EASE PERFORMANCE AUTO-TUNING THRU-ZERO VCO

ENDORPHINES
GODSPEED NEW

CONTENT

WARRANTY

1-year warranty is guaranteed from the product's purchase date in case of any manufacturing errors or other functional deficiencies during runtime.

The warranty does not apply in case of:

→ damage caused by misuse

→ mechanical damage arising from careless treatment (dropping, vigorous shaking, mishandling, etc.)

→ damage caused by liquids or powders penetrating the device

→ heat damage caused by overexposure to sunlight or heating

→ electric damage caused by improper connecting

The warranty covers replacement or repair, as decided by us. Please contact us via email for a return authorization before sending anything. Shipping costs of sending a module back for servicing is paid by the customer.

VISIT US

https://endorphin.es

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https://www.instagram.com/endorphin.es/

https://www.modulargrid.net/e/modules/browser/vendor:167

For technical requests: **support@endorphin.es**

For dealer / marketing inquiries: **info@endorphin.es**

It is doing business as FURTH BARCELONA, S. L. (EU VAT ID: ES B66836487).

INTRO

NEW GODSPEED is a peak performance, compact 6hp VCO with complex analog waveshapers, auto-tuning and MIDI control. It is the successor module of the GODSPEED with the revolutionary, literally instant auto-tuning. The problem with all analog voltage controlled oscillators is that the applied 1v/oct pitch voltage might not match up exactly to what note's frequency they should generate and it'll end up sounding out of tune. What's worse is that even if you adjust for this you'll need to re-adjust as the instrument gets warmer. Now you will never be out of tune whether you are playing by 1v/oct or MIDI.

CONNECTING THE POWER

Before installing a new module in your case, ensure your power supply has a free power header and sufficient available capacity to power the module.
Connect the module directly to the power bus-board with supplied 10-16 ribbon cable like any other eurorack module. Pair of ***RED***/***BROWN*** pins on the multicolor ribbon cable corresponds to ***NEGATIVE -12 VOLTS***.
Make sure to align the power cable with the ***'RED/BROWN STRIPE'*** label on the module that corresponds to -12V, to the 10-pin connector and with typically a white line for the 16-pin connector on the bus board.

