

Apsaras

PLAY BOOK



RANDOMARP SEQUENCER

with the Ap-X expander

Random melodies from three modulation sources
Quantizer with a twelve-key scale selector
256-step sequencer with swing, ratchets and per-step automation
Phrase recorder, with T/H over the loop
Keyboard mode for playing the keys by hand
USB-MIDI note and portamento output

lots
Play
Synth

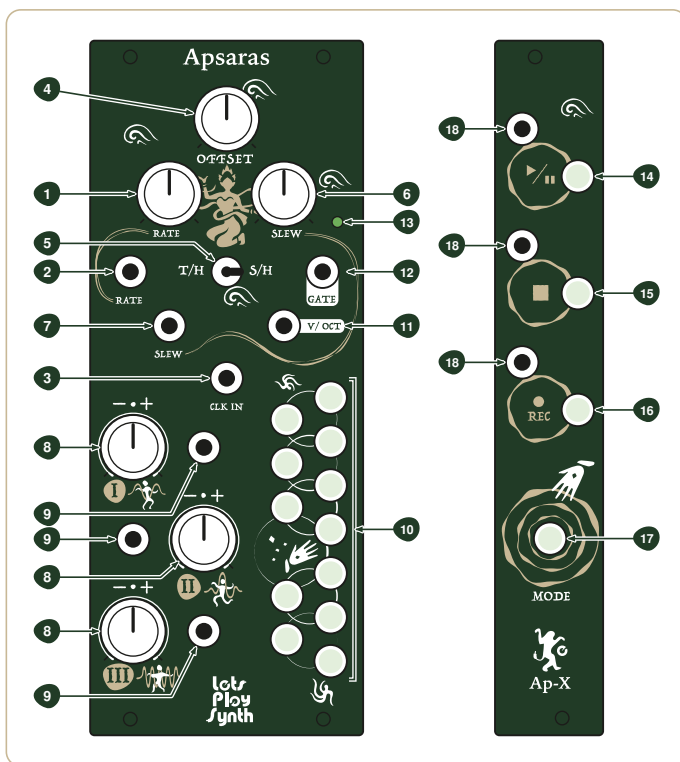


FIG. 1 Apsaras and Ap-X front panels: layout and controls

CONTROL	WHAT IT DOES
1 RATE	Clock speed, 0.1–30 Hz; with CLK IN $\div 8 \dots \times 8$
2 RATE INPUT	CV for RATE
3 CLK IN	External clock in
4 OFFSET	Pitch offset ± 2 oct · Sequence: swing
5 T/H · S/H	How the pitch follows the clock
6 SLEW	Glide between notes, 1 ms–10 s
7 SLEW INPUT	CV for SLEW
8 I · II · III	Source amounts · Sequence: octave, gate width, ratchet
9 I · II · III INPUTS	Your CV in place of a source
10 KEYS	Choose the scale, or enter notes
11 V/OCT	Pitch out, 1 V per octave
12 GATE	Gate out, 0 or +5 V
13 GATE LED	Follows GATE

AP-X EXPANDER

14 PLAY	Starts · pauses a sequence · hold: freeze
15 STOP	Starts and stops · Sequence: back to step 1
16 REC	Hold to record a phrase or knob moves
17 MODE	Hold 1 s: Random $\leftrightarrow$ Sequence · tap: keyboard, or store a step
18 GATE INPUTS	A gate presses PLAY, STOP or REC

Let's Play Synth! Apsaras is a melodic CV generator and step sequencer. In Random mode it adds up three modulation sources, samples the sum on each clock and snaps it to the notes you pick on its twelve keys. The melody wanders and stays in key. Catch a phrase you like with the recorder, and Apsaras loops it.

In Sequence mode you enter a melody of up to 256 steps on the same keys, then shape it with swing, gate width, ratchets and octave jumps. Apsaras can record those moves step by step. While Apsaras is stopped, a tap on **MODE** turns its keys into a small keyboard.

The 4HP **Ap-X** expander, included with Apsaras, adds the transport: **PLAY**, **STOP**, **REC** and **MODE** buttons, three of them with gate inputs.

✦ INSTALLATION

Apsaras needs 10HP of free space in your Eurorack case, and Ap-X another 4HP. Connect the power ribbon cable so that

the red stripe, which marks the -12 V rail, matches the -12 V marking on both the module and the bus board. Apsaras uses a 10-pin power header and has protection against a reversed connection.

Ap-X takes no power from the bus board. Connect it to the expander header on the back of Apsaras with the supplied 10-pin ribbon cable.

The USB-C socket on the back is for USB-MIDI and firmware updates. Apsaras draws its power from the case, never from USB.

Fasten the modules with the supplied screws before powering up.

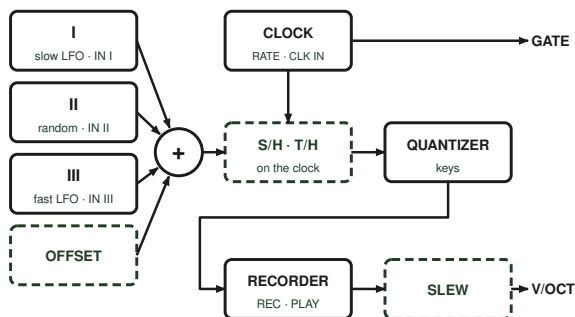


FIG. 2 Random mode: from the three sources to V/OCT

✧ THE MODES

Apsaras has two modes, Random and Sequence, and a keyboard mode that sits on top of either one while it is stopped (fig. 3). Hold **MODE** 17 for one second to switch between Random and Sequence mode; the **MODE** LED is green in Random mode and red in Sequence mode. Switching keeps the scale and the sequence, so each is waiting when you come back; recordings and recorded knob moves are cleared. Random mode always comes back stopped.

Apsaras also keeps its mode, scale and sequence through a power cycle, saving them a couple of seconds after your last change. It starts again in the same mode: Random mode running on your scale, or the sequence paused on its first step, ready for **PLAY** (still in note entry if you hadn't finished it).

To start in Random mode whatever you left, hold the F key while powering up: Random mode runs on your scale, and the sequence stays stored for when you switch back.

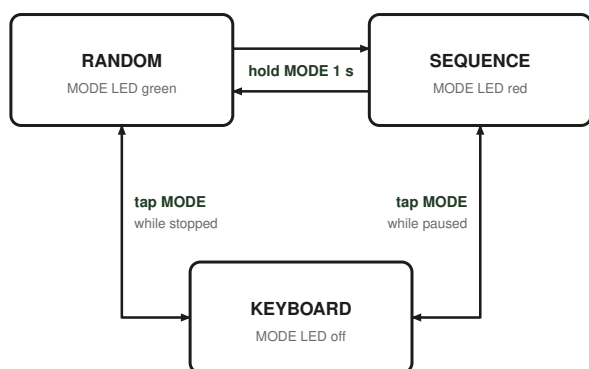


FIG. 3 The modes and how MODE moves between them

KEYBOARD MODE

Keyboard mode turns the twelve keys into a keyboard: a key sounds its note at once and holds the gate open for as long as you hold it. If you hold several keys, the lowest one sounds.

OFFSET sets the octave (± 2) and **SLEW** glides between notes as usual.

With Random mode stopped, or a sequence paused or stopped, tap **MODE**: its LED goes out. Tap **MODE** again to go back. The scale, the sequence and any recording stay as they were underneath. On the way out, the gate closes and **V/OCT** stays on the last note you played.

✧ THE CLOCK

RATE 1 sets the internal clock from 0.1 Hz, one step every ten seconds, to 30 Hz. Apsaras adds the **RATE** input 2 to the knob: +5 V sweeps the whole range, and negative voltages slow the clock down.

