

IMPORTANT SAFETY INSTRUCTIONS

- Read all the instructions before use.
- Do not position the synthesizer in direct sunlight or in areas subject to heat, moisture, dust, cold or vibration.
- Clean the synthesizer with a damp cloth while switched off. Do not use solvents or abrasive cleaners.
- Do not apply excessive force to any of the switches and knobs.
- Switch off and unplug when not in use.
- The synthesizer is capable of producing audio levels that could cause hearing loss. Do not use the synthesizer at high volume levels for extended periods of time, especially when using headphones. If you experience ringing in your ears after use, consult an audiologist.
- The EEPROM that stores patches and user waves has a life of 100,000 write/erase cycles. You may find it becomes unreliable after this.
- Only use the power supply provided. Do not hold the power supply by the cable when plugging and unplugging it into the synthesizer, always hold it by the connector. Do not stand on it.
- Do not attempt to service the synthesizer. Contact Soulsby Synthesizers if your synthesizer stops working.

Introduction

Thank you for purchasing the Atmegatron by Soulsby Synthesizers. We feel certain that it will provide you with a whole world of new sounds and creativity. The Atmegatron is designed for performers, programmers and hackers.

The controls have been designed to be intuitive; you will soon find yourself tweaking sounds even if you have never programmed a synthesizer before. There are no complex menu systems or sequences of button presses.

The first section of this manual provides you with all the information for basic operation of the Atmegatron. The next chapters go through each feature in detail. Following that there is an overview of advanced functions, as well as tables of certain sound parameters.

Atmegatron parameters such as function names or physical connections are highlighted in red. Programming and debugging tips are marked with a thumbs-up symbol.

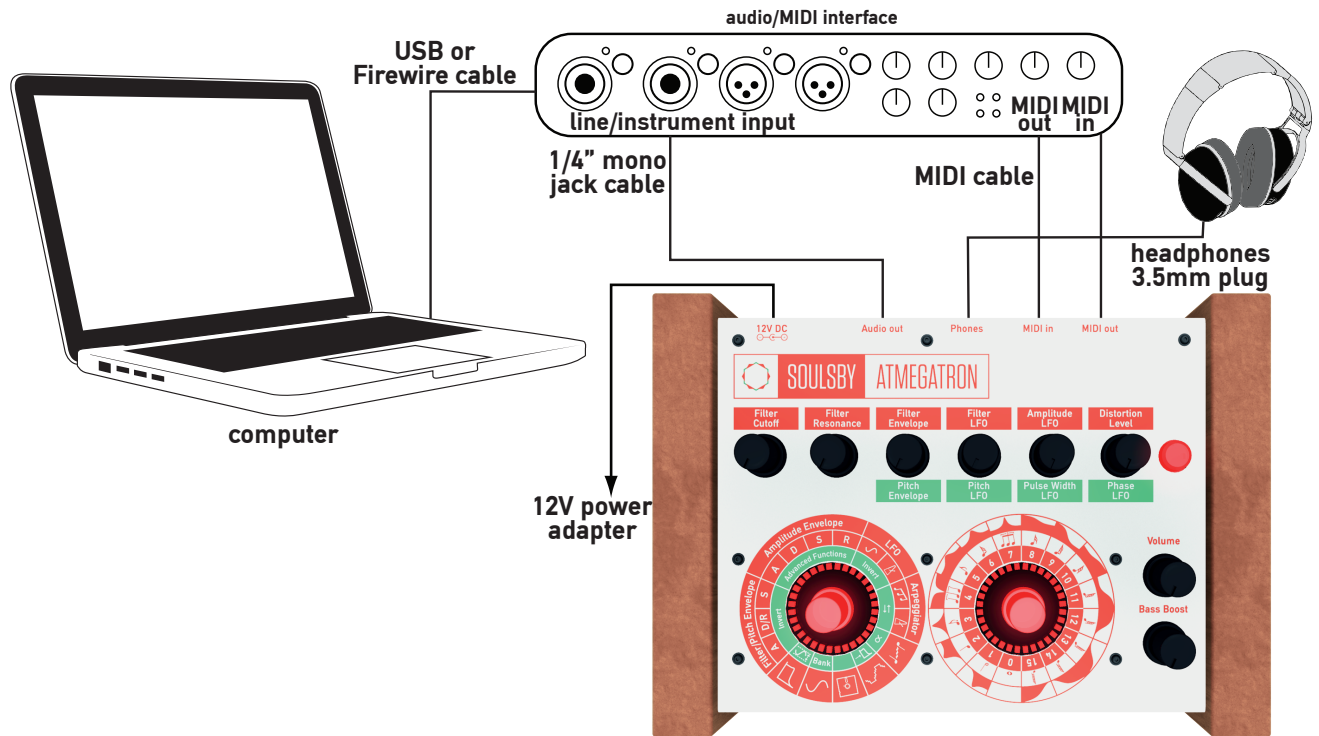
Please take time to visit soulsbysynths.com where you can find more information, patches and the Atmegatron Librarian software.

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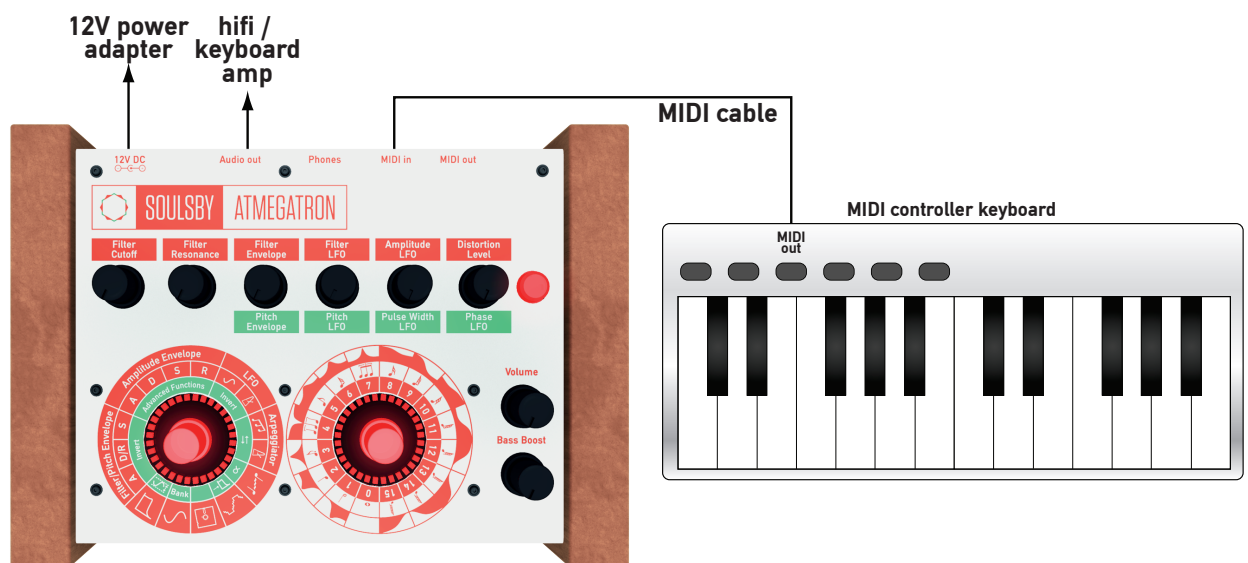
Connections

