Xsynth

Portable synthesizer

with master keyboard,

MIDI interface

and audio interface

User Manual

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1. Table of contents

This table of contents features clickable hyperlinks in the PDF version, which will take you directly to the desired chapter. In addition, there are clickable cross references throughout the manual. Also, the Search function of your PDF reader can be used in this document. You will have to find the easter eggs yourself though.

1. Table of contents **2**
2. Introduction **6**
3. Quickstart **6**
3.1 Setup 6
3.2 Using the Synthesizer 7
3.3 Using the Keyboard 7
3.4 Using the Audio interface: 8
3.5 How to update 9
4. FAQ, Troubleshooting **10**
Technical Specifications **15**
5. General Overview **17**
6. Synth engine block diagram **18**
Operation Instructions **19**
6.1 How to understand this manual 19
6.2 Getting started 20
7. Connections **21**
7.1 Connection types and signal directions 22
7.2 USB connection 23

8. General controls, display..... 24
9. Keyboard and controls..... 25
9.1 Velocity, Polyphonic Aftertouch.....25
9.2 Keyboard control buttons.....26
9.3 MIDI PANIC.....27
10. Arpeggiator..... 28
11. Display Parameters..... 29
CC Send..... 29
11.1 List of default CC numbers..... 30
12. Oscillators..... 31
12.1 Introduction.....31
12.2 Walkthrough.....32
12.3 Common features.....33
12.4 Osc Global features.....33
13. Envelopes..... 35
13.1 Overview.....35
13.2 Function..... 35
13.3 Walkthrough.....37
14. LFOs..... 40
15. Macro..... 41
16. Filter..... 42
16.1 Introduction.....42
16.2 Cutoff.....45
16.3 Resonance..... 45
16.4 Filter Modes..... 46

16.5 12dB or 24dB slope?....47
16.6 Drive/PreFilter....48
16.7 Keytrack (KTrck)....49
16.8 Walkthrough: Playing notes with just the filter....50
16.9 EnvAmt/E.Amt....52
16.10 Walkthrough: How to work with the filter....52
17. Mixer....54
18. Audio Routing Options....55
19. Effects/Aux....56
19.1 FX1 – Distortion/Reduction....56
19.2 FX2 – Reverb/Hall....57
19.3 FX3 – Chorus/Flanger/Delay....58
19.4 Patch Volume....58
20. Modulation Matrix....59
20.1 Sources....61
20.2 Destinations....62
20.3 Walkthrough....63
21. GLOBAL menu/system settings, Init patch....64
22. Saving Patches....67
23. MIDI....69
23.1 Introduction....69
23.2 Connecting MIDI, signal directions....70
23.3 MIDI Interface....70
23.4 MIDI routing, switches....71
23.5 Settings, Avoiding MIDI feedback, Local Off....72

23.6 MIDI Implementation Description....73
24. Editor....74
24.1 Preparations....74
24.2 Handling....75
24.3 Pages....76
Appendix....82
25. Legal note....89

2. Introduction

Welcome to Xsynth! A portable synthesizer, based on the Xkey series, fitted with a MIDI and Audio interface. Perfect for mobile use and fulfilling ideas, wherever you go.
This manual is written for beginners and more experienced users alike. Synth veterans can skip the Walkthrough sections of this manual and may jump directly to chapter 8.General controls, display. We kindly ask you to read as much as possible before you start working. Please read at least the Quickstart, Troubleshooting and the **NOTE:** sections of the manual. Especially the latter will contain vital information which you really have to know to operate this device. Furthermore, we gave our best to keep it short. Plus, we have hidden some easter eggs in here.
Many common questions are answered in this manual. Please try finding an answer in this document before you contact our support team.

3. Quickstart

3.1 Setup

Put Xsynth on a flat, stable and clean surface.
Connect your cables first before starting the device. You will need at least power over USB and headphones or loudspeakers.
Line out → Mixer/Audio Interface input
External line level audio signal → Aux In
Phones → Headphones
Xsynth MIDI Out → External synthesizer/keyboard MIDI In
External synthesizer/keyboard MIDI Out → Xsynth MIDI In
DIN MIDI ports use TRS A pin layout. Use a TRS A to 5pol DIN adapter if needed.
USB transmits power, MIDI and audio.

Turn the input volume of the mixer channel/audio interface that Xsynth is conected to all the way down. Then, start Xsynth by turning up the **I/O Volume potentiometer** in the upper left corner.
Press one of the keys of Xsynth and hold it while slowly turning up the volume of Xsynth to about 50%. Then, keep the key pressed and turn up the input volume of your mixer/audio interface so you can hear Xsynth clearly.

3.2 Using the Synthesizer

Turn the **Patch Select** encoder on the upper right corner of the device to change through patches.
Press some keys to hear a sound.
To adjust the sound settings:
Choose a Module that you want to adjust, for example the Oscillators. Press the corresponding button (**OSC** in this case) to call up the Page for this module. The button will light up, this shows which module is currently selected.
Adjust the settings shown on the screen by turning the four **DISPLAY PARAMETERS** to the left hand side of the screen. These encoders are mapped to the parameters on the screen from left to right or from top to bottom.
Press the button of the Module again to access further instances (**Osc1/2/3** etc.)
Press the **PAGE** ← → buttons for advanced settings.
To create an Init patch, press **GLOBAL**, then **ENTER**.
To access the system settings, press **GLOBAL** several times.
If you want to use MIDI In or Out, you may have to activate it in the **GLOBAL** settings.

3.3 Using the Keyboard

By default, Xsynth's keyboard is linked to the internal synth engine.
You can press the keys at any position. These have mechanics similar to space bars on QWERTY keyboards, so the Xsynth keys will not get wedged.
Keys produce Velocity and polyphonic Aftertouch.
To shift the Keyboard up or down, press the **– OCTAVE +** button at the left hand side of the keyboard. Press it at the left side for -, at the right side for +.

The **MODULATION** button is pressure sensitive. The more you press, the more the value increases. **– PITCH +** is also pressure sensitive, but in two ways: the more you press on the left side, the lower the pitch and vice-versa for the right side.
If you want to use MIDI In or Out, you may have to activate it in the **GLOBAL** settings.
Press **MACRO and GLOBAL** to access the **MIDI CC** page. Then, the four encoders to the left hand side of the display will transmit CC messages when turned.

3.4 Using the Audio interface:

Connect Xsynth to your computer through **USB.**
Your computer will automatically recognize Xsynth as an audio interface and MIDI interface.
Connect your external signal to **AUX IN** of Xsynth. Connect Xsynth **LINE OUT** to your speaker system/Mixing console/audio interface/amplifier etc. or connect your headphones to **PHONES.**
The audio interface must be activated in **GLOBAL.** After changing the setting, power cycle Xsynth.

Sampling rate of the **Audio Interface** is fixed at 96kHz. This equals the internal sampling rate of the synth engine and cannot be changed. When your computer recognizes the Audio Interface, the computer's sampling frequency may also be set to 96kHz. If this causes issues, deactivate the Audio Interface or select a different audio interface as the primary audio device in your computer settings.

When Xsynth's Audio Interface is switched from ON to OFF, Windows may still show the Audio Interface as a connected device. In that case, disconnect the USB cable, wait one minute and reconnect the cable. This is caused by a bug in Windows which we cannot fix.

3.5 How to update

Download our Editor and newest firmware from **esi-audio.com**.

Open the **Editor** and go to **Global>Update firmware**. Select the update file and click **OK**.

Observe the progress bar on your computer as Xsynth may not show anything on screen.

Wait until the updater says the process is finished. This may take 15 minutes or more.

While the update is running:

- Do not switch Xsynth off.
- Do not play any notes on Xsynth and do not touch any of the controls.
- Do not send any other MIDI data towards Xsynth.
- Do not terminate the connection to your computer.
- Do not run anything on your computer that causes a high CPU and/or RAM usage.

NOTE: Xsynth must be connected through USB for the update process. It will not work through DIN MIDI. Wait until the updater says the update is finished, then reboot Xsynth.

4. FAQ, Troubleshooting

Xsynth does not switch on.

Check the USB connection. Try a different USB cable or connect it to a different port on your computer.
If you use Xsynth without a computer, make sure the power supply works correctly.
The **Volume potentiometer** also works as an I/O switch. Turn it clockwise to switch on Xsynth.

There is no sound output.

Make sure Xsynth is switched on.
Check your cable connections, try different cables. Cables with a plug shell diameter larger than 10mm may be too big to fit.
Restart Xsynth and recheck.
Press the **MIX** button and make sure that at least one oscillator is at an audible volume.
Check the modulations in **MOD** if there are modulations that change the volume.
If you are using MIDI, make sure that MIDI is activated in the **GLOBAL** settings. Check if Xsynth is set to the same MIDI Rx channel as the sending device.
Check that the **Filter Cutoff** is not set to zero (or maximum when using High pass), check the corresponding modulations.
Check the effects, make sure no effect has a **Post level** of zero.
Check **GLOBAL**, page 3: **Channel vol**. This must not be zero.
Update the firmware and retry.

There is sound output although there should be none.

Check **HOLD** (must not be lit). Then, check **MOD**. It is quite likely that a modulation is present which lifts the volume over zero. **Osc1** and **2** are routed into **RingM** before the **Mixer**. If **RingM** is active, output will be heard even if **Osc 1** and **2** vol are zero. Also, some FX can make noise on their own, especially Bit Crusher. Remember that Xsynth has an external input and an audio interface, so the output might also come from there. Also, there might be a note sent through MIDI which got stuck. Press **OSC** and **LFO** together for 2sec.

I cannot access the system settings. When pressing Global, the display just says „Init Sound, Press ENTER".

Press **GLOBAL** again, then the system settings will be shown.

Xsynth does not react to MIDI.

Make sure that **Global>DINMIDIIn To Engine** is set to **Enable**.
Check if **Global>MIDIRxCh** is set to **ALL** or the same MIDI channel as the sending device.
Check your cable connections. The MIDI Out of the sending device needs to be connected to the MIDI In of Xsynth. DIN MIDI on Xsynth uses TRS-A type connections. Use a DIN to 3.5mm jack adapter if necessary.
If you are using a 3.5mm to 3.5mm jack cable, make sure the other device has the same pin configuration as Xsynth (TRS-A, Tip=signal, ring=ground).

Xsynth does not connect to my computer through USB.

Do not use front USB, a USB hub or longer extension cables. Try other cables or different USB ports on your computer. If you use a computer which is so fancy that it does not have native USB support, try a different hub/bridge adapter or try another computer. Remove all other USB devices except for a mouse. Check if dust has accumulated in Xsynth's or your computer's USB ports. Make sure the Audio Interface is activated in the **GLOBAL** menu.

Xsynth is not recognized as a MIDI device by a standalone device with USB MIDI host.

Some standalone sequencers or controllers with MIDI host have difficulties with Xsynth, as this is a combo device with MIDI and audio interface. Try disabling the audio interface in **GLOBAL** or use DIN MIDI instead.

I cannot change the sampling rate of the audio interface on my computer.

Xsynth's internal synth engine works with 96kHz sampling rate. The audio interface is coupled to this sampling rate and cannot be changed.

After Xsynth has been connected to my computer, the sound output through another interface is distorted.

Connecting Xsynth can change the sampling rate of your system. Go to the settings of your primary audio interface and switch the sampling rate back and forth two times. Otherwise, unplug and replug your primary audio interface.

When connecting Xsynth to the computer and using the Editor, there is a strange error message like „Not enough memory available" or similar, although the computer has plenty.

On some OS, Xsynth cannot be connected through MIDI to the Editor and your DAW at the same time. In this case, make sure only your DAW or the Editor is open, not both.

I cannot record a signal on Aux In on my computer.

Check if the AUX cable is plugged in correctly. Open the **Editor** and select the **OSC** page. Look at the **MIXER** section. Set **Ext Source** to **Analog** and make sure the **External** value is not zero.
Xsynth does not have a mic preamp and cannot supply phantom power. Use an external mic preamp if necessary.

Xsynth has crashed and does not react to any inputs anymore.

First, restart your device. Make sure Xsynth is using the most current firmware. Check back with our web site for the current version. This may be caused by sending too much data through MIDI to Xsynth. Avoid sending MIDI data to Xsynth which was meant for a different device. If possible, avoid sending unneccesary CC or Sysex messages.
If you can reproduce a crash, please contact our support team with a detailed description and if possible, how to reproduce the issue.

There is an issue with Xsynth while the device is connected to other hardware.

Disconnect everything but a power supply and a pair of headphones. If the issue is gone, it may possibly be caused by one of the other devices and not Xsynth itself. Connect the other devices one by one and re-check inbetween if the issue is back. This might help identifying the source.

Xsynth's display keeps saying „Updating" or „Updating, please wait".

Please observe the status window in the Editor. When the Editor says „Update finished", then restart Xsynth to finish the updating process.

The updating process has failed.

Check your USB connection. Restart the Editor once and reboot Xsynth two times. Then try updating again.
If your computer recognizes Xsynth as a device named „RWAHK" or similar, press **Refresh** in the Editor and retry performing the update. Repeat this process up to 5 times if needed. If it still does not work then, please contact our support.

Xsynth's display shows weird glitches and the menus reacts in strange ways.

It is quite likely that the OS has not been written correctly onto Xsynth's memory. Perform a firmware update. If you already have the newest version available, install it again.

There is a setting I would like to adjust, but I cannot find it on Xsynth!

Many additional settings can be accessed through the **Editor**. Sound-related requests might be solved through the Mod Matrix.

The Aftertouch or Modulation button do not seem to do anything.

These controls have to be used in the Mod Matrix to a destination before they have any effect. Note that the **MODULATION** button (=Mod wheel) is pressure sensitive.

The LFOs do not seem to have any effect.

Check the **Rate** value, this has high resolution in the ultra low range.
Value 0=no effect, 1=1rev per 55sec, 40=1Hz approx.

On some Mod Slots, the destination list seems to miss some items.

Check if there is another Mod Slot with **To Node [number of the Slot with missing entries]** as a destination. You cannot daisy-chain or cascade the Node modulations.

I have connected Xsynth to a different device, but Aftertouch messages do not seem to be transmitted.

Xsynth produces Polyphonic Aftertouch, not all devices are compatible to this. If necessary, use the **Editor>GLOBAL>AT type>Channel** setting. Then, Xsynth sends Channel Aftertouch messages which can be received by most devices.

Xsynth wildly plays a lot of notes which cannot be stopped!

Deactivate **ARP** and **HOLD** by pressing the buttons at the left hand side of the keyboard. If you are connected to a computer or other MIDI device, make sure you have not created a MIDI feedback loop.

How can I change the internal tempo of Xsynth from 120 to something else?

Use **Arpeggiator>Tempo**.

How do I connect a Sustain Pedal to Xsynth?

Connect an external MIDI device to Xsynth which has a pedal jack and connect your pedal there. Send the MIDI output of this device to Xsynth. You may also use the **HOLD** button on Xsynth instead. Due to its compact size, Xsynth itself does not feature a pedal jack.

Xsynth sends a Sysex message when idle.

This is a „Keepalive“ signal and can be ignored. It lets the Editor know that Xsynth is still connected.

Technical Specifications

Xsynth

Compact synthesizer with integrated keyboard, MIDI interface and audio interface
Solid aluminum chassis

Synthesizer

Architecture: Virtual analog subtractive synthesis, based on samples
Polyphony: up to 10 voices
3 Oscillators
3 LFOs
3 AHDSR Envelopes (Attack, Hold, Decay, Sustain, Release)
Mod Matrix slots: 16
Patch memory: 512 sounds (4 banks with 128 patches each)
3 effect sections, EQ

Keyboard

25 velocity-senitive keys with full width and compact length, derived from Xkey series
Polyphonic Aftertouch
Arpeggiator, Glide, Octave Shift, Hold functions
Pressure-sensitive Modulation and Pitchbend buttons

Connections

USB-C: for power, audio and MIDI
DIN MIDI Input and Output on 3.5mm TRS jack each (TRS-A)
Headphones, Line Out, Aux In on 3.5mm TRS jack each (2ch per plug, unbalanced)

Audio interface

96kHz/24bit
Recording of synth engine output directly to computer
Playback from computer is routed to Phones and Line Out
Recording of external signals through Aux In

MIDI interface

Connects Computer with Xsynth itself through USB MIDI
DIN MIDI In and Out can be bridged to USB

Free Editor app for Mac and Windows

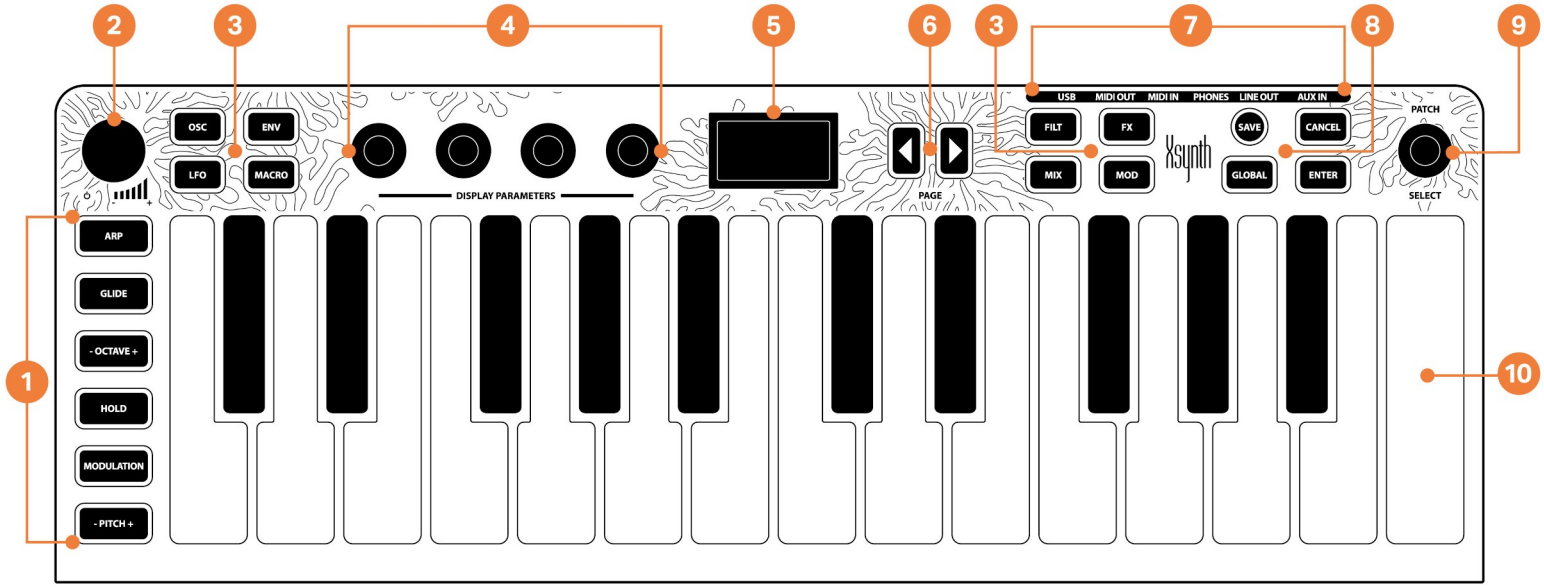
Power

Bus-powered over USB-C
Power consumption: <400mA at 5V / <2W

Dimensions

387mm (width) x 148mm (depth) x 27mm (height, including encoders, caps and rubber feet)
Weight: 634g

