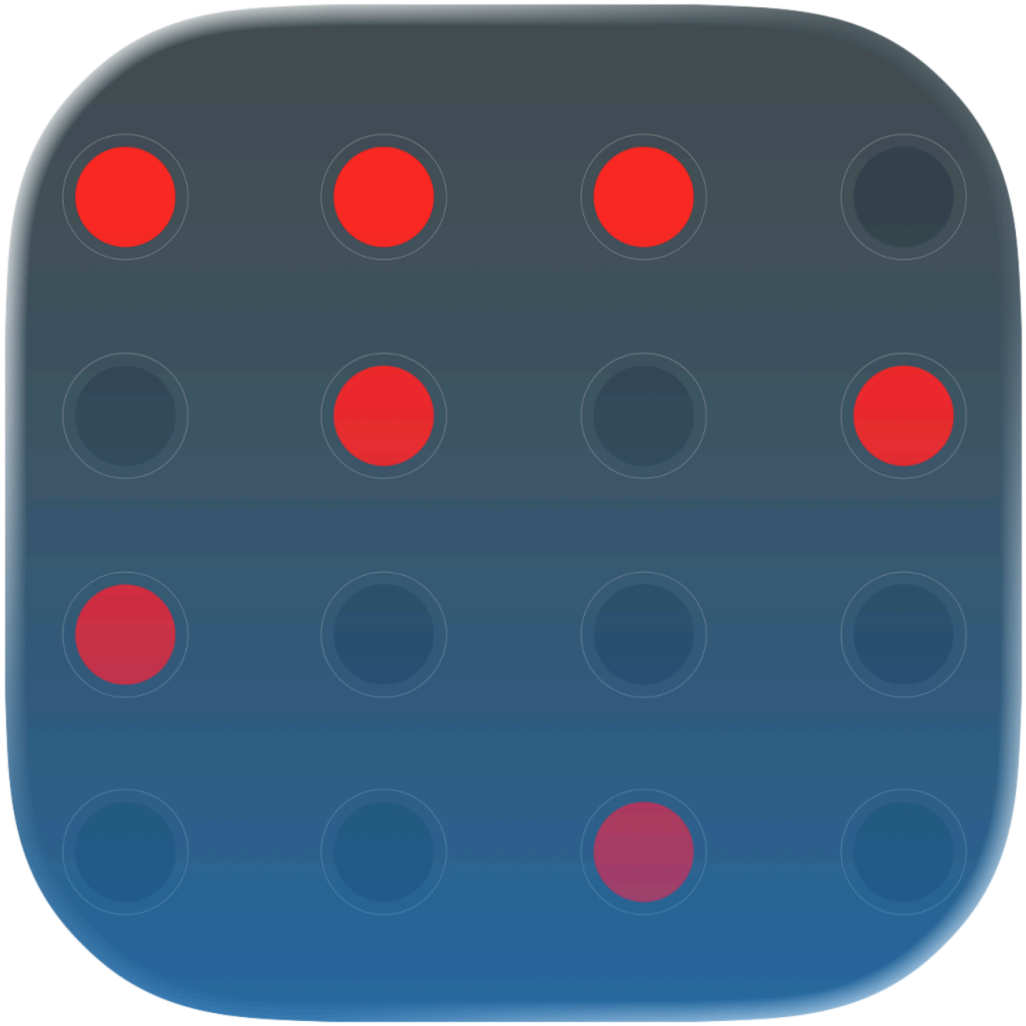
ThreeTuring



User Guide

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Overview

ThreeTuring is a semi-modular groove box that generates endless sequences and rhythms, all with a few clicks. Designed to be immediate and fun while still allowing for complex exploration of sound and music.

There are six main parts to ThreeTuring:

Synth - a basic monosynth capable of generating the classic bass and lead sounds beloved by electronic music.

