WTFM

Wavetable FM Synthesizer

[RACK EXTENSION] MANUAL

2021

by Turn2on Software

WTFM is not an FM synthesizer in the traditional sense. Rather it is a hybrid synthesizer which uses the flexibility of Wavetables in combination with FM synthesizer Operators.
WTFM Wavetable FM Synthesizer produces complex harmonics by modulating the various selectable WT waveforms of the oscillators using further oscillators (operators).
Imagine the flexibility of the FM Operators using this method. Wavetables are a powerful way to make FM synthesis much more interesting.

WTFM is based on the classical Amp, Pitch and Filter Envelopes with AHDSR settings. PRE and POST filters include classical HP/BP/LP modes. 6 FXs (Vocoder / EQ Band / Chorus / Delay / Reverb) plus a Limiter which adds total control for the signal and colours of the Wavetable FM synthesis.

Operators Include 450+ Wavetables (each 64 singlecycle waveforms) all sorted into individual Categories.
The synthesizer includes a basic Modulation matrix for the main settings, special FX mod matrix, and also individual modulation routings to the various synthesizer elements.

WTFM includes 5 special modes:

Traditional Wavetable (WT) synthesis. 4 oscillators, each including 450+ Wavetables sorted into categories.
Classical 4-OP FM synthesis: each operator use 450+ Wavetables to modulate other operators in various routing variations of 24 FM Algorithms.
FM WT Mod Synthesis: The selected Wavetable modulates the frequency of the FM Operators (Tune / Ratio).
RINGMOD Synthesis: The selected Wavetable modulates the Levels of the FM Operators similarly to a RingMod
FILTER FM Synthesis: The selected Wavetable modulates the Filter Frequency of the synthesizer.

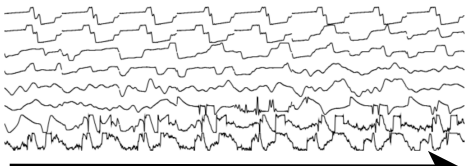
This is a modern FM synthesizer with easy to program traditional AHDSR envelopes, four LFO lines, powerful modulations, internal effects, 24 FM algorithms. Based on the internal wavetable's library with rich waveform content: 32 categories, 450+ wavetables (each with 64 single-cycle waveforms), up to 30,000 waveforms in all.

Classical oldschool FM synthesizers give control of the Operator Levels and Ratio as a main function. WTFM additionaly works with the Operators, morphing waveforms of the selected wavetable. The era of oldschool FM synthesis is now moving to the future. Should you wish however, you can of course go back to its origins using the included classical waveforms.

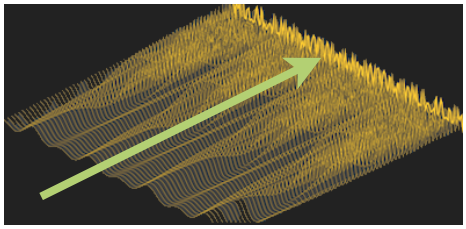
WHEN 2 BECOME 1

WAVETABLE SYNTHESIS

The first commercial use of Wavetable synthesis was in 1979. Wavetable synthesis is based on the periodic reproduction of a single-cycle waveform. Each table can include up to 64 waveforms. Wavetables can include collections of various waveforms, and the user can select required waveforms from the wavetable. So, the main idea of Wavetable synthesis not just to use various collections of single-cycle waveforms into one table but to use morphed single-cycle waveforms to change oscillator sound in real-time.



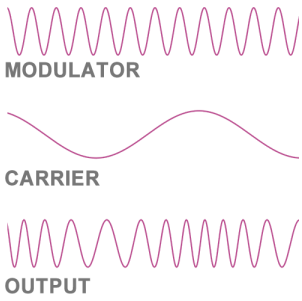
Morphing of 64 single-cycle waves



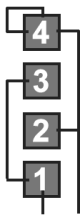
The earliest wavetables were produced to recreate filter sweeps from analog synthesizers: The first single-cycle waveform was harmonically rich in sound and with no filter applied. The second waveform started to introduce filter removing some of the harmonics. The last single-cycle waveform was presented as a simple Sine.
Later wavetables were created like the LFO, Envelope, Velocity and other possible modulation activity. Wavetables help to emulate various morphings of the single-cycle waveforms. Wavetable Oscillators have traditional Tune and Gain settings, but also include waveform selection which enables switching between single-cycle waveforms, or selectable wavetable banks to the oscillator.

FM SYNTHESIS

The FM sound was discovered in the 1970s, when Dr. John Chowing was experimenting with Vibrato. **FM (Frequency Modulation)** is similar to an ultra-speed Vibrato effect. The Phase of the oscillator is modulated by the signal from the **Modulator**, which raises and lowers its pitch value. If the modulation is very fast, we hear only the change of the tone. If the modulation is normal or slow, we can hear a Vibrato effect (one oscillator waveform modulates the pitch of another oscillator).