5. General Overview



1 Keyboard control buttons

2 I/O and Volume potentiometer

3 Module buttons

4 Display Parameters encoders

5 Display

6 Page ← → buttons

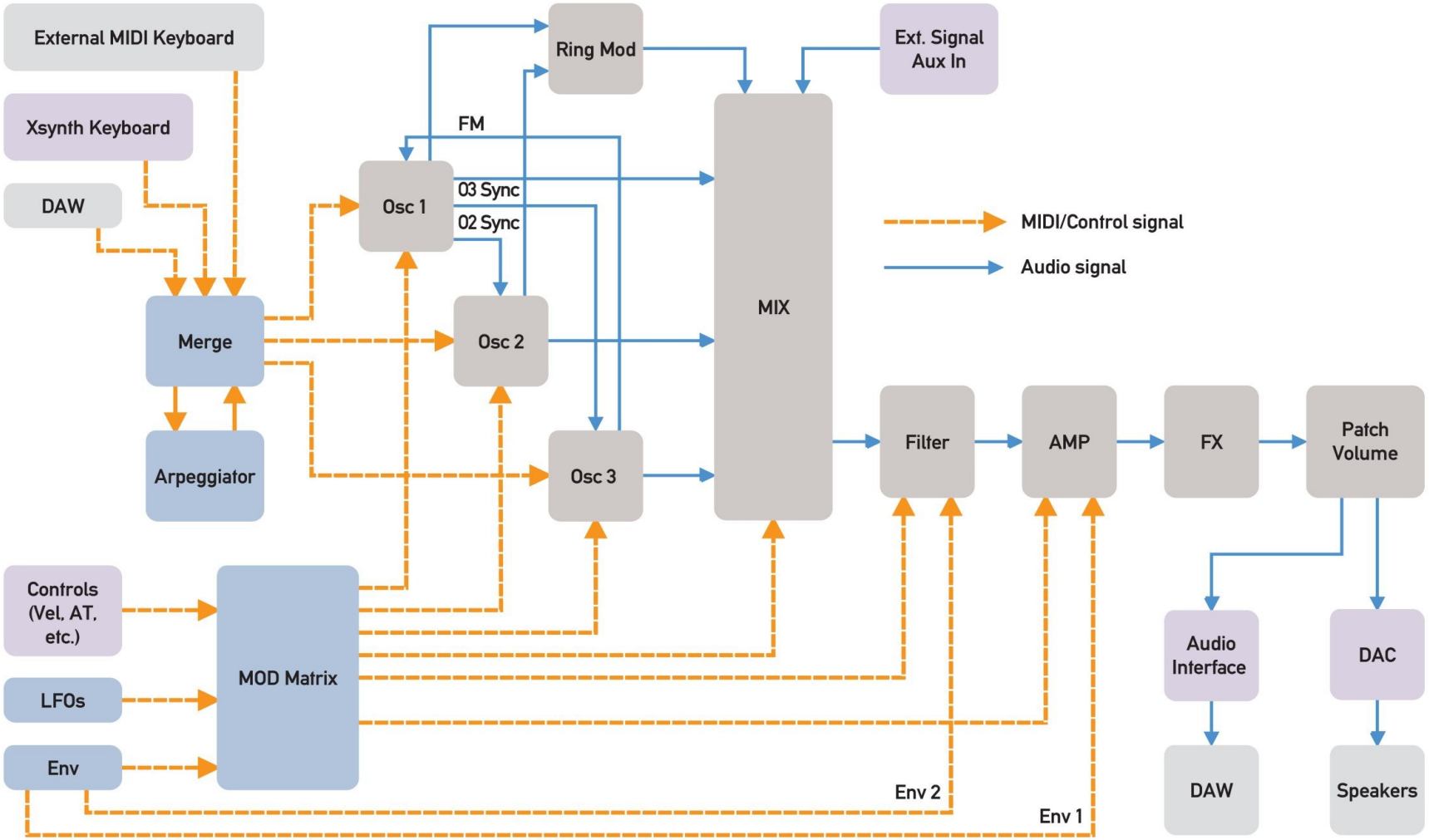
7 Connectors

8 System buttons

9 Patch Select encoder

10 Keyboard

6. Synth engine block diagram



Operation Instructions

6.1 How to understand this manual

NOTE: Important information about technical details and useful tips. You may run into difficulties if you do not read these hints carefully. Even if you only flicker through this manual, you should definetly take a look at these hints.

WARNING: Not following this advice can result in one or more of the following: damage, injury, loss of data, voiding warranty, sad cats and very angry support staff.

Controls, buttons and connections on Xsynth hardware and Editor are written in bold and with a capital letter, for example the **Osc button** or the **Volume** potentiometer.

Control substructures and menu layers are explained with **>**, for example: **Osc1>PWM**. Keep in mind that some settings on Xsynth can only be accessed through pressing the corresponding button several times, or by using the **Page** ← → buttons.

Some entries refer to different chapters with a single arrow, → **see corresponding section.** This has been done to avoid having to write the same paragraph multiple times.

Entries in **Table of contents** as well as hyperlinks can be clicked and will lead you to the designated chapter of this manual or to a website.

- Bullet points indicate a list of either instructions, menu entries or technical details.

Most values on Xsynth range from **0...127**. This is based on the MIDI protocol, which provides a 7-bit range for these numbers. While humans would count from 1...128, computers start counting at zero.

If you are new to synthesizers, you will find lots of explanations for the very basics in this manual. It might be a bit overwhelming at first because there is a lot of knowledge to take in before you will understand Xsynth. Therefore, we recommend to read this manual in small portions.

NOTE: Load this manual on your mobile device, carry it with you and read a few pages every time you have a few minutes. No matter where and when you take a short break – in the office, on a journey, at the fireplace, or even in the bathroom (but not under the shower): regularly read one chapter of this manual at a time. This will help you memorize all the info better than by reading it in one go.

Please do not print this manual unless absolutely necessary. This document is in A4 landscape format. Rotate it by 90 degrees to fit it onto a regular page.

6.2 Getting started

Open the box and take Xsynth out. Keep the box for later use. Unwrap Xsynth from the bag.
A USB-C cable is included in the small oblong paper package if needed.
There is a protection foil on the display, removal is optional.

Xsynth comes with free software so you can get started with audio production right away. There are postcard-sized vouchers included in the box. Please follow the instructions on these vouchers in order to get your free software. (Contents may vary depending on availability)

Place Xsynth on a flat, even surface where it has a safe stand. Xsynth should not move when the keys are being played.

NOTE: Many normal keyboard stands that are shaped like an X cannot support Xsynth, as Xsynth is not wide enough to bridge the gap between the upper two metal rods. Put a large solid board across these two rods where Xsynth can rest safely on, or use a table or laptop stand instead.
For example, the rear galley of an Airbus A350 (not included in the package) provides a fantastic place to put your Xsynth on. The crew might even start a spontaneous jam session with you.

WARNING: If Xsynth is in an unstable position, damage and/or injury may occur. Plus, spectators may experience schadenfreude.

WARNING: Keep Xsynth away from any liquids, food, dirt and any other substances which may get into the case and/or under keys. Do not let any kind of liquid get into any part of the device! Also, keep Xsynth away from excessive amounts of dust and sunlight. Do not operate or store Xsynth in moist, extremely hot or cold environments. Do not slam Xsynth into faces of people who do not like your music.

WARNING: This device can create sounds which can damage your sense of hearing when listened to at high volume levels and/or for prolonged time. Only turn up the volume as much as you need to hear the sounds clearly.

If necessary, you may clean Xsynth with a soft, lint-free dry cloth. Do not apply pressure to the plastic parts while cleaning. Do not use a microfiber cloth, as these can scratch the plastic surfaces. Do not use any cleaning liquids or alcohol, as they may damage the surface and make the plastics brittle. When Xsynth is not in use for longer amounts of time, cover the instrument with a piece of cotton cloth or put it into its original packaging.

7. Connections

Connect your cables before you switch on Xsynth. Preferrably also before you switch on your computer, if you decide to connect Xsynth with it.

You will definetly need:

- power through **USB**, from a computer, a separate power supply or a power bank
- headphones connected to **PHONES** or **LINE OUT** connected to a mixer/interface/amplifier connected to a loudspeaker setup.

Other connections are optional.

Please see the diagram on the next page for details.

7.1 Connection types and signal directions

Line out → Mixer/Audio Interface input
External line level audio signal → **Aux In**
Phones → Headphones (preferrably 32 Ohm)

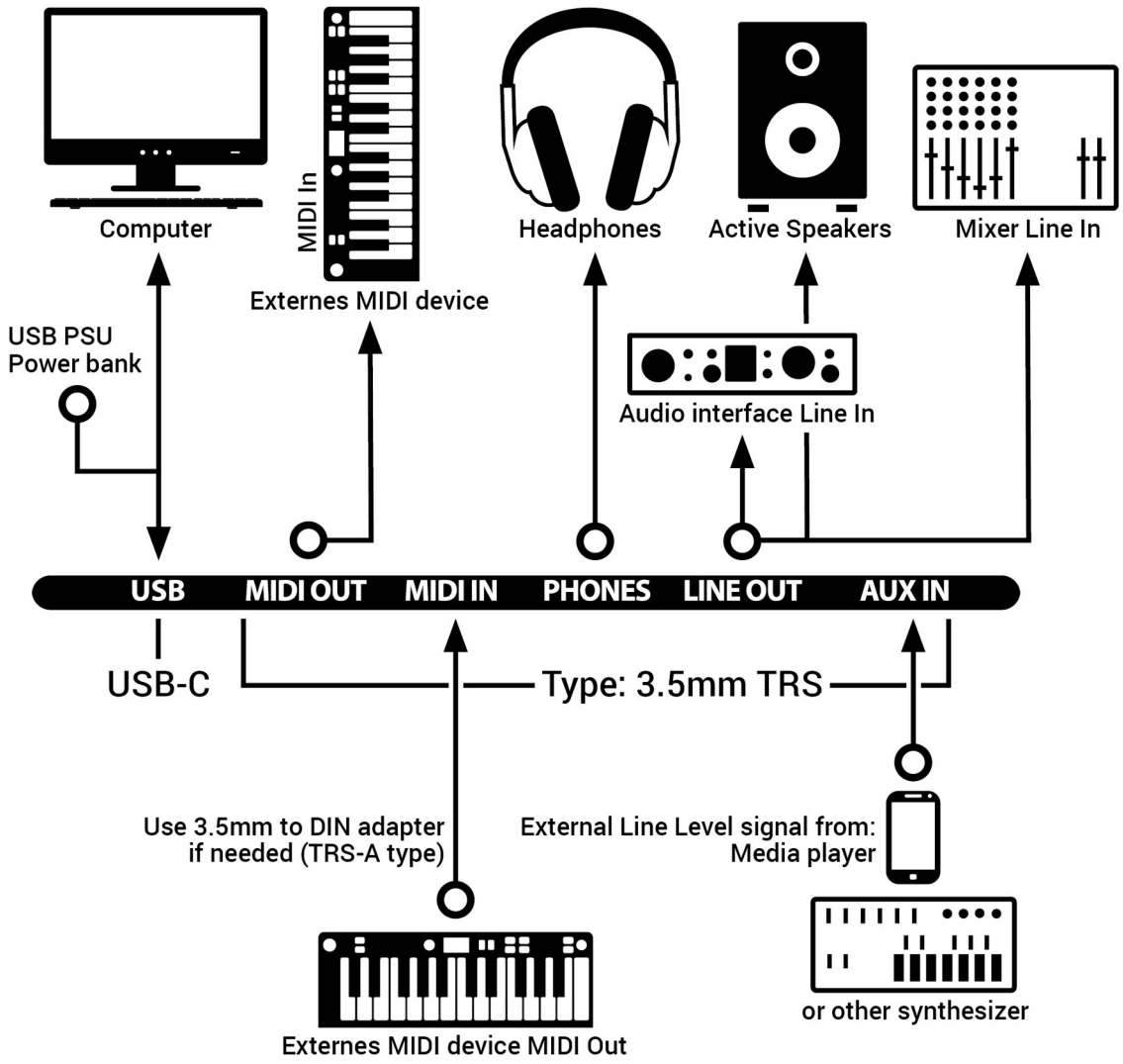
Xsynth **MIDI Out**
→ External synthesizer/keyboard MIDI In

External synthesizer/keyboard MIDI Out
→ Xsynth **MIDI In**

USB transmits power, MIDI and audio.

Cable types
USB: **USB-C**
All others: **3.5mm TRS** (outer shell diameter <10mm or they will not fit!)
DIN MIDI pin layout: **TRS-A**

PHONES, LINE OUT and **AUX IN** feature two channels on one stereo plug.
These audio connections are unbalanced. If needed, use a Y-cable with one 3.5mm / 1/8“ TRS plug on one side and two 6.3mm / 1/4“ TS OR two RCA plugs on the other side, depending on the other device.



NOTE: 3.5mm / 1/8“ plugs have an outer shell. This shell’s outer diameter must be below 10mm, otherwise the shell will be blocked by a ledge and the plug will not get a proper contact.

WARNING: Only connect Line level signals to Aux In. Do not connect any modular synthesizer output to the Aux In, as this will damage Xsynth’s circuitory.
Connect the MIDI ports of Xsynth only to other device’s MIDI ports, otherwise damage and/or injury may occur.
Never connect outputs with outputs. Also, never eat toadstools.

NOTE: We recommend using headphones with 32 Ohms or less. You may use higher rated headphones, but these might not produce enough output volume when used on Xsynth.

7.2 USB connection

Make sure you connect Xsynth directly with your computer. Do not use front USB, or a USB hub inbetween.
If you are using Xsynth with a USB PSU, ensure that this PSU is connected to the same wall output as the device(s) Xsynth is connected to.
Xsynth will appear as a combo device, featuring MIDI and audio. Some other standalone synthesizers/grooveboxes/sequencers etc. with USB MIDI Host may not be able to detect one or more of these modes. In this case, you can deactivate the audio interface in **GLOBAL**, then your other device can use the MIDI input of Xsynth.

Your computer may detect Xsynth as two devices: one audio interface/sound card and a MIDI device/multimedia controller. Your DAW program should recognize both of them easily.

8. General controls, display

Switch Xsynth on by turning the **I/O knob** clockwise. This also regulates the output volume on **LINE OUT** and **PHONES.**

Turn the PATCH SELECT encoder on the upper right corner of the device to change through patches. Press some keys to hear a sound.

To adjust the sound settings: Choose a Module that you want to adjust, for example the Oscillators. Press the corresponding button (**OSC** in this case) to call up the Page for this module. To create an Init patch, press **GLOBAL**, then **ENTER**. To access the system settings, press **GLOBAL** several times. If you want to use MIDI In or Out, you may have to activate it in the GLOBAL settings.

The button will light up, this shows which module is currently selected. Adjust the settings shown on the screen by turning the four **DISPLAY PARAMETERS** to the left hand side of the screen. These encoders are mapped to the parameters on the screen from left to right or from top to bottom. Press the button of the Module again to access further instances (OSC1/2/3 etc.) Press the **PAGE** ← → buttons for advanced settings .

To create an Init patch, press GLOBAL, then ENTER. To access the system settings, press GLOBAL several times. If you want to use MIDI In or Out, you may have to activate it in the GLOBAL settings.

Press one or more keys to hear a note. The display now shows the **Wave Display**, an oscilloscope view of the current output signal. When you release the keys and the note volume diminishes, the oscilloscope view goes away after a few seconds. Then, the values of the currently selected module will be displayed again.

NOTE: You can adjust the oscilloscope view display time or switch it off entirely in **Global>WavDisplay** and **Global>DispTime.**

9. Keyboard and controls

Xsynth features a compact keyboard with 25 keys, derived from our Xkey series. Key width on Xsynth is the same as on Xkey, just the height has been shortened. Key mechanism consists of two crisscross levers and can be pushed at any position without getting wedged.

9.1 Velocity, Polyphonic Aftertouch

The keys produce **Velocity** and **Polyphonic Aftertouch**. Every key has its own sensor for both values.

Velocity measures how fast every key is pressed. At every beginning of a keystroke, this value is measured and passed on to the single corresponding voice in the Mod Matrix. This value increases the faster the key is pressed down.

Polyphonic Aftertouch measures the additional force applied to the key after the keystroke, while the key is held and pushed further. The more pressure, the more the value increases. Also, this value is measured for every key and sent to every single note individually.

NOTE: In order to activate aftertouch: After the initial keystroke, reduce the pressure and then add pressure again. Also, keep in mind that the AT reacts to very light pressure, so make sure not to overdrive the sensors.
If your finger tips lose color, you are pressing to hard.
Also, Polyphonic Aftertouch and Velocity will not do anything unless they are assigned to a modulation in the Mod Matrix.
Our tip: Use **Source: Poly After.** → **Filter Cutoff** or **Resonance.**

You can switch the Aftertouch to Monophonic/Channel Aftertouch in **Editor>Global>Touch>AT type>Channel**.

Then, the whole keyboard aftertouch sensors will be switched together and act as one Aftertouch sensor. Every note will receive the same Aftertouch value in this case.

WARNING: Xsynth's keys have been constructed to withstand heavy use, but only to a certain extent. Slamming the keys overly hard will destroy your warranty, your device, and your fingers (in that order).

9.2 Keyboard control buttons

ARP: Arpeggiator settings. Calling up the **ARP** page for the first time after the device has started will activate the Arpeggiator. Pressing the **ARP** button again will toggle between on and off. Top line of the **Display** will state if the Arpeggiator is ON or OFF. Please read the next chapter for further information → see Arpeggiator chapter

GLIDE: Sets Portamento transitions between played notes. Press the **GLIDE** button to call up the Page and to activate **GLIDE.** Pressing the **ARP** button again will toggle between on and off. Increase **Rate** for longer transition times. **GLIDE** also works on polyphonic sounds, as it blends the individual notes of a chord to each note of the next chord. **Mode: Trig**/**Legato** determines if the Glide is active after releasing all keys or not.

- OCTAVE +: Pressing this button at the left half will shift the entire keyboard down one octave.
Pressing the right half shifts the keyboard up. This change will affect all oscillators alike and remains active when you load a new Patch.

You can shift octaves several times in a row. To go back to normal pitch, adjust with – and + until the **Display** says **Octave: 0**.