Live Setup

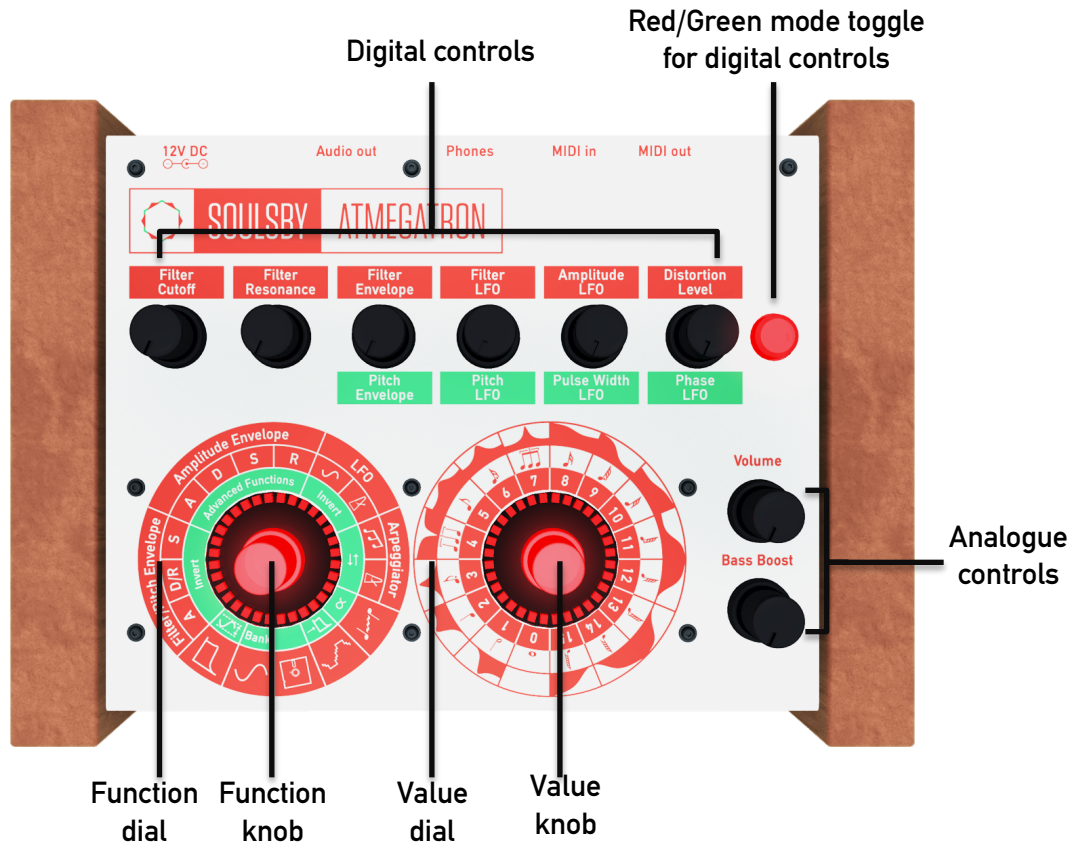


Studio Setup

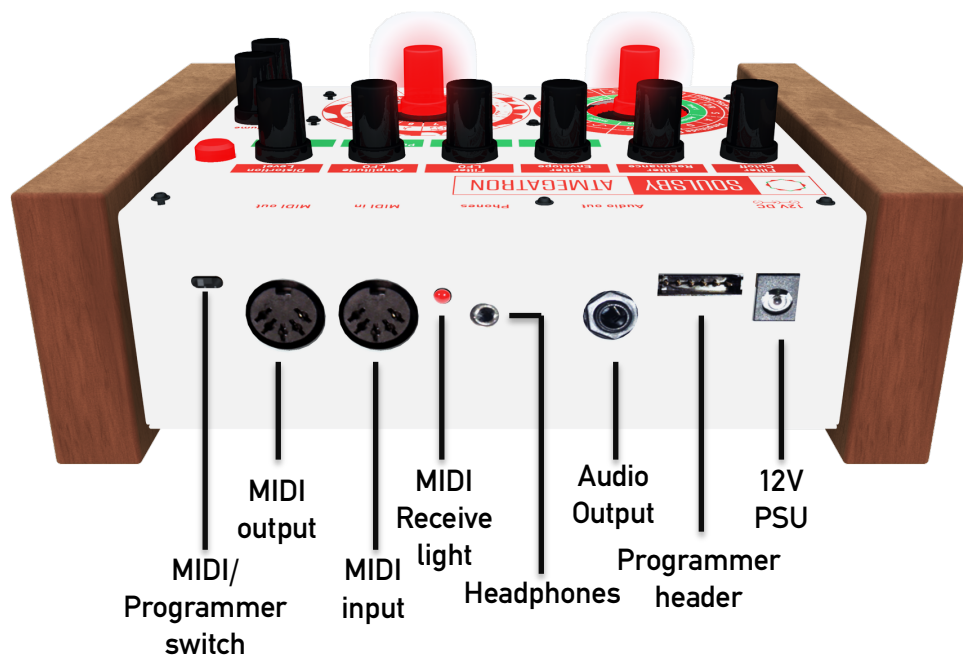
If your MIDI interface has multiple MIDI ports, connect the MIDI controller to a different port from the Atmegatron. If it doesn't, remove the MIDI cable connected to the MIDI out of the Atmegatron and connect to the MIDI controller. This will need to be reconnected when using the Librarian software.



Top Panel



Back Panel



Basic Operation

Overview

The Atmegatron is a monophonic 8-bit synthesizer.

Monophonic means that it can only play one note at a time. This means it is ideal for basses and leads. In addition, a unique form of polyphony can be simulated using the Arpeggiator (see page 10 for information on how to do this).

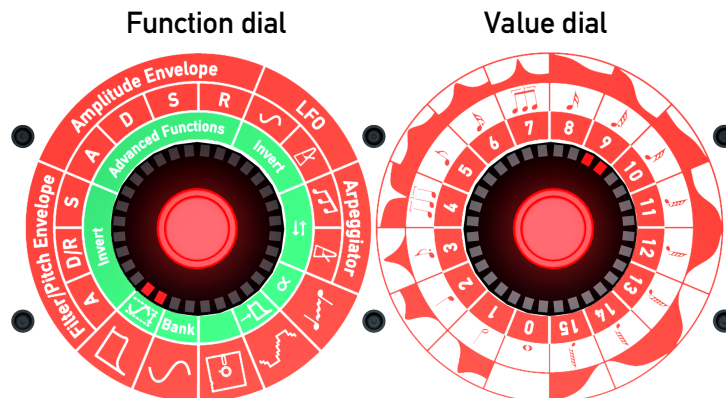
8-bit means that the sound is calculated digitally using 8-bit values (integer numbers between 0 and 255). This is how home computers worked in the 1980s and the Atmegatron excels at creating these kinds of sounds. However the processor is far more powerful than those in 80s home computers, so it is packed with features never possible in that era.

