

◀ KODAMO

M A S K 1

bitmask synthesizer

マスク - 1

ビットマスクシンセサイザー

USER'S MANUAL

AK

M A S K 1

bitmask synthesizer

Thank you for purchasing the Kodamo MASK1. The MASK1 is a powerful synthesizer focused on the interaction between the player and the instrument. Sounds can respond differently depending on your playing style and the articulations you use. The goal with the MASK1 was to create a great sounding instrument, and take full advantage of its keyboard to control it in expressive ways.

The MASK1 is based on Kodamo's new bitmask synthesis combined with subtractive synthesis. Sine waves are mangled in different ways to produce ultra-rich waveforms which are then filtered, mixed with noise and processed with effects. We were inspired by the best analog synths to design the filter used in the MASK1, and by early, crunchy digital synths for the oscillators.

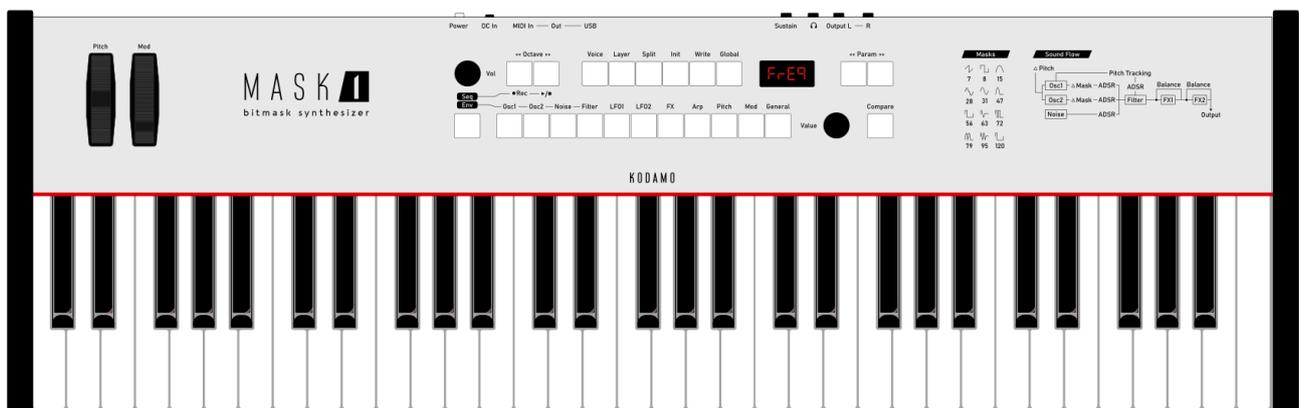
Bitmask synthesis isn't hard at all! The sound is manipulated with a single parameter.

We studied many old synthesizers to find what made them appealing. Technical limitations of the era often added small variations and unevenness to the sound that made for a very human feeling. Our ears are made for acoustic sounds that are, by nature, imperfect. We embraced that and used many techniques to make the MASK1 sound as organic and as pleasing as possible.

A lot of modern synthesizers offer hundreds, sometimes thousands of parameters, with a wealth of options. We took a radically different approach for the MASK1. Each sound is made of very few parameters. Only useful ones, with an optimized range for best results.

All these choices make the MASK1 a unique and characterful instrument that I hope will provide you with years of enjoyment.

- Stéphane Damo



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Do not discard this manual. A PDF version is also available at

kodamo.org

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Where it shines

Knowing about the strengths of an instrument is important to know what you can do with it. The MASK1 was designed with some key points in mind:

- Raw sound quality with gritty and powerful oscillators
- High quality filter
- High quality stereo effects
- Wide range of playing modes
- Excellent matching between keyboard velocity and the sound engine
- Full MIDI control with CC and SysEx support
- Strong output level
- Compact size and lightweight

Unpacking & inspection

In the box you will find:

- The MASK1 synthesizer
- A power brick
- A power cord
- This printed user manual
- Protective foam



Open the box. The MASK1 should be firmly secured by the foam blocks.

If the box is damaged due to inadequate handling during shipping, carefully check that the MASK1 is in perfect condition. Check that all the items from the list above are present. If something is missing or damaged, contact your dealer.

Take the MASK1 out of the box.

Keep the original box with the foam in case you need to return the product under warranty.

Precautions

The MASK1 is a sturdy instrument, however some common sense precautions need to be taken to prevent any damage.

- Avoid rain and excessive humidity
- Avoid putting the MASK1 close to any source of heat (maximum operating temperature: 40°C - 104°F)
- Avoid excessive vibrations
- Avoid dusty environments
- Avoid bad, unstable electrical installations
- Unplug the MASK1 from the outlet if left unused for a long period of time or during a lightning storm where power surges might occur
- Be careful when using the MASK1 with speakers or headphones. Always use moderate volume to prevent fatigue and hearing loss. Take a break every few hours.
- Ensure the MASK1 is correctly installed before playing.
- Do not put drinks on it. If liquid goes into the unit, immediately unplug it. Unscrew the front panel using an M3 hex screwdriver, clean any traces of liquid and let it dry before powering it on again.
- Do not apply excessive lateral or vertical force on the knobs. They are not clickable.
- Do not drop objects on the keys. Keys are very sturdy and can support several kilograms each when played with aftertouch, but dropping heavy objects can damage them because of the impact.
- When you are not using the MASK1 during a long period of time, do not keep it stored vertically. Keyboards that are stored vertically tend to develop more problems inside the key mechanism.

Care

If the surface becomes dirty, clean it with a dry cloth. A slightly damp cloth can be used on areas that are far away from the buttons and connectors. Do not use aggressive solvents like acetone, as they will damage the plastic parts and paint. Do not use the abrasive side of sponges.

Installation and setup

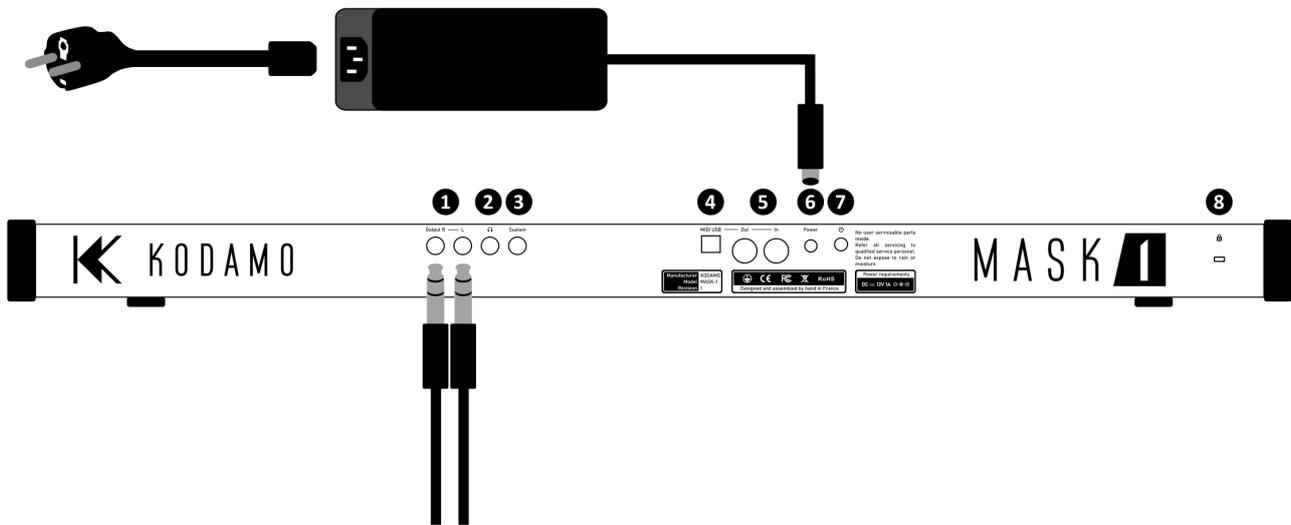
Put the MASK1 on a stable surface like a synth stand or a desk.

Find the power cable and the power brick in the accessories bag. Plug the power cable into an outlet, and plug the cable into the power brick. Then, plug the output of the power brick into the MASK1 power input (6).

AC Power cable, to outlet

Power brick

DC 12V, to MASK1 power input



MASK1 audio output, to sound card, mixer or amplifier

Depending on where you purchased the MASK1, it may come with a different IEC power cable to match the outlets in your country. IEC power cables are standard and can be purchased in any store if you didn't get the appropriate one.

To connect the MASK1 audio output (1) to your sound equipment, use 1/4" balanced (TRS) jacks for a clean, noise-free experience.

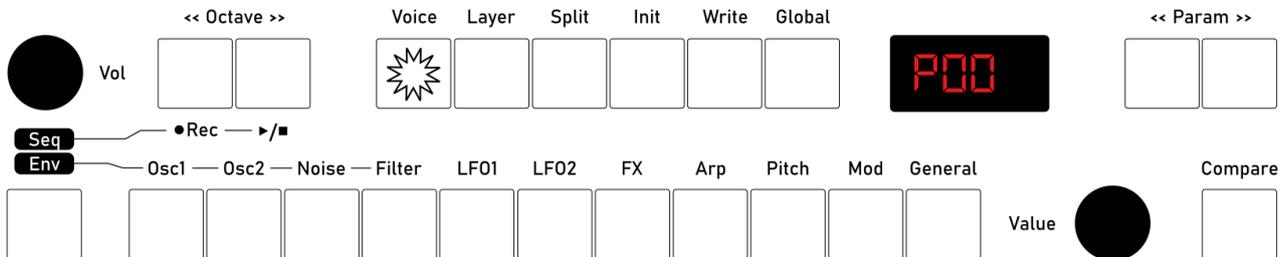
Here is a description of all the rear panel connectors:

1. 1/4" jack balanced left and right audio outputs. Connects to your audio interface, mixer or amplifier.
2. 1/4" jack headphones output. Works with any headphones including high impedance ones
3. 1/4" jack sustain pedal input. Works with any pedal, the polarity is automatically detected at startup.
4. USB type-B. Class-compliant MIDI interface, input and output.
5. Classic MIDI DIN connectors, input and output.
6. 12V DC Power input
7. Power switch
8. Kensington security port. Can be used with most laptop lock cables.

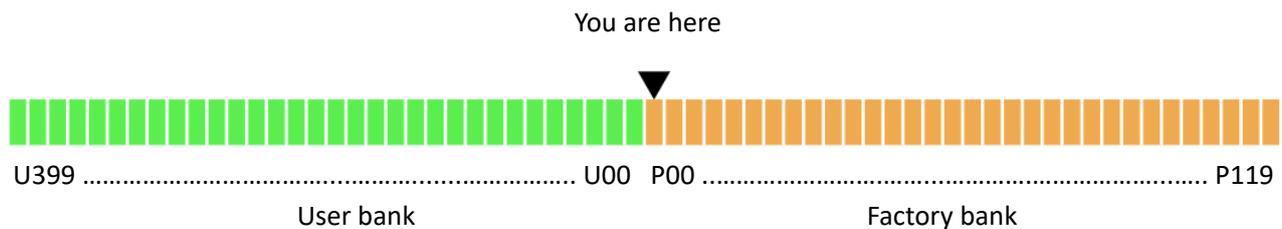
Power it on!

Press the power switch to turn the MASK1 on.

Press some keys, you should hear sound being output. Adjust the volume using the **Vol** knob on the left.



The **Voice** button is lit up, indicating you are in Voice mode. The display will show you the current voice number (here Preset #00) and its name. In this mode, you can switch voices by turning the **Value** knob or by pressing the **<< Param >>** buttons.



By turning the **Value** knob clockwise or pressing **Param >>**, you are exploring the preset bank which goes from P00 to P119.

