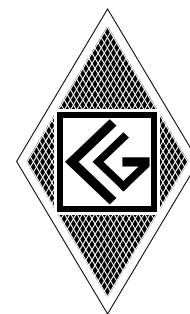


Peak & Hold

Dynamic Percussion Interface




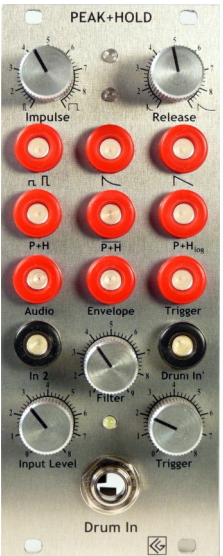
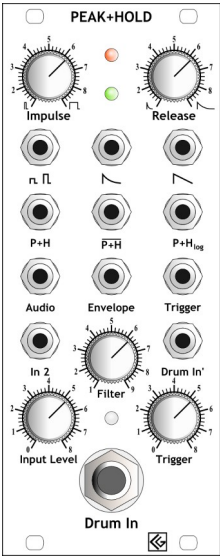

1. Description

The *Peak & Hold* allows one to play and control analog synthesizer equipment using a drum with a pickup or any other percussive signal source. It generates 9 different CV/signal outputs from one input source.

The *P+H* provides a dynamic hold voltage (linear and logarithmic), a dynamic impulse signal e.g. for triggering filters or delays; a dynamic release signal (linear and logarithmic), an envelope and a trigger signal output. Additionally, the original sound signal is available for further signal processing. The input stage is equipped with adjustable level and trigger controls and a filter for flexible adaptation of different percussive instruments – such as long or short sounding, high or low drums and cymbals. Furthermore, there is a 2nd input to cascade two *Peak+Holds* or to add another signal source.

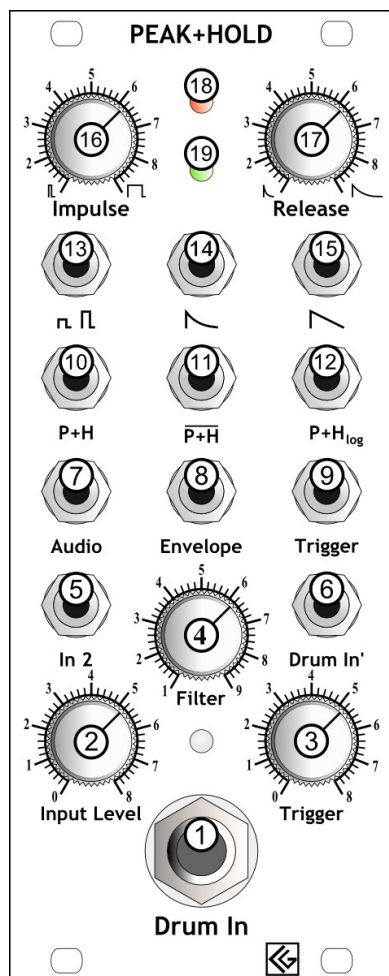
2. Features

- 9 different CV/signal outputs
- Manual level, trigger and filter controls of the input signal
- Selectable frequency band (for cascading 2 or more P+Hs)
- Pickup included
- Optionally with banana or 3,5mm minijacks
- Eurorack module
- Width: 10 HP
- Dimensions: 128,5 mm x 50,5 mm
- Depth: 35 mm
- Supply voltage: $\pm 12V$
- Consumption: +12V: $\approx 78mA$; -12V: $\approx 55mA$

			
Minijack version	Banana version	Drawing	Pickup with 2m cable



3. Functions



① **Drum In** (1/4" jack socket) Input for a percussion instrument pickup (or rhythm machine output etc.). Its level is adjustable with the "Input Level" knob ②. The sensitivity of the input is suitable for many pickups such as the optional piezo pickup or for line outputs, but not for microphones. Impedance is $\approx 300k\Omega$. The input sensitivity is adjustable by the internal trimmer ① (Read chapter 5. *Adjustments*)

② **Input Level** The input level control for the jack socket input "Drum In" ①, or, from Rev.4., the alternative minijack input "Drum In'" ⑥. For the best dynamic range adjust this knob clockwise until the red limit indication LED ⑱ even lights for very loud input sounds.

③ **Trigger Threshold** Input sensitivity of the internal schmitt-trigger comparator. The trigger point adjusted by this knob resets the P+H and prepares it for the next (percussive) input sound. The more this knob is turned clockwise, the more sensitive the P+H becomes to low input and pianissimo tones, but also to noise and unwanted signals such as vibrations etc.. One should find a compromise between good input sensitivity and low susceptibility to interferences; even in combination with the "Filter"-knob ④.

④ **Filter** This is a special lowpass filter affecting only the falling edges of the internal envelope/differentiator signal. It ensures minimal latency and best response to the input drum sounds. With regards to the large variety of percussive sounds this filter allows good adaption for most purposes. For very short and high sounds such as clicks or woodblock sounds, the filter knob can be turned far to the left (ccw). This makes the P+H's reaction very fast and sensitive. For long sustaining sounds such as cymbals, metallophones and/or low frequency tones (like tomtoms or base drums) the controller knob should be turned further clockwise to make the processor more unsensitive to low frequencies and subaudio oscillations (which may cause a premature interruption of the P+H signal). Please note, the reaction becomes slower the further right the filter knob is turned.

⑤ **Input 2** 2nd audio input socket. The signal applied on this input will be added to the signal of 'Drum In' ① or may replace it, but it is not affected by level controller "Input Level" ②. This input is intended for applying a 2nd signal source like from a drum machine or for cascading 2 or more *Peak+Holds*. NEW (from Rev.3): The In2 signal level can be adjusted by trimmer ⑧ (nearby the socket In2); please read chapter 4. *Settings* and chapter 5. *Adjustments* .



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- ⑥ **Drum In'** Alternative minijack input, may replace the 1/4' socket input "Drum In" ① and will be switched off if a cable is applied to the 1/4' jack below. In comparison to socket "In 2" ⑤, the signal level can be directly adjusted by knob "Input level" ② .
- ⑦ **Audio Out** The input signal applied to ① or ⑥ (preamplification or attenuation level adjustable with ②) , mixed with the signal applied on "In 2" ⑤ is provided at this socket; useful for further signal processing and/or cascading 2 or more **Peak+Holds** (See also chapter 4. *Settings*, and chapter 5. *Adjustments*).
- ⑧ **Envelope Out** The audio input signal is internally rectified and low-pass filtered (The filter settings are partially adjustable with knob "Filter" ④); the resulting envelope shape is accessible at this socket.
- ⑨ **Trigger (Gate) Out** Positive rising trigger (gate) signal with a signal level from 0 to +5V, suitable for triggering of e.g. external envelope generators. *From P+H rev.2:* there is a jumper on the board allowing to change (inverse) the polarity of the gate/trigger signal from 0V→+5V (rising edge), or from +5V→0V (falling edge) for best adaption to other trigger inputs.
See chapter 5. *Adjustments*: ⑦ **Trigger Out** polarity
Note: The envelope signal which generates the trigger signal is internally differentiated, resulting in a quite short GATE output signal!
- ⑩ **Peak+Hold Out** The P+H processor detects the signals highest level and keeps it as a hold signal. The next incoming signal resets the Peak+Hold by triggering at the very beginning and the next Peak+Hold value will be set. The trigger threshold level is adjustable with ③ . The provided P+H output voltages are in a range between 0 and +10V (also dependent on settings of controllers ② and ③).
- ⑪ **Peak+Hold inverse Out** The inverted Peak+Hold signal, in a positive range from +10V to 0V; suitable e.g. in combination with output "P+H" ⑩ to control 2 VCAs for panorama effects.
- ⑫ **Peak+Hold logarithmic Out** The Peak+Hold signal (accessible on socket ⑩) converted to a logarithmic voltage. Many VCAs (and also frequency CV inputs from most VCOs and VCFs) are working with exponential CV inputs for aurally correct perception. Because the P+H output CV is already proportional to the incoming audio intensity, it must be converted to a logarithmic (anti exponential) response to control these CV inputs adequately.
- ⑬ **Impulse Out** Dynamic impulse output e.g. for triggering Delays or VCFs. The width of the impulse can be regulated with the "Impulse"-knob ⑩ .
- ⑭ **Release Out** The dynamic impulse signal (accessible on socket ⑩) equipped with a falling envelope shape. Length of the falling shape can be adjusted with "Release"-knob ⑪ .





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- ⑮ **Release logarithmic Out** The logarithmic converted **Release Out** signal ⑭ ; especially useful for VCA CV inputs (See under ⑫).

- ⑯ **Impulse Time** Regulates the length of the dynamic impulses at output "Impulse" ⑬ . It also influences the shapes of the **"Release"** ⑭ – and **"Release log"** ⑮ –outputs.

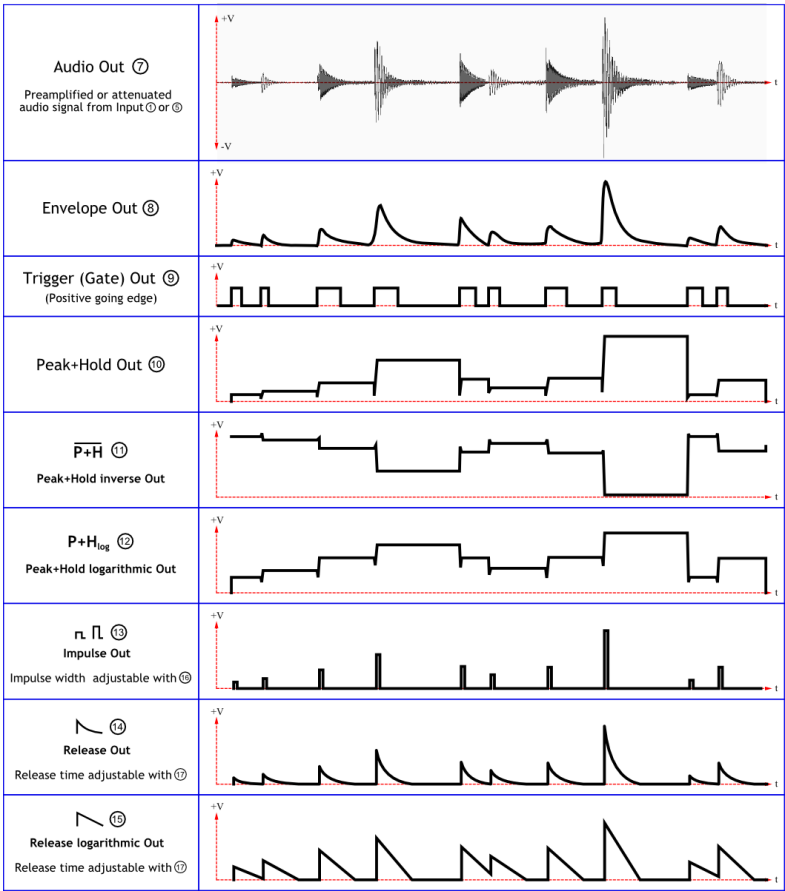
- ⑰ **Release Time** Adjusts the length of the release shape of the **Release** ⑭ – and **"Release log"** ⑮ – output signals .

- ⑱ **LED "Saturation"** This LED indicates when the **P+H**'s outputs reach their maximum level and no further dynamic expression or increase is possible. It is recommended to adjust the input amplification (Controller **"Level"** ②) such that this LED only lights for very loud input sounds or very hard drum beats.

- ⑲ **LED "Impulse"** Indicates the generated impulse signal (Output **"Impulse"** ⑬) and is also useful for optical control to see if the **P+H** is working properly.

Examples of typically generated waveforms

(Input: Rhythm machine)





Modular

4. Settings

Pickup

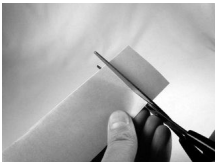

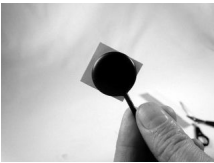



There is a pickup and double-sided adhesive tape included to the Peak+Hold module package by standard, so it is easy to connect the P+H to any percussive instrument. The pickup is equipped with 1 / 4' jack and 2m cable.

Suggestions:

		
on tabletop	bongo drum	cymbal
		
Filter	Filter	Filter

Recommended filter settings for different instrument inputs (Knob ④)

Attaching the Pickup

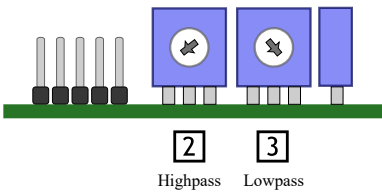
					
Cut off a piece of ca 2,5x2,5 cm ² from the tape	Pull off the paper from one side	Fix it on the metallic side of the pickup	Cut off the overhanging edges	Pull off the second paper	Fix it on the instrument

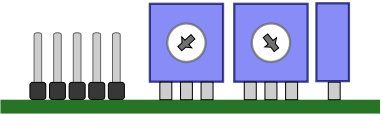
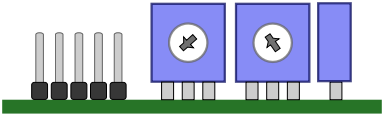
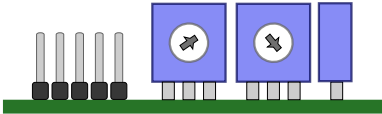
Note: The pickup cable is microphonic; to avoid unwanted triggers it should be fastened, e.g. on the drum stand.

Frequency-selective mode

It is possible to limit the audio signal's frequency range for the further internal processing. This allows advanced settings especially when working with two P+H modules. As well as this, unwanted noise may be minimized by reducing very low or very high frequencies.

There are two trimmers **2** and **3** on the backside PCB (nearby the power supply connector) creating a simple adjustable highpass–lowpass filter combination. *Note:* There is no ability to listen directly to the filtered audio signal; it only affects the processed CV outputs. The Audio Out **7** always provides the full-frequency range signal. Please also read chapter **5. Adjustments** for more information.



 Full frequency range	 High cut \triangleq Lowpass characteristic	 Low cut \triangleq Highpass characteristic
Highpass (left trimmer): fully ccw Lowpass (right trimmer): fully cw	Highpass (left trimmer): fully ccw Lowpass (right trimmer): \approx 11 o'clock	Highpass (left trimmer): \approx 2 o'clock Lowpass (right trimmer): fully cw

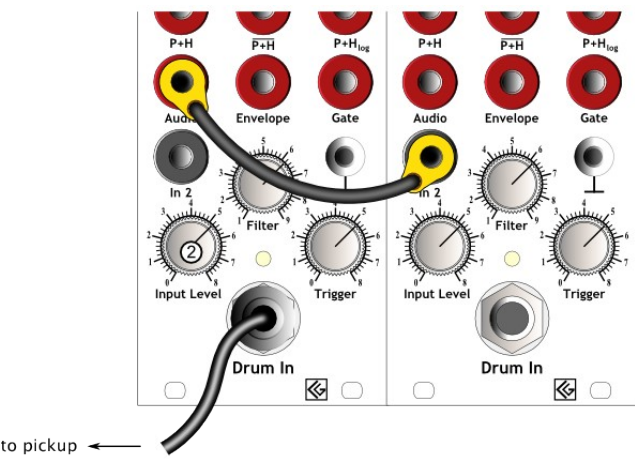
Suggestions for settings of the filter trimmers **2** and **3**

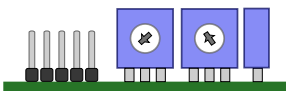
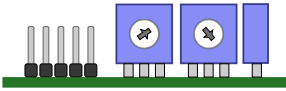
Example:

The audio output **7** of the 1st P+H is connected to the 'In 2' input **5** of the 2nd P+H. The pickup amplitude for both P+Hs is controlled by the knob 'Input Level' **2** of the 1st P+H.

The filter trimmers **2** and **3** are creating a lowpass characteristic filter for the 1st P+H and a highpass filter for the 2nd P+H.

Depending on the amount of overtones and/or fundamentals of the input signal, the two P+Hs will process different, frequency-selective output CVs.

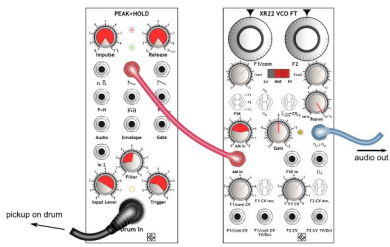
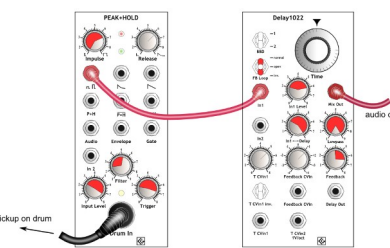
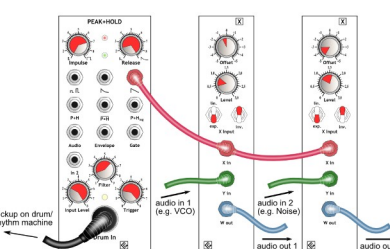
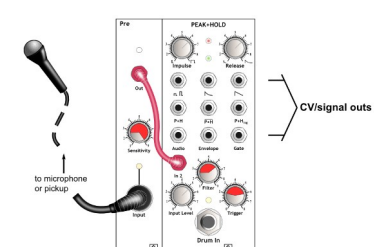


 High cut \triangleq Lowpass characteristic	 Low cut \triangleq Highpass characteristic
Highpass (left trimmer): fully ccw Lowpass (right trimmer): \approx 11 o'clock	Highpass (left trimmer): \approx 2 o'clock Lowpass (right trimmer): fully cw



5. Examples

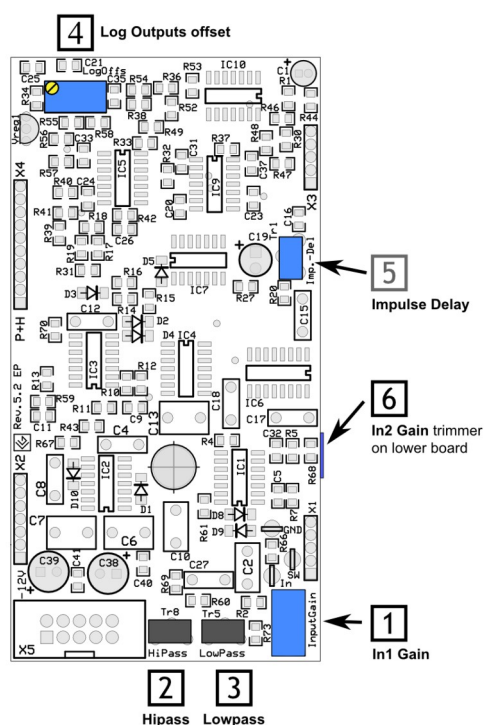
Simple patches (...with other CG Products' modules)

Patch	Description	Audio Link
	<p>1. Peak+Hold controlling the XR22 VCO</p> <p>The <i>Peak+Hold</i>'s linear release output ⑭ is connected to the XR22VCO's AM input and controls the VCO's \wedge_v/\wedge_v output amplitude.</p>	<p>Different XR22VCO frequency settings</p> <p>...PEAK+HOLD CV outs are controlling the VCO's frequencies (in FSK mode)</p> <p>http://www.cg-products.de/Audio/PH_Patch1_XR22VCO.mp3</p>
	<p>2. Peak+Hold triggering the Delay1022</p> <p>The dynamic pulse output ⑬ of the <i>Peak+Hold</i> triggering the Delay1022 is a simple way to create percussive drum- and string-like sounds.</p> <p>Instead of a delay, also VCFs with high resonance can be triggered.</p>	<p>Different Delay1022 Lowpass filter settings</p> <p>...PEAK+HOLD CV output is controlling the delay time</p> <p>http://www.cg-products.de/Audio/PH_Patch2_Delay1022.mp3</p>
	<p>3. Peak+Hold and X</p> <p>The <i>Peak+Hold</i>'s logarithmic release output ⑮ is connected to the control inputs of 2 X multipliers. The multipliers are working as exponential VCAs with different operation points (see different positions of knobs 'Offset' and 'Level'). The 2nd X multiplier only gets active from a certain CV amplitude level.</p>	<p>1st X audio signal in: VCO</p> <p>2nd X audio signal in: Noise/VCO;</p> <p>P+H Input: Pickup on drum</p> <p>...Rhythm machine</p> <p>http://www.cg-products.de/Audio/PH_Patch3_X.mp3</p>
	<p>4. Peak+Hold with Pre</p> <p>When running the <i>Peak+Hold</i> with the Pre (The preamplifier's output is applied on 'In 2' ⑤), the <i>Pre</i>'s 'Sensitivity' knob is overtaking the function of the <i>Peak+Hold</i> knob 'Input1 Level' ② (which is only referring to input socket 'Drum In' ①).</p>	<p>Mic input: Different percussion instruments.</p> <p>PEAK+HOLD CV outs are controlling cutoff frequencies of Korg MS20 VCFs and VCA envelope</p> <p>http://www.cg-products.de/Audio/PH_Patch4-Pre.mp3</p>