HOLD: Works like a Sustain pedal. When **HOLD** is active, all notes will continue until the **HOLD** button is released (**Momentary**) or pushed again (**Latched**). The **HOLD** button LED is lit for as long it is active. Additionally played notes will also continue. If you exceed Xsynth's polyphony by playing more notes, the new notes will replace the old notes. In **GLOBAL**, **SustainMode** can be switched between **Latched** and **Momentary.**

MODULATION: This is a pressure sensitive button that resembles the Modwheel on other devices and generates Modulation messages through MIDI (CC1).

The harder you press, the higher the output value. Lowering pressure the button sends smaller values and when the button is fully released, value 0 is sent as the last message.

- PITCH +: Resembles Pitch bend on other keyboards. This button has two halves which are pressure sensitive each. Pressing on the left half bends the pitch downwards, and upwards on the right half.

The more pressure you apply, the larger the pitch bend. Releasing the button returns it to the normal (zero) position.

Is it not cruel when poor innocent notes are disharmonized because of suppression? Therefore, we only use this feature sparsely.

NOTE: Pitch Bend range in semitones can be adjusted in **Editor>OSC>PITCH>Bend Range** or on **Xsynth Osc>Osc Global>Bend**.

9.3 MIDI PANIC

Press **OSC** and **LFO** and hold them for two seconds. This will send a message on MIDI CC 123 (All notes off) and a Note Off message for every note of the current channel.

After you release all keys and wait until the Envelopes and FX have faded out, all notes on Xsynth will fade out under normal circumstances. Same goes for an external MIDI device controlled by Xsynth. If a note on Xsynth keeps playing although HOLD is not active and no MIDI input is present, you may use the MIDI PANIC function.

10. Arpeggiator

When notes are played on Xsynth's keyboard, the Arpeggiator uses these as an input and creates a pattern of notes based on your input. Pressing the ARP button calls up the Arpeggiator Page and switches the Arpeggiator on and off. Current state is shown on the top line of the display on the Arpeggiator Page.
When Arpeggiator is on, the **ARP** button LED blinks at the rate of **Tempo**.

Type: Chooses the basic direction/mode for the Arp. **Up** and **Down** and combinations of these are available, as well as **Random** and **Played**. In these modes, a monophonic melody line is created when at least one note is played. Notes will jump back and forth between and around the input notes. Direction is determined by the selected type.
Except for **Played**, this mode keeps the order of the notes as they were played.
Chord creates a rhythmic pattern by chopping the chord into shorter notes. These notes remain on the same pitch as the notes entered on the keyboard.

Tempo: How fast the Arpeggiator is running in beats per minute. This setting sets the internal clock of Xsynth.
If **Sync** is On, the Tempo will be taken over from external MIDI clock signal and the Tempo setting cannot be changed manually.

Octave: How many octaves above or below the Arpeggiator extends around the base notes.

NOTE: Notes created by the Arpeggiator are sent out through MIDI.
More controls are available in the **Editor>Aux>Arpeggiator**.
When using **Sync** with external clock signals which have jitter, issues with the Arp may arise.

11. Display Parameters

The four encoders to the left hand side of the Display are controlling the up to four on-screen parameters, either from left to right horizontally or from up to down vertically. Turning to the right increases the value and vice-versa.
For example:

- Press **OSC**.
- Then, **Osc Wave** can be controlled by the leftmost encoder, **Coarse** tune by the second etc.
- Now press **MOD** two times.
- The leftmost encoder scrolls through **Source**, second encoder selects **Destination** and third encoder the **Amount**. As there is no fourth value on this screen, the rightmost encoder does not control anything.

NOTE: All encoders on Xsynth have acceleration detection. This means that the faster you turn an encoder, the bigger the value changes per turn. If you cannot select a value precisely enough, try turning the encoder slower.

CC Send

By popular demand, we inplemented a Page which turns the four **Display Parameters** encoders into MIDI CC transmitters.
Press **MACRO** and **GLOBAL** simultaneously. Now the **Display** shows a set of four CC numbers.
These are mapped to the four **Display Parameters** encoders accordingly. The lowest row of this Page shows the current CC value.
When one of the encoders is turned and the value is changed, a MIDI CC message with the new value will be sent. When reaching 127 and turning further, the value will NOT jump back to 1.

There are four Pages available with a different set of CCs each. CCs will be sent on the Channel that Xsynth is set to in **GLOBAL>MIDIRxCh**.

Use the MIDI Learn feature of your DAW to map these CCs to a value in your computer. Consult the documentation of your DAW on how to map a MIDI controller or on how to use MIDI Learn.

11.1 List of default CC numbers

DP Encoder	1	2	3	4
Page 1	45	46	47	48
Page 2	66	67	68	69
Page 3	80	81	82	92
Page 4	94	95	96	97

The CC numbers may seem odd, but they have been chosen so that the CC messages generated from this feature will not interfere with Xsynth's other settings when sent back towards Xsynth.

NOTE: You can change the CC assignments in **Editor>Global>MIDI CC** at your own risk.
CCs above 119 are not available for safety reasons as they can suddenly mute outputs of Xsynth or other MIDI devices.
In some cases, these messages could even render other devices mute or permanently unusable, hence these CC numbers cannot be sent by this feature.

12. Oscillators

12.1 Introduction

Oscillators are the heart of Xsynth. For this reason, we have put some extra love into this section.

An Oscillator produces an alternating signal in the audible range at a desired pitch. Xsynth has three Oscillators, each of them can be set independently and be active at the same time.

For every note being played, a set of these three oscillators is present and produces a basic audio signal at the pitch corresponding to the note. Then, these signals are handed to the next stages of Xsynth's signal processing.

Xsynth is based on a samples. The Waveforms of the Oscillators are stored as wave files on Xsynth. The files have been polished, furnished with loop points and grouped together as sample sets. One sample set is visible as one Osc Wave. The timbre of the sounds differ a lot across the keyrange. Try them out!

We included basic waveforms, ready-to-use sounds from many categories, field recordings and drumkits. Drumkits have many different one-shot sounds within one sample pack, so make sure to press several keys when trying them out.
Most samples are looped and will play as long as a note is held. Some are one-shot, especially the drum sounds.

NOTE: Open the Editor and click on **OSC>Osc Wave** selection. There, you can see all available Waves and the groups in which the Waves have been organized.

12.2 Walkthrough

- Create an Init Patch by pressing **GLOBAL**, then **ENTER**.
- Press **OSC** and if the display does not show Osc 1, then press the Osc button again until it does.
- Play one note on the keyboard. You will hear the first **Osc Wave** on its own.
- While holding the key, listen to the waveform. In this setting, you will hear the pure, unchanged waveform without any alteration or effects.
- Note how the waveform changes over time. Most waveforms are looped and play on for as long as you hold the key, some are just one-shot and will only play once.
- Release the key, turn the leftmost of the **Display Parameters** encoder slightly clockwise until the next **Osc Wave** is selected.
- Press the key, listen to the sound, release the key, go to the next **Osc Wave** etc., etc.

NOTE: Many **Osc Waves** sound different in the Attack phase than the rest of the waveform. We recommend to release the key and press it again for each new **Osc Wave** you listen to.
Also, many **Osc Waves** change their timbre depending on note and octave. Use the **– OCTAVE +** button between keystrokes to switch octaves up and down.

Listen through all **Osc Waves** and memorize how they sound. These waveforms are the basis for all further processing of the synth engine's modules.

12.3 Common features

Each of the Oscillators has the following features:

- **Wave** selection
- Tuning in **Coarse** (semitones) and **Fine** (Cent, one hundreth of a semitone)
- **Keytrack ON/OFF**: Decouples the **Osc** from the keyboard. When OFF, this will tell the Osc to play at only one pitch, regardless of which key is pressed. Use a **Modulation in Mod, Constant>OSC1/2/3 Pitch** for tuning if needed.

12.4 Osc Global features

Accessed through **Osc, Page** ← →.

- **FM**: Frequency Modulation amount. **Osc3** modulates the pitch of **Osc1** at audio rate.
- **PWM**: Pulse Wave Modulation. Available on **Osc1** only. This narrows the width of square waves and many others, but does not work for all Osc waves. Standard value is 64, which has no effect.

NOTE: PWM resembles a modulation with a square wave on volume. On some longer Osc waves, using PWM can result in a few seconds of silence, then a few seconds of sound etc.

- **O2sync/O3sync**: Hard Sync between **Osc1+2** and **Osc 1+3**
- **Poly**: Changes between polyphonic and monophonic mode for the current Patch
- **Unison**: Stacks several voices on top of each other. Count determines how many voices are stacked onto a single key, and **Detune** spreads the tuning of each voice.

NOTE: Using **Unison** makes a fatter sound, but reduces the polyphony! Unison **Count** of 4 leaves you with 2 voices, and 1 voice for **Count** levels over 4. **Count** and **Detune** settings are only visible when Unison is ON.

- **Drift**: Available on **Osc3** only. On each keystroke, the tuning of this Osc is chosen randomly. The note stays constant in pitch while being played.
- **Bend**: Controls Pitchbend range of the **-PITCH+** button in semitones

13. Envelopes

13.1 Overview

Envelopes are control signal generators which start every time a key is pressed. First and foremost, Envelopes are used to control volume over time, but they can be also used to control other parameters.
Xsynth has three **Envelopes**, each of them has five stages:
Attack, Hold, Decay, Sustain, Release.

NOTE: Env2 and Env3 can be selected by pressing the **Env** button several times. **Hold** can be accessed by pressing **Page** →.

Env1 is connected to Amp Volume. **Env2** can be connected to **Filter Cutoff** using **Filter>EnvAmt.**
Envelopes themselves cannot be heard, as the resulting values are not frequencies in audible range.

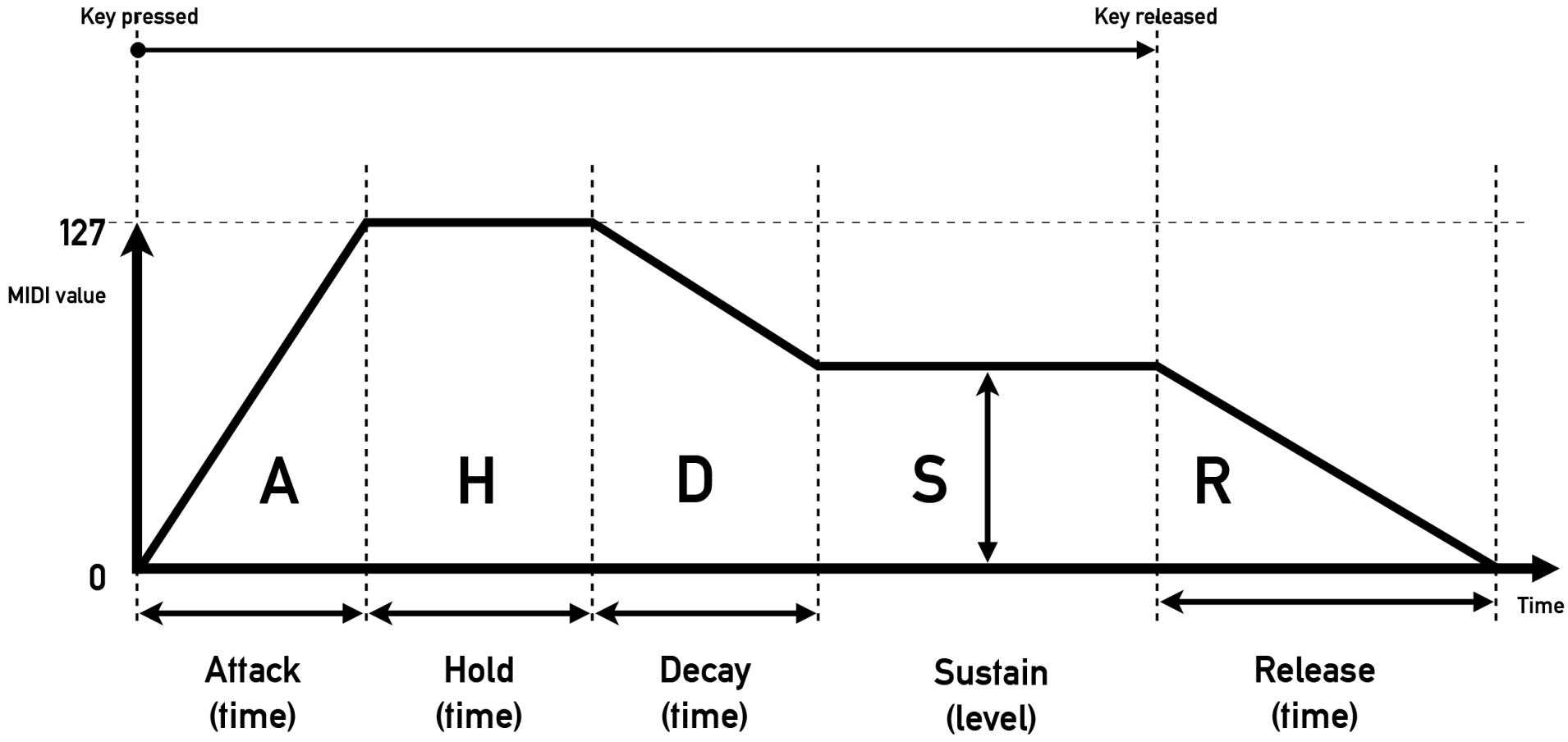
13.2 Function

When you press a key, the **Envelope** starts running from 0 to its full amount (127).
The **Attack** value describes how long this will take. If **Attack** is 0, the Envelope value output will immediately jump to 127 when the key is pressed.

Hold describes how long the maximum value is continued.
When the **Hold** time has run out, the **Envelope** output value will diminish again until it reaches the **Sustain** level.

Sustain is the level that remains constant as long as the key is being held. The transition time between the full level and the **Sustain** level is called **Decay.**

As soon as the key is released, the Envelope output value goes to zero again. Transition time between **Sustain** level and zero is called **Release.**
Then, the Envelope is reset and starts again on the next keystroke.



To sum it up:

- **Attack:** Fade in time from 0...127
- **Hold:** How long 127 is held
- **Decay:** Fade time from 127 to Sustain level
- **Sustain:** Level that is kept constant as long as key is held
- **Release:** Fade out time from Sustain level to 0

Confused? Let us take a look at some examples.

13.3 Walkthrough

- Create an Init patch (**GLOBAL**, **ENTER**). Press **ENV**. You will now see **Env1**, which is linked to Amp Volume by default.
- Now all **Envelope** values are set to 0, only **Sustain** is at 127.
- Press a key on the keyboard and release it after a few seconds. You will hear a simple sound which transitions to full volume immediately after you have pressed the key, and it goes silent immediately when you release the key. Also, there is no volume variation while the note is held.

This happens because:

Attack=0: Volume goes from zero to full value immediately

Sustain=127: Volume remains at full value as long as the key is held

Release=0: Volume goes from Sustain level to 0 immediately

(**Hold** and **Decay** play no role here since **Sustain** is at full, therefore there is no transition between the end of **Attack** and the **Sustain** level.)

- Now set **Attack, Decay, Sustain** and **Release** of **Env1** to a value about 70. Again, press a key on the keyboard and release it after a few seconds.
- You will hear the same sound, but this time, the volume swells up, then diminishes a bit and fades out smoothly when you release the key.

This happens because:

Attack=70: Volume goes from zero to full value slowly

Hold=70: Volume remains at full for a while

Decay=70: Volume fades to Sustain level smoothly

Sustain=70 :Volume remains at medium value as long as the key is held

Release=70: Volume fades out smoothly

- Experiment with these values and try different combinations!

NOTE: Env3 is not connected to anything by default, you have to make the connection yourself in the **Mod Matrix**. You can also link **Env1** and **Env2** to something else there. You can make these modulations in parallel to their pre-set use.

NOTE: The individual Envelope stage values are available as destinations in the Mod Matrix. Normally, the Envelope gradients are linear, but you can also modulate the envelopes with themselves in order to create warped gradients.

If you want to decouple **Env1** from Volume, go to the **Mod Matrix** and add a modulation with **Constant** → **Amplitude -100%**.

14. LFOs

While the **Envelopes** are one-shot control signal generators, **LFO**s produce cyclic control signals.
LFO stands for Low Frequency Oscillator. Xsynth features three **LFO**s which range from approx. 0.018Hz (≈55sec/period)...90Hz. Hence why these are called low frequency, which also sets them apart from the Oscillators in the **OSC** section who can produce frequencies well over 20.000Hz.

NOTE: The LFOs themselves are not audible. They must be used as **Sources** in the **Mod Matrix** to have any effect.

Every note that is being played gets its own set of these three LFOs, which start by default at zero when each note begins. You can synchronize these LFOs with **LFO Global On/Off**.

Each LFO has the following parameters:

- **Wave**: Sets the shape of the LFO. Noise can be used as a random generator.
- **Global On/Off**: Switches between individual LFO per note or one for all notes
- **TempoSync**: Synchronizes this LFO to incoming MIDI clock. When active, **Rate** switches to fractions of beats. 1/1 means one LFO cycle per one beat etc.
- **Rate**: Cycle speed of this LFO. 0=no effect, 1=1cycle/55sec, 40=1Hz, 127=90Hz (Values approx.)
- **Delay**: Starts the LFO a certain amount of time after the keystroke
- **StartPhase**: Starts the LFO from a later point of the wave

15. Macro

Offers shortcut access to some parameters of Xsynth. Pick your favorite controls and arrange them onto to one set of the four **Display Parameters** encoders as you like.
You can map up to 3 parameters onto one Macro control.

Press **MACRO** once. Xsynth will now display **M1...4** parameters. Turn the encoders to change values.

Press **MACRO** again to get to the **Macro Edit M1** page (1/12). Here, you can edit:

- **Param1**: Destination for M1. A selection of control destinations across Xsynth are available, part of the list of the Mod Destinations.
- **Min:** / **Max**: Sets the borders of the control range. This limits the Macro control range to a definable area. Default: 0...127.
- **Type:** Spread: Macro control changes original value proportionally to the original value. Absolute: Macro control changes destination value immediately.

Press **Macro** 3x to get to **M2 Param 1** (Page Macro Edit M2 4/12).
Make sure you do not set M2 Parameter 1 to M1 Parameter 2, unless you want both of these parameters mapped to the same encoder.

NOTE: Macro settings are stored globally, not per patch. If the settings do not persist after reboot, use the **Editor>Macro>Save to Xsynth** command.

NOTE: Press **MACRO** and **GLOBAL** to access CC Send.

