PLUGFREAK



Subharmonic synthesizer

User Manual - Version 1.0.0

plugfreak.com

Windows 10/11 | 64-bit VST3

START HERE

Contents

SUBWAVE is a two-oscillator subharmonic bass synthesizer. Each oscillator has two sub-oscillators. Two 8-step pitch sequencers and eight rhythm dividers let the two voices move in different rhythms. SUBWAVE makes sound and also sends sequencer notes as MIDI.

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> **GENERAL CONTROLS**
> Double-click a knob to return it to its default. Hold SHIFT while dragging a sequencer step knob for exact 1-semitone changes. All musical controls are host-automatable VST parameters.

Windows 10/11, 64-bit VST3. User Manual - Version 1.0.0.

01 | SETUP

Quick start

Install SUBWAVE

1 Close your DAW. Unzip the SUBWAVE download.

2 Copy the **SUBWAVE.vst3 folder** to C:\Program Files\Common Files\VST3\. Do not rename the .vst3 bundle.

3 Open your DAW and rescan plugins if needed. Find SUBWAVE in the instrument list under PLUGFREAK.

4 Load SUBWAVE on an instrument track. Play it from a MIDI keyboard, or use its internal sequencers.

Trial and activation

CONTROL	FUNCTION
TRIAL	The 10-day full-function trial starts automatically on first use. That first start needs an internet connection. There is no trial button or account step.
LICENSE	Click LICENSE at the top right. Paste your License Key, then click ACTIVATE. Copy and send your Machine Code if requested. See page 14.
USER PRESETS	Install the 27 included preset files separately from licensing. Copy them into Documents\Plugfreak\SUBWAVE\Presets, then reopen the plugin. See page 13.

First sound

Select a preset, or raise VCO VOL in OSC 1 and set MASTER VOL above zero. Play a MIDI note to hear the instrument. For a sequence, turn DAW SYNC off and press PLAY. Enable SEQ1 in at least one RHYTHM cell, enable VCO 1 in SEQ 1, and give the step knobs different pitches.

> **TIP**
> Start with one oscillator and one rhythm. Add SUB1 VOL or SUB2 VOL to hear undertones, then bring in OSC 2 and a different rhythm for SEQ 2.

02 | MAP

Interface overview

The numbered markers identify the main areas in the current SUBWAVE interface. The image is the actual interface; only the markers have been added.



1 / 2 OSC 1 / OSC 2 - main oscillators and sub-oscillators (page 7).

3 TRANSPORT / CLOCK - tempo, transport and clock ranges (page 6).

4 FILTER / ENVELOPES - shared VCF, VCA and output controls (page 8).

5 / 6 SEQ 1 / SEQ 2 - pitch, divider routing and octave values (page 9).

7 RHYTHMS - eight divider cells and SEQ1 / SEQ2 / OCT routing (page 10).

8 PATCH BAY / MOD MATRIX - eight modulation routes (page 11).

9 DUAL LFO - two modulation oscillators (page 12).

10 Top bar - presets, RESET ALL, ROOT and SCALE (pages 6 and 13).

11 LICENSE - trial and paid activation (page 14).

03 | SOUND AND TIMING

How SUBWAVE works

One shared signal path



The main oscillator and two sub-oscillators in each voice are mixed together. Both voices then pass through one common filter (VCF) and one common amplifier (VCA). The VCF and VCA each have one shared envelope. MASTER VOL sets the output level.

Whole-number undertones

A sub-oscillator plays the main oscillator frequency divided by its SUB1 DIV or SUB2 DIV value. Dividers are whole numbers from /1 to /16. For a 440 Hz main oscillator:

DIVIDER	SUB-OSCILLATOR FREQUENCY
/2	220 Hz
/3	146.667 Hz
/4	110 Hz
/8	55 Hz
/16	27.5 Hz

Rhythms advance the sequencers

The master rhythm clock feeds eight divider cells. Each cell can advance SEQ 1, SEQ 2 or both. The sequencers then move the selected main-oscillator pitches and/or sub-oscillator dividers. Different rhythm assignments create different timing for the two sequencers.

> **SHARED ENVELOPES**
> Every real SEQ 1 or SEQ 2 step triggers both envelopes. If both sequencers step at the same moment, the envelopes trigger once. See pages 8-10.