Patch a clock to **CLK IN** 3 and Apsaras follows it. **RATE** then becomes a divider and multiplier with fifteen settings: $\div 8$ fully counterclockwise, $\times 1$ at the centre and $\times 8$ fully clockwise. Apsaras locks on after two pulses, keeps up with tempo changes, and stops when the incoming clock stops.

✧ RANDOM MODE

A new Apsaras starts in Random mode; the Ap-X **MODE** LED is green. Apsaras builds the melody from three sources and adds them together with **OFFSET** (fig. 2):

- **I**: a slow triangle LFO, about 1.2 Hz.
- **II**: random steps, a new value about 23 times a second.
- **III**: a fast triangle LFO, about 23 Hz.

Each knob 8 sets how much of its source reaches the sum: inverted on the left, off at the centre and full on the right. A small dead zone around the centre makes sure a knob that looks centred is off. At full, **I** and **III** move the pitch by up to ± 1 octave and **II** by up to ± 1.5 octaves. The clock samples the sum, so **II** and **III** land on a new value at each step and sound random, while **I** drifts in slow, recognisable arcs.

A cable in an input 9 replaces that source, and the knob then scales it: at full, 1 V moves the pitch by one octave. **OFFSET** 4 shifts the whole sum by up to ± 2 octaves.

THE SCALE

Choose the scale on the keys 10. Press a key to add its note and press it again to remove it; with no key selected, Apsaras uses all twelve notes. The quantizer picks the nearest note of the scale. A dim key is part of the scale, and the bright one is the note playing now.

S/H AND T/H

The **T/H** · **S/H** switch 5 sets how the pitch follows the clock (fig. 4):

- **S/H**, sample and hold: a new note at every clock pulse, held until the next.
- **T/H**, track and hold: while the clock is high, the pitch follows the sum, so a single step can hold a quick run of notes; while it is low, the pitch holds.

The gate output follows the clock at 50% width.

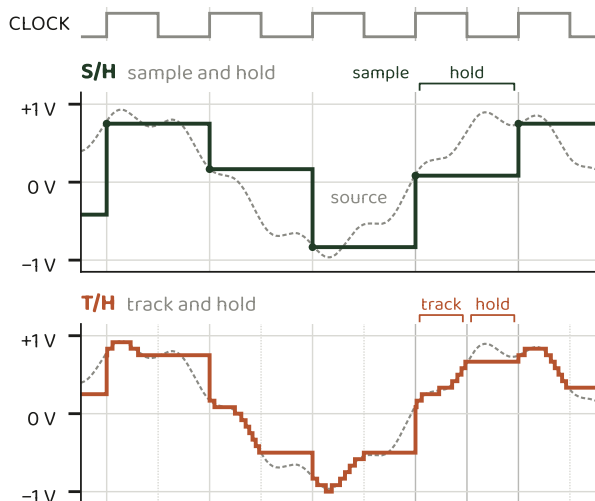


FIG. 4 The same source through S/H and T/H

TRANSPORT

STOP **15** starts and stops Apsaras; its LED lights while Apsaras runs (Fig. 5). **PLAY** **14** starts it too, and breathes while Apsaras is stopped. While stopped, the gate stays low and the keys still edit the scale; a glide in progress finishes, so **V/OCT** comes to rest on the last note. Tap **MODE** to play the keys in keyboard mode instead.

While Apsaras runs, hold **PLAY**, or send a high gate to its input, to freeze the CV: the current note repeats on every clock until you let go. A recorded loop keeps counting meanwhile, and picks up where it has got to. The **PLAY** LED breathes while the CV is frozen.

RECORDING A PHRASE

While Apsaras runs, press and hold **REC** **16** to record what it plays, and release it to loop the recording. The **REC** LED is dim while recording and bright while the loop plays.

Apsaras keeps the note each clock pulse starts on, up to the first 256, whichever way the switch is set. In **S/H** it plays the notes as recorded. In **T/H** each note still starts on its pulse, then, while the clock is high, follows the sum's moves from there, on the scale. The moves are the sources' as they play now, so the loop varies every time round.

Hold **REC** again to record over the old phrase. Double-click **REC**, also while stopped, to clear the recording and return to live melodies.

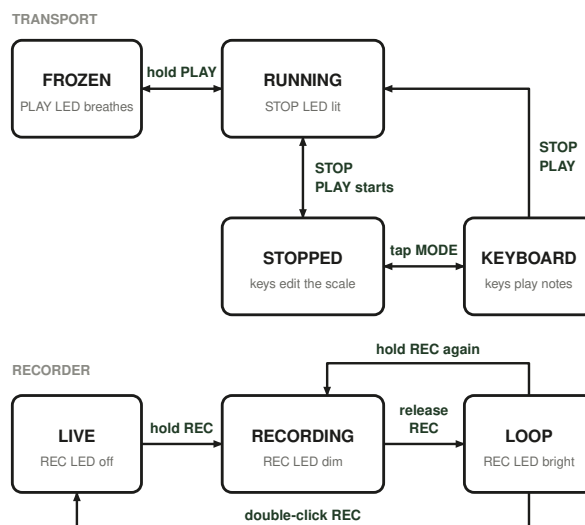


FIG. 5 Random mode: transport and recorder

✦ SEQUENCE MODE

Hold **MODE** **17** for one second to switch to Sequence mode; its LED turns red. A sequence moves between three states: note entry, playing and paused (Fig. 6).

ENTERING NOTES

A new sequence starts in note entry:

1. Press a key to choose the note of the step; it sounds while you hold the key. Press the same key again to make the step a rest.
2. Tap **MODE** to store the step and move on to the next.

Repeat for up to 256 steps, then press **PLAY** to start. **PLAY** needs at least one step with a note: its LED starts breathing once you have stored one, and rests alone won't play. Double-click **MODE** at any time to clear the sequence and start again.

PLAYING

PLAY **14** starts the sequence from the first step, and pauses and resumes it. **STOP** **15** stops it and returns to the first step. The **STOP** LED lights while the sequence plays; the **PLAY** LED breathes while it is stopped.

While paused or stopped, the keys are silent. Tap **MODE** to play them in keyboard mode; **PLAY** then resumes the sequence and ends keyboard mode. **STOP** in a paused sequence returns to the first step and stays paused.

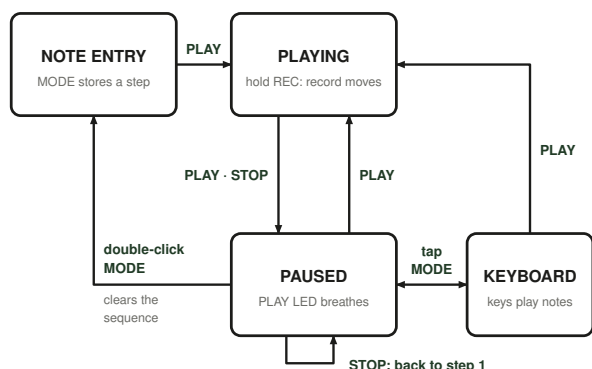


FIG. 6 Sequence mode: note entry, playing, paused and keyboard mode

The **T/H · S/H** switch sets the direction: **S/H** plays forward, **T/H** backward.

SHAPING THE SEQUENCE

In Sequence mode the knobs take on new jobs (fig. 7):

- **I** sets the **octave** of the whole sequence, ± 5 octaves in whole steps. Apsaras reads it at the start of each step, so a change lands on the next note.
- **II** sets the **gate width**, from short blips (1%) to almost tied notes (99%).
- **III** sets the **ratchet**: each step repeats anywhere from $\times 1$ to $\times 8$ within its length.
- **OFFSET** sets the **swing**. At the centre the steps are even; turning it right delays every second step and turning it left pulls it early, up to a triplet feel at either end. Fig. 7 gives swing as the point in each pair of steps where the second one starts: 50% is even, and the ends of the knob are about 67% and 33%.

With a cable in an input **9**, its CV takes over and the knob scales it. For **I**, 1 V is one octave; for **III**, 0–5 V covers $\times 1$ to $\times 8$ in equal steps.

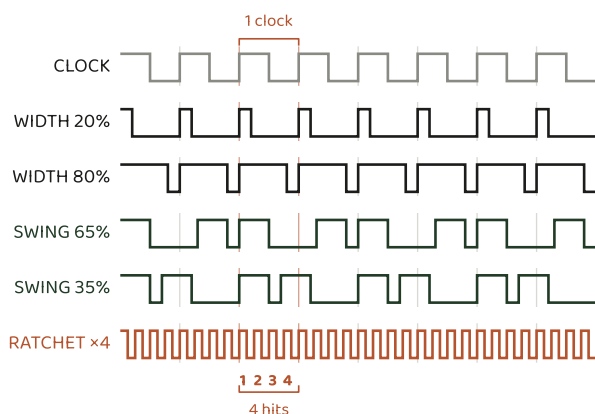


FIG. 7 Gate width, swing and ratchet over eight steps

RECORDING KNOB MOVES

Apsaras can record the moves of **I**, **II** and **III** step by step, and the CVs at their inputs **9** as well:

1. While the sequence plays, press and hold **REC** **16** its LED lights dim.
2. Turn a knob. From the moment it moves, Apsaras stores its value on each step that passes, for as long as you hold **REC**. Knobs you leave alone aren't recorded.
3. A patched input is recorded from the moment you press **REC**, whether or not you touch its knob. Apsaras stores the CV as the knob scales it.
4. Release **REC** and the sequence plays your moves back. The **REC** LED stays bright while Apsaras holds recorded moves.

A recorded knob and its input stop responding; a knob you haven't recorded keeps working live. Steps without a recording keep the value of the last recorded step. The moves belong to the steps: at **T/H** the sequence runs backward, and each step keeps its moves.

To change a recording, hold **REC** again while the sequence plays and turn only the knob you want to change. It records over the steps that pass while you hold **REC**, starting from where the knob actually sits; its other steps and the other knobs keep their recordings. A patched input records over its moves on every pass.

Double-click **REC** to clear all recorded moves; its LED goes out. Clearing the sequence or switching modes clears them too, and a power cycle doesn't keep them.

✧ OUTPUTS

V/OCT **11** carries the pitch at 1 or 1.2 V per octave, with 0 V = C4 (middle C), across about ± 4.7 V. **GATE** **12** is 0 or +5 V; its LED **13** follows it.

SLEW **6** glides between notes, from 1 ms to 10 s per volt. Apsaras adds its input **7** to the knob: +5 V sweeps the whole range. The glide comes after the quantizer, so it always ends on a note of the scale.

USB-MIDI

Connect the USB-C socket to a computer and Apsaras appears as a USB-MIDI device. It sends a Note On when the gate opens and a Note Off when it closes, on channel 1 (the CONFIG page of the LetsPlaySynth tool sets another) with velocity 100; 0 V at **V/OCT** is note 60 (C4). If the note changes while the gate is open, as in **T/H**, Apsaras sends the new note at once.

SLEW goes out as MIDI portamento on the same channel: CC 5 (time) follows it from 0 to 127, and CC 65 (on/off) is on while **SLEW** sits above zero. Before each note, CC 84 names the note

before it, so a synth that follows the MIDI standard glides from there.

The same CONFIG page switches **V/OCT** to 1.2 V per octave, for systems built around that scale. The keys and the MIDI notes stay as they are; the ± 4.7 V range then covers about ± 3.9 octaves.

