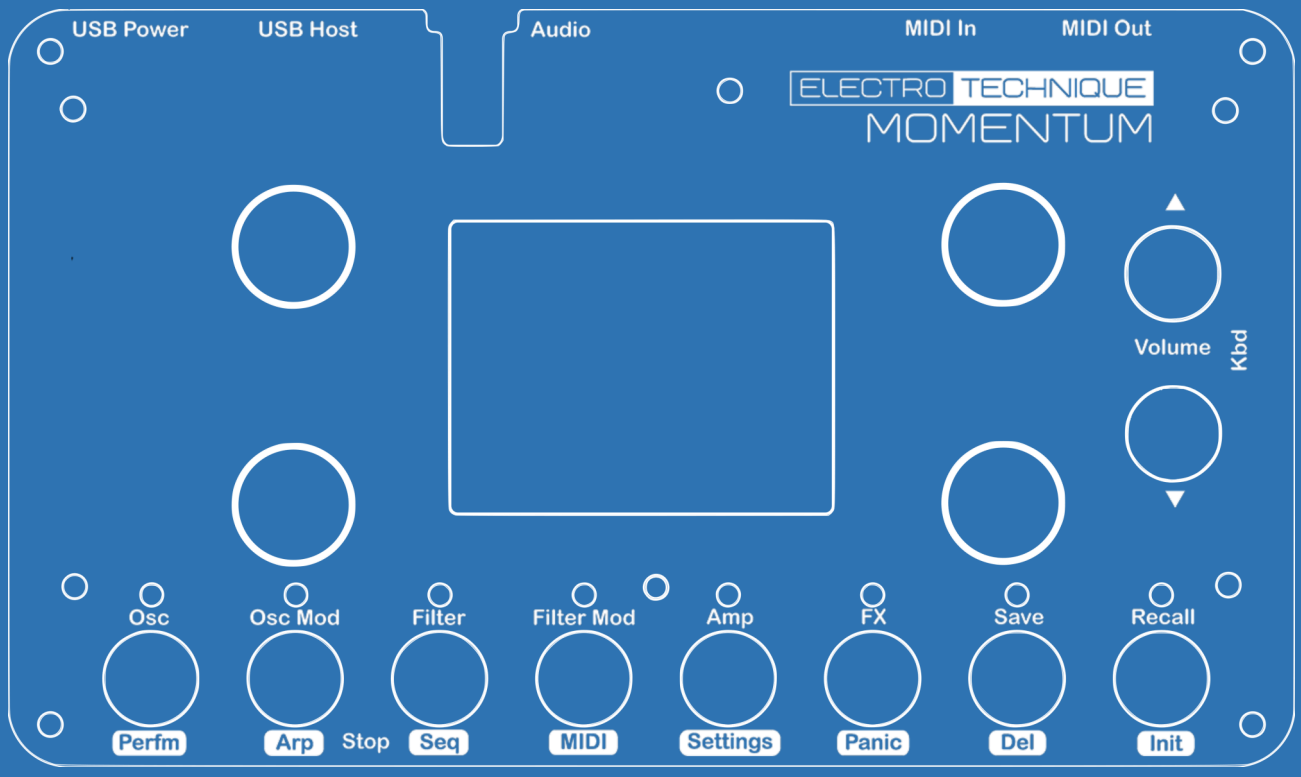


ELECTRO TECHNIQUE

MOMENTUM

USER MANUAL

September 2023

Momentum is a powerful, low-cost, 12-voice digital virtual analogue polyphonic synthesizer. It's features rival those of synths costing many times more. Momentum builds on TSynth, Electrotechnique's first synthesizer and adds additional features.

Sound:

- 12-voice polyphony 16bit 44.1kHz audio
- Stereo analogue audio and digital audio via USB port
- 2 oscillators and state variable filter per voice, with comprehensive modulation
- Stereo ensemble and reverb effects

Three MIDI ports:

- USB HOST MIDI Class Compliant (direct connection to MIDI controller, no PC needed)
- USB Client MIDI In from PC
- MIDI In TRS —supports both type-A and type-B TRS leads

  MIDI Out/Thru TRS - configurable as a MIDI Thru with filtering options

Patches:

- 8 user banks with 128 nameable patches, recallable via MIDI

Performance:

- 128 performance memories—store patch and choose parameters for encoders to

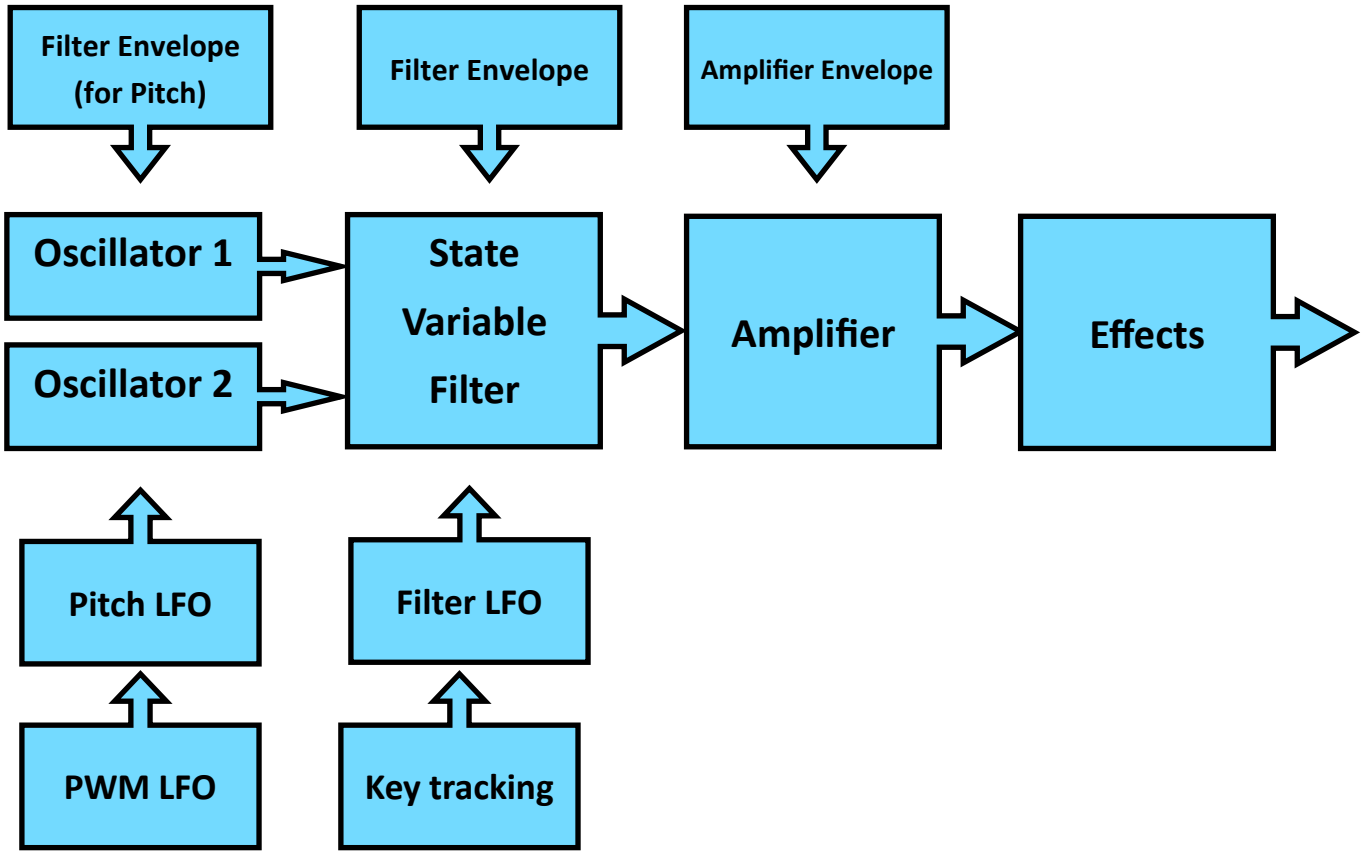
control and MIDI settings, recallable via MIDI

- Simple step sequencer with up to 64 steps and 128 sequencer memories
- Arpeggiator—simple arpeggiator with six styles, choice of ranges, base octave and tempo divisions
- Simple 8 note polyphonic keyboard with scales and octave choice

Storage:

- Removable SD card for patches, performance and sequence memories

Momentum is a virtual analogue synthesizer and has parameters that are usually seen on analogue synthesizers. The flow of audio and control is that of a two oscillator polysynth:



Momentum is velocity sensitive on both filter and amplifier. Mod wheel amount can be set for filter cutoff frequency as well as LFO pitch modulation depth.

Assembly Guide

If you have purchased the DIY kit, this is the assembly guide. The following components should have come with your kit. The Teensy Micromod was an optional purchase.