04 | GLOBAL CONTROLS

Transport / clock and top bar

CONTROL	FUNCTION
DAW SYNC	Follows the host tempo and transport. The HOST readout shows the host state and tempo.
PLAY	Starts or stops the internal clock manually when DAW SYNC is off.
Tempo number / arrows	Set manual tempo with the large tempo control and its up/down arrows. The manual tempo range is 20 to 3000 BPM.
SEQ OCT	Sets the pitch-knob range for both sequencers: +/- 1 OCT, +/- 2 OCT or +/- 5 OCT.
RHY CLOCK	Sets the global rhythm-clock speed: 1x, /2, /4 or /8.
ROOT	Selects C, C#, D, Eb, E, F, F#, G, Ab, A, Bb or B. It transposes everything even when SCALE is OFF. C is 0 semitones; G is +7. Double-click ROOT to return to C.
SCALE	Selects OFF, CHROMATIC, MAJOR, MINOR, DORIAN, PHRYGIAN, LYDIAN or MIXOLYDIAN. With a scale selected, pitch is quantized to ROOT and SCALE.
RESET ALL	In the top bar beside the preset controls. Returns the instrument to its default state.
USER PRESETS / arrows	Select a saved patch or move to the previous/next preset. SAVE, SAVE AS and DELETE are explained on page 13.
LICENSE	Opens licensing. The small status label above it shows the current license state. See page 14.

ROOT IS ALWAYS ACTIVE
Choosing SCALE = OFF disables scale quantization, but does not disable ROOT transposition.

Two different clock controls

The tempo sets the basic speed. RHY CLOCK scales the rhythm clock globally. Each RHYTHM divider then sets its own pulse spacing within that shared clock. Changing SEQ OCT changes pitch-knob range, not clock speed.

05 | OSCILLATORS

OSC 1 and OSC 2

Each oscillator has a main VCO and two sub-oscillators. OSC 1 and OSC 2 have independent tuning, level and divider controls.

CONTROL	FUNCTION
WAVE	Chooses SQUARE, PULSE / SUB SAW PWM or SAW. **SQUARE:** The main oscillator and both sub-oscillators are square (pulse) waves, with 50% duty by default. A Patch Bay route to VCO1 PWM or VCO2 PWM sets the pulse width of the main oscillator and both sub-oscillators together. **PULSE / SUB SAW PWM:** SUB1 and SUB2 are sawtooth waves. The main oscillator is a pulse wave whose width is moved automatically by the SUB1 saw. The duty cycle swings around 50%, roughly between 14% and 86%. A Patch Bay route to VCO1 PWM or VCO2 PWM overrides this automatic movement. **SAW:** The main oscillator and both sub-oscillators are sawtooth waves.
TUNE	Sets the main oscillator pitch offset in semitones.
VCO VOL	Sets the level of the main oscillator.
SUB1 DIV	Sets sub-oscillator 1 frequency to the main frequency divided by a whole number from 1 to 16.
SUB2 DIV	Sets sub-oscillator 2 frequency to the main frequency divided by a whole number from 1 to 16.
SUB1 VOL	Sets the level of sub-oscillator 1.
SUB2 VOL	Sets the level of sub-oscillator 2.
SYNC TO SEQ1	OSC 2 only. Makes OSC 2 ignore SEQ 2 and take the same pitch as OSC 1 from SEQ 1. SEQ 2 remains available as a Patch Bay modulation source.

Dividers set pitch; volume sets the blend

For a 440 Hz oscillator, SUB1 DIV = /2 gives 220 Hz and SUB2 DIV = /3 gives about 146.667 Hz. The sub-oscillators remain whole-number divisions of the main oscillator. Use SUB1 VOL and SUB2 VOL to decide how much of each undertone enters the shared signal path.

Sequence pitch or sequence the dividers

What the SEQ checkboxes do:

VCO 1 (or VCO 2): the sequence moves the pitch of the main oscillator, your melody.

SUB 1 / SUB 2: the sequence moves that deeper note instead, by changing its divider. You can tick one, both, or neither.

> **TIP**
> Turn both sub-oscillator levels down, set TUNE and WAVE, then raise one sub-oscillator level at a time. This makes the effect of each divider easier to hear.