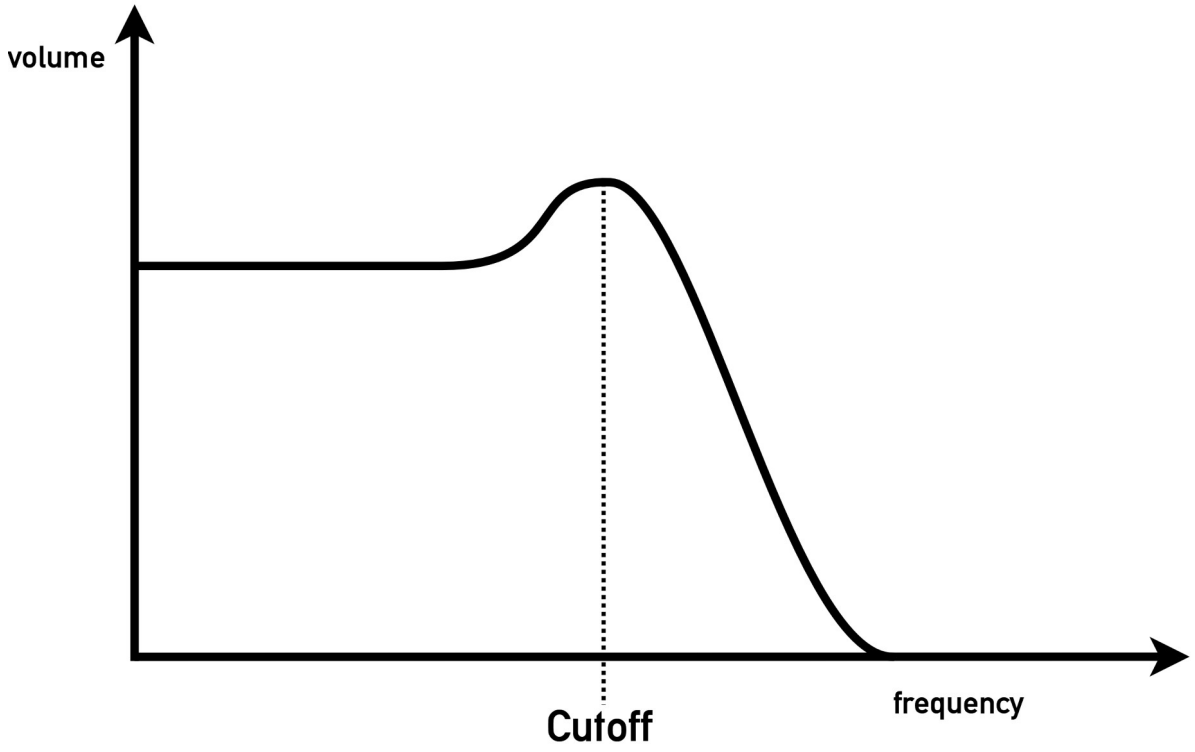
16. Filter

16.1 Introduction

Xsynth is based on subtractive synthesis. This means that the basic sound is created by oscillators, then a filter is applied and subtracts part of the signals until the desired timbre is achieved. Think of a block of marble: By chiseling away part of the stone, a wonderful sculpture is crafted. The oscillators provide the stone, the filter is your chisel and hammer.

First, let us take a look at the most commonly used filter type, and how it works.

This is a so-called low pass filter. It removes the high-pitched frequencies from a signal (right hand side) and lets only the frequencies around the cutoff frequencies and below (left hand side, area under the curve) pass through.



Ever seen the visualization with the moving, jumping bars on a stereo system or media player? This depicts the volume of frequencies across the audio range. Low frequencies are on the left and high frequencies on the right hand side, like in the diagram above.

With a low pass filter, you can reduce the height of the frequencies/jumping bars to the right hand side of the **Cutoff** value. This smoothens the signal.

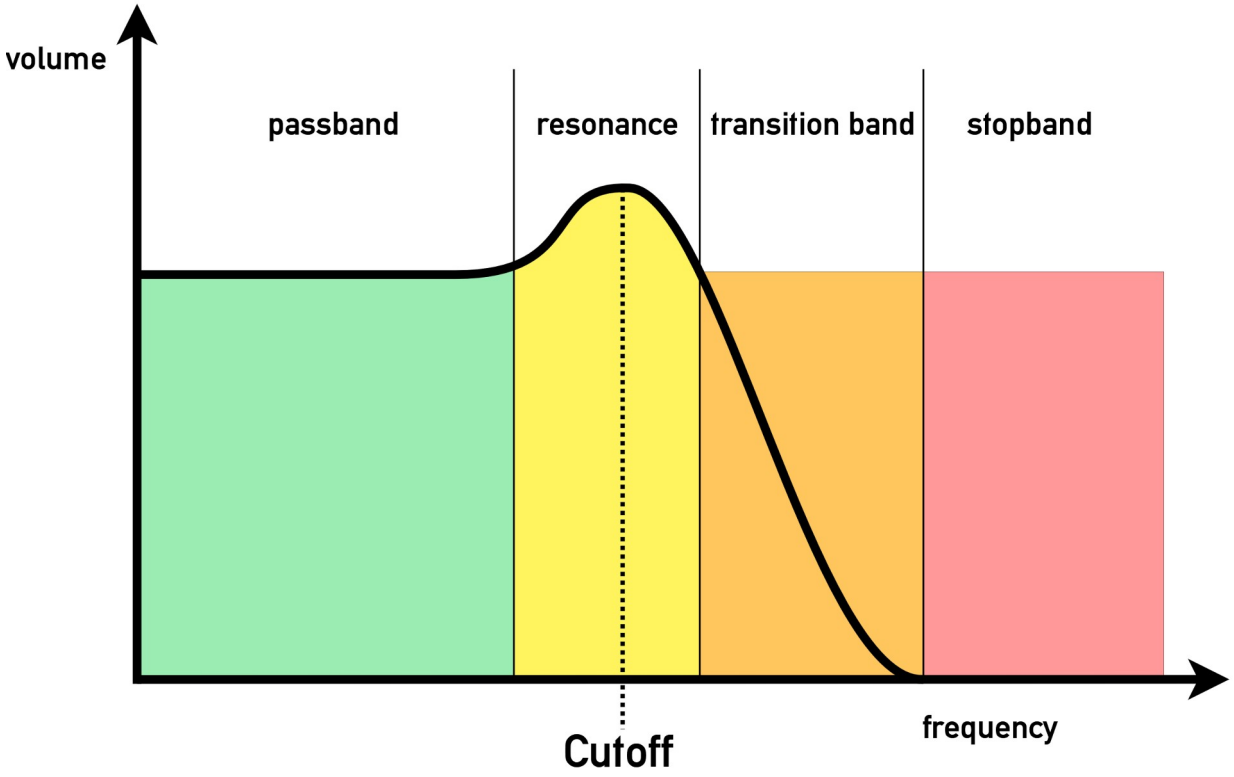
On an oscilloscope or the **Wave Display** on Xsynth, you can see corners of various signals (for example square or sawtooth wave) getting rounded off. This effect increases the more you turn the **Cutoff** downwards.

If this reminds you of an equalizer, you are correct! Each band of the EQ acts as a single filter. However, these usually cannot change the sound as much as the filter on a synthesizer.

First generations of filters in synthesizers consisted of entirely analog circuits. Contrarily, Xsynth features a fully digital filter section. Otherwise, we would not have been able to fit it into this compact case. Xsynth has a multimode filter, with settings for 24dB and 12dB slope, as well as low pass, band pass, high pass mode. More on that will follow later in this chapter.

There is one filter setting per patch and the filter can be set into one mode. Every voice gets its own filter, similar to the Envelopes and LFOs.

Let us take a closer look at each of the sections of the filter curve.



- **Passband** (green): Frequencies which pass through the filter unchanged
- **Cutoff** (dotted line): Boundary value for filter
- **Resonance** (yellow): Area around the cutoff. Lets original signal pass with definable augmentations/distortions
- **Transition band** (orange): Slope zone where less and less frequencies get through
- **Stopband** (red): Frequencies removed entirely by filter

Please read until the end of this chapter for further information.

Filters do not just cut away some of the frequencies and leave you with the rest. In fact, filters also add something to the signal. In the area around the Cutoff value and the transition band, slight distortions and colorations appear, adding to the character of the overall sound of a synthesizer.

If the Filter was perfect with no distortions and no impurities, the resulting would sound sterile and lifeless. Also, an ideal filter with no distortions would be mathematically impossible.

16.2 Cutoff

The central value for the filter. It determines the point at which the filter starts cutting away and coloring the sound. On Xsynth, **Cutoff** has double bit resolution, hence why the maximum value is 16383 (=2^{14}-1) instead of 127 (=2^{7}-1). This allows for tuning the filter precisely to certain frequencies or even notes.

On **Low pass** filters, the default **Cutoff** value is at full (16383). On this setting, no frequencies are filtered out. Turn it down to cut more high frequencies away and to smoothen the sound.

Default for **High pass** is 0. On this setting, no frequencies are filtered out. Turn it up to cut more low frequencies away and make the sound hissy and thin.

Band pass does not have a default value as it always cuts away frequencies below and above the cutoff.

16.3 Resonance

This parameter controls the amount of frequency augmentation which is applied around the cutoff frequency.

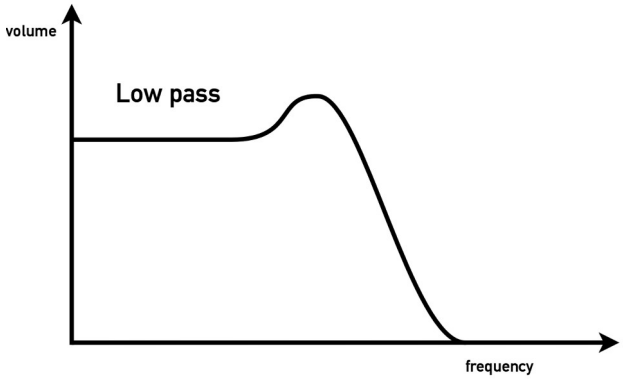
This is basically a controllable feedback loop. Turning this up results in nasal, whistling or zappy sounds. Then, move **Cutoff** to hear the result better.

WARNING: The more you turn this value up, the more the danger of clipping and brutal distortions. This can lead to damage of hearing, devices and to get beaten up by the sound technician.
On value 127, the filter goes into self-oscillation mode. Then, the filter will start whistling on its own, even when no input signal is present.
Also, keep in mind that this overdrive can also be achieved with modulations, so be careful.

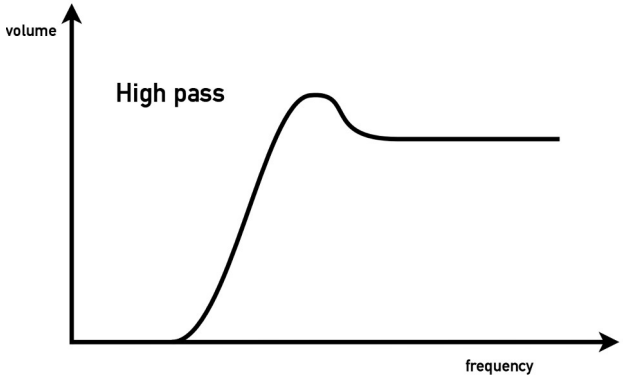
16.4 Filter Modes

Xsynth provides a multimode filter with the following options (can be accessed with **Page** →):

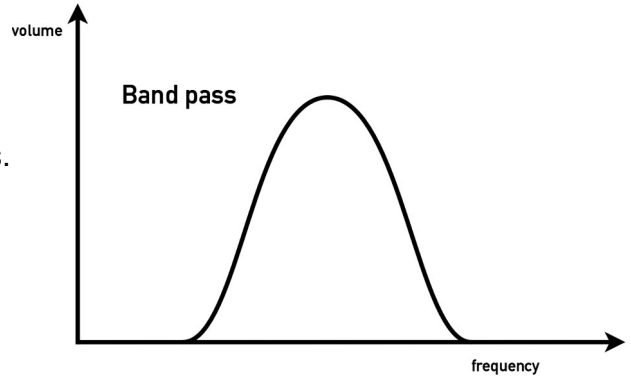
- **Off** (no filter)
- **12dB Low pass**
- **12dB Band pass**
- **12dB High pass**
- **24dB Low pass**
- **24dB High pass**
- **24dB Band pass**



Low pass: The frequencies below a certain frequency pass through the filter.
Most commonly used in synthesis. This filter rounds off the sharp edges, resulting in a smooth sound. The lower the **Cutoff**, the more sharp edges disappear.
On Low pass, start with the **Cutoff** value at full and turn it down to subtract more frequencies.



High pass: The frequencies above a certain frequency pass through the filter.
Removes the bass and leaves you with a sparkling, hissing sound.
On High pass, start with the **Cutoff** value at zero and turn it up to subtract more frequencies.



Band pass: A combination of Low Pass and High pass, leaving only middle frequencies.
Creates thin, hollow or flat sounds. Can be interesting for pads and FX sounds.

On Band pass, start with the CutOff value in the middle and move it around. There will always be frequencies filtered out in this mode.

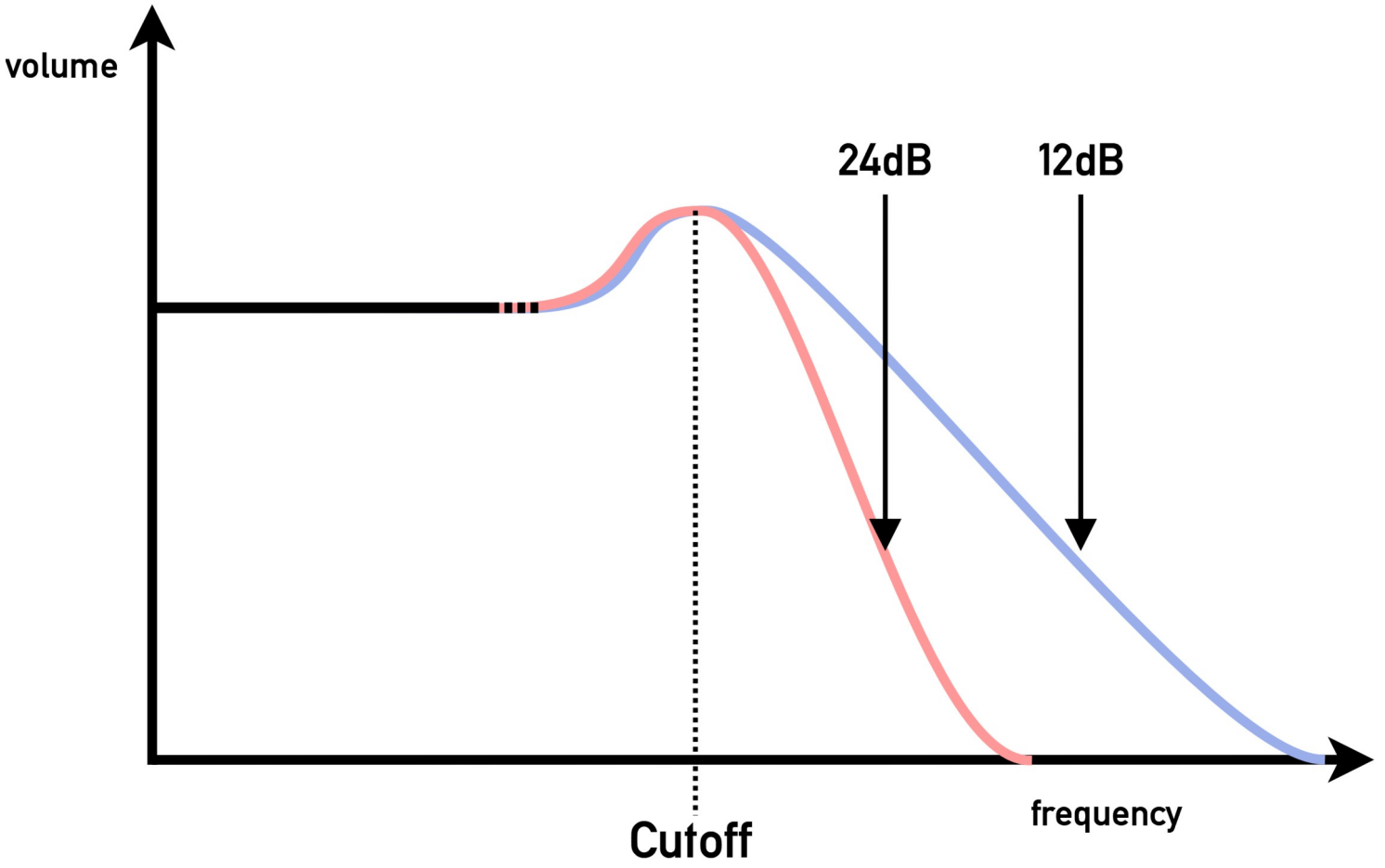
NOTE: Band pass 12dB lets much more frequencies pass through than Band pass 24dB. If you are creating a sound based on Band pass, make sure to try out both versions!

16.5 12dB or 24dB slope?

A filter in a synthesizer does not block all frequencies which are exactly above the filter Cutoff frequency threshold. Instead, the transition is a bit smoother.

A 24dB Low pass filter means:
For all frequencies above the cutoff frequency, the volume diminishes by 24 dB per octave that goes above the cutoff frequency.

The more dB on the filter, the steeper the filter curve line. Test which mode (12/24dB) works better on your sound.



For example: Imagine the cutoff frequency on a 24dB Low pass is set to note A at 440Hz.

- One octave up means that the frequency is doubled, therefore the A one octave above is at 880Hz.
- Per octave up, loudness is dampened by 24dB.
- After the filter, the frequencies around 880Hz will be 24dB less in volume than the frequencies around 440Hz.
- Another octave above, at around 1760Hz (=880x2), the volume will be 48dB less (24x2).
- And another octave above, at 3520Hz (=880x2x2 or 1760x2) the volume will be 72dB less (24x3) etc. until the upper frequencies become inaudible.