By turning the **Value** knob counterclockwise or pressing **<< Param**, you are exploring the user bank, which stores your custom voices and goes from U00 to U399.

The **Value** knob is speed sensitive. Turning it quickly will accelerate your travel through the presets. Slower turns allow you to pass through presets at a more leisurely pace.

How to play the MASK1

The MASK1 is a performance-oriented synth. Here is a recap of the ways you can interact with it to make music.

The keyboard

A 5-octave velocity and aftertouch-sensitive keyboard.

Velocity means sound can react in different ways depending on how hard you press the keys.

Aftertouch is the extra pressure you apply on a key after it has been pressed.

Unlike many synthesizers, the MASK1's keyboard is not just about triggering and stopping notes. Voices will react in different ways depending on the play mode they use:

- Polyphonic modes: You can play several notes at the same time. The maximum polyphony is 12 notes. Notes that are held have priority, whereas the oldest released notes will be interrupted by newly played ones (only noticeable if the sound tail is long enough). Some sounds are made to resonate for a very long time, so you either let all the 12 notes play, or you can decide to play the same notes multiple times (eg. repeated chords) to stop the old ones and make the new chord clearer.
- Monophonic modes: A single note can play at a time. Some mono modes will trigger portamento only when playing legato. Some may also trigger the attack on every notes or only on the first note played.
- Slurred modes: These are a combination of polyphonic and monophonic modes. When playing neighbouring notes (notes that are less than 3 semitones apart) in a legato style, they will be slurred instead of being retriggered. This helps musical phrasing and expressivity. With some practice you can also slur notes that are further apart, by quickly pressing the notes inbetween (eg. slurring from C to E can be done by quickly pressing D then E)
- Paraphonic modes: These work a bit like polyphonic modes, except that only the first note triggers all the envelopes. The subsequent notes will catch up with the envelope of the first one. This allow for interesting attack variations especially when combined with mask envelopes. It also improves playability for long sweeping pads when holding a bass note, by making the new notes sound immediately.
- Hybrid modes: Some of these combine Paraphonic and Slurred modes, or Mono and Polyphonic modes at the same time. Refer to the "Editing voices > General" section for more information.

Wheels

The pitch bend and modulation wheels are located on the left side of the MASK 1.

The pitch bend wheel is used to alter the pitch of notes. It is preset to alter pitch by two semitones in either direction but it can be configured for a range of up to +/- 1 octave. It is spring-loaded to return to its center position when released.

The modulation wheel, or mod wheel, isn't spring loaded. It is used to offer an extra control over the sound. It is often used to control the vibrato amount but can also be configured to alter the filter or other characteristics of the sound.

The value knob

The value knob is used for editing parameters, but it can also be used as an extra real-time controller while you are playing. Simply leave the MASK1 on the parameter you want to interact with (eg. Filter resonance) so it is ready to use when you need it.

Sustain pedal

If you have a sustain pedal you can plug it into the MASK1. Notes will be held as long as you keep it pressed. When many notes are held by the pedal, polyphony may run out and new notes will replace old ones. You can avoid that for important notes that you want to prioritize (usually the bass note) by keeping them pressed.

The sequencer

The built-in sequencer works like a looper which allows you to record and loop any chords or melodies. You can play over the recorded sequence and start new recordings seamlessly.

The Arpeggiator

The MASK1 offers a latchable arpeggiator that can run independently and adapt to new chords while you are playing or tweaking the sound. It can also sync to an external MIDI clock.

MIDI input

For advanced users, MIDI inputs can be used to control voice parameters through CCs (see “MIDI implementation” section) or to play multitimbral sequences. Hardware controllers can be used to control almost all the parameters.

First listening & voice presets

Try some of the presets. The MASK1 comes with 120 expertly crafted voices covering many styles. They are not sorted by type to allow for a more interesting exploration.

You can keep the keys pressed while switching voices, notes will be re-triggered to allow for quick auditioning.

Each voice has specific ways of playing it. Try various amounts of velocity and pressure. Play with the modulation wheel, legato or staccato, one or more notes at the same time to fully enjoy them!

Preset no.	Name	Play mode	Attributes	Comments
P00	MEGAMASK	Para slurred		Pad using evolving masks. Use aftertouch to switch octaves.
P01	DAWN	Slurred / Poly	Layer	Saw pad layered with an e-piano. Use aftertouch to alter the tone.
P02	FIVELOVE	Poly / Para	Split	Slap bass/organ split

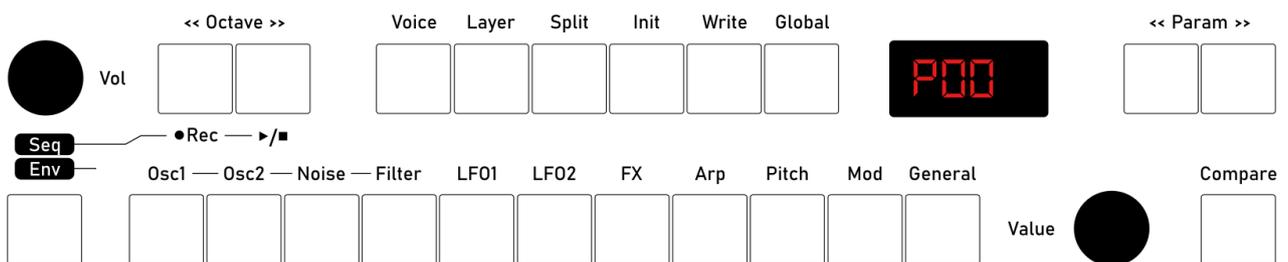
P03	ORGAN	Slurred		Ethereal organ. Mod wheel alters the tone.
P04	BREATH	Slurred		Warm notch pad
P05	POLYMONO	Moly		Analog-like sound. Play legato for mono, or staccato to let the notes resonate.
P06	MOOGI	Moly		Solo bass-lead. Works the same as POLYMONO
P07	PPGEEZ	Poly / Poly	Layer	Resonant pad with harpsichord
P08	COZY	Slurred / Poly	Split	Bass/rhodes split with subtle distortion
P09	SOLOBASS	Slurred / Slurred	Layer	Expressive saw bass
P10	NYMPHOSE	Para slurred		Long sweep pad with interesting color
P11	BRASS	Slurred / Slurred	Layer	Brass section
P12	PLANET	Poly	Arp	Arpeggiated square wave
P13	POLICE	Para slurred		Cinematic pad. Keep at least one key pressed to avoid the pitch slide.
P14	SEASIDE	Mono porta legato	Arp	With real simulated seagulls. Birds do chirp when at least two keys are pressed.
P15	ANISE	Mono porta legato / Slurred	Split	Fifth pad with lovely guitar
P16	SULFUR	Slurred		Melodic pad with gritty lows and fifth
P17	NEONS	Poly		Play staccato for a brighter sound
P18	BARBA	Mono		Fat solo lead. Use aftertouch to go crazy
P19	LYLE	Slurred / Para slurred	Layer	Square lead mixed with tanpura
P20	TINE	Poly		Almost like a DX7
P21	VAPOR	Poly		Classic analog pluck. Fully opens with modwheel.
P22	ARCO	Para		Strings, different attack if more than 1 note is played.
P23	HORNS	Slurred		Classic analog horns
P24	RAVE	Para slurred		Heavily detuned and bandpassed
P25	STARS	Para slurred		Ethereal pad with alternating fifth
P26	SUBTERRA	Para		Pad with evolving masks. Use the paraphonic behavior for a different attack.
P27	SIDERAL	Para slurred / Poly	Layer	Sweep pad. Release all notes to retrigger the filter sweep.
P28	BRITER	Poly		Bright saw pad. Velocity controls the filter's opening rate.
P29	REDEMPT	Mono / Para slurred	Split	Synth bass + bagpipe-like instrument
P30	EDGE	Para slurred		Try holding 1 note while playing staccato with the other hand
P31	PWBRASS	Poly		Powerful, jumpy brass ensemble

P32	COFFEE	Slurred		Looped ethnic bells
P33	NAPPY	Slurred		Melodic pad
P34	REVOX	Mono		Voice-like lead
P35	MELANC	Slurred		Wide pad
P36	VOCALI	Mono porta legato		Resonant analog bass-lead
P37	CONTEMP	Poly		Soft piano with delayed pad
P38	BITPIANO	Slurred		E-piano with delay using mask envelopes
P39	SPATIAL	Slurred		Gritty saw pad
P40	REZ	Slurred		Resonant pad
P41	VOLCA	Mono / Mono	Layer	Fifth lead
P42	AQUA	Slurred		Square pad with noise attack
P43	REMIND	Poly		Melodic pad
P44	STICKY	Moly		Solo lead
P45	CHORUSER	Poly		Simple saw with chorus
P46	DERVICH	Poly		Extreme effect with sirens on modwheel and noise on aftertouch.
P47	NUCLEAR	Slurred / Poly	Layer	Overly-rich layered pad
P48	TANK	Poly		Metallic resonant sound
P49	MARS	Para slurred / Poly	Layer	Firworks-like effect. Paraphony changes the attack.
P50	SUPERSAW	Poly / Poly	Layer	The classic, with velocity-sensitive filter
P51	ASIA	Poly		Ambient pad with fifth and evolving masks
P52	RAINY	Poly		Lofi piano with rain in the background. Turning the modwheel increases the tape effect.
P53	MOOD	Poly		Warm saw pad with fifth
P54	DIRTYBIT	Mono		Mellow, dirty bass
P55	SAPPHIRE	Slurred		Evolving, melodic pad
P56	VINTAGE	Para		Sweep pad
P57	OB BRASS	Slurred		Raw analog brass
P58	GLASS	Para slurred		Additive-like ethereal sound
P59	AMBI	Poly / Slurred	Split	Relaxing split pads
P60	NOTCHKA	Poly		Pad using the notch filter
P61	ELGUIT	Poly		Clean guitar
P62	VANGELIC	Slurred		Sweep pad
P63	REZZOID	Mono		Resonant lead
P64	PIPORG	Slurred		Pipe organ with sweet attack
P65	WINDY	Slurred		Snowy, delicate pad

P66	PURRLEAD	Slurred		Lead with growl effect
P67	SPARKLE	Slurred		Piano with evolving tone
P68	CHORAL	Poly		Synth choir
P69	RHODY	Poly / Poly	Layer	Groovy rhodes + saw
P70	KRUSH	Moly		Percussive lead
P71	DRUMS	Mono retrig / Poly	Split	Kick + clap combo
P72	ASHES	Mono porta legato	Arp	Ambient sound effect
P73	OCHOIR	Para slurred		Sweep resonant pad
P74	SMOOZ	Slurred		Fretless bass
P75	VOYAGER	Poly / Slurred	Arp + Split	Synth arp + lead
P76	PICCOLO	Mono porta legato		Metallic piccolo with fifth
P77	ORGI	Poly		Organ sweep pad
P78	BIKE	Mono porta legato	Arp	A funny ride
P79	REST	Para		Ethereal pad
P80	ARPY	Poly / Slurred	Arp + Layer	Arp with saw pad
P81	PEPEGE	Slurred		Voice-like synth sound
P82	DREAM	Para slurred		Slow evolving pad
P83	INFRA	Mono porta legato		Glitchy, digital bass
P84	BADLAND	Slurred		Ambient melodic, distorted guitar
P85	GRAINORG	Para		Gritty hammond organ pad
P86	CARPEN	Poly		Synth choir pad
P87	SQUEEZE	Mono		Resonant lead
P88	FRET	Slurred		Guitar with subtle distortion
P89	COLORFUL	Para		Resonant pad
P90	FM BASS	Mono		Sounds like FM feedback
P91	SQLYR	Poly		Square resonant pad
P92	LESLIE	Poly		Hammond organ
P93	BUZZY	Slurred		Melodic pad with wah-wah effect
P94	SOLINA	Slurred / Slurred	Layer	Rich strings
P95	MITHRIL	Poly		Between an electric piano and a xylophone
P96	GONG	Slurred		Melodic one
P97	TEMPLE	Para slurred / Slurred	Layer	Sweep pad
P98	MYSTIC	Para		Organ
P99	SH LEAD	Mono porta legato		Rich lead
P100	GRENADA	Poly		Halfway between an electric piano and a percussive organ
P101	MAYHEM	Poly		Noisy SFX

P102	KOTO	Slurred		Slurred notes must be performed quickly
P103	CLARI	Mono		Bass clarinet with gritty low end
P104	CLAP	Poly		Echoed clap
P105	WARMPAD	Poly		Sweep pad
P106	WANDER	Slurred		Ethereal, voice-like pad
P107	CHURCH	Poly		Organ pad
P108	FLOATING	Poly		Piano using filter self-resonance
P109	LAZER	Slurred		Melodic pew-pew
P110	LSD	Mono porta legato		Very high
P111	BREEZE	Slurred		Soft melodic lead
P112	LARK	Para slurred		Bagpipe-like
P113	EP	Poly		Simple rhodes
P114	BABE	Slurred		Sexy lead
P115	TEARS	Poly		Saw pad
P116	BLOOM	Poly		Sweep ethereal pad
P117	FALLSTAR	Poly		Pad with falling meteors
P118	FLUTE	Slurred		Warm solo flute
P119	GOD OB	Poly		The only one

First steps with the interface



The MASK1 provides a clean and simple interface.

