Note/Chord
- 50% - contains only TIE data
- 0% - is empty or contain parameter locks only (press Clear button to display)

In order to edit the particular modulators, when in Edit mode (Rec. is blinking) hold the Clear button and nudge a selected knob/slider/button to see if any of its parameter locks are existing in the sequence.

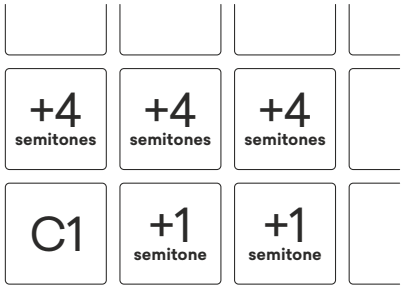
3. Using the pads as a keyboard

The 8 x 8 grid of velocity sensitive silicon pads can also be used to play the Medusa, using one of 40 predefined musical scales and modes (see Appendix C: List of Modes and Scales for the complete list of options). Just put the Medusa in Notes mode (ensure the Grid button isn't lit), and start hitting the pads to make beautiful music. In addition to playing a note, each pad can modulate up to 3 different targets based on side-to-side motion (X), up-and-down (Y) motion, and pressure (Z).

Notice that X, Y & Z targets are being modulated by the last pressed pad only.

The playable matrix of pads is laid out with the lowest note value being in the lower left pad (pad 57), incrementing a semitone with each position to the right. If pad 57 were a C1, then the next note on pad 58 would be a C#1, pad 59 would be a D1, and so on until pad 64 which would be a G1.

How the adjacent pads change pitch depends on the chosen Layout from the Preset Menu. Choose a pad, and the pad directly to the right will increase the pitch one semitone regardless of the chosen Layout. For Layout 1, the pad directly above will increase the pitch 1 semitone. For Layout 2, the pad directly above will increase the pitch 2 semitones. For Layout 4, (see the illustration) the pad directly above will increase the pitch 4 semitones. And so it goes, up to Layout 7 where the pad directly above will increase the pitch 7 semitones.



Keyboard layout 4

When not in Grid mode (when the pads are behaving like a keyboard), the pads corresponding to the root and octave notes will be lit, letting you know which keyboard layout is selected.

4. Creating, playing, and editing a sequence

With a sequence playing, it's possible to toggle between play modes (unison and polyphony), and the Voice Priority setting (first or last, in either of the polyphonic modes), or sequence length, all live without impact sequenced playback. So you can have some fun playing with these settings. The sequencer only triggers preset changes when the Grid mode is enabled. So you can start a sequence, then toggle your sequenced parameters on and off by switching Grid mode on and off.

Think of combining this with live-triggered parameters. Try blending the glide parameter in the polyphonic modes, adjust the amplitude envelope Release in order to create overlapping portamento effects. But again, let's start from the very basics.

Creating a sequence is an easy process which you can approach in few different ways. To start from scratch, simply pick an empty program, or clear any notes or parameter locks from an existing one. Choose the length, the sequence mode, musical scale, swing and then:

– hit the Record button and start playing in the notes or chords with the pads or an external midi keyboard. This way you will record your sequence in an incremental way. Use the Clear button in order to skip a pad and leave a pause.
– When the sequencer is running, press the Record button and start playing the pads to record notes and chords in an "overdub" manner. The real time modulations of the synth encoders will also get recorded then.
- In the Grid mode you can edit the sequences recorded in the Notes mode, copy the steps and apply the parameter changes per step.