Clock - sets the timebase of the whole application. ThreeTuring syncs to the timebase of your DAW when using the plugin version

Quantiser - constrain generated notes to a scale. Allows for transposition and construction of more complex sequences.

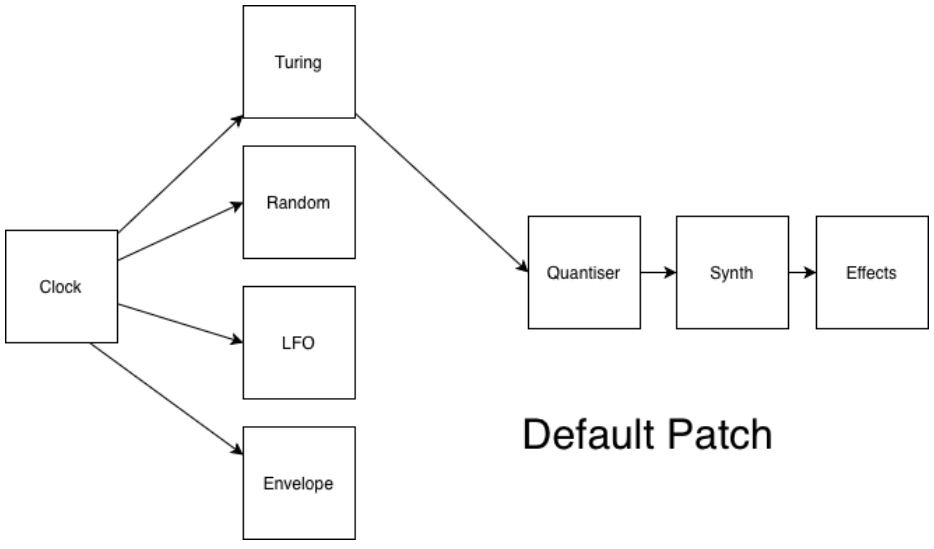
Modulators - a set of modulation tools to generate notes or modulate the controls of the application.

Modulation Matrix - allows the modulation of any of the controls in the system, including the modulation matrix itself.

Effects - four basic effects: distortion, phaser, multitype delay, reverb.

ThreeTuring flow diagram

The ‘init’ patch connects the Turing module with the Quantiser. The modulators are not yet connected.



Synth

Oscillators

ThreeTuring has 2 anti-aliasing oscillators.

Osc 1 Wave and **Osc 2 Wave** set the waveforms of the respective oscillators.
Both oscillators have 3 waveforms to choose from - saw, sine, and square. At the wave knob's default starting position - the saw waveform is selected. When the knob's dial is set to 12 o'clock, the sine waveform is selected and at the end of the dial's range a square waveform is selected.
In between dial positions does basic interpolation between the waveforms - in a future update this will be changed to a more expected and natural mixing method.

Osc 1 Detune and **Osc 2 Detune** sets the frequency detuning of the oscillators. It has a bipolar range that spans from -50 to 50 cents. At the default value no detuning is applied.

Osc 2 Transpose sets the pitch offset of Osc 2 from Osc 1. It has a bipolar range that spans from -24 to 24 semitones. At the default value no pitch offset is applied.

Osc 2 Gain sets the gain of the second oscillator. At its default position, the gain is set to the lowest value and isn't audible.

Amp Envelope

An ADS - attack, decay, sustain - envelope generator with adjustable curves.
The length of an envelope cycle is set to the note length set by the Clock.

Attack, Decay and **Sustain** respectively set the amount of attack, decay and sustain of the envelope. You can think of **Attack** and **Decay** as being 0-100% of the note length. So, an envelope with only **Attack** set to 100%, with no **Decay** or **Sustain**, will generate an exponential rise that spans the full length of the note. Likewise, an envelope with only **Decay** set to 100% will generate an exponential decay that spans the full length of the note.
Attack and **Decay** are not relative to each other. Changing the amount of one will never affect the amount of the other.
Let's say **Attack** is set to 50% and **Decay** is set to 100%. The envelope will naturally decay to 0 at 150% of the note length - but as mentioned the cycle of an envelope is contained within the note length set by the Clock. Whenever the envelope generator detects an envelope won't naturally decay to 0 by the end of its cycle, it automatically enters into a quick release, triggered at a set time relative to the note length, to ensure its decay to 0 by the end of the cycle.