The first row of buttons are general functions (from left to right): keyboard octave transpose $-/+$, voice selection, voice layering, voice split, initializing a voice, writing a voice to memory, accessing global settings.

All the buttons except **<< Octave >>**, **<< Param >>**, **Seq/Env** and **Compare** are mode buttons. By pressing them, you enter the corresponding mode to access their parameters. After you have entered a mode, use the **<< Param >>** buttons to navigate between parameters. Navigation can also be done by pressing the same mode button again to cycle through parameters. You can then turn the **Value** knob to change the parameter

value. For modes that have only one parameter, the << **Param** >> buttons act the same as turning the **Value** knob.

The << **Param** >> and **Value** buttons are conveniently placed near to each other to make one-hand editing easier while you are playing.

The second button row in the centre is dedicated to voice editing. Press one of them to edit a specific part of the voice (see “Editing voices” section).

On the very left, the **Seq/Env** button is a toggle switch. When enabled, the buttons connected to it via the lines on the front panel will act differently. << **Octave** >> transpose buttons will act as **Record** and **Play/Stop** for the sequencer, and pressing **Osc1**, **Osc2**, **Noise** and **Filter** will give access to their envelope settings.

On the very right, the **Compare** button is also a toggle switch. When enabled, it will allow you to listen to the original sound before you made any modification to it (if any) and COMP will be displayed on the screen. Compare mode is made for comparative listening purposes. Press **Compare** again or press any other button to exit this mode and go back to your edited voice. If you are not happy with your changes, switch voices to get your original voice back (eg. if you are editing voice U01, go to any other voice then go back to U01). Switching voices always loses changes, unless you pressed **Write** to save it into memory.

That’s it! You now know everything required to use the MASK1 interface!

Now that you have read this part of the manual and auditioned some of the presets, the next step is up to you! Read the following sections in any order you want, depending on your needs.

Layering two voices

Press the **Layer** button. Two sounds will now play at the same time. When you are in layer mode, the displayed voice number and name is always the layered one, you can change it by turning the Value knob.

Press the << **Param** >> buttons to access the layering options.

- **SEMI**: transposition in semitones for the layered voice
- **BAL**: balance between the two voices
- **PAN**: stereo separation for the two voices
- **TUNE**: detuning amount between the two voices

To disable layering, press the **Voice** button two times. If you press it just once, you can look at the base voice number and name, but the layer remains active (the **Layer** button will blink to remind you the layer is active).

Layer settings are stored within the voice.

Splitting the keyboard

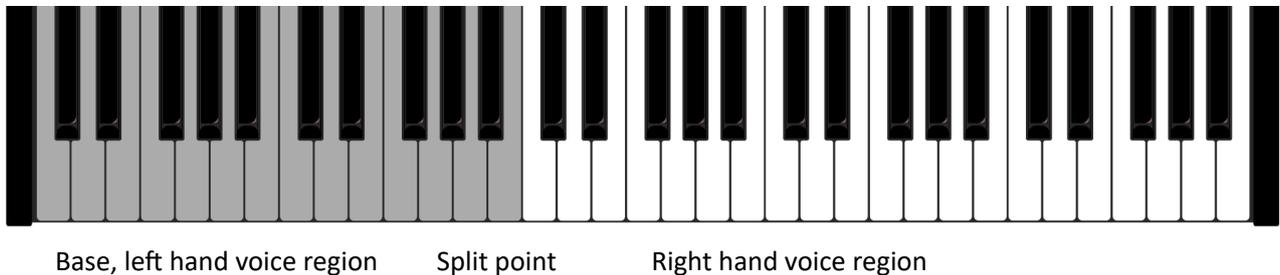
Press the **Split** button. The voice you had already selected will now only play on the left hand side of the keyboard, and the right hand side will play another voice. Use the Value knob to change the right hand side voice.

By pressing the << **Param** >> buttons, you can edit the exact same parameters as in Layer mode.

To change the split point, keep **Split** pressed and then press the key where you want the split to be. This will be the first note where the right hand region starts.

To disable the split, press the **Voice** button two times. If you press it just once, you can look at the base voice number and name, but the split remains active (the **Split** button will blink to remind you the split is active).

Split settings are stored within the voice.



Quick transpose

Press the << **Octave** >> buttons to quickly transpose the whole keyboard while playing. You can transpose down two octaves and up two octaves. This setting is remembered after shutting down.

Using the built-in sequencer

The MASK1's built-in sequencer is very simple and works like a looper.

Press the **Seq/Env** button. When lit, it tells you that the << **Octave** >> buttons no longer work as octaves switches, but rather as **Record** and **Play/Stop** buttons.

Press **Rec**. Play some notes. Then, press **Play**. The sequence you played will replay and loop.

When you start recording, the MASK1 waits for the first note to be played, so the timing when you press **Rec** isn't important. However, the timing when you stop the recording is important as it will tell the MASK1 to loop at this exact moment.

You can play the keyboard, switch voices and edit them while the sequence is playing.

Adjusting the settings

Press the **Global** button to access the global settings.

All these settings are remembered after shutting down.

- **TEMP:** Temperament (tuning method) to use. All temperaments are based on a C root note. The root note can be changed by transposing the keyboard.
 - **ET:** Equal-tempered. The default tuning for western music.
 - **ARAB:** An Arabic tuning. E and B are a quartertone lower than ET, while F# and G# are a quartertone higher.
 - **JMAJ:** Just intonation optimized for major keys.
 - **JMIN:** Just intonation optimized for minor keys.
 - **MEAN:** Quarter-comma meantone, for early baroque and medieval music.
 - **PYTA:** Pythagorean. An early tuning that sounds great for fifths and fourths.
- **SEMI:** Keyboard transpose in semitones.
- **TUNE:** Global tuning (400 Hz...470 Hz)
- **VEL CURVE:** Keyboard velocity response. The first available curves (1-5) provide the strongest dynamics, while the last one (MAX) completely disables velocity.
- **AT CURVE:** Keyboard aftertouch response. The first available curves (1-5) provide the best control but require more force. The last curve is easier to press but immediately reaches the maximum value. Set it to NONE to disable it completely.
- **PITCH BEND:** Range in semitones for the pitch bend wheel, up to +/- 12 semitones.
- **LOCAL KB:** Enables or disables the link between the keyboard and the sound engine. Usually you disable it when using the MASK1 with an external sequencer, to prevent double note triggering.
- **MIDI CH:** The base MIDI channel the MASK1 will respond to. By default, it listens and transmits to channels 1 to 4. Setting the value to 5 for example, will make it use channels 5 to 8. Do not change the channel while receiving or transmitting, as this could lead to stuck notes (if this happens, switch voices to stop the remaining notes on the first channel, or send a program change to stop notes on other channels).
- **TIME FX:** Enables or disables time-based effects (delay and reverb) on a global basis, in case you prefer using your own effect pedals, or if you prefer the raw sound.

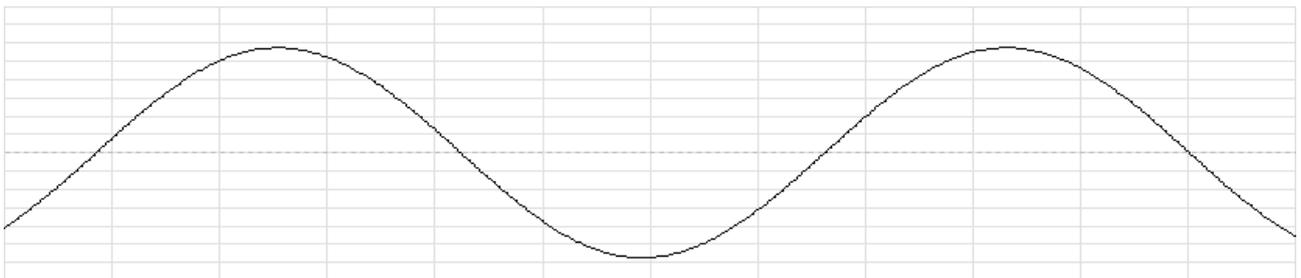
- **RANGE BEEP:** For blind or visually impaired people. When enabled, reaching the first and last parameter of any mode will produce a click. This helps with navigation. The click volume can be set from quiet (1) to loud (10).

Synthesizer basics

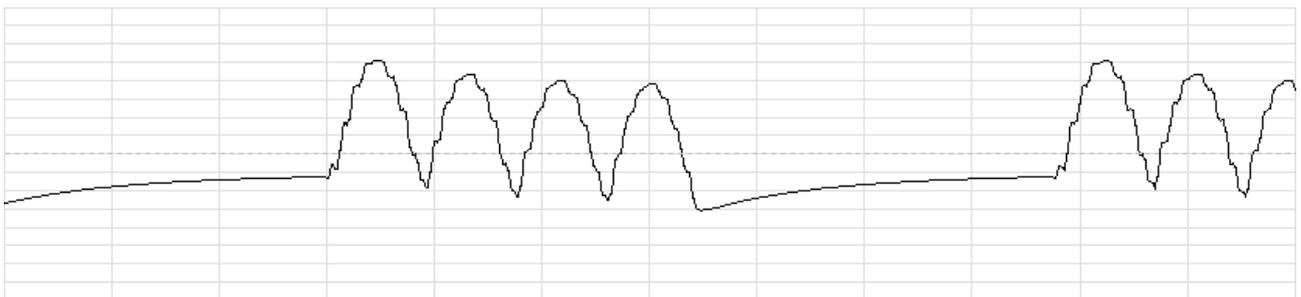
If you are new to synthesizers, you may be not familiar with all the terms used.

OSCILLATORS

Oscillators are the heart of the synthesizer, they are the basis of any melodic sound. They are made out of electronic components (in analog synths) or out of algorithms (in digital synths). They oscillate, which is to say they create an electrical signal that varies over time in a repeated way. Depending on the frequency of the repetition, different notes are created, and depending on their shape, different tones are created. See “Editing Voices” “Osc1 and Osc2” section.