The controls of the Atmegatron are divided into 3 areas: the function and value dials, the digital controls and analogue controls.

Function and Value Dials

Selecting functions and setting values

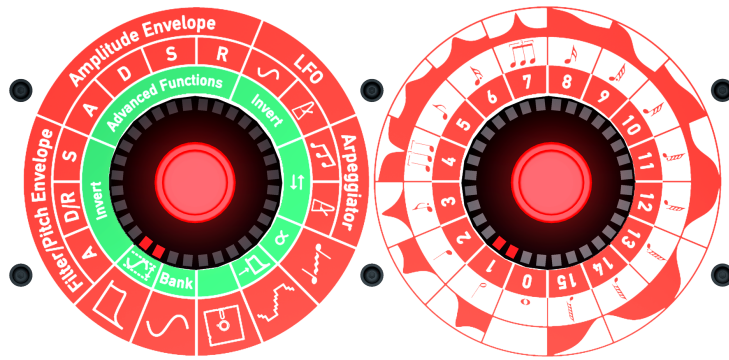
The function dial is on the left and the value dial is on the right. By looking at the position of the lit red LED and the corresponding symbol on the dial, you can see what the current function is, and its value.



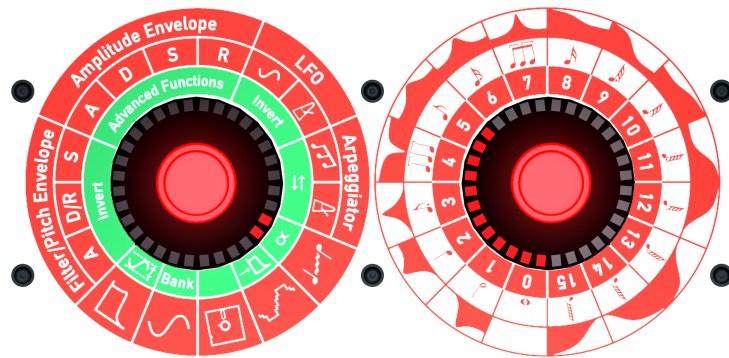
In this example, the function is set to **Filter Type** and the value is set to **9** (low shelf filter) as shown by the outer ring on the value dial.

To change the **Filter Type**, turn the value knob and the circular LED will change position. For example if you want to change the **Filter Type** to a low pass filter (LPF), turn the knob until the LED next to **1** on the inner dial is lit. There is a symbol representing a low pass filter on the outer ring of the value dial.

The full list of filter types and their corresponding symbols can be found on page 22.



In this example we are going to change the **Portamento** time (the time it takes for the pitch to glide from one note to another). Turn the function knob to the **Portamento** symbol and then turn the value knob to the desired value. In the example below it has been set to 5 (the portamento time is longer at higher values).

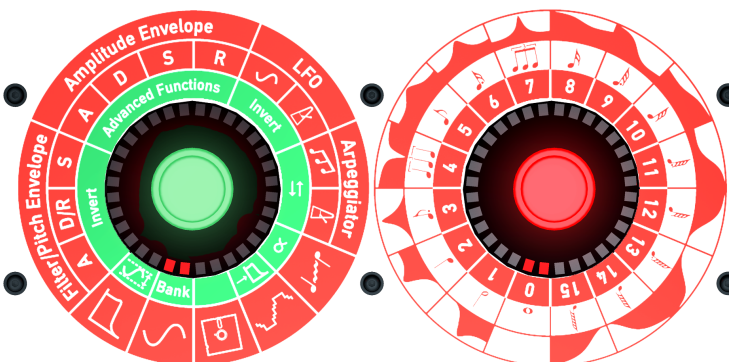


You may notice that all the LEDs from 0 to 6 are lit, as opposed to just 6 (in the previous example). Functions that have a scale (rather than a set value) are shown like this. These parameters are: all **Filter/Pitch Envelope** and **Amplitude Envelope** parameters and **Portamento**.

Red and green modes

The function knob can be pushed in and when you do this, it changes from glowing red to green (and vice versa). Each function on the function dial has a green mode, which is activated by pushing the knob.

For example turn the function knob so that **Waveform Select** is highlighted. Play a few notes. Now press the knob on the function dial, so it glows green. Play a few more notes and you will hear that the sound is different. This is because you are now in the green bank of waveforms. If you turn the value dial you can hear all the different waveforms in the green bank.



Sound test

When the value knob is pushed in, the Atmegatron plays a test note. When you twist the knob whilst it is pressed in, you can change the pitch of the note. This is useful for programming sounds when you don't have a MIDI controller keyboard attached.

Loading and saving patches

To load or save a sound, turn the function knob to the load/save symbol (it looks like a 5¼" floppy disk!)

To load a sound, turn the value knob to the patch number you require, then briefly press the function knob.

To save a sound, turn the value knob to the patch number you want to save over, and then hold the function knob down for at least **2 seconds**. The knob will flash when it is finished. The previous patch will be lost. See page 12 for more information.

Digital Controls



The digital controls are used to change parameters of the Atmegatron's sound. The difference between these and the function and value dials is that they provide continuous control of the parameters, rather than discrete levels. The difference between these and the analogue controls is that they control the digital circuitry of the Atmegatron, rather than the analogue circuitry.

For example, reboot the Atmegatron (turn power off and on), and then turn the **Filter Cutoff** control clockwise and anti-clockwise. You will hear the sound get brighter and duller. Each of the controls alters a different parameter of the sound.

For more details on these parameters see the Functions chapter of this manual.



Sometimes the digital controls won't affect the sound. For example if the **Filter Type** is set to **0** (off), then the **Filter Cutoff**, **Filter Resonance**, **Filter Envelope** and **Filter LFO** won't affect the sound.

Red and green modes

Like the function and value knobs, the digital controls also have a red and green mode. Push the button to the right of the digital controls to toggle between red and green modes.

The **Filter Cutoff** and **Filter Resonance** controls do not have a red and green mode. The red and green labels show what parameter the controls change in the respective modes.

Analogue Controls

These affect the analogue circuitry at the output of the Atmegatron. These parameters are not stored when you save a patch.

The controls consist of a Volume control and a Bass Boost control, which adjusts the gain of a low shelf filter.

Volume



Bass Boost



Functions



Waveform Select

There are 32 waveforms to choose from, 16 in red mode and 16 in green mode. The full list of waveforms can be found on page 21.

Bank

Bank Select

Press the function knob to toggle between the red and green bank of waveforms.



Filter Type

There are 15 filter types to choose from. Setting the value knob to **0** will turn off the filter. By shaping the harmonic content of the sound, it can make the sound brighter or duller. The full list of filters can be found on page 22.



The Filter Resonance control doesn't affect the sound with some filter types. This is the case with filter types **12** to **15**. This is because the algorithms for Butterworth and Bessel filters do not require a resonance parameter.



If you are used to using analogue synthesizers you will notice that the filters on the Atmegatron sound a bit different, particularly at low cutoff values. This is partly to do with the sound being calculated in 8-bit and partly to do with the way the waveform is updated.