Item	Quantity
PCB	1
Front panel	1
Plastic case	1
M3 8mm Brass standoffs	6
M3 Screws - 5mm length	17
USB Type A socket	1
3.5mm sockets	2
12mm buttons	10
12mm button caps	10
Encoders with washer and nut	4
Plastic washers for encoders	4
Encoder Knobs	4
Display	1
Display plastic standoff	1
PCM5102A PCB	1
Six pin header for PCM5102A PCB	1
Two pin header for PCM5102A PCB	1
3mm Bi-colour LED	8
Plastic standoffs for LEDs	8
M2 screw for Micromod	1
Feet	4
Teensy Micromod (*if purchased*)	*1*
MicroSD Card (*if purchased*)	*1*

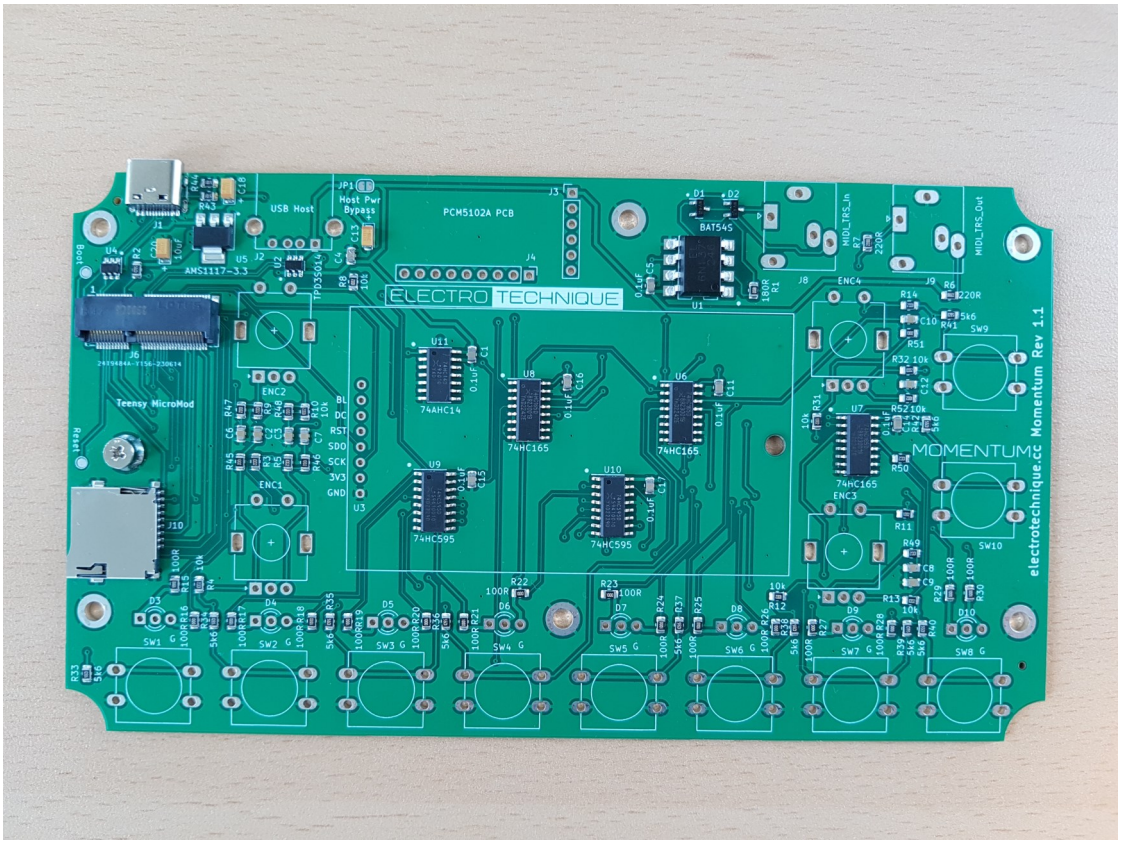
1. Soldering the components

Important notes and tips

All components are fitted onto the **top** of the PCB and soldered underneath. **Take your time** and solder one pin on a component first and **ensure it is flat** against the PCB before soldering the rest of the pins. This is probably the most critical part of soldering and getting this right will avoid problems when fitting the front panel.

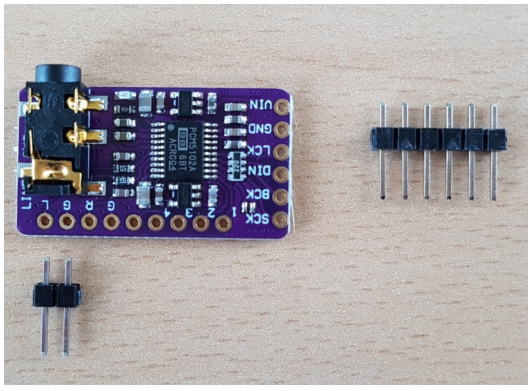
If you have problems soldering pin headers due to only having one pair of hands, try loading the soldering iron with solder and dabbing the first pin to keep the header in place on the PCB, then correcting it later when you've soldered another pin at the

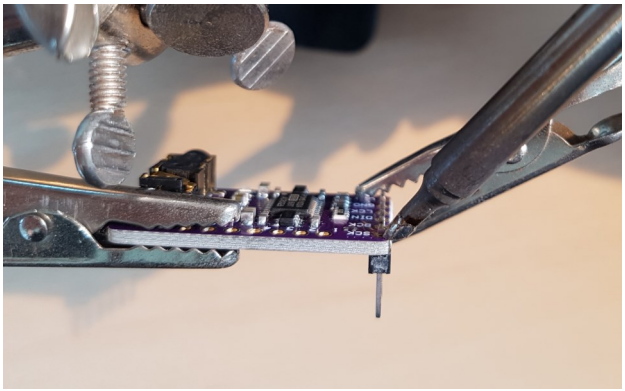
opposite end of the header. You can ensure the header is flat and at right-angles by alternating between applying the iron to the soldered pins at each end while pushing the header into the correct position.

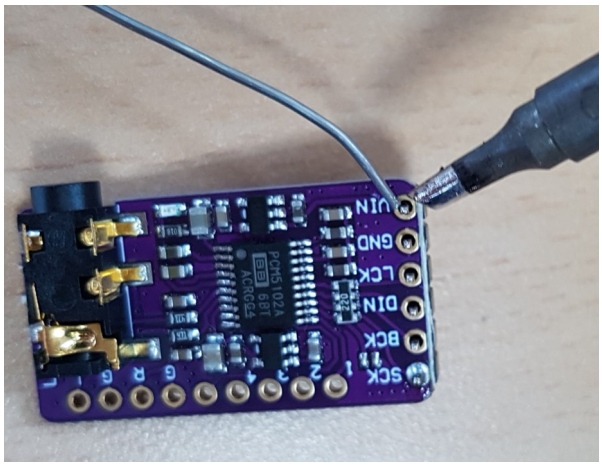


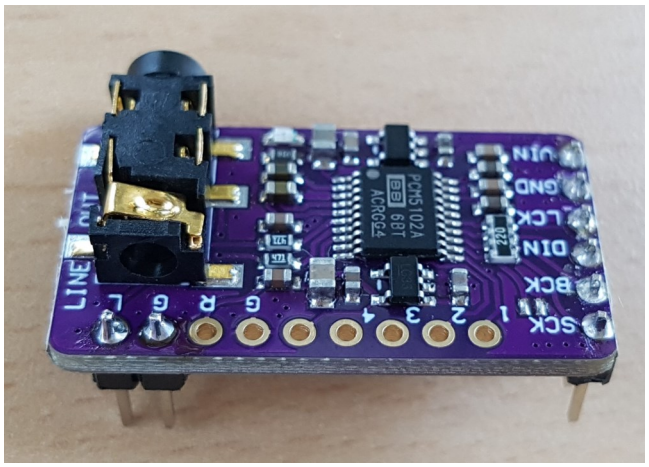
Solder the pin headers onto PCM5102A PCB.

It is important to ensure that the pin headers are soldered at right-angles and flat onto the small PCB. Start with the six pin header. Solder one pin at the end first and then the pin at the other end. If the pin header isn't flat, you can apply the soldering iron to a pin and push until it is flat. Then solder the pins in between. The small two pin header goes behind the socket on the other end of the PCB to add mechanical strength when it is on the main PCB.



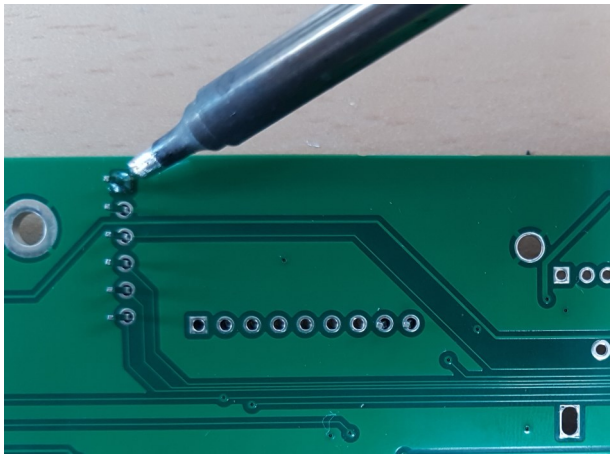


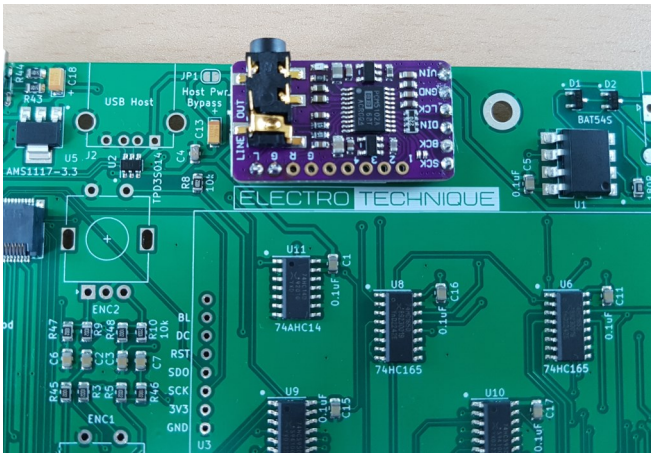




Solder the PCM5102A PCB onto the main PCB.