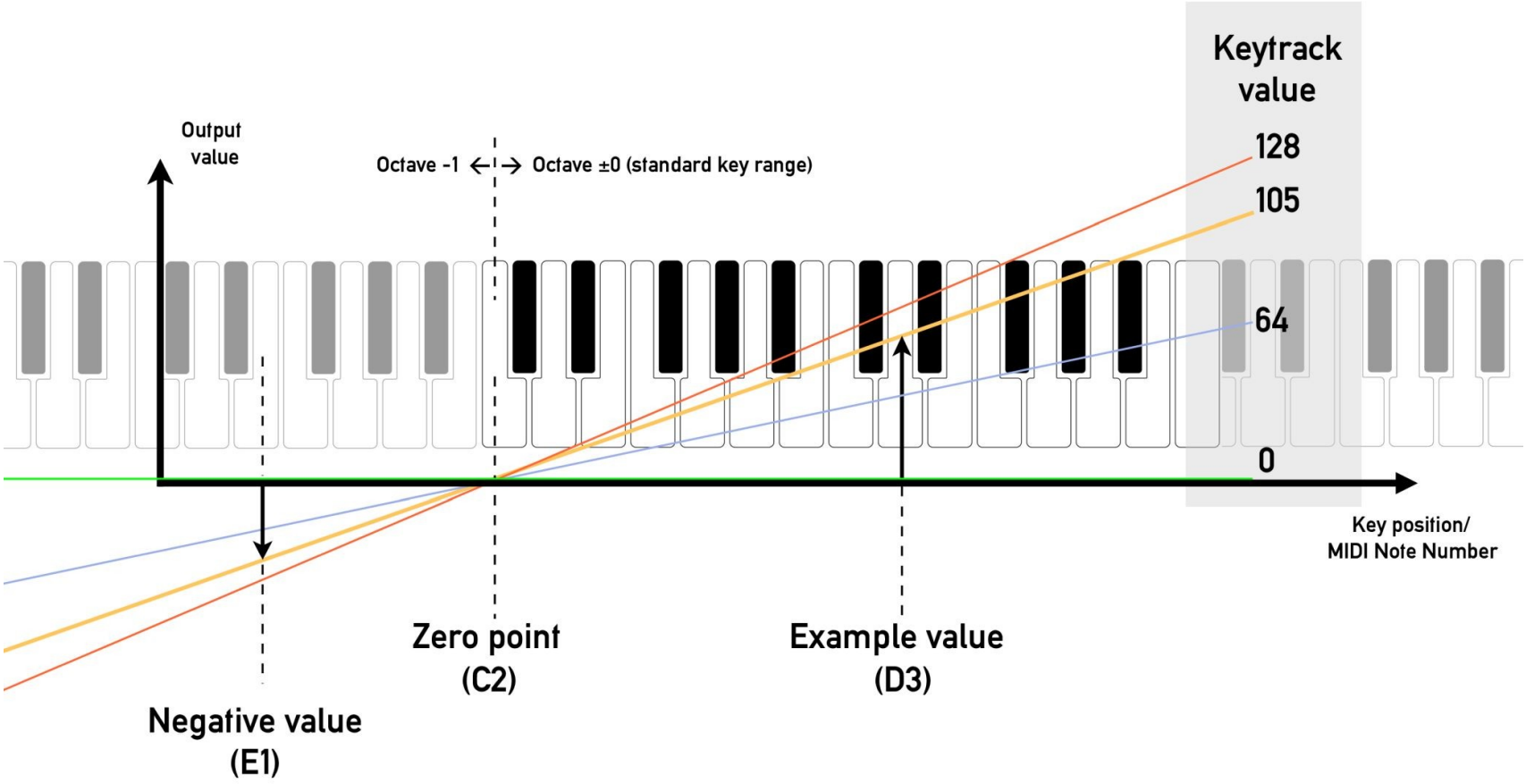
Remember the simile with the marble? 12dB would be the wider chisel, which offers less precision. 24dB would be the narrower chisel, allowing for more precision and sharper edges.

16.6 Drive/PreFilter

Volume control for all signals entering the filter. As Xsynth's filter reacts depending on loudness, it can be rather aggressive. Therefore, it may come in handy to reduce the signal going into the filter.

16.7 Keytrack (KTrck)

Value created depending on position of the keyboard. The higher notes you play on the keyboard, the higher this value gets. Zero point is note C2 (lowest key while Octave ±0). Below C2, the **Keytrack** value becomes negative.



NOTE: This chapter is a bit complicated. Beginners may skip it for now and proceed to the next point.

By default, **Keytrack** is coupled to pitch. The more you play to the right, the higher the pitch and vice-versa. However, **Keytrack** can also be used for other modulations.

Filter KTrck/Keytrack adjusts the **Cutoff** value proportionally according to the pitch of the note. Keytrack parameter value defines the proportionality/rate at which the **Filter** follows the notes. On **Keytrack**=105, the **Filter** is chromatically tuned. On this setting, it is possible to play notes just with the **Filter** and its **Resonance** (see explanation below).

Increasing **Filter Keytrack** results in a steeper gradient and spreading of the output value (see Keytrack 128 line in red). Lowering **Keytrack** flattens the line (see Keytrack 64 line in blue). Base pitch of the oscillators is not affected by this, as the **Filter Keytrack** only controls the **Filter Cutoff**. On **Keytrack**=0 (green line), the line stays level. Playing different notes do not cause any difference at the destination parameter then.

Examples:

Set **Keytrack** value to 105. On D3, output value of **Keytrack** is medium (equals the length of the arrow pointing from the horizontal axis towards the yellow line). On C2, output value is 0. When shifting the keyboard down by one octave by pressing **-OCTAVE** and pressing E1, Keytrack output value will be negative. On **Keytrack** value 0, output value is always 0, no matter which note is being played.

Does your brain hurt? OK, let us try a practical approach for you to try out.

16.8 Walkthrough: Playing notes with just the filter

- Create an **Init Patch** (**GLOBAL**, **ENTER**).
- Set **Osc1 Wave** to **White Noise/Wnois** and **Osc1 Ktrck=OFF** (this is the pitch keytrack, but we only want to use the Filter Keytrack at this time).
- Play a few notes on the keyboard. You will now hear white noise, which sounds equal across the entire keyrange.

- Press **FILT**. Here, **Ktrck** should already be set to 105. Set **Resonance** to 100. Play one note and move the **Cutoff** up and down. Now, the sound will start to whistle. We will make use of this behavior.
- In order to tune this whistling, we will use a sine wave in parallel. Sine waves are less likely to be altered by a filter, as they only consist of one frequency. Set **Osc2 Wave** to **Sine** and **Coarse** to **12**. **Osc2 Ktrck** should remain **ON**.
- Go to **MIX** and set **Osc2** to **80**.
- Play one note on the keyboard and listen closely. Pitch of sine wave and filter whistling are probably very different.
- Adjust **Filter Cutofff**, until pitch of sine and filter whistling are as close together as possible. This may be the case around value **5410** (value may vary, just try around).
- Optional: Use a FFT analyzer and look at the spectrum of Xsynth's output. Sine wave and filter whistling each produce a peak in the diagram. If these peaks are exactly in the same position, the filter is tonally tuned.
- When tuning is done, go to **MIX** and set **Osc2** to **0**. This deactivates the sine.
- Now you can play some notes on the keyboard, although the oscillator itself only produces atonal white noise. The keyboard controls the filter, which then forms a tonal noise from the white noise, using its resonance.
- The parameter gradient for matching the **Cutoff** to the key is the **Keytrack**. At this point, experiment with different settings of the **Keytrack** parameter value. This shifts the frequency distance between the tones as well as the octave spreading. For **Keytrack>105**, the notes are too far apart. Below 105, they are too close together. Intervals or chords will not match the standard equal temperament tuning.
- If your brain does not already smoke by now, search the net for „Karplus-Strong algorithm synthesis". This works in a similar way, but this is a story for another day and another synthesizer.

NOTE: Key Track can also be used as a **Source** in the **Mod Matrix**.The **Amount** there works like the gradient control on the Filter Keytrack. If you wish the curve to be even steeper, you may use the same modulation more than once. If you set **Osc1/2/3 Pitch** as destination, you will create microtonal scales with equally distanced steps between the notes.

16.9 EnvAmt/E.Amt

Envelope 2 → **Filter Cutoff Amount**. Controls how much of **Env2** is added to the Cutoff value. In order to have enough room for the addition, the **Cutoff** value may have to be reduced or set to **0**. The **Envelope** cannot push **Cutoff** out of bounds.

16.10 Walkthrough: How to work with the filter

- Create an Init Patch (**GLOBAL, ENTER**).
- Press **OSC**. Turn the leftmost of the **Display Parameters** encoders clockwise until **White Noise (Wnois)** is selected as an **Osc Wave**.
- Press **FILT**. Set **Ktrck** to **0**.
- Press a key and hold it for a few seconds. What you will hear now is unaltered White Noise. This consists of all frequencies across the entire audible range.

Remember the old days of analog TV when the antenna was unplugged or when there was no signal reception? Then, the TV screen showed a greyscale image with lots and lots of dots dancing around. If you looked closer though, some of these dots were in color. And if you looked even closer, you would have seen that every dot would have been in every color, but changing so fast to other colors that one could barely keep track. However, when you step away from the screen, all of the basic colors of analog TV light (red, green, blue) are mixed together, the result is grey, black and white.

White Noise audio is basically the same. As there are so many frequencies present at the same time, it is impossible to hear out individual frequencies. Now, we are going to use the filter to pick just some of these frequencies out and focus on these, while the rest is discarded.

- Press and hold one of the keys on the keyboard. You may also use the **HOLD** function instead.
- Make sure the Display shows **Filter** and, on the right hand side, **CutOf**. If it does not, press **FILT** until it does, possibly several times.
- Now move the rightmost of the **Display Parameters** encoders down and up. This moves the **Cutoff** value.
- Listen how the sound changes according to your **Cutoff** value input. Play a bit around with this parameter, while playing some notes, so you will get a feeling for what the **Filter** does. This is the result of the 24dB Low pass filter, which is selected by default.
- Set the **Resonance** parameter to about 64. Again, play a note and keep it pressed.
- You will notice a distinct whistling introduced to the sound. This is the augmentation of frequencies around the cutoff, caused by the resonance.
- Let **Resonance** remain at value 64. Move the **Cutoff** up and down.
- Notice how the whistling moves up and down with your value movements. You could in fact play melodies with the whistling while you just keep the same note pressed all the time. → see Walkthrough: Playing notes with just the filter
- Change the **Resonance** parameter to something else, move **Cutoff** up and down and repeat.
- Experiment with different combinations of these values. You will be surprised what you can get out of just some plain white noise.

After playing for a while, try out the other filter models.

- Press **Page** → several times, until the display says **Filter: 24dB LowPass**. Then, turn the leftmost **Display Parameters** encoder. Switch to any other type you want, for example 12dB Band pass.
- Go back to the default Filter page by pressing **Page** ← or → until the display says **Filter** and, on the right hand side, **CutOf**.
- Experiment with different combinations **Cutoff** and **Resonance** values etc. Repeat with all other filter types, until you got to know the behavior of each of them.

NOTE: Cutoff values of 0 for Low pass and maximum for High pass will result in no output, as all frequencies will be blocked then.

NOTE: Please do not attempt to examine the grainy greyscale image on a modern TV. They will possibly just show a plain single-color frame when no signal is received.

17. Mixer

All signals from the **Oscillators** are merged in this section.
Here, volumes of **Osc1/2/3** can be regulated separately.

NOTE: Turning up the volume of the **Oscillators** too much may result in internal clipping. Listen closely and check the output signal with the **Wave Display** constantly. When the waves plateau at the upper and/or lower end although the Osc Waves do not look like this by default, clipping is present.

RingM: Ring Modulator. Grabs signals of **Osc1** and **Osc2** and multiplies them with each other.

NOTE: RingM gets its signal from the oscillators before the Mixer section. If **Mixer>Osc1** and **Osc2** are set to to zero but **RingM** is active, you will hear an output!

ExtIn (available through **Page** →) regulates volume of an external signal connected to **Aux In**.

The output of the **Mixer** section is forwarded to the **Filter**.

18. Audio Routing Options

Xsynth offers complex audio routing. Each of these paths can be either switched **ON** or **OFF**.
These settings are stored globally, not per patch.

On Xsynth, routing can be accessed through **MIX**.

In the **Editor**, routing can be found on the **AUX** tab.

- **Aux In** → **Engine:** Includes the Aux In signal into the synth engine. Currently, the signal can only pass through the EQ. We are trying to offer more later.
- **Aux In**→ **Output**: Signal inserted on **Aux In** will be played back on **PHONES** and **LINE OUT**.
- **Aux In** → **PC**: Signal inserted on **Aux In** will be forwarded to the 2ch recording stream of Xsynth's USB audio interface towards your computer. Keep in mind that the Aux In signal will be added to Xsynth's synth engine output.
- **USB In** → **Output**: Couples/decouples playback from your computer/DAW towards **PHONES** and **LINE OUT.**

19. Effects/Aux

Xsynth is furnished with three effect sections and an equalizer. Press **FX** to access the settings.
On the first page of FX, the Display will now show **FX1**, **2** and **3** from left to right with their corresponding **Post level** values. These control the volume after the FX module has been passed.

NOTE: Do not set the Post level value to zero, otherwise you will mute the output of Xsynth entirely!!
If you want to bypass an effect, set **Type** to **Off**.

Press **FX** again to get to the settings of each FX or scroll with **Page** ← and→**.** Each effect type has its own parameters available.

19.1 FX1 – Distortion/Reduction

Off: no effect/bypass

EQ bandpass: Changes volume of mid-range frequencies.
MidFreq: Center Frequency
MidGain: Volume shifting up/down

Distortion: Intentional destruction of audio. Introduces more dirt and grime into the timbre.
Type: Overdrive – warm sound, only slight distortions
Distortion – skittish destruction of sound
Fuzz – violently transforming the signal into noise
Depth: intensity of distortion
PreGain: Volume increase before signal enters destruction stage
PostGain: Volume increase after distortion
HighCutoff: Removes overtones

Compressor: Reduces volume fluctuation.

Threshold: Volume level at which the compressor starts acting.
Attack: Time after reaching Threshold and before compressor reacts.
Release: Time for how long the compressor keeps working after signal drops below Threshold.
Ratio: Volume narrowing rate for everything that goes above the Threshold.

WahWah: Filter whose cutoff goes quickly upwards, then downwards one time for each keystroke.

Filter type: Low Pass / Band Pass, Frequency, Resonance → see detailed explanation in the **Filter** section.
Attack: Time how long the filter takes to rise to its maximum point
Decay: Time how fast filter descends after reaching maximum point
Threshold: Volume level which must be reached before the filter is activated

LoFi: Reduces the signal into a lower bitrate and sample rate, which introduces artifacts and distortion.

BitDepth: Staggers/rasterizes the signal vertically.
SampleRate: Staggers/rasterizes the signal horizontally.

19.2 FX2 – Reverb/Hall

Selection of different reverb types.
Off: no effect/bypass
Hall1/2,
Room 1/2/3,
Stage 1/2,
Plate

Time: Hall length
PreDelay: Time difference between original signal and reverb

19.3 FX3 – Chorus/Flanger/Delay

Chorus effects make the sound fuller by copying the sound and playing it along with slight delays. Flanger effects cause a wobbling sound. Delays create copies of the sound and play it along the original sound with larger time dilations. This creates multiple echoes, some of them distributed over Left and Right on the Stereo panorama.
Xsynth contains several different types and combinations each:
Chorus 1/2/3/4, Chorus feedback, Chorus Flanger 1/2/3,
Short delay, Short delay+ feedback,
Delay Echo, Cross Delay, Delay Left Center Right, Delay Left Right

Chorus parameters:

Speed: Chorus cycle length
Feedback: how much of the output is routed back to the input
Depth: Chorus intensity

Delay parameters:

Time L: Delay time for left stereo channel
Feedback: how much of the output is routed back to the input
Time R: Delay time for left stereo channel

19.4 Patch Volume

This parameter in **FX** (or **AUX** on the **Editor**) is located at the end of the signal chain and is used to trim the overall volume of Sound Patches, in order to minimize loudness differences between Patches. Other volume parameters may change more than just volume. With this parameter, changing volume will not affect the sound timbre.

20. Modulation Matrix

NOTE: Pressing the **MOD** button for the first time after startup will take you to the **Macro** page → see **Macro** section. Press the **MOD** button once more to get to the Modulation Matrix settings.

Many of Xsynth's values can be modulated. These connections are managed here. Use **PAGE** ← → for scrolling or press **MOD** several times to access all the slots.

The **Mod Matrix** has 16 slots. Each one is organized as following:

- **Source**
- **Destination**
- **Amount**

Source selects the signal which is used as the modulator and **Destination** selects the signal which should be modulated.
Amount determines how strong the modulation is in % and whether it should be added or subtracted from the target signal.

All modulations work the following way:
The **Source** value is added to the **Destination** value.
Amount scales the addition or, when set to a negative amount, inverts the addition to a subtraction.

NOTE: Modulations cannot push destination value out of bounds. If a value is already at its upper limit and you add a modulation with a positive amount, the modulation will not have any effect.

NOTE: Identical modulations can be set in parallel several times. Sources and Destinations can be used as much as you want until the Mod Matrix is full. However, you cannot cascade more than two slots using To Node […] destinations.

NOTE: Amount cannot be set to every value and skips some of them. In fact, this parameter ranges from 0...127 and is only visualised with a range of -100...+100% for better understanding.

On the **Init Patch**, the following settings are prepared:

- Slot 1: **Poly AT** → **Cutoff**, Amount 0 (inactive)
- Slot 2: **Velocity negative** → **Env1 Attack**, Amount 0 (inactive)
- Slot 3: **LFO1** → **Pitch**, Amount 0 (inactive)
- Slot 14: **Mod wheel** → **LFO 3 Rate**, Amount 60%
- Slot 15: **Mod wheel: To node 16**, Amount 25%
- Slot 16: LFO3 → Pitch, Amount 100%

When initialising a patch, the **MODULATION** button at the left hand side of the keyboard already has an effect. Also, you can easily couple **Polyphonic Aftertouch** to **Filter Cutoff**.
To do so, simply increase **Slot 1 Amount**. Remember: the value of **PolyAT** will be added to the **Cutoff**, so you may have to manually reduce **Cutoff** value or set it to 0. Then, the more you press on the keys, the more the filter opens up.

The following modulations pre-set, but not visible in the Matrix:

- **Env1** → **Volume** (permanent)
- **Env2** → **Filter Cutoff** (not active by default, can be activated with **Env Amt**)
- **Keytrack** → **Filter Cutoff** (standardmäßig aktiv, regelbar mit Filter KTrck)
- **Keytrack** → **Pitch** (standardmäßig aktiv, in Osc1/2/3 deaktivierbar mit KTrck)

20.1 Sources

- 0 None: Disables this modulation slot
- 1...3: Envelope 1/2/3 → see **Envelopes** section
- 4...6: Release phase of Envelope 1/2/3
- 7...18: LFOs → see **LFO** section.
    - Unipolar: only positive values of LFO
    - Fine: Reduces the overall amplitude of LFO. Great for subtle pitch modulations
    - Unipolar Fine: combination of the two above
- 19...20: Velocity. → see **Velocity, Polyphonic Aftertouch** section Velocity negative inverts the output.
- 21: Key Track. Value increases for higher notes and decreases for lower notes. → see **Filter, Keytrack** section
- 22...25 Mod wheel, Pitch Bend, Channel aftertouch, Poly aftertouch → see **Keyboard control buttons** section Xsynth's keyboard produces polyphonic aftertouch. Channel Aftertouch will only be received from other devices.
- 26..28: Expression. Processes Expression and Sustain messages from an external MIDI device. Xsynth itself does not feature a connector for an Expression pedal or Sustain pedal.
- 29: Portamento: Glide Rate parameter
- 30...34: Inverted versions of Channel aftertouch, Poly aftertouch, Key track, Mod wheel, Sustain
- 35: Constant: Continuous, non-changing value. Use this to countersteer offsets caused by other modulations.