✧ THE AP-X EXPANDER

Ap-X (fig. 1) holds the transport buttons. A gate or trigger at one of its inputs **18** acts like a press on the button beside it; Ap-X combines the two, so either one works. **PLAY**, **STOP** and **REC** have inputs; **MODE** has none.

LED	RANDOM MODE	SEQUENCE MODE
MODE	green	red
STOP	lit while running	lit while playing
PLAY	breathes while stopped or frozen	breathes while paused, or in note entry once a step holds a note
REC	dim while recording, bright while the loop plays	dim while recording, bright with moves recorded

In keyboard mode the **MODE** LED is off; the other LEDs keep showing the transport underneath. **MODE** does a different job for each kind of press:

MODE	WHAT IT DOES
tap	stores a step during note entry; turns keyboard mode on or off while stopped or paused
double-click	clears the sequence
hold 1 s	switches between Random and Sequence mode

✧ CALIBRATION

You can recalibrate **V/OCT** with a voltmeter:

1. Hold C and B while powering up. **V/OCT** goes to about -3 V and the C key lights.
2. Use C# and D# to step the output down or up until the meter reads -3.000 V, then press B.
3. **V/OCT** goes to about $+3$ V and the D key lights. Adjust it the same way to $+3.000$ V and press B. All keys flash three times and Apsaras starts.

Press A# at any time to leave without saving. If the keys blink for two seconds instead, the output cannot reach the full range, and calibration starts again from the first step: turn up the RV1 trimmer on the back and set both points again.

✧ PATCH IDEAS

• **A generative voice.** Patch **V/OCT** to Genesis **V/OCT** and **GATE** to Chiron **GATE**. Select a pentatonic scale, turn **I** up a little and **II** a touch past its dead zone, and let it play.

• **Slow drift.** Use **I** only, set the switch to **T/H** and add some **SLEW** for melodies that rise and fall like a voice.

• **Keep the good bits.** If a phrase catches your ear, hold **REC** for a few bars and release it. Flip to **T/H** to let the sources vary it.

• **Quantize anything.** Patch another sequencer or a slow LFO into the **I** input, turn **I** fully right and the other knobs to the centre: Apsaras snaps the incoming CV to your scale.

• **Clock from an envelope.** Put Chiron in Cycle mode and patch its **EOC** to **CLK IN**, so the melody steps with the loop.

• **Drum fills.** Patch a random or sample-and-hold source into the **III** input in Sequence mode for ratchets that come and go.

• **A tiny MIDI keyboard.** Stop Apsaras, tap **MODE** and play the keys: the notes go out over USB-MIDI as well as **V/OCT** and **GATE**.

• **Freeze on the beat.** Patch a slow gate into the Ap-X **PLAY** input in Random mode: the melody freezes on each gate and moves on in between.

TECHNICAL SPECIFICATION

WIDTH	DEPTH	POWER	CURRENT DRAW
Apsaras 10HP Ap-X 4HP	37 mm	±12V 10-pin header with reverse-polarity protection	+12V: 45mA -12V: 10mA +5V not used

INPUTS		OUTPUTS	
CLK IN	5 V gate or trigger	V/OCT	1 V/oct (or 1.2 V/oct), ±4.7 V
RATE, SLEW CV	±5 V = full knob travel	GATE	+5 V
I, II, III CV	±5 V	USB-C	MIDI notes and CC#, firmware updates
Ap-X PLAY, STOP, REC CV	5 V gate or trigger		

CLOCK	SEQUENCER	RECORDER	SLEW
0.1–30 Hz external ÷8 ... ×8	256 steps ratchet ×1–×8; swing up to triplet	256 notes	1 ms – 10 s per volt



THE LETSPLAYSYNTH FAMILY

GENESIS	wavetable VCO with built-in unison
APSARAS	RandomArp sequencer
CHIRON	envelope generator and stereo VCA
PLAN	balanced output and headphone monitor

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Let's Play Synth
Designed by KX, Lua, Lui
Made in Taiwan
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PLAY BOOK rev.1.0