How to	Mode	Steps
Clear all Notes and parameter locks	Grid	1. Press the Record button (it should be blinking if active). 2. Press Hold + Clear and hold. 3. On the sequencer screen "Clear Notes & param" appears, and using the Knob-Button, select "all steps". 4. All note and patch modifying data should be deleted
Set up the sequencer	Either	1. Press the Menu Button to access the Preset menu and set up the Tempo, Seq length, and Seq mode. 2. Select and click Seq length from the menu and set the length (1-64) by dialling a value with the Knob-Button or pressing the pad that will be the last in the sequence. 3. Select and click Tempo from the menu and dial in the desired BPM value (min 1 to max 300) 4. Select and click Seq Mode to select Forward, Backward, Ping Pong, and Random.
Enter sequencer notes (Notes data)	Notes	1. Press the Record button (it should be blinking if active) 2. Play the notes you want with either the pads or an external MIDI keyboard (to enter a blank or rest for a step, press the Clear button instead of a key or pad)
Edit sequencer notes (Notes data)	Either	You can edit notes from both the Notes mode and the Grid mode. From the Notes mode: 1. Press the Record button (it should be blinking if active). 2. The current active pad will also be blinking. Dial the Menu Button to change the active pad to the step/pad you wish to edit. 3. Play the new note either from the pads or an external MIDI controller.

How to	Mode	Steps
		From the Notes mode: 1. Press the Record button (it should be blinking if active). 2. The current active pad will also be blinking. Dial the Menu Button to change the active pad to the step/pad you wish to edit. 3. Play the new note either from the pads or an external MIDI controller. From the Grid mode: 1. Press the Record button (it should be blinking if active). 2. Press the step/pad you wish to change and hold it. The note will sound and the screen will display which step it is and what the note value is (e.g. G3, C2, etc). 3. While pressing the pad, dial the Menu clickable encoder to select a new note. The screen will display the notes as you scroll through them. • Click down the menu encoder to set the note length using the TIE function or add a random change of the note or chord root note under the desired step/pad by using the RND function. • The note randomisation will be related to the chosen musical scale in a range of two octaves. • The RND function used on a pad/step without an existing note will trigger notes randomly chosen from the set musical scale scattered thru all the available octaves.
Copy sequencer notes and parameter locks (from one step or pad to another)	Grid	1. Press the Record button (it should be blinking if active) 2. Press the pad you want to copy and hold it (both note and parameter locks will be copied). After a couple seconds, the screen will indicate the step and note were copied. 3. While still pressing the first pad you want to copy, press the second pad you want to copy the data to. 4. The screen will show a message that the first step was copied to the second step (e.g. "Step 3 copied to 2")
Start/Stop sequencer	Either	1. Press the Play button to start the sequencer. The Play button will be lit when the sequencer is playing. 2. While the sequencer is playing, press the Play button again to stop it. 3. If the sequencer is stopped and you restart it, it starts from the beginning of the sequence, not where it stopped.
Enter parameter locks	Grid	1. Enter the Edit mode by pressing the Record button (it will be flashing). 2. Press and hold the pad to select where you want to enter data (note: there doesn't have to be note data already stored in the pad location; pads holding parameter locks only, can be used like programmable buttons to instantly modify synth parameters on the fly).

How to	Mode	Steps
		3. Adjust any of the synth parameters. The pad will now have basically a “snapshot” of programming parameters. 4. Lastly, if you do have a sequence already recorded, you can hit Play while Rec is active and record parameter locks by adjusting synth parameters and values while the sequencer is running.
Edit the parameter locks	Grid	1. Enter the Edit mode by pressing the Record button (it will be flashing). 2. Press the pad that contains the parameter locks which you want to edit. Adjust the desired parameters (cutoff, resonance, octave, course tuning, LFO amount, etc). 3. When you're finished editing, press the Record button again to quit the Edit mode in order to avoid accidentally making unwanted changes/edits.
Delete the parameter locks	Grid	1. Press the Record button (it should be blinking if active). 2. Press Clear button and hold it. 3. On the sequencer screen “Clear parameters” appears, and using the Menu Knob-Button, select either “selected steps” or “all steps”. 4. To clear only “selected steps”, press and hold the pads you want to delete, and release the Clear button. 5. To clear “all steps”, select it in the menu, and release the Clear button. • You can clear the parameter locks for the selected separate modulators only. Simply nudge a knob or slider to see if there is any automation saved for it on the Grid steps.
Delete sequencer notes	Grid	1. Press the Record button (it should be blinking if active). 2. Press Hold button and hold it. 3. On the sequencer screen “Clear Notes” appears, and using the Knob-Button, select either “selected steps” or “all steps”. 4. To clear only “selected steps”, press and hold the pads you want to delete, and release the Hold button. 5. To clear “all steps”, select it in the menu, and release the Clear button.