NOTE: If a Source does not affect the Destination, make sure that the Source value is not zero. Also, check if the Destination value is already at the upper or lower limit. Modulations cannot push the Destination value out of bounds.

20.2 Destinations

- 0: LFO3 Rate → see **LFOs** section, Mostly used for Osc Pitch
- 1: Cutoff → see **Filter** section
- 2...5 Pitch: Controls pitch of all three Oscillators separately. Osc1/2/3 Pitch controls pitch for every Oscillator separately.
- 6: Amplitude: Regulates Env1 to Amp amount. Default is 100%, use a modulation with negative amount towards this destination if you want to reduce this value
- 7: Resonance → see **Filter** section
- 8: Ring Mod. Output volume of Ring modulator → see **Mixer** section
- 9: Ext in. Input from external audio signal
- 10: FM Amount. Regulates frequency modulation of Osc3 to Osc1 → see **Oscillators, Osc Global features** section
- 12...13: LFO1, 2 rate → see **LFOs** section
- 14: OSC detune: Unisono Voice tune spread → see **Oscillators, Osc Global features** section
- 15...17: OSC1/2/3 volume. Controls volume of each Osc separately
- 18...32: ENV1/2/3 stages. Controls each stage of evey Envelope separately
- 64...79 To Node 1...16 / Mod1...16 Amount: Use this to control another slot with this slot. Sends the output of this slot as a control value to the designated target slot.

20.3 Walkthrough

- Initialize the current patch (**GLOBAL, ENTER**).
- Play a few notes on the keyboard. A simple sound will be played. Try to memorize the timbre.
- Press **LFO**. Set **Rate** with the rightmost of the **Display Parameters** encoders to 60.
- Press **MOD** two times. The **Display** should now show a **Page** called **Mod Slot 1**.
- Turn the leftmost of the four encoders and set **Source** to **LFO1.**
- Use the second encoder and set **Dest** to **OSC1Pitch** and set **Amount** to 8% with the third encoder.

Now you have set your first modulation. Press one key of the keyboard. You will hear the same sound like before, but now the pitch is drifting up and down rhythmically.

- Use **Mod Slot 1 Amount** to control depth and **LFO1 Rate** to control speed of your modulation.
- Experiment with different values. Press a key after each change and observe the results.

21. GLOBAL menu/system settings, Init patch

Pressing **GLOBAL** once will call up the **Init Sound** function. By pressing **Enter**, the current patch will be reset to standard settings so you can start designing a sound from scratch. Pressing **GLOBAL** again takes you to the system settings.

NOTE: Executing the **Init Patch** function does not overwrite the currently selected patch on Xsynth's patch memory. Use the **SAVE** function to store your creation when you are done. Otherwise, just go to the next patch.

When Xsynth shows the **Init Sound** page, press the **GLOBAL** button again to access the next pages.
These settings are independent from patches and will affect the entire device.

To change settings, turn the corresponding **Display Parameters** encoder. Clockwise=ON, anticlockwise=OFF.

Page 1/4

- **Master Tune**: Sets the main pitch frequency for note A4 in .1Hz steps. Standard=440Hz

  Changing this will shift all notes up or down in frequency, this applies to all Patches.

- **MIDIRxCh**: Sets on which MIDI channel Xsynth will react to external notes. Standard is ALL. If Xsynth does not react to external MIDI notes, set this value to the channel on which the other device is sending. If unsure, set this to ALL – then, Xsynth will listen on all channels (Omni mode).

- **MIDITxCh**: Sets on which channel Xsynth will send out its MIDI data.

- **Local**: Local On/Off. Couples/decouples Xsynth's own keyboard from the sound engine. When set to OFF, Xsynth will only send MIDI data out when its keyboard is played, but the sound engine will not play these notes. However, notes played over MIDI will be played back on Xsynth then. This setting can be used when Xsynth is connected to a DAW which pings back the MIDI notes from Xsynth's own keyboard. This way, a MIDI feedback loop can be avoided.

NOTE: Local will be reset to ON every time the device is rebooted. This safety measure has been implemented in order to reduce support inquiries because of suddenly muted outputs.

Page 2/4

- **PatchChange**: Determines whether selection of a new patch will load it instantly or after pressing Enter.
- **WavDisplay**: Toggles oscilloscope visualization of sound output.
- **DispTime**: When sound output has faded out, the **Wave Display** will still be displayed for this time until the last selected page will be shown again.
- **SustainMode**: Changes operation of the **HOLD** button to the left hand side of the keyboard. Latch: When **HOLD** is pressed, it remains on until it is pressed again. Momentary: **HOLD** is only active as long as the button is being pressed. → see **Keyboard control buttons** section

Page 3/4

- **DINMIDIOut**: Enables/disables transmission of MIDI data at the MIDI OUT port. This is set to OFF by default in order to minimize damages of equipment by accidentally connecting this port to an audio input of a different device.
- **DINMIDIInToEngine**: Couples/decouples transmission from Din MIDI In to the synth engine. This setting can be set to OFF when you want the signals of an external MIDI device be forwarded to the computer through USB, but Xsynth itself should not react to these MIDI signals.
- **Channel vol**: General output volume of Xsynth.
- **Version**: Displays the current version number. To change this, update to the latest version.

WARNING: Do not set **Channel vol** to zero, otherwise there will be no sound output. Also, you will be struck by a flying ice cream truck.

Page 4/4

- **AudioInterface:** When set to OFF, this disables the Audio Interface and changes the USB class descriptor. Then, Xsynth will only be a MIDI device. Use this setting if you want to connect Xsynth to another standalone device which has as MIDI Host function that cannot connect to audio interfaces. After changing this setting, Xsynth needs to be rebooted. Then, Xsynth changes from a USB combo device with audio and MIDI to a MIDI only device.

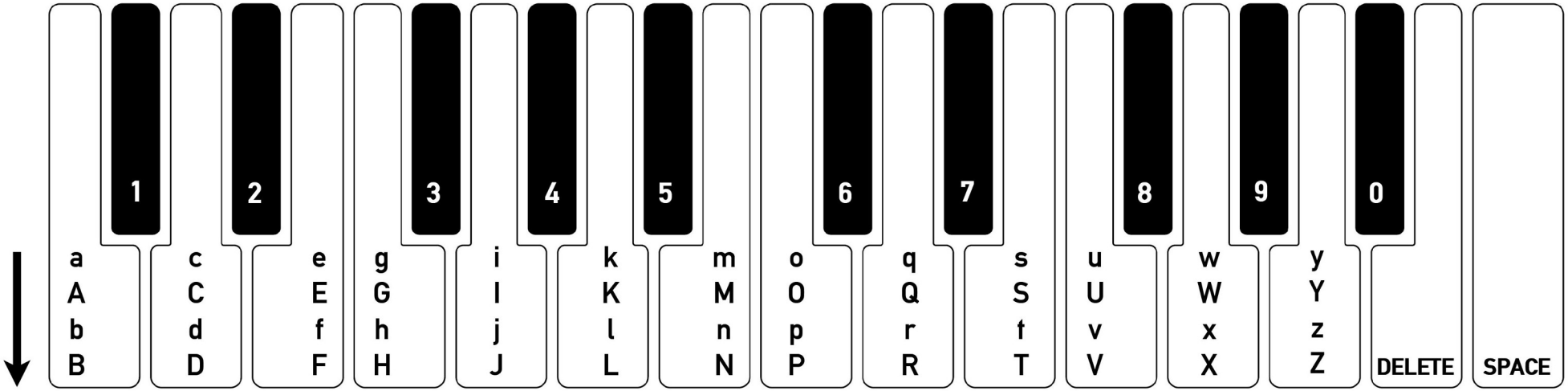
22. Saving Patches

When you create a sound, make sure you save your data.

- Press **SAVE** on Xsynth to call up the **Patch Save** page. Xsynth now asks to which slot you want to save and under which name.
- Leftmost of the **DISPLAY PARAMETERS** encoder chooses the slot number and the second encoder selects the bank.
- Use the **Page** ← → buttons for navigating the cursor to the left and right.
- Enter the letters through pressing keys on the keyboard. Most keys have several characters assigned, press several times to go through them.

Lower Octave
C: a, A, b, B
C#:1
D: c, C, d, D
Eb:2
E: e,E, f, F
F: g, G, h, H
F#: 3
G: i, I, j, J
G#: 4
A: k, K, l, L
Bb: 5
B:m, M, n, N

Upper Octave
C: o, O, p, P
C#:6
D: q, Q, r, R
Eb: 7
E: s, S, t, T
F: u, U, v, V
F#: 8
G: w, W, x, X
G#: 9
A: y, Y, z, Z
Bb: 0,
B: [DELETE] (erase character at cursor position and move cursor one position to left)
Upper C: [SPACE]



Turning **Patch Select** changes the currently selected character.

After each character, press **Page** → in order to move the cursor to the next position.

When done, press **ENTER**. Xsynth will display **SAVE OK** then. Or press **CANCEL** to abort.

WARNING: Make sure to backup your sounds regularly and before performing a firmware update to prevent data loss! You can backup your sounds on your computer using the **Editor** using the **Export Patch(es)** button.

23. MIDI

23.1 Introduction

For a better cooperation between electronic instruments, the MIDI protocol was published in 1983. This protocol remains in use until today and connects MIDI devices between each other as well as these devices and computers.
MIDI transmits control signals generated by keystrokes, encoders, buttons etc. However, MIDI does not transmit any audio signals.

Take a look at the QWERTY (or whatever) keyboard of your computer, like the one this manual has been typed on. The keystrokes on the keyboard are transformed in a signal that is passed on to your computer. The graphic representation of the letters on the screen are generated by the computer, but not by the keyboard itself.
Synthesizers work in a similar way. Here, also a keyboard sends a signal to a different circuit which then generates an audible note. This signal standard for digital transmission of notes, controllers etc. is called MIDI.

Soon after its introduction, more and more manufacturers integrated this protocol into their synthesizers, keyboards, organs and other key instruments, as well as drum computers, FX units and many more. These devices can control each other through MIDI. Also, sequencers and Digital Audio Workstations (DAW) are able to create, record, manipulate and arrange these data. With a DAW, you can record notes played on Xsynth and play them back to the instrument. Also, you can play software instruments (VST/AU/CLAP/AAX etc.) in your computer with Xsynth's keys. Try it out!

NOTE: Please refer to the manual of your DAW on how to configure and use MIDI input devices. This greatly differs from DAW to DAW and even within versions, so we cannot offer a walkthrough here. It may be similar to the following:
First, look into your DAW's Settings and check if Xsynth is recognized and activated as a MIDI input device. Then, assign the MIDI output of Xsynth to an input of a MIDI or Instrument track. Make sure this track has a virtual instrument assigned to it. Now try out, if it works. Check MIDI channel settings if needed.
Be careful, some DAWs automatically play back Xsynth's own notes to the instruments which can create a MIDI Feedback loop!

23.2 Connecting MIDI, signal directions

Most users will be perfectly fine with Xsynth being connected through USB with their computer. Then, Xsynth will appear by its name in your DAW settings, both as MIDI device/controller and as an audio interface.

If you decide to use DIN MIDI, connect the **MIDI OUT** of Xsynth → the other device's **MIDI in**
and Xsynth's **MIDI IN** → the other device's **MIDI OUT**. Connect Xsynth to a standard 3.5mm to DIN converter if needed.

Xsynth uses TRS-A pin layout. Make these connections while all devices are switched off and switch them on when everything is connected. → see **Connection types and signal directions** section

23.3 MIDI Interface

Connect Xsynth to your computer through USB. Then, your computer will list the following MIDI ports:

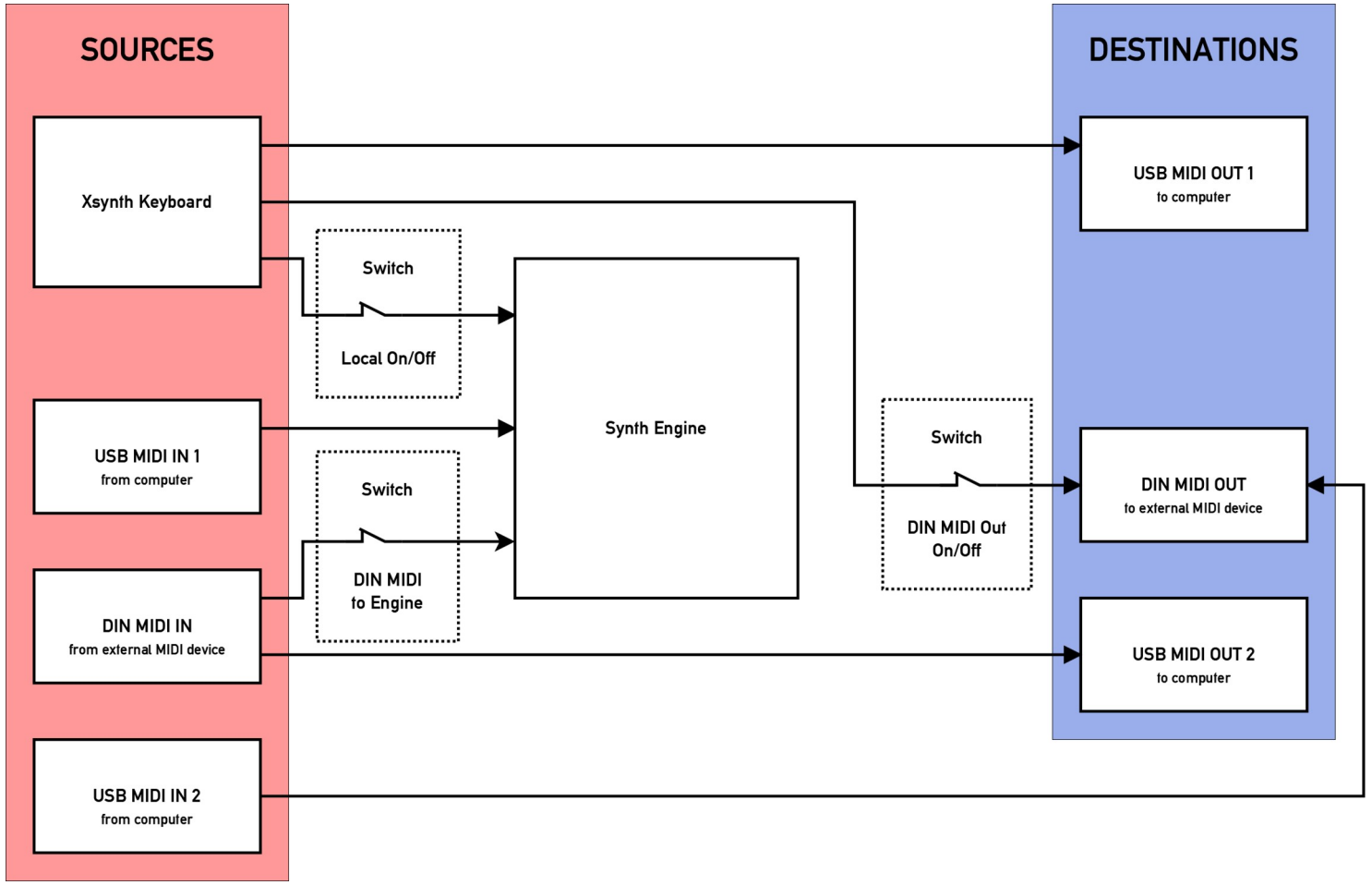
Inputs:

- **Xsynth**: Xsynth's own keyboard input
- **MIDIIN2** (Xsynth): DIN MIDI input from external device connected to **MIDI IN** jack

Outputs:

- **Xsynth**: To Xsynth's own sound engine
- **MIDIOUT2** (Xsynth): To external MIDI device connected to **MIDI OUT** jack

23.4 MIDI routing, switches



- Switch

  Local On/Off:

  GLOBAL, Page 1

- Switch

  DIN MIDI In to Engine:

  GLOBAL, Page 3

- Switch

  DIN MIDI Out to Engine:

  GLOBAL, Page 3

23.5 Settings, Avoiding MIDI feedback, Local Off

Xsynth's own keyboard can be decoupled from the internal sound engine with the **Local ON/OFF** function in **GLOBAL**. When set to **OFF**, Xsynth's keys will send notes out through MIDI, but the internal synth engine will not react to these notes.

This mode can be needed if you use Xsynth with a DAW that sends all input notes right back to Xsynth. Then, Xsynth will forward these notes to the DAW, they will come back etc etc. This creates a MIDI feedback loop, resulting in many notes sent back and forth between Xsynth and your DAW which will make normal playing of notes impossible.

When **Local=OFF**, the notes sent back through MIDI will trigger the internal synth engine but Xsynth will not send these notes out again. Thus, the feedback is terminated.

NOTE: When **Local** is set to **Off** while no other MIDI device or DAW is connected to your Xsynth, you cannot play any notes on Xsynth itself. Therefore, there will be no sound output!
Local will be reset to **ON** every time the device is rebooted. This safety measure has been implemented in order to reduce support inquiries because of suddenly muted outputs. If you do it anyway by tricking yourself into this trap and contacting our support then, you owe them a drink of their choice.

DIN MIDI Output may have to be switched on in **GLOBAL** before it becomes active. This is set to OFF by default in order to minimize damages of equipment by accidentally connecting this port to an audio input of a different device.

Also available in **GLOBAL**: **DINMIDIInToEngine On/Off**
This activates/deactivates transmission from DIN MIDI In to the synth engine.
This setting can be set to **OFF** when you want the signals of an external MIDI device to be forwarded to the computer through USB, but Xsynth itself should not react to these MIDI signals.

23.6 MIDI Implementation Description

Xsynth can receive and transmit the following MIDI messages on all channels:

- Note On/Off
- Control Change (CC)
- RPN, NRPN
- System Exclusive (SysEx)

The four **DISPLAY PARAMETERS** encoders can be used to send user-definable CC messages. Press **MACRO+GLOBAL** to access this function. → see **CC Send** section

NOTE: The preset CC numbers may seem odd, but they have been chosen so that the CC messages generated from this feature will not interfere with Xsynth's other settings.
You can change the assigned CCs in **Editor>Global>MIDI CC** at your own risk.
CCs above 119 are not available for safety reasons. These can cause suddenly muted outputs on Xsynth as well as other devices.

A detailed SysEx documentation is available upon request, please contact ESI.

24. Editor

A free Editor app for mac and Windows is provided for Xsynth on esi-audio.com. Use it to:

- edit your sounds
- backup and recall your data
- adjust system settings
- update Xsynth's firmware

24.1 Preparations

- First of all, make sure your Xsynth is connected through USB to your computer and switched on.
- Download, unzip and open the Editor app on your computer.
- Check if **Device Out** and **Device In** show **Xsynth** as a device. If this is not the case, press Refresh and recheck if Xsynth is connected properly.