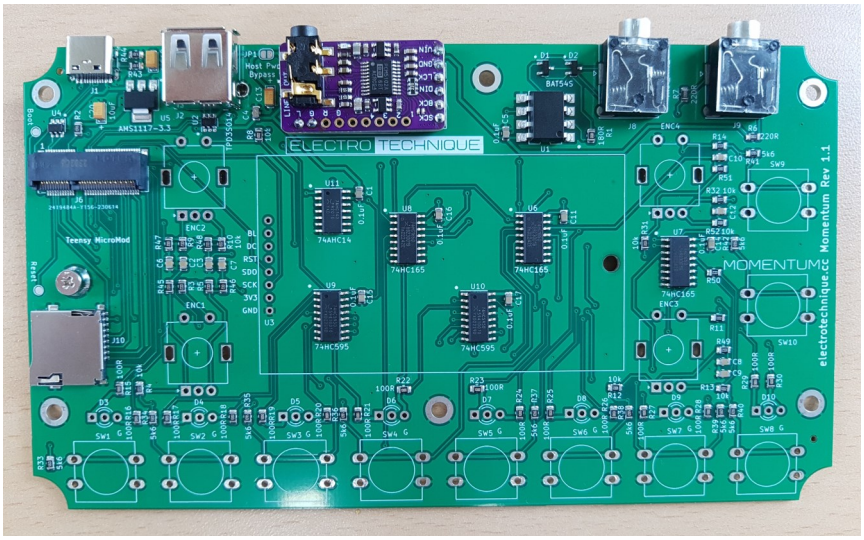
Again, solder one pin at the end and then the other end, and ensure the header is flat against the main PCB. The pins don't require trimming under the main PCB.





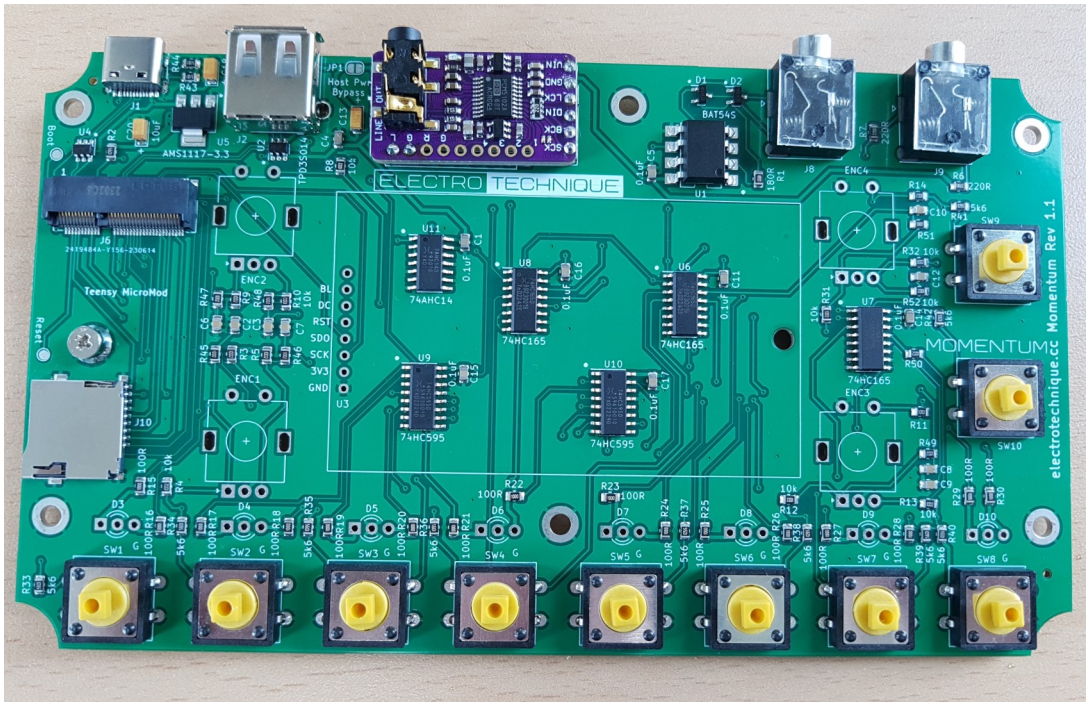
Solder the USB and 3.5mm sockets onto the PCB.

Solder the USB type A socket and the two 3.5mm sockets onto the PCB. Solder one pin and ensure they are flat against the PCB before soldering the rest of the pins. The 3.5mm sockets will need careful manoeuvring to get the pins in the holes, but they do fit.



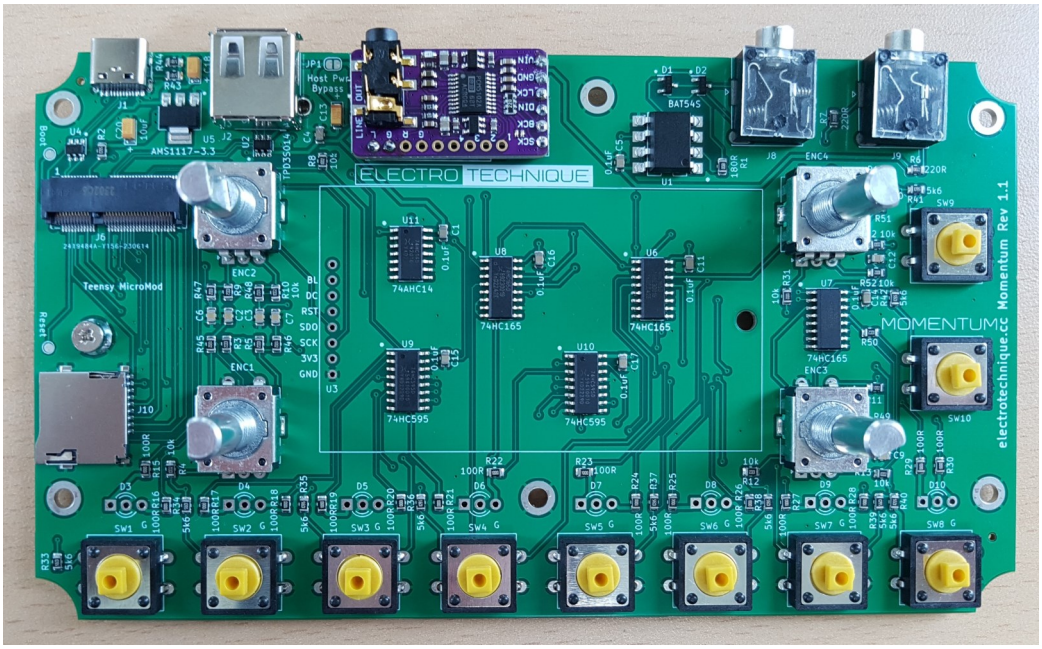
Solder the buttons onto the PCB.

Solder the ten buttons one at a time. Solder one pin and ensure the button is flat against the PCB before soldering the rest of the pins. If the button isn't completely flat, there will be problems when the caps are on and the front panel is being mounted.



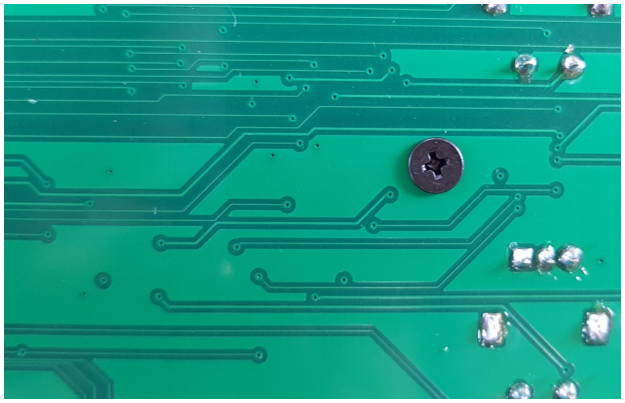
Solder the encoders onto the PCB.

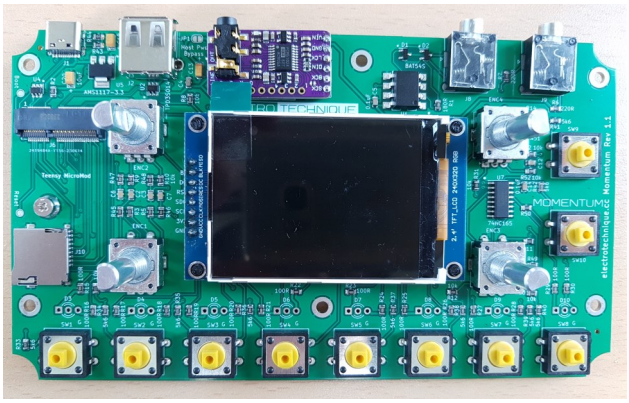
The encoders tend to be difficult to push onto the PCB due to the side tabs. Gently pushing these inwards against the side of a table is often enough to allow them to push in easier. Ensure both tabs and all five pins are soldered. Place a plastic washer on each encoder before the front panel is placed on top.



Solder the display onto the PCB.

