GHOST ENDORPHINES x Andrew Huang User Guide
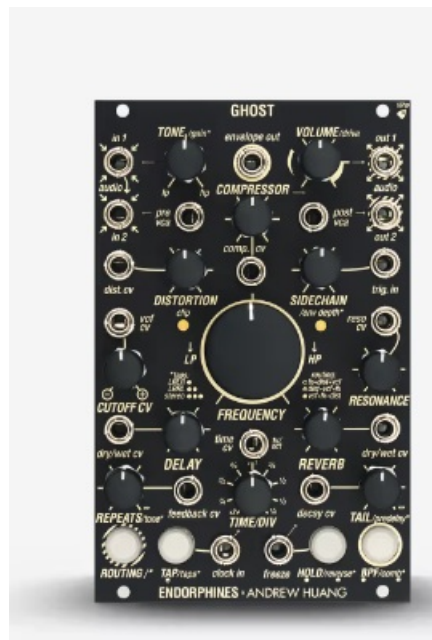
GHOST ENDORPHINES x Andrew Huang

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
https://youtube.com/user/TheEndorphines
https://facebook.com/TheEndorphines
https://twitter.com/endorphin_es
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**
ENDORPHIN.ES is a registered trademark.
It is doing business as FURTH BARCELONA, S. L. (EU VAT ID: ES B66836487).

- 16hp digital audio processing unit without fixed structure: intuitively create astonishing and ephemeral timbres: from atmospheric rumbles to heavy or distorted textures
- creative stereo effect processor with delay, reverb, filter and distortion with quickly explorable routing chain with a single button press
- matrix of micro-modulations creates infinite, alive and unexpected interactions of controls
- lush hall and whooshing reverse reverbs with audio freeze and pre-delay

- sidechain audio ducking with trigger input and one knob single band compressor
- new generation ARM Cortex-M7 processor with 96 kHz 32 bit internal processing
- zero-delay feedback state-variable filters: bipolar low-pass / high-pass, band-pass and alternative comb filter with resonator
- tap delay with external clock and clock divider, 1v/oct time control for Karplus-Strong, various taps settings with up to 2,5 sec. maximum delay time
- 8x oversampled distortion algorithm
- pre- and post- VCA controls. Tone and Volume controls with extra gain/drive reserve

INTRO
In collaboration with Andrew Huang, based on his modern music production techniques we developed a creative audio processor with multiple blocks that can be moved around in order to achieve different flavors for sound design.
GHOST is a fully digital stereo processing unit without a fixed structure in 16hp: intuitively create astonishing and ephemeral timbres, from atmospheric rumbles to heavily distorted textures.
The extremely flexible audio chain consists of a delay, reverb, multimode filter and distortion, where the order of these audio processing blocks can be easily switched with a single press of a button.
The ability of the delay to self-oscillate at audio rate frequencies, track 1v/oct signals, be processed by onboard VCAs and an envelope make GHOST a complete Karplus-Strong Synthesis voice in itself.

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 -12V.
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

- Width: 16 HP/TE, depth: 25 cm / 1" with inserted ribbon cable
- Current draw: +12V: 130 mA, -12V: 35 mA
- Audio I/O: 96 kHz 16 bit with 32 bit floating point internal processing
- CV capture: 16 bit, 2 kHz
- CV range: 0…+5V typically with up to 0…+10V. -5…+5V for 1v/oct and VCF.
- Audio input range: typical eurorack standard +/-5V (10Vpp) with up to 18Vpp when saturation starts (at around +21 dBu).
- audio output: typical +/-5V eurorack standard