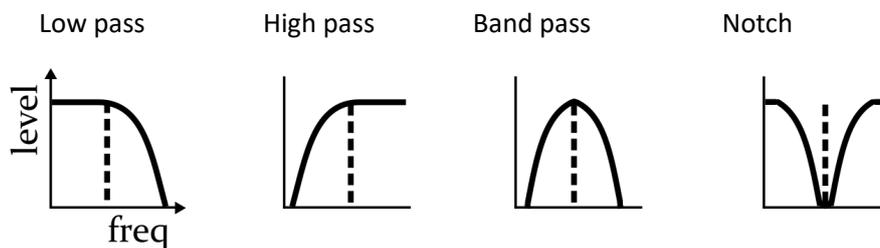
Sine wave (MASK=31), 440Hz



Buzzing wave, (MASK=78), also 440Hz. The shape is different, so the timbre will also be different.
It repeats at the same rate as the sine wave, so the note will be the same.

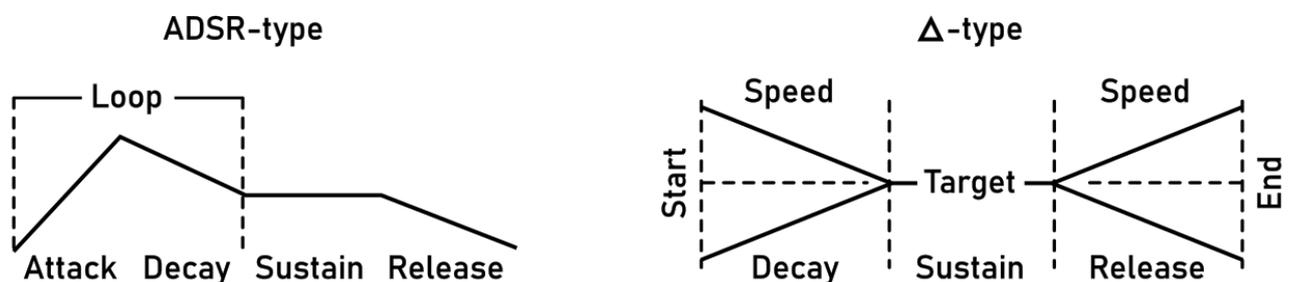
FILTERS

Filters take the oscillators' output and filter out frequencies from their signal. Usually any synth with filters start with oscillators producing high harmonic content. Harmonic content is the amount of high frequencies a sound contains, usually a sound with high harmonic content can be described as rich, crisp or even aggressive to the ear. Filters are well suited to them because they will remove more or less frequencies depending on how they are setup. You can try on the MASK1 to create a voice using mask #31 (sine) and use the filter: it won't be effective, since the sine wave already has no harmonics to filter out. However, trying that with mask #7 (saw) will work very well, since a saw wave is full of harmonics. A filter can be configured to start acting from a certain frequency threshold. This is called the cutoff. It is represented on the graphs below by the dashed line.



Filters often have several modes to filter out frequencies above or below the threshold. This is called the filter mode. The MASK1 has four filter modes; low pass, high pass, band pass and notch. Low pass is the most used mode, as it helps achieve a warmer tone by removing high frequency content. High pass will produce a buzzy sound by removing bass (low frequency) content. Band pass is a mix of both low and high pass modes. Notch is an often underestimated mode. It produces a nice phase-shifting effect that is not used very often. It is best to experiment with them right from the beginning to familiarize yourself with the effect they produce. See the "Editing Voices" chapter for more info.

ENVELOPES



ADSR envelopes are very common in synthesizers, they are often used to control the volume or the filter cutoff.

1. You press a key. The envelope level increases more or less quickly, depending on the **Attack** parameter.

2. Once the Attack reaches its maximum level, the envelope enters the **Decay** phase and gets quieter quickly or slowly, depending on the **Decay** parameter.
3. When the envelope reaches the **Sustain** level, it stays indefinitely at the level set by the **Sustain** parameter.
4. You release the key. The envelopes fades out, at a rate depending on the **Release** parameter.

The MASK1 has four ADSR envelopes; one for each oscillator, one for the noise and one for the filter cutoff. Attack follows a linear curve, while decay and release are exponential.

Delta envelopes (as shown in the previous diagram, to the right) are used for Pitch and Mask. These envelopes are simpler than ADSRs:

- You press a key. The envelope starts at a higher or lower position relative to the target position, depending on the **Start** parameter.
- The envelope reaches the Target level more or less quickly depending on the **Speed** parameter.
- You release the key. The envelope goes up or down depending on the **End** parameter, at a rate determined by the same **Speed** parameter.

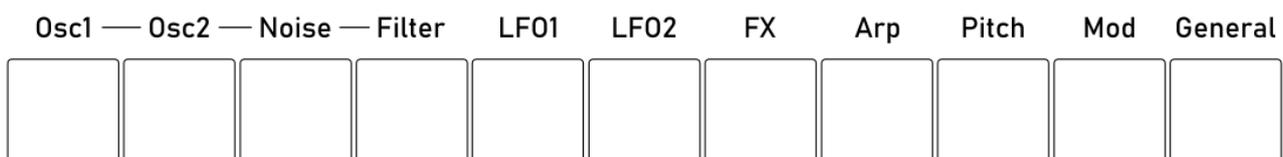
LOW FREQUENCY OSCILLATORS

Low Frequency Oscillators (LFO) are commonly used in synthesizers to give life to a sound by altering its pitch (vibrato), its volume (tremolo), or other properties over time. They work like normal oscillators, but much slower, typically from sub-hertz frequencies for slow moving effects to a few hundred hertz.

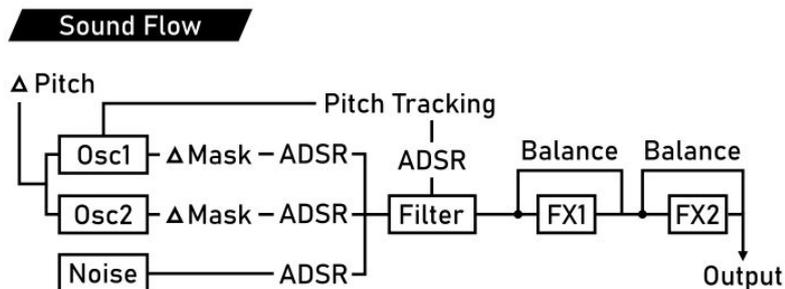
In the MASK1 you can use the LFOs to control 16 different parameters of the sound, with a configurable delay, decay, speed and shape.

Editing voices

Live editing a voice can be performed at any moment on a preset or user voice. Press one of these buttons to access the different sections of the voice.



Before diving deeper into voice editing, let's get familiar with the synth architecture:



Sound starts when the Pitch envelope is triggered by pressing a key.

Two bitmask oscillators and a noise generator are triggered.

Bitmask oscillators have their own mask envelope, and both oscillators and noise have dedicated ADSR amplitude envelopes. If you are not sure what an ADSR is, check the Envelope section of this manual.

The sound is sent through the filter, which has its own cutoff ADSR and can track pitch from oscillator 1.

The filter is then connected to the first effect processor (FX1) which offers chorus, phaser, distortion, bit crush and ring mod.

Then the second effect processor (FX2) offers time-related effects like delays and reverbs, and a second distortion.

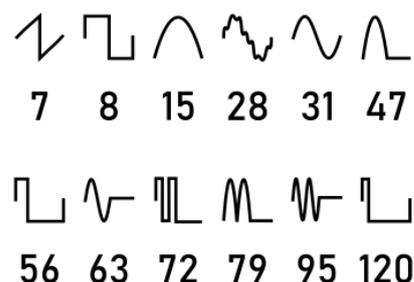
Two LFOs are available, which are not shown in this diagram since they can be configured to impact almost any section of the voice.

OSC1 AND OSC2

Bitmasking is the technique used by the oscillators in the MASK1 to produce sound. Internally, the oscillators produce sine waves which are then bit-masked to create new shapes. Bit-masking is a digital technique used in computing that we have adapted for sound generation purposes. It works by splitting the waveform into many parts and deciding which part will be flipped, repeated, scaled or silenced. This technique provides a wide range of tones, with a lot of grit and harmonic richness which is perfect for the resonant filter that comes just after.

Depending on the mask you choose (MASK setting), different waveforms will be created. Different masks will also produce sounds in higher or lower octaves. To compensate for that, the semitone (SEMI) setting is conveniently located next to the MASK setting.

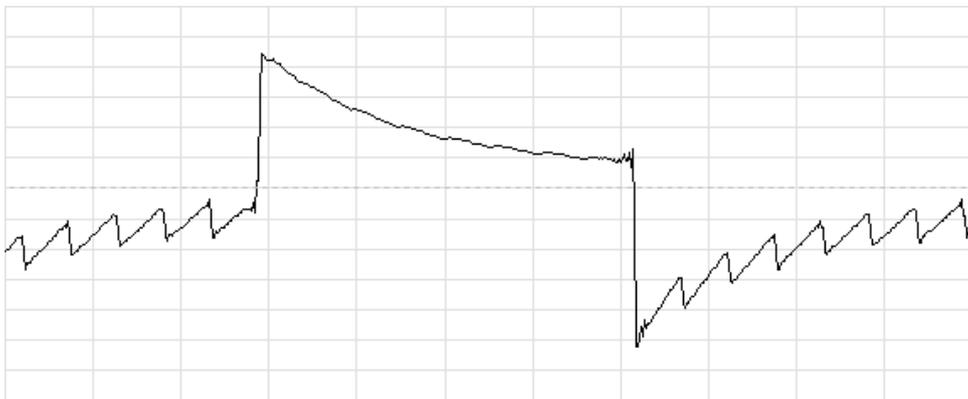
A recap of the waveforms generated by different masks is displayed on the right side of the front panel and here on the right. Classic analog synth waveforms can be easily obtained by using number 7 (saw) and 8 (square). Generally, the smaller the number the simpler the waveform. As you go into higher values, waveforms are more pulse-like. You will find some interesting cases where waveforms are so complex that they contain sub-patterns and fractal shapes inside them. Some have a lot of grit in the low octaves which gives them a PPG flavour, some may create rhythmic patterns when transposed even lower.



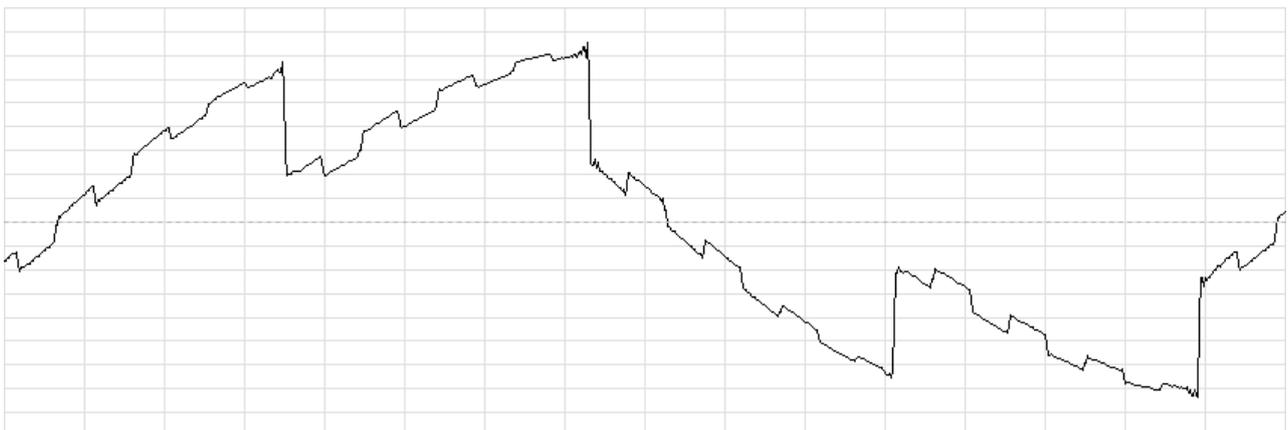
These waveform representations are simplified to give you an idea of their tonal quality. Rounded shapes like 15, 31, 47, 63, 79 and 95 produce a mellow sound (fewer harmonics) compared to the shapes with sharper edges.



