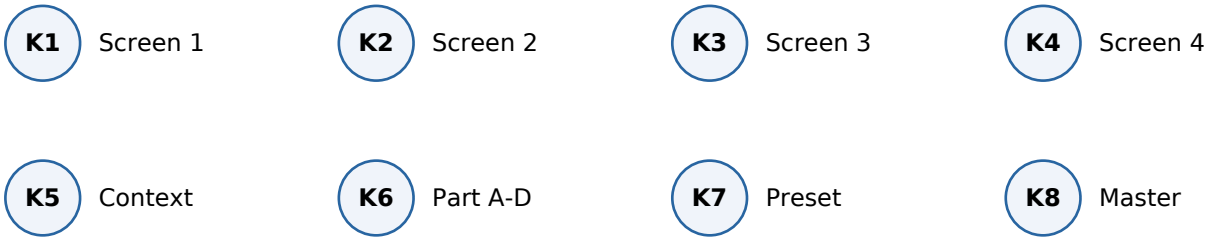
1. Overview and navigation

Developed using AI: Marcus Padrini defined and directed the experience, created the patterns and tested on hardware. ChatGPT (OpenAI) contributed technical solutions and generated and revised code, tools, documentation and graphics. Original engines: authors in CREDITS.md. No OpenAI endorsement.

Firmware 1.0.0 for M-VAVE SMK-37 Pro. Four parts A-D; ANALOG (OberVave) or DRUM-X per part. Eight shared ANALOG voices. 16 patterns; up to 256 steps per track and four notes per ANALOG step.



K1-K4 edit the labels shown on screen. K6 selects part, K7 preset, K8 physical master. K5 is contextual: tempo on Performance and ordinary pages, page/bar in STEPS, next pattern in other SEQ views and Mixer, LEVEL/OCT in Split/Layer.

Pad bank and display page are separate states. PLAY, REC and engine selection do not automatically choose another bank. SEQ explicitly requests steps; KNOB BANK returns to the manual cycle.

Bank	Entry	Purpose
1	KNOB BANK	Performance and eight favourites
2	KNOB BANK	Two Split/Layer rows
3	KNOB BANK	16 patterns/scenes and save
4	KNOB BANK + DRUM-X	Play/record eight instruments
SEQ	SEQ	16 steps in the page

Tap = press and release. Hold = keep pressed for the stated time. Pad diagrams use two rows of eight, left to right: 1-8 above, 9-16 below. Other drawings are functional maps, not to scale.

2. Buttons: reference

PATCH	**PARA**	**SCALE**	**CHORD**
ARP	**NOTE REPEAT**	**GLOBE**	**BT / SAVE**
FX	**SEQ**	**PLAY**	**REC**
KNOB BANK	**FADER BANK**	**OCT - / +**	**< / >**

Button	Function
PATCH	Tap: Performance; on Performance opens Mixer; in Mixer cycles seven rows. Hold 0.7 s: return to Performance.
PARA	Tap: synthesis pages; in STEPS clears and advances a step (DRUM: clears the lane hit). Hold: edit/erase layer.
CHORD	ANALOG: FILTER ENV / AMP ENV. DRUM-X: DRUM SOUND.
NOTE REPEAT	ANALOG: LFO / LFO DEST / LFO +. DRUM-X redirects to DRUM SOUND.
ARP	Open ARP. Another tap on that page toggles the part’s HOLD.
SCALE	Hold in ANALOG STEPS: STEP+. On GLOBAL, tap toggles SYNC AUTO / INTERNAL.
GLOBE	Tap: GLOBAL > POLYPHONY > OUTPUT > PART SETUP. Hold: keys for start/stop, mute, solo and tap tempo.
BT / SAVE	Tap: save the part preset to its current program. Hold 0.7 s: SAVE PRESET AS; K7 chooses destination, BT confirms.
FX	Tap: CHORUS > DELAY > REVERB > DRIVE. Hold: K1/K2/K3 chorus/delay/reverb returns; K4 delay time.
SEQ	Tap: sequencer views and explicit step-pad ownership. Hold: white keys become steps.
PLAY	Start from step 1 or stop. Stopping also ends REC.
REC	Tap: arm while stopped; toggle recording while running. Hold over 1.2 s: clear selected track.
KNOB BANK	Tap: cycle pad banks. Hold 0.7 s: Performance/Favourites. From SEQ, one tap returns to Performance.
FADER BANK	Toggle fader bank A / B; lit LED means B. Does not change the pad bank.
OCT - / +	Selected part octave: -2 to +2; both together reset. While holding SEQ: page; while holding PARA: undo/redo.
< / >	16-step page for the selected track, within its configured length.

3. Performance, faders and wheels

1	2	3	4	5	6	7	8
A	**B**	**C**	**D**	**DELAY**	**REVERB**	**PRESET -**	**PRESET +**
9	10	11	12	13	14	15	16
F1	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**

	K1	K2	K3	K4
ANALOG	CUTOFF	RESO	ENV AMT	RELEASE
DRUM-X	MORPH	TONE	DECAY	FOLD
KEY TRANS ON	Normal	Normal	Normal	KEY TR

Pads 1-4 select A-D. Pads 5/6 disable or restore the part’s delay/reverb sends. Pads 7/8 change preset. When KEY TRANS is enabled, K4 shows KEY TR instead of Release/Fold; turn left to disable capture.