Filter Normalise Mode

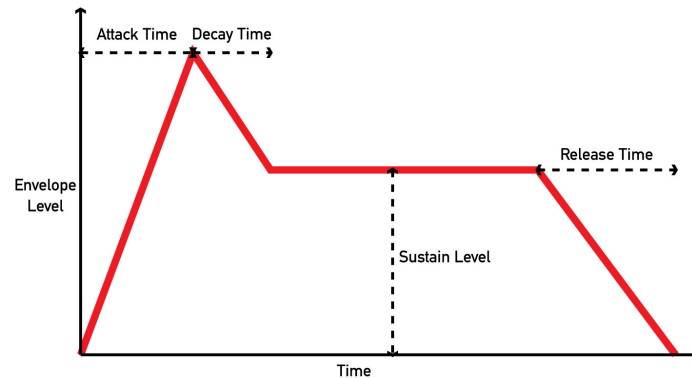
Press the function knob to turn normalise mode on and off.

When normalise mode is off (function knob is red), the filter will distort with certain filter settings, particularly when the resonance is turned up. This is because the waveform is stored at maximum amplitude and there is no headroom (which a 32-bit or 64-bit synth would have).

When normalise mode is on (function knob is green), the waveform amplitude is attenuated to 25% before filtering. This allows some headroom, so that the filter doesn't distort as easily. The waveform is then normalised at the output of the filter (hence the name).

Filter/Pitch Envelope

This envelope is used to shape the sound, by controlling the cutoff frequency of the filter and/or the pitch. The amount of shaping is controlled by the analogue controls: **Filter Envelope** and **Pitch Envelope** (see page 13).



There are four parameters (or stages) to the envelope. These are represented in the diagram above. The Filter/Pitch Envelope uses just one control to set the decay and release time.

A – Attack Time

This is the time taken to go from the resting level (zero) to the peak level. The range of times on the Atmegatron is between 0 and 6 seconds, with setting **0** = 0 seconds and **15** = 6 seconds.

D/R – Decay and Release Time

The decay time is the time taken to go from the peak level to the sustain level. The release time is the time taken to go from releasing the note (i.e. taking your finger off the key on a MIDI controller keyboard), to go back to resting level. The range of times on the Atmegatron is between 0 and 6 seconds, with setting **0** = 0 seconds and **15** = 6 seconds.

S – Sustain Level

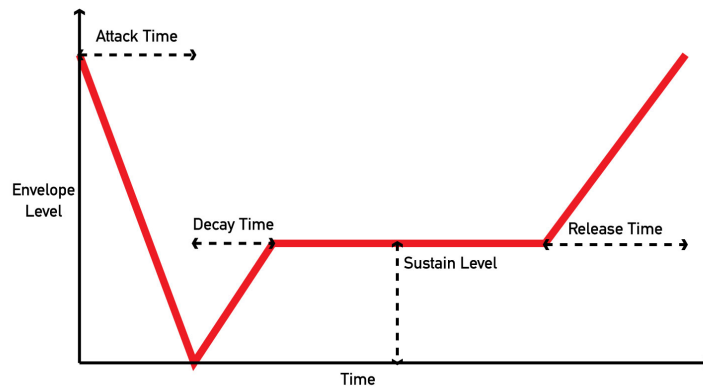
The sustain level is the level that the envelope will hold at until note is released. The range of levels is between 0% and 100%, with **0** = 0% and **15** = 100%.



It is worth noting that the Attack, Decay/Release and Sustain values only affect the shape of the envelope. They don't affect how much the envelope affects the filter and pitch. Use the Filter Envelope and Pitch Envelope digital controls for this purpose.

Inverted Envelope Shape

Press the function knob to turn invert mode on and off. The envelope is inverted when the function knob is green. The diagram overleaf shows the envelope at the top of this section inverted.



Amplitude Envelope

The amplitude (volume) of the sound can be shaped using the amplitude envelope. See the [Filter/Pitch Envelope](#) section for information on how envelopes work.

A – Attack Time

The range of times is from 0 to 6 seconds, with 0 = 0 seconds and 15 = 6 seconds.

D – Decay Time

The range of times is from 0 to 6 seconds, with 0 = 0 seconds and 15 = 6 seconds.

S – Sustain Level

The range of levels is from 0% to 100%, with 0 = 0% and 15 = 100%.

R – Release Time

The range of times is from 0 to 6 seconds, with 0 = 0 seconds and 15 = 6 seconds.

Advanced Functions

The Atmegatron has some advanced features that will interest users who wish to experiment further. Please refer to page 17, for more information about these features.

LFO (Low Frequency Oscillator)

The LFO is used to shape the sound. Unlike the envelope, it continually shapes the sound using a waveform. This is just like the waveform that is used as the source of the sound, except it oscillates at a much lower frequency (several Hertz as opposed to many hundred Hertz).

The LFO can control the filter cutoff, amplitude (volume), pitch and waveform pulse width. Use the [Filter LFO](#), [Amplitude LFO](#), [Pitch LFO](#) and [Pulse Width LFO](#) analogue controls to control the amount that the LFO affects these respective parameters.

The LFO has 2 parameters – waveform and rate (frequency) .



Waveform Select

There are 16 LFO waveforms to choose from. These are listed on page 23.



Rate

The rate (or frequency) of the waveform is set by a division of the internal metronome of the Atmegatron. This runs at **120bpm**. See page 24 for a list of these divisions.

This can be overridden by an external MIDI clock source plugged into the **MIDI input**, which can run at any tempo. This can come from a MIDI sequencer such as Logic or Ableton, or another MIDI instrument such as a drum machine. Refer to your software or instrument instruction manual to see if it can transmit MIDI clock.

Inverted LFO shape

Press the function knob to turn invert mode on and off. The function knob is green when invert mode is on. This essentially flips the LFO waveform upside-down. For example, waveform **2** would change from a ramp down to a ramp up waveform.

Arpeggiator

The Arpeggiator allows you to play arpeggios by holding down chords on a MIDI controller keyboard. The Atmegatron goes far beyond the standard up and down arpeggios of classic synths and allows complex sequences of notes to be played.



Pattern Select

There are 15 patterns to choose from. Setting the value knob to **0** turns the arpeggiator off. See page 25 for a list of the patterns.

Select an arpeggiator pattern and then hold down a chord on a MIDI controller keyboard. A pattern will play using the held notes. The pattern will last a maximum of 16 notes before looping back to the start.

Different patterns require different numbers of notes to be held down to allow every step in the pattern to be played. If the next note in the pattern is not available, the pattern will loop back to the start.



Rate

This works in the same way as the **LFO Rate**. The rate is set as a division of the Atmegatron's internal metronome. This is set at 120bpm. It can be over-ridden by an external MIDI clock. See the **LFO Rate** section above for more information. Also see page 24 for a list of the clock divisions.



A good way to simulate chords is to set the Arpeggiator to pattern **1** and the rate to a high value (e.g. **13**). Hold a chord and it will cycle through the notes very quickly. This is how 8-bit computers simulated polyphony in music.



