SOULSBY miniATMEGATRON

INSTRUCTION MANUAL

Contents

Functions

Waveform Select

There are 16 waveforms to choose from. The full list of waveforms can be found on page 8.

Filter Type

There are 15 filter types to choose from. Setting the value 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 9.

> 👍   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/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 controls: Filter Envelope and Pitch Envelope (see page 5).

Attack Time Decay Time

Release Time

Envelope
Level

Sustain Level
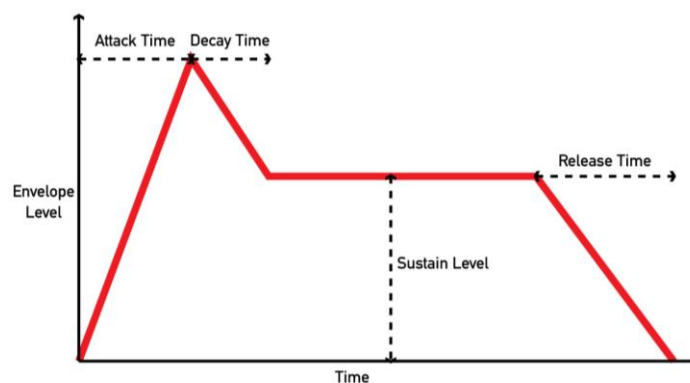
Time

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.

The miniAtmegatron has 16 preset envelope shapes, which consist of a variety of combinations of Attach, Decay, Sustain and Release parameters. The preset envelope shapes are shown on page 12.

☞ 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.

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.

The amplitude envelope uses the same preset shapes as the Filter/Pitch Envelope.

LFO (Low Frequency Oscillator) Waveform Select

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.

There are 16 LFO waveforms to choose from. These are listed on page 10.

LFO (Low Frequency Oscillator) Rate

The rate (or frequency) of the LFO waveform is set by a division of the internal metronome of the Atmegatron. This runs at **120bpm** by default. See Pattern Tempo for information. See page 11 for a list of these divisions.

This can be overridden by an external MIDI clock source plugged into the USB 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.

Wave Crusher / Portamento

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 7 useful combinations of bit depth and sample rate reduction in the miniAtmegatron. See page 14 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.

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.

Pattern Select

The miniAtmegatron has an inbuilt sequencer with 15 preset patterns. The root not of the pattern is selected using the Pitch control or via the USB MIDI Input. The patterns can be found on page 13. Pattern 0 turns the sequencer off, allowing notes to be play via the Play button or USB MIDI Input.

Pattern Tempo

The internal tempo can be adjusted by holding down the Func + button and pressing the Value + and – buttons. The tempo ranges from 60 to 220bpm and each press increments by 10bpm.

Save Patch

The miniAtmegatron can save the current sound to a patch. The patch is automatically loaded when the miniAtmegatron is powered up. Press and hold the Func – button. When the Func LED flashes, the patch is saved.

Reset Patch

The miniAtmegatron can be reset back to its factory preset by holding the Func – button and Func + button together for a couple of seconds. The Function will do a single flash to signify this.

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 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.

Volume

This sets the volume of the audio. It controls the volume of the sound digitally. The volume should be set to maximum when using the headphone jack as a line output.

Unprocessed sine wave   Distorted (clipped) sine wave
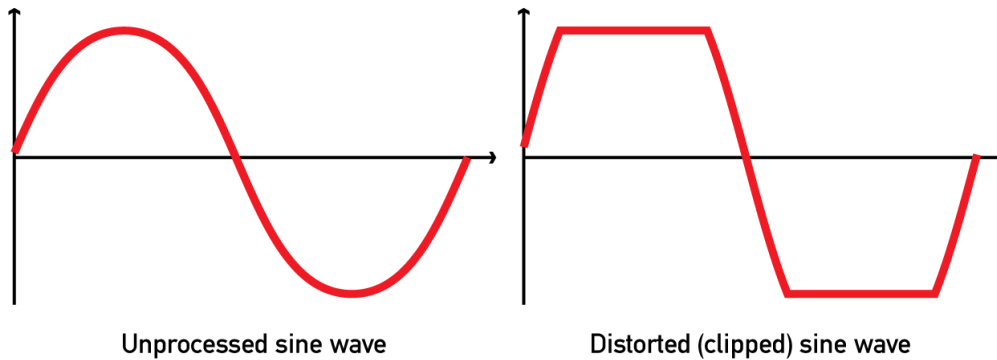
Filter Resonance

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.

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.
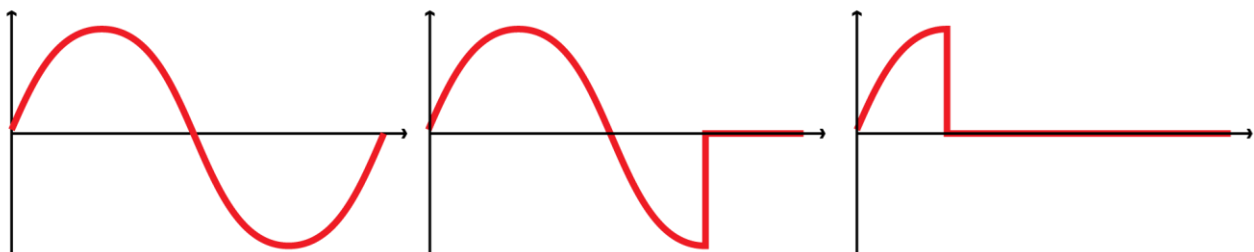
Sine wave with maximum Pulse Width LFO. 0%, 25% & 75% through LFO cycle (ramp down wave).