06 | SHARED SOUND SHAPING

Filter / envelopes

The FILTER / ENVELOPES strip shapes the combined sound of both oscillators and all four sub-oscillators.

CONTROL	FUNCTION
CUTOFF	Sets the shared filter cutoff.
RESONANCE	Sets emphasis around the cutoff frequency.
VCF EG AMT	Sets how much the VCF envelope moves the cutoff.
VCF ATTACK	Sets filter-envelope attack from 1 ms to 10 s.
VCF DECAY	Sets filter-envelope decay from 5 ms to 10 s.
VCA ATTACK	Sets amplifier-envelope attack from 1 ms to 10 s.
VCA DECAY	Sets amplifier-envelope decay from 5 ms to 10 s.
DRIVE	Sets the drive amount in the shared sound-shaping strip.
MASTER VOL	Sets final output level after the shared VCA.

Sequencer triggering

Every real step from either sequencer triggers the VCF and VCA envelopes together. Simultaneous SEQ 1 and SEQ 2 steps trigger them once. The audible sequencer note length is shaped by VCA DECAY and VCF DECAY.

Playing a MIDI keyboard

A MIDI note gates both envelopes: attack, then hold while you keep the key down. Releasing the key moves the envelopes into decay. The same shared envelopes shape both voices.

> **TIP**
> For shorter sequenced notes, shorten VCA DECAY. Use VCF EG AMT and VCF DECAY to shape how the filter opens and closes during the note. Short envelope times are reached early in the knob travel.

07 | PITCH AND DIVIDERS

SEQ 1 and SEQ 2

Both sequencers have eight steps. SEQ 1 normally moves OSC 1; SEQ 2 normally moves OSC 2. SYNC TO SEQ1 changes OSC 2 pitch routing as described on page 7.

CONTROL	FUNCTION
Step pitch knob	Sets the step pitch in semitones. SEQ OCT selects +/- 1, +/- 2 or +/- 5 octaves. Hold SHIFT while dragging for exact 1-semitone changes.
Step octave arrows	Store an octave value for each step. The range is -2 to +2. 0 adds no octave change. These values are heard only when an OCT-enabled rhythm pulse applies them.
Step LED / ACTIVE readout	Show the step currently playing. SEQ 1 ACTIVE and SEQ 2 ACTIVE do not show sequence length.
VCO 1 / VCO 2	Route the sequence to its main oscillator pitch.
SUB 1 / SUB 2	The sequence moves that deeper note instead, by changing its divider. You can tick one, both, or neither.
LENGTH	Sets the number of active steps from 1 to 8.
DIR	Chooses FORWARD, REVERSE, PENDULUM or RANDOM.
Blue i button	Opens the small help window for step dragging and SHIFT fine control.

Sub-oscillator routing keeps integer dividers

A divider is always a whole number from /1 to /16 (there is no /5.3). So when the sequence asks for a pitch change, the sub-oscillator jumps to the closest divider it can play. Example, sub-oscillator at /8 (55 Hz on a 440 Hz oscillator):

OFFSET WITH BASE /8	RESULTING DIVIDER
+12 semitones	/4
0 semitones	/8
-12 semitones	/16

sequence +12 semitones (one octave up): /4 = 110 Hz, exactly one octave higher

sequence 0: stays at /8 = 55 Hz

sequence -12 semitones (one octave down): /16 = 27.5 Hz, exactly one octave lower

sequence +7 semitones (a fifth up): the exact value would be /5.3, so it plays /5 = 88 Hz, which is a little more than 7 semitones above 55 Hz. This is part of the sound of the instrument: the sub-oscillator always plays the nearest note its whole-number divider allows.

MIDI output

SEQ 1 sends generated notes on MIDI channel 1; SEQ 2 sends on channel 2. ROOT transposition is included. Route SUBWAVE MIDI output using your DAW MIDI-routing controls.

> **OCTAVE VALUES NEED A RHYTHM**
> A step-octave arrow value does not change the sounding pitch by itself. Enable OCT in a RHYTHM cell to apply the stored octave layer. See page 10.

08 | POLYRHYTHMS

Rhythms

RHYTHM 1 through RHYTHM 8 divide one master clock. They stay in phase and meet again at common multiples. The three buttons beside each knob belong to that same rhythm cell.