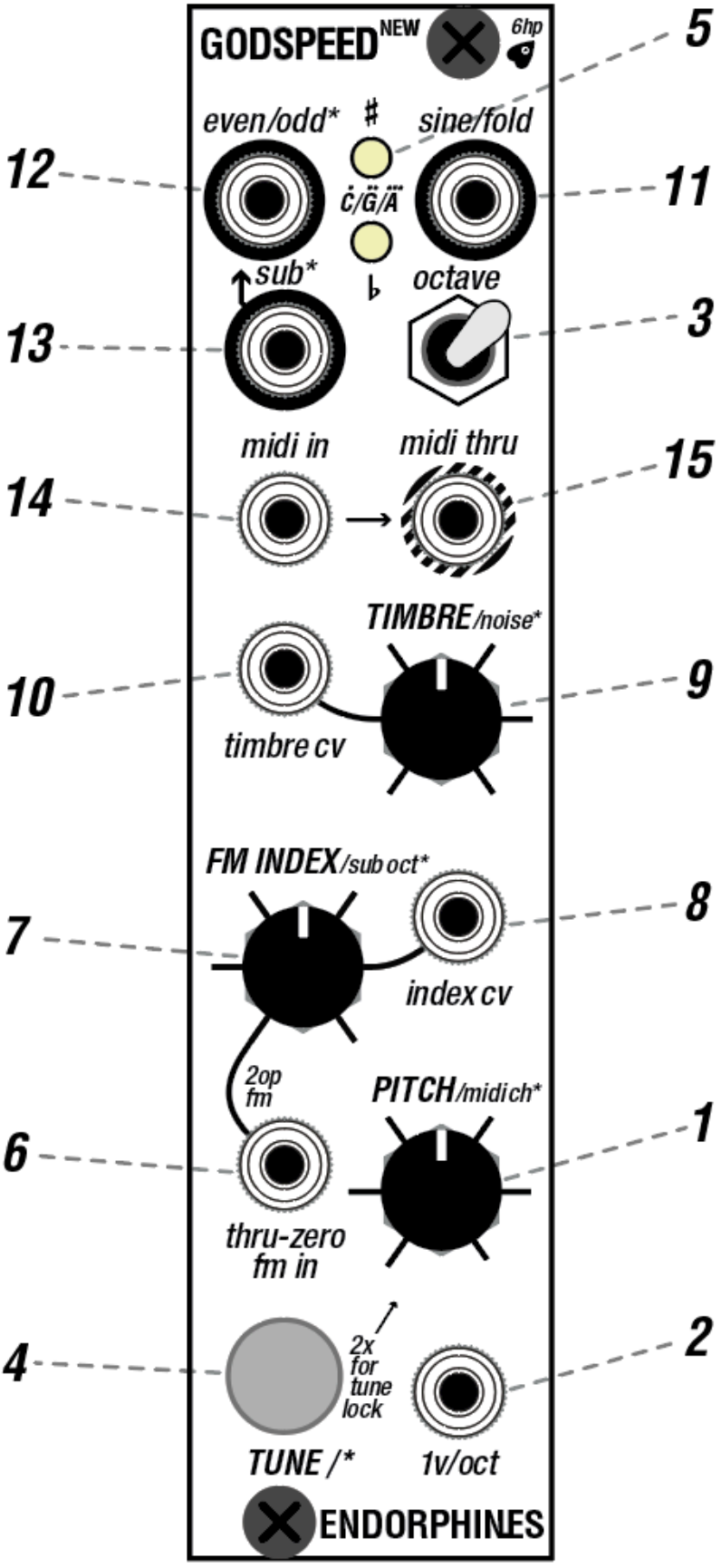
TECHNICAL SPECIFICATIONS

➝ **GODSPEED[NEW]**: +12V: 65 mA; -12V: 40 mA; 30mm depth (with ribbon cable inserted); horizontal width: 6HP

OVERVIEW

NEW GODSPEED is a new generation hybrid triangle core VCO for demanding musicians with zero live performance compromises: forget about the oscillators warming up and tune them instantly under 1v/oct pitch voltage or MIDI. Use your favorite 3.5mm TRS-MIDI standard A or B or put it into the MIDI THRU chain. Lock the pitch knob to not accidentally alter it. Based on our Strong Zero VCO core, advanced with an internal modulator, it delivers a powerful 2-operator FM voice on its own. Odd/even output has a pre-patched sub-oscillator with selectable sub octaves as well as a white noise generator for even deeper bass action while sine/wavefolder output will deliver you crispy west-coast tones. And finally - use the oscillator for creating your own tuned kick drums to sit them perfectly in phase with the bass.

INTERFACE


GODSPEED^NEW
6hp
5
even/odd*
sine/fold
12
11
ċ/G̈/Ä
sub*
octave
13
3
midi in
midi thru
14
15
TIMBRE/noise*
10
9
timbre cv
FM INDEX/sub oct*
7
8
index cv
2op fm
PITCH/midi ch*
6
1
thru-zero fm in
4
2x for tune lock
2
TUNE /*
1v/oct
ENDORPHINES

1. ***PITCH/midi ch* knob:*** is a manual frequency control with -/+2 octaves range. Adjustment goes in discrete chromatic semitone steps. Secondary ***/MIDI CHANNEL**** function (pressing and holding ***TUNE /**** while turning the knob from CCW to CW) will set the *INPUT MIDI CHANNEL*: from default OMNI at full CCW, to 1, 2 etc. up to 16 at full CW. Each channel change will shortly blink with the *TUNE* button LED.

2. ***1V/OCT jack:*** is unattenuated, unquantized, DC-coupled, exponential frequency modulation input that follows the 1-Volt-per-octave scale. Input range is -5...+5V (10 octaves). That's where your pitch CV from the sequencer or MIDI CV converter is expected to be applied. Can be used simultaneously with *MIDI IN jack* (14). When you apply some LFO with external attenuation will work as a vibrato. When you apply some decay envelope with external attenuation it will work as a pitch envelope for the kick drum.

3. ***OCTAVE switch:*** is a three position octave transpose selector: with -1, 0 and +1 octave shift

4. ***TUNE /* button:*** shortly press to instantly ***AUTOTUNE*** the oscillator's frequency to the nearest **C**, **G** or **A** notes. If you press that button after applying that certain note from the MIDI CV or your sequencer into ***1V/OCT jack*** (2) or ***MIDI IN jack*** (14), the oscillator will be tuned in exactly that note enabling its perfect pitch offset to be played with all the rest instruments. Double click the ***TUNE*** button to ***LOCK*** the ***PITCH knob*** (1) from accidental frequency altering during the live performance. When such *LOCK* is enabled, its **white** LED in the *TUNE* button is on and you may check that the pitch knob is no more influencing the oscillator's frequency. It will stay LOCKED on the next module's power up until you will unlock it with the double click. Long hold for 5 seconds to select the C, G or A notes scale: see ***TUNING LEDS*** (5) below.