Ping Pong Mode

Press the function knob to turn ping-pong mode on and off.

When ping-pong mode is on (function knob is green), the pattern will play forwards until it hits the end of the pattern, then backwards until it hits the start of the pattern, then forwards again and so on.



Portamento

Portamento (or glide) is the time it takes for the pitch to change from the last note to the new note, when a key is pressed (on a MIDI controller keyboard). The portamento values range from **0** = 0 secs (i.e. portamento off) to **15** = 6.5 secs. This is only when **Proportional Mode** is off.



Proportional Mode

Press the function knob to turn proportional mode on and off.

When proportional mode is off (function knob is red), it takes the same amount of time to glide between two notes, no matter how far apart the previous and current notes are.

When proportional mode is on (function knob is green), the portamento time is proportional to the difference between the last note played and the new note. So if C3 then C5 were played, the portamento time would be longer than if C3 then C4 were played.



Wave Crusher

The Wave Crusher allows the resolution of the waveform to be reduced. It can do this in two ways: reducing the bit depth of the waveform and reducing the sample rate of the waveform. If the waveform were plotted on a graph or viewed on an oscilloscope, changing the bit depth would alter the resolution vertically. Changing the sample rate would alter the resolution horizontally. The symbol for the Wave Crusher demonstrates this process on a sine wave.

There are 15 useful combinations of bit depth and sample rate reduction in the Atmegatron. See page 26 for a list of them. When the value knob is at **0**, the Wave Crusher is off.

It is worth noting that the Wave Crusher works differently to a Bit Crusher plugin commonly used in audio software. The Wave Crusher only affects the waveform and not the overall output of the synthesizer (as would happen with a plugin). This means that the decrease in resolution of sample rate isn't fixed, but is a division of the current frequency (or note) being played.



Pre-Filter Mode

Press the function knob to turn pre-filter mode on and off.

When pre-filter mode is off (function knob is red), the waveform is processed through the Wave Crusher after the phaser and before distortion.

When pre-filter mode is on (function knob is green), the waveform is processed through the Wave Crusher after the pulse width modulator and before the filter. See the system diagram on page 19 for a visual depiction of this.

The Wave Crusher will sound more aggressive with pre-filter mode off.



Load/Save Patch

The Atmegatron has 16 memory locations to store patches (sounds).

To load a patch, set the function dial to Load/Save Patch and set the value dial to the patch number that is to be loaded. Then briefly press the function knob.

To save a patch, set the function dial to Load/Save Patch and set the value dial to the patch number that is to be overwritten. Then hold the function knob for **2 seconds** and it will flash, signifying that has saved successfully. The previous patch at this memory location will be lost.

It is possible to load and save patches to the Atmegatron Librarian software, which is available from the Atmegatron website. It is also able to manage banks of all 16 patches, so that the entire memory can easily be saved and restored.

Digital Controls

Filter Cutoff

This sets the frequency at which the filter acts. For example if the **Filter Type** is set to **1** (low pass filter), frequencies above the Cutoff are attenuated.

The Filter Cutoff is inactive when the Filter Type is set to **0** (bypassed).

Filter Resonance

Resonance (also known as emphasis or Q) is the magnitude of the peak of the filter at the cutoff frequency. The resonance ranges from 0.5 when the knob is fully anti-clockwise to 20 when the knob is fully clockwise.

Resonance adds a sharp characteristic to the sound. It can be very useful for sound effects.



The sound will have an interesting distortion effect when the resonance is set to high values. This is because the waveform is at maximum amplitude before it is processed by the filter. To reduce this distortion, turn on **Filter Normalise Mode**. See page 7 for more information.

Filter Envelope

This sets the amount that the envelope affects the filter cutoff frequency.

The A, D/R and S values of the Filter/Pitch Envelope set the shape of the envelope. See the **Filter/Pitch Envelope** section for more information.

Filter LFO

This sets the amount that the LFO (low frequency oscillator) affects the filter cutoff frequency.

See **LFO** for information on how to set the LFO's parameters.

Amplitude LFO

This sets the amount that the LFO (low frequency oscillator) affects the amplitude of the sound. This is commonly called a 'tremolo' effect.

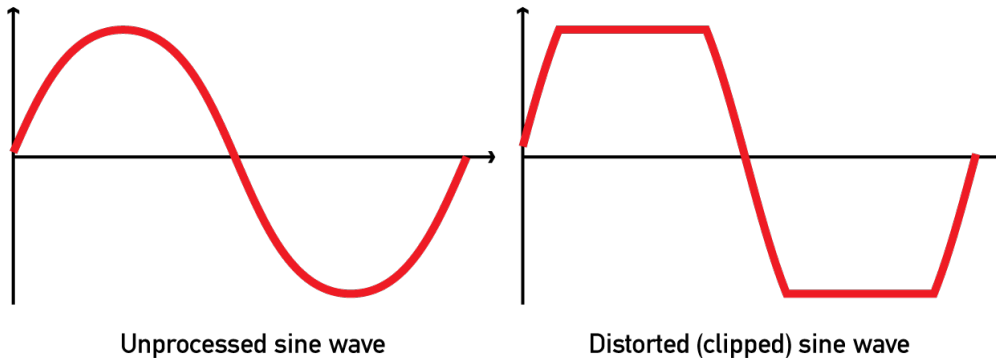
See **LFO** for information on how to set the LFO's parameters.



If the LFO waveform is set to **15** (DC offset) and the Amplitude LFO is set to minimum (fully anti-clockwise), the output of Atmegatron will be silent. This is intentional, as the DC waveform is useful for assigning a fixed level to the Pulse Width and Phaser parameters.

Distortion Level

Distortion is an effect on the output that clips the waveform. It does this by multiplying each sample by a value. If the result is greater than the maximum amplitude, it sets the sample to the maximum amplitude. There are in fact only 8 discrete values for the distortion level. They range from a multiplier of 1 when the knob is fully anti-clockwise (i.e. no distortion) and a multiplier of 128 when the knob is fully clockwise.



Pitch Envelope

This sets the amount that the envelope affects the pitch (or frequency) of the sound.

The **A**, **D/R** and **S** values of the Filter/Pitch Envelope set the shape of the envelope. See [Filter/Pitch Envelope](#) for more information.

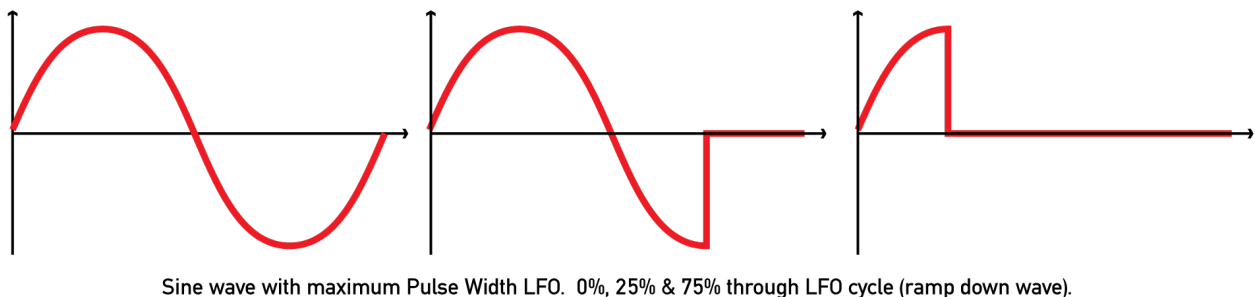
Pitch LFO

This sets the amount that the LFO (low frequency oscillator) affects the pitch (or frequency) of the sound. This is commonly called 'vibrato'.