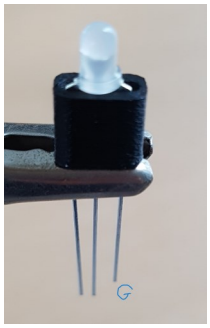
Place the plastic standoff under the display and solder in place on the PCB. Start by soldering a pin at one end first and ensure the display is flat against the PCB before soldering the rest. The hole in the PCB and standoff on the right is for an M3 screw to be screwed in from the bottom to hold the display down and centred. Don't over -tighten this, because it's screwed into plastic.

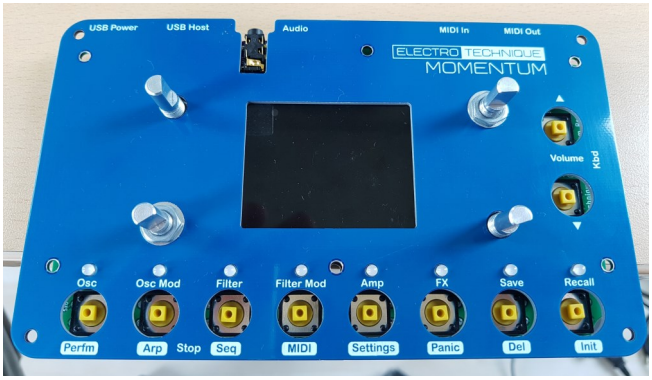


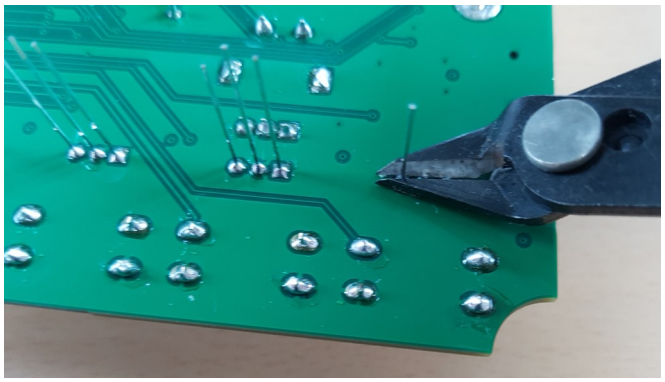


Solder the LEDs onto the PCB.

The LEDs are bi-colour red and green with three legs. The **shortest** leg is green and should be in the pad on the right (marked G on the PCB). Push it into the standoff (with the slot at the top) before placing it onto the PCB. Ensure they are upright and centred. Place the front panel onto the PCB and to ensure the LEDs pass through the holes and solder with the front panel on top. The front panel can be held in place with the encoder nuts and then removed after soldering. The LED legs should be cut-off with side cutters.







Attach the Teensy Micromod.

The Micromod slots in to the connector and sits at an angle until you use the M2 screw to hold the Micromod flat, in place.

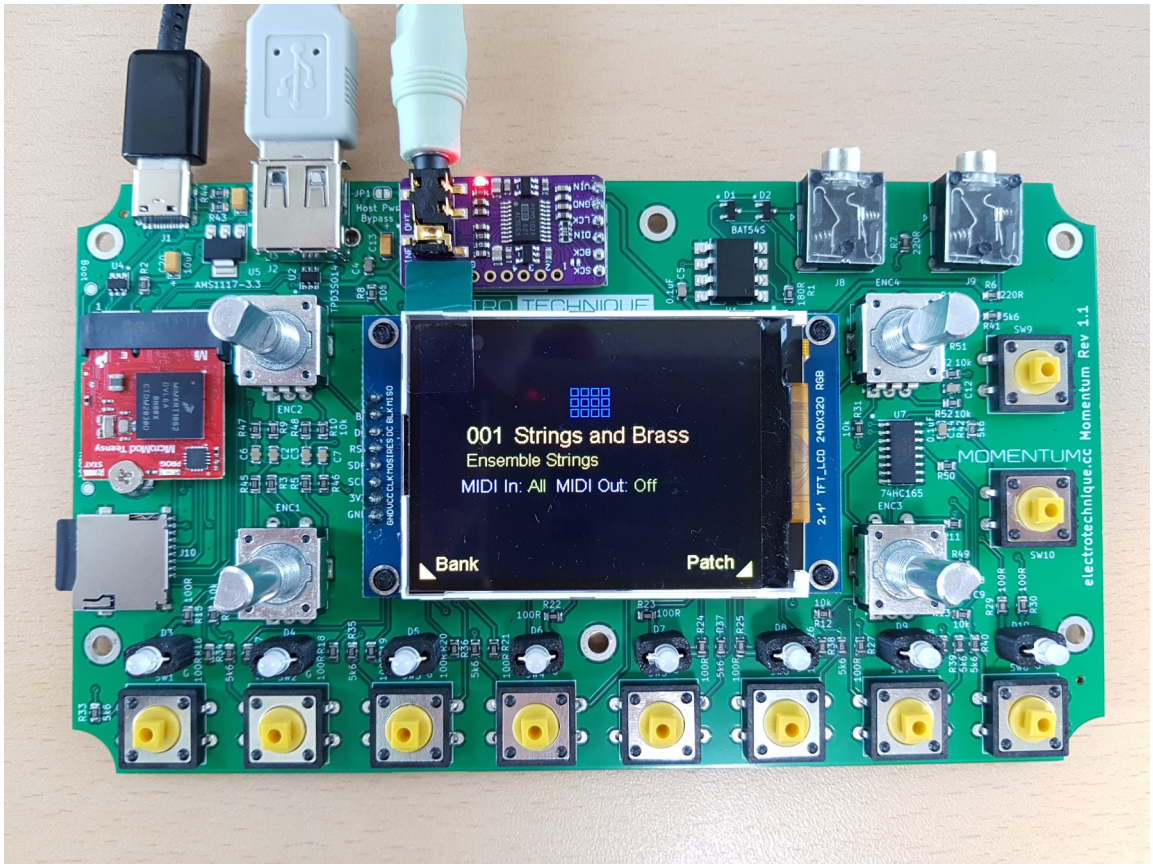
Test the assembled PCB.

• If you have received a Teensy Micromod as part of your purchase, it should be programmed with the latest firmware. Plug-in a USB power source into the USB Power socket. Use a suitable USB adaptor or powerbank. Note that plugging Momentum into a computer USB port will work fine, but will probably introduce noise into the analogue audio. If you need to routinely plug Momentum into a computer, consider buying a USB isolator.

• If you bought a Teensy Micromod separately, you need to plug Momentum into a computer and flash the firmware. The computer will probably introduce noise into the analogue audio, if you need to routinely plug Momentum into a computer, consider buying a USB isolator. Go to tinyurl.com/ET-momentum and download the latest firmware, which will be a HEX file in a zip named—*momentum_Vx_xx.hex*. Install the flashing utility from PJRC here tinyurl.com/TD-Loader

Use the Teensyduino utility to flash the HEX file extracted from the zip onto Momentum. See sections on **Flashing Firmware** for more details.

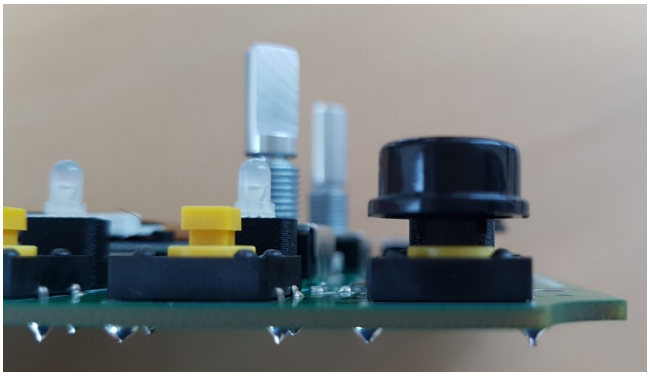
Push the microSD card into the socket. If this came with a kit, it should contain the factory presets. If not, go to tinyurl.com/ET-momentum and take the **contents** in



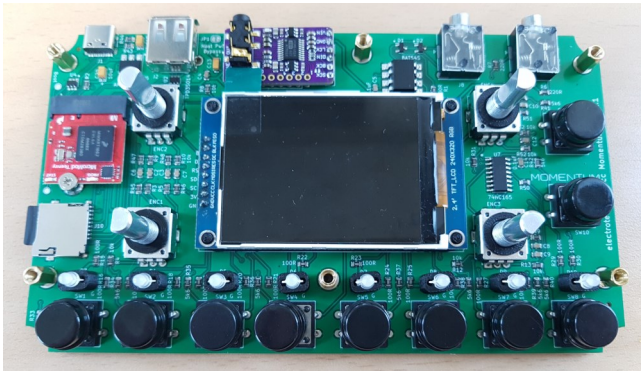
the SD card folder and copy these to the SD card. They should be placed directly onto card (in the root directory.)

Test your build. Ensure the volume is turned up. You can press the volume buttons simultaneously to activate the keyboard and use the eight lowers buttons to play notes. Ensure the buttons all work and the LEDs light up red and green — see *Accessing Parameters*. Check the encoders all work.

