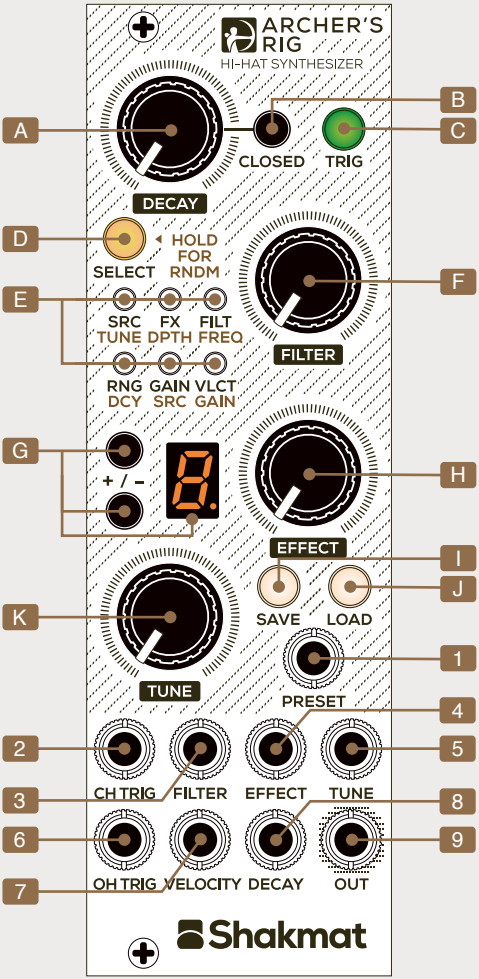
Shakmat Archer's Rig

- 8HP Eurorack Module
- Built & designed in E.U.
- www.shakmat.com


ARCHER'S RIG
HI-HAT SYNTHESIZER
A
B
C
CLOSED
TRIG
DECAY
D
SELECT
HOLD FOR RNDM
E
SRC TUNE
FX DPTH
FILT FREQ
RNG DCY
GAIN SRC
VLCT GAIN
FILTER
F
G
+ / –
H
EFFECT
I
J
SAVE
LOAD
K
TUNE
1
PRESET
4
2
5
CH TRIG
FILTER
EFFECT
TUNE
3
8
6
9
OH TRIG
VELOCITY
DECAY
OUT
7
Shakmat

Introduction

The Archer's Rig boasts a quiver full of digital noise generation algorithms, offering sharp and cutting sound sources for hi-hat and high-pitched percussion synthesis. As our archer has more than one string to its bow, he processes its source material through a versatile analog chain featuring filters, distortion, and a VCA. Randomizer, a memory of 96 presets, and compatibility with select bus protocol round out the Archer's capabilities, making it a powerful tool for creating a vast and personalized sonic palette.

- A Decay potentiometer
- B Closed-hat decay button
- C Trigger button
- D Menu select button
- E Menu LEDs
- F Filter potentiometer
- G Menu +/- buttons and display
- H Effect potentiometer
- I Save button
- J Load button
- K Tune potentiometer
- 1 Preset input
- 2 Closed-hat trigger input
- 3 Filter CV input
- 4 Effect CV input
- 5 Tune CV imput
- 6 Open-hat trigger input
- 7 Velocity CV input
- 8 Decay CV input
- 9 Audio output

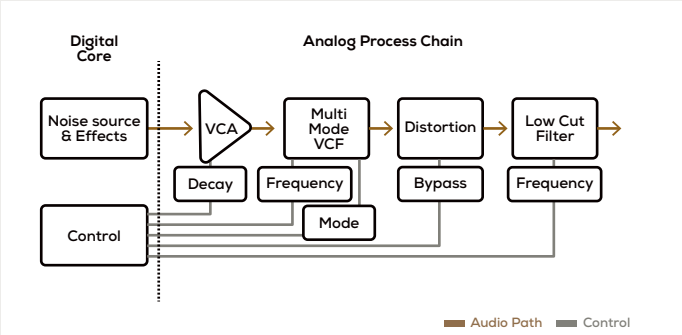
Installation

The Archer’s Rig requires a standard 2x8 pin eurorack power cable. Make sure the red stripe on the cable matches the -12V side of the Archer’s Rig power header.

Architecture

The Archer's Rig has a hybrid digital–analog architecture. The digital section provides a continuous noise source, similarly to a VCO in a substractive voice, and drives the analog section with modulation signals. The analog section is composed of a multimode VCF, a VCA, a distortion and low-cut filters.

Fig. 01 — Archer's Rig simplified architecture



Noise Source SRC

The digital source is composed of a noise source followed by a digital effect. In order to select a source, first navigate to "SRC" on the main LED menu [E] using the select button [D], then choose a source using the display and +/- buttons [G]. The tune potentiometer [K] and associated CV input [5] act on the noise source tuning. The available sources are listed on the next page.

Metal
Classic metallic noise source made of 6 detuned square waves.

808
6 square waves with a frequency ratio close to what can be found in a 808 hi-hat source with a little bit of extra noise.

XOR
6 square waves processed by a XOR processor.

DR110
4 square waves and a white noise generator. This source is inspired by the DR110 hi-hat.

Noise
A white noise source, processed by a rate reducer and a mix with speckle noise.

Grains
A granular noise, efficient to design your own shakers.

909
A source similiar to the 909 hi-hat source.

Eeprom
Source inspired by 80's sample based drum machines.

FM
One square wave is modulated by a second one. Frequency ratios are complex in order to provide a non harmonic sound source.

Cross-FM
Same as FM but square waves are cross-modulated, resulting in a more chaotic and less harmonic noise source.

Resonance noise
A source made by a square wave modulated in frequency by the noise source.

Bell
2 square waves detuned, great source to make electronic cowbell sounds.

Sine
A simple sine wave ready to be distorded by the effects section.

External
In this mode, the digital noise source (noise source and effects) is bypassed to give a direct access to the analog process chain. Patch your external signal in the Tune CV input to process it with the analog section.Tuning and Effect parameters are disabled.

Effects FX

The noise source is processed by a digital effect. To select the effect type, scroll the main LED menu **[E]** to "FX" and choose an effect using the display and +/- buttons **[G]**. Each effect has a parameter controlled by the effect potentiometer **[H]** and CV input **[4]**. Turning the effect potentiometer **[H]** fully counter-clockwise bypasses the effect.

FM
An internal sine wave modulating the tune parameter.

Ring Modulation
A ring modulation of an internal square wave with the digital source.

Comb Filter
A delay line providing a comb filtering effect.

Metallizer
This mode disrupts the audio buffer, resulting in metallic sonic material.

LFO on Tune
A sine LFO is applied to the tune parameter.

LFO on Amplitude
A sine LFO is applied to the amplitude parameter.

Up Filter Envelope
Apply the amplitude envelop to the frequency of the VCF.

Down Filter Envelope
Same as the Up Filter Envelope but with an inverted envelope.

Sample Rate Reducer
Digital low fidelity effect.

VCA & Envelope

Entering the analog chain, the digital audio source is first shaped by a VCA controlled by the open and closed-hat envelopes. The decay knob **[A]** adjusts the open-hat decay time. Pressing the closed-hat decay button **[B]** allows the decay knob to set the closed-hat decay time. The choosen value also sets the minimum open-hat decay time.

Turning the decay knob [A] fully counter-clockwise while changing the closed-hat decay time, mutes it entirely. This setting allows the closed-hat trigger input [2] to close the open-hat without generating any sound.

Drone Mode:
To activate the drone mode, press both the trigger [C] and closed-hat decay buttons [B] simultaneously. In this mode, the volume envelopes are replaced by an infinite sustain. The decay knob [A] and CV input [8] act as a volume control.

Open and closed-hats are exclusive. When a closed-hat envelope is triggered as the open envelope is still decaying, the open-hat envelope stops immediately.

Filter Type FILT

The Archer's Rig has two filters in series: a multimode resonnant VCF and a low-cut filter. The VCF frequency is controlled by the filter potentiometer [F] and CV input [3]. To select the VCF type, scroll the main LED menu [E] to "FILT" and choose a filter type thanks to the display and +/- buttons [G]. There are 4 different filter types :

HiPass
Three poles hi-pass filter.

Band-pass
A 12 db/oct. hi-pass filter and 6 db/oct. low-pass filter.

Resonant HiPass
A resonant version of the hi-pass filter.

Peak
A highly resonant version of the band-pass filter.

Filter Range RNG

The next menu page is the frequency range of the filter. This value sets the fixed frequency of the end of chain low-cut filter and, the VCF cut-off frequency range. To select the filter range, scroll the main LED menu [E] to “RNG” and choose a filter range thanks to the display and +/- buttons [G].

Full
150 Hz, suitable for medium percussions.

Low
1 kHz, removes the low mids.

Medium
6 kHz, removes the mids. Usefull for 808 style Hi-hats.

High
10 kHz, keeps the very highs.

Gain & Distortion GAIN

The module level can be set using the fifth menu page called “GAIN”. Values from 0 to 9 act on the level without distortion. A *normal* volume is achieved around 6 or 7. Values over 9 enable distortions for which the distortion gain is ranging from A to J.