INTERFACE
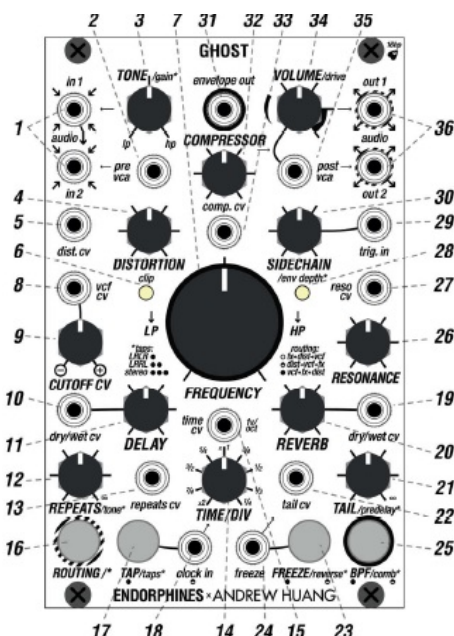
FRONT PANEL CONTROLS

1. **IN 1, IN 2 JACKS:** stereo audio inputs, INPUT 1 (typically left) – is normalled, i.e. pre-routed • to INPUT 2 (right) when no audio cable is present on INPUT 2. Typical input audio level: eurorack modular +/-5V with maximum up to +/-9V when saturation starts with higher audio amplitude.

2. **PRE-VCA CV INPUT JACK:** external 0…+5V CV input that controls the amplitude of the incoming stereo signal. Normalled to +5V when no patch cable is inserted.

3. **TONE/GAIN* KNOB:** multi-function knob. By default it acts as a 6db/oct TILT EQ for low and high frequencies (CCW and CW respectively) with no effect when the knob is at 12 o'clock. Secondary function is a gain boost for incoming audio, activated by turning while holding the ROUTING button. Fully CCW the signal is at its original level – turn CW to boost.

4. **DISTORTION KNOB**: manual control over the distortion level. Is summed with an external CV applied to the DIST. CV jack.

5. **DISTORTION CV JACK**: external 0…+5V control over the distortion level.

6. **CLIP LED:** lights up when clipping occurs at the distortion stage.

7. **FREQUENCY KNOB:** manual control over the FILTER CUTOFF.

8. **VCF CV INPUT JACK:** -5V…+5V CV input for the FILTER CUTOFF. The polarizer CUTOFF CV knob defines its amount, mixed with the setting of the FREQUENCY knob.

9. **CUTOFF CV KNOB:** polarizer / attenuverter for incoming CV to the FILTER CUTOFF.

10. **DELAY DRY/WET CV JACK:** 0…+5V external CV input for the DRY/WET mix of the delay effect. Normalled to +5V when no patch cable inserted.

11. **DELAY KNOB:** manual control of the DRY/WET MIX OF THE DELAY effect, acts as attenuator for DRY/WET CV jack.

12. **REPEATS/TONE* KNOB**: manual control over REPEATS or FEEDBACK level of the delay. Turn it fully CW for self-oscillation. Secondary /TONE* function (holding ROUTING while turning REPEATS/TONE*) adjusts the LOW-PASS FILTER after the WET output of the delay chain. Is summed with an external CV applied to the REPEATS CV jack.

13. **REPEATS CV JACK: 0**…+5V external CV input for the feedback control of the delay effect.

14. **DELAY TIME/DIV KNOB:** manual control of the delay time, from short audio rate repeats CCW and longer

taps CW. When an external clock is present at the CLOCK IN jack, the knob acts as a divider / multiplier for this clock with the divisors written around the knob on the panel.

15. **TIME CV INPUT JACK:** -5…+5V external CV control for the speed of the delay's repetitions, follows 1v/oct tracking. Is inversely summed with the TIME/DIV knob value when no external CLOCK IN applied: higher CV values shorten the delay time and lower values increase the delay time. When the delay is synchronized to external CLOCK IN, that CV sets the clock divider also summed with the value of TIME/DIV knob.

16. **ROUTING /* BUTTON**: routing chain switching as well as multifunction shift button. Short presses will cycle through three different orders of audio effects (see FX CHAIN STRUCTURE). Acts as a 'shift' button when held down while using other controls (shift functions are labeled with /* on the panel).

17. **TAP/TAPS* BUTTON:** acts as a tap tempo button for the delay speed. When internal clock is enabled (no patch cable connected) this button blinks fully lit, shown by the symbol under it: . When external clock is patched, the button blinks semi-lit shown by the symbol under it: . Secondary function (ROUTING + TAPS) changes the stereo behavior of the taps produced by the delay. Available delay tap configurations are:

LRLR: left and right summed, taps 1 and 3 hard panned left, taps 2 and 4 hard panned right.

LRRL: left and right summed, taps 1 and 4 hard panned left, taps 2 and 3 hard panned right.

STEREO: left and right inputs tap independently in their corresponding left and right outputs. In this mode the total delay time is halved.

18. **CLOCK IN JACK:** 0…+5V external input for the clock that sets the TEMPO of the delay. External clock sets the delay time in sixteenth notes. Module switches to external clock automatically when a patch cable is inserted in the CLOCK IN jack: TAP button blinks semi-lit following the incoming clock.

19. **REVERB DRY/WET CV JACK**: 0…+5V external CV control over the DRY/WET MIX OF THE REVERB. Normalled to +5V when no patch cable is inserted.

20. **REVERB KNOB:** manual control of the REVERB DRY/WET mix level, acts as attenuator for DRY/WET CV jack.

21. **TAIL/PREDELAY* KNOB:** primary function controls the decay of the REVERB's TAIL, Secondary function in combination with ROUTING /* button controls the AMOUNT OF PRE-DELAY for the reverb. Is summed with an external CV applied to the TAIL CV input jack.

22. **TAIL CV INPUT JACK**: 0…+5V external CV input for the DECAY of the reverb.

23. **HOLD/REVERSE* BUTTON:** primary function holds or freezes the reverb, allowing you to 'hold' a part of audio until you press this button again. When hold is enabled, this button is fully lit, shown by the symbol under it: . Secondary function in combination with ROUTING /* button switches the algorithm to REVERSE REVERB. When reversed reverb is activated, the button is semi-lit, shown by the symbol under it:

When REVERSE REVERB is activated, a single HOLD button press along with FREEZE trigger input activates and deactivates delay freeze

(recirculating delay buffer audio).

24. **FREEZE JACK: 0…**+5V external trigger input to enable the HOLD of the reverb. Has a latch action: each consequent trigger either enables or disables the freeze.

25. **BPF/COMB* BUTTON**: switches the filter type from default STATE-VARIABLE FILTER LP/HP to BAND-PASS filter and back. When band-pass filter is enabled, this button is fully lit shown by the symbol under it: . Secondary function switches to COMB FILTER with resonator by using the ROUTING + BPF/COMB* button combo. When the COMB FILTER is activated, the button is semi-lit, shown by the symbol under it: . A second press on the button switches back to the LP/HP filter (button unlit).

26. **RESONANCE KNOB:** manual control over the RESONANCE OF THE FILTER; is summed with the external CV applied to the RESONANCE CV input jack. When the BAND-PASS filter is selected, this knob defines the

width of the band. In COMB FILTER mode this knob is bipolar and defines the feedback adding negative (to CCW) and positive (CW) combs and at maximum CW/CCW values enables the resonator.

27. **RESONANCE CV INPUT JACK:** 0…+5V external CV control for the RESONANCE of the filter.

28. /**ENV DEPTH* LED**: Brightness shows the internally generated envelope.. When turned while pressing the ROUTING /* button, this LED shows the amount of the envelope applied to the internal sidechain audio ducking effect.

29. . **TRIGGER INPUT JACK**: trigger input for the onboard sidechain envelope.

30. **sIDECHAIN**/**ENV DEPTH* KNOB**: Sets the decay of the onboard envelope from zero (no envelope) to approx. 5 seconds. When turned while pressing the ROUTING /* button, this knob adjusts the depth of the envelope to the internal sidechain audio ducking effect.

31. . **ENVELOPE OUTPUT JACK: 0**…+5V envelope output triggered from TRIG IN jack. The envelope has fixed 1 msec attack and a natural-sounding exponential curve. While the internal envelope for sidechaining is negative (to duck the audio) this output provides a positive version of the envelope to use elsewhere in your system or modulating module's parameters.