5. ***TUNING LEDs:*** two LEDs by lighting up show the current VCO tune:

   → ♭○ if the frequency is lower than any closer C/G/A-notes

   → ○♯ if the frequency is higher than any closer C/G/A-note

   → ♭○ ○♯ if the frequency is in perfect tune with the selected C/G/A-note

   Long hold the ***TUNE button*** (4) for *5 seconds* will select the either C, G or A reference note: by blinking the ***TUNING LEDS*** (5):

   → ● **one** blink (by default) means that the tuning (and autotuning) works to the nearest ***C*** (*Do*) notes frequencies multiple to 261.63 or 523.26 Hz in both directions. Since in most MIDI CV interfaces C notes correspond to the whole voltage numbers (e.g. 0v, +1v, -3v etc), that becomes essential to even autotune to oscillator without pitch CV patch cable applied. Be sure as there might always be a small voltage offset from any sequencer or MIDI CV

interface so it is always recommended to autotune after you patched the pitch CV cable first.

→ ●● **two** blinks means that the autotuning works to the nearest ***G*** (*Sol*) notes, frequencies multiple of 392 Hz in both directions. Tuning to G notes would be interesting if you plan to use GODSPEED[NEW] in the lower range for tuned kick drums. Typical Roland® TR-909 kick drum would be tuned to 49-50 Hz which approximately corresponds to exact G note.

→ ●●● **three** blinks means that the autotuning works to the nearest ***A*** (*La*) notes frequencies multiple to the standard 440 Hz in both directions. A-440 is still a standard anyway.

→ ***HINT:*** selected note is saved and is restored on the next module's power up. Every time the module is powering up, the tuning LEDs show the selected note with a certain amount of blinks as shown with the amount of dots above C / G / A note letters on the panel: Ċ/G̈/Ä

6. THRU-ZERO FM IN jack: is an AC-coupled, thru-zero linear FM audio input with the expected modular input level approx -5...+5v. Its level is attenuated by the ***FM INDEX knob*** (7) and also by control voltage from the ***INDEX CV jack*** (8). Internal 'virtual' sine wave of identical frequency as the oscillator is applied when nothing is plugged into ***THRU-ZERO FM IN jack*** (5) making an efficient *2-operator FM tone-generator* with only a single GODSPEED[NEW] module.

7. FM INDEX/sub oct* knob: is a manual control over the amount (depth or index) of linear thru-zero modulation applied. Acts as attenuator when patch cable is present in the *INDEX CV jack* (8). Secondary ***/sub octave**** function (holding *TUNE* while turning *FM INDEX* knob) sets the frequency of the sub oscillator frequency at ***SUB JACK*** (13) from -1 octave (knob before noon to CCW) to -2 octaves (knob at noon) to -3 octaves (knob after noon to CW).

8. INDEX CV jack: 0…+5V external CV control over the FX INDEX (7). Normalled to +5V when no patch cable is present.

9. TIMBRE/noise* knob: is a manual 'macro' control over the amount of wavefolder applied to SINE/FOLD jack (11) and waveshaping applied at EVEN/ODD jack (12). Acts as attenuator when patch cable is present at *TIMBRE CV JACK* (10). Secondary ***/noise**** function (holding *TUNE* while turning *TIMBRE/noise** knob) adjusts the level of the ***WHITE NOISE*** added to the *EVEN/ODD* jack (12): from no noise at CCW to high volume at CW.

→ ***HINT:*** medium noise levels will add rough character to the tone while high volume level is useful for drum synthesis with the oscillator defining the drum tune.

10. TIMBRE CV jack: 0…+5V external CV control over the *TIMBRE* (8). Normalled to +5V when no patch cable is present.

11. SINE/FOLD output jack: is a pure sine output of the VCO. Folds when *TIMBRE* (9) or associated *TIMBRE CV* (10) is applied. That output recreates a typical west-coast hollow tone and creates a famous *bongo* sound when patched further into the pingable lo-pass gates while modulating *TIMBRE* or *FM INDEX.* Output signal level: up to +/-5V.

12. EVEN/ODD output jack: output wave rich of even harmonics. Transforms into a wave rich of odd harmonics when *TIMBRE* (9) or associated *TIMBRE CV* (10) is applied.