5. Hold button functions for musical performance – Drone mode and sequence transposing

Drones: while the sequencer is stopped press the Hold button and it will light up, the pads will now work in a note sustain mode which is great for making ambient drones. You can toggle the individual notes on/off while they're sustained. Now just fire up a couple of LFOs and ENVs, set lower clock value (especially for this reason you can go as low as 1 BPM). This mode is interesting with different polyphonic modes and glide. You can also use the three pressure axis to add some additional modulation as you drone (remember that only the last trigger uses the X/Y/Z modulation).

Arpeggiate/transpose: you can also transpose your sequences while they are being played back by the sequencer by pressing and holding the Hold button and indicating the root note on the pads. With short sequences, this can be a bit like running an arpeggiator or phrase sequencer.

6. Random button

The Random button allows you to randomise Medusa's various synth and Grid parameter settings on a three different levels. Take a look at the description chart below. Besides these functions. You can also set the RND per step function to add random change of the note or chord root note under the desired step/pad by using the RND function.

Randomize	Mode	Steps
OSC section parameters	Notes	1. Press the Random button. 2. Select “confirm”. 3. Various synth OSC parameters including Wave, LFOs with all their values, wavetable position, Octave, Sync 2, and Sync 3 (including FM) will be randomized .
Sequencer notes	Notes	1. Press the Record button. 2. Press the Random button. 3. Select “confirm”. 4. Randomized notes and null values (blanks) an octave above and below the “Root Note” (set in the Preset Menu) will be randomly generated for all 64 pads.
Parameter locks	Grid	1. Press the Record button. 2. Press the Random button. 3. Select “selected steps” or “all steps”. 4. The parameter locks will be randomized for all the 64 steps.

Preset menu

All the basic and additional parameters for controlling and setting up the sequencer/synth preset can be viewed and modified through the Preset menu. To access the Preset menu for the sequencer, press the Menu Button (as shown on the previous page). Turn the knob to highlight the menu item you want to select, press the knob (clicked like a button), then select from the possible values, and then press the knob again to choose the value you want.

The preset menu will let you access the following parameters:

Parameter	Possible values	Information
Tempo	1-300 bpm	Lets you set the tempo for the Medusa master clock, from 1 to 300 BPM. When the LFO rate is synched to the master clock it will change in relation to this value. We've decided to slow down the clock to 1 BMP as it's really useful in the so called Drone mode of the Medusa. Just remember when you've set the tempo to 1 BPM as the sequencer might seem to be not working on such low a tempo.
Swing	25-75	A value of 50 is neutral and offers no swing to the note value.
Seq Length	1-64	A sequence can be 1 to 64 steps long
Seq Mode	Forward Backward Ping Pong Random	• Forward - the sequence executes the total number of steps and then loops to start again (e.g. 1-2-3-4, 1-2-3-4, etc) • Backward – the sequence starts at the last step of the total number of steps runs in reverse until it reaches the first step, and then loops back to the last step again (e.g. 4-3-2- 1, 4-3-2-1, etc) • Ping Pong - sequence runs all steps forward, then all steps backward, and loops to start again (e.g. 1-2-3-4, 4-3-2-1, 1-2-3-4, etc) • Random - the sequence endlessly loops, randomly picking values from the total sequence length (e.g. 3-1-2-3, 4-1-2-1, 2-4-2-3, etc)
Scale	See Appendix B: List of Modes and Scales	Offers user a list of 39 modes and scales to use playing the synth.
Layout	1-8 & Guitar	Layout offers different intervals for how notes are laid out on the 8 x 8 Grid. Each possible value reflects the number of semitones between a pad and the pad just above it. (See 4. Using the Pads as a Keyboard for more information)
Root note	C1-D4	Sets the root note of pad 57, letting you transpose the entire range of notes the 64 pads can play.

