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Visit [www.mothsynth.com](http://www.mothsynth.com) for latest info, board schematics, github and more.



## MothSynth & MothSynth OLED operation instructions:

These instructions will walk you through all of the functionality accessible in the latest version of MothOS, operating system powering MothSynths.

MothSynth is a platform for creators, a playground for tinkerers, both limited and limitless. Whether you get a pre-assembled unit, loaded with MothOS and curated samples, or build something uniquely yours based on DIY schematics, MothSynth invites you to push boundaries one millimeter at a time. Hack your beats!

Our mission is to spread the joy of 4 channel trackers from the days of Amiga and MOD files. MothSynth and MothSynth OLED are tiny packages with a huge sound, 4 Channels, 7 chainable realtime effects per channel, companion software to edit and upload your samples and limitless possibilities in your pocket. For those who want to go deeper and make MothSynth truly their own there are DIY schematics and MothOS Github.

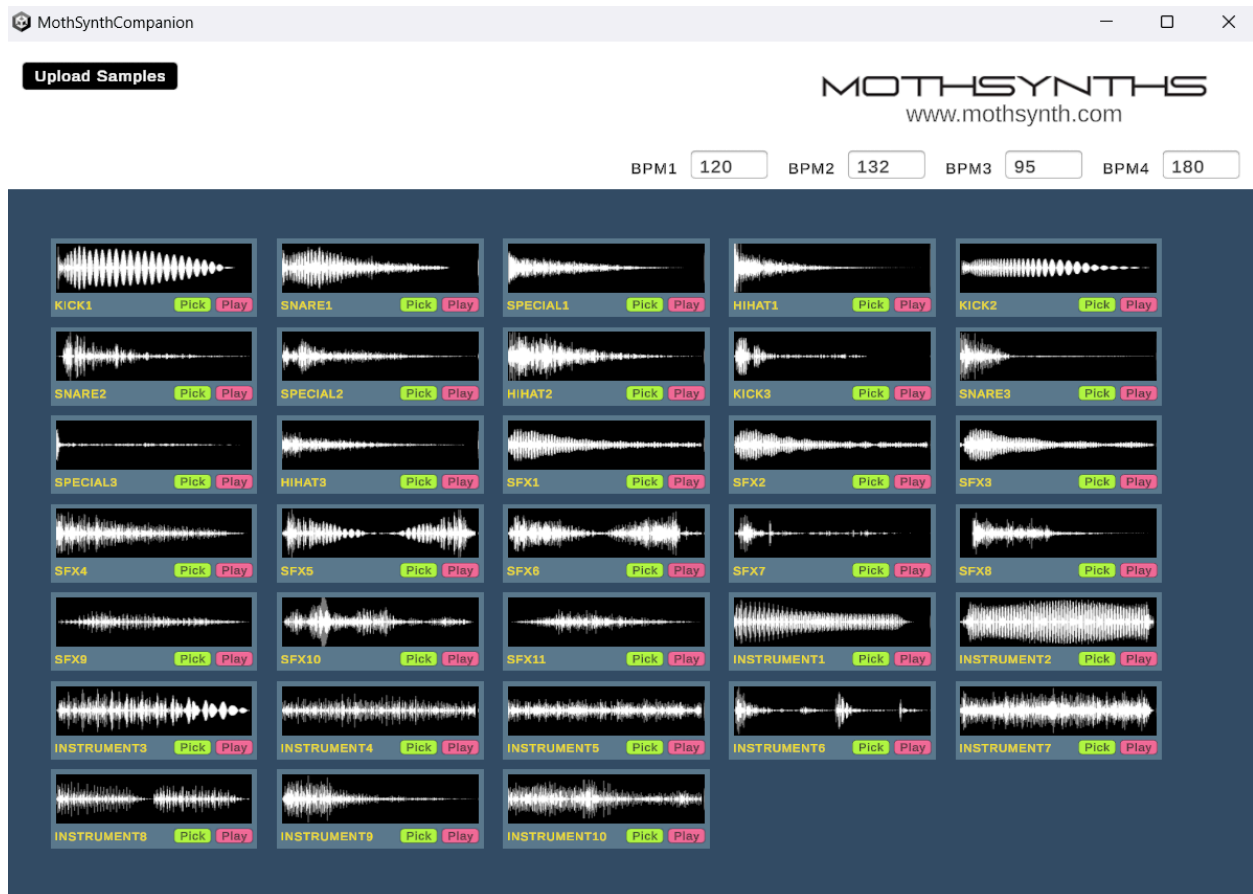
## MothSynth Hardware and Output:

- ESP32-S3 MCU
- PCM5201 (New) / MAX98357a (Old) I2S amplifier
- OLED Display (MothSynth-OLED Only)
- 16 Button Matrix (Soft Feel Switches)
- USB-C Port (Power / Data)
- 3.5mm Headphone Jack (Headphones / Line-Out)

Output is rendered at 44100 kHz, Drums and SFX banks support sounds that are 16000 (~ $\frac{1}{3}$  sec) samples long, Instruments support sounds 44100 (1s) samples long (sample in this context means a single waveform value, for example a 1 second instrument will consist of 44100 samples, later on we'll refer to sounds rendered by the synths as samples).