32. . **COMPRESSOR KNOB:** manual control over the amount of compression applied after the effects processing chain, is summed with an external CV applied to the COMPRESSOR CV IN jack.

33. **COMPRESSOR CV IN JACK**: 0…+5V external CV input for the compressor amount.

34. **VOLUME**/**DRIVE KNOB**: controls the final output volume. Acts as an attenuator for the POST VCA CV jack. When the knob passes after 15 o'clock it adds extra DRIVE saturation to the output signal while trying to maintain its amplitude.

35. . **POST-VCA CV INPUT JACK:** 0…+5V external CV input for the final volume level. Normalled to +5V when no patch cable is inserted.

36. **OUT 1, OUT 2 JACK**S: final stereo audio outputs. OUTPUT 1 is typically left and OUTPUT 2 is typically right. OUTPUTS 1/2 can drive headphones or be used as separate mono L/R outputs connected with mono cables. When each jack is used with stereo TRS cables, these outputs can be used in PSEUDO-BALANCED CONNECTION for example to your audio interface directly. Pseudo-balanced connection ensures less noise hum on the long cables but cuts the audio signal amplitude by half – to approximate pro-line level +/-2.5V. Both audio inputs and outputs support airline audio jack adapter (sold separately) to connect a 3.5mm TRS stereo (AUX) cable directly.

TONE SHAPING

TONE knob enables light tone shaping after initial pre-VCA with a light TILT EQ leaving more low frequencies at knob's full CCW position, and leaving more high frequencies at knob's full CW position. After that stage, the signal is passed to the main processing chain. By pressing and holding the ROUTING button, TONE/GAIN* knob acts as a gain booster for the external audio signal from 100% at full CCW to boosted at full CW.

- REMINDER: when digital gain is increased past 100% it brings digital noise, use at your own discretion.

DISTORTED REALITY

The power of the GHOST lies in its complex stereo audio effect chain with 96kHz, 32-bit internal audio processing, consisting of 2 VCAs (pre and post), 3 distortion stages, a multimode filter, delay, reverb, compressor, and sidechain ducking envelope. The order of the three main processing blocks – DELAY/REVERB, VCF, and DISTORTION – can be changed by pressing the ROUTING button, letting you achieve many different flavors of sound without having to repatch. The settings of the GAIN, DRIVE and COMPRESSOR in the audio chain are

adjusted manually for optimal control over the dynamics.
There are three possible orders for the DELAY/REVERB (FX), DISTORTION and VCF blocks:

1. FX DISTORTION VCF
2. DISTORTION VCF FX
3. VCF FX DISTORTION

The selected order is shown by the brightness of the ROUTING button, and written as a hint on the faceplate:

- when ROUTING button LED is off
- when ROUTING button is semi lit
- when ROUTING button is full on
- HINT: experiment with the audio chain order to fit your needs and find new and unexpected sounds with a push of a button.

We advise exploring the routing chains and picking your favorite based on each situation. From our sound design experience with the module, the first routing chain is well suited to rumble/ghost sounds, the second is good for cleaner effects based on overdriving the filter, and the third will generally have the heaviest distorted tones.

THREE FLAVORS OF DISTORTION DIST

- GAIN: digital input gain (3) capable of light saturation, adjusted with ROUTING + TONE/gain*
- DISTORTION: 8x oversampled distortion algorithm with a single (8) knob control
- /DRIVE: final output saturator when VOLUME (34) is pushed to the top of its range, as indicated around the knob on the panel

THREE FLAVORS OF FILTER VCF

- Bipolar LP/HP filter
- BAND-PASS filter (BPF)
- COMB filter with resonator at high resonance settings.

To switch the filter type you simply press the BPF/COMB button. A single press will switch the filter type to a band-pass, and a combination of **ROUTING +**
BPF/COMB buttons will change the filter type to Comb, which is also capable of self-oscillation at full CW or CCW RESONANCE settings. Resonance knob behavior in Comb filter is special: it is bipolar, so from noon it either adds negative (CCW) or positive combs (CW).
SPATIAL EFFECTS FX
This chain of audio effects (a.k.a. FX) consists of a delay which is then routed into the reverb with mid/side widener.