CONTROL	FUNCTION
Divider knob	Sets this rhythm to a whole-number division from /1 to /16.
SEQ1	Makes this cell pulse advance SEQ 1.
SEQ2	Makes this cell pulse advance SEQ 2.
OCT	Applies the current step-octave values when this cell fires. It works independently of this cell SEQ1 and SEQ2 buttons.

Pulse spacing with RHY CLOCK = 1x

RHYTHM DIVIDER	TIME BETWEEN PULSES
/1	One 16th note
/2	One 8th note
/4	One quarter note
/8	One half note
/16	One 4/4 bar

RHY CLOCK = /2, /4 or /8 slows the shared rhythm clock by that factor. If several rhythms assigned to the same sequencer fire together, that sequencer advances once.

The OCT layer

An OCT-enabled pulse applies the current step-octave values and holds them until the next OCT-enabled rhythm pulse. If no rhythm has OCT enabled, the octave layer is 0. To hear it, set at least one active step octave to +1, -1, +2 or -2 and enable OCT in a rhythm.

> **TRY TWO RHYTHMS**
> Set RHYTHM 1 to /2 and enable only SEQ1 in that cell. Set RHYTHM 2 to /3 and enable only SEQ2 there. The two sequences now advance at different spacings while sharing the same master clock.

The Patch Bay can also change individual rhythm dividers through RHYTHM 1 DIV through RHYTHM 8 DIV.

09 | ROUTING

Patch bay / mod matrix

The right-hand column contains eight independent routes. Each route selects a SOURCE, a DESTINATION and a bipolar amount from -1 to +1. An amount of 0 adds no modulation.

Available sources

SOURCE GROUP	MENU ENTRIES
Sequence CV	SEQ1 CV; SEQ2 CV.
Envelopes	VCF EG; VCA EG.
Performance	VELOCITY; KEYTRACK; GATE.
Rhythm pulses	RHYTHM 1 through RHYTHM 8.
Modulation oscillators	LFO 1; LFO 2.
Disabled	OFF.

Available destinations

DESTINATION GROUP	MENU ENTRIES
Oscillator pitch / dividers	VCO1 PITCH; VCO2 PITCH. VCO1 SUB1 DIV; VCO1 SUB2 DIV; VCO2 SUB1 DIV; VCO2 SUB2 DIV.
Oscillator levels	VCO1 MAIN LEVEL; VCO1 SUB1 LEVEL; VCO1 SUB2 LEVEL. VCO2 MAIN LEVEL; VCO2 SUB1 LEVEL; VCO2 SUB2 LEVEL.
Filter / output	FILTER CUTOFF; FILTER RESONANCE; FILTER DRIVE; VCF EG AMOUNT; MASTER VOLUME.
Envelope times	VCF ATTACK; VCF DECAY; VCA ATTACK; VCA DECAY.
Sequence steps	SEQ1 STEP; SEQ2 STEP. SEQ1 STEP 1 through SEQ1 STEP 8; SEQ2 STEP 1 through SEQ2 STEP 8.
Events / clock	TRIGGER; SEQ1 CLOCK; SEQ2 CLOCK; RESET.
Rhythm dividers	RHYTHM 1 DIV through RHYTHM 8 DIV.
LFO rates	LFO 1 RATE; LFO 2 RATE.
PWM / disabled	VCO1 PWM; VCO2 PWM; OFF.

The next page explains the documented event, step and envelope-time behavior, plus the two LFO controls.

10 | MODULATION

Dual LFO and modulation behavior

DUAL LFO is at the bottom of the Patch Bay column. LFO 1 and LFO 2 are independent modulation sources; select either in a Patch Bay source menu.

CONTROL	FUNCTION
LFO 1 / LFO 2	Each has its own activity indicator, SYNC checkbox, waveform selector and rate slider.
SYNC	Selects synchronized LFO timing. With SYNC off, the rate readout is in Hz. With SYNC on, the rate selects one of 12 divisions: 4 BAR, 2 BAR, 1 BAR, 3/4, 1/2, 1/4, 1/4T, 1/8, 1/8T, 1/16, 1/16T, 1/32.
Waveform selector	Chooses SINE, SAW UP or SAW DOWN.
Rate slider	Sets this LFO rate. The readout shows the current setting. LFO 1 RATE and LFO 2 RATE are also Patch Bay destinations. With SYNC off, the free-mode range is 0.02 Hz to 20 Hz.