2. Assembling the PCB and front panel



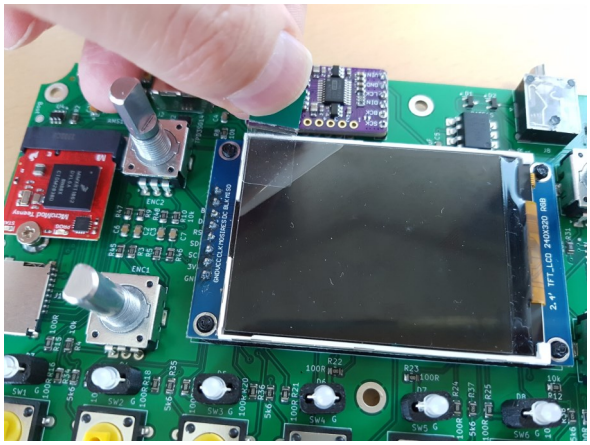
Fit the ten caps to the push buttons.



Attach the six 8mm hex standoffs to the PCB, using the M3 screws.

Place the four plastic washers onto the encoders before placing the front panel on.

Remove the protective film from the display. **Note**—be careful, the film is often stuck



well to the screen and can lift it off it's PCB when pulling the tab! Place a finger on the display and then carefully peel the film off.

Attach the front panel to the PCB using six M3 screws.

Check the buttons push properly.

Place the four metal washers onto the encoders and screw the four nuts on top—do not over-tighten these nuts. Again, check the buttons push properly.

Attach the four knobs onto the encoders.

3. Assembling the PCB into the case

Attach the PCB and front panel into the case using the four remaining M3 screws.

Stick the four feet onto the bottom of the case.

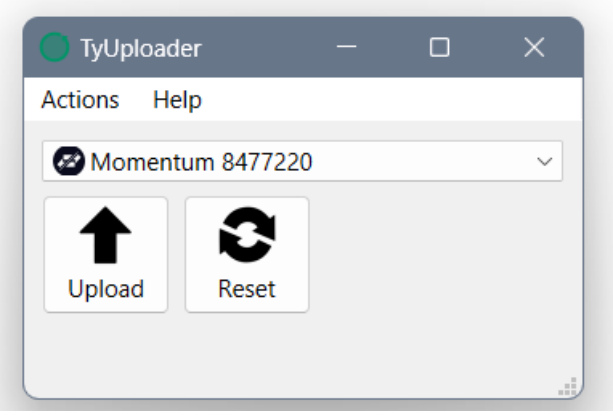
Congratulations, your Momentum is built!

Flashing Firmware — Using TyUploader

Use the TyLoader app tinyurl.com/tyupl , which will upload firmware without having to access and short the *Boot* pad. Find the version for your operating system.

Press *Upload* and choose the firmware hex file you have downloaded. TyUploader should then flash the firmware directly to Momentum.

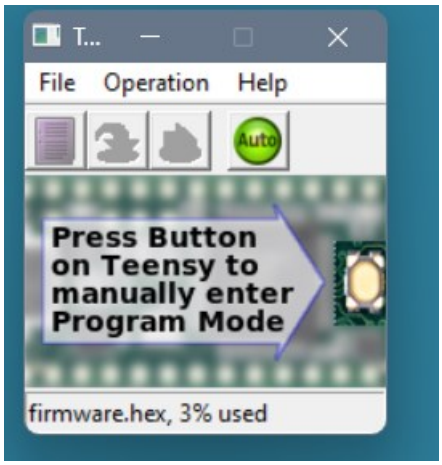
If there are problems, such as Momentum being unresponsive, the Teensy Loader may be used, which involves bridging the *Boot* pad inside—see the section **Flashing Firmware — Using Teensy Loader**



Flashing Firmware — Using Teensy Loader

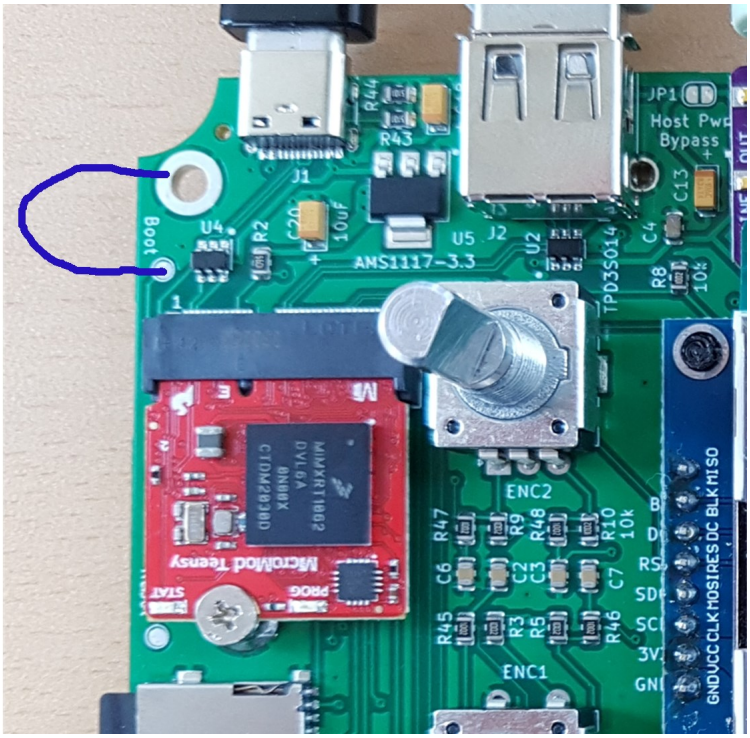
Use the Teensy Loader app tinyurl.com/TD-Loader from PJRC (the makers of the Teensy MCU platform) to flash the firmware onto Momentum. Find the version for your operating system.

When you have downloaded the code from GitHub for Momentum tinyurl.com/ET-momentum , you will find the firmware named *momentum_Vx_xx.hex* with the latest version. Press *File* on the Teensyduino app and *Open HEX File.* Select the hex file.



If the app doesn't respond and flash the firmware, then you will need to tell the Teensy MicroMod to go into boot mode, which will automatically start the flashing process. Using a wire, bridge the *Boot* pad next to the MicroMod connector to ground as shown below. When contact is made, it will start to flash. If Momentum is fully built, you only need to remove the four screws holding it in the case to access the *Boot* pad. Use the brass standoff as ground.

Bridge the ***Boot*** pad to ground with a wire



Using Momentum

Please read through the User Manual. There are features and functions accessed by pressing, and pressing and holding the buttons and encoders

Power

Momentum is powered through the USB Power port. Plug a USB power source into the USB Power type-C socket. Use a suitable USB adaptor or powerbank. Note that plugging Momentum into a computer USB port will work fine, but will probably introduce noise into the analogue audio. If you need to routinely plug Momentum into a computer, consider buying a USB isolator. Momentum requires normal USB 5V 500mA. Some cheaper (sub $10) USB isolators have a significant voltage drop that may cause problems noticeable as a dim, flickering display, and may not be able to power attached keyboards. Better isolators will provide 5V, often by an external power supply.

SD Card

Momentum requires a FAT formatted SD card to function. Patches, performance and sequencer data are stored on it. It will work without one, but there is no store or recall available and Performance, Sequencer and Patch pages won't show. The SD card can be very low capacity, 64MB is more than enough. Be aware that older cards do work, but may occasionally fail to be recognised first time and re-inserting usually works. Very large capacity cards (32GB+) may not work. Use the memory card formatter from the SD Association if you want to ensure correct formatting www.sdcard.org/downloads/formatter/

USB and MIDI connections

Momentum is very flexible and will receive MIDI data from:

- The USB Power port (USB-C socket) if connected to a pc or something that provides MIDI data from a Host port
- The USB Host port (USB–A socket) if connected to a keyboard or sequencer
- MIDI In TRS port (3.5mm socket). This is equivalent to the classic 5-pin MIDI DIN socket and MIDI In will accept **both** TRS type A (the MIDI standard, Korg...) and type-B (Arturia, Novation...) The MIDI Out TRS port is type A **only.** Two or more Momentums can be connected together by using an ordinary 3.5mm stereo to 3.5mm stereo cable.

Do not connect the MIDI TRS ports to anything other than MIDI TRS or there may be damage to the TRS ports or the other equipment.

MIDI TRS to MIDI DIN adapter cables can be used but you are recommended to use type-A, which are considered the standard by the MIDI Association.

Audio

Audio comes from Momentum either from the analogue 3.5mm stereo socket or digitally (16 bit 44.1kHz) from the USB Power port to an attached pc. If you experience unwanted noise, see the Troubleshooting section at the end.