- **DELAY**: stereo delay with 1v/oct tracking, capable of Karplus-Strong synthesis. The delay can be synchronized externally via CLOCK IN, or by using the onboard TAP TEMPO BUTTON, with maximum delay time of 2.5 seconds. Three configurations of delay taps are available, toggled between by holding the ROUTING button and short pressing the TAP button. Delay tap configurations are LRLR, LRRL, and STEREO mode, also known as true stereo, where taps will appear at OUT 1 or OUT 2 only if something is present at IN 1 or IN 2 respectively.

- **REVERB**: lush stereo hall reverb with additional controls and configurations such as tail decay adjustment, pre-delay adjustment, reverse reverb and audio freezing.
- **MID/SIDE** widener stays after the reverb and increases the stereo field simultaneously with the amount of TAIL reverb knob. This feature is best audible on true stereo signals processed with the GHOST.

Both delay and reverb have advanced secondary parameters and modes that can be accessed by pressing the ROUTING button in combination with either a knob or another button. These controls are internal and do not have CV control; they are designed as 'set and forget' controls to fine-tune your sound.

ADVANCED DELAY PARAMETERS

- ROUTING + REPEATS KNOB: controls the light TILT EQ that adjusts the TONE / brightness of repetitions: from sparkling clean to dub delays. That TONE* range for repeats is identical to TONE input shaping control.
- ROUTING + TAP BUTTON: switches the way the delay taps are distributed (hard panned) in the stereo OUTPUTS 1/2. When the TAP button blinks

button blinks twice – the tap pattern is LRRL. When the TAP button blinks 3 times – STEREO mode is selected, where the delay taps appear on either L or R output only when there is something present on L or R input, aka true stereo operation. The true stereo mode shortens the maximum delay time by half. Minimum delay time manually set with TIME/DIV knob corresponds to approximate C4 note (~261 Hz) in LRLR and LRRL taps and approximate C5 note (~523 Hz) and 1 octave more with external 1v/oct TIME CV applied.

- **NOTE:** Tap tempo via the TAP button doesn't work if an external clock is applied.

ADVANCED REVERB PARAMETERS

- **ROUTING + TAIL KNOB:** sets the PRE-DELAY amount for the reverb, which is an important control that can add additional depth to your sounds, particularly useful when processing percussion. Full CCW knob position corresponds to no pre-delay and full CW position corresponds
- **HOLD BUTTON**: freezes the reverb creating an infinite recirculation in the feedback loop, which is reminiscent of what is called a 'wall of sound'. When REVERSE REVERB is activated (see next), HOLD button activates and deactivates freeze for the delay (recirculating delay buffer audio).
- R**OUTING + HOLD BUTTON:** switches the reverb to the REVERSE algorithm, particularly useful for obtaining whooshing sounds by processing kicks, snares, pads, vocals and so on, giving you an extra dimension of movement.

DYNAMICS SHAPING
In order to tame our signal at the end of the main processing chain we have the following dynamics blocks: COMPRESSOR and SIDECHAIN ducking envelope.

COMPRESSOR
One-band peak stereo compressor controlled by a single knob, from none to light to heavy compression settings with pre-defined and manually tuned values to fit various music styles for best performance. Compressor behavior varies on the audio material and music taste. We recommend setting for 12 o'clock for ambient/pads and full clockwise setting for obtaining snappy drums.

SIDECHAIN DUCKING
Sidechain ducking 'compression': this is the last stage in the audio chain before the final post-VCA volume control.

The sidechain envelope is triggered using the SIDECHAIN TRIG. INPUT jack. Its release time is set with the SIDECHAIN knob, and its depth of ducking is controlled by holding the ROUTING button while turning the SIDECHAIN knob.

RESET
In case you have tweaked everything so hard you have distorted signal main outputs, a soft reset adjusts all advanced / secondary parameters to their default values, so you may start tweaking from the beginning.
Press all four buttons simultaneously and hold them for more than 3 seconds. Release them once they are all four on, and module will reset to its default values.
KARPLUS-STRONG SYNTHESIS ROUTING 1
Ghost can function as a complete Karplus-Strong Voice by using the delay at the shortest time setting for sound generation and built-in filter, VCAs and envelope as tonal / dynamics control.

- Set the ROUTING mode to the first order (FX→DISTORTION→VCF) when ROUTING button LED is off
- Set REPEATS to maximum with TIME/DIV delay time turned fully CCW. Moderately adjust DELAY DRY/WET to the 12 o'clock
- Feed any audio to the GHOST audio inputs to start up the Karplus-Strong sound generation. You will hear a strong recirculating oscillator sound of approximate C4 note (~261 Hz). Its amplitude is rather high therefore it is convenient to adjust it by DELAY DRY/WET knob
- Patch a trigger / gate signal from your sequencer to the SIDECHAIN TRIGGER input: this will trigger an internal envelope that will come out from the ENVELOPE OUT. The decay of the envelope is controlled by the SIDECHAIN knob
- Patch the signal from the ENVELOPE OUT to either: DELAY DRY/WET CV IN or the POST-VCA input to shape our oscillator in different stages
- Split the ENVELOPE OUT signal and patch it to the VCF CV input for additional tonal shaping
- Connect the 1v/oct PITCH CV output from your sequencer and patch it to the TIME CV 1V/OCT input of the DELAY
- TIP: if you would like to add one extra octave to the available PITCH range of the delay, set the TAPS DISTRIBUTION to STEREO mode via **ROUTING + TAP.**

LOW-END GROOVE A.K.A. TECHNO RUMBLE
BASS ROUTING 2
Modern techno music is defined by a groovy low-end rumble, which along with the kick drum defines the key element of the style. Ghost can generate such rumble from any transient sound or same kick applied into the audio inputs.

- Split your techno 909-style kick drum and apply it into AUDIO IN 1
- Set the DISTORTION and COMPRESSOR knobs to own taste, usually around 12 o'clock
- Set the VCF filter type to normal LP/HP and set the filter FREQUENCY knob around 11 o'clock
- Apply clock from your sequencer into CLOCK IN jack (typically expected in 16th notes) and set the TIME/DIV knob to obtain desired repeats. Set DELAY DRY/WET and REPEATS to own taste, usually both around 12 o'clock
- Enable REVERSED REVERB by ROUTING + HOLD/reverse*. Set REVERB DRY/WET and TAIL to your own taste until you obtain a whooshing sound. For proper groove set the pre-delay amount by ROUTING + TAIL/preleday* to approx. 12 o'clock
- Apply kick-drum trigger into SIDECHAIN TRIG IN jack. Set the ducking envelope amount to 50% with ROUTING + SIDECHAIN to 12 o'clock. Then move SIDECHAIN knob alone to around 10-11 o'clock to catch

the proper pumping time

- Mix the sound from AUDIO OUT 1/2 with the original kick drum using a mixer such as Cockpit 2
- **TIP**: it is best to keep your low end consistent or even better – MONO. So when using the delay to create the rumble, set TAPS DISTRIBUTION to STEREO mode via ROUTING + TAP to avoid PING-PONG effect or simply only use AUDIO OUT 1.

GHOST DRONE ROUTING 3

GHOST structure and multidimensional modulation matrix is capable of producing dark drones and ephemeral soundscapes full of texture and harmony.

- Set the ROUTING mode to the third order (VCF→FX→DISTORTION) when ROUTING button LED is off when ROUTING button is fully lit .
- Select the COMB FILTER by pressing the ROUTING + FILTER BUTTON and set the RESONANCE fully CW
- Patch a variable waveform oscillator into the AUDIO IN 1, SAW and SQUARE waves work best. Feed an additional envelope or LFO to the pre VCA input on the GHOST to create movement. Patch the AUDIO OUT 1/2 to your mixer
- Set DELAY DRY/WET to 80% with REPEATS around 30-40%, adjust the REPEATS/tone* by pressing the ROUTING + REPEATS knob to around 13:00 – 14:00. Sync the delay by sending a clock from your sequencer into the CLOCK IN and leave TIME/DIV knob at 12:00
- Set REVERB DRY/WET to 60% with a moderate TAIL amount at around 40%. Adjust the PRE-DELAY by pressing the ROUTING + turning the TAIL/predelay* knob to approximately 70-80%.
- Set DISTORTION to 20% and COMPRESSOR to 70% to bring in some noise
- Send a PITCH sequence to the VCF CV input. COMB does not track 1v/oct, but this allows you to highlight frequencies without doubling the amplitude of the fundamental of the sound source. Set the FREQUENCY CUTOFF knob to 11:00 with VCF CV attenuverter fully CW
- Start the sequencer and listen how GHOST creates timbres on top of a steady oscillator
- Patch another 1v/oct PITCH CV signal to your oscillator and play around with the notes, you will hear how new ghost harmonies appear, let them direct your next note.

FIRMWARE UPDATE

Firmware updates are essential for any digital modules. They bring new features or bug fixes. Feel free to write any bugs, features ideas or improvements to
beta@endorphin.es
To update the firmware on your Ghost, first download the latest firmware file once available on ENDORPHIN.ES website: **https://www.endorphin.es/modules/p/ghost**
The update procedure is done via audio: either computer or phone will work, we advise you to disable all notifications (flight mode) so that the update is not interrupted.

1. Power OFF your modular system.
2. Unplug all the cables from GHOST except a simple mono or stereo cable connecting the audio output from your computer headphones output to the **AUDIO IN** 1 input of the module.
3. Set the output volume of your computer to 100% or slightly lower.
4. **Hold ROUTING** while powering your system ON – you will see both CLIP and /ENV DEPTH* LEDs on.
5. Open the Ghost_Update_xxx.wav file with any audio player. Press play and wait 1.5+ minutes while the

firmware is updating. Both CLIP and /**ENV DEPTH* LED**s will slowly blink during that procedure and a row of 4 buttons will show the approximate signal level as imaginary VU meter. Try to adjust the volume of the update so it will not clip but also will be enough level to blink the VU meter.

6. If all 4 buttons LEDs blink fast during update or both CLIP and /ENV DEPTH* LEDs stop blinking, that means an error occurred in the update and you have to stop the audio file playback, reset the firmware listening input (single **ROUTING** button press), adjust the audio file playback volume and then start it again.

7. The module will reboot automatically after new firmware installed and will act normally with TAP button blinking. That's a good sign that update was successful.

8. . Enjoy the new features.

- **IMPORTANT**: to prevent the errors during the audio playback of the firmware, please use any audio editor without any effects applied (EQ etc).

CREDITS

ENDORPHIN.ES x ANDREW HUANG – GHOST
FIRMWARE VERSION 1.00
COLLECTION SPRING/SUMMER 2023
Module idea and concept by Andreas Zhukovsky and Andrew Huang Hardware design, direction and manual by Andreas Zhukovsky Core engine programming by BSVi
Firmware polishing, curves, additional features by Kouik03
Manual proofreading and beta testing: Wisdom Water ENDORPHIN.ES are made in Barcelona, 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 ; EN55103-2:2009 (EN55024) ; EN61000-3-2 ;
EN61000-3-3
Low Voltage: 2014/35/EU
EN 60065:2002+A1:2006+A11:2008+A2:2010+A12:2011
RoHS2: 2011/65/EU
WEEE: 2012/19/EU

Documents / Resources

GHOST ENDORPHINES x Andrew Huang [pdf] User Guide
ENDORPHINES x Andrew Huang, ENDORPHINES, Andrew Huang, Huang

References

- **E** **ENDORPHIN.ES - sounds like music**
- **E** **ENDORPHIN.ES - sounds like music**
- **E** **GHOST — ENDORPHIN.ES - sounds like music**
- **MG** **Modules on ModularGrid**

Manuals+,