Event destinations

CONTROL	FUNCTION
TRIGGER	Fires the shared VCF and VCA envelopes once.
SEQ1 CLOCK	Advances SEQ 1.
SEQ2 CLOCK	Advances SEQ 2.
RESET	Sets both sequencers back to their first step. If RESET and a SEQ1 CLOCK or SEQ2 CLOCK arrive at the same moment, RESET wins.

Step modulation does not overwrite a preset

SEQ1 STEP and SEQ2 STEP affect whichever step is currently active. SEQ1 STEP 1 through 8 and SEQ2 STEP 1 through 8 address one particular step. These destinations change the sounding note while modulation is active; they do not rewrite stored steps or preset data.

Envelope-time modulation

For VCF ATTACK, VCF DECAY, VCA ATTACK and VCA DECAY, amount -1 reaches the shortest time, +1 reaches 10 s, and 0 leaves the knob setting unchanged. The minimum attack is 1 ms; the minimum decay is 5 ms.

> **START WITH ONE ROUTE**
> Choose LFO 1 as SOURCE and FILTER CUTOFF as DESTINATION, then increase the amount gradually. Choose SEQ2 CV instead for filter movement driven by the second sequence.

When SYNC TO SEQ1 is enabled for OSC 2, SEQ 2 can still provide SEQ2 CV for modulation even though OSC 2 no longer takes its pitch from that sequencer.

11 | STORAGE

Factory and user presets

The download includes 27 factory preset files, Preset 001 through Preset 027, ending in .pfsubpreset. Preset installation and license activation are independent.

Install the factory presets

1 Open SUBWAVE once. It creates Documents\Plugfreak\SUBWAVE\Presets.

2 Find the Presets folder included in your download.

3 Copy its .pfsubpreset files into Documents\Plugfreak\SUBWAVE\Presets.

4 Reopen SUBWAVE. The copied presets appear in USER PRESETS.

Top-bar preset controls

CONTROL	FUNCTION
USER PRESETS	Choose a saved patch from the menu.
Left / right arrows	Move to the previous or next preset.
SAVE	Overwrites the selected user preset. When no preset is selected, it behaves like SAVE AS.
SAVE AS	Asks for a name and saves the current patch as a new preset.
DELETE	Deletes the selected user preset after confirmation.
RESET ALL	Returns the instrument to its default state. It is beside the preset buttons in the top bar.

PRESET FILES
Keep the .pfsubpreset files in the SUBWAVE Documents folder. The VST3 installation folder and the preset folder serve different purposes.

Defaults and automation

Double-click a knob to restore its default. This also applies to tempo, sequencer steps, rhythm dividers and Patch Bay amounts. All musical controls are available as host-automatable VST parameters.

12 | HELP

Licensing and support

The first start of the automatic 10-day full-function trial needs an internet connection. For a purchased license, open LICENSE, paste your License Key and click ACTIVATE. Provide the Machine Code if requested. License keys use the prefix **SUBWAVE-**.

TOPIC	DETAILS
Computer limit	A license can be activated on up to three computers.
Move a license	Choose DEACTIVATE on the old computer, then ACTIVATE on the new one.
Offline use	After the last successful paid validation, SUBWAVE can work offline for up to one year. It quietly re-checks when a connection is available.
Validation request	Open SUBWAVE once while online. It unlocks within seconds; you do not need a new key.
Trial ended	SUBWAVE remains installed and loadable, but produces no sound until activated.

Troubleshooting

SUBWAVE is missing in the DAW. Check that the SUBWAVE.vst3 folder is in C:\Program Files\Common Files\VST3\ and that the DAW searches there. Rescan plugins.

A preset is missing. Copy the included .pfsubpreset files into Documents\Plugfreak\SUBWAVE\Presets, then reopen the plugin.

The sequencers do not advance. With DAW SYNC on, start the host transport. With it off, press PLAY. Enable SEQ1 or SEQ2 in at least one RHYTHM cell.

The octave arrows make no difference. Set a nonzero active step-octave value and enable OCT in a RHYTHM cell.

There is no sound. Check VCO VOL / SUB1 VOL / SUB2 VOL and MASTER VOL. If the trial has ended, open LICENSE and activate.

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