Pure saw (MASK = 7). Close to an analog saw made with capacitor discharge.



Square (MASK = 8). Notice how the low portion of the wave is made of little saws. This unique characteristic create extra grittiness in the lows. In the mid and upper ranges, it sounds like a normal square.



Can you find which mask creates this waveform?
Do you think it sounds like a saw, a square or a mix of both?

All the masks can be experienced through a single MASK parameter. There are a total of 5 parameters for both oscillators, plus 6 envelope parameters.

Basic oscillator parameters:

- **MASK:** Selects the mask to use for this oscillator
- **SEMI:** Oscillator transpose in semitones (120 semitone/10 octave range)
- **TUNE:** Oscillator detune. We suggest detuning the oscillators in a symmetrical way (eg. -3/+3 instead of 0/+6), to keep the overall pitch of the voices in tune with each other.
- **START:** Mask envelope start (delta envelope)
- **SPD:** Mask envelope speed (delta envelope)
- **LOOP:** Mask envelope loop (delta envelope). When set to NO, loop is disabled. When set to YES, loop works as you would expect, returning to the starting position to do the cycle again like a saw LFO. When set to BIDI, the loop works in bi-directional mode (also called “ping-pong”), going back and forth between start and end points, like a triangle LFO.

Press the Env button to access volume envelope settings for Osc1 and Osc2:

- **L:** The overall level of the envelope (controls the volume of the oscillator)
- **A:** Attack time. 0 means instant attack.
- **D:** Decay time. 0 means instant decay.
- **S:** Sustain level
- **R:** Release. 0 means instant release.
- **LOOP:** When enabled, Attack and Decay segments will be looped until the key is released. Envelope loops are useful to make evolving sounds and quick repeated attacks without using the LFOs.

Note: you can edit multiple envelopes at the same time. Simply press the corresponding buttons (Osc1, Osc2, Noise, Filter) at the same time, they will both light up to tell you they are being edited.

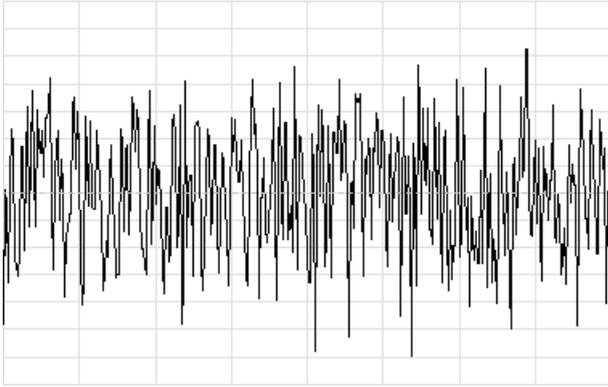
NOISE

Each voice has its own noise generator. It is a sample-and-hold noise, which has a very noticeable crunchy sound quality as it goes into low frequencies. For smoother, low-frequency noise, set the frequency to the maximum setting with the filter in low pass mode to make it darker.

Noise parameters :

- **FREQ:** Frequency of the noise
- **TRACK:** Keyboard tracking for the noise

Noise is generally used to emphasize the attack of a sound, to simulate a lo-fi sound or to make a tone richer. It can make interesting tones when combined with a highly resonant filter setting.



Noise at maximum frequency (white noise)



Noise at a lower frequency

When the Env button is lit, you are editing the noise envelope settings, which are the same as other envelopes (L, A, D, S, R, LOOP).

FILTER

The MASK1 has two high quality 12dB/octave state-variable filters per voice. It takes Osc1, Osc2 and Noise as inputs, and outputs the sound to the first effect processor.

The first filter or main filter is fully controlable with its own independent envelope. The second filter is also 12dB and is controlled exclusively via the EXTRA parameter, see below.

- **CUTF:** The filter cutoff. In low-pass mode (default), a low value means a dark, muffled sound, while a high value means an open, bright sound.
- **RESO:** The filter resonance. As you increase it, sound will become more resonant. Beware of high resonance settings. Combined with some notes and oscillator settings, they may produce loud sounds.
- **MODE:** Selects between the four available filter modes.
 - **LP:** Low-pass darkens the sound
 - **HP:** High-pass brightens the sound
 - **BP:** Band-pass makes the sound more midrange-focused, by removing highs and lows
 - **NOTCH:** Notch removes a narrow band of frequencies. Set resonance to zero for maximum effectiveness.
- **TRK:** Allows the filter cutoff to track Osc1 pitch. This allows you to control the brightness of the sound across the keyboard. If you want the timbre to be identical no matter which note you play, set it to 100%. Tracking is affected by Osc1 transpose (SEMI) parameter.
- **EXTRA:** Controls the behavior of the second filter. When set to 12DB, it is disabled (only filter 1 is working). When set to 24DB, it connects in series with the first filter and mimic its settings to form a 24dB filter. The next options set the second filter to either lowpass or highpass modes, with fixed frequency settings (LP1-7, HP1-7). These options are useful for example to have control over the high end when using the main filter as high pass, or simply to get more sound shaping options.

When the Env button is lit, you are editing the filter envelope settings (L, A, D, S, R, LOOP).

The filter envelope can be controlled by velocity (see “Modulation” section), and the cutoff frequency by the mod wheel or aftertouch.

LFO1 AND LFO2

LFOs in the MASK1 are always free running, that means they don't restart their cycle each time you play a note. They also exist on a per-part basis, not per voice, so their effect is always heard in sync across all the currently playing notes.

LFOs are bipolar; they go above and below a center point. This is essential for effects like vibrato. For certain effects that might require unipolar LFOs, like using a square LFO to make an upper fifth interval, you will have to transpose/tune the oscillator to compensate.

Each LFO offer 6 parameters :

- **AMT**: The amount of LFO affecting the sound
- **SPD**: Selects the speed of the LFO
- **DEST**: Selects which parameter of the sound is controlled by the LFO. 16 destinations are available:
 - **FREQ**: Voice frequency for both Osc1 and Osc2. Creates a vibrato effect.
 - **VOL**: Voice volume. Creates a tremolo effect.
 - **FILT**: Filter cutoff. Creates a wah effect.
 - **MASK**: Mask for both oscillators
 - **PAN**: Voice panning
 - **O1 FREQ**: Osc1 frequency
 - **O1 VOL**: Osc1 volume
 - **O1 MASK**: Osc1 mask
 - **O2 FREQ**: Osc2 frequency
 - **O2 VOL**: Osc2 volume
 - **O2 MASK**: Osc2 mask
 - **N FREQ**: Noise frequency
 - **N VOL**: Noise volume
 - **FX1 TYP**: FX1 type
 - **FX2 TYP**: FX2 type
 - **FX2 BAL**: FX2 balance

- **WAVE:** Selects the LFO shape. 8 waveforms are available including noise. LFO waveforms are internally generated using the same bitmasking technique as the oscillators.
 - **SIN:** (sine)
 - **SQR:** (square)
 - **UP:** (saw up)
 - **DOWN:** (saw down)
 - **SAWS:** (mixed up-down saws)
 - **STEP:** (stair-like shape)
 - **HSIN:** (half-sine)
 - **RAND:** (random, noise)
- **DLAY:** The delay before the LFO kicks in. A lot of solo voices sound great with delayed vibrato. If the modulation wheel or aftertouch are mapped to the LFO amount or speed (see “Modulation” section), and you use these controllers, delay will be cancelled to give priority to musical expression. Subsequent notes get the delay back.
- **DCAY:** The LFO will stop after a time defined by the Decay parameter. When set to zero, decay is disabled. LFO decay isn’t very common in synthesizers. It is very useful to create attack transients. You can look at some factory presets that use them, e.g. CLAP (P104) uses LFO1 to hash the sound a few times at the start. It needs to stop quickly to let the hand clap resonate. EP (P113) uses LFO2 to make the tine wobble a bit when struck.

EFFECTS

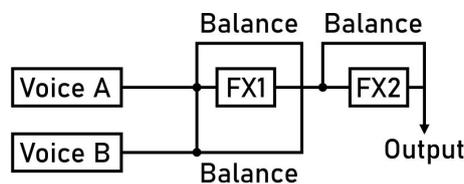
The MASK1 offers high quality effects that are very easy to use with a preset-based approach. We selected for you many interesting parameter combinations. Most of the effects also alter the tonal characteristics of the sound and create their own stereo field to make them more interesting.

Two effects can be used in series. Each voice retains the settings for both effects. To access these settings, press the FX button. Two parameters are available for each effect:

- **1BAL:** Sets the balance for the first effect, 0 is 100% dry, 100 is 100% wet, 50 is a perfect 50-50 mix.
- **1TYP:** Selects the effect type for the first effect processor.
 - Chorus (**CH1-CH16**): Adds life and movement to a sound. Different speeds and depths are available. With choruses, the best depth is often achieved when doing a 50-50 mix (BAL=50). Using them with BAL=100 can be useful for a warmer vibrato rather than a LFO-based vibrato. The last two choruses (15 and 16) work more like phasers, and the maximum effect is achieved when BAL=100.

- Distortion (**DT1-DT16**): Soft and crunchy distortions. They emphasize different harmonics and color the sound in different ways. The first types are subtle and only distort at high volumes, while the last ones set the saturation threshold lower for a more pronounced effect.
- Bitcrush (**BC1-BC16**): A very digital and grainy effect. Types 9 to 16 have a built-in LFO controlling the crush rate. Some types also warm up the sound to compensate for the natural crispiness of bit crushing.
- Ring modulation (**RM1-RM16**): The first types are very slow and work like a stereo tremolo effect. The last types get into audio range and can be useful to simulate the human voice by interacting with the filter resonance to create formants (see preset P106 WANDER)
- **2BAL**: Sets the balance for the second effect.
- **2TYP**: Selects the effect type for the second effect processor.
 - Delay (**DL1-DL16**): Makes an echo effect. The first types are long echoes, later ones are so short they create a comb filtering effect.
 - Reverb (**RV1-RV16**): A great sounding reverb that includes long cathedral-like reverberations (the first types) and shorter ones that simulate smaller rooms.
 - Distortion (**DT1-DT16**): Same distortion effect as the first effect processor. It was included here to allow for chorus and distortion combinations.

In split and layered modes, effects are common to both voices. The base voice, or left-hand voice, always controls which effects are used. Both voices can still have different balances for the first effect. The signal flow from the front panel can be adapted to show what really happens in split and layered modes:



ARPEGGIATOR

Arpeggiators in synthesizers provide a way to automatically play arpeggios that would be quite hard to play by hand. The MASK1 takes notes in the order you played them to create an arpeggio. Press **Arp** then select an arpeggiator type to start using it.