See [LFO](#) for information on how to set the LFO's parameters.

Pulse Width LFO

Many classic analogue synthesizers have a pulse width parameter. Traditionally this controls the mark/space ratio of a square wave. The Atmegatron's pulse width parameter works in a similar way and is the ratio of sound to silence within the waveform. The LFO (low frequency oscillator) affects the pulse width value over time.



The Pulse Width LFO control sets the amount that the LFO affects the pulse width. For example with the LFO control set to half, the pulse width will be 50% at the peak of the LFO waveform.



To hold the pulse width at a fixed value, set the **LFO Waveform Select** to **15** (DC offset) and use the **Pulse Width LFO** control to set the pulse width.

Phase LFO

This sets the amount of 'phaser' effect. It is created by adding a delayed copy of the wavetable to the output sound. The LFO controls the delay time of the waveform.

When the Phase LFO control is fully anti-clockwise, the effect is off. When it is fully clockwise, the maximum delay is equal to the length of 1 waveform cycle.

To prevent distortion, the amplitude of the main waveform and delayed waveform are halved. If the Phase LFO control is fully anti-clockwise, the effect is off and the output waveform is unaffected.

With certain waveforms, the delayed waveform can actually cancel out the main waveform. This is only momentary, as the LFO continually adjusts the delay.

To use a fixed delay, set the **LFO Waveform Select** to **15**.

Analogue Controls

Volume

This sets the output volume of the Atmegatron. Do not have the volume at full for long periods of time when using headphones or you may suffer hearing damage. When the knob is fully clockwise the volume is at maximum level and when it is fully anti-clockwise it is at minimum level.

The volume is not stored in the patch data, when storing and loading sounds.

Bass Boost

This sets the gain of an analogue low shelf filter. When the knob is fully anti-clockwise the gain is 0dB. When the knob is fully clockwise the gain is 6dB.

It is worth noting that the output waveform is affected when the bass boost is used, so the output waveform will not look (or sound) like the waveforms shown on page 21. For example the Pure Square waveform (**Red Bank, 0**) would have a sinusoidal element, as the lower harmonics would be louder.

The bass boost is not stored in the patch data, when storing and loading sounds.



The Bass Boost can sound great when used on bass sounds. However it is wise to keep it turned off for high lead sounds, as it will only boost unwanted frequencies in the sound. Having the bass boost on every Atmegatron sound in a track will result in a 'woolly' bass end. Use Bass Boost sparingly!

Advanced Functions

SysEx Write Patch

SysEx (system exclusive) is a method of transmitting and receiving data via MIDI that is specific to the device. Patches can be saved and loaded via SysEx. This can be done via a MIDI sequencer (such as Logic or Ableton) or using the Atmegatron Librarian which can be downloaded from soulsbysynths.com.

Follow these instructions to save a patch using SysEx:

1. Make sure a MIDI cable is connected from the **MIDI out** of the Atmegatron to the MIDI in of your computer's MIDI interface.
2. If using a MIDI sequencer, set it to record on a blank MIDI track. Alternatively launch the Atmegatron Librarian software.
3. Set the function dial to **Amplitude Envelope Attack (A)**.
4. Hold the **function knob** for 2 seconds. When the knob flashes it transmits the patch information.
5. The MIDI sequencer should show that data has been recorded. The Atmegatron Librarian controls will show the patch that has been received.

Enable SysEx Read

SysEx Read has to be enabled so that the Atmegatron can receive SysEx data. This could be either a patch, a user wave or a memory bank (the entire Atmegatron memory). The SysEx data can come from a MIDI sequencer or the Atmegatron Librarian. Follow these instructions to enable SysEx Read:

1. Make sure a MIDI cable is connected from the MIDI out of the computers MIDI interface to the **MIDI in** of the Atmegatron.
2. Set the function dial to **Amplitude Envelope Decay (D)**.
3. Press the **function knob** so it turns green.
4. If using a MIDI sequencer, play the MIDI track containing the SysEx data. If using the Atmegatron Librarian, click the Write User Wave button, Write Patch button or Write Memory Bank menu.
5. The **MIDI receive LED** on the Atmegatron will flash to indicate that it is receiving data. The **function knob** will flash to indicate it has successfully read the SysEx data.
6. The Atmegatron will load the data received. This could be a patch, user wave or memory bank (entire Atmegatron memory).

Enable User Waveform Mode

The Atmegatron has 32 preset waveforms. It also has 6 user waveforms. These are waveforms that can be loaded into the Atmegatron using the Librarian software.

Follow these instructions to load and save user waveforms from and to memory:

1. Turn the **function knob** to **Amplitude Envelope Sustain (S)**.
2. Press the function knob so that is green and user waveform mode is enabled.
3. Turn the function knob to **Waveform Select**.
4. Select the patch that is to be loaded or saved using the **value knob**.
5. To load a patch, briefly press the **function knob**. To save a patch, hold the **function knob** for 2 seconds until it flashes.

Press the **function knob** to turn user waveform mode on and off. When user waveform mode is off (function knob is red), the preset waveforms are used. When user waveform mode is on (function knob is green), the user waveforms are used.

See the **Enable SysEx Read** section above, for instructions on how to transfer a user waveform from the Librarian software to the Atmegatron.



There are only 6 memory locations to store user waveforms. When user waveform mode is enabled, the **value dial** will only highlight values **0-5**. If you are trying to access waveforms higher than **5** and can't, it is probably because user waveform mode is on!

SysEx Write Memory Bank

This transfers the entire memory of the Atmegatron to the Librarian software. To do this, follow these instructions:

1. Make sure a MIDI cable is connected from the **MIDI out** of the Atmegatron to the MIDI in of the computers MIDI interface.
2. Make sure that the Atmegatron Librarian software is running on your computer.
3. Set the function dial to **Amplitude Envelope Release (R)**.
4. Hold the **function knob** for 2 seconds. When the knob flashes it transmits the memory data.
5. The Atmegatron Librarian will show the memory data has been received.

Hacking



The fastest way to learn how to upload software to the Atmegatron is to go to: <http://www.soulsbysynths.com/tutorials> and watch the "Uploading Software" tutorial.

To program the Atmegatron you will need a USB TTL Serial Cable. The **FTDI TTL-232R-5V** is recommended, although other brands may work.

Be **very** careful to insert the cable the correct way round, as shown in the diagram above. Use a small screwdriver to slide the Programmer/MIDI switch. While in Programmer mode, the MIDI input and output ports will be inactive.