Sustain can be thought of as 0-100% of an envelope's amplitude. An envelope sustains after it has decayed, and only if the attack and decay of the envelope have both concluded before the end of its

cycle. The previously mentioned quick release also applies to an envelope that sustains, as such an envelope will never naturally decay to 0.

Curve controls the amount of curving applied to the attack and decay of the envelope. At the dial's lowest value, the attack and decay are basically linear. As **Curve** is increased, the attack has a more logarithmic rise and the decay has a more exponential decay.

Filter

The synth's filter is a 4-pole (24 dB per octave) lowpass ladder filter. Commonly used to achieve a classic acid bass sound, which is the reason it was chosen for the ThreeTuring - although not limited to only this use.

Drive controls the amount of pre-filter soft clipping applied to the enveloped oscillators.

Cutoff sets the cutoff frequency of the filter, with the control ranging from 20 Hz to 8 kHz. The **Cutoff** control is exponentially skewed so you have finer control over the lower frequencies when moving the knob, which gives an audibly linear feel to the control's range.

Resonance sets the resonance of the filter at the cutoff frequency - also known as the filter's 'Q value'. As the resonance of the ladder filter increases, the gain of the filter's passband decreases.

Gain controls the output amplitude of the filter and synth section as a whole.

Clock

The clock module sets the timebase for the device by generating beat signals used by the other modules. These beat signals are synchronized with your DAW when using the device as a plugin. These simple controls allow for a wide variety of complex rhythms. You can modulate these controls to generate intricate ever-changing rhythms.

Rate sets the overall rate. If used in a DAW the control will be constrained to useful multiples of the current tempo.

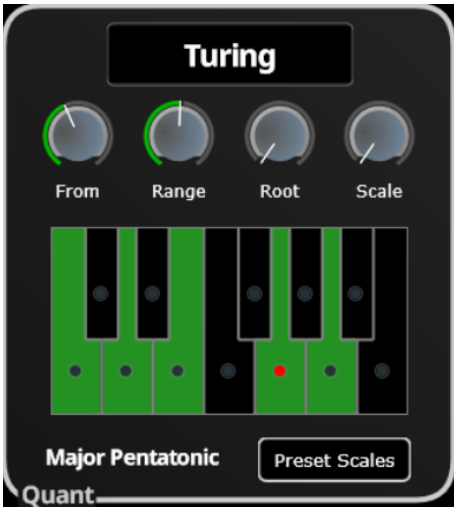
Swing adds positive or negative swing to the clock. Positive swing makes every other beat a little longer. Negative swing makes every other beat a little shorter. No swing is added at the default value.

Len sets the note length as a percentage, ranging from 0-100% of the note length set by **Rate**.

Skip Chance gives the probability that a given note will be skipped. All notes are played at the default value. Turning the control clockwise increases the chance any note will be skipped. Turning it anti-clockwise increases the chance that odd notes are skipped

Pattern allows you to select from a set of Euclidean rhythms that are applied to the notes. At the default value, no pattern is selected.

Quantiser



The quantiser allows you to shape the generated notes to fit your music. It shifts incoming notes to the nearest one in the scale.

The quantiser has a collection of preset scales and an option to program Custom Scales.

Set the **Range** of possible note pitches to be generated which starts **From** the selected base note.

Root chooses the root note of the scale - changing this transposes the sequence.

Scale selects the scale to be used

Note Source

To change the note source, click the slot at the top of the Quant Panel. By default it's set to **Turing**. Available note sources are shown in the drop down menu when you click on the note source slot. You can also select note source by dragging the desired modulator to the note source slot - explained in Adding Modulation.

Custom Scales

By clicking the button in the bottom right hand corner of the Quant panel, you can choose between using **Preset Scales** or **User scales**.
When **User scales** is selected, clicking the notes on the keyboard, in the middle of the panel, turns a note on or off. Notes that are turned on are shown by a coloured highlight.
Up to 12 scales can be programmed and **Scale** can be used to select between your custom scales, either manually or with a modulator.

Modulators

Turing

The Turing Machine is a shift register based pseudorandom number generator. Pioneered by Tom Whitwell of Music Thing Modular, it uses an algorithm that long predates any musical application but happens to produce pretty musical results when using short sequence lengths.
It works by having a binary number of N bits where N is the sequence length. Each new note shifts the bits along, optionally flipping the top bit at random. The whole number is then read and used to generate a note. Ignoring bit flips for a moment it can be seen that after N shifts the first number will be arrived at again and hence a sequence is generated.
The version in ThreeTuring runs directly from the clock module - each beat triggers a shift.

Change is the chance of a bit being flipped. Note that this is the chance of the top bit being randomly changed - it might be changed to the same bit it already is, a 1 could change into a 1 or 0, and vice versa. This means that even at 100% it doesn't *always* change.

Seq Length lets you set the overall sequence length. Notice that the indicator on the right only displays the first 16 bits of the number so if you have the sequence set higher than this you are only seeing part of the overall sequence.

Flip inverts all of the bits before generating the note number. It allows musical changes to the whole sequence without interfering with the generation process. This can be modulated. Note that you should make sure the depth of the modulation is turned up to full since this is a binary parameter - 0 is off and 1 is on.

Random

The Random module is a take on Mutable Instruments Marbles, implemented from the description of Marbles found in its manual and adjusted to taste.

The module generates a random walk of values. It also has a memory that allows a collection of random values to be captured into a sequence, or to have a semi repeating sequence.

Rate sets the timing of Random based on **Sync.** When **Sync** is turned on, the rate is either a multiple or division of the clock rate, which synchronises the Random module to the beats. When **Sync** is turned off, the rate is a variable in a similar range and the generated values are free running.

Spread controls the distribution of new values. As you turn the **Spread** knob anti-clockwise, random values tend to have more of a Gaussian distribution, which means generated values are more likely to be closer together. As you turn the knob clockwise, random values will tend to have more of a uniform distribution, which means every value has the same likelihood of being generated.

Memory sets the likeliness of any given value being retrieved from memory or stored to memory. This allows for adding repetition into the generated sequence. The **Memory** knob turned completely anti-clockwise means Random will always generate a new value, and turned completely clockwise means Random will always read from memory. Setting the knob position to an in-between value varies the chance of which option is selected - with the chance being skewed towards the option the knob position is closer to.
Length sets the length of the memory sequence.

Smooth will smooth out the values ramping from one value to the next. The higher the setting the smoother the value sequence will be.

LFO

The ThreeTuring LFO is designed to be a *slightly* eccentric take on a more conventional LFO. It generates three core waves: Sine, Triangle and Square. By manipulating the duty cycle and the slope of the curves other shapes can also be generated.

Rate sets the timing of LFO based on **Sync.** When **Sync** is turned on, the rate is either a multiple or division of the clock rate, which synchronises the LFO module to the beats. When **Sync** is turned off, the rate is a variable in a similar range and the generated values are free running.

Shape sets the overall shape - fully anti-clockwise is Triangle , twelve o'clock is Sin and fully clockwise is Square. The shape is variable so intermediate settings generate intermediate wave shapes

Duty moves the duty cycle that is the location the wave changes direction. For Triangle this moves between *not quite a* saw tooth and for the square wave this is essentially PWM.