A / ANALOG	**F1** CUTOFF	**F2** RESO	**F3** ENV AMT	**F4** RELEASE
A / DRUM-X	**F1** MORPH	**F2** TONE	**F3** DECAY	**F4** FOLD
B	**F1** CHO SEND	**F2** DLY SEND	**F3** REV SEND	**F4** MASTER

Fader Bank A controls the selected part on every page. Bank B: F1-F3 are per-part sends; move through the stored value for pickup to engage. F4 and K8 control the same physical master. This differs from VOL on the Mixer MASTER row.

Physical Pitch and Mod follow the selected part. Pitch uses the sound’s BEND range; Mod adds vibrato. Held notes retain their correct note-offs when changing parts.

4. Favourites and presets



1. Select a part with K6 or pad 1-4 and adjust the sound.

2. To store, hold one of pads 9-16 for 0.7 s.

3. Stop PLAY/REC, release notes and sustain, and wait for FAVOURITES SAVED.

4. To recall, tap a favourite. It loads into the selected part, not the original source part.

Each favourite stores a sound snapshot, program number, edited state, patch octave and chorus/delay/reverb sends. Shared effect returns and tails are preserved on recall. Saving an extra preset first is not required.

Operation	Command	Result
Save preset	BT / SAVE	Overwrite the part’s current program
Save preset as	Hold BT; K7; BT	Choose and overwrite one of 99 programs
Cancel Save As	PATCH	Close without confirming the write

The base has 64 factory presets and INIT positions 65-99. A user save can overlay any position. A preset does not contain the entire sequence or all four parts. Wait for PRESET SAVED / SETTINGS SAVED before powering off; writing waits for stop and silence if playing.

5. Split and Layer



The two rows are independent configurations. A-D select ANALOG parts. Hold one part and press another in the same row to create the pair/layer. SINGLE uses the normal selected-part flow; SPLIT divides the keyboard; LAYER plays both parts. DRUM-X cannot be used in these combinations.

	K1	K2	K3	K4
LEVEL	MODE	Part 1 level	Part 2 level	SPLIT
OCT	MODE	Part 1 octave	Part 2 octave	SPLIT

1. Enter bank 2 using KNOB BANK.

2. In the desired row, form the pair using two A-D pads.

3. Tap SPLIT or LAYER; adjust the split point with K4.

4. K5 switches K2/K3 between levels (0-100%) and octaves (-2 to +2).

5. Tap PLAY 1 (pad 8) or PLAY 2 (pad 16) to play that configuration.

6. Save the pattern to store both rows and the active row.

Bright white pad 8/16 identifies the playing row. Editing the other row does not activate it. K6 still selects the recording part; that part must be in the heard routing to record. In SPLIT, notes below the split belong to the first part; at and above it, to the second.

6. Patterns and scenes



Each slot combines a four-track sequence and its scene: four sounds, mix and Split/Layer configurations. Favourites are a separate bank. Tempo is global, not an independent BPM per pattern.

Gesture	Action
Tap P1-P16	Load when stopped; schedule for the next bar while playing
Hold 0.7 s	Save the current pattern to that slot; another slot acts as a copy
Occupied slot	OVERWRITE: tap the same pad within 4 s to confirm
Other pad / PATCH / timeout	Cancel overwrite confirmation

Writing waits for stop and silence. If STOP TO FINISH SAVE FIRST appears, finish the previous save before changing/copying. Navigating does not automatically save edits; save before loading another pattern.

Light	Meaning
Very dim red	Empty slot
Red	Occupied slot
Blue	Selected pattern; intensity changes when edited
Blinking blue	Scheduled change
Blinking red	Overwrite confirmation
Bright white	Pending write to that slot

Initial content: P1-P5 filled; P6-P16 empty; eight favourites; 90 BPM; no extra personal presets. Restoring your backup replaces this content with the file’s data.

7. DRUM-X and Drum Pads



1. Select the part with K6. Tap GLOBE until PART SETUP.

2. K1 selects DRUM-X; K2 chooses 808 BOOM, 909 CLUB, 606 MINI, 707 SNAP or DRUM-X.

3. Cycle KNOB BANK to Drum Pads. Selecting a kit alone does not change the bank.

4. Play the upper pads with velocity. PLAY/REC preserve the chosen bank.

5. To record live, start PLAY, tap REC and play the pads; REC ends recording, PLAY stops everything.

Drum Pads only enters the cycle when a DRUM-X part is selected. If you select ANALOG while this bank is active, it remains selected but inactive; use K6 to return to DRUM-X or KNOB BANK to leave. Pads 9-16 are reserved/unlit.

Violet at about 70% at rest; white on live hits and sequenced notes. Each instrument can retrigger; open/closed hi-hats choke each other. 606/707 kits are timbral starting points, not ROM reproductions.

	K1	K2	K3	K4
PERFORM	MORPH	TONE	DECAY	FOLD
DRUM SOUND	SOUND	LEVEL	DECAY	PITCH
PART SETUP	ENGINE	KIT	VOLUME	TUNE

Instrument	KICK	SNARE	CLAP	HAT CL	HAT OP	TOM	RIM	BELL
MIDI	36	38	39	42	46	45	37	56

MIDI notes 60-67 also trigger the eight lanes in order. In DRUM SEQ, multiple hits can share a step; