

MOSKWA

ROTO
SEQUENCER II

Model of 1965

OPERATOR'S MANUAL *rev. 1965/2.0*

SALUT

Thank you for buying this Xaoc Devices product. Moskwa II is an eight-step sequencer generating two kinds of signals: gate/trigger and CV. Designed with live sequence programming in mind, Moskwa II takes inspiration from classic analog sequencers and greatly expands on their functionality surpassing our original Moskwa rotosequencer, while retaining the same size, basic panel structure, and operation principles.

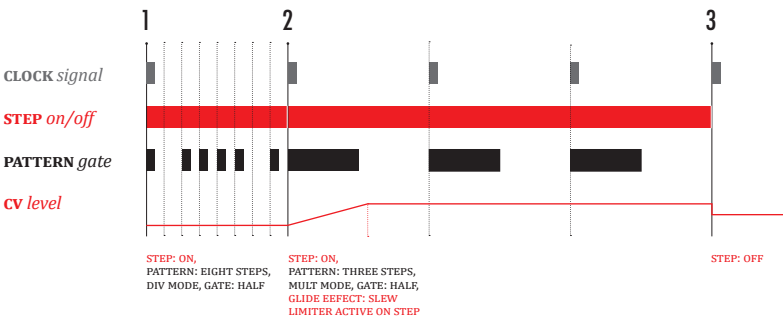
At the core of the module is an eight-step CV sequencer and a parallel eight-step gate/trigger sequencer. Together these sequencers provide the single pair of CV and gate/trigger signals necessary to play looped eight-note musical phrases typical of old-school analog sequencers. These two signals (CV and gate/trigger) can be used separately to trigger different events in your system and modulate any parameters expecting CV (e.g. in the available bipolar mode). The CV can be modified by the built-in quantizer and slew limiter. The tempo of the sequence is set by an internal or external clock which allows for synchronization with other modules in the system. The incoming clock rate can be internally divided or multiplied.

In addition to these basic functions, Moskwa II offers more unique, advanced features, such as eight independent gate/trigger pattern generators (one for each step of the sequence). You can treat them like a sequencer within the sequencer offering eight microsteps for each main sequence step. This allows for programming complex gate/trigger rhythmic patterns (e.g. step repeat, additional pauses, microtiming, or swing effect).

Moskwa II features two independent randomization sections that give the user advanced control over the optional chaotic/random change of various sequence parameters. Topping it all off, Moskwa II can store eight presets to be loaded at any time.

All these unique functions allow Moskwa II to generate longer and more complex sequences than those produced by traditional 8-step sequencers.

fig. 1: **POSSIBLE SEQUENCE STEP STRUCTURE EXAMPLE**



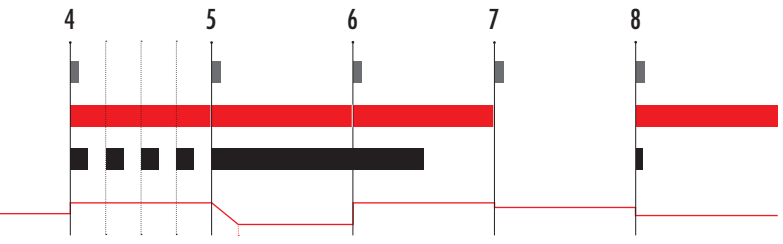
INSTALLATION & SETUP

The module requires 20hp worth of free space in the Eurorack cabinet. Always turn the power off before plugging the module into the bus board using the supplied ribbon cable. Pay close attention to power cable pinout and orientation. The red stripe indicates the negative rail and should match the dot or **–12V** *mark on both the bus board and the unit. Moskwa is internally secured against reversed power connection, however, rotating the 16-pin header* **MAY CAUSE SERIOUS DAMAGE** *to other components of your system because it will short circuit the +12V and +5V power lines. Always pay particularly close attention to the proper orientation of your ribbon cable on both sides! Do not attach the power ribbon cable to the Ostankino expander connector!* **CONNECTING THE POWER CABLE TO AN INCORRECT HEADER WILL DESTROY YOUR MODULE!** *The unit should be fastened by mounting the supplied screws before powering up. To better understand the device, we strongly advise the user to read through the entire manual before use.*

PANEL OVERVIEW

Moskwa's panel is divided into four functional sections with a row of inputs/outputs at the bottom of the module. In the center is the **TRANSPORT** *button* ❶ *surrounded by three red knobs. The button starts and pauses the sequence, while the three knobs adjust the main sequence parameters.* **RATE** ❷ *adjusts the frequency of the built-in clock, thus setting the tempo of the sequence (12 to 2400 BPM). When an external clock is patched into the* **EXT CLOCK** *input* ❸*, the* **RATE** *knob allows for division or multiplication of its rate.* **RANGE** ❹ *adjusts the amplitude of the signal present at the* **CV OUT** *output* ❺ *(adjustable in quantized 1V increments). Moskwa produces CV within the 0–8 V or ±5V range (see: "Global Settings"). The inner ring around the* **RANGE** *knob indicates value increments for 0-8 V, the outer ring does the same for ±5V.* **RESET** *sets* ❻ *the number of steps in the sequence (1–8).*

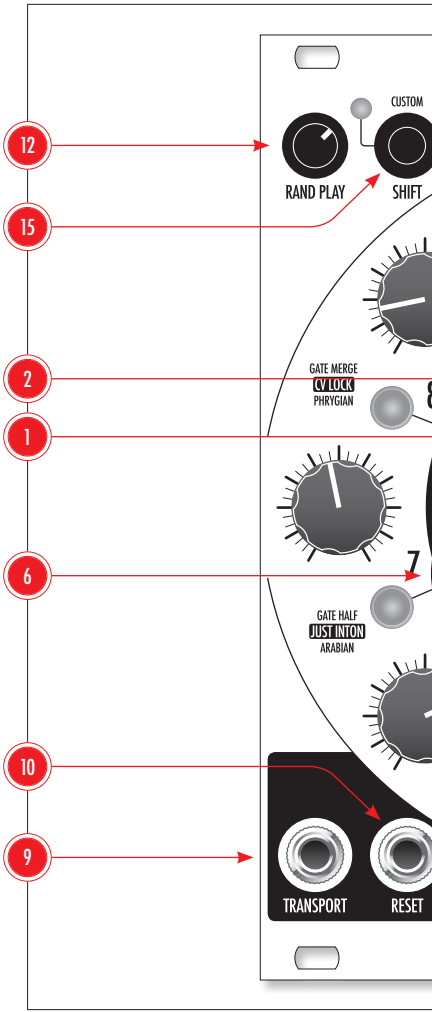
The three main knobs are circled by eight potentiometers and eight buttons—a pair for each



STEP ❼. *This section uses the knobs to set the CV value present at the CV output for each step and uses the buttons to activate/deactivate each respective step. An active step generates signal at the* **GATE OUT** *output* ❽. *Note that the* **CV OUT** *always sends the voltage set for each step, regardless of whether the step is active.*

Moskwa is equipped with three inputs situated at the bottom left of the panel that allow for real-time playback interaction. The **TRANSPORT** *input* ❾ *pauses the sequence (see: "Global Settings" section), the* **RESET** *input* ❿ *resets the sequence to the first step, and the* **DIRECTION** *input* ⓫ *reverses the direction of the sequence.*

At the top of the panel, there are three smaller knobs and three buttons. The **RAND PLAY** *knob* ⓬ *gradually mutates the sequence resulting in some steps being randomly replaced by other steps from the same sequence. Turning the knob clockwise increases the probability of replacing the next step with another step chosen randomly and returning the knob to 0 returns the sequence to the current panel settings. The* **SLEW** *knob* ⓭ *sets the global slew time from zero up to the length of a whole step. The* **PROBABILITY** *knob* ⓮ *increases the probability of random setting inversions (activated by* **STEPS 2-4** *in the* STEP MODE, *see: "Step Settings" section). The value set by the potentiometer is common for all the steps, but for each step, the draw is performed individually, so the result can be different for each step. The* **CUSTOM/SHIFT** *button* ⓯ *activates a custom sequence (see: "Custom Sequence" section below), and also acts as a shift control giving access to secondary functions. The* **STEP/QUANT** *button* ⓰ *chooses the* STEP MODE *(single press), or the quantization menu (press and hold). The* **PATT/PRESET** *button* ⓱ *activates the* PATTERN MODE *(single press), or the preset manager (press and hold).*



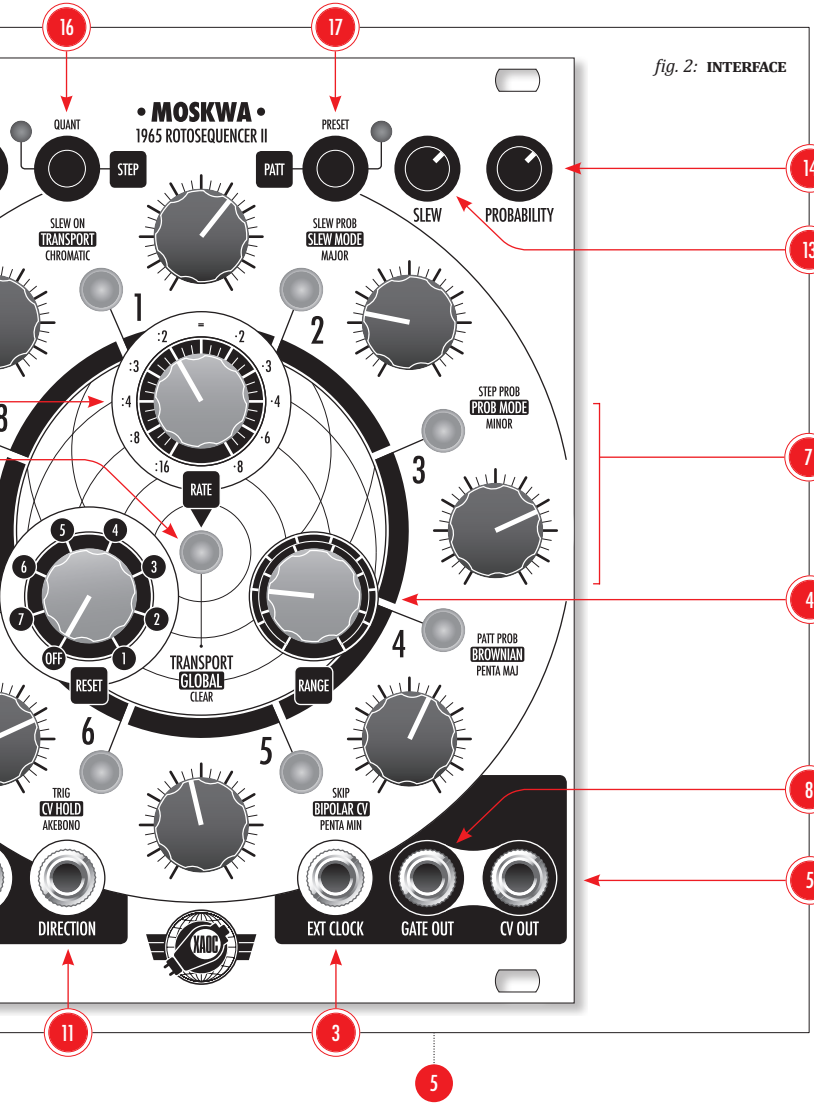


fig. 2: **INTERFACE**

Each button has a LED indicating various modes of operation and to help the user navigate the more advanced functions—without the need for menu diving!

MODES: STEP & PATTERN

Most adjustments are performed in two main operational modes: STEP MODE *and* PATTERN MODE. *The principal functionality for both modes is the modification of the gate/trigger events. Press the corresponding* **STEP** *or* **PATT** *button to select the mode as indicated by the adjacent LED appearing yellow.*

STEP MODE

In the STEP MODE, *the step buttons activate and deactivate the gate/trigger signal for each sequence step similar to a traditional sequencer. You deactivate the step to create a pause for the duration of that particular step. To enter the advanced settings for a step, press and hold the* **STEP** *button for one second. More details on the advanced settings are presented later in this user manual.*

PATTERN MODE

Each step can have an unique pattern—a micro-sequence of up to eight gates/triggers played at the moment the main sequence step is triggered.

Patterns enable the user to achieve ratcheting, repeat steps, move the gate/trigger signal within the duration of the step to achieve swing, lengthen the step duration, or introduce a pause. When a pattern is active, it replaces the default single gate/trigger on the given step of the main sequence with a micro sequence of up to eight gate/triggers. Depending on the PATTERN PLAYBACK MODE, *each step button will be illuminated red or orange, and the sequence step will last either one clock cycle, or up to eight clock cycles (for details see: below). Remember – if the given step is inactive, even an active pattern on that particular step will not produce any gate/trigger signal.*

QUANTIZATION

Pressing and holding the **STEP/QUANT** *button for one second activates the quantization settings. This mode is indicated by a red LED next to the* **STEP/QUANT** *button.*

The quantizer gives you access to eight scales selected via the step buttons. The active scale is indicated by a green backlight. When you choose one of the scales and then send Moskwa's CV output to a frequency input of a 1V/oct oscillator, the step knobs select note values corresponding to the given scale. Don't forget to tune your oscillator to the root note of your choosing. To exit the quantizer settings, push either of the main mode buttons, **STEP** *or* **PATT**.

Available scales: **CHROMATIC, MAJOR, MINOR, MAJOR PENTATONIC, MINOR PENTATONIC, AKEBONO, ARABIAN, PHRYGIAN.**

CUSTOM SEQUENCE

The **SHIFT/CUSTOM** *button allows for programming a unique step combination as a* CUSTOM SEQUENCE. *This function is available only in the* STEP MODE. *To program a* CUSTOM SEQUENCE, *press and hold the* **SHIFT/CUSTOM** *button while pushing the step buttons in the desired order. When you release the* **SHIFT/CUSTOM** *button, the default step order will be replaced by the* CUSTOM SEQUENCE. *The* CUSTOM SEQUENCE *can be as long as 256 steps. The* CUSTOM SEQUENCE *playback is indicated by a yellow LED next to the* **SHIFT/CUSTOM** *button. The* CUSTOM SEQUENCE *can be recalled at any time (in the* STEP MODE*)*

by pressing the **SHIFT/CUSTOM** *button. You can add steps during playback by pressing and holding the* **SHIFT/CUSTOM** *button, and then choosing steps to be added at the end of the* CUSTOM SEQUENCE*. When the* CUSTOM SEQUENCE *is inactive adding new steps erases the previous* CUSTOM SEQUENCE*. To erase the* CUSTOM SEQUENCE *without replacing it with a new one, press* **TRANSPORT** *+* **SHIFT**.

PRESETS

Pressing and holding the **PATT/PRESET** *button for one second enterss the preset memory. This mode is indicated by a red LED next to the* **PATT/PRESET** *button. There are 8 preset slots available. A written slot is indicated by a green backlight. To choose a preset, push the corresponding step button. Upon loading the preset its step button flickers, and the backlight changes from green to red. The last loaded preset is indicated by a red backlight on the corresponding step/slot. Patterns saved while two Moskwa II units were chained together (see: below) are indicated by a yellow backlight. Loading such a chained pattern switches the units to chain mode.*

To write a new preset (saving the current state of the module), enter the preset memory by pressing and holding the **PATT/PRESET** *button for one second. Press and hold the* **SHIFT** *button, and then press the step button to which you want to assign the preset. All settings are written along with the preset except for the* **CV LOCK** *function (see: "Global Settings"). Loading a preset may lead to discrepancies between the values set by the knobs and the actual values generated by the loaded preset. To avoid unexpected pitch jumps after touching a knob, the value changes only when you move the knob past the value written with the preset. To recall the current knob positions, load an empty preset slot.*

TRANSPORT BUTTON: SECONDARY FUNCTIONS

The **TRANSPORT** *button can be used to restore default settings when combined with the individual sequence* **STEP 1-8** *buttons or the main mode buttons* **STEP** *and* **PATT**. *In* STEP MODE, **TRANSPORT** *+* **STEP 1-8** *resets all settings for the chosen step, while* **TRANSPORT** *+* **STEP** *resets all steps' settings from* STEP MODE *(including the deactivation of steps). In* PATTERN MODE, **TRANSPORT** *+* **STEP 1-8** *clears the pattern for the chosen step, while* **TRANSPORT** *+* **PATT** *resets all the settings from* PATTERN MODE*. In* PRESET MODE, **TRANSPORT** *+* **STEP 1-8** *clears the chosen preset slot.*

With **STEP 3** *active in the* GLOBAL SETTINGS *(see: below), pushing the* **TRANSPORT** *button and turning the* **PROBABILITY** *knob all the way clockwise and then all the way counterclockwise clears the* PROBABILITY SEQUENCE *(see: below). In* STEP MODE, *press* **TRANSPORT** *+* **SHIFT/CUSTOM** *to erase the* CUSTOM SEQUENCE.

STEP SETTINGS

To edit a step, push and hold its button for one second. Editing multiple steps simultaneously is possible by pressing and holding the first one while pressing each additional step to be edited. The chosen steps light up green. The **STEP 1-8** *buttons are used to select various functions marked on the panel. When a function is selected its button lights up green.*

STEP 1 • SLEW ON *button activates/deactivates the slew limiter for the chosen step. The length of the slew is adjusted globally for all steps with the* **SLEW** *knob.*

STEP 2 • SLEW PROB *button activates/deactivates the probability of the inversion of the slew*

limiter state (on/off). If the slew limiter is active on the given step, turning on the probability function enables it to influence the deactivation of the slew limiter and vice versa. The degree of probability of change is adjusted globally with the **PROBABILITY** *knob.*

STEP 3 • STEP PROB *button activates the probability function for the gate/trigger of the edited step.*

STEP 4 • PATT PROB *button activates the probability function for turning the pattern on and off for the given step.*

STEP 5 • SKIP *button activates the skip function. When skip is turned on, deactivating a step excludes it from the sequence, resulting in a shorter sequence.*

STEP 6-8 *buttons select the type of signal present at the* **GATE OUT.** *When no buttons are lit, the output signal is a gate. Its length is a direct copy of the width of the external clock pulse (with the internal clock, it lasts for half the length of the step). When the* **STEP 6 • TRIG** *button is active, the output of the* **GATE OUT** *changes to trigger.*

STEP 7 • GATE HALF *button activates a gate with a duration of half the step length (or half the division resulting from the active pattern).*

STEP 8 • GATE MERGE *button button activates a legato style gate lasting the entire length of the step that merges with the next step's gate.*

PATTERN EDITING

As stated above, each step can have an unique pattern. To activate and edit a pattern, enter PATTERN MODE *by pressing the* **PATT** *button then select a step by pressing one of the eight* **STEP 1-8** *buttons. The button lights up, but no change is audible yet. Hold the* **STEP 1-8** *button for one second to enter* EDIT MODE. *To edit multiple patterns at the same time, press and hold the first pattern button, and then push the others to be edited. The selected steps light up green.*

The default pattern has eight steps with only the first step active. To change that, press and hold the **SHIFT** *button, and choose the desired last pattern step using the step buttons. The length of a given pattern is indicated by a red backlight.*

Now you are ready to activate pattern steps the same way as steps in the main sequence by pressing the **STEP 1-8** *buttons. Buttons of active pattern steps light up yellow. To exit the pattern editor, press the button of the mode you wish to exit to, either* **PATT** *or* **STEP**.

In the PATTERN MODE, *you can choose the pattern playback mode for each step. To do that, press and hold* **SHIFT** *and press a step button of your choosing. There are two options: a red backlight indicates the default* DIV PATTERN MODE *in which the entire pattern lasts for the duration of a single main sequence step. Therefore, each pattern step lasts for the duration of a fraction of the duration of the main sequence step (depending on the number of pattern steps). A yellow step backlight indicates* MULT PATTERN MODE *in which each pattern step lasts for the duration of one clock cycle. Therefore, the main sequence step lasts for as many clock periods as there are steps in the pattern for the given step. This setting is unique for each step.*

In PATTERN MODE, *the steps that have been programmed with their own unique patterns, but have not been activated, are dimly lit with the color indicating the pattern playback mode (dim yellow for* MULT PATTERN MODE *and dim red for*

DIV PATTERN MODE*). In* STEP MODE *the steps with active patterns are indicated by a dim orange backlight.*

Default pattern settings are: DIV PATTERN MODE*, 8 steps, first step active. That way, the user can activate a pattern before editing it, and not have it affect the main sequence initially (with the default pattern, the only noticeable difference being the shorter gate duration for the given step).*

GLOBAL SETTINGS

Global settings access additional options for detailed control over the sequencer behavior. To enter, press and hold the **TRANSPORT** *button for one second. Active functions are indicated by a yellow backlight on the corresponding* **STEP 1-8** *buttons.*

STEP 1 • TRANSPORT *button changes the behavior of the* **TRANSPORT** *input. By default, a gate at this input pauses the sequence. When the transport function is active, the input expects triggers which toggle the sequence between on and pause, thus mimicking the behavior of the* **TRANSPORT** *button.*

STEP 2 • SLEW MODE *button changes the behavior of the slew limiter from portamento to glissando. When active, the CV value change between steps is quantized to the current quantization setting resulting in a change that is stepped instead of smooth as in the default portamento setting. With the quantization off, glissando works just like regular portamento.*

STEP 3 • PROB MODE *button changes the function of the* **PROBABILITY** *knob. When active, the knob no longer increases the probability of random event inversion. Now, it adjusts the degree of randomization of a self-creating sequence of inversions of settings activated with* **STEP 2–4** *buttons in the* STEP MODE *(see: "Step Settings").*

The sequence consists of 16 steps (it changes every two main sequencer cycles). The **PROBABILITY** *knob adjusts the chance of the inversion of the setting from the step mode. Despite having the same probability value for all the steps, each step's result can be quite different.*

With the **PROBABILITY** *knob set at minimum, the sequence is fixed at its latest iteration and repeated without any changes. With the* **PROBABILITY** *knob at maximum, the probability of inversion of the parameter set in the* STEP MODE *is 100%. It means that the value inverts every two main sequence cycles without any random factor, creating a 32-step sequence. With* **PROBABILITY** *knob settings between the extremes, the inversion sequence slowly morphs from one to another. To clear the sequence and restore the settings from the* STEP MODE*, push and hold the* **TRANSPORT** *button and then turn the* **PROBABILITY** *knob all the way clockwise and then all the way counterclockwise.*

STEP 4 • BROWNIAN *button changes the functionality of the* **RANDOM PLAY** *knob. By default, the* **RANDOM PLAY** *knob increases the randomization of the step order. The setting activated in the global settings by the* **STEP 4** *button changes that behavior to Brownian motion. With the knob set at maximum, there is a 20% chance of a step back, a 20% chance of staying put, and a 60% chance of moving forward. With the* **RANDOM PLAY** *knob set at minimum, there is a 100% chance of moving one step forward, therefore, the knob does not modify the order of the steps in the main sequence.*

STEP 5 • BIPOLAR CV *button changes the maximum CV range from unipolar 0–8V to bipolar ±5V.*

STEP 6 • CV HOLD *button activates the CV hold feature. It holds the voltage from the last active step until there is a gate/trigger from the next active step. It is useful, e.g. when you mute a step and the VCA envelope is longer than the duration of one step of the main sequence. In that scenario, the CV hold feature prevents the pitch from changing when the envelope is still in the decay/release stage.*

STEP 7 • JUST INTON *button activates the just intonation tuning replacing the equal temperament tuning.*

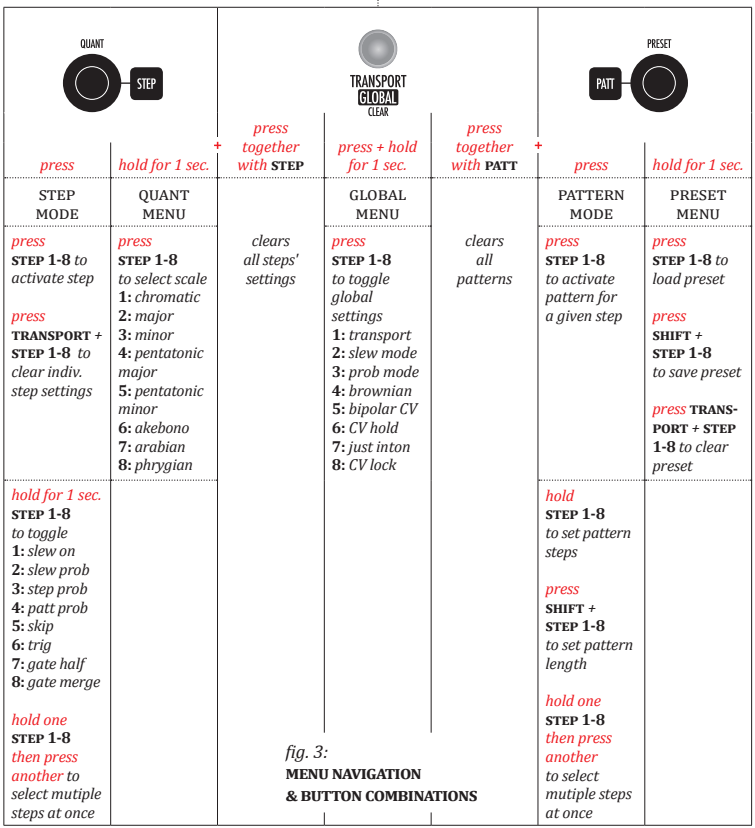


fig. 3:
MENU NAVIGATION & BUTTON COMBINATIONS

STEP 8 • **CV LOCK** *button activates the CV lock function which deactivates CV knobs. Therefore, changing their position does not have any influence on the voltage present at the* **CV OUT.** *This function allows for safe adjustments to all the other functions without the risk of accidental pitch change. This is also very useful in live situations as a cue mode to create a new sequence or to make changes to the current sequence before initiating the change. To avoid confusion, this is the only setting not saved with the presets.*

EXPANDABILITY: CHAINING TWO UNITS

Two Moskwa II units can be chained to prepare a sequence longer than 8 steps. Turn the power off and join the modules with a 6-pin ribbon cable included with the module. The headers are keyed, there is no way of plugging the cable the wrong way. Chaining and unchaining is performed by pressing and holding the **TRANSPORT** *button on the unit you want to be the primary module and pushing the* **TRANSPORT** *button on the other module. Successful chaining is indicated by an animation —the step buttons of the primary module blink green, the step buttons of the secondary module blink red. To chain two Moskwa's one can also load a chain preset (indicated by yellow backlight). Unchaining can be achieved by loading a regular preset (indicated by red backlight).*

Two chained Moskwa II units generate a joint sequence, but the CV values can be independently modified on each module. Each **CV OUT** *can have unique quantization and range settings. Both* **CV OUT** *and* **GATE OUT** *jacks are sending the same basic sequence. Nonetheless, the primary Moskwa uses its own quantization and range settings. The secondary Moskwa behaves likewise. Therefore, the users have at their disposal two longer sequences, each with unique settings (not only quantization and range but also e.g. the slew time). The sequence length depends on the* **RESET** *parameter setting on both Moskwa II units. With* **RESET** *set to „off" on both modules, the sequence has 16 steps. Any change to the* **RESET** *setting on any Moskwa unit shortens the combined sequence, e.g. with* **RESET** *set to „off" on the primary Moskwa and* **RESET** *set to 4 on the secondary Moskwa, the total step count is 12. Chaining two Moskwa II modules doubles the number of available* CUSTOM SEQUENCES. *Both* CUSTOM SEQUENCES *can use 16 CV values from both modules.*

To adjust **RANDOM PLAY** *and* **PROBABILITY** *settings, use the primary Moskwa II. The same goes for the* **EXT CLOCK** *input. The* **TRANSPORT** *on the primary unit switches the sequence on and off. The* **TRANSPORT** *button on the secondary unit toggles between a 16-step sequence from both modules, an 8-step sequence from the primary unit, and an 8-step sequence from the secondary unit.*

EXPANDABILITY: OSTANKINO EXPANDER

The Xaoc Ostankino II module further expands Moskwa II's connectivity. It adds CV inputs for Random, Slew, Probability, Range, and Rate parameters. Ostankino II also includes a transpose input. Moreover, it enables the user to choose the first and the last sequence step with CV. The expander features a step repeat button as well as a gate input for that function. There are nine additional outputs: clock out and individual gate/bit outputs for each sequence step. Please note that neither Ostankino II is compatible with the original Moskwa module, nor Moskwa II is compatible with the first iteration of Ostankino. Also, one is advised against trying to chain an old Moskwa module with the Moskwa II.

ACCESSORY

Our Coal Mine black panels are available for all of Xaoc Devices modules. Sold separately. Ask your favourite retailer. •

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MAIN FEATURES

Custom gate/trig pattern for each step

Custom gate/trig sequence up to 256 steps

Built-in quantizer, slew limiter

Two randomization circuits

Eight preset slots

Built-in clock 12–2400 BPM

External clock input, clock multiplier, and divider

Unipolar & bipolar operation

Two units can be daisy-chained for longer sequences

Expandable with Ostankino II module with additional controls

TECH DETAILS

Eurorack synth compatible

20hp, skiff friendly

Current draw: +40 mA/ -0 mA

Reverse power protection

