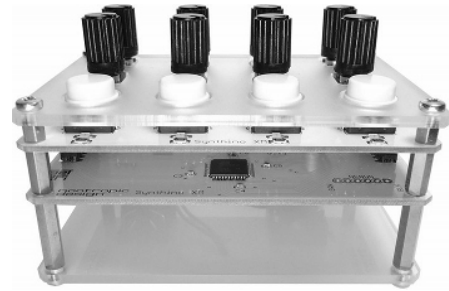


Synthino XM™

polyphonic MIDI synthesizer
and groovebox



Features:

- 5-note polyphony for superb playability
- 12 waveforms, noise generator, 5 drum samples (kick, snare, hi-hat, tom, clap)
- 12-bit audio at 25KHz output rate
- 4 voices, each with independent waveform and ADSR envelope settings
- low pass filter with cutoff frequency and resonance controls
- 2 independent low frequency oscillators (LFOs): pitch and filter
- selectable waveform for LFOs
- 1V p-p audio output voltage with enough current to drive headphones
- volume control
- MIDI over standard 5-pin DIN cable or USB
- MIDI over USB works with DAW software on Mac and Windows computers as well as iOS and Android devices
- arpeggiator mode with 4 patterns: up, down, up-down, random
- 4 built-in arpeggiator chords or use MIDI to specify up to 16 notes
- arpeggiator pitch transposition control
- 16-step live performance "groovebox" sequencer
- pitch fine-tuning adjustment
- programmable/upgradable over USB

Getting Started

Powering the Synthino XM

The Synthino XM can be powered by 9V battery or by USB power using a USB cable with a “mini” connector. Only connect one power source at a time.

When powering with a 9V battery, the ¼” audio jack serves as a power switch. The device can be turned off by removing the audio plug, and turned on by inserting the audio plug. When the battery becomes low, you may notice dimmer LEDs and erratic behavior. Replace the battery if you observe these conditions.

When powering with USB, the device is powered whenever USB power is connected. When using USB power, ensure that the contacts on the 9V battery connector are not touching any electrical connections on the circuit boards.

Audio Output

The Synthino XM audio output is ¼” **mono**. *Do not* connect a ¼” stereo plug, as this will cause excessive noise in the output signal. Only use a ¼” mono plug to connect your equipment, such as an amplifier. The Synthino XM comes with a ¼” mono to 3.5mm stereo adapter which can be used with headphones or to connect to other equipment.

Volume Control

The output volume is controlled using the small thumbwheel on the right side of the Synthino XM. Clockwise (pulling toward you) is higher volume, counterclockwise is lower volume.

Mode Selection

The Synthino XM has 3 modes: synthesizer, arpeggiator, and groovebox. When Synthino XM is powered on, all the LEDs blink, prompting you to select a mode by pressing one of the buttons (1-3). The details of each mode are described in following sections.

System Reset

The Synthino XM can be reset by holding down button 4 for two seconds. The LEDs will then blink, prompting you to choose a mode as described above.

User Interface

Understanding Voices, MIDI Channels and Polyphony

When using synthesizer mode, the Synthino XM controls let you define 4 different voices. Each voice can have its own envelope and waveform, allowing you to play 4 completely different sounding instruments at the same time. A voice is defined by the set of parameters that make a particular sound or instrument. Specifically, a voice is defined by a waveform and the ADSR (attack, decay, sustain, release) envelope parameters. The **voice select** pot lets you specify which voice that the waveform and envelope controls are changing.

The incoming MIDI channel is mapped to one of the 4 voices. Channels 1-4 map directly to voices 1-4. Higher MIDI channels “wrap” naturally, so notes on channel 5 use voice 1, notes on channel 6 use voice 2, etc.

