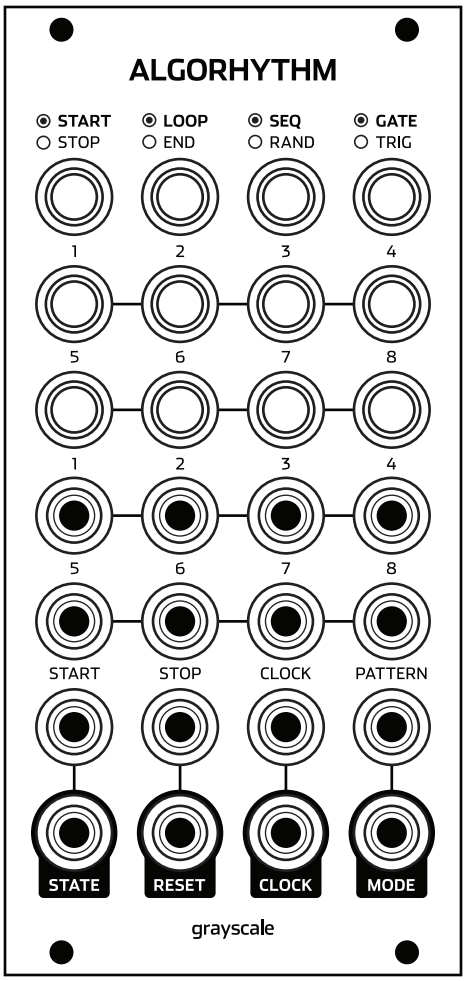


ALGORHYTHM

User Manual

Version 1.0

ALGORHYTHM

Algorhythm is an eight-step pulse sequencer for the Eurorack modular synth format. The interface provides realtime programming of patterns and sequencer settings, with all parameters automatically saved in memory across power cycles.

The most obvious application of a pulse sequencer (also called a trigger sequencer or event generator) is to program a percussive rhythm, like the x0x drum machines of the 1980s. Algorhythm can be used for this purpose, but it's useful to think about dividing an arbitrary time period into discrete segments and generating time-based events within a modular system instead.

Algorhythm modules can be linked together, creating a pattern with more than eight steps. This can either provide a longer pattern or a pattern with increased resolution. Consider two linked Algorhythm modules. This provides a maximum of 16 pulses generated in series. Whether these pulses correlate to 32nd notes or 8th-note triplets is relative only to the incoming clock speed (and other time-based aspects of a patch).

Pattern length can also be set independently for each module, from 1-8 steps. This makes it easy to program polyrhythms or use odd time signatures without any physical patching required. An external RESET input remains available for voltage-controlled manipulation of pattern length. The availability of individual outputs for each step makes reset patching very simple.

SEQ and RAND modes can be set independently for each linked module. SEQ mode allows for linear playback of the current pattern. RAND mode provides up to nine random outputs, with probability for each output controlled by the number of active steps and the current pattern length. The MODE input allows for voltage control over SEQ/RAND.

Each of the eight steps has an illuminated on/off switch and its own output. The sum of all steps appears at the PATTERN output. Tempo is set by the external CLOCK input, which is regenerated (and buffered to +5V) at the CLOCK output. Playback can be started and stopped manually, or through voltage control via the STATE input. START and STOP events generate pulses at their respective outputs for dynamic interaction with other modules such as sequencers or envelope generators.

Technical Details

In the box:
- Algorhythm module
- Power cable (10-to-16 pin)
- Link cable (8-to-8 pin)

Dimensions:
- Width: 12hp (2.4" or 60.6mm)
- Depth: 42mm (with power/link cables installed)
- Height: 3U (5.06" or 128.5mm)

Power Requirements:
- Maximum of 100mA at +12V
- Protected against reverse polarity

Module Installation

To install the module in your Eurorack system, first ensure that power to the system is turned off. Please take precautions against ESD (electrostatic discharge) to prevent permanent damage to the module's components. Connect the smaller 10-pin socket of the power cable to the module, noting the "stripe" indicator on the PCB (which should align with the red stripe on the cable). Then connect the 16-pin socket to your power distribution board. Take note of the power cable's orientation with regard to the -12V supply of your power distribution board. The red stripe usually (but not always) aligns with the bottom of the power connector. Algorhythm is protected against reverse polarity (which occurs when a power cable is connected upside down) but other modules in your system may not be.

For connecting Link cables, power to the system should also be off, and precautions against ESD should also be taken. Refer to the Link section of the manual for full details on connection of these cables.