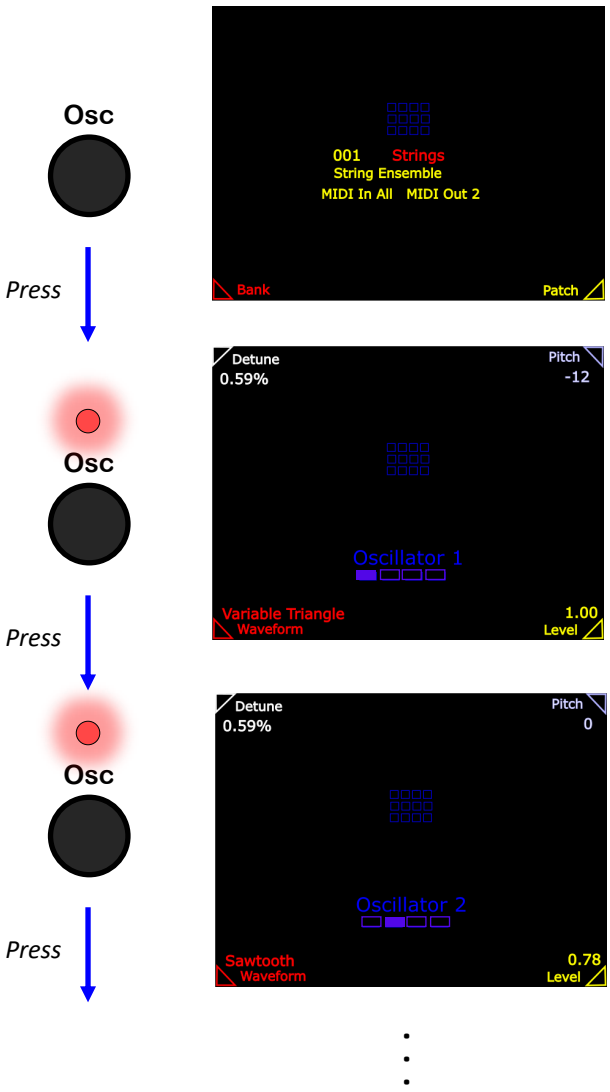
Accessing parameters

Momentum is a very capable digital synthesizer with 12 voice polyphony. It has been designed to be a small desktop unit, but with quick access to the parameters that you would expect on a synthesizer. The eight buttons at the bottom access parts of the sound engine and allow patch save and recall. In most cases, pressing the same button will bring up the next page for that particular area.

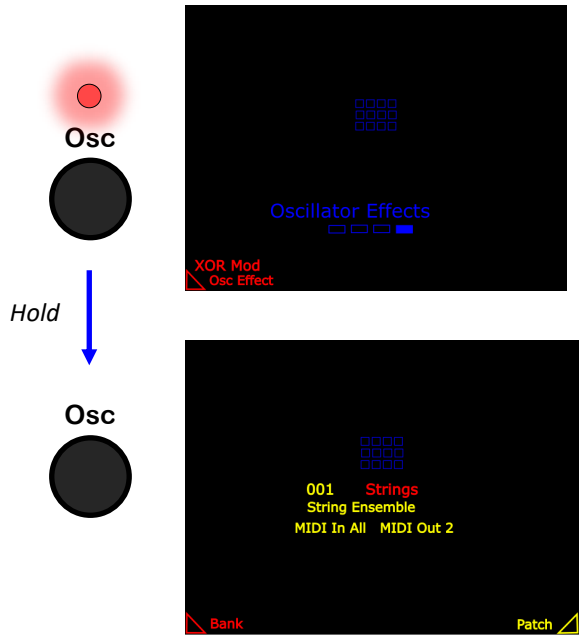
Parameters are set using the four encoders. In most cases, pressing the encoder will set the parameter to it's default value. In some cases such as on the Sequencer Edit page, pressing and holding the encoder will perform some other action—see the Sequencer section.

Paging through parameters

The **Osc** button for instance, brings up parameters to alter the oscillators. The first page is for oscillator 1. Pressing the button again brings up oscillator 2. Pressing again brings up the parameters like noise level. A fourth press brings up oscillator effects such as frequency modulation. A fifth press bring you back to the first oscillator page again. The LED will light up red to indicate that you are in the parameter pages.

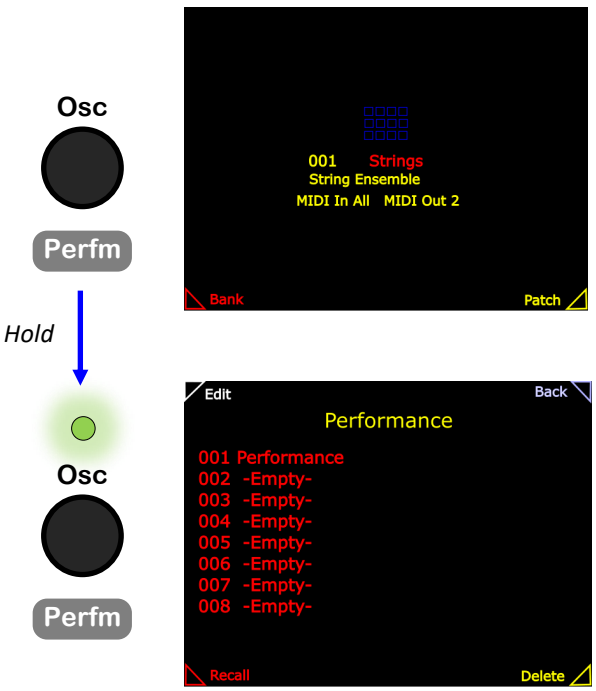


Holding the **Osc** button will bring you back to the main page. Pressing any other parameter button at the bottom will take you to the pages for that parameter.



Secondary parameters and functions

Pressing and holding the parameter buttons will take you either into other parameter pages, or execute functions. For instance, holding the **Perfm** button (**Osc**) will take you into the Performance pages. The LED will light up green to indicate that you are into the secondary parameters.



Saving and Recalling Patches

Patches can be recalled on the Main page by using the two lower encoders to move through the banks and patches. The patches will recall as the encoders are turned through each one.

Pressing the **Recall** button, will show the Recall page. Patches can be selected and recalled by pressing either of the lower two encoders or the **Recall** button to go back to the Main page.

Patches are saved by pressing the **Save** button. An empty patch is selected at the end of the current bank. By pressing **Save** again, this empty patch will be saved with the current patch and with it's patch name. If the **Name Patch** encoder is pressed, the naming page is recalled and the patch can be given a name. Characters can be selected and entered by pressing the **Character** encoder, and deleted with the **Del. Char** encoder. Pressing either the **Save** encoder or button, saves and takes you back to the main page.

Patches can be over-written by selecting them and pressing the **Save** button, bypassing the naming routine.

Editing Banks

Bank names can be changed by pressing the **Edit Banks** encoder and then selecting the **Rename Bank** encoder.

Deleting Banks

Bank patch contents can be entirely deleted by pressing the **Edit Banks** encoder and then selecting the **Del Bank** encoder.

Patch parameters

Most of the parameters that can be changed in a patch are familiar to anyone who has used an analogue or analogue-like synth before.

Osc

Waveforms

There are the usual range of common waveforms but Variable Triangle is less common. It works like Pulse Width Modulated (PWM) waveforms and can be modulated between sawtooth, through triangle to ramp (reverse sawtooth). Sample and hold (on Oscillator 2) is like tuned noise, a fast changing pulse wave of different heights. Parabolic is a parabola. Harmonic differs between Oscillator 1 and 2. On 1, it is like an organ sound . On 2, it is a wave from the PPG Wave 2.2.

Oscillator Effects

XOR Mod will perform an exclusive-or operation between the two oscillators and usually results in more high frequency harmonics. It doesn't work well when using Variable Pulse waveforms. X Mod is a cross-modulation effect. By vhanging the pitch of both oscillators (usually higher) and altering the levels, bell-like FM sounds can be produced and interesting effects. The *Autobell* preset shows this quite well.

Osc Mod

Osc PWM

PWM Source allows the modulation source to be chosen for the Variable Pulse and Triangle waveforms. The current wave form for each oscillator is shown above the source, so that you know what the current oscillator is. Each oscillator has a dedicated LFO for modulating these. Or the Filter Envelope can be used. Or the width/shape can be manually set.

Osc Pitch

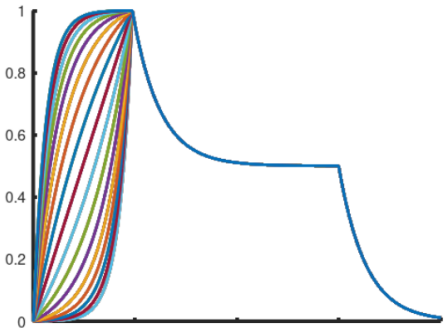
Modulation of both oscillators pitch is on two pages. The first is a dedicated LFO with various waveforms, rate (speed) and amount. Pitch LFO Sync allows the rate to be synchronised with incoming MIDI clock messages. The Rate encoder changes to show divisions of a bar (… 1/16, 1/8, 1/4 …) Pitch Envelope modulates the pitch using the Filter Envelope. It allows 'positive' and 'negative' modulation. Sustain level zero is unmodulated (original) pitch. Pitch LFO Retrig will retrigger the LFO from the same initial point in it's cycle. Pitch Mod W. Dep sets the amount of pitch modulation that the modulation wheel will produce.

Filter

The filter is a ‘State Variable’ type which means it can be altered between low pass through to high pass (this acts as a notch filter when between these two settings) and finally band pass. Cutoff Frequency and Resonance should be familiar. The filter is a 12dB two-pole model. High values of resonance will cause distortion at certain frequencies. Filter Envelope allows both ‘positive’ and ‘negative’ modulation. The Filter Envelope is on the second page.

Filter Mod

Modulation of the filter cutoff is on three pages. The first is a dedicated LFO with various waveforms, rate (speed) and amount. Filter LFO Sync allows the rate to be synchronised with incoming MIDI clock messages. The Rate encoder changes to show divisions of a bar (… 1/16, 1/8, 1/4 …)



Filter Env. Shape will set the envelope shape on the attack, decay and release stages. It can be set to linear (Lin) and different exponential shapes from curve up and curve flat. The diagram shows how the shape differs for the attack stage.

Filter LFO Retrig will retrigger the LFO from the same initial point in it’s cycle. Filter Mod W. Dep sets the amount of filter modulation that the modulation wheel will produce. Filter Vel Sens will set the velocity sensitivity of filter cutoff. There are four response shapes and off, which will give full 127 velocity.