Parameter	Possible values	Information
Voice Priority	First, Next	This setting pertains to playing in P1 or P2 mode. With Voice Priority set to First, whatever note is played will grab the first available A OSC, D OSC or pair of OSCs. If you play monophonically in P1 or P2 (one note at a time), it will only use that first oscillator. With the Voice Priority set to Next, Medusa will rotate through the available OSCs, allowing longer releases to sound.
X Target PitchBend	See Appendix A: List of Modulation Destinations	Lets you assign a modulation target to respond to either: 1. MIDI pitch bend values from an external MIDI controller or 2. side-to-side movement of a pad. Can scale the amount from 100 to 100 (can only scale positive values for pitch bend).
Y Target ModWheel	See Appendix A: List of Modulation Destinations	Lets you assign a modulation target to respond to either: 1. MIDI mod wheel values from an external MIDI controller or 2. up-and-down movement of a pad. Can scale the amount from 100 to 100 (can only scale positive values for the mod wheel).
Z Target AfterTouch	See Appendix A: List of Modulation Destinations	Lets you assign a modulation target to respond to either: 1. MIDI channel aftertouch values from an external MIDI controller or 2. adding pressure to a pad. Can scale the amount from 100 to 100 (can only scale positive values for aftertouch).
Smoothing	On/Off	Lets you turn on or off anti-aliasing for modulations programmed into the Grid when the sequencer is playing.
Wavetable	1-64	Lets you select different wavetables to use with the digital oscillators. Note that D OSC1, D OSC1, and D OSC3 will all use the same wavetable that is selected from this menu option, though each digital oscillator with a wavetable can be modulated independently.

Config Menu

The config menu is accessed by pressing the Config button directly under the sequencer screen and gives you access to both basic and advanced functions of the synthesizer and the sequencer.

It's worth to mention here that using the MIDI channel input menu you can set your Medusa unit to the **MIDI channel per voice** mode where using an external multitrack sequencer or your DAW you're able to sequence all the six Medusa oscillators separately which extends the way you can use the instrument radically.

The MIDI menu allows you to set up the Medusa as a powerful MIDI controller too. Not only the pads can be used as a MPE controller for your external software and hardware synths, the sequencer is also sending out its content and every slider, knob and button is also able to send out the CC signals. The velocity sensitive pads and their X, Y and Z functionality can be also precisely adjusted in order to control your external instruments.

In case of any problematic Medusa behaviour, you can reset the config settings. To do so, enter the config, go to firmware section, press and hold the Clear button together with the Config button and confirm the config reset with the encoder.

Parameter	Possible values	Information
MIDI Clock in	Internal, USB, MIDI	Lets you choose the incoming MIDI clock data from internal or through MIDI out and the USB connection.
MIDI Clock out	Off, USB, MIDI	Allows you choose the send of MIDI clock data through MIDI out and the USB connection.
Transport in	Off, USB+DIN, USB, MIDI	Choose the incoming start and stop messages from the chosen external sources.
Transport out	Off, On	Lets you choose to send start and stop messages through MIDI out and the USB connection.
MIDI Channel In	All, 1-16, Off, Channel per voice	Allows you select if the Medusa receives MIDI data on all channels, on one channel (1 through 16), or it doesn't receive MIDI data. Additionally – Channel per voice allows you to control, play and sequence each of Medusa's oscillators on a separate MIDI channel form 1 to 6 (fixed) with external gear. This works in P2 mode only. Please, notice that when this function is toggled on the Medusa pads won't play polyphonically.