- **TYPE**: Selects the arpeggiator type to use. Patterns from **1OCT** to **RND3** use the currently pressed keys to build the arpeggio, spreading the notes into different octaves or repeating them. Subsequent patterns use pre-programmed arpeggios (major, minor and others) which are transposed depending on the last played note. To disable the arpeggiator, set to **NONE**. Here is the list of all the patterns:
 - **1OCT**: repeat notes over one octave
 - **DBL**: repeat notes over one octave, doubling each note
 - **2OCT**: repeat notes over two octaves

- **ALT**: repeat notes, alternating between two octaves
- **3OCT**: repeat notes over three octaves
- **PONG**: repeat notes in a ping-pong (up-down) way
- **PON2**: repeat notes in a ping-pong (up-down) way over two octaves
- **PON3**: repeat notes in a ping-pong (up-down) way over three octaves
- **RND**: randomly repeat notes
- **RND2**: randomly repeat notes over two octaves
- **RND3**: randomly repeat notes over three octaves
- **MIN / MAJ / SUS2 / SUS4 / 7TH**: chord intervals
- **MIN2 / MAJ2 / SU22 / SU42 / 7TH2**: chords intervals over two octaves
- **10 / 20 / 30**: one to three octave intervals
- **5TH / 5TH2**: fifth intervals over one or two octaves
- **SPD**: Speed of the arpeggiator, from 20 to 400 BPM. Arp triggers every sixteenth note. When a MIDI clock signal is received, the arpeggiator automatically synchronizes to it and the speed parameter is used to set the clock division.
- **HOLD**: When enabled, the arpeggiator remains active after key release (latching). You can play different chords and it will adapt. To stop the arpeggiator when hold is enabled, switch voices or keep the Arp button pressed for a second.
- **TRIG**: When enabled (default), the arpeggiator will trigger new notes every time. When disabled, a single note is triggered then its pitch is altered to create the arpeggio. This allows for interesting effects combined with envelopes and makes a less mechanical sound.

The arpeggiator only applies to the left-hand voice if you use splits, or to the base voice if you use layers. All sounds that use the arpeggiator make the **Arp** key blink to remind you it is active. If you control the MASK1 through MIDI, you can have up to four independent arpeggiators running at the same time (one per part).

PITCH ENVELOPE

The pitch envelope controls Osc1 and Osc2 frequency when a key is pressed. Pitch starts from a level relative to the normal note frequency (START), then reaches it after a set amount of time (SPD). When the key is released, the pitch goes up or down (END).

- **START**: Pitch starting position relative to the note's frequency.
- **SPD**: Speed at which the pitch envelope runs. 1 takes a very long time to reach the normal note frequency, while 40 is almost instant.
- **END**: Pitch ending position relative to the note's frequency.

Pitch envelopes are especially useful for brass sounds (speed about 15) and on electric pianos (speed about 35) to emphasize the attack.

MODULATIONS

The MASK1 offers three modulation sources in addition to the LFOs: velocity, modulation wheel and aftertouch.

Each one of these has two settings: a destination and an amount.

- **V-DEST:** Velocity destination, which can be one of the following:
 - **FLT:** Filter cutoff (adds to the existing cutoff)
 - **F EG:** Filter cutoff envelope amount (scales the filter envelope)
 - **VOL:** Voice volume (increases the volume)
 - **MASK:** Mask for both oscillators (adds or subtracts from the current mask)
 - **P EG:** Pitch envelope (scales the starting point)
 - **ATK:** Attack rate (makes the attack quicker)
- **V-AMT:** The amount of impact the velocity has on the destination
- **M-DEST:** Modulation wheel destination. Destination can be one of the following:
 - **FLT:** Filter cutoff (adds to the existing cutoff)
 - **LFO1 AMT:** Amount of LFO1
 - **LFO1 SPD:** Speed of LFO1
 - **LFO2 AMT:** Amount of LFO2
 - **LFO2 SPD:** Speed of LFO2
 - **VOL:** Voice volume (affects the volume)
 - **MASK:** Mask for both oscillators (affects the current mask)
 - **FREQ:** Voice frequency (affects Osc1 and Osc2)
 - **O1 VOL:** Osc1 volume
 - **O1 MASK:** Osc1 mask
 - **O2 VOL:** Osc2 volume
 - **O2 MASK:** Osc2 mask
 - **N FREQ:** Noise frequency
 - **N VOL:** Noise volume
 - **FX1 BAL:** FX1 balance

- **FX2 BAL:** FX2 balance
- **M-AMT:** The amount of impact the modulation wheel has on the destination
- **AT-DEST:** Aftertouch destination. Destination list is the same as the destinations for the modulation wheel.
- **AT-AMT:** The amount of impact the aftertouch has on the destination

GENERAL

Voice settings that don't belong to other sections are grouped here.

- **MODE:** The play mode for the voice. Using these modes is a great way to add expressiveness to your sounds. It can be any of the following:
 - **POLY:** Polyphonic, with poly portamento. Polyphonic and slurred modes never reset the envelopes to allow for nice variations during playing. However, this can be an undesirable behavior for filter sweeps with long release times, as a new note may start with the filter already opened. In which case, use the poly retrig mode (for individual note resets) or one of the paraphonic modes (first note reset).
 - **MONO:** Monophonic. Envelopes aren't retriggered. Portamento is always applied. Last note priority.
 - **SLUR:** Neighbour notes (1 or 2 semitones apart) that are played legato are slurred (pitch-shifted) rather than retriggered. Only slurred notes get portamento.
 - **MONO PORTA:** Mono with portamento on legato.
 - **PARA:** Paraphonic. Envelopes from the first note played are reset and used for all the subsequent held notes. This applies only to ADSR envelopes (osc1, osc2, noise, filter). Portamento is applied if more than one note is pressed.
 - **MOLY:** Hybrid poly-mono mode. Note releases are allowed to overlap (polyphony) unless you play legato. Portamento applied on legato.
 - **PARA SLUR:** combination of the Paraphonic and Slurred modes.
 - **MONO RETRIG:** Monophonic. Envelopes are always retriggered. Portamento applied on legato.
 - **POLY RETRIG:** Polyphonic with poly portamento, envelopes are always retriggered.
- **VOL:** Global volume of the voice
- **SEMI:** Global transpose of the voice in semitones
- **PORT:** Portamento time. From 0 (disabled) to 13 (very long portamento)
- **PANS:** Pan spread. Notes will be alternatively panned left and right as you play. The higher this setting is, the more extreme the panning is.

- **RATE:** Keyboard rate scaling for the envelopes. Increasing this value makes the envelopes slower in the low notes, and faster in the high notes.

Creating a voice from scratch

The easiest way to create a voice is often to take the closest preset and modify it. However you may prefer to start with a clean, neutral tone. To do so, press the **Init** button two times to initialize the current voice to a simple unfiltered saw wave.

If you press it only once, you can choose between different init voices using the **<< Param >>** buttons or the **Value** knob.

- **1OSC:** Voice with only one oscillator enabled
- **2OSC:** Voice with both oscillators enabled
- **VEL:** Same as 2OSC but with velocity pre-configured to control the filter envelope
- **RAND:** Randomized voice. Can make really unexpected and interesting noises.

Using an init voice does not restrict you in any way. They are just starting points.

Creating your first sounds

Here are some very easy sounds to make on the MASK1. If you have already worked with analog or VA synths you are mostly in known territory except that the masks add an extra layer of sound diversity compared to classic oscillators.

Synth bass

Initialize the voice with a single oscillator (1OSC). Initialized oscillators always produce a simple saw wave. Set filter cutoff to 20 (CUTF=20). Set filter envelope level to 30 (L=30). Set global transpose to -12 (Global > SEMI).

Flute/Clarinet

Initialize the voice with a single oscillator (1OSC). Set osc1 mask to 8 (MASK=8) to make a square wave. Set osc1 mask start to 7 (START=7) to create an attack transient. Set osc1 envelope attack to 6 (A=6). Set filter cutoff to 60 (CUTF=60). Set LFO1 amount to 4 (AMT=4). Set global transpose to 12 (Global > SEMI). Set FX2 balance to 15 to add a nice delay effect (FX > 2BAL=15).

Saw pad

Initialize the voice with dual oscillators (2OSC). They are already detuned. Set attack and release to 9 for both oscillators (A=9, R=9). You can edit both envelopes at the same time by pressing Osc1 and Osc2 buttons simultaneously. Set FX1 balance to 50 (FX > 1BAL=50) and FX1 type to chorus 2 (FX > 1TYP=CH2).

Brass ensemble

Initialize the voice with dual oscillators (2OSC). Set filter cutoff to 37 (CUTF=37). Set filter envelope level to 20, attack to 6, decay to 6, sustain to 10 (L=20, A=6, D=6, S=10). Set pitch envelope start to 4 (START=4). Set pan spread to 8 for a nice stereo depth when playing chords (General > PANS=8).

FM-like marimba with velocity sensitivity

Initialize the voice with a single oscillator (1OSC). Set osc1 mask to 29 (MASK=29). Set filter cutoff to 20 (CUTF=20). Set filter envelope level to 20 (L=20). Set velocity destination to filter envelope (Mod > V-DEST=FE), set modulation amount to 15 (Mod > V-AMT=15).

Saving voices

When you edit a voice, you are working in a temporary memory area which is lost if you switch voices or power the MASK1 off.

To make a voice permanent, press **Write**.

1. You are asked where to save your voice. This can be from U00 to U399. Select the slot using the << **Param** >> buttons or the Value knob. When you find the slot you want, press **Write** again.
2. You can now rename the voice. Press << **Param** >> to select the character to edit, then use the Value knob to scroll from A to Z. To remove a character or put a space, simply turn the Value knob counterclockwise past A. When you find the perfect name, press **Write** again.
3. "Done" will be briefly displayed to confirm the voice has been saved. The MASK1 then goes into Voice mode and displays the name of your voice.

The last save slot is remembered. After further edits you can save your voice again on the same slot by pressing **Write** three times.

Organizing, sharing and loading voice banks

By writing voices to different slots, you can prepare a set of contiguous voices for easy access during a live performance. If you need to move many voices consider using our MASK1 Organizer software. You can find it at kodamo.org on the Support page.

It runs in any browser and will talk to the MASK1 through SysEx. It also allows you to create voice banks to share with other people, and import existing banks. Detailed instructions are provided with this software.

Sound design tips

Starting point for beginners

The signal flow of the MASK1 is pretty close to classic subtractive synths so usually, you start by tweaking one or two oscillators to find the sound you like. This is mainly done by experimenting with the MASK parameter (inside Osc1 and Osc2 sections) and the SEMI (oscillator transposition) parameter. The oscillator envelope is also often edited early.

The filter is a critical next step as it will drastically change the timbre. Edit its cutoff envelope until you are satisfied with the tone. Then you can set up the LFOs and various modulations to make the sound more lively. Finally, you can add effects.

Once you get more used to the MASK1, these rules usually don't apply. You may do everything in a different order depending on what you feel is the most appropriate for the sounds you are looking for. Also, most of the tips you may find in books or online regarding classic analog synthesis also apply to the MASK1.

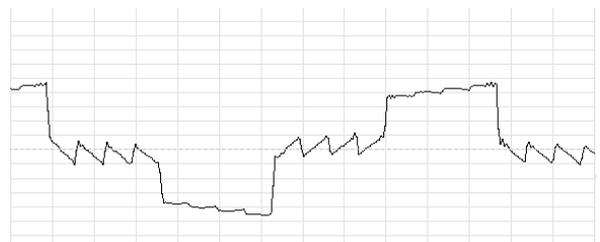
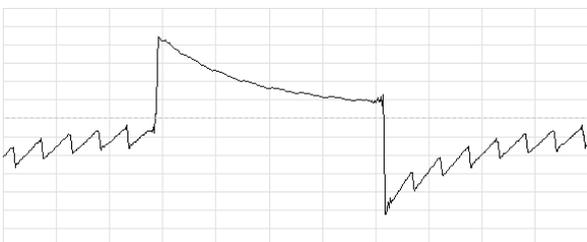
Help with bitmasks

Start with the basics. You need only a few masks to make most sounds. If you are into classic analog synth type sounds, the most important masks are 7 (saw \nearrow), 8 (square \square) and 56 (pulse \uparrow). Use them as starting points when you think about a sound. You can then explore other masks.

If you want pure tones, try mask 31 (sine \smile) and lower values (30, 29, 28) which will produce some ethereal, FM bell-like tones.

Usually, when increasing the mask value, the sound will get darker (harmonic content gets lower) until you reach a pure, round wave: 15 \frown , 31 \smile , 47 \searrow , 63 \swarrow (multiples of 16 minus 1), then you jump again to a very bright tone.