FM synthesis is based on a few **Operators** (oscillators), which produce complex harmonics by modulating one oscillator's waveform using another oscillator's waveform. The output from the Modulators affects in turn another Operator and modifies that Operator's output.
Carriers receive the outputted sound from the modulators and produces the final modulated result.



Example:
4 = MOD
2 = CARRIER
3 = MOD
1 = CARRIER

Main FM settings are the RATIO and LEVELS parameters:
RATIO: Changes the Pitch value of the Operators, raises the Pitch of the Modulator and sets the Brightness harmonics of the FM.
LEVEL: Changes the output level of the Operators. Sets the volume changes for Carriers and Brightness of the Modulators.

WTFM SYNTHESIS POWER

WTFM is a not traditional Wavetable or FM synthesizer. It is a hybrid synthesizer which uses the flexibility of Wavetables in combination with FM synthesizer Operators.
- WTFM Wavetable FM Synthesizer produces complex harmonics by modulating the various selectable WT waveforms of the oscillators using further oscillators (operators).
- Includes not only traditional Wavetable or 4-OP FM synthesis, but also Wavetable FM, RM and Filter FM modes.
- Selection of the PRE and POST filters. 6 FXs (Vocoder / EQ Band / Chorus / Delay / Reverb), Limiter.
- 450+ Wavetables per Operator / Osc
- 24 FM Algorithms
- Basic Modulation matrix, special FX mod matrix and also individual LFO routings to synthesizer elements.

HYBRID WT FM SYNTHESIZER

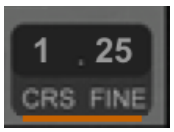
FM MODE

OPERATOR: Frequency Modulation Oscillators that can be modulated by the waveform of another Oscillator. Operators can work as Modulator or Carrier.

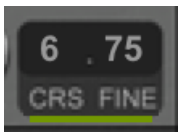
Modulator send its own waveform to modify the Ratio setting of another Operator.
Carrier recieves the waveform from the Modulator and produces frequency changes of the operator, affecting the Ratio value.

LEVEL

Level knobs change the output Volume of the Carrier Operators and change the brightness and harmonics of the Modulator Operators.



Neg. value



Pos. value

RATIO

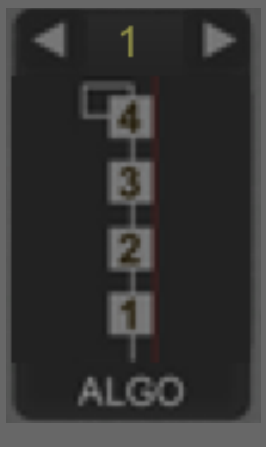
Ratio knobs change the Pitch value of the Operators (mainly for the Carriers), and the Brightness and Harmonics for Modulators.
* SCALE parameter toggles the RATIO measurement between a number of different modes (Lite & Full Coarse/Fine,Decimals, Pythagorian progression and MicroTune).

SEGMENT

Operators include built-in Wavetables. The Segment fader changes the current position of the wavetable. Each Wavetable includes 64 waveforms. The Segment fader selects the waveform of the remaining 63 waveforms of the Wavetable.

OP-1 CONTROL

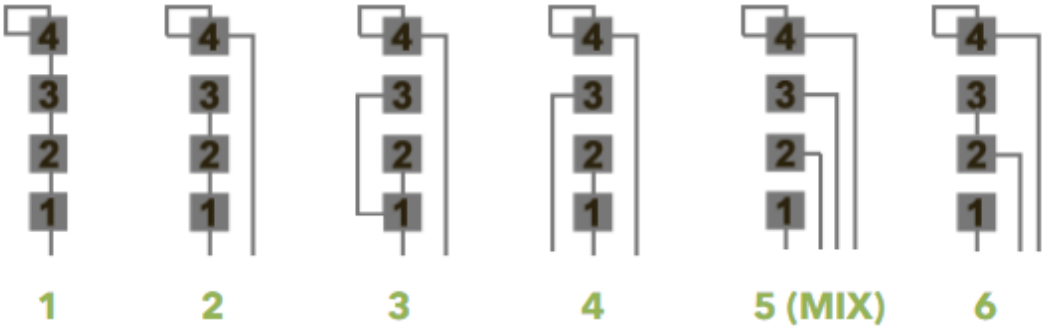
OP-1 Level works as the Main Operator's Output Volume controller.
OP-1 Tune works as a classical Global Tune parameter in the range -36..0..+36 semitones

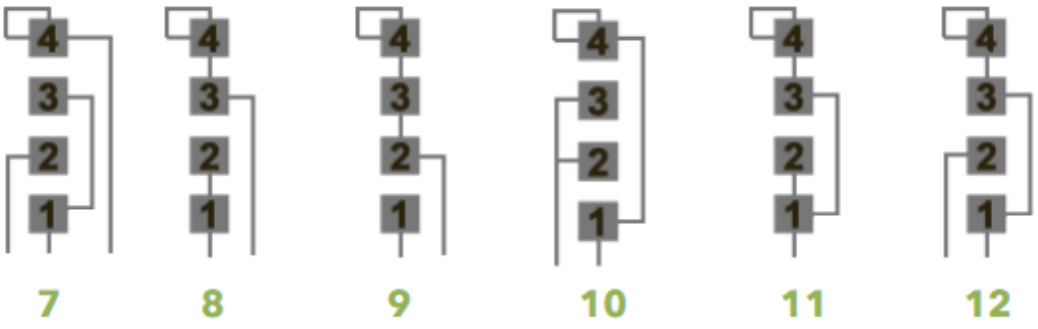


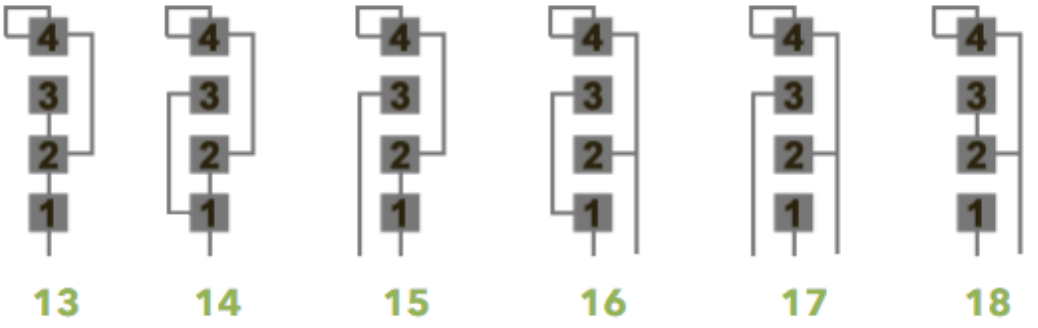
ALGORITHM SELECTION

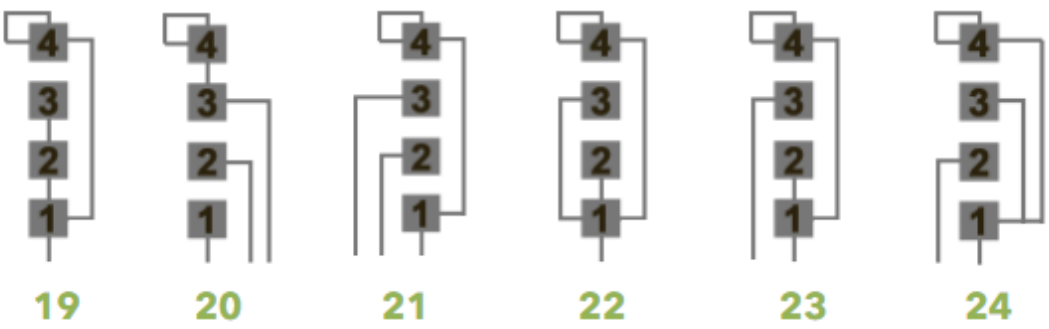
The FM Engine includes 24 different algorithms which function as preset models for the Operators routing. (With modulator and carrier roles).
The Operator Algorithms aid in creating new sounds using different routings of the carriers and modulators.

MODULATOR ➡ CARRIER



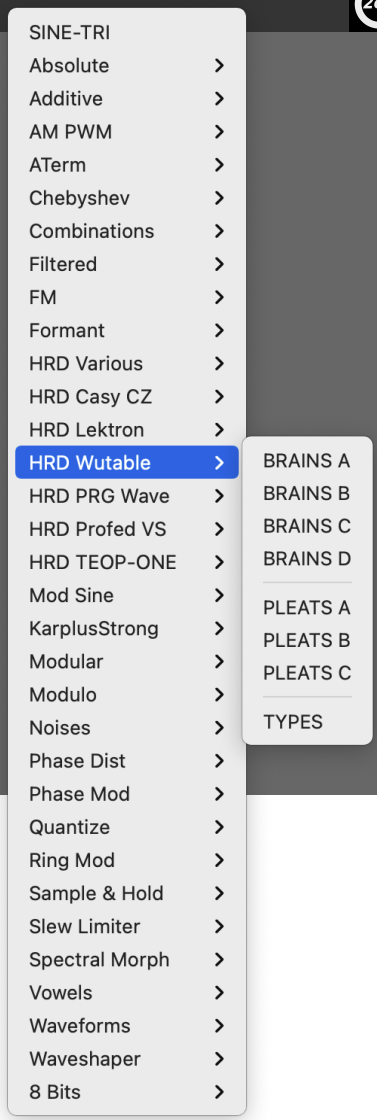






WAVETABLE SELECTION

WTFM Synthesizer comes with more than **450** wavetables. Using the "WTBL" button opens a pop-up menu within which the user can select wavetables from 32 different categories. The selected wavetable can be loaded into all the operators.
Default Position: "Sine-Triangle". This morphs between a sine waveform and a triangle waveform.



FEEDBACK: Sets self-feedback amount from the OP4 outputs. Creates a noisier and richer sounding waveform.

FM BREAKPOINT: Reduces progressively the levels of operators 2-4 above the breakpoint key. Works as a Key Tracker for high frequency damping. Note range from C0-A7.

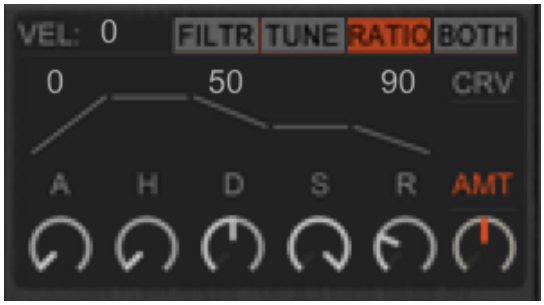
AMP SECTION

Every operator has its own Amp EG section.
Amp envelope genarators are presented with classic ADHSR faders.

Attack, Delay and Release have additional curve parameters which change the curve type from linear to exponential.

PARAMETER	DESCRIPTION
ATTACK	Attack Time of the Amplitude Envelope generator
ATTACK CURVE	Change Attack Time: -100..0 (from slow to reach value), 0..+100 (from fast to reach value)
HOLD	Hold Time at the maximum level of the Amplitude Envelope generator
DECAY	Decay Time of the Amplitude Envelope generator
DECAY CURVE	Change Decay Time: -100..0 (from slow to reach value), 0..+100 (from fast to reach value)
SUSTAIN	Sustain level of the Amplitude Envelope generator
RELEASE	Release Time of the Amplitude Envelope generator
RELEASE CURVE	Change Release Time: 0% set to Linear fade out. +90 set to exponential fade out

PARAMETER	DESCRIPTION
AMOUNT	Amount of the Amplitude Envelope generator
SMOOTH	Smooth Time parameter for Amount value of the Amplitude Envelope generator
LFO	LFO amount to the Operator Level
VELOCITY	Velocity value to the Amplitude Envelope generator



EG SECTION

The display in the picture shows switching buttons between Filter / Tune / Ratio / Both envelope generators. The envelope generator is based on classic AHDSR parameters with control over EG and Velocity level.

EG MODES	DESCRIPTION
FILTER EG	Filter Envelope Generator affect the Global Filter
TUNE EG	Tune Envelope Generator affect the OP-1 Tune parameter
RATIO EG	Ratio Envelope Generator affect the OP-2, OP-3, OP-4 Ratio parameters at the same time
BOTH EG	Both Envelope Generator affect the OP-1 Tune, OP-2, OP-3, OP-4 Ratio parameters at the same time

EG PARAMETERS	DESCRIPTION
ATTACK	Attack Time of the Envelope generator
ATTACK CURVE	Change Attack Time: -100..0 (from slow to reach value), 0..+100 (from fast to reach value)
HOLD	Hold Time at the maximum level of the Envelope generator
DECAY	Decay Time of the Envelope generator
DECAY CURVE	Change Decay Time: -100..0 (from slow to reach value), 0..+100 (from fast to reach value)
SUSTAIN	Sustain level of the Envelope generator
RELEASE	Release Time of the Envelope generator
RELEASE CURVE	Change Release Time: 0% set to Linear fade out. +90 set to exponential fade out
AMOUNT	Amount of the Envelope Generator to the OP-1.. OP-4
VELOCITY	Amount of Velocity that affect the Envelope Generator

OP LFO 1-4 SECTION

The display in the picture shows switching buttons between LFO 1/2/3/4. Four LFO lines are available as a source for modulating different elements of the synthesizer

PARAMETERS	DESCRIPTION
LFO 1/2/3/4	Switch between 1/2/3/4 LFO displays with own settings per LFO
LFO SYNC	Set LFO Sync mode: FREE (Rate value in Hz) / BEATS (quarternote per cycle. Sync to the project tempo)
LFO RATE	Duration of 1 cycle of the LFO waveform (Hz in FREE sync mode, Quarternotes in BEATS sync mode)
LFO WAVEFORM	Select LFO waveform: Sine / Triangle / Square / Saw / Exponential Saw / Random / Analog Drift
LFO RETRIGGER	OFF (all voices modulated in sync) / ON (When note is triggered, LFO starts from beginning)
LFO PHASE	Starting point of the LFO waveform

FILTER SECTION

The filter section works with both pre and post filtering.
Pre filter: up to 4-pole multimode filter for each voice of the synthesizer
Post filter: Master multimode filter.

PARAMETERS	DESCRIPTION
PRE / POST	Switch display between PRE FX and POST FX filters. Both of the filters work at the same time
CUTOFF	Cutoff frequency
RESONANCE	Strength of the resonant peak at the Cutoff frequency
FILTER MODE	Set filter mode: - OFF - HP12: Highpass 12dB/oct - BP6: Bandpass 6 dB/oct - LP24: Lowpass 24 dB/oct
PEAK	Limits the level of the resonant peak and makes sound of the filter overdriven. When "OFF", Self-Oscillations disabled. Only for PRE FX filter
LFO MOD SRC	Select filter modulation source (LFO 1/2/3/4)
LFO MOD AMT	Set amount of the modulation source (LFO 1/2/3/4)
LFO DEST	Select LFO destination: Cutoff frequency / Resonance. Avaliable only for POST FX filter
MW	ModWheel amount to filter Cutoff modulation
AFT	Aftertouch amount to filter Cutoff modulation
KEY	Note keytracking to filter Cutoff modulation
REL	Release Velocity to filter Cutoff modulation
EXP	Expression amount to filter Cutoff modulation
SUS	Sustain amount to filter Cutoff modulation

MAIN SECTION

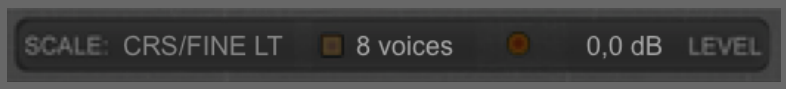
Includes PitchBend, ModWheel, Detune, Transpose and Glide settings

PARAMETER	DESCRIPTION
PB	PitchBend controller for pitch bending synthesizer tone
MW	ModWheel modulation controller for the synthesizer parameters
P.B. RANGE	Depth of the modulation from the PitchBend to the synthesizer Tune (-36..0..+36 semi)
TRANSPOSE	Transpose tone in 4 octaves (-24..0..+24 semitones). Will not change the tone of the synthesizer in realtime
DETUNE	Detune synthesizer tone in 6 octaves (-36..0..+36 semitones) with tone changes in realtime
GLIDE	Select Glide mode: OFF (no Glide) / ON (Always Glide) / AUTO (Glide only if a key is pressed)
GLIDE TIME	Set Glide Time value (0-1000ms).

MODWHEEL SECTION

ModWheel controller includes additional modulations

PARAMETER	DESCRIPTION
LEVEL 1-4	Amounts of the ModWheel to the Levels of the Operators 1-4
TUNE 1, RATE 2-4	Amount of the ModWheel to the TUNE OP-1 and RATE of the Operators 2-4
L/R SWITCHER	Switch modulation destination for the ModWheel for each operator: - Levels of the OP1..OP4, or - Tune (OP-1) / Ratio (OP2 .. OP-4)

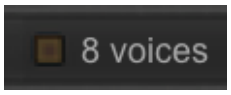


TOP PANEL SETTINGS SECTION

Main settings of the synthesizer, such as Mono/Poly mode, Voices quantity, Master Gain

POLY MODE

By default the synthesizer is set to Poly mode with 8 voices.
The maximum number of voices is 32.



MONO MODE

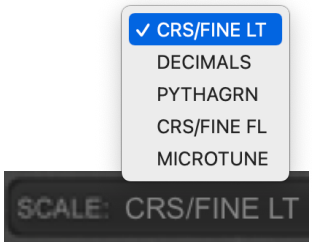
Monophonic mode of the synthesizer works always with 1 voice.
To activate MONO Mode, press the button near the Polyphony Voices.
This button activates a popup menu with two MONO Modes for selection:
- **RETRIG**: every new note jumps from the previous note immediately.
- **REPITCH**: every new note plays over the previous note with a glide-effect

MASTER LEVEL OUTPUT

Synthesizer output volume with gain up to +12dB.

OPERATORS SCALE MODE

OP-1 Tune and OP-2..OP-4 Ratio settings can be scaled in a number modes



PARAMETER	TUNE (OP-1)	RATIO (OP2...OP4)
COARSE / FINE LT	Coarse/Fine Tune with fast steps (-36.0..+36.0)	Coarse / Fine Ratio with fast steps (0..32.0)
DECIMALS	Decimals (-36.0.. +36.0, with steps .99)	Decimals (0..32.0, with steps .99)
PYTHAGORIAN	Decimals (-36.0.. +36.0, with steps .99)	Pythagorian progression Ratio (0.125...32.0)
COARSE / FINE FL	Coarse/Fine Tune with full range (-36.0/+36.0)	Coarse/Fine Ratio with full range (0..32.0)
MICROTUNE	Decimals (-36.0.. +36.0, with steps .99)	Ratio with steps 0.000..32.000. Adds vibe effect

Coarse/Fine Tune LT based on the steps like 0.125, 0.25, 0.5, 1.0, 1.125...36.0)
Coarse/Fine Tune FL based on the steps like 0.01..0.99
Decimals Tune based on the steps like 0.01..0.99
Pythagorian Tune based on the steps like √Pi/2xN
Microtune based on the steps like 0.001, 0.002.. 36.000

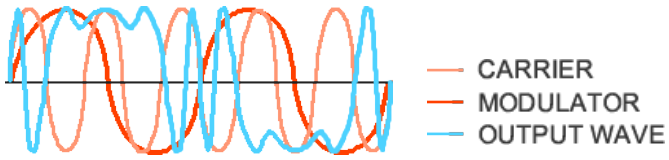
SYNTHESIS MODES

The Synthesizer includes 3 additional synthesis modes, which can modulate the Wavetable using different parameters: FM WT MOD / RINGMOD / FILTER MOD

SYNTHESIS PARAM	DESCRIPTION
WT TUNE	Sets the WT waveform pitch for synthesis modulations
POSITION	Sets the start position of the WT waveform for synthesis modulations
UNIPOLAR	Switches between Bipolar or Unipolar mode of the synthesis source waveform modulation. Bipolar (0..+1), Unipolar (-1..0..+1)

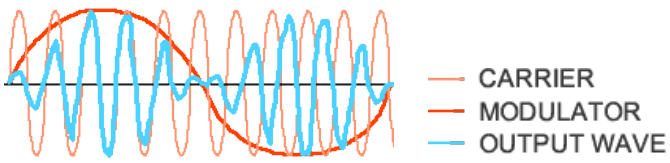
FM WT MOD SYNTHESIS

Selected Wavetable modulates the frequency of the FM Operators (Tune / Ratio).
With high WT tune, a high-speed vibrato and tone changes can be heard.
With low WT tune the vibrato effect is more subtle.
WT tune changes the pitch of the modulated signal

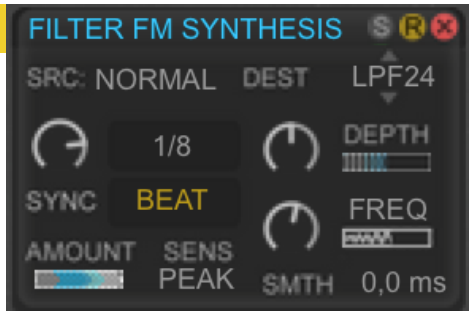


RINGMOD SYNTHESIS

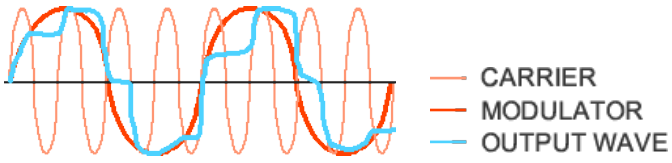
Selected Wavetable modulates the Levels of the FM Operators like a RingMod.
With high WT tune, high-speed tremolo or tonal changes are heard easily.
With low WT tune, tremolo effect is more subtle.
WT tune changes the amplitude (lower tune = louder modulation)



FILTER FM SYNTHESIS



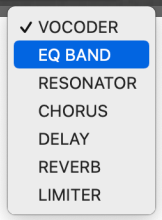
Selected Wavetable modulates Filter Frequency of the master output Ladder filter.
With high WT tune a high-WahWah effect is easily heard.
With low WT tune, the WahWah effect is more subtle.
WT tune changes the Cutoff frequency



SYNTHESIS PARAM	DESCRIPTION
WT SRC WAVEFORM	Wavetable modulation waveform: **NORMAL**: Wavetable playing in the loop from start of the 1st waveform up to the end of the last 64 waveform. Various waveforms modulation: SINE / TRIANGLE / SQUARE / RANDOM / DRIFT / SAW / EXPONENTIAL SAW
DESTINATION	A. FMWT MOD: Set what operator Tune or Ratio to modulate B. RINGMOD: Set what operator Level to modulate (OP-1..OP-4 Level) C. FILTER FM: Set what ladder filter type to modulate (HP/BP/LP)
WT SYNC	Set WT Sync mode: FREE (Rate value in Hz) / BEATS (quarternote per cycle. Sync to the project tempo)
WT RATE	Duration of 1 cycle of the WT waveform (Hz in FREE sync mode, Quarternotes in BEATS sync mode)
AMOUNT	Amount of the synthesis modulation to the selected destination
DEPTH	Depth between synthesis modulated signal (100%) and Operator signal (0%)
SHAPE	Shaper level for the Wavetable signal. 100% produce fully shaped signal
SMOOTH TIME	Smooth Time of the Synthesis Depth parameter
WT SENSITIVE	Sensitive value of the Wavetable waveform by PEAK or AVERAGE level
FREQUENCY	Filter Cutoff frequency of the master Ladder filter (for FILTER FM synthesis mode)
WT RETRIGGER	Synthesis Wavetable Retrigger: OFF (modulation works in sync) / ON (When note is triggered, modulation starts from the beggining of the waveform)
WT SMOOTHNESS	Adjust Wavetable waveform smoothness

EFFECTS SECTION

The Synthesizer includes internal effects:
Vocoder / EQ Band / Resonator / Chorus / Delay / Reverb / Limiter



VOCODER FX

Classic vocoder with up to 20 bands. Applies the spectrum of one signal to another.
WTFM synthesizer includes vocoder inputs at the rear panel


FX OFF


FX ON

FX PARAM	DESCRIPTION
BANDS	Quantity of the frequency bands
LOW FREQ	Center frequency of the lowest band
HIGH FREQ	Center frequency of the highest band
RESONANCE	Set width of each band
BLEND	Mix between modulator (0%), Vocoder (50%) and Carrier signal (100%)
GAIN	Output level of the vocoded signal

EQ BAND FX

Single band equalizer with frequency adjust up to 3 octaves

FX PARAM	DESCRIPTION
FREQ	Center frequency of the selected EQ band
WIDTH	Slope of the EQ left and right from the center frequency
GAIN	Attenuation / Boost

RESONATOR FX

Resonators emulate natural resonated sounds of acoustic instruments like a piano

FX PARAM	DESCRIPTION
DECAY	Decay time of the resonance
KEYTRACK	Faster decay at the higher frequency
WIDTH	Stereo spread of the resonators
MIX	Mix between dry and wet signal

CHORUS FX

Classic chorus effect, which creates wider, fatter or thicker sound.
Copying signal up to 4 times and playing them slightly delayed

FX PARAM	DESCRIPTION
RATE	Modulation rate frequency
DEPTH	Depth of the delay (pitch) modulation
LAYERS	Number of the chorus voices
MIX	Mix between dry and wet signal
DELAY	Pre-Delay for each voice

DELAY FX

Stereo delay effect with L/R spread and feedback

FX PARAM	DESCRIPTION
DELAY TIME	Delay Time in quarternotes, synced to the project tempo
RATIO	Negative and positive values reduce the L/R channels delay
FEEDBACK	Feedback from delay output to the input. Adds multiple repeats
FEEDBACK MODE	Set which channel feedback is taken from
DAMPING	LP filter for progressive damping of each delay repeat
MIX	Mix between dry and wet signal

REVERB FX

Algorithmic reverb emulating digital reverb

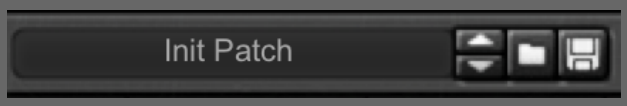
FX PARAM	DESCRIPTION
TIME	Length of the reverb tails
PRE DELAY	Initial delay before reverb effect
DAMPING	Loss of the high frequencies in the reverb tail
MIX	Mix between dry and wet signal

LIMITER & **MAXIMIZER** FX

Algorithmic reverb emulating digital reverb

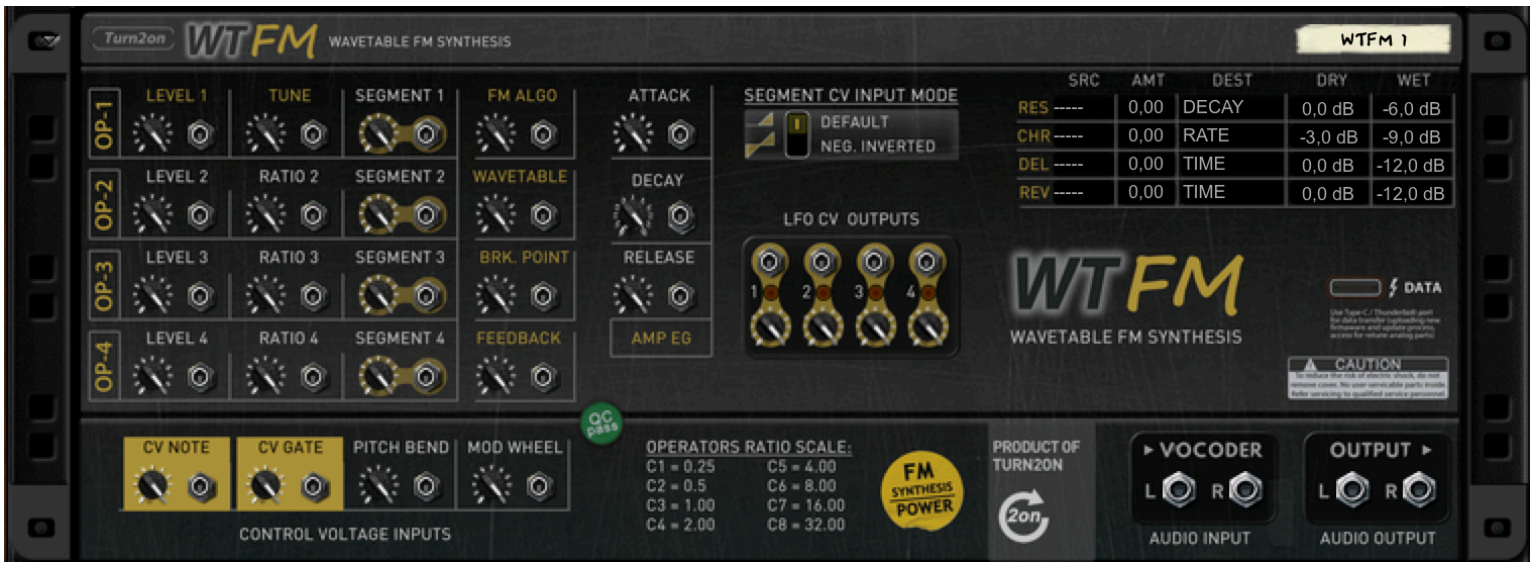
FX PARAM	DESCRIPTION
RELEASE	Recovery time
MODE	Select limiter mode: Soft knee, Hard knee, Hard clipping
MAXIMIZE	Maximizer mode boost and compress the input to the limiter
DRIVE	Maximizer Input level

PATCH BROWSER



Used to open the patch library with categories, load built-in patches, or save your own patches.

REAR SIDE PANEL



CV INPUTS

LEVEL (1/2/3/4): Inputs for Operators Level modulations

TUNE (OP-1) ***/ RATIO*** (OP-2..OP-4): Inputs for Operator Tune/Ratio modulations

SEGMENT (OP-1..OP-4): Inputs for Operator Wavetable Segment modulations

FM ALGO: Input for Algorithm modulation

WAVETABLE: Input for Wavetable selection modulation

BRAKE POINT: Input for the high frequency damping keytrack modulation

FEEDBACK: Input for the FM Feedback modulation

ATTACK AMP EG: Input for the Global Attack Amp modulation
DECAY AMP EG: Input for the Global Decay Amp modulation
RELEASE AMP EG: Input for the Global Release Amp modulation

CV NOTE: Input for the CV Note control signal
CV GATE: Input for the CV Gate control signal

PITCH BEND: Input for the CV signal to control PICHBEND
MODWHEEL: Input for the CV signal to control MODWHEEL

WT *SEGMENT CV INPUT MODE*:
DEFAULT MODE: Unipolar modulation (0..+1)
NEGATIVE INVERTED: Bipolar modulation (-1..0..+1) with invertion of the modulation in the loop. (Like a "normal->inv->normal->inv->infinity")

CV OUTPUTS

LFO CV OUTPUTS:
Outputs of the LFO 1 /2 / 3 / 4
With lamp indication of the LFO rate activity and Trim pots to control CV output level.
Mainly, LFO CV outputs created to modulate WT segments

FX MODULATION MATRIX TABLE

	SRC	AMT	DEST	DRY	WET
RES	-----	0,00	DECAY	0,0 dB	-6,0 dB
CHR	-----	0,00	RATE	-3,0 dB	-9,0 dB
DEL	-----	0,00	TIME	0,0 dB	-12,0 dB
REV	-----	0,00	TIME	0,0 dB	-12,0 dB

Matrix includes 4 rows for Resonator, Chorus, Delay & Reverb:
Source: *set one of the modulation sources for each effect.*
Amount: *set modulation depth to the selected FX parameter.*
Destination: *Set what fx parameter to modulate*

DRY: *set level of the incoming signal to the effect*
WET: *set level of the processed signal by the effect*

INPUTS & **OUTPUTS**

VOCODER INPUTS:
audio inputs for an external signal routed to the Vocoder FX. It is also possible to use other fx as an external signal.

OUTPUTS:
main stereo audio output of the synthesizer

WTFM

Wavetable FM Synthesizer

Available in the Reason Shop

Re Rack Extension

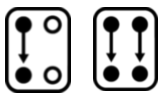
Wavetable libarary of WTFM is based on:

- Wavetables and waveforms manually created from scratch;
- Open libraries under the CC0 public domain license (No Copyright): WaveEdit, Free Wavetables by Taro Kimura and other open public sources with CC0 public domain licenses.

https://creativecommons.org/publicdomain/zero/1.0/

WTFM Synthesizer does not include any samples at all.
All wavetables use the spectrum at equally spaced points of the waveforms

CONNECTIONS:



The device also a True-Stereo effect. For Mono input, the device produces mono output. For Stereo input, the device sums the Left and Right channels before applying the effect. The output is in Stereo.

Turn2on

Rack Extension Developer

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- MrFigg (Cameron Jeffrey)
- Despondo (Philip Meadows)