Parameter	Possible values	Information
MIDI Channel Out	Off, 1-16, MPE	Lets you select the channel that Medusa will transmit MIDI data out or to turn off MIDI out. There is no soft MIDI thru. MPE is enabling MIDI Polyphonic Expression of the Medusa's pads to control external devices.
CC input	Off, USB+DIN, USB, MIDI	Determines if Medusa is receiving the MIDI CC modulation signals through MIDI and the USB connection.
CC output	Off, USB+DIN, USB, MIDI	Determines if Medusa is sending the MIDI CC modulation signals through MIDI and the USB connection.
X Range	0-100	Adjusts the range of MIDI out pressure for the X axis on the Grid pads.
Y Range	0-100	Adjusts the range of MIDI out pressure for the Y axis on the Grid pads.
Z Range	0-100	Adjusts the range of MIDI out pressure for the Z axis on the Grid pads.
Middle C	C3-C6	Allows you to choose the middle C note for the Grid pads as a MIDI controller.
Pot. Mode	Absolute, Preset value	Lets you choose whether a control changes a parameter immediately (Absolute) or has to pass through the preset value before it changes (Preset value).
X mode	Absolute, Relative	Lets you choose whether side-to-side movement of the pad fully controls/modulates the target or only relative to its initial value.
Y mode	Absolute, Relative	Lets you choose whether up-and-down movement of the pad fully controls/modulates the target or only relative to its initial value.
Velocity	Soft, Medium, Hard	Sets the level of velocity for the Grid pads and external controllers.
Firmware	NA	Displays installed firmware version.
Credits	NA	Displays the Medusa production credits.
Calibration	Cancel, Start	Performs the manual calibration and tunes the analog oscillators.

Saving and loading programs

Though the Medusa comes with presets, you will no doubt want to tweak and save some of your own programs, and the Medusa will let you save up to 128 programs. Saving a program on the Medusa is very easy. When you have programmed the sound and sequence you want, press the Save button, dial the Menu Button to select either Bank A or Bank B, press the pad where you want it saved (any of the pads 1 through 64), and then press the Save button again. The sequencer screen should say the pad number and “saved”. Loading the program is as simple as hitting the Load button, selecting the bank (A or B), and then hitting the pad number you want to load.)
You can copy the synth voice from one preset to another while the sequence remains. While in the grid more press record button and next press the load button, the current voice will get copied to the chosen destination.

It's possible to dump/load the preset banks A and B into/from a file with the use of a Medusa Tool.

Inputs and Outputs

The Medusa is equipped with both MIDI in/out/thru and USB ports, and it will receive and send out notes, CCs, clock and transport start/stop messages corresponding to Medusa's sequencer Play button. You can use Medusa as a MIDI controller and send out the pads MPE functionality. There is also a 1/4 inch jack for the main output (mono), a 1/4 inch jack for headphones, and a 1/4 inch jack for inputting an external audio signal before the Medusa filter.

Firmware update procedure & preset load/dump function

Polyend Tool for Medusa Hybrid Synthesizer is a software tool which will allow you to dump/ load your Medusa presets and flash it with a new firmware in a convenient way. It is compatible with both Mac and Win OS.

Instructions of use:

1. Run the MedusaTool.jar
2. Use the "Flash Firmware" button and indicate the *.hex firmware file located in the Tool folder in order to flash your unit. Press the button located at the back panel when prompted.
3. Use the "Send Presets" to load the default wavetables into your unit.
4. Use the "Send Presets" to load the new presets factory bank file into your unit.
5. Use Get Presets to dump your presets into a file when needed.

Important information:

* Java JRE (Java Runtime Environment) is required to run the Medusa Tool.
* Use no USB hubs, no adapters, only straight connection between the instrument and the computer. If you're using a laptop, power it up from the AC adapter.
* The Tool containing folder can't have any spaces in the folder name, same for the root directory. In case of problems move the MedusaTool folder to the "c:\" directory.
* Please notice that your RAR application might treat the MedusaTool.jar as an archive file.
* If after the update (or during a fast off/on power toggling) your Medusa unit would start humming, glitching, freezing or behaving strangely just toggle it off for 10 seconds and back on.
* You might need to pause the antivirus software while using the Tool.
* Problems during the flashing process (like power shortage, usb hubs or adapters) might brick the unit. Yet, if for any reason your Medusa unit looks like it's bricked, you can still flash it. In case of trouble just repeat the procedure.