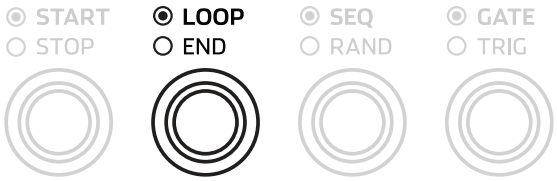
Getting Started

Operation of Algorhythm will be straightforward once you familiarize yourself with the interface and the available features of the module.

START/STOP Switch

The module powers up in the STOP state. Tap START to arm the sequencer for playback. The switch will illuminate to indicate its status. Once the sequencer is armed, playback begins when the rising edge of a clock pulse is detected at the CLOCK input. Tap STOP to immediately discontinue playback. The STATE input provides voltage control of START/STOP.

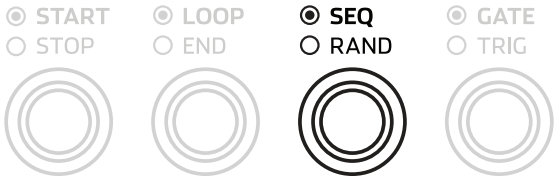
LOOP/END Switch



Tap to change whether a pattern repeats indefinitely (LOOP) or stops when an endpoint is reached (END). An endpoint occurs when the voltage of the last step in a pattern is reached, or when an external reset is received.

Hold for 500ms to change the Loop Repeat setting. The display of the 1-8 switches changes to indicate the current number of loops (from 1-8) that will be counted before an endpoint occurs. During playback, each switch also flashes a certain number of times, representing the current Pattern Length setting. The current loop is represented by the switch that is flashing. Tap the LOOP/END switch to exit and return to Pattern View.

SEQ/RAND Switch



Tap to change between sequential and random playback modes. In SEQ mode, playback begins at step 1, and the PATTERN output reflects the currently-programmed pattern. In RAND mode, the 1-8 switches control the probability of a pulse appearing at the PATTERN output. With just one active step, the chance of a pulse being generated is only 12.5% (1-in-8 chance). With four steps active, the chance is 50%. With all 8 steps active, the PATTERN output will always generate a pulse (100% chance).

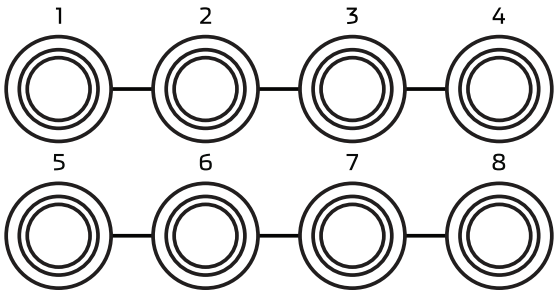
Hold for 500ms to change the Pattern Length setting. Use the 1-8 switches to set the length of the current pattern. Tap the SEQ/RAND switch to exit.

GATE/TRIG Switch

Tap to toggle the duration of pulses at the PATTERN output. In GATE mode, the PATTERN output pulse equals the duration of the incoming clock pulse. Modify the clock's pulse width to change the gate length. In TRIG mode, the PATTERN output pulse is always 10ms long, regardless of the clock.

Hold for 500ms to change the Step Length setting. Whereas the GATE/TRIG setting is for the PATTERN output only, the Step Length setting allows each step output to use either a gate or trig. An illuminated switch indicates a gate, non-illumination indicates a 10ms trig. Tap the GATE/TRIG switch to exit.

1-8 Switches

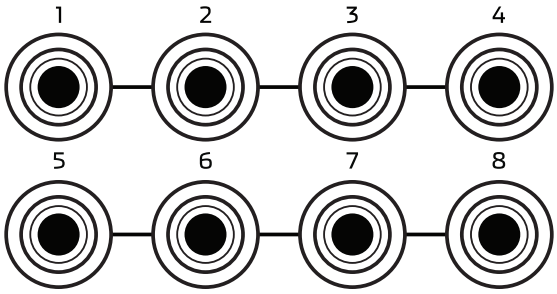


These are multi-function switches that have different applications depending on the current view (see above).

Algorhythm powers up in Pattern View, where each switch represents an active step in the current pattern.

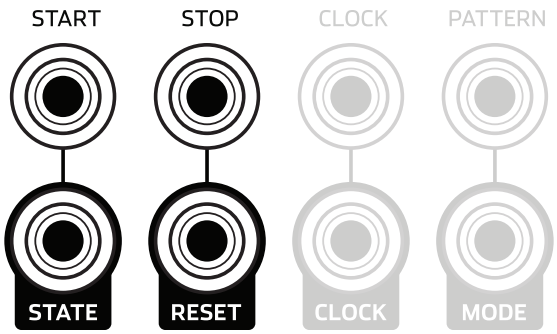
The same switches are used to change settings in Loop Repeat, Pattern Length, and Step Length views.