Note that some masks may create similar sounding tones, even if their shape look different to the eye. This is the case for the square wave, which can be made using mask 8 but also masks between 20 and 25.



Square with MASK=8

Square with MASK=25

After some practice you will be more familiar with masks, the sound they produce and which one you need depending on the situation.

How to thicken up sounds

Several tricks can be used to make a sound appear thicker or warmer:

- Detuning both oscillators
- Transposing oscillators one or two octaves apart
- Using masks that provide a thicker natural sound
- Adding effects like Chorus or Distortion
- Layering two voices together
- Lowering filter cutoff, with the filter in low-pass mode. Generally, sounds with less overtones appear thicker/warmer to the ear.

Simulating multiple filters in a voice

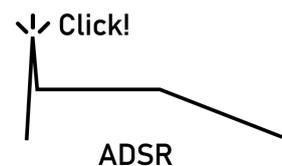
With careful selection of the oscillator mask, you can give the impression that an oscillator is low-pass filtered while it is not. This is done by choosing masks that have low harmonic content (15, 31, 47, 63, 79, 95, 111, 127, 143...). They can all be calculated by finding multiples of 16, then subtracting 1. This technique allows, for example, to make a dark tone mixed with bright noise, or a dark sounding oscillator mixed with a brighter one.

Syncing looped envelopes together

Unlike the LFOs, which are always in sync no matter how many notes you play, envelopes are independent. To sync them together, set the voice mode to Paraphonic or Slurred Paraphonic (General > MODE)

Increase envelope snappiness

To make a snappier envelope, try using a very quick decay (value of 0, 1 or 2) in combination with a sustain that is not at max level (13, 12, 11...). Then, compensate for the loss of volume by increasing the overall voice volume. You will get a snappy “click” that emphasizes the attack of your sounds.



Smooth out envelope noises

The MASK1 uses gritty, crunchy envelopes like early digital synths. If you want pure sounds without the small noises introduced by the envelopes, using the filter in low-pass mode is a very effective way to get rid of them.

Super warm vibratos

Instead of doing vibrato with an LFO, use the chorus effect with balance = 100 (100% wet). A wet chorus is like a vibrato but, due to the way it is done, it warms up the sound.

Stereo tremolos

Instead of doing tremolo with an LFO, use the ring modulator effect on its first types. It will do the same effect, but with nice left-right movements.

Lowering harshness in the highs, opening the high-end or making the lows more gritty

A voice may sound great when played on some areas of the keyboard, but not so great when going into the extremes. A way to adjust how a voice responds to different keyboard regions is to use the filter tracking (Filter > TRK).

When filter tracking is set to zero (default), lows sound more gritty and highs are muffled. When set to the max, highs will be increasingly opened as you walk up the keyboard.

Finding the right filter tracking amount often requires you to also adjust filter cutoff and filter envelope to compensate.

These methods work when the filter is in lowpass mode. Other modes react differently.

Making the timbre evolve over time

Timbre changes over time can be done in several ways:

- With the envelopes. Since the MASK1 has dedicated ADSR for both Osc1, Osc2, Noise and Filter, it is easy to set up different attack/decay values to make one oscillator start after the other. Envelope loops can be also useful with different attack/decay settings for both oscillators, to have them sound at different moments
- With the filter. The classic analog way of making timbre changes
- By altering the mask in real time. This can be done with the built-in mask envelopes for each oscillator (START and SPD parameters), or by using an LFO to control it. Depending on the mask range you are covering, you can get quite smooth transitions or harsher ones.
- By using chorus. A slow chorus will introduce timbre changes by creating many reinforcements and cancellations to different harmonics

Calibration & testing

The MASK1 comes pre-calibrated from the factory. This affects the modulation wheel, pitch bend wheel and aftertouch.

If you feel the controls doesn't respond as expected, you can try re-calibrating them:

- Power on the MASK1 while holding down the last two white keys on the keyboard (B and C)
- **B PITCH** is displayed. Put the pitch bend wheel to its bottommost position, then press Param >>
- **T PITCH** is displayed. Put the pitch bend wheel to its topmost position, then press Param >>
- Repeat the previous two steps for the modulation wheel ("B MOD" and "T MOD")
- **B AFT** is displayed. Put pressure on a key until you see the number increase on the display. Find the lightest force required to show a number greater than 1 then press Param >> (press it while still holding the key with the same pressure). Note: low values are very sensitive and may vary depending on which key is pressed, so it is best not to go for too light a touch.
- **T AFT** is displayed. Press the key harder to set the force required to push aftertouch to the maximum. Use the maximum force that you are comfortable with (do not hurt your fingers!). This will set the reference point for the top of the aftertouch curve. Keep it pressed while pressing Param >>.

After you have completed this process, the synth is ready to play immediately. Calibration settings will remain stored in memory.

This calibration mode also works as a test mode to ensure everything is working correctly:

- When entering the calibration mode, all the digits of the display lit briefly (showing "8888") to confirm that all the LED segments are working.
- All keys do make sound (if volume is not set to zero) and respond to velocity. Sustain pedal also works in this mode.
- Pressing any button or turning any knob shows an underscore "_" on the display to confirm it works properly.
- Receiving MIDI note events triggers sounds. Playing the keyboard sends note events to MIDI out.
- Going through the calibration steps also ensures that the pitch bend wheel, mod wheel, aftertouch and Param >> button work.

Factory reset

Power on the MASK1 while holding the first two white keys on the keyboard (C and D).

“CONFIRM RESET” will appear on the display. Press **Param >>** to proceed.

All global settings will be reset and all user voices will be erased. Calibration isn't affected by factory reset.

Firmware upgrade

Firmware can be upgraded by connecting the MASK1 to a computer with a USB cable.

To check which firmware you currently have installed, turn the MASK1 on while pressing the last two black keys on the keyboard. The firmware version will be displayed. Press **Param >>** to exit.

When available, firmwares and instructions will be released at kodamo.org on the Support page.

MIDI implementation

The MASK1 listens and transmits to four MIDI channels, depending on the Base MIDI Channel setting. If Base MIDI Channel is set to 1 (default), channels 1/2/3/4 will be used.

The keyboard always controls the first MIDI channel. Only the voice loaded in the first MIDI channel can have a layer or split enabled, and that voice always controls which effects are used.

The MASK1 can receive and transmit MIDI over the DIN connectors and over USB.

Most parameters are mapped to CCs, so the voices can be edited in real time using an external controller.

Message type	Remarks
Note on	Velocity is received and transmitted.
Note off	Release velocity is transmitted.
Pitch bend	14-bit received, 7-bit transmitted. Smoothed
Message using running status	Recognized
Clock	Recognized
Active sensing	Recognized. Will issue an “All notes off” if detected then not received for about 1 second. Not transmitted.
Other single-byte messages	Ignored
Program change	Recognized. Use CC 32 to select bank
Aftertouch	Smoothed attack and release. Transmitted unless aftertouch is disabled.
CC 0 Bank select MSB	Ignored. Use CC 32 to select bank

CC 1 Modulation wheel	7-bit received, 6-bit transmitted. Smoothed
CC 3 Pan spread	Mapped to General > PANS
CC 7 Volume	Mapped to General > VOL
CC 9 Transpose	Mapped to General > SEMI (middle is 64)
CC 10 Pan	Not accessible through the interface, panning will remain unless you reset it with CC 121
CC 14 Osc1 tuning	Mapped to Osc1 > TUNE (middle is 64)
CC 15 Osc2 tuning	Mapped to Osc2 > TUNE (middle is 64)
CC 19 Filter tracking	Mapped to Filter > TRK
CC 20 Filter cutoff	Mapped to Filter > CUTF
CC 21 Filter resonance	Mapped to Filter > RESO
CC 22 Filter mode	Mapped to Filter > MODE
CC 23 Osc1 mask 1/4	Mapped to Osc1 > MASK (0-127 range)
CC 24 Osc2 mask 1/4	Mapped to Osc2 > MASK (0-127 range)
CC 25 Osc1 envelope level	Mapped to Osc1 (Env) > L
CC 26 Osc2 envelope level	Mapped to Osc2 (Env) > L
CC 27 Filter envelope level	Mapped to Filter (Env) > L
CC 28 Noise envelope level	Mapped to Noise (Env) > L
CC 29 Osc1 semitone transpose	Mapped to Osc1 > SEMI
CC 30 Osc2 semitone transpose	Mapped to Osc2 > SEMI
CC 31 Noise frequency	Mapped to Noise > FREQ
CC 32 Bank select LSB	Bank 0 contains factory presets. Banks 1-4 contain user voices.
CC 33 LFO1 destination	Mapped to LFO1 > DEST
CC 34 LFO2 destination	Mapped to LFO2 > DEST
CC 35 LFO1 waveform	Mapped to LFO1 > WAVE
CC 36 LFO2 waveform	Mapped to LFO2 > WAVE
CC 37 LFO1 delay	Mapped to LFO1 > DLAY
CC 38 LFO2 delay	Mapped to LFO2 > DLAY
CC 39 LFO1 decay	Mapped to LFO1 > DCAY
CC 40 LFO2 decay	Mapped to LFO2 > DCAY
CC 41 Pitch envelope start	Mapped to Pitch > START
CC 42 Pitch envelope speed	Mapped to Pitch > SPD
CC 43 Pitch envelope end	Mapped to Pitch > END
CC 44 Play mode	Mapped to Global > MODE
CC 45 Keyboard envelope rate scaling	Mapped to Global > RATE

CC 46 Osc1 mask 3/4	Mapped to Osc1 > MASK (256-383 range)
CC 47 Osc2 mask 3/4	Mapped to Osc2 > MASK (256-383 range)
CC 48 Osc1 mask 4/4	Mapped to Osc1 > MASK (384-511 range)
CC 49 Osc2 mask 4/4	Mapped to Osc2 > MASK (384-511 range)
CC 50 Noise frequency keyboard tracking	Mapped to Noise > TRK
CC 51 Second filter parameters	Mapped to Filter > EXTRA
CC 52 Osc1 delta env start	Mapped to OSC1 > START
CC 53 Osc2 delta env start	Mapped to OSC2 > START
CC 54 Osc1 delta env speed	Mapped to OSC1 > SPD
CC 55 Osc2 delta env speed	Mapped to OSC2 > SPD
CC 56 Osc1 delta env loop	Mapped to OSC1 > LOOP
CC 57 Osc2 delta env loop	Mapped to OSC2 > LOOP
CC 64 Sustain pedal	Received and transmitted
CC 84 Portamento	Mapped to General > PORTA
CC 85 LFO1 amount	Mapped to LFO1 > AMT
CC 86 LFO2 amount	Mapped to LFO2 > AMT
CC 87 LFO1 speed	Mapped to LFO1 > SPD
CC 88 LFO2 speed	Mapped to LFO2 > SPD
CC 89 Arp speed	Mapped to Arp > SPD
CC 90 FX1 balance	Mapped to FX1 > BAL
CC 91 FX2 balance	Mapped to FX2 > BAL
CC 92 FX1 type	Mapped to FX1 > TYPE
CC 93 FX2 type	Mapped to FX2 > TYPE
CC 94 Osc1 mask 2/4	Mapped to Osc1 > MASK (128-255 range)
CC 95 Osc2 mask 2/4	Mapped to Osc2 > MASK (128-255 range)
CC 103 Osc1 envelope attack	Mapped to Osc1 (Env) > A
CC 104 Osc2 envelope attack	Mapped to Osc2 (Env) > A
CC 105 Filter envelope attack	Mapped to Filter (Env) > A
CC 106 Noise envelope attack	Mapped to Noise (Env) > A
CC 107 Osc1 envelope decay	Mapped to Osc1 (Env) > D
CC 108 Osc2 envelope decay	Mapped to Osc2 (Env) > D
CC 109 Filter envelope decay	Mapped to Filter (Env) > D
CC 110 Noise envelope decay	Mapped to Noise (Env) > D
CC 111 Osc1 envelope sustain	Mapped to Osc1 (Env) > S
CC 112 Osc2 envelope sustain	Mapped to Osc2 (Env) > S
CC 113 Filter envelope sustain	Mapped to Filter (Env) > S