Limited warranty

Polyend warrants this product, to the original owner, to be free of defects in materials or construction for one year from the date of purchase. Proof of purchase is necessary when warranty claim is made. Malfunctions resulting from improper power supply voltages, abuse of the product or any other causes determined by Polyend to be the fault of the user are not covered by this warranty (normal services rates will be applied). All defective products will be replaced or repaired at the discretion of Polyend. Products must be returned directly to Polyend with the customer paying the shipping cost. Polyend implies and accepts no responsibility for harm to person or apparatus through operation of this product. Please contact hello@polyend.com for return to manufacturer authorisation, or any other technical questions/concerns.
Thank you!

Appendices

Appendix A: List of Modulation Destinations

Destination	What will be modulated
None	Nothing
Pitch	Frequency or pitch of all 6 oscillators
Amp	Overall amplitude of all 6 oscillators
Cutoff	Cutoff frequency of the filter
Resonance	Resonance of the filter
FM Osc 1,2	Frequency modulation amount for OSC 1 and 2
FM Filter	Frequency modulation amount for the filter
Pulse Width	Pulse width of the 3 analog oscillators
Wavetable all	Position in the wavetable for all digital oscillators
Wavetable D1	Position in the wavetable for all D OSC1
Wavetable D2	Position in the wavetable for all D OSC2
Wavetable D3	Position in the wavetable for all D OSC3
A Osc1 Freq	Frequency or pitch of A OSC1
A Osc2 Freq	Frequency or pitch of A OSC2
A Osc3 Freq	Frequency or pitch of A OSC3
D Osc1 Freq	Frequency or pitch of D OSC1
D Osc2 Freq	Frequency or pitch of D OSC2
D Osc3 Freq	Frequency or pitch of D OSC3
Noise Color	Mix of high pass and low pass filtering of the noise source
A Osc1 Mix	Amount of A OSC1 signal in the overall mix
A Osc2 Mix	Amount of A OSC2 signal in the overall mix
A Osc3 Mix	Amount of A OSC3 signal in the overall mix

Destination	What will be modulated
D Osc1 Mix	Amount of D OSC1 signal in the overall mix
D Osc2 Mix	Amount of D OSC2 signal in the overall mix
D Osc3 Mix	Amount of D OSC3 signal in the overall mix
Noise Mix	Amount of noise source signal in the overall mix
LFO1 Rate	Rate (cycles per second) of LFO1 wave
LFO2 Rate	Rate (cycles per second) of LFO2 wave
LFO3 Rate	Rate (cycles per second) of LFO3 wave
LFO4 Rate	Rate (cycles per second) of LFO4 wave
LFO5 Rate	Rate (cycles per second) of LFO5 wave
LFO1 Wave	Shape of the LFO1 wave
LFO2 Wave	Shape of the LFO2 wave
LFO3 Wave	Shape of the LFO3 wave
LFO4 Wave	Shape of the LFO4 wave
LFO5 Wave	Shape of the LFO5 wave

Appendix B: List of Modes and Scales

	Full Name	Abbreviation		Full Name	Abbreviation
0.	NA	No scale	20.	Hungarian Minor	Hung Min
1.	Chromatic	Chromatic	21.	Ukrainian	Ukrainian
2.	Minor	Minor	22.	Marva	Marva
3.	Major	Major	23.	Todi	Todi
4.	Dorian	Dorian	24.	Whole Tone	Wholetone
5.	Lydian	Lyd Maj	25.	Diminished	Dim
6.	Lydian Minor	Lyd Min	26.	Super Locrian	SLocrian
7.	Locrian	Locrian	27.	Hirajoshi	Hirajoshi
8.	Phrygian	Phrygian	28.	In Sen	In Sen
9.	Phrygian Dominant	PhrygDom	29.	Yo	Yo
10.	Mixolydian	Mixolydian	30.	Iwato	Iwato
11.	Melodic Minor	Melo Min	31.	Whole Half	WholeHalf
12.	Harmonic Minor	Harm Min	32.	Kumoi	Kumoi
13.	BeBop Major	BeBopMaj	33.	Overtone	Overtone
14.	BeBop Dorian	BeBopDor	34.	Double Harmonic	DoubHarm
15.	BeBop Mixlydian	BeBopMix	35.	Indian	Indian
16.	Blues Minor	Blues Min	36.	Gypsy	Gypsy
17.	Blues Major	Blues Maj	37.	Neapolitan	NeapoMaj
18.	Pentatonic Minor	Penta Min	38.	Neapolitan Minor	NeapoMin
19.	Pentatonic Major	Penta Maj	39.	Enigmatic	Enigmatic