The Synthino XM is polyphonic and can play up to 5 notes at the same time, regardless of voice or MIDI channel. As an example, you might be playing your keyboard controller on channel 1 and can play up to 5 notes simultaneously, all played with voice 1 parameters. Or you might be using sequencer software on your computer playing 4 different tracks on different MIDI channels, and the 5 simultaneous notes are spread across those channels, playing different voices.

Secondary Functions on Pots and Buttons

In some modes, pots and buttons may have secondary functions labeled as “**fn:**”. These functions are enabled/disabled by tapping button 4. When secondary functions are enabled, the LED under button 4 flashes and the particular pot or button now controls the parameter labeled as “**fn:**”.

Example: In synthesizer mode, pot 8 (rightmost pot in second row) controls the filter cutoff frequency, but has the secondary function of controlling the filter resonance. Tap button 4 to enable the secondary functions. The LED on button 4 now flashes. Use pot 8 to control the filter resonance. Now disable secondary functions by tapping button 4 again. The LED stops flashing and pot 8 now controls filter cutoff again.

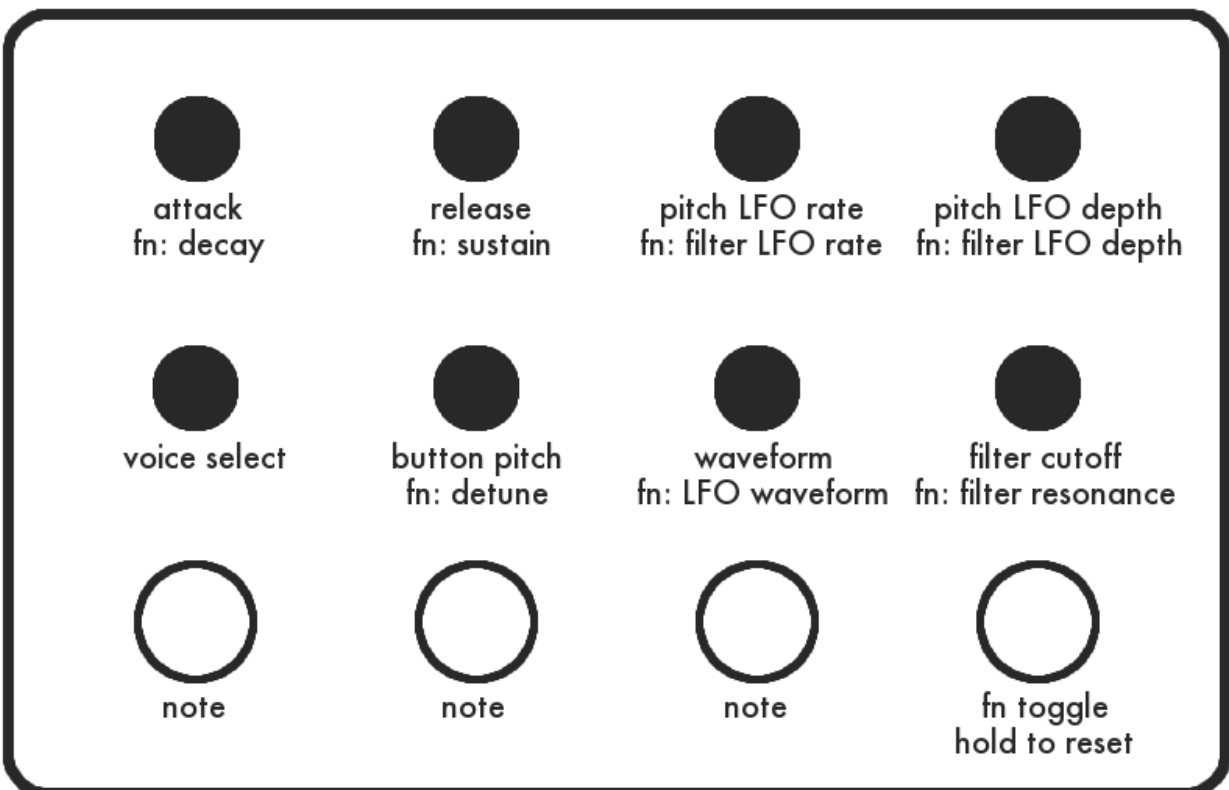
Waveforms and Samples

In all modes, the **waveform** pot lets you select from 12 waveforms, the noise generator, and 5 drum samples. In order from lowest pot position to highest:

1. sine
2. triangle
3. sawtooth
4. square
5. piano
6. electric piano
7. electric organ
8. cello
9. violin
10. oboe
11. flute
12. electric bass
13. noise generator
14. kick drum
15. snare drum
16. hi-hat
17. tom
18. clap

Mode 1: Synthesizer

Synthesizer mode allows you to play the Synthino XM with a MIDI controller connected to the MIDI jack or from your favorite DAW (digital audio workstation) software with MIDI over USB. You can also play the synthesizer in standalone mode using the 3 note buttons. Explore different sounds by changing the waveform, controlling the note envelope parameters (ADSR - attack, decay, sustain, release), modulating the pitch and filter with independent LFOs for each, and adjusting the low pass filter.



Each of the 4 independent voices has its own waveform/sample and ADSR envelope parameters. The **waveform** pot lets you choose from waveforms 1-12, noise generator, and 5 drum samples.

To access secondary pot functions denoted by “fn:”, tap the **fn toggle** button. Hold **fn toggle** for two seconds to reset device.

Use **voice select** pot to choose which voice the controls are changing. LED indicates which voice you selected. Voices 1-4 are associated with MIDI channels 1-4. Higher MIDI channel numbers map to voices 1-4 by wrapping. e.g. notes on channel 5 use voice 1, notes on channel 6 use voice 2, etc.

MIDI channel 10 reserved for percussion sounds in the MIDI specification. Incoming notes on channel 10 are mapped to drum samples with various speed/duration to emulate as many percussion instruments as possible. Since channel 10 maps to voice 2 controls, you may use the voice 2 **release** parameter to specify the duration of the drum sample after it is released.

Buttons 1-3 can be used to play notes in standalone mode. Use **button pitch** to change the pitch of a pressed button. Notes are played using the currently selected voice parameters.

The digital low-pass filter is global and filters all voices at the same time. Use **filter cutoff** and **filter resonance** to change its behavior.

There are two independent low frequency oscillators (LFOs), one for pitch and one for filter cutoff frequency. Use the LFO **rate** and **depth** parameters to control each LFO. Disable an LFO by setting its rate to the lowest setting. The filter LFO causes the cutoff frequency to modulate around the *current filter cutoff* setting. If you don't hear much modulation, change the **filter cutoff** parameter to a lower value.