Step Output Jacks



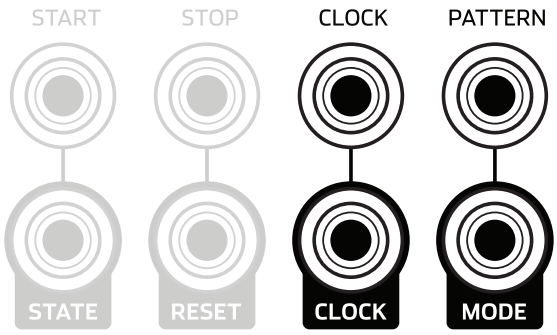
Each of these jacks corresponds to the 1-8 switches above. In SEQ mode, each jack sends out a +5V pulse whether or not the corresponding step is active. The output simply follows the clock, which enables the patching of secondary timing events that are separate from the programmed pattern. In RAND mode, these outputs only send a pulse if that step is switched on and the chosen random number (from 1-8) matches that particular step.

STATE, START, STOP, and RESET Jacks



A pulse received at the STATE input will start or stop playback, depending on the current playback state. A pulse received at the RESET input will restart the pattern at the first step as of the next incoming clock pulse. The START and STOP outputs correlate to the beginning and end of playback, respectively, sending out +5V trigger pulses (10ms in length) whenever start and stop events occur.

CLOCK, PATTERN, and MODE Jacks



The CLOCK input (bottom jack) advances the pattern by one step for each clock pulse received (when the module is armed for playback). The CLOCK output mirrors the CLOCK input (normalized to +5V) so that it can be patched to other modules.

The PATTERN output combines the step outputs into a single pulse stream. The GATE/TRIG switch controls the duration of the PATTERN output pulses.

The MODE input provides voltage control over the SEQ/RAND switch.

Link Functionality

Included with each module is a short 4x2 ribbon cable. This is the Link cable, which is used to connect multiple Algorhythm modules together.

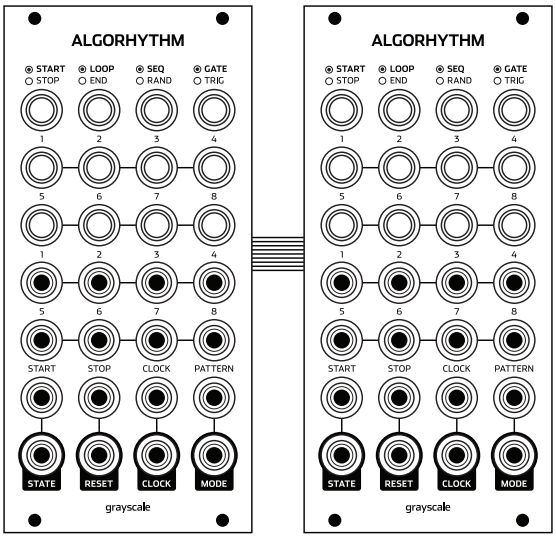
Connection and disconnection of Link cables should only be done when the module is powered off and proper precautions are taken to prevent ESD (electrostatic discharge).

The first module in the chain should not have a Link cable connected to its LINK IN socket. Only the LINK OUT socket should be connected. The last module in the chain should not have a Link cable connected to its LINK OUT socket. Only the LINK IN socket should be connected.

For connecting three or more modules, all but the first and last modules should have a Link cable connected to both the LINK IN and LINK OUT sockets.

Upon startup, each module detects the presence or absence of Link cables to determine whether it's the first, intermediate, or last module in a series.

To disable Link mode, power down the system and remove the Link cables, then restart. Link mode will be disabled when the system is powered on.



Link Mode and Clock Distribution

Any linked module with a physically-patched clock distributes its clock signal to all subsequent linked modules, eliminating the need to physically patch the same clock source to all linked modules. The typical setup would involve patching a clock to the first linked module only. But it's also possible to interrupt the distributed clock by patching a different clock to another linked module. This allows each module to have its own tempo.

To give a concrete example, consider a system with four linked Algorhythm modules. A 120 BPM clock is patched to the first module. This module now distributes a 120 BPM clock to the other three modules via the Link bus. A 90 BPM clock is then patched into the second module. The second, third, and fourth modules are now running at 90 BPM, because the 120 BPM clock coming from the first module has been interrupted. To restore the 120 BPM clock for the third and fourth modules, patch the CLOCK output of the first module to the CLOCK input of the third module. The third module is now receiving the 120 BPM clock, and passing this clock to the fourth module via the LINK bus. Only the second module will run at 90 BPM.