The Atmegatron software is built entirely on the Arduino platform. The latest Arduino software can be downloaded from: <http://arduino.cc/en/main/software>

The latest Atmegatron software can be downloaded from www.soulsbysynths.com/downloads.

The software should be simple to understand for anyone with a basic understanding of C and the Arduino platform. Before uploading any modified software, go to the Tools menu and make sure Board is set to Uno, Serial Port is set to your TTL cable and Programmer is set to AVRISP mkII.

Remember to slide the Programmer/MIDI switch back when MIDI is required again.

At the time of writing the official alternative software versions from Soulsby Synthesizers are:

ATCYCLOTRON: Wavetable cycling synthesizer. Uses 4 waveforms rather than 1 and cycles around the waveforms at a rate determined by the controls.

ATMEGADRUM: 16 sound drum machine. Also features sample rate adjust and delay effect.

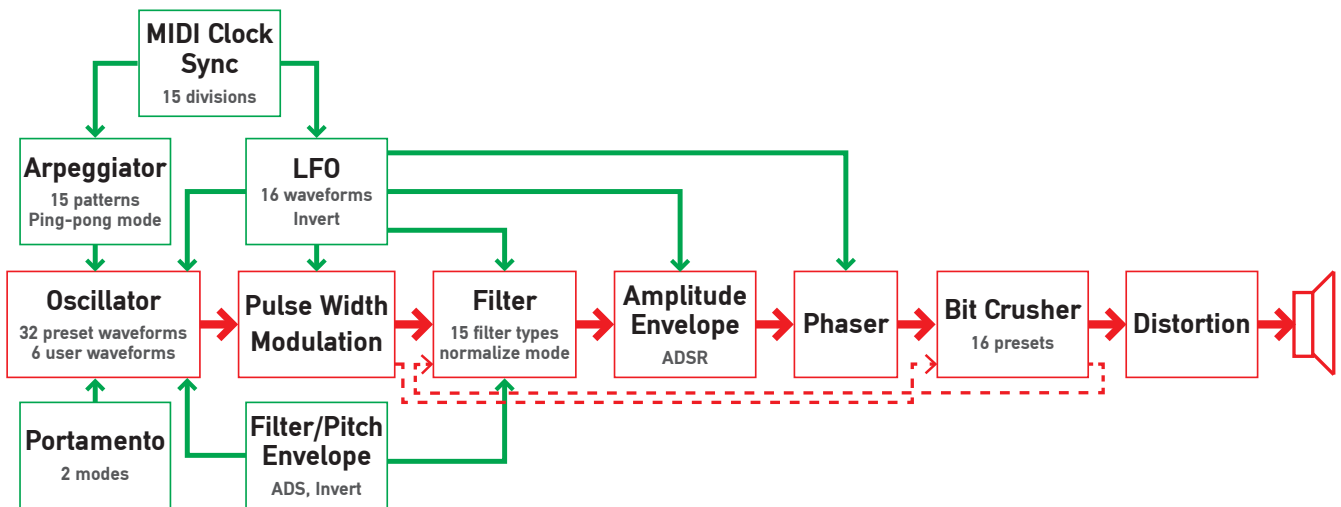
DELAYERTRON: 8-bit delay loop synth. Great for creating weird sci-fi effects. Also features 128-sample waveforms (rather than the usual 32), 2 filter types and many ways to control the delay parameters.

DUOTRON: Duophonic synth with 2 independent oscillators.

ATPOLYTRON: 4 voice paraphonic synth.

ODYTRON: Modelled around the classic 70s duosynth, but has it's own unique 8-bit character. It contains most of the key features of the original classic synth.

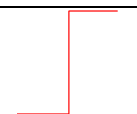
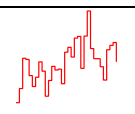

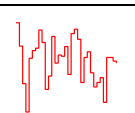
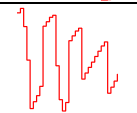
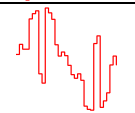
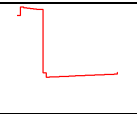
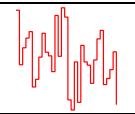
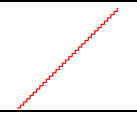
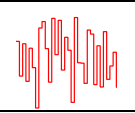
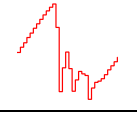
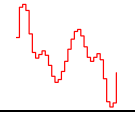
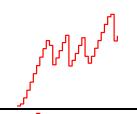
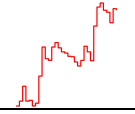
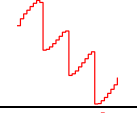
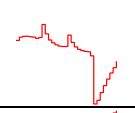
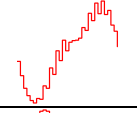
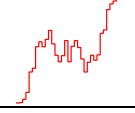
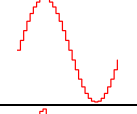
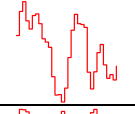
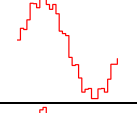
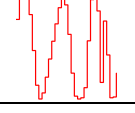
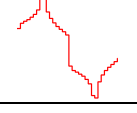
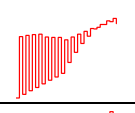

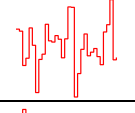
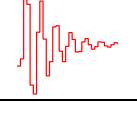
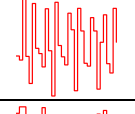
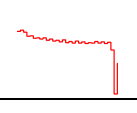
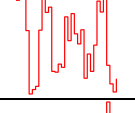

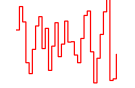
System Diagram



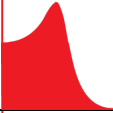
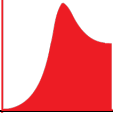
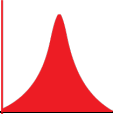

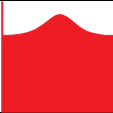






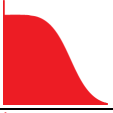
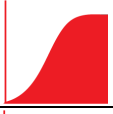
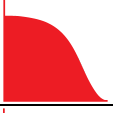

Glossary

Arpeggiator	The Arpeggiator allows sequences of notes to be played, based on the MIDI notes received and held.
Distortion	This is an audio effect that clips the waveform. It does this by increasing the gain of the waveform by a multiplier value.
Envelope	The envelope is a method of shaping the sound. The envelope is triggered every time a MIDI note is received or when the value knob is pushed. There are 4 parameters to the amplitude envelope: Attack, Decay, Sustain and Release.
Filter	The filter alters the harmonic content of the sound. For example the Low Pass Filter allows low frequencies (deep sounds) to pass through and cuts out the high frequencies. A High Pass Filter does the opposite of this.
LFO	The LFO of low frequency oscillator is a method of shaping the sound. Unlike the Envelope, which is triggered, the LFO oscillates continuously. The shape of the LFO is determined by a waveform. The waveforms are listed on page 23.
MIDI Clock Sync	This is a MIDI signal generated by MIDI sequencers and some other hardware devices. It allows the LFO and Arpeggiator of the Atmegatron to be locked by a division of the tempo of the MIDI sequencer.
Oscillator	This is the sound source of the Atmegatron. It generates audio waveforms.
Patch	This is a term to describe a set of sound parameters stored in memory. It derives from modular synthesizers that used patch leads to create the sound.
Phaser	This is an audio effect created by adding a delayed copy of the waveform to the output. The delay time is modulated by the LFO.
Pulse Width Modulation	The pulse width describes the proportion of the waveform that passes through the pulse width modulator. The waveform that is outside the pulse width will be zeroed (sound silent). With pulse width modulation turned off, 100% of the waveform will pass through unaffected. The pulse width is modulated by the LFO.
Portamento	Portamento (or glide) is the time it takes for the pitch to change from the current frequency to the next frequency when a MIDI note on is received.
Wave Crusher	This is an audio effect that reduces the resolution of the waveform. It does this by reducing a combination of the sample rate and bit depth of the waveform.
Waveform	The waveform is the shape of the audio sound or control signal. It can be represented graphically. The Atmegatron's 32 preset audio waveforms are shown on page 21 and the LFO waveforms are on page 23.