CC 114 Noise envelope sustain	Mapped to Noise (Env) > S
CC 115 Osc1 envelope release	Mapped to Osc1 (Env) > R
CC 116 Osc2 envelope release	Mapped to Osc2 (Env) > R
CC 117 Filter envelope release	Mapped to Filter (Env) > R
CC 118 Noise envelope release	Mapped to Noise (Env) > R
CC 119 Arp type	Mapped to Arp > TYPE
CC 120 All sound off	Hard cut notes. Does not clear effect buffers
CC 121 All controllers off	Resets panning (CC 10), sustain pedal, modwheel and pitch bend
CC 123 All notes off	Stop notes, let them go through their release phase
CC 126 Mono mode	Mapped to Global > MODE > Mono
CC 127 Poly mode	Mapped to Global > MODE > Poly
Other CCs	Ignored
SysEx Voice transmit	For interaction with external software
SysEx Voice receive	For interaction with external software
SysEx Partial voice transmit	For interaction with external software
SysEx Partial voice receive	For interaction with external software
SysEx Trigger voice write	For interaction with external software
SysEx Enter firmware upgrade mode	For interaction with external software
SysEx Current voice reload	For interaction with external software
Other SysEx	Ignored

Specifications

Synthesis type	Bitmask, subtractive
Polyphony	12 voices with Smart Allocation
Multitimbrality	4 parts (5 in layered/split mode)
Oscillators	<ul style="list-style-type: none"> • 2 bitmask per voice with 512 masks each, transpose and detune • 1 noise with programmable sample-and-hold frequency
Filter	2 per voice, two-pole (12dB/oct) and four-pole (24dB/oct) state variable, self-resonant with pitch tracking and 4 modes (low, high, band pass, notch)
Envelopes	4 loopable ADSR per voice (osc1, osc2, noise, filter), 3 delta-decay (osc1 mask, osc2 mask, pitch)
LFO	2 per part with 7 waveforms + noise, delay, decay

Arpeggiator	26 patterns with adaptive or fixed chords, latchable, retrigger or pitch change modes
Looper/Sequencer	Up to 10000 events, unlimited duration, single track. Records notes, pitch bend, mod wheel, aftertouch and sustain pedal.
Effects	Two stereo DSP in series. First offers chorus, phaser, distortion, bitcrusher, tremolo and ring mod (64 types). Second offers delay, comb filter, reverb, room simulations and distortion (48 types)
Modulations	<ul style="list-style-type: none"> • Velocity (6 destinations) • Modulation wheel (16 destinations) • Aftertouch (16 destinations) • LFO1 and LFO2 (16 destinations)
Play modes	<ul style="list-style-type: none"> • Polyphonic • Monophonic • Slurred • Mono portamento on legato • Paraphonic • Hybrid poly-mono on legato • Slurred paraphonic • Mono retrigger • Poly retrigger
Split	Configurable split point, balance between voices, transpose, panning and tuning
Layers	Configurable balance between voices, transpose, panning and tuning
Misc	Voice pan spread, polyphonic portamento, keyboard envelope rate scaling
Memory	120 factory presets, 400 user voices
Audio outputs	2 balanced 1/4" TRS jack, 1/4" jack headphones
MIDI	2 DIN (in, out), class-compliant USB type B, SysEx voice transmit/receive, CC-mapped voice parameters
Keyboard	61 full-size keys, weighted Fatar action with velocity and channel aftertouch
Keyboard response	6 velocity curves, 6 aftertouch curves
Controls	23 buttons, 2 rotary encoders, pitch bend wheel, modulation wheel
Display	4-digit 7-segment red display
Pedal input	Sustain, 1/4" TS jack, adaptive polarity
Tuning	400-470Hz. 6 temperaments including arabic tuning.
Size	89 x 26 x 8cm including knobs and feet. Package: 102 x 37 x 27cm
Weight	7.5 Kg
Power	12V DC

Troubleshooting

No sound is coming from the unit

Check the volume is not set to zero; turn the knob on the left (Vol) clockwise then check again.

Check that the current selected voice isn't empty; press Init two times. You should hear a sound coming when pressing keys.

Check that "Local Keyboard" isn't disabled (Global > LOCAL KB should be ON).

If you are controlling the MASK1 via MIDI, check you are sending to MIDI channels the MASK1 is supposed to listen to (see "Adjusting the settings" section). Try playing on the keyboard to eliminate any MIDI-related issue.

There is hiss, hum or noise on the outputs

The MASK1 uses balanced outputs to guarantee a noise-free operation. If you are having noise issues, check that your full audio setup is using balanced cables (¼" TRS jacks), and try doing modifications to your setup to find the source of the problem. Do not use the headphones output as a line output.

If you are pushing the gain really high on your equipment, getting noise is normal so try lowering the gain and increase the MASK1 volume to compensate. The best signal-to-noise ratio is achieved when the MASK1 volume is set to the maximum without saturating your audio equipment.

The MASK1 sound is distorted

You probably set the volume too high. The MASK1 can easily saturate most audio equipment. Lower the volume on the MASK1, and increase it on your sound card/mixer.

A lot of the voices sound weird

Check that the mod wheel is at its bottommost position. It is very common to use it then forget about it.

All notes get stuck

If you are using a sustain pedal, ensure it is not pressed when you turn the MASK1 on. The MASK1 will automatically detect the pedal's polarity at startup, so if it is pressed when you power on, it will work in reverse.

The unit doesn't power up at all

Ensure the following:

- The power supply is plugged in to your outlet, and its output is plugged into the MASK1, and you pushed the Power button
- The outlet is correctly working (100-250V AC at the output – check by plugging in another device to confirm)
- The power supply is working and outputting 12V (you can check with a multimeter)

If, despite these checks, nothing happens on the MASK1 (no display, no light under keys, no sound), your unit may be damaged. Contact your retailer to return the unit.

When playing voices with a long release a clicking noise appears sometimes

If you are playing with pure, sine wave sounds, this is expected. When the polyphony is fully used, the MASK1 will take an already used channel to play a new note on, and doing so may produce a clicking sound. To mitigate this issue you can try lowering the release duration of your sounds, and compensate with some delay or reverb. You can also lower the filter cutoff in lowpass mode, to smooth out any noise.

Using fast envelopes or tremolo LFOs on pure sounds is noisy

Due to the way the MASK1 handles envelopes and LFOs this is normal. Ear is very sensitive to amplitude variations on pure sounds. You can lower the filter cutoff in lowpass mode to make transients less noticeable. You can also replace LFO-based tremolos with the ring modulator effect. Its first presets are very slow and make for a nice stereo tremolo effect.

The unit seems to ignore MIDI messages

Check you are sending MIDI over the first four channels, starting from the channel set by the Settings > MIDI CH parameter (eg. MIDI CH is set to 3, the MASK1 will receive/transmit only on channels 3, 4, 5 and 6).

The keyboard is too sensitive or not sensitive enough

Press the settings button and find the VEL CURVE parameter. Try several curves to find the one that matches your playing style best.

The provided power cable doesn't fit my outlet

If you purchased it from a dealer that ships worldwide, this may happen since we can't know in advance where the units will end up. Fortunately, the power cable is called an IEC cable and can be purchased easily in any local shop.

The unit shows "Err" on the display followed by a number

Contact us by email and tell us which error code you have to find a solution.

The pitch bend wheel doesn't work properly

Check the Global > PITCH BEND parameter, it sets the range of the pitch bend wheel in semitones. If something is still wrong, it may not be properly calibrated. See the "Calibration" section.

The sustain pedal works backwards

Do not press the pedal when powering the MASK1 on. Pedal polarity is detected at startup. To make it work the right way, power cycle the MASK1.

Support & warranty

For official, personalized support from our team you can visit the Kodamo forums (kodamo.org then click on Support) or contact us by email (contact@kodamo.org).

The MASK1 comes with a 2-year manufacturer's warranty. It covers all defects that may have happened during the manufacturing. It does not cover shipping damage/mishandling, damage due to the unit being dropped by the user, neglect, electrical surges, exposure to extremes in temperature or humidity. The unit must be in perfect condition, without any modifications, and with all the accessories in the box.

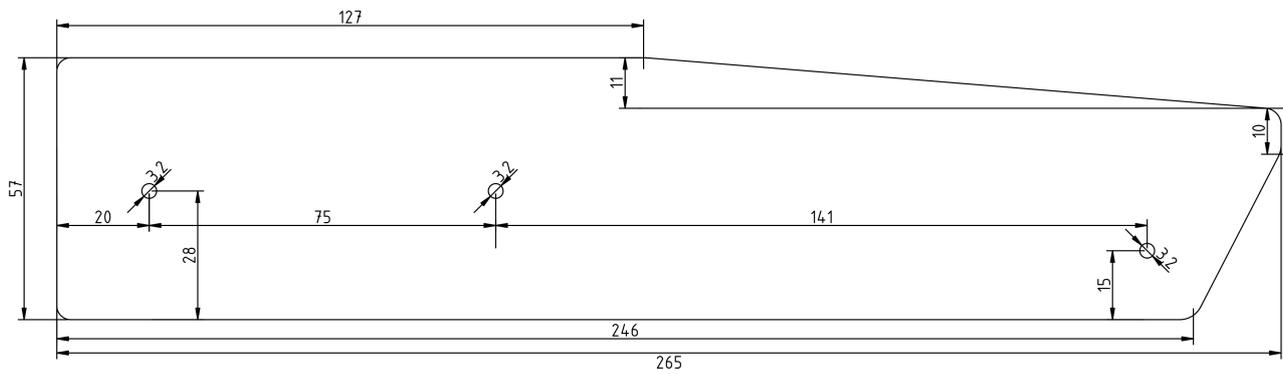
Warranty only applies to the original owner of the product, it is not transferable.

If you want to claim on the warranty then contact us by email. Explain the issues encountered, with pictures if needed, a proof of purchase and the serial number of your unit (found on the sticker on the rear side of the MASK1). Also please provide your full address and contact information (phone and email). If the warranty applies we will take the unit back and repair or exchange it.

Third party repair and DIY

Parts for repair are available for purchase for at least a 10-year period after the product launch. Parts that can be bought are encoders, switches, key caps, knobs, motherboard, pitch bend and modulation wheels, power supply, display cover, individual notes and springs for the keyboard.

We strongly advise against doing any electronic modifications to the unit due to the warranty, the risks of damaging the product or hurting yourself in the process. However, some outside parts can be easily customized like the knob caps which use standard 6mm D-shafts or the side panels. If you want to make custom wood sides, use the drawing below as a reference. We would appreciate seeing the results!



MASK1 side panel drawing. Units=mm. Thickness=15mm.

Contact

By email	By social media	By mail
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Thanks

Creating the MASK1 was a labour of love. Several people have contributed to its success by creating the voice presets, suggesting improvements to the sound engine, and giving valuable feedback.

I would like to thank especially Manny Fernandez, Cyril Colom, Thomas Billiou, Benoit Ruelle, Claire Duran, Masami Komuro and Rob Puricelli for the help they provided, along with my family and friends for their support.

I also thank all the partner companies that did an incredible job manufacturing the different parts for the MASK1. Most of them are located in France, UK and Italy. Supporting the local industries is very important for our future.

Thank you for using our products, enjoy creating music with the MASK1!



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