



PULSAR-23
UTILITIES

USER
MANUAL

GENERAL DESCRIPTION

UTILITIES contains a set of simple auxiliary modules to expand the functionality of the PULSAR•23 drum machine. UTILITIES modules can also be used with any gear that works with CV signals (Eurorack, semi-modular synthesizers, etc.).

The modules included in UTILITIES can be divided into two groups:

- 1) Passive elements such as switches, resistors, capacitors.
- 2) Various types of amplifiers and waveshapers, linear, non-linear, controlled and uncontrolled.

Passive elements are designed to expand the possibilities of switching and controlling the PULSAR.

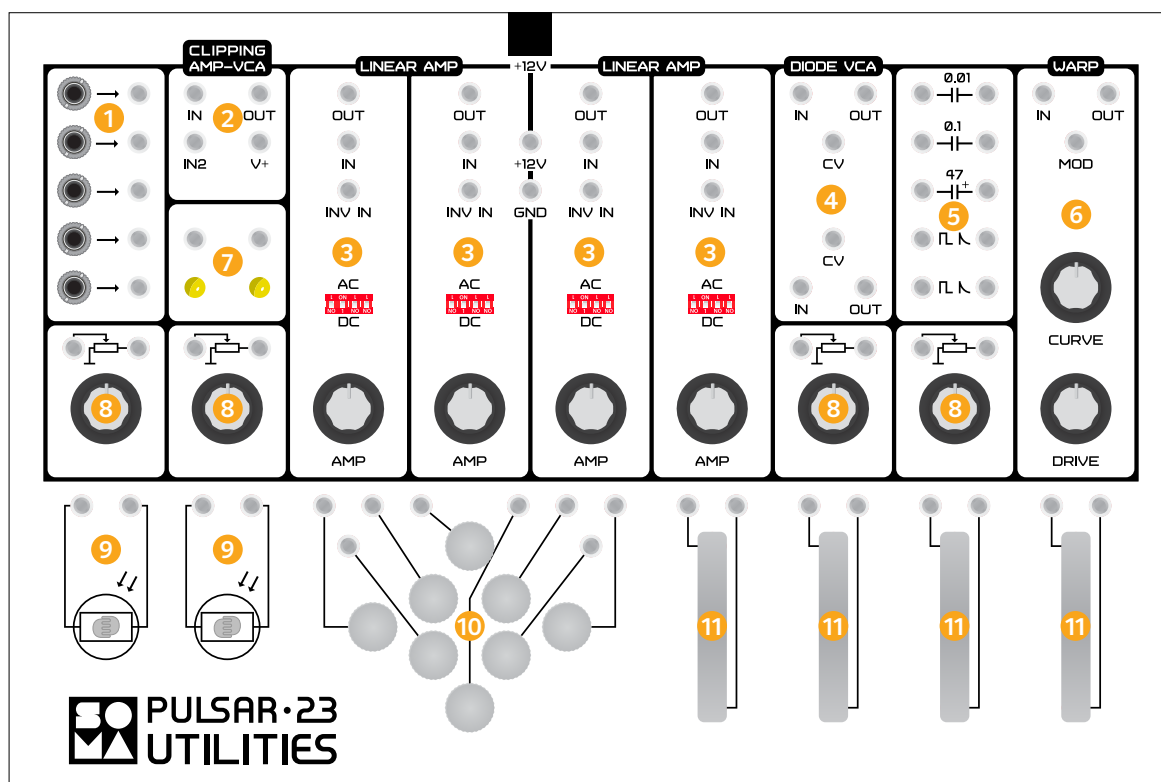
Linear amplifiers are needed when you need to feed a signal from a device operating in a lower voltage format to the PULSAR inputs. For example, it can be a step sequencer with an output voltage of 5 volts, while the PULSAR needs 10 volts to fully trigger the drum modules. Or it could be the output of a cassette tape recorder, which has an output of 1 volt, while for normal operation the PULSAR needs an input level of an audio signal of 5 volts.

Non-linear and controlled amplifiers and waveshapers are designed to control the signal level, while simultaneously changing its spectrum, distorting its shape and adding harmonics. The circuitry of these amplifiers is very simple and based on the early developments of the transistor era, with its inherent beauty and grace.

UTILITIES connectors are made in the PULSAR•23 format on pins designed to connect the alligator clips. There are also adapters for 3.5mm Eurorack mini-jacks.

The top panel and enclosure of UTILITIES are made of PCBs, which significantly reduced the cost of the device.

ОПИСАНИЕ МОДУЛЕЙ



- 1 5 adapters for 3.5 mm mini-jack (Eurorack) — pins designed to connect the alligator clips.
- 2 Controlled amplifier-limiter (CLIPPING AMP-VCA).
- 3 4 linear amplifiers.
- 4 2 diode-controlled amplifiers (DIODE VCA).
- 5 A set of capacitors and two pulse converters.
- 6 Waveshaper (WARP).
- 7 Two LEDs for visual control of signals.
- 8 4 attenuators.
- 9 2 photoresistors.
- 10 Array of sensors for body patching.
- 11 4 switching buttons.

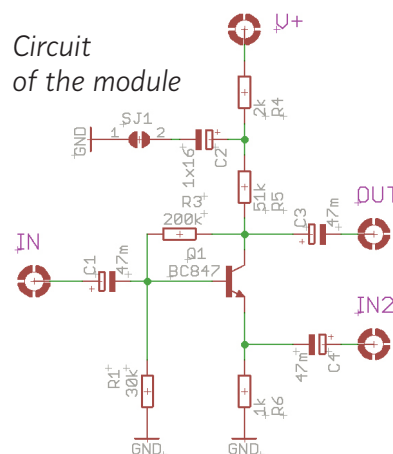
ADAPTERS 3.5 mm MINI-JACK (EURORACK) — PINS DESIGNED TO CONNECT THE ALLIGATOR CLIPS

The tip of the mini-jack is connected to the pin, the sleeve is connected to the UTILITIES ground. Allows you to connect Eurorack to UTILITIES and PULSAR.

CONTROLLED LIMITING AMPLIFIER (CLIPPING AMP-VCA)

Limits the inputs **IN** and **IN2** signals, smoothing their peaks. The level of gain and clipping of the input signals depends on the supply voltage applied to the **V+** pin, which can vary from 0 to +15 volts. The module consumes very little current (about 0.3 mA), which means that LFO, sequencer and audio signals can all be used as supply voltage. The lower the voltage, the less gain and more distortion. Thus, this module is a controlled amplifier and a spectrum shaper at the same time, allowing you to saturate the signal with harmonics. If you apply different signals to the **IN** and **IN2** inputs at the same time, they will interact, creating crosstalk and modulations.

Circuit
of the module



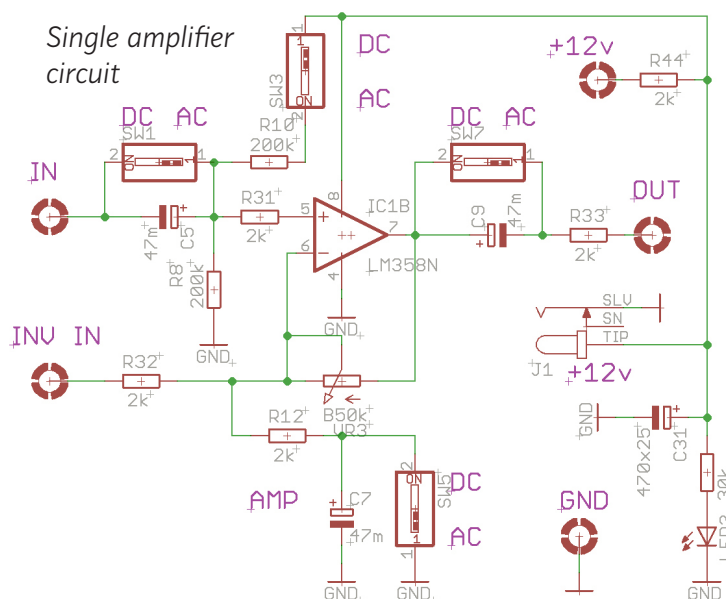
On the reverse side of the top panel below this module there is a jumper SJ1. You can solder this jumper yourself to change the behavior. If it is soldered, a smoothing capacitor will be included in the **V+** circuit, which will round the edges of the signal applied to **V+**, acting as a primitive envelope generator, softening the attack and decay of the signal applied to **V+**. Soldering this jumper will create a smooth slope for the AMP-VCA. If you leave it without soldering, the AMP-VCA has a fast reaction and modulation but CV (**V+** signal) can be audible in the output signal. Soldering it gives a slower response but a cleaner output. We included this and other additional soldering options so people can customize UTILITIES according to their wishes. Adding more switches would have made the module more expensive and was not practical.

LINEAR AMPLIFIERS (LINEAR AMP)

4 identical linear DC and AC voltage amplifiers with adjustable gain.

With the switches set to **DC**, the amplifier will be able to amplify DC voltage, producing an output signal in the range of 0-10 volts. For example, this function is necessary to connect a sequencer with an output voltage of less than 10 volts to the PULSAR (such as Eurorack sequencers). The **AMP** knob smoothly changes the gain from 1 to 25.

With the switches set to **AC**, the amplifier will be able to amplify AC



voltage, producing an output signal in the range of -5 to 5 volts. For example, this function is necessary for connecting consumer audio equipment (radio, tape recorder, etc.) to PULSAR, as well as for restoring the signal level after converters (for example, the **WARP** module). The **AMP** knob smoothly changes the gain from 1 to 25.

You can experiment with different positions of the **AC/DC** switches on one amplifier, flipping some of them up and some of them down, and thus get unusual, mixed gain modes.

The amplifiers have two inputs—**IN** and **INV IN**. **IN**—the signal is amplified without changing the phase. **INV IN**—signal phase is reversed (inverted). The inputs can work simultaneously. **INV IN** has a low input impedance of 2 k Ω .

For the amplifiers to work, they need to be supplied with a supply voltage of +12 volts!