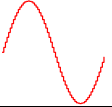
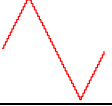
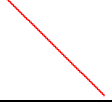
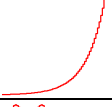
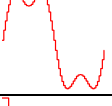
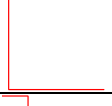
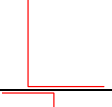
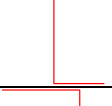
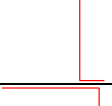
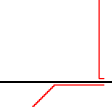


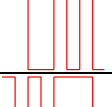
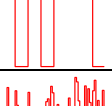
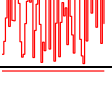

Audio Waveforms

0		Square	Pure Square	0		Metallic	Metal 1
1			Octave Square (Juno 60)	1			Metal 2
2			Square Fifths	2			Metal 3
3			Pulse Wave (RP2A07)	3			Metal 4 (PPG)
4		Saw	Pure Saw	4		Vocal	Vocal 1
5			Buzz Saw	5			Vocal 2
6			Saw Fifths (Juno 60)	6			Vocal 3 (PPG)
7			Octave Saw (Juno 60)	7		Organ	Brass (Multivox)
8		Sine	Sub Sine + Square	8			Reed Organ (PPG)
9			Pure Sine	9			Electric Piano
10			Sine + Harmonics (PPG)	10			Reed
11			Warped Sine	11		Resonant	Resonant Saw (CZ101)
12		Pulse	Pulse (CZ101)	12		Harmonic	Bell (PPG)
13			Bassoon (Multivox)	13			Chord
14			Bass (Multivox)	14			Sine Overtones
15		Noise	Continuously Generated Noise	15			Saw Thirds

















Filter Types

0			Filter Bypassed	Cutoff and Resonance controls inactive
1			Low Pass Filter	
2			High Pass Filter	
3			Band Pass Filter	
4			Notch Filter	
5			Parametric EQ (10dB gain)	
6			Parametric EQ (30dB gain)	
7			Parametric EQ (100dB gain)	
8			Low Shelf (10 dB gain)	
9			Low Shelf (30dB gain)	
10			High Shelf (10dB gain)	
11			High Shelf (30dB gain)	
12			Butterworth Low Pass Filter	Resonance control inactive
13			Butterworth High Pass Filter	Resonance control inactive
14			Bessel Low Pass Filter	Resonance control inactive
15			Bessel High Pass Filter	Resonance control inactive















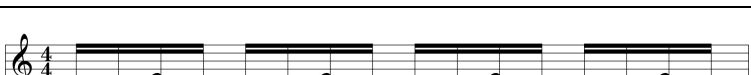
LFO Waveforms

0		Sine
1		Triangle
2		Ramp Down
3		Exponential Ramp Up
4		Sine + 3 rd Harmonic
5		5% Pulse
6		25% Pulse
7		50% Pulse
8		75% Pulse
9		95% Pulse
10		Ramp Up and Hold
11		Hold and Ramp Down
12		Duh Dugga
13		Dugga Duh
14		Noise-like
15		DC (static) offset

Clock Division Rates

0		4 beats
1		2 beats
2		1 beat
3		$\frac{3}{4}$ beat
4		$\frac{2}{3}$ beat
5		$\frac{1}{2}$ beat
6		$\frac{3}{8}$ beat
7		$\frac{1}{3}$ beat
8		$\frac{1}{4}$ beat
9		$\frac{3}{16}$ beat
10		$\frac{1}{8}$ beat
11		$\frac{3}{32}$ beat
12		$\frac{1}{16}$ beat
13		$\frac{3}{64}$ beat
14		$\frac{1}{32}$ beat
15		$\frac{1}{64}$ beat

Arpeggiator Patterns

0	Patterns below created by holding all notes in C major from C3 to D5	Arpeggiator Off
1		Up
2		Down
3		Octave
4		Fifths
5		Skip One Up
6		Skip One Down
7		I Feel Love
8		Horton
9		Etheridge
10		Meads
11		Palmer
12		gwEm 1
13		gwEm 2
14		Triplet Up
15		Robyn

Wave Crusher Presets

	Bit Depth Reduction	Sample Rate Reduction
0	Off	Off
1	3 bit	Full
2	2 bit	Full
3	1 bit	Full
4	4 bit	1/2
5	3 bit	1/2
6	2 bit	1/2
7	1 bit	1/2
8	4 bit	1/4
9	3 bit	1/4
10	2 bit	1/4
11	1 bit	1/4
12	4 bit	1/8
13	3 bit	1/8
14	2 bit	1/8
15	1 bit	1/8

MIDI Implementation Chart

Manufacturer: Soulsby Synthesizers Model: Atmegatron Version: 1.0 Date: 21/9/13

Functions	Transmitted	Recognised	Remarks
Basic Channel			
Default	X	1-16	Only SysEx transmitted.
Changed	X	1-16	
Mode			
Default	X	Mode 2	
Messages	X	Mode 2	
Note Number	X	0-127	There is a limit on maximum output frequency.
Velocity			
Note ON	X	V=1-127	
Note OFF	X	V=0-127	
After Touch			
Key	X	X	
Channel	X	X	
Pitch Bender	X	0	7 bit resolution
Control Change			
1	X	0	Pitch LFO
5	X	0	Portamento Time
16	X	0	Filter Envelope
17	X	0	Distortion Level
71	X	0	Filter Resonance
72	X	0	Amplitude Envelope Release
73	X	0	Amplitude Envelope Attack
74	X	0	Filter Cutoff
75	X	0	Amplitude Envelope Decay
79	X	0	LFO Rate
91	X	0	Pulse Width LFO
92	X	0	Amplitude LFO
93	X	0	Filter LFO
94	X	0	Pitch Envelope
95	X	0	Phase LFO
Program Change	X	X	
System Exclusive	X	X	
System Common			
Song Position	X	X	
Song Sel	X	X	
Tune	X	X	
System Real Time			
Clock	X	0	
Commands	X	X	
Aux Messages			
Local On/Off	X	X	
All Notes Off	X	X	
Active Sense	X	0	
Reset	X	0	
Notes			