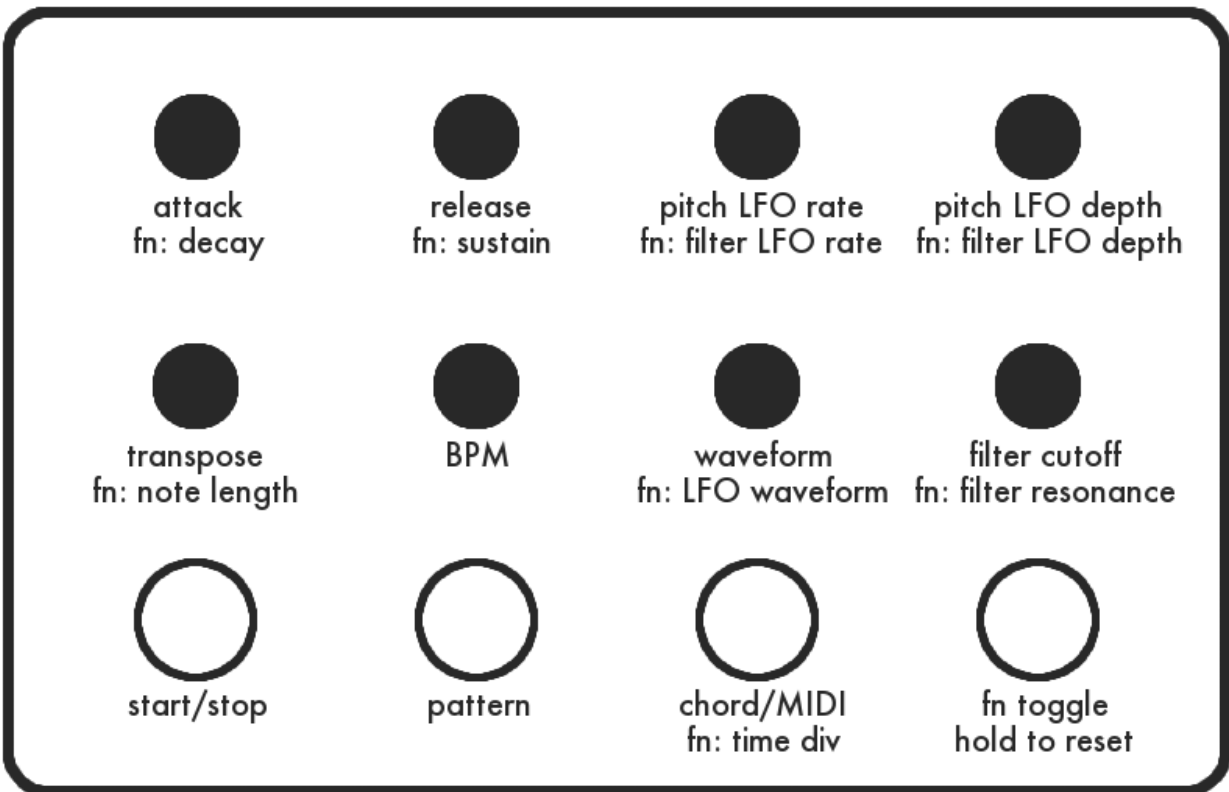
The LFO **rate** ranges from 0 to 20 Hz on lower half of the pot range, then from 20-420 Hz on the upper half of the pot range. This lets you explore some very high frequency oscillation, creating strange FM synthesis effects and aliasing.

The **LFO waveform** parameter selects from 5 waveforms that the LFOs use for modulation. Selections are sine, square, ramp-down, ramp-up, and a strange waveform that is kind of a combination of a square and ramp up.

Each voice may be detuned up or down (up to one semitone) using the **detune** parameter. This allows you to create very fat sounds by having the voices slightly out of tune with one another.

Mode 2: Arpeggiator

The arpeggiator lets you play predefined arpeggios or set your own arpeggio notes with MIDI.



start/stop: Start and stop the arpeggiator

pattern: Cycle through the arpeggio patterns UP, DOWN, UP-DOWN, RANDOM

chord/MIDI: Cycle through four 4-note arpeggio chords major, minor, M7, m7. If you have a MIDI controller connected, played MIDI note sets the root note of the arpeggio. The 5th “chord” is MIDI input mode. In this mode, the arpeggiator creates an arpeggio from the notes you play on the controller. It does not matter which MIDI channel is used.