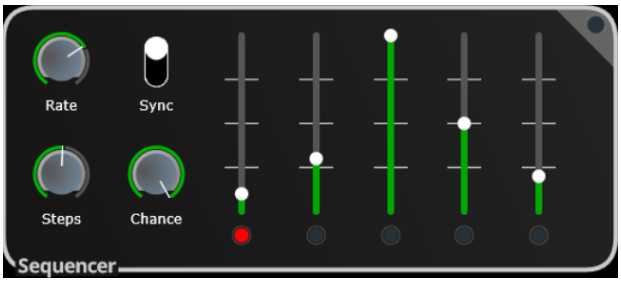
Slope applies either exponential or log shaping to the wave and can give a variety of interesting variations of the basic waves

Phase shifts the phase of the wave and is useful in generating specific rhythms

The display shows the shape of the generated wave but is not a direct readout of the modules output, unlike the random and envelope modules

Sequencer

The sequencer in ThreeTuring is a simple way of generating fixed control signals. The choice of 5 steps is not only a nod to the Buchla Easel, but also a way of leaning into the generative philosophy of the device by encouraging loops of different lengths working with and against each other.



Rate sets the timing of the Sequencer based on **Sync.** When **Sync** is turned on, the rate is either a multiple or division of the clock rate, which synchronises the Sequencer module to the beats. When **Sync** is turned off, the rate is a variable in a similar range and the generated values are free running.

Steps sets the number of steps in operation.

Chance sets the chance of the next step being skipped. In practice, this means the current value is kept for an extra beat and the subsequent step is then selected. At higher amounts of **Chance**, the Sequencer module will occasionally stick on a value. At mid-range amounts, it will more or less pick steps at random. At lower amounts, it will stay on any given step for a long time before moving to another seemingly random one.

The sliders have a unipolar range and set the value of each step. The currently active step is indicated by a lit LED.

Envelope

The Envelope module is more properly a function generator module.

Depending on the sync and rate settings, a control signal with an attack and a decay will be triggered. The Envelope signal can be shaped with the curve control

Rate sets the timing of the Envelope based on **Sync.** When **Sync** is turned on, the rate is either a multiple or division of the clock rate, which synchronises the Envelope module to the beats. When **Sync** is turned off, the rate is a variable in a similar range and the generated values are free running.

Chance controls if the envelope is triggered or not - turning this down allows gaps to be introduced into the signal as a whole.

Attack, **Decay** and **Curve** shape the signal - how long it takes to rise and fall and how those signals are shaped

Accent

The ThreeTuring Accent has its roots in the Roland TB-303 feature of the same name. This special hardwired modulator is hardwired to the synth's volume and to the filter's cutoff.

Amount sets the depth of the accent modulation.

Pattern allows you to select from a set of Euclidean rhythms that dictate the timing of the accent modulation.

Skip Chance gives the probability that a given accent will be skipped. All accents are played at the default value. Turning the control clockwise increases the chance any accent will be skipped. Turning it anti-clockwise increases the chance that odd accents are skipped

Ghost Notes controls the chance of letting through accent envelopes that are outside the set pattern. These ghost notes are generated by a simple shift register, whose sequence chance is weighted towards repeating the sequence.

Modulation Matrix

Adding modulation

ThreeTuring is set up as a wireless semi-modular system. Each modulator is indicated by a triangle at the top left of the panel with an LED in it. If the modulator is in use the LED is lit up. Dragging from this triangle to a different control sets up a modulation. Most controls can be modulated - the main exceptions being sync controls and buttons.

Modulations can also be set up directly from a modulation slot - as described in Modulation Slot.

Creating a modulation adds a new entry to the modulation slots in the ModControls panel.
There are 9 modulation slots. When all slots are in use, no more modulations can be added.

Modulation Slot

Depth sets the range of modulation.

The polarity of the modulation is controlled by the slider at the top of the modulation slot. Bipolar polarity is achieved by setting the slider to its middle position, which is also its default position. Negative polarity is achieved by setting the slider to the left-most position, where the minus symbol is. Positive polarity is achieved by setting the slider to the right-most position, where the plus symbol is. Setting the slider in between the middle position and either the plus or minus symbol achieves weighted bipolar polarity, which skews the modulation depth either more positively or negatively.