Velocity VLCT

The Archer's Rig has a unipolar velocity input [7] acting on the level/gain. Each time a trigger is received at the trigger inputs [2&6], the module samples the CV received at the velocity input [7] which therefore works as a VCA combined with a sample & hold. It is possible to set the minimum level that is when 0v is received at the velocity input [7]. To do so, scroll the main LED menu [E] to "VLCT" and choose a value from 0 to 9 with the display and +/- buttons [G]. Note that the velocity input is normalised to 5 volts.

Randomizer TUNE DPTH FREQ DCY SRC GAIN

The randomizer function allows to randomize each main parameter of every hit (tune, effect depth, decay and VCF frequency). In adddition, the gain/level and noise source can also be randomized.

To access the randomizer, hold the select button [D] for two seconds (the button is now on), then select the parameter to randomize using the main menu LEDs [E]. The randomized parameter is shown by the second line of text under each menu LED. When the randomizer is in use the main menu LEDs [E] are blinking. The randomizer amount can be set for each parameter from 0 to 9, using the +/- buttons and the display [G].

It is possible to scroll the main menu LEDs [E] backward. To do so, press the select button [D] alongside the minus [G] button.

Memory

The Archer's Rig has a non-volatile memory of 96 presets. A preset stores the selected source and effect type, the filter type and range, the gain setting, the accent level as well as every randomization amount and every potentiometer value (including the closed-hat decay option). Also included are three banks of factory presets (A, B & C) featuring a hi-hat bank, a miscellaneous percussion bank, and a randomized percussive sounds bank.

To load a preset, press the load button **[J]** (the button is now on). Choose a bank from which to load your preset using the six main menu LEDs **[E]** and select button **[D]** then, select a slot using the display and +/- buttons **[G]**. 16 slots ranging from 1 to G, are available for each of the six banks. When browsing slots, the value "r" and "i" are found in every bank at the end of the list. Loading the "r" preset will generate a random preset ready to mangle. Loading the "i" preset will set every parameter to its initial state, so that you can start sound designing from scratch. The very last value of each slots list is a dash "-" which allows to exit the load menu without loading any preset.

A preset can be pre-listened before loading. To do so keep the load button [J] pressed while browsing through slots.

To save a preset, press the save button **[I]** (the button is now on). Choose a bank to store your preset using the six main menu LEDs **[E]** and select button **[D]** then, select a slot using the display and +/- buttons **[G]**. 16 slots ranging from 1 to G, are available for each of the six banks. The very last value of each slots list is a dash "-" which allows to exit the save menu without saving any preset.

The Archer's Rig automatically and continuously saves its current state. This means that it will always starts in the same state as when it was turned off.

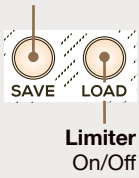
The Archer's Rig also has a preset input **[1]** which allows preset selection, in the current bank, via CV.

Select Bus

The Select Bus protocol enables digital communication between modules through the ribbon cable used for power (at the back of the module). Communication occurs via pins 15 & 16 of the power connector, making it feasible only for modules employing large power cables (16 pins to 16 pins).

To enable Select Bus communication, a module needs to be set as a transmitter (master) and one or several modules must be set as receivers (slaves). The Archer's Rig handles the Select Bus protocol as a receiver allowing the presets to be loaded and saved using a select bus transmitter module such as the Harlequin's Context. All the modules involved in the communication need to be connected to the same bus board.

Options Menu



The options menu allows to enable (or disable) the Select Bus and limiter options. To enter the option menu, press both the save & load buttons **[I&J]** for 5 seconds, the display will show «o». To exit the options menu press the select button **[D]**.

The limiter option simulates the effect of a true limiter by shortening the hold stage of the envelop, granting more punchy hi-hats.

Three options are available for the Select Bus behaviour. LED off **[i]** means Select Bus is off. LED on **[i]** means Select bus is on, and the module handles save/load messages for 16 presets in the active bank. Blinking LED **[i]** means Select Bus is on, and the module handles save/load messages for 96 presets across all banks.

Factory Reset

To restore your Archer's Rig to the factory presets & settings and clear its memory, hold the closed-hat decay button **[B]** while powering up your modular system. The display will show the letter "F" as factory. Confirm the factory settings restorations by pressing the load button **[J]**.

Specifications

Size	CV inputs
8 HP	-5 to +5V
Depth	Audio output
21 mm	-8 to +8V
Current Draw	
105 mA @ +12V	
45 mA @ -12V	

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