Don't try to find standard synth waveforms here. It is good to understand however that even side is closer to the sawtooth (sounds warmer) and the odd part is closer to the squarewave (sound colder).

That even/odd combo has additionally pre-patched or 'normalled' sub oscillator from ***SUB JACK*** (13) and internal white noise added (see ***TIMBRE/noise**** (9) secondary function). That output recreates a typical single oscillator monosynth tone (a.k.a. *SH-101*) ready to be used as a bass or lead when patched further in the *VCF*. Output signal level: up to +/-5V.

13. SUB jack: is a simple square waveform with two, four and eight times lower the frequency of the main waveforms. Is normalled (pre-patched) to upper *EVEN/ODD* jack (12) to enable richer bass sounds.You may select the sub oscillator octave by holding the ***TUNE*** (4) while turning *FM INDEX* knob (7): from -1 octave (knob before noon to CCW) to -2 octave (knob around noon) to -3 octaves (after noon to CW). Output signal level: +/-5V.

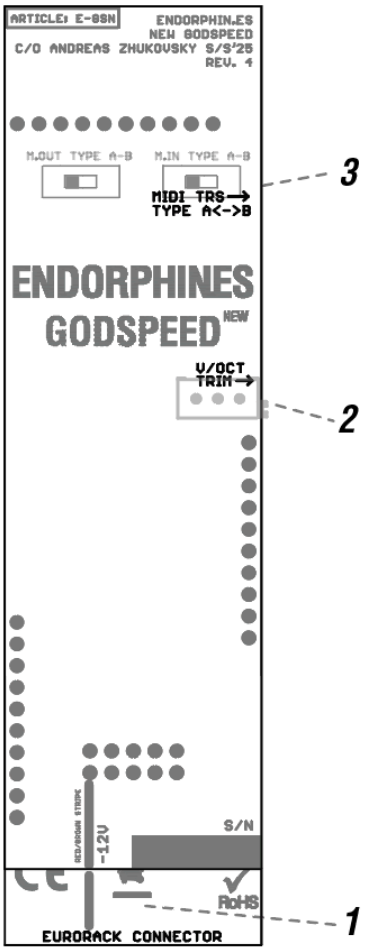
→ ***NOTE:*** to have the ***EVEN/ODD*** (12) cleaner with a deeper low end - the *SUB OSCILLATOR* normalled from ***SUB JACK*** (13) is not affected by the linear thru-zero frequency modulation (but it is affected by all the 1v/oct, pitch, octave shirt and MIDI notes).

→ ***HINT:*** to have purer waveform from *EVEN/ODD* output (12), simply plug a *dummy cable* into the ***SUB jack*** (13) so it will not be summed there.

14. MIDI IN jack: is 3.5mm *TRS MIDI* input jack with selectable type A or B MIDI standard (see ***TRS MIDI A/B STANDARDS*** below).

15. MIDI THRU jack: is 3.5mm *TRS MIDI* output jack with selectable type A or B MIDI standard (see ***TRS MIDI A/B STANDARDS*** below). It simply mirrors (duplicates, buffers) all the MIDI events which come to ***MIDI IN*** jack (14) so you may conveniently put the GODSPEED[NEW] inside the MIDI chain.

REAR CONNECTIONS



1. ***POWER CONNECTOR:*** is 10 pin standard +/-12V ***eurorack*** power connector with reverse polarity protection. Side pair or brown/red pins correspond to -12V which is marked with the white bold line on the backside.
2. ***V/OCT TRIMMER:*** is a multi-turn trimmer to adjust ***1V/OCT input jack*** (2) to a proper 1 volt-per-octave scale. Every module comes factory pre-tuned to have a proper tracking: that means increasing the voltage on the input jack by 1 volt will double the frequency of the oscillator. Increasing by 2 volts will quadruple the frequency etc. You should expect good tracking over 5 and more octaves. If you consider your tracking is slightly off - refer to our video tutorial on 1v/oct calibration: https://www.youtube.com/watch?v=CHWN2ur-OGk
3. ***MIDI TRS TYPE A/B:*** those are two switches located in the inner part of the module. Each switch selects if a certain MIDI jack: MIDI IN (M.IN) or MIDI OUT (M.OUT) is by standard A or B. You may set different standards on the MIDI I/O jacks so the module will also work as an A to B or vice-versa TRS-MIDI

standard converter. For setting the appropriate jack to a certain TRS MIDI standard:

➞ Power off your modular system, take the GODSPEED[NEW] module from the case. You may separate its two boards or just look at its side in the area behind the MIDI jacks. You may find two slide switches - one switch per jack.