transpose: Transpose the current arpeggio up or down

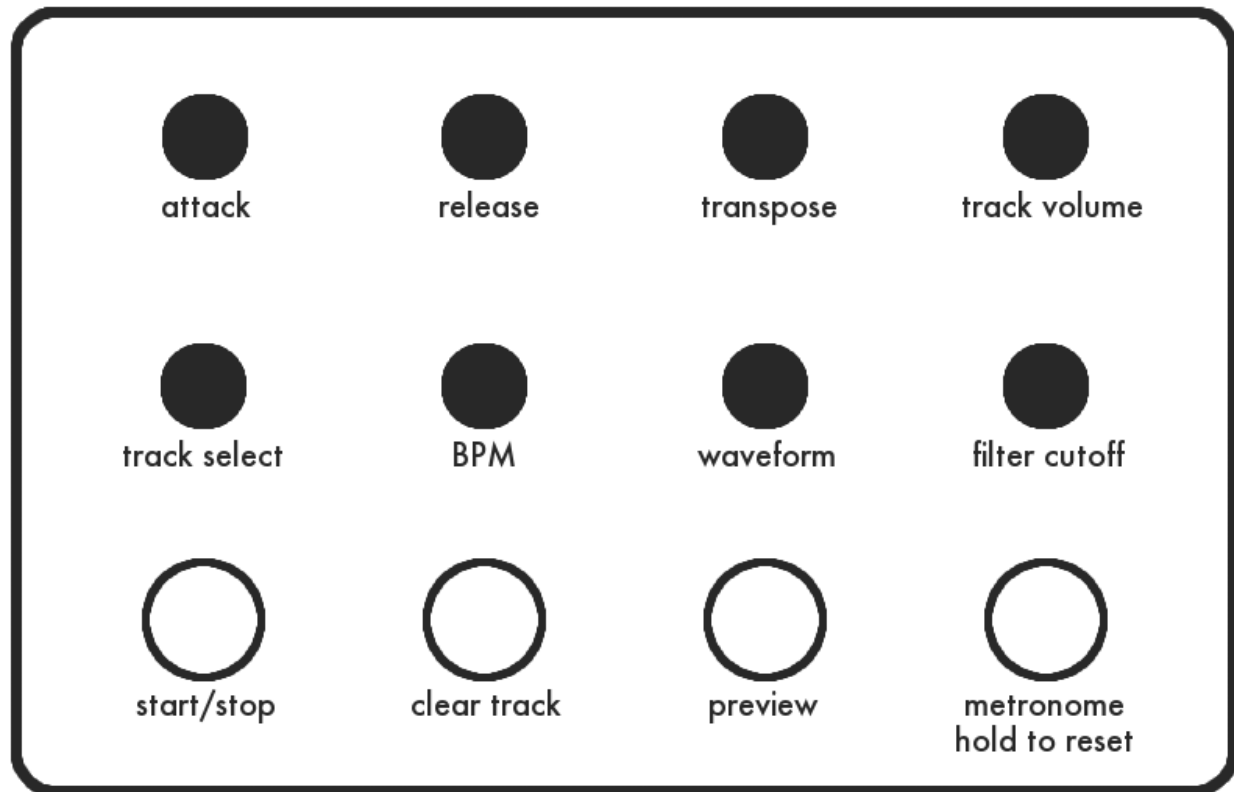
BPM: Set arpeggiator speed in the range of 20 to 300 beats per minute. (If MIDI clock pulses are being received by the device, this control will have no effect.)

time division: Change the note length relative to the rate in BPM. Cycle through values quarter notes, eighth notes, sixteenth notes, 32nd notes. The default is sixteenth notes.

note length: Change length of each note in arpeggio. This allows you to have very short staccato notes or long notes with no break between them.

Mode 3: Groovebox Live Sequencer

Groovebox mode is the most sophisticated feature of the Synthino XM. It is a "live" 16-step sequencer which allows you to lay down 4 different tracks by playing a MIDI controller. For simplicity when playing live, this mode does not have secondary functions on the controls but all parameters may still be controlled using MIDI control change messages (see section "MIDI Messages").