Amp

The Amplifier pages feature the envelope page and some parameters such as Glide. Amp Env. Shape will set the envelope shape on the attack, decay and release stages—see diagram above. Velocity Sens. Will set the velocity sensitivity—see diagram above. Monophonic mode restricts the synth to playing a single note at a time. This is useful for some types of performance and can be set to last, first, highest and lowest note. Glide is also known as portamento and has a shape parameter, which sets linear or exponential response, which is more like actual analogue behaviour.

Effects

There are two effects available on two pages. Stereo Ensemble produces a stereo chorus style effect with adjustable rate and mix. Reverb is a very simple monaural reverberation effect with adjustable room size and mix. Reverb is after stereo chorus and will produce a monaural output.

Keyboard

Momentum has a very minimal keyboard that uses the bottom eight parameter buttons to play notes. By simultaneously pressing the two volume buttons—marked **Kbd**, the keyboard will be activated. An indicator on the screen **KEY** shows it's active. By pressing the two volume keys simultaneously again, the keyboard can be deactivated.

When the main page is showing, the two top encoders will allow selection of the base octave of the keyboard and the scale. Pressing either of the two top encoders also deactivates the keyboard.

MIDI Settings

The **MIDI** Settings page allows setting of global MIDI channels and whether the MIDI Out socket acts as a MIDI Thru. MIDI In can be set to receive all channels or individual numbered ones. MIDI Out sets the channel number that Momentum will transmit on and can be set to off.

MIDI Thru passes data directly from MIDI In to the MIDI Out socket. However, it is also possible to set which channel(s) it will pass through:

- Full — MIDI data passed from all channels
- Same Ch. — Same channel as MIDI In
- Diff. Ch. — Different channel, same as MIDI Out

Note — MIDI Thru only works with classic MIDI on TRS not with USB MIDI.

Global Settings

There are a few settings that globally affect Momentum, which are stored permanently and not on the SD card. By pressing and holding **Settings**, the Settings page will appear. Using the bottom left encoder selects the choice of setting to change. The bottom right encoder will change the value of this setting.

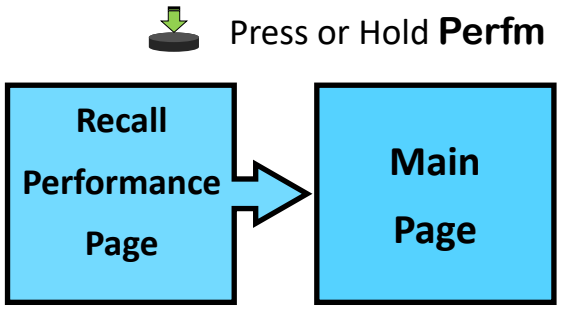
The settings are:

- VU display—shows a simple VU meter on the left of the main page .
- Oscilloscope—displays a small oscilloscope-type screen.
- Global Tuning— changes the overall tuning of Momentum by +/- 50 cents.
- Patch MIDI CC Out—sends MIDI CC messages through MIDI out when patches are recalled. This is useful for using MIDI editors that can take the messages when a patch is loaded and use the data such as an application that will display the current patch parameters and send changes back. This is functionality that System Exclusive would normally be used for.
- Sync to MIDI Clk—sets whether the sequencer will start and stop, and sync its tempo to incoming MIDI Clock messages. This also sets whether the arpeggiator tempo is synced.

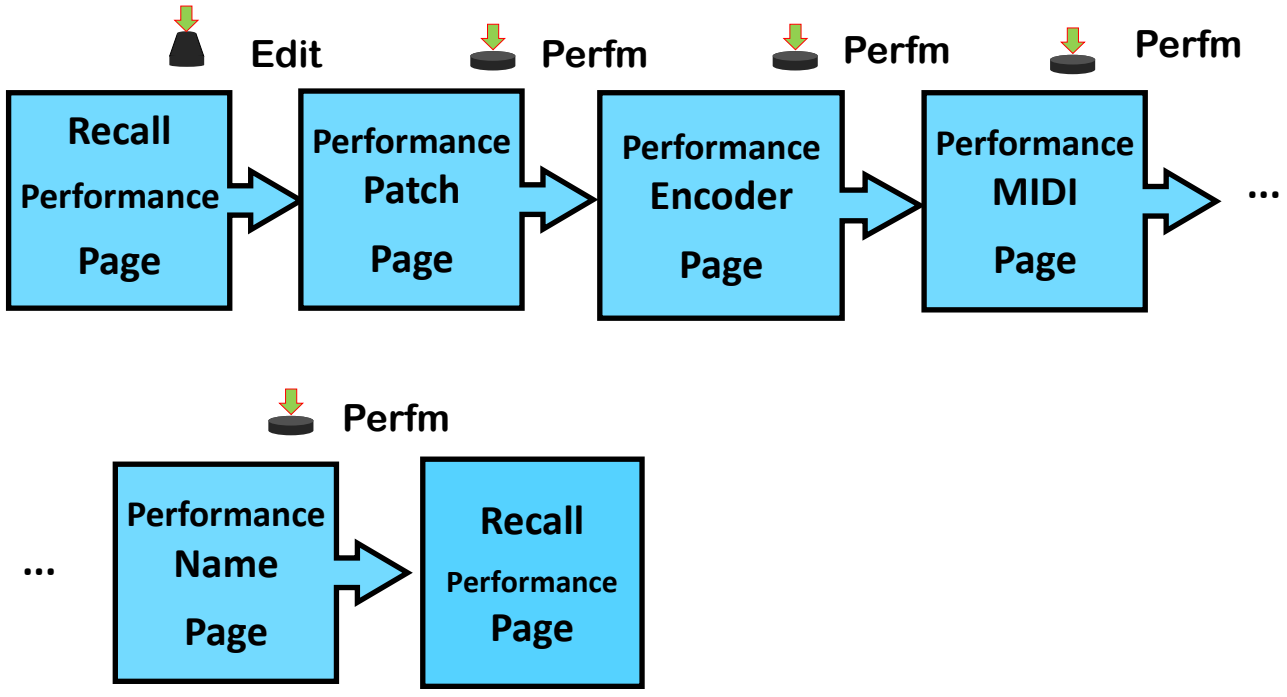
Performance

Press and hold the **Perfm** button to activate the performance mode. An indicator **PER** shows it's active. Performances allow patches to be selected with particular MIDI settings and the four encoders programmed with particular parameters that can be changed. An example would be a patch that receives MIDI on a certain channel, perhaps from an external sequencer, with the encoders set to allow access to filter cut-off frequency, resonance, ensemble rate and ensemble mix, that you would alter while the patch is being played.

The Recall Performance page allows the recall and editing/saving of up to 128 performances. Pressing the **Performance** encoder will recall the selected performance. Performance can be used with the arpeggiator or sequencer, if those have already been selected. Press and hold the **Perfm** button to exit the performance mode and go back to the Main page.



Pressing the **Edit** encoder while on the recall page, will recall the selected performance and allow editing. Pressing the **Perfm** button takes you through each page:



- **Edit Performance—Choose Patch** choose the patch for the performance.
- **Edit Performance—Choose Encoders** choose the parameter associated with each of the four encoders. *None* will deactivate that particular encoder.
- **Edit Performance—Choose MIDI** choose the MIDI in and out channels and the thru mode.
- **Performance Name** set the name for the performance.

A note on MIDI

The 128 performances can be recalled by MIDI using normal patch (sometimes called program) recall messages. These will need to be on the same channel as the current performance MIDI in channel, to be received.

When the Performance mode is exited, the MIDI in, out and thru setting will go back to their original values, as set on the MIDI page by pressing and holding the **MIDI** button.

Arpeggiator

Press and hold **Arp** to activate the arpeggiator. An indicator **ARP** shows it's active. The arpeggiator has two pages with parameters:

- The first page allows setting the tempo, style or type of arpeggiation, the number of divisions of a bar and the number of cycles.
- The second page has different parameters on the top two encoders—the range and the basis, which is the octave where the arpeggio will play from.

The styles are *Up*, *Down*, *Bounce* (up and down without repeating the end notes), *Up and Down* (repeating end notes), *Random* and *Play Order*. The last will arpeggiate entered notes in the order they were played.

Cycles will allow the arpeggiation to play once, twice, three times and infinitely. These have to be held on the keyboard to play. By selecting Hold, the arpeggiation will play infinitely until different notes are entered. Pressing the encoder will toggle between Infinity and Hold.

Range sets how many octaves up or down the arpeggiator will play.

Basis sets the octave the arpeggiator will start from. Base Octave is the same as the octave that the notes are played on the keyboard.

The arpeggiator will continue to play if you select other parameter buttons. It can be stopped by holding the Arp button when on the arpeggiator pages, or by pressing the second and third button simultaneously—marked Stop.