The **<source>** and **<target>** slots show the source and target of a modulation.
A modulation's source or target can be changed by clicking on either slot and selecting the new source or target from the drop down menu that appears. New modulations can be set directly from a modulation slot by using **<source>** and **<target>**.

To remove a modulation, click the X button at the top left of the modulation slot it occupies.

Positions of modulation slots are fixed in place, adding or removing modulations doesn't affect the position of any other modulation slot.

Effects

Distortion

A mix of soft clipping and sine wavefolding.

Shape controls multiple of the distortion's internal parameters: the dry/wet mix of the input and distorted output signal, the frequency of the sine wavefolder and gain multipliers within the distortion's architecture. The dry/wet mix is set in the first quarter of the **Shape** knob's range. When full the knob reaches the start of the fully wet range, it then begins to increase the frequency of the sine wavefolder and adjusts gain multipliers to help shape the sound.

At lower values of the fully wet range, the distortion will have more of a soft clipping effect, at higher values it'll have a more pronounced sine wavefolding effect.

Phaser

Splits the audio signal into two and runs one of those signals through a series of 6 allpass filters. The cutoff frequencies of the filters is modulated with a sine LFO and the signal is mixed back

Phaser Center sets the cutoff frequency of the allpass filters. Control ranges from 20Hz - 15kHz.

Phaser Amount controls both the depth and rate of the phaser. Depth refers to the modulation range of the LFO. Rate refers to the rate of the LFO. As you turn the knob anti-clockwise, the depth gets shorter and the rate gets faster. As you turn the knob clockwise, the depth gets longer and the rate gets slower.

Phaser Feedback controls how much of the phaser's output is fed back into its input. The sweeping effect becomes more pronounced at higher feedback amounts.

Phaser Mix sets the dry/wet mix of the input and phaser output signal.

Delay

Records audio input into a delay buffer and plays it back after a specified amount of time.

Delay Time sets the delay time based on **Delay Sync.** When **Delay Sync** is turned on, the delay time is either a multiple or division of the clock rate, which synchronises the delay time to the beats. When **Delay Sync** is turned off, the delay time ranges from 10 to 3000 milliseconds.

Delay Feedback controls the amount of the delay output fed back into the delay buffer, which gives an echo effect.

Delay Type switches between the delay's two types: Mono and Ping Pong. At its default position, as shown in the image above, **Delay Type** is set to Mono. In Mono, the delayed output is played in both audio channels simultaneously. Switching **Delay Type** from its default position sets it to Ping Pong. In Ping Pong, the delayed audio output bounces between the left and right audio channels, switching channels on every output.

Delay Mix sets the dry/wet mix of the input and delayed output signal.

Reverb

Reverb Space can be thought of as setting the space the audio is being reverberated in. The knob controls multiple internal parameters to achieve this. **Reverb Space** ranges from a small mono space to a big stereo space.

Reverb Mix sets the dry/wet mix of the input and reverberated output signal.

Control

Output sets the gain level of ThreeTuring. It uses a dBFS scale that ranges from -60 to 3 dB. At -60 dB, no audio will come from the device and is shown as ‘-inf dB’ on the knob’s label.

The option switch has two choices: **Midi** and **Always**. The **Midi** option means ThreeTuring accepts MIDI input and will start generating audio when MIDI information is received. The **Always** option means ThreeTuring will always generate audio, it will start playing sound the moment the switch is toggled to this option.

Presets is where you can find factory presets, along with the option for the user to save and load their own presets.

Options has a few controls. The first being **init** which, when clicked, sets all knobs adjustable parameters back to their default positions. Next is **Audio/MIDI Settings…** which allows the user to adjust their audio device settings and set MIDI input.