When the sequencer is running, any MIDI note or drum sample you play will be recorded to the current track and repeated as the sequencer runs. You can simply play different notes to record over what is currently recorded on the the track. Each track has independent envelope (**attack**, **release**) and volume. Each note can have a different **waveform**, even on the same track. The waveform recorded is the waveform that was selected when the note was played. Using MIDI channel 10 is a great way to lay down a drum track, since channel 10 MIDI notes are mapped to various percussion samples (i.e. the waveform setting is ignored).

start/stop: Start and stop sequencer

track select: Choose which track you are editing. The LED indicating track 1-4 will blink momentarily when you change tracks. Try this first with the sequencer stopped. The incoming MIDI channel number does not matter (except in the special case of channel 10 drum samples).

clear track: Clear the current track

preview: Tap to enable/disable preview. When enabled, you can play notes without recording them to current track. The LED under the button indicates that preview is enabled.

track volume: control volume of current track

BPM: Set sequencer speed in the range of 20 to 300 beats per minute. (If MIDI clock pulses are being received by the device, this control will have no effect.)

transpose: transpose notes up/down (drum samples are not transposed). Transposition is relative to the position of this knob when the note was recorded.

metronome: enable/disable the metronome. There are 3 modes: OFF, quarter notes (every 4th sequencer step), sixteenth notes (every sequencer step).

Saving and Loading Patches/Sequences

When using any mode you may save and load your patch settings so that you don't have to set up all of your parameters again. Also, if you are using groovebox mode you may save your entire sequence to memory. There are 4 slots in EEPROM memory for you to save your patch settings and sequence.

Patch settings include the ADSR envelope parameters, waveform setting, and detune setting for each channel. It also includes the filter cutoff setting, filter resonance setting, and the LFO waveform setting.

When in groovebox mode, the current sequence is also saved.

Saving a Patch/Sequence

Hold down button 1 and button 4 for two seconds to initiate the reset procedure. When button 1 is held during reset, the Synthino XM will allow you to save the current patch + sequence in one of the 4 memory slots. You will hear a short beep. *While still holding down* button 1, turn the pot just above button 1 to select one of the 4 memory slots to save in. The selected memory slot will be indicated by one of the 4 LEDs. When you have selected the memory slot, release button 1. The LED will blink while the data is saved to memory. This may take a few seconds when an entire sequence is saved (when in groovebox mode). After saving is complete you will hear a short beep. Now all 4 LEDs will blink (just as with a normal reset) prompting you to choose which mode to enter. The patch+sequence you just saved will be loaded after you choose the mode.

Loading a Patch/Sequence

Hold down button 2 at startup or while holding down button 4 to reset. When button 2 is held during startup or reset, the Synthino XM will allow you to read a set of patch settings and a sequence from one of the 4 memory slots. *While still holding down* button 2, turn the pot just above button 1 to select one of the 4 memory slots to load from. The selected memory slot will be indicated by one of the 4 LEDs. When you have selected the memory slot, release button 2. Now all 4 LEDs will blink (just as with a normal reset) prompting you to choose which mode to enter. If there is nothing saved at the selected memory slot, you will hear two short low beeps.

MIDI Messages

The Synthino XM responds to a wide variety of MIDI messages to control its behavior and various parameters. MIDI **program change** messages with values 1-18 can be used to select the waveform/sample. MIDI **pitch bend** messages will bend the notes on a channel up to 2 semitones up/down.

The arpeggiator and groovebox mode **BPM** rate may be controlled with MIDI clock pulses. If the Synthino XM detects MIDI clock pulses, they will be used to set the rate and the BPM pot will be ignored until MIDI clock pulses stop arriving. MIDI **start** and **stop** messages will start and stop the arpeggiator and sequencer. The MIDI **system reset** message will reset the device.

The table on the following page shows the mapping of MIDI control change messages to Synthino XM parameters.