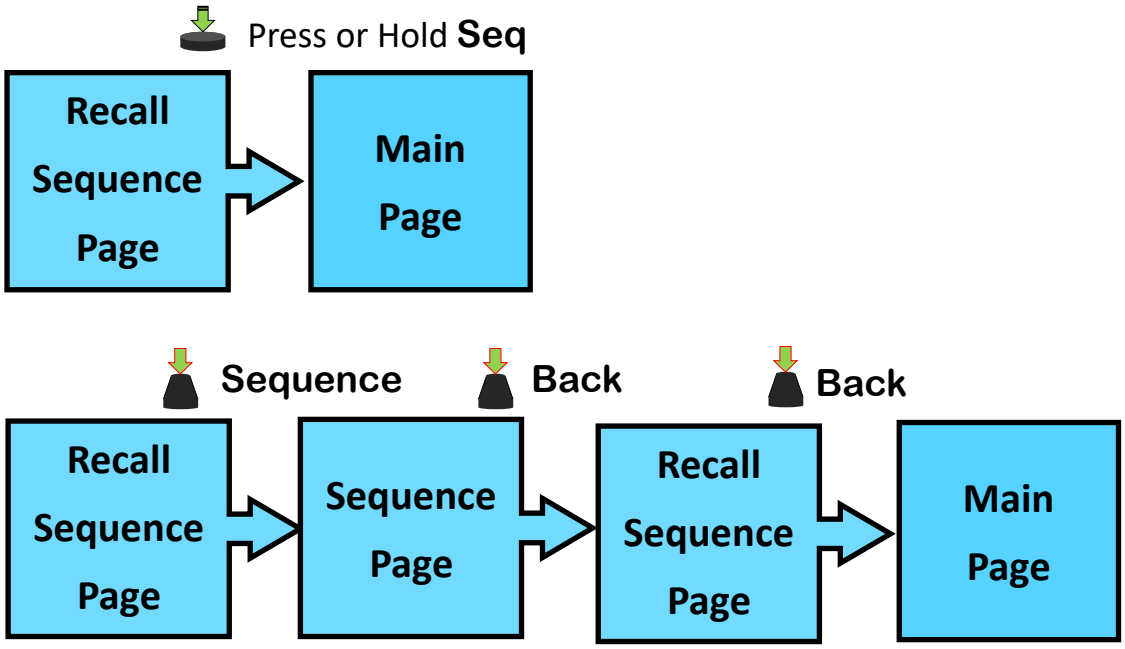
External Clock

When MIDI Clock messages are received by Momentum in Arpeggiator mode, the tempo will adjust to the tempo of the clock. The arpeggio will end when a MIDI Clock stop message is received.

Sequencer

Momentum has a simple monophonic sequencer. It's worth mentioning that it's best to use a dedicated external sequencer.

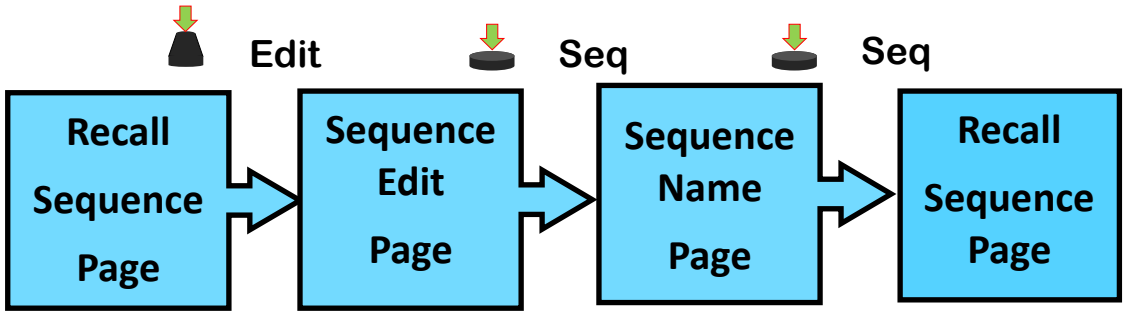
Press and hold **Seq** to activate the sequencer. An indicator **SEQ** shows it's active. The sequencer has pages that are navigated through by pressing the **Seq** or encoder buttons each time.



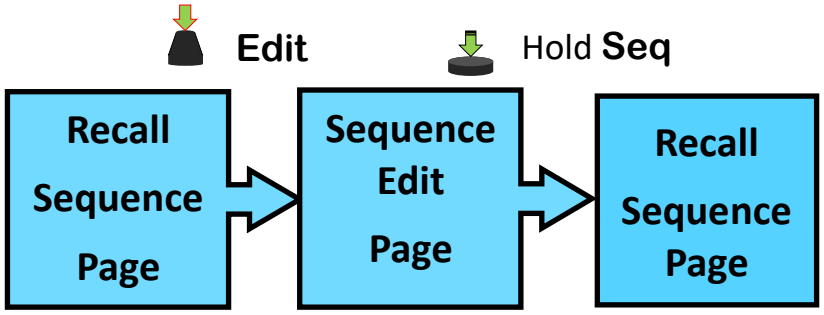
Sequences can be recalled by selecting and pressing the **Sequence** encoder. This will bring up the sequence page. Pressing **Start/Stop** will toggle the sequence to play or stop. Simultaneously pressing the second and third buttons, marked **Stop**, will stop and also start the sequence.

Tempo can be adjusted while playing and will adjust to match incoming MIDI Clock messages — the **CLK** indicator will show that Momentum is receiving these messages.

Sequences can be edited by selecting and pressing the **Edit** encoder. Pressing the **Edit** button will page through sequence naming and back to the recall page. This will also save the sequence to the SD card.



Holding the **Seq** button will take you back to the recall page. Without saving.



Sequences are created and edited in the edit page. Using the **Position** and **Note** encoders, single notes can be entered onto the grid. The **Length** encoder will alter the sequence length. Pressing this encoder will also change the length to 8, 16, 24, 32, 48 and 64 note lengths. Note velocity defaults to 64 when entered this way.

Pressing and holding the **Length** encoder while on the editing page will toggle recording a sequence from incoming MIDI. A **REC** indicator at the top will show if this is activated. The note velocity is recorded properly this way.

The sequencer will sync to incoming MIDI Clock messages and adjust the tempo to match. This isn't especially accurate however, as it relies on timing the 24ppqn messages. The sequencer will also start, stop and continue when it receives the corresponding MIDI messages to do so.

Troubleshooting

No sound

- Check Waveforms are not set to off and volume is at least mid way.
- Check that filter cutoff and filter type will allow sound through.
- Check MIDI In channel is correct and taking MIDI data from attached keyboard/pc.
- Pulse Width of Pulse waveforms will be quiet if set to maximum (very narrow!)
- If using digital audio via USB, check your computer. Windows sometimes doesn't pass the audio through - Go into the Control Panel, Manage Audio Devices and the Recording tab. Double-click the digital audio device and go into the Listen tab and set the Listen to this device to on - you may find it's already on and you have to toggle it off and on so it works again.
- Pressing Init to set Momentum to initialised settings and with the controls set to make sound, will show if there is a problem.

Digital noises

If there are digital noises on the analogue audio and you have connected Momentum to a pc, you need a USB isolator between the pc and Momentum. Low cost ones are fine as long as they allow sufficient voltage and current to power Momentum and any attached USB keyboard.

Humming Noises

This could be attributable to ground or mains noise through the USB port if connected to a pc or an external amplifier and needs action by you see what configuration works. Momentum can be powered from a USB powerbank and played by a small MIDI controller without an attachment to the mains or a pc, this would show if noise is from the mains or possibly your computer. Again, a USB isolator can help if its's from a pc.

SD Card problems

Use a low value (1GB is more than enough!) SD card. It doesn't need to be particularly fast and cheaper, older cards are fine (although some may need re-insertion if not recognised first time). Ensure that the card is formatted as FAT16/32 before using it and the SDFormatter application from the SD Association is recommended: www.sdcard.org/downloads/formatter/

Other problems

If there are intermittent problems, check the hardware, particularly if you soldered it

yourself. Are there dry solder joints? Is the Teensy Micromod working and properly seated in the connector? Is the SD card in the slot properly? Contact **info@electrotechnique.cc** if you have a problem and need assistance.

MIDI Control (CC) Implementation

Parameters are mapped to the following MIDI CC values.

MIDI CC	Controller	MIDI CC	Controller
0	Bank Select MSB (not used)	80	Filter Attack Time
1	Mod Wheel	81	Filter Decay Time
3	Pitch LFO Amount	82	Filter Sustain Level
5	Glide	83	Filter Release Time
7	Volume	85	Osc 1 Pulse Width
14	Osc 1 Waveform	86	Osc 2 Pulse Width
15	Osc 2 Waveform	87	PWM Rate Osc 1
16	Filter Envelope Amount	88	PWM Amount Osc 1
19	Filter Type	89	Key Tracking
20	Osc 1 Level	90	Filter LFO Waveform
21	Osc 2 Level	91	Ensemble Rate
23	Noise Level	93	Ensemble Mix
24	Osc FX	94	Detune
26	Osc 1 Pitch	95	PWM Amount Osc 2
27	Osc 2 Pitch	96	PWM Rate Osc 2
28	Pitch Envelope Amount	97	Reverb Time
30	Osc LFO Retrig	98	Reverb Mix
31	Filter LFO Retrig	102	Pitch LFO Rate
32	Bank Select LSB	103	Pitch LFO Waveform
71	Resonance	104	Filter LFO MIDI Clock Sync
72	Release Time	105	Pitch LFO MIDI Clock Sync
73	Attack Time	106	PWM Source Osc 1
74	Cut Off Frequency	107	Unison
75	Decay Time	108	PWM Source Osc 2
76	Filter LFO Rate	109	Velocity Sensitivity
77	Filter LFO Amount	110	Filter Velocity Sensitivity
79	Sustain Level	123	All Notes Off
		126	Mono mode