Patch Ideas

Now that the operational theory of Algorhythm is clear, you should be able to visualize many different applications for the sequencer. To further your understanding of the module's possibilities, here are some basic patches to try.

CLOCK DIVIDER/MODIFIER/CONTROLLER

Patch a steady pulse (such as a square wave LFO) to the CLOCK input. Patch the PATTERN output to another sequencer module. With all steps engaged, the PATTERN output will mirror the CLOCK output. But by changing the pattern, you will have a clock divider that can be programmed in realtime, with the option to start/stop or reset the clock at any time. Engage only the odd-numbered steps to create a clock that runs at 1/2 the speed of the incoming clock. Engage only steps 1 and 5 to create a clock that runs at 1/4. Disengage all steps other than step 1 to create a clock that runs at 1/8. Shorten the Pattern Length to program clock divisions of 1/3, 1/5, or 1/7. By adding/subtracting steps, you can also program rests for sequencers that would normally play one step for each clock pulse. Patch the step outputs to the reset inputs of other sequencers to work with variable time signatures.

X0X-STYLE ACCENT

Patch a sound source through a lowpass filter and then into a VCA. Patch the PATTERN output to the gate input of an envelope module. Patch this envelope's output to the VCA CV input. Then patch one or more of the step outputs to the gate input of a second envelope, and patch that envelope's output to the CV input of the filter. During playback, the first envelope controls the output amplitude, and the second envelope opens the filter more on each of the chosen steps. Experiment with patching the second envelope to various sources for different results.

BROKEN OSCILLATOR

Enable all steps, then patch the pulse/square output of a VCO module to the CLOCK input. Patch the PATTERN output to an audio mixer or output module and listen to the output. Algorhythm can run at audio rate, so the PATTERN output will generate a steady tone. Adjust the VCO frequency to change the tone's pitch. Then try removing pulses from the pattern. The harmonics of the output tone will change dramatically, resembling a bit crushing or sample-rate reduction effect. Enable RAND mode for harmonics that change over time, and experiment with different combinations of the 1-8 switches to modify the harmonics or divide the frequency of the PATTERN output.

BASIC POLYRHYTHMS

Polyrhythms can be created by setting the Pattern Length on different modules to different values. For example, set a Pattern Length of 4 on one module and 6 on another. The patterns will fall into sync after 3 loops and 2 loops, respectively, and then diverge briefly before falling back into sync. Due to the math involved, any combination of pattern lengths will eventually converge.

PROGRAMMED RANDOMIZER

With two or more linked modules, enable SEQ on some and RAND on others. You will have a repeating pattern interspersed with random segments. By patching the step outputs to the MODE inputs of one or more modules, you can control exactly when playback changes from SEQ to RAND (and from RAND to SEQ on the next loop). By patching a random pulse source (such as an Algorhythm in RAND mode) to various MODE inputs, the pattern will become more unpredictable, but will always be in time with the incoming clock.

ENDLESS RANDOM

When Algorhythm is in RAND mode, patching each of the step outputs to different destinations can have interesting rhythmic results. By using the Pattern Length setting, this type of patch can be scaled to systems of different sizes. Set the Pattern Length value to match the number of modules that you want to use. For example, set the Pattern Length to two steps, and patch the 1st and 2nd step outputs to separate envelope generators. With each incoming clock pulse, an output pulse will be generated at one of the two outputs, triggering a rhythm that alternates between the two voices. Add extra steps in the Pattern Length view, but leave those outputs unpatched, to increase the probability of rests (silent moments) within the rhythm. Or connect one of the unpatched step outputs to the MODE input. The pattern will alternate between sequential and random playback, creating recognizable repetitions interspersed with bursts of random activity.

SIMPLE CV SEQUENCER

Patch two or more step outputs into a CV-capable mixer module. By adjusting the level of each mixer channel, Algorhythm's pulse outputs can be fine-tuned to create voltages that can be used for basic CV sequencing. The 0>5V output range correlates to five octaves of pitch CV for modules that use the 1V/Octave standard. Dial in octave intervals to simulate an arpeggiator that changes in time with the clock. Use RAND mode to create predictable pitch changes with unpredictable timing.

Technical Support and Warranty Information

Send an email to contact@grayscale.info with requests for service or technical support.

Warranty coverage is provided for a period of one year from the date of purchase. Problems with a module under warranty may be remedied through repair, replacement, or refund, at the sole discretion of the manufacturer. The warranty does not cover damage caused by the user, including but not limited to system power supply malfunction, electrostatic discharge, introduction of excessive voltage levels into the module, or physical damage to the components.