## MothSynth Companion App (Windows Alpha)

The companion app allows you to edit samples and change some settings on the moth synth. Ensure MothSynth is the only ESP32 device connected to serial ports of your windows computer before using.



## New Song / Selecting Pattern Length

Press F4 then 32 or 64 slots buttons to start a new song and set the specified pattern length for that song.

			F4
32 Slots	64 Slots		

## Selecting Instruments

Press F1 then any of the bottom rows to select instruments and sample banks, Instruments are longer samples that can be played like a keyboard in NOTE mode, they'll behave like sound banks in SAMPLER mode. Drums and SFX banks always play in SAMPLER mode (octave transpose only)

F1			
Inst6	Inst7	Inst8	Inst9
Ins2	Inst3	Inst4	Inst5
Drums	SFX	Inst0	Ins1

## Playing Notes / Samples

Press any of the bottom 3 rows to trigger notes for instruments and samples for Drums and SFX banks.

G#	A	A#	B
E	F	F#	G
C	C#	D	D#

## Track Quantization

When recording to tracks, notes will be placed at a quantized position (32 or 64 positions per pattern) which might result in the playback for that note sounding a bit delayed or ahead of the beat if you're not hitting the notes exactly on the beat, in playthrough mode however, the note will trigger as soon as you press the button.

## Note / Sampler Modes

Press F4 then the Note/Samp button to switch between Note and Sampler modes.

In NOTE mode, the selected instrument will get triggered in a standard 12 note notation.

In SAMPLER mode, each of the bottom three row buttons will trigger a different sample transposed by octave selection.

			F4
			Note/ Samp

## Changing Octaves

Press F1 then any of the top row buttons to change octaves.

F1 Oct0	Oct1	Oct2	Oct3

## Selecting Tracks / Patterns

Press F3 then any of the top row buttons to change current track. Press F3 then any of the second bottom row buttons to change the current pattern. Each song consists of 4 patterns and each pattern consists of 4 tracks, only one instrument can be rendered on a single track at a time, resulting in 4 note polyphony.

Trk 1	Trk 2	F3 Trk 3	Trk 4
Pat 1	Pat 2	Pat 3	Pat 3

## Clearing Tracks / Patterns

Press F3 then any of the third row buttons to clear any track. Press F3 then any of the bottom row buttons to clear the whole pattern

		F3 Trk 3	
Clear Trk 1	Clear Trk 2	Clear Trk 3	Clear Trk 3
Clear Pat 1	Clear Pat 2	Clear Pat 3	Clear Pat 3

## Pattern / Song Mode

MothSynth defaults to Pattern mode, which means your pattern will play on a loop until you switch to Song mode, which will play all 4 patterns sequentially. Press F4 then Pat/Song button to toggle modes.

			F4
			Pat/ Song

## Copying/Pasting Patterns

Press F4 then any first 3 buttons in the second bottom row to copy / paste / fill all patterns.  
To copy a pattern, set active pattern (F3+second bottom row), execute Copy command, switch to the pattern you want to fill and execute the Paste command. You can fill all 4 patterns (for example with a drum/bass line) by copying and then pasting to all (F4+Paste All).

			F4
Copy Patt	Paste Patt	Paste All	

## Changing Track Volume

Press F2 then F2 again to change volume of the current track. F2 then F1 to mute current track, F2 then F3 for distortion overdrive, F2 and F4 to solo current track.

Mute	F2 Vol	Overdrive	Solo



## Changing Master Volume

Change the master volume by pressing F4 then master volume button.

			F4
		Mst Vol	

## Changing Note Length

Press F4 then top row buttons 1-3 to change note length, this setting only applies to Instruments, Drums and SFX banks ignore it.

Short	Med	Long	F4

## Record / Playthrough

Press F4 then F4 again to toggle between record and playthrough mode, in record mode MothSynth will add the note to the track, but in playthrough mode the note/sample will be played but not added to the track.

			F4 R/P

## Changing Envelopes / Sample Direction

Instruments support 4 envelopes, fade in, fade out, keep max volume and loop at max volume. Drums and SFX banks (or Instruments in Sampler mode) use the same buttons for forward / reverse playback.

	F2 Mid		
Fade Out / Fwd	Fade In / Fwd	Max / Rev	Loop / Rev

## Enabling Effects

MothSynths support up to 7 effects on each of the tracks (LowPass, Retrig, Tap Wobble, Echo, Chord Offset, Whoosh Filter, and Pitch Up and Down). Press F2 and any of the effects buttons to apply, pressing the selection AGAIN will change the effect level, each effect has 3 levels, OFF, 1 and 2.

Have fun mixing and experimenting.

	F2 Mid		
Echo	Chord	Whoosh	Pitch Bend
FX Off	Low Pass	Retrig	Tape

## Changing BPM

Change BPM of your song by pressing F4 then any of the third row buttons. Default BPM settings can be changed with our companion app.

			F4
BMP1 120	BMP2 132	BMP3 95	BMP4 180