Control Change Map

CC #	MIDI Name	Synthino XM Parameter
73	attack time	attack time
75	decay time	decay time
79	sustain volume	sustain volume
72	release time	release time
70	sound variation	waveform
76	vibrato rate	pitch LFO rate
1	modulation depth	pitch LFO depth
12	effect control 1	LFO waveform
13	effect control 2	filter LFO rate
91	effects depth 1	filter LFO depth
71	timbre	filter resonance
74	brightness	filter cutoff frequency
16	general purpose 1	arp/groovebox BPM (alternative to MIDI clock)
17	general purpose 2	arpeggiator note length
18	general purpose 3	arpeggiator/groovebox transpose
19	general purpose 4	detune
7	channel volume	groovebox track volume (channel n controls track n)
20	[undefined]	groovebox track 1 volume (regardless of channel)
21	[undefined]	groovebox track 2 volume (regardless of channel)
22	[undefined]	groovebox track 3 volume (regardless of channel)
23	[undefined]	groovebox track 4 volume (regardless of channel)
123	all notes off	all notes off

Miscellaneous Procedures

Fine-tuning Procedure

To fine-tune the pitch of the Synthino XM, hold down button 4 when powering on the device, and keep holding it down. You will hear two beeps and then an A4 note (440Hz). Turn the pot just above button 4 to adjust the pitch of A4 to match your other instruments. When you release button 4, Synthino XM will remember this tuning even when powered off.

Hardware Test Procedure

If you believe that one of your pots or buttons is not functioning, perform this procedure. Disconnect power and set all the pot positions to zero. Hold down button 1 while powering on the device. You will hear a low beep while holding the button. Press each button to ensure that the tone sounds and the LED below the button illuminates. To test the pots, hold down a button and then, one by one, turn each pot up and then down again. The pitch of the tone should vary as you increase the pots.

Factory Reset Procedure

To erase the contents of the EEPROM (saved patches, sequences, fine tuning settings), hold down both buttons 1 and 2 when power is turned on. You will see LED 1 blink while the entire memory is being erased.

Troubleshooting Guide

I don't hear any sound.

Check the volume thumbwheel on the right side. Turn it clockwise (toward you) to increase volume.

Check to see that the filter cutoff frequency is not set to zero.

Ensure that your MIDI controller is sending on the right channel.

If using the groovebox sequencer, make sure the track volume is not set to zero on the current track.

The waveform and envelope controls are not changing the sound I'm playing on my controller.

The voice select pot controls which voice the controls affect. Turn the voice select pot to choose voice 1-4 as indicated by the LEDs. Ensure that your MIDI controller is sending on the channel that corresponds to the selected voice.

The filter LFO does not have much effect.

The filter LFO modulates around the current cutoff setting. If this is set too high or too low, you will not hear much modulation. Adjust the filter cutoff.

If you cannot solve your problem by reading this manual or by reading information on synthino.com, please email support@synthino.com for assistance.

Updating the Synthino XM Firmware

Windows PC

Download the [Flip tool from Atmel](#).

Hold button 3, then connect the Synthino XM to the computer via USB.

If Windows prompts you for a driver location, navigate to the install location of the Atmel Flip tool.

If you get DLL errors, update the driver by opening the Windows Device Manager. Select the ATXmega128A4U device and click the button “Update Driver”. Then navigate to the Flip usb directory: C:\Program File(x86)\Atmel\Flip 3.4.7\usb

[Watch this video tutorial](#) which shows how to use the Flip tool to upload the firmware on to the Synthino XM.

Mac OS X

Download the [DFU Programmer Utility](#) disk image.

It contains a folder dfu-programmer-0.6.2 which contains the command line utility dfu-programmer.

To upload a firmware hex file (e.g. ‘synthino_xm.hex’) to the Synthino XM device, perform this procedure. Hold down button 3 then connect USB between your Mac and the Synthino XM. You may now release button 3. The Synthino XM is in programming mode and is waiting for new firmware from your Mac. Run this command from the Terminal application on your Mac:

```
dfu-programmer atxmega128a4u flash --erase-first synthino_xm.hex
```

After a few seconds you should see a response like this:

```
Validating...  
117148 bytes used (89.38%)
```

Now disconnect and reconnect power to the Synthino XM. It will now be running the new firmware.

Manual version v1.1

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