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.
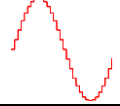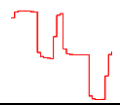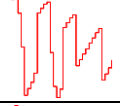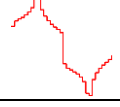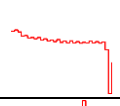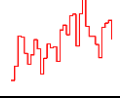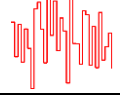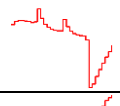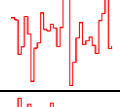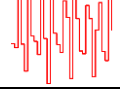
Pitch

The Pitch control sets the pitch of the Play button and also the root note of the Pattern Sequencer. The Pitch value can also be set via the USB MIDI Input.
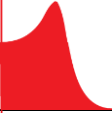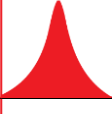
Audio Waveforms
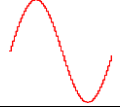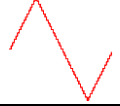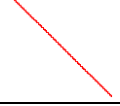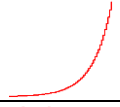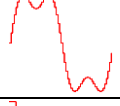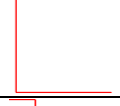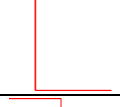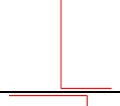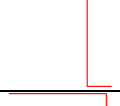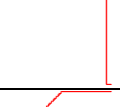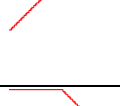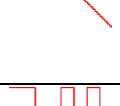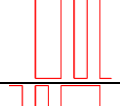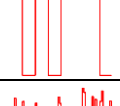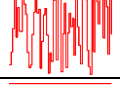
0		Pure Square
1		Pure Saw
2		Pure Sine
3		Octave Square (Juno 60)
4		Square Fifths
5		Pulse Wave (RP2A07)
6		Warped Sine
7		Bass (Multivox)
8		Metal 1
9		Metal 2
10		Vocal 1
11		Brass (Multivox)
12		Reed Organ (PPG)
13		Bell (PPG)
14		Chord
15		Continuously Generated Noise

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 + 3rd 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
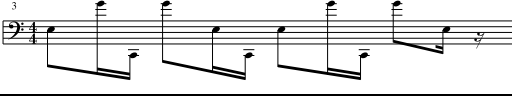
0	𝅝	4 beats
1	𝅗𝅥	2 beats
2	𝅘𝅥	1 beat
3	𝅘𝅥𝅮.	3/4 beat
4	(triplet of three eighth notes)	2/3 beat
5	𝅘𝅥𝅮	1/2 beat
6	𝅘𝅥𝅯.	3/8 beat
7	(triplet of three sixteenth notes)	1/3 beat
8	𝅘𝅥𝅯	1/4 beat
9	𝅘𝅥𝅰.	3/16 beat
10	𝅘𝅥𝅰	1/8 beat
11	𝅘𝅥𝅱.	3/32 beat
12	𝅘𝅥𝅱	1/16 beat
13	𝅘𝅥𝅲.	3/64 beat
14	𝅘𝅥𝅲	1/32 beat
15	𝅘𝅥𝅳	1/64 beat

Envelope Presets

0		0,0,15 (Attack time, Decay time, Sustain level)
1		0,3,0
2		0,5,0
3		0,5,15
4		0,7,0
5		0,7,7
6		0,11,0
7		0,11,15
8		3,0,0
9		3,5,0
10		5,7,0
11		7,0,0
12		7,3,0
13		7,7,7
14		11,7,7
15		15,15,0

Sequencer Patterns

0	Sequencer off. miniAtmegatron can be played by Play button or via MIDI.
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Wave Crusher / Portamento Presets

	Bit Depth Reduction	Sample Rate Reduction	Portamento Time
0	Off	Off	Off
1	2 bit	Full	Off
2	4 bit	1/2	Off
3	2 bit	1/2	Off
4	4 bit	1/4	Off
5	2 bit	1/4	Off
6	4 bit	1/8	Off
7	2 bit	1/8	Off
8	Off	Off	5ms
9	Off	Off	27ms
10	Off	Off	77ms
11	Off	Off	195ms
12	Off	Off	477ms
13	Off	Off	1145ms
14	Off	Off	2728ms
15	Off	Off	6484ms

MIDI Implementation Chart

Manufacturer: Soulsby Synthesizers   Model: miniAtmegatron   Version: 1.1   Date: 28/4/17

Functions	Transmitted	Recognised	Remarks
Basic Channel			
Default	X	1-16	
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	O	7 bit resolution
Control Change			
1	X	O	Pitch LFO
5	X	O	Wavecrush/Porta. preset
16	X	O	Filter Envelope
17	X	O	Distortion Level
32	X	O	Waveform
33	X	O	Filter Type
34	X	O	Filter/Pitch Env Preset
35	X	O	Amp Env Preset
36	X	O	Sequencer Preset
71	X	O	Filter Resonance
74	X	O	Filter Cutoff
77	X	O	Pitch LFO
78	X	O	LFO Shape
79	X	O	LFO Rate
91	X	O	Pulse Width LFO
92	X	O	Amplitude LFO
93	X	O	Filter LFO
94	X	O	Pitch Envelope
95	X	O	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	O	
Commands	X	X	
Aux Messages			
Local On/Off	X	X	
All Notes Off	X	X	
Active Sense	X	O	
Reset	X	O	
Notes			