NOTE: On some OS, Xsynth cannot be connected through MIDI to the Editor and your DAW at the same time. You may get strange error messages like „Not enough memory available" or similar although your computer has more than enough memory. In this case, make sure only your DAW or the Editor is open and/or access Xsynth's MIDI ports, not both programs at the same time.

We do not recommend controlling Xsynth with the Editor via DIN MIDI, please use USB if possible.

24.2 Handling

The Editor features the following controls:

- **Value dials/Potentiometers**: Circles with a dot as an indicator of the current value and a numerical value below.
  Click on them, hold the mouse button and drag the mouse upwards or to the right to increase and in the opposite directions to decrease their value. Or move the mouse over a potentiometer and turn the mouse wheel to change values.
- You may also click onto the value box below the dial and enter the new value manually by typing in the desired number on your computer's QWERTY keyboard. Press Enter/Return when done.
- **Buttons**: rectangular with rounded edges, these show their function or current state.
  Clicking on them activates their function or toggles between states.
- **Dropdown boxes**: rectangular with rounded edges and a triangle pointing downwards.
  Click on them and select the new value from the menu or hover your cursor over the dropdown box and scroll/turn the mouse wheel to dial through values.
- **Virtual keyboard**: Visualizes incoming notes from Xsynth. You can also click on the keys on your screen, then the correspronding note will be played back on Xsynth. **Send Channel** sets the channel on which the virtual keyboard will send data.
- **Message window**: Displays MIDI data coming from (In) or going towards (Out) Xsynth. You cannot enter any commands here.

  If this says „Load fail!" or „Load GLOBAL/MACRO/PATCH fail!", then this probably means your Xsynth is either not connected correctly (USB plug lopsided) or a previous firmware update went wrong. Please see the **Troubleshooting** section.

Some pages feature saving and recalling their own settings.

NOTE: On the OSC and AUX page, you can restore the last saved value by double-clicking on a control.

24.3 Pages

Please see the corresponding sections for detailed explanation. This chapter will focus on the controls which have not been explained in the chapters before.

OSC

Oscillators, Envelopes, LFOs → see **Oscillators** section ff.
Mixer: Mixes Oscillators together.
Ext Level: Volume of Ext Source.

Pitch: Sets Pitch Glide (Portamento) mode and rate.
Bend Range: Sets Pitchbend (**- PITCH +** button) range in semitones.

Filter: EnvAmt: Env2 → Filter Cutoff Amount → see **Modulation Matrix** section
PreFilter: Volume control for the signal from the Mixer before it enters the Filter
KTrack: Keytrack scaling for Filter → see **Keytrack** section

Voice: Polyphonic On/Off: Toggles if Patch is polyphonic or monophonic
Unison: Enables Unisono mode. This stacks multiple Voices on one key.
Uni Voices: Determines how many voices are on one key and Detune adjusts tune spread between the voices.
Transpose, Fine Tune: Adjusts pitch shifting for this Patch. There is another Transpose in **GLOBAL** which works for the whole device and all Patches.

MOD

Modulation Matrix with 16 Modulation slots → see **Modulation Matrix** section
Clear all empties all slots.

AUX

Effects: Post level: Adjusts output level of every effect → see **Effects/Aux** section

EQ: Equalizer for this patch

Arpeggiator: → see **Arpeggiator** section

Bank, Pattern: Choose your Arp pattern from two banks with 128 presets each
Mode: Switches between Standard and Phrase. On Phrase, the Arp stays within a pre-defined scale. Pressing a key on the keyboard will then determine the start off the resulting pattern on the corresponding scale.

MACRO

M1...M4 Macro control quick access settings → see **Macro** section

GLOBAL

→ see **Global** section
Channel: Global Volume settings.

Volume: Overall volume of Xsynth
Direct: Playback volume from computer through the audio interfaces

Audio Interface On/Off: Can be set to OFF for improving compatibility with standalone USB MIDI host devices → see **Global** section

MIDI: Receiving channel, sending channel, receiving of clock

Touch curve: Select from several Velocity (Touch) and Aftertouch (AT) curves. → see **Aftertouch** section

AT type: Toggles between **Polyphonic** and **Monophonic** (Channel) aftertouch.
AT First Value: Toggles between Aftertouch response being calculated absolutely (**Zero**) or relatively (**Note Velocity**). Users who play with a lot of force will not trigger the AT easily on Zero. On Note Velocity, AT trigger threshold will adapt to the player better.

Global Touch Curve On/Off: When on, factory calibration data sets for all keys are ignored and all keys are sent with the same Velocity value. This can be determined with **Fixed Value**.

MIDI CC: Settings for CC Send pages 1-4, activated by pressing **MACRO** and **GLOBAL** buttons on Xsynth hardware at the same time.
There are four pages with four CCs each.
→ see **MIDI CC Send** section

System:
Local On/Off: Disconnects Xsynth's own keyboard from synth engine when OFF. → see **Local Off** section
Sustain Mode: How **HOLD** button works. → see **Keyboard and controls** section
Momentary: **HOLD** will only be active for as long as it is pressed.
Latch: Press **HOLD** and it will be active until it is pressed again.
RealWaveSensi: Zoom in/out for **Wave Display**
Global Octave/Transpose, Master Tune: Keyboard transpose for all patches

Factory reset: Resets all parameters, configuration data and all Sound Patches to factory settings.

WARNING: Performing a Factory Reset erases ALL data on Xsynth: all settings, patches configuration data etc. Only use this when you have a backup of all your patches or when you want to wipe Xsynth's memory completely. However, this does not erase your bad memories about your ex partner.

Update firmware: → see corresponding section in **Quickstart** Automatically loads the file supplied with the editor.
Make sure to backup your patches before performing a firmware update!

Manual update: This allows you to choose a file for the update yourself. With this, you may reinstall the current firmware, if something did not work as expected.

WARNING: This way, you may also install an earlier verion at your own risk. Doing so can cause Xsynth to not start, be muted, glitchy or entirely bricked. Therefore, we strictly advise you not to do it.

Save File, Load File: Saves all settings on this Page into one file which can be loaded up later.

Save to Xsynth: Writes the current settings of this Page into Xsynth's memory. If you have made some changes here which have not been saved properly, please retry and press this button once you have finished.

Load from Xsynth: Downloads the current settings of this Page from Xsynth, basically like a Refresh command.

Reset Global: Reverts this page back to factory default settings, both on Xsynth and the Editor.

Expert Mode

You have reached the world's edge, none but devils play past here.

NOTE: We have put this page behind a lock for a reason. If something on your Xsynth does not work as expected, do not just randomly change some settings on this page. You may cause even more problems by doing so.

Here, you can set the current Patch as the new Init Patch.

Save current patch as Init patch: This will save the current settings as the settings which will be recalled using the **Init Patch** function. To recall these settings, press **GLOBAL**, then **ENTER**. Then, the currently active sound settings will be saved as the new Init settings. The currently selected memory slot will not be overwritten until **Save Patch** is activated.

Using **Save current patch as Init patch** in Expert Mode will **not** overwrite the Init patches on Xsynth's memory slots.
If the new Init patch is not correctly saved to Xsynth hardware after clicking on **Save current patch as Init patch** in Expert Mode, press **Save to Xsynth**.

Also, this page contains settings for Velocity and Aftertouch curves, as well as Aftertouch responsiveness, Keyboard calibration and Keyboard scanner settings.

Only proceed if you know what you are doing, otherwise Xsynth's own keyboard may become sluggish and unusable. We recommend to not change these settings unless instructed by our support team.

If you messed up the settings, you can use the Reset all button in the upper right corner. This loads default values for this Page.

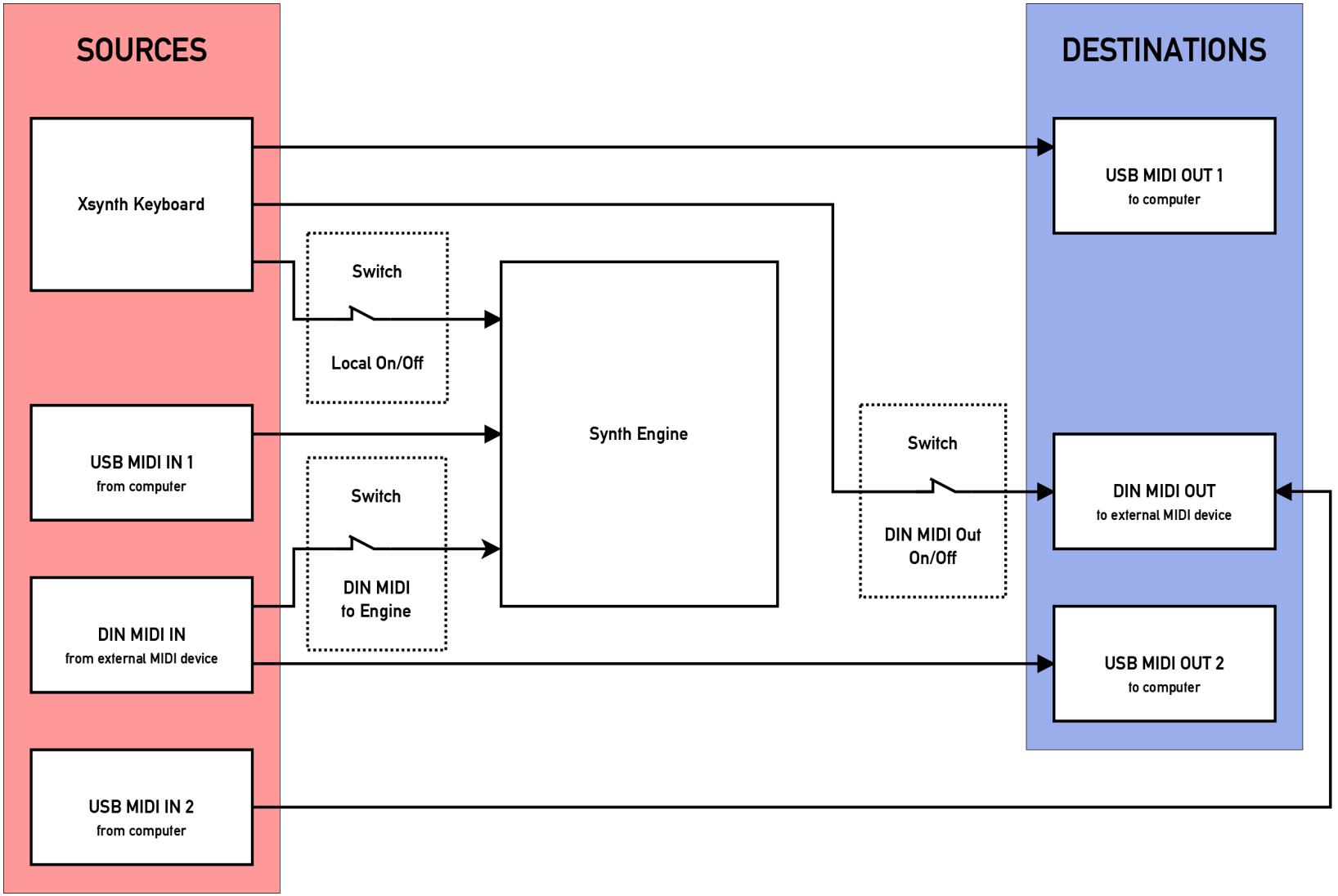
Oh hey, you have actually read all the way down to here. I did not expect anyone to do this.
Thank you for reading through all of this manual.
You are the best!

I want to say hi to all my fuzzy friends out there.

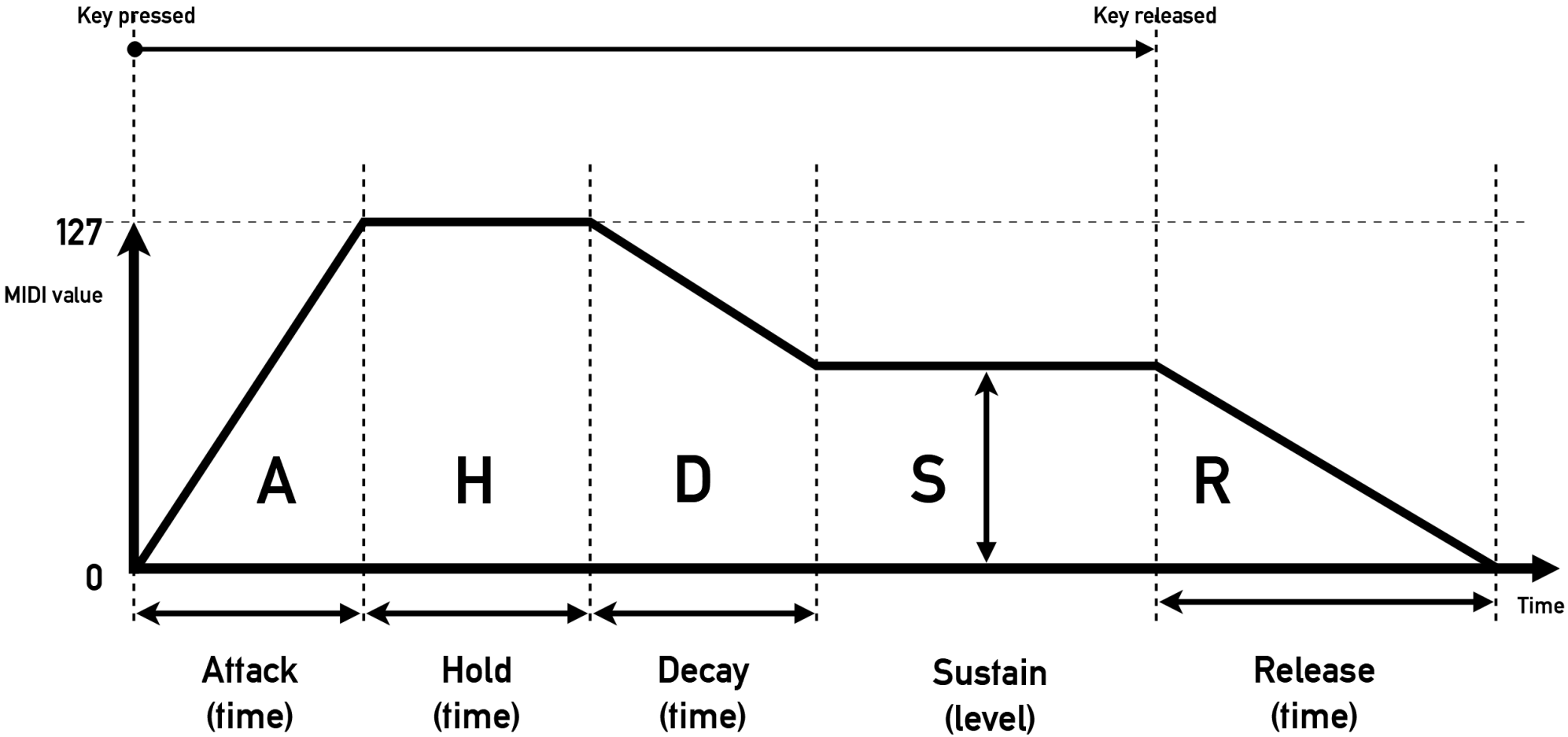
Parts of this document have been written in the middle of the night on a plane with lots of turbulence and at the wave table dance bar in Waldorf. Please excuse the chaos.

Appendix

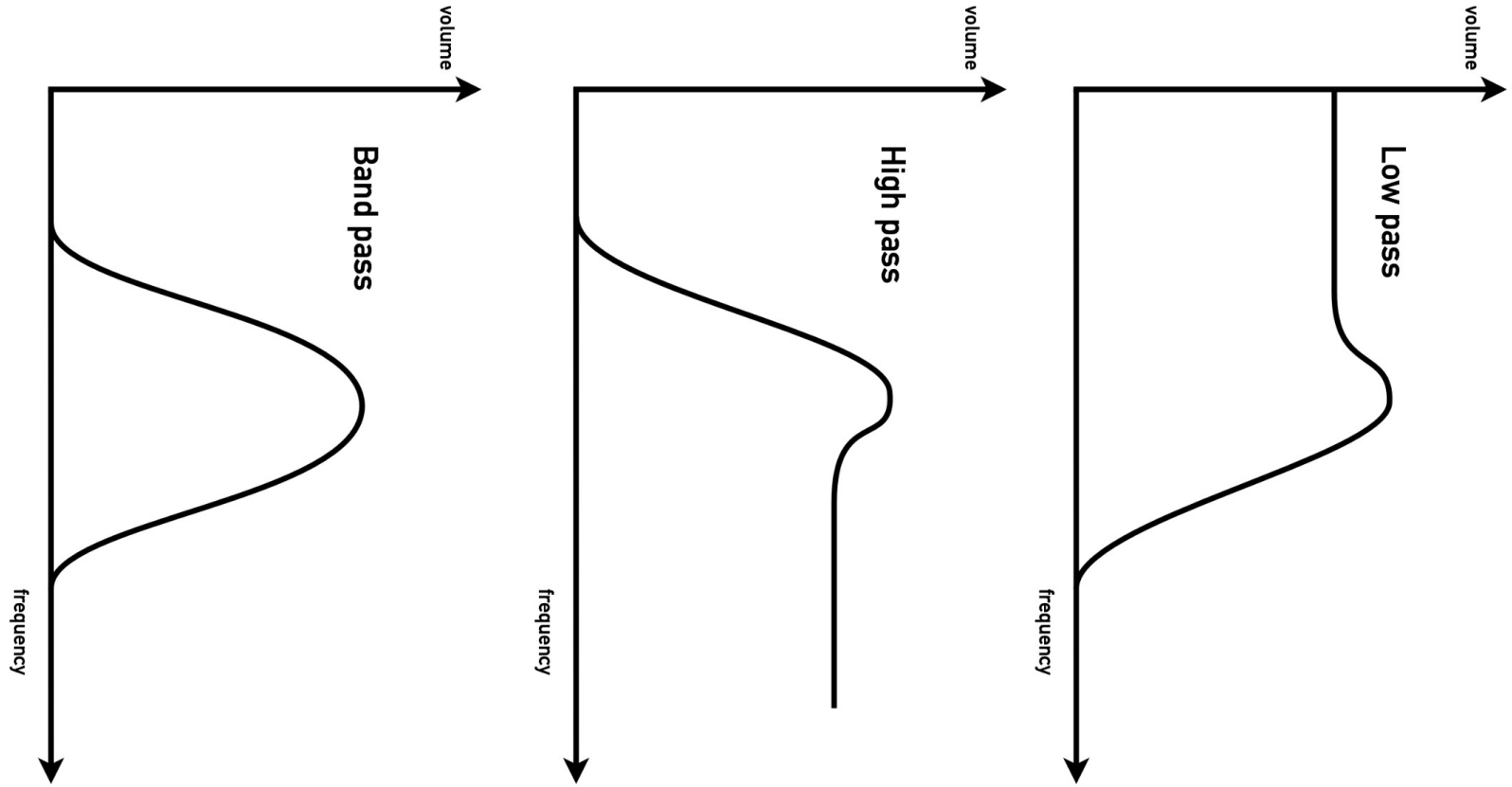
Contains diagrams in bigger size. The vermiform appendix has already been removed.