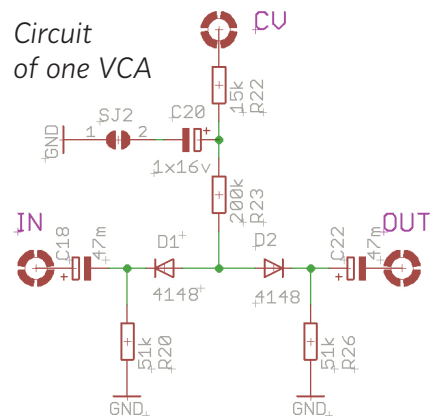
To achieve this, you need to connect the power supply to the DC **+12 v** connector (5.5 x 2.1 mm center "+"). The passive/idle current consumption of this module is around 6 ma (very low). The presence of supply voltage is indicated by the LED below the **+12 v** connector.

This module contains a **GND** pin that needs to be connected to Pulsar's **GND** pin to connect the grounds!

If a power supply is connected to the +12 v connector, you can use the **+12 v** pin to control the **CLIPPING AMP-VCA** or **DIODE VCA** by connecting the **V+** or **CV** inputs to the **+12 v** pin through an attenuator. The **+12 v** output is over current protected.

DIODE VCAS (DIODE VCA)

2 identical controllable amplifiers based on the old two-diode circuit used in early Theremin models, producing a warm, rich sound. The output signal level depends on the voltage applied to the **CV** input and varies from 0 to the level of the signal applied to the input. With an input signal greater than 0.2 volts (peak-to-peak), the amplifiers will add distortion. The higher the input signal level, the more distortion. The recommended **CV** input voltage is 0-10 volts. Supplying CV voltage up to 15 volts is also possible and safe. This module does not require a power supply.



On the reverse side of the top panel inside this module are jumpers SJ2 and SJ3. You can change their behavior by soldering one or both of these yourself. If they are soldered, smoothing capacitors will be included in the **CV** circuit, which will round the edges of the signals applied to the **CV** pins, playing the role of primitive envelope generators, softening the attack and decay of the applied signals. You can also solder just one jumper and it will give that VCA different characteristics.

A SET OF CAPACITORS AND TWO PULSE CONVERTERS

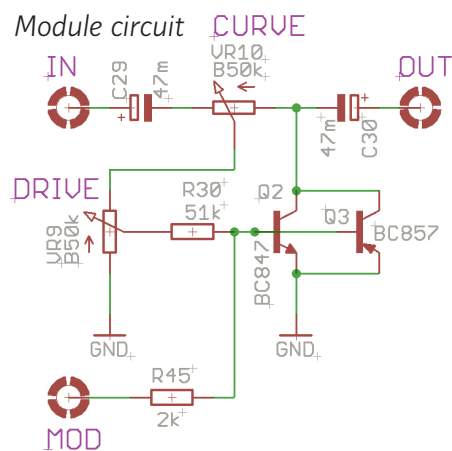
There are several capacitors of various capacitance for live circuit bending and two pulse converters. Pulse converters convert a square wave signal into a fast decaying signal, which is necessary for the correct triggering of the PULSAR drum modules. This is necessary to create rhythms using the PULSAR•23 CLOCK DIVIDER module. A square wave signal (CLOCK DIVIDER output) is connected to the converter's left pin. The right pin of the converter is connected to the TRIG input of the drum module.

NON-LINEAR WAVEFORM CONVERTER (WARP)

Adds distortion to the input signal. By turning the **DRIVE** knob clockwise, the signal is softly symmetrically limited at the top and bottom. Turning the **CURVE** knob clockwise creates a negative slope in the signal clipping — from a certain voltage, the rise of the input signal causes the output to fall, which adds harsher, more intense harmonics.

The **MOD** input allows the signal applied to the **IN** input to be modulated by the signal applied to the **MOD** input.

The module does not require a supply voltage.



LEDS FOR VISUAL CONTROL OF SIGNALS

You can visualize any PULSAR CVs by connecting these CVs to the LEDs input pins.

ATTENUATORS

4 independent attenuators that allow you to adjust the signal levels by attenuating them. For example, this is necessary to control the depth of modulation of the filter frequency by the LFO output signal.

PHOTORESISTORS

2 independent photoresistors that allow you to control signals using light. For example, you can include a photoresistor in the break of some modulation circuit and control the modulation depth by bringing your hand to the photoresistor.

ARRAY OF SENSORS FOR BODY PATCHING

Allows more convenient and masterful use of PULSAR's unique ability to be controlled by connections of various inputs and outputs through the artist's body. Connect all the necessary inputs and outputs to these contacts and manage them conveniently.

SWITCHING BUTTONS

Just 4 reliable, easy-to-use buttons that can commute any signal and endure the passion of your performance.

SPECIFICATIONS

Power supply	DC +12 v 5.5x2.1 mm center plus
Current consumption	50 ma max
Dimensions	288x193x40 mm
Weight	0.75 kg

CREDITS

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www.somasynths.com
Vlad Kreimer, 2022



Manual version 1.0
Designed in Russia