➞ set the slide switch to the ← ***LEFT*** for standard **A**, and to the ***RIGHT***→ for standard **B**.

➞ merge back the module boards and place the module back into the rack

See more in the ***TRS MIDI A/B STANDARDS*** paragraph below.

TRS MIDI A/B STANDARDS

Because of historical reasons, some companies have chosen TRS MIDI standard A while others have chosen B. See the full companies' standards list within the following link: https://minimidi.world. The only difference between TRS MIDI A and B is they have swapped TIP and RING contacts.
GODSPEED[NEW] supports both TRS-MIDI A and B standards set for its MIDI IN and MIDI THRU jacks separately by selecting with two switches inside of the module.

MIDI STANDARD – TYPE A
Used by Akai, Bastl, Befaco, Novation, Knobula, Korg etc.
DIN-5 MIDI pinout:

➞ PIN 4 – RING (current source)

➞ PIN 5 – TIP (current sink)

➞ PIN 2 – SLEEVE (shield)

MIDI STANDARD – TYPE B
Used by Arturia Beatstep Pro, 1010Music, ALM, Polyend, VPME etc.
DIN-5 MIDI pinout:

➞ PIN 4 – TIP (current source)

➞ PIN 5 – RING (current sink)

➞ PIN 2 – SLEEVE (shield)

➞***NOTE:*** the MIDI-TRS adapter is NOT included with the module. You can use any third party ones - just ensure to switch to the proper standard behind the module. Example of the TRS-MIDI type B adapter from our webshop:

https://www.endorphin.es/accessories/p/35mm-midi

HOW AUTOTUNING WORKS

GODSPEED[NEW] has the fastest, nearly instant auto-tuning system so you may start playing with it without any warming up or using external guitar tuners.

Whether you will use 1 volt per octave pitch CV or MIDI, playing with any VCO requires you to offset its frequency so it will coincide with the notes you are playing with the rest of the instrument and generic scale.

The theory or operation is the following: first time you start to play you send a reference note from your sequencer, DAW or MIDI CV interface. Such notes may be default **C** (*Do*), **G** (*Sol*) or **A** (*La*).

After you play that note over *MIDI* or *pitch CV* - the oscillator shifts to a certain frequency which we still don't know yet. And we even don't need to know because not everyone has an absolute pitch or a tuner at hand. We also may be busy on stage, disturbed or nervous by the public. That's where the magic starts: after you press the *TUNE* button, the oscillator stays in perfect *C*, *G* or *A* note - done. You may then *DOUBLE CLICK* on the *TUNE* button then to *LOCK* it - so we will not accidentally touch the knob during performance altering the tune. Instead we may safely wiggle with the patch cables, *TIMBRE* and *FM INDEX* knobs and have fun.

LOCK, tune adjustment and *tuning note* are remembered on the next module's power up so you may not even need to retune your oscillator anymore. Yet - better to double check before you play but with time you will notice how little you care about the tuning because it always remains in the perfect one.

MIDI IMPLEMENTATION CHART

PARAMETER	***RANGE***
NOTE ON	128 MIDI notes: 0…127 (from approx. 8 hz to approx. 14kHz)
NOTE OFF, VELOCITY	ignored
RECEIVING MIDI CHANNEL	OMNI, 1…16 (17 values in total. Output / transferring MIDI channel is always the same as coming from receiving MIDI channel
CC, CLOCK	none, passing thru
MIDI THRU	always enabled

CREDITS

ENDORPHIN.ES – GODSPEED^NEW

Module idea, concept and manual by Andreas Zhukovsky
Hardware design, code direction by Andreas Zhukovsky
Core engine programming by BSVi
MIDI, hybrid waveshapers, optimisation and full code rework by Matim
Beta testing by Daniele Giannattasio
ENDORPHIN.ES are made in Barcelona province, Spain
Follow, like, post and tag us at Instagram: @endorphin.es

COMPLIANCE

FCC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes / modifications not approved by ENDORPHIN.ES doing business as Furth Barcelona, S.L. could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

CE

This device meets the requirements of the following standards:

EMC: 2014/30/EU EN55032: 2015 ; EN 55103-2: 2009 (EN55024) ; EN61000-3-2; EN 61000-3-3

Low Voltage: 2014/35/EU EN 60065: 2002+A1: 2006+A11: 2008+A2 :2010+A12: 2011

RoHS2: 2011/65/EU

WEEE: 2012/19/EU