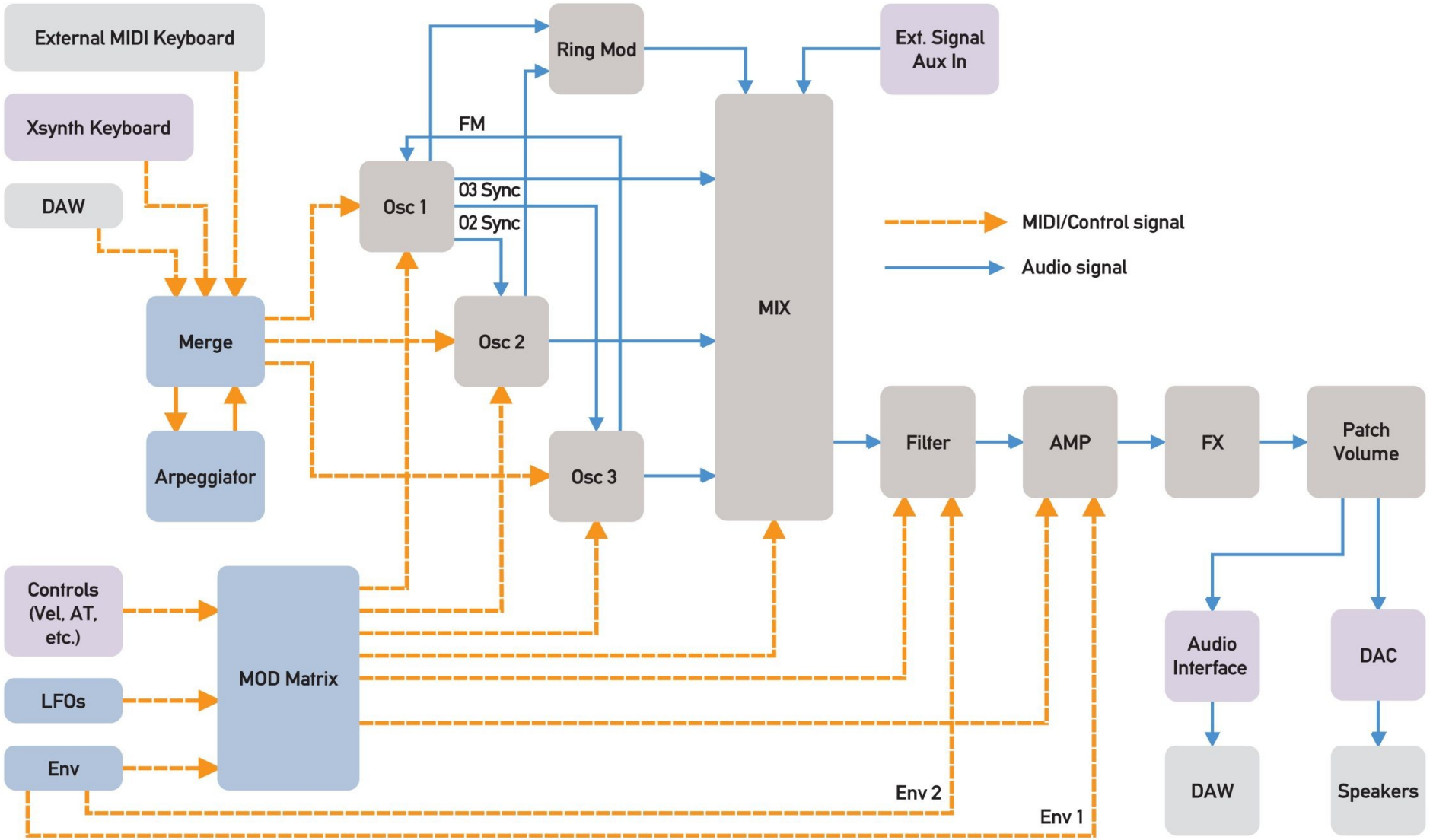


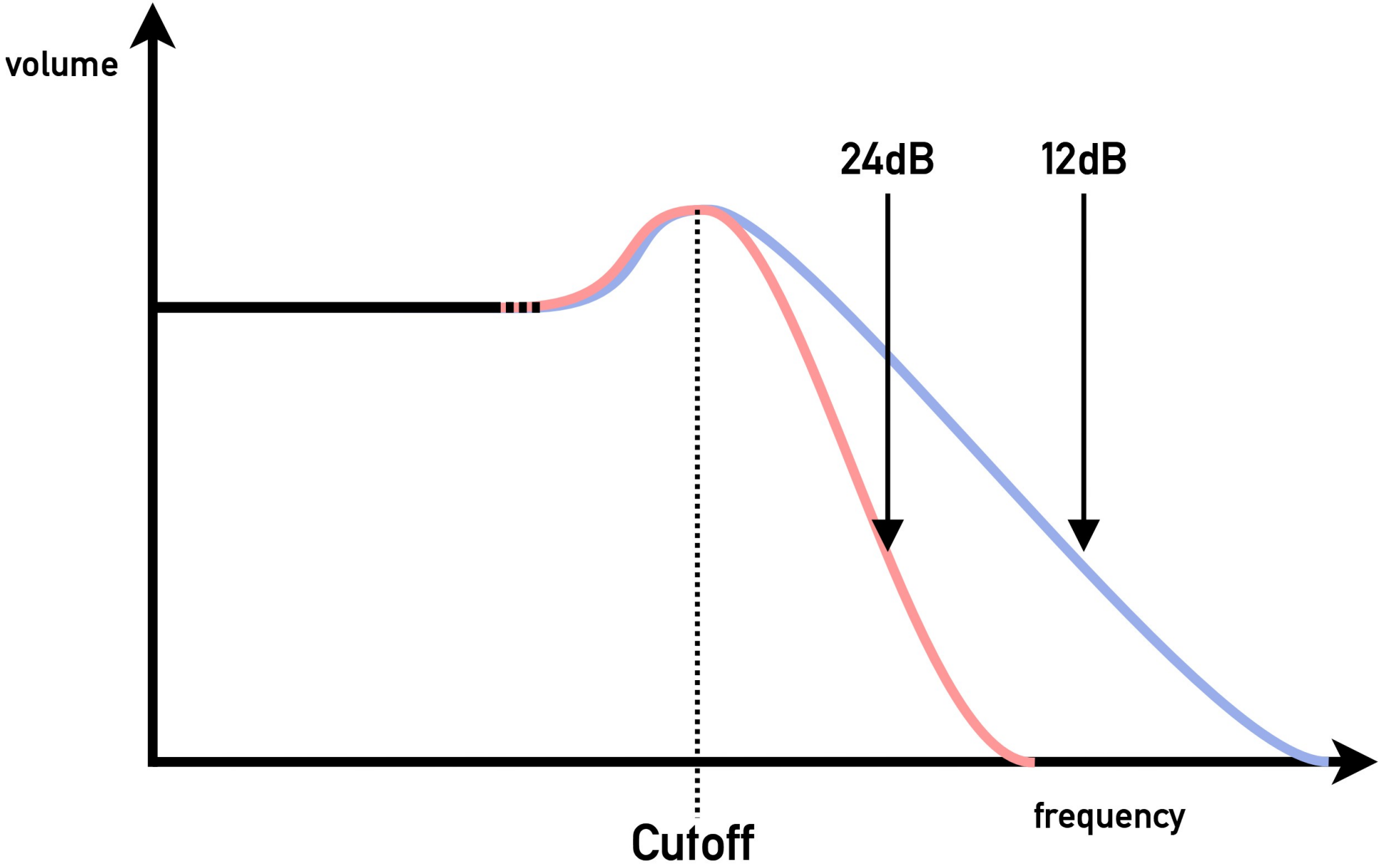
AHDSR Envelope

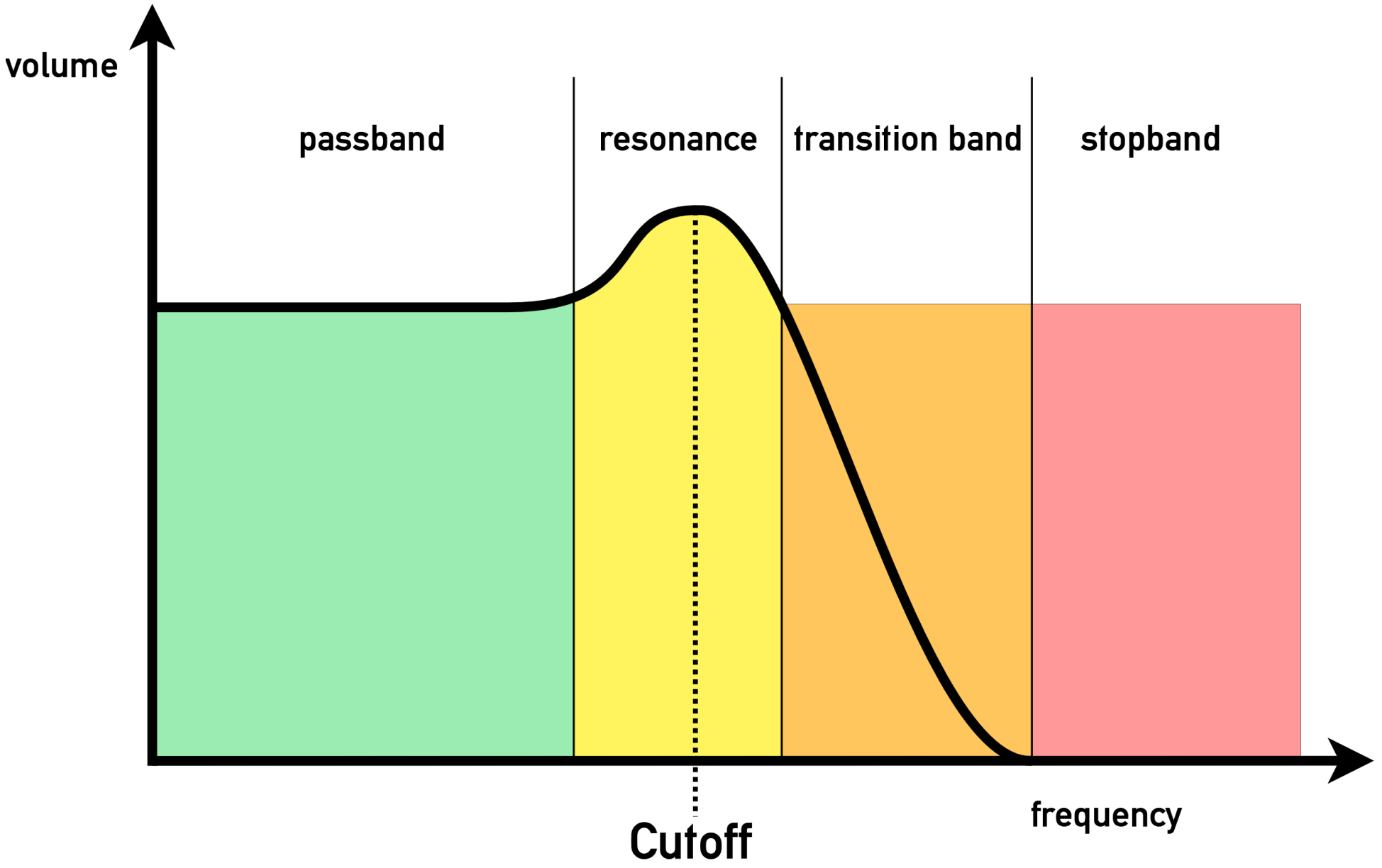


Comparison Low pass/High pass/Band pass

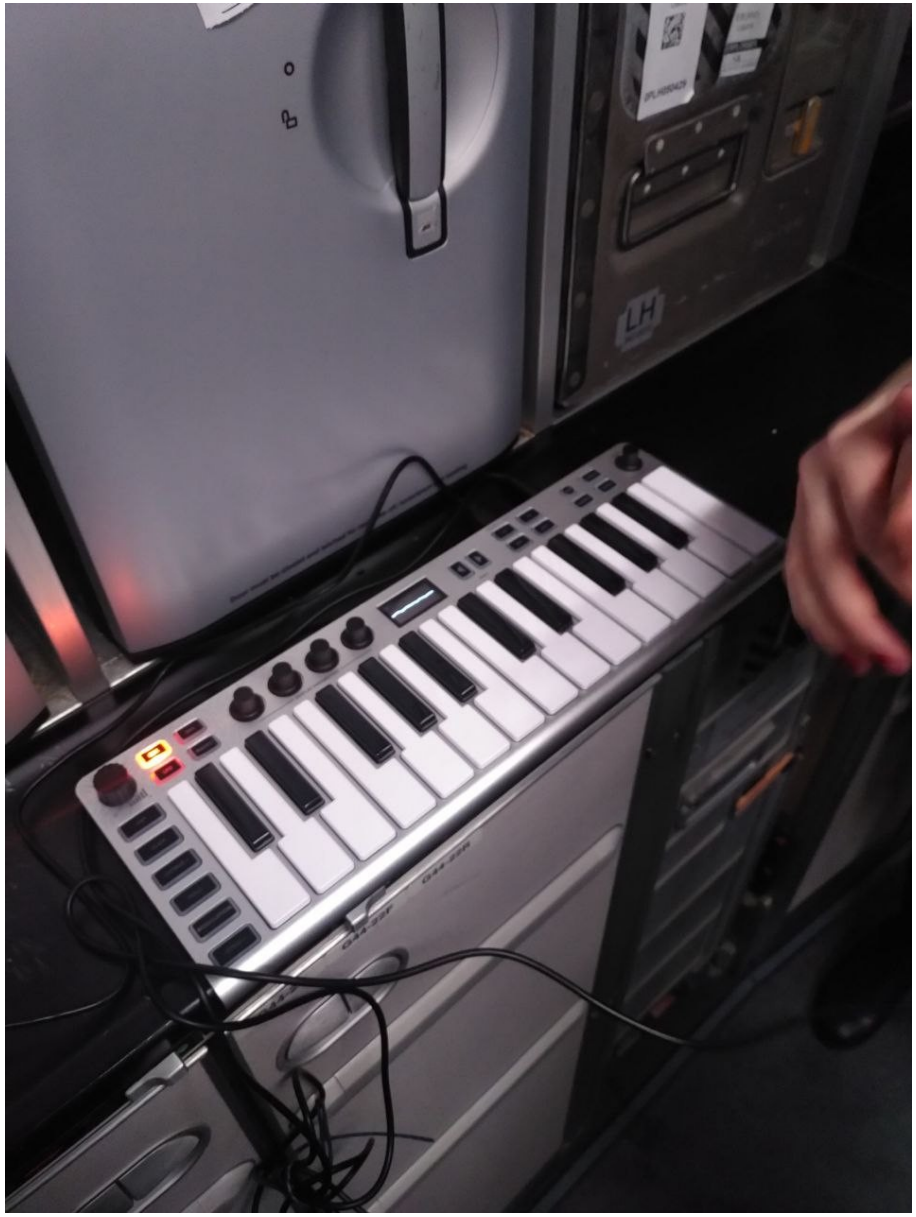



External MIDI Keyboard
Xsynth Keyboard
DAW
Merge
Arpeggiator
Ring Mod
Ext. Signal Aux In
FM
Osc 1
03 Sync
02 Sync
Osc 2
Osc 3
MIX
MIDI/Control signal
Audio signal
Filter
AMP
FX
Patch Volume
Controls (Vel, AT, etc.)
LFOs
Env
MOD Matrix
Env 2
Env 1
Audio Interface
DAC
DAW
Speakers


volume
24dB
12dB
Cutoff
frequency


volume
passband
resonance
transition band
stopband
Cutoff
frequency

Proof: Xsynth fits onto the counter of the rear galley of an Airbus A350



25. Legal note

A4=442.3Hz would still be a legal note. Now, seriously:

You are free to use all sounds from Xsynth in your music for both commercial and private use. However, you may not build a sample library which uses unaltered factory presets and/or raw waveforms from Xsynth and you may not claim any of these as your own work.

This manual has been written with utmost care. However, we deny any liability for any damages, injuries, loss of data and/or profits which may result from the information herein or from incomplete or incorrect information in this document.

Xsynth has no user-servicable parts inside. Do not open the case and do not try ro remove the keys. Attempting to open the device or to remove the keys will void the warranty and possibly result in unrepairable damage of the device and/or personal injury.

Xsynth's ports must only be used with the corresponding signal sources or receivers.
MIDI input signals must not exceed 5V.
Power supplied through USB must not exceed 5V.
Aux In signals must not exceed Line level.
Do not connect any outputs to other outputs. Do not connect Control Voltage (CV) from modular synthesizers to any of Xsynth's ports.

Non-compliance of the instructions from this manual may void the warranty, result in damage and/or injury and forfeits all legal claims towards ESI, Artesia Pro or any of their representatives.

Any reverse-engineering of Xsynth's firmware, waveforms, memory content, hardware and Editor software is strictly prohibited.

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Manual written by:
Lukas Schütte

Sound designers:
Dirk Krause, Johannes „JayB“ Berthold, Lukas Schütte, Flora Zaret, Mario Escalante, Manfred Maraun, Carsten „Casi“ Schmid

Big thanks to:
Paul Whittington, Till Kopper, Dietmar Belloff

Greetings to our friends at Waldorf!

Get in touch with us! We look forward to hearing from you. Our support team mostly just gets messages when something does not work. Write to them when you are happy with your Xsynth and that it works as expected. This will really make their day.

ESI is represented by:

ESI Audiotechnik GmbH
Mollenbachstr. 14
71229 Leonberg
Germany

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Artesia Pro is represented by:

Artesia Pro Inc.
P.O. Box 2908
La Mesa, CA 91943 USA

Satisfied?

If something is not working as expected, please don't return the product and first use our technical support options via www.esi-audio.com or contact your local distributor. Do not hesitate to give us feedback or write a review online. We love to hear from you so we can improve our products!

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The FCC and CE Regulation Warning

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. Caution: Any changes or modifications in construction of this device with are not expressly approved by the party responsible for compliance, could void the user's authority to operate equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. If necessary, consult an experienced radio/television technician for additional suggestions.

Correspondence

For technical support inquiries, **contact your nearest dealer, local distributor** or ESI support online at www.esi-audio.com.
Please also check our extensive Knowledge Base with Frequently Asked Questions, installation videos and technical details about our products in the support section of our website.

Disclaimer

All features and specifications subject to change without notice. Parts of this manual are continually being updated. Please check our web site www.esi-audio.com occasionally for the most recent update information.