Appendix C: CC Chart

Function	CC	Function	CC	Function	CC
OSC1_TUNING	7	OSC3_OSC12	31	ENV1_R	55
OSC1_U_TUNING	8	OSC3_FILTER	32	ENV1_AMOUNT	56
OSC1_WAVE	9	OSC_PW	33	ENV1_TARGET	57
OSC1_OCTAVE	10	OSC_NOISE	34	ENV1_LOOP	58
OSC2_TUNING	11	OSC_WAVETABLE	35	ENV2_DELAY	59
OSC2_U_TUNING	12	OSC_SYNC2	36	ENV2_A	60
OSC2_WAVE	13	OSC_SYNC3	37	ENV2_D	61
OSC2_OCTAVE	14	PLAY_MODE	38	ENV2_S	62
OSC3_TUNING	15	PLAY_MODE_GLIDE	39	ENV2_R	63
OSC3_U_TUNING	16	FILTER_CUTOFF	40	ENV2_AMOUNT	64
OSC3_WAVE	17	FILTER_RESONANCE	41	ENV2_TARGET	65
OSC3_OCTAVE	18	FILTER_TYPE	42	ENV2_LOOP	66
OSC4_TUNING	19	FILTER_TRACK	43	ENV3_DELAY	67
OSC4_U_TUNING	20	MIXER_OSC1_ANALOG	44	ENV3_A	68
OSC4_WAVE	21	MIXER_OSC2_ANALOG	45	ENV3_D	69
OSC4_OCTAVE	22	MIXER_OSC3_ANALOG	46	ENV3_S	70
OSC5_TUNING	23	MIXER_NOISE	47	ENV3_R	71
OSC5_U_TUNING	24	MIXER_OSC1_DIGITAL	48	ENV3_AMOUNT	72
OSC5_WAVE	25	MIXER_OSC2_DIGITAL	49	ENV3_TARGET	73
OSC5_OCTAVE	26	MIXER_OSC3_DIGITAL	50	ENV3_LOOP	74
OSC6_TUNING	27	ENV1_DELAY	51	ENV4_DELAY	75
OSC6_U_TUNING	28	ENV1_A	52	ENV4_A	76
OSC6_WAVE	29	ENV1_D	53	ENV4_D	77
OSC6_OCTAVE	30	ENV1_S	54	ENV4_S	78

Function	CC
ENV4_R	79
ENV4_AMOUNT	80
ENV4_LOOP	82
ENV5_DELAY	83
ENV5_A	84
ENV5_D	85
ENV5_S	86
ENV5_R	87
ENV5_AMOUNT	88
ENV5_LOOP	90
LFO1_RATE	91
LFO1_WAVE	92
LFO1_AMOUNT	93
LFO1_TARGET	94
LFO1_SYNC	95
LFO2_RATE	96
LFO2_WAVE	97
LFO2_AMOUNT	98
LFO2_TARGET	99
LFO2_SYNC	100
LFO3_RATE	101
LFO3_WAVE	102
LFO3_AMOUNT	103
LFO3_TARGET	104

Function	CC
LFO3_SYNC	105
LFO4_RATE	106
LFO4_WAVE	107
LFO4_AMOUNT	108
LFO4_TARGET	109
LFO4_SYNC	110
LFO5_RATE	111
LFO5_WAVE	112
LFO5_AMOUNT	113
LFO5_TARGET	114
LFO5_SYNC	115
TARGET_X_SELECT	116
TARGET_Y_SELECT	117
TARGET_Z_SELECT	118
TARGET_Y_VALUE	119