6. Adjustments

Backside PCB view:



1 Preamp Gain

This trimmer sets the preamplification gain for input "Drum In" ① / "Drum In" ⑥. In general, it is recommended to **adjust the preamp gain lower** (trimmer more ccw) and then turn knob 'Input Level' ② more up to increase the input level, because the preamp may come to its limit (even when the red LED ⑮ not lites) with negative effects on the module's output dynamics.

2 Hipass Filter

Together with trimmer ③ (lowpass filter) a simple filtering option is created. This special feature allows control over the P+H by selecting the inputs frequency band. Combining two or three P+H modules run from one input source, the frequency range can be split to high and low or high, middle and low frequencies, such that each P+H gets its own specific frequency band resulting in e.g.

overtone or bass preferring P+H control.

Note: There is no extra output for the filtered signal, the settings have to be done by trying-out or by visual control of the trimmer's position.

The trimmer fully turned left: full frequency range. The more the trimmer is turned clockwise, the more the low frequencies will be cut off.

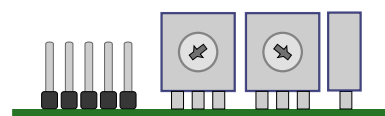
3 Lowpass Filter

Together with highpass filter trimmer ②, this provides the option of audio signal filtering to achieve highpass, lowpass or bandpass characteristics for the further signal processing. This allows frequency selective control of the Peak+Hold (Read also about ② **Highpass Filter**). **Note:** There is no ability to listen directly to the filtered audio signal.

The trimmer fully turned right: full frequency range. The more the trimmer is turned ccw, the more the high frequencies will be cut.

Please also read chapter **4:Settings**, for further explanation and examples.

Default settings of the filter trimmers ② (left, highpass – fully ccw) and ③ (right, lowpass – fully cw)





Modular

4 Logarithmic Amplifier 0-point adjustment

Especially for the **Release logarithmic output** ⑮, in 0-point sensitive applications such as controlling the CG-Products **XR22VCO's** AM input, but also in frequency controlled applications, a divergence to exactly 0 V from the 0-point may be annoying. It is possible to readjust the 0-point precisely with this trimmer.

5 Impulse Delay (from Rev.4.2)

This trimmer is adjusting the length of a pre-delaying impulse which is triggering the impulse output ⑬ and the release outputs ⑭ and ⑮. This short latency is necessary to measure the attack dynamic – a short delay from the trigger impulse (treshhold adjustable with knob ③) to the relative growing of the input signal's attack time. Too short values (trimmer positions ccw) cause negative effects on the impulse output dynamic, too long settings (trimmer positions cw) are causing longer latencies on these outputs.

For normal operation there is no need for adjustments!

6 In2 Gain

With this trimmer (on the lower board, nearby the socket In2 ⑤) the amplification gain of Input 2 ⑤ can be adjusted. The amplification factor can be set between $\approx *1 - *6$ (fully ccw: *1).



Modular

7. Contact & Support

This is the **Rev.5.2** documentation.

PDF download:

http://www.cg-products.de/P+H_documentation.pdf

http://www.cg-products.de/P+H_documentation-Rev.4.2.pdf

http://www.cg-products.de/P+H_documentation-Rev3.5.pdf

http://www.cg-products.de/P+H_documentation-Rev3.1.pdf

Product homepage with soundfiles: <http://www.cg-products.de/module/peakhold/>

Soundfiles also on <https://soundcloud.com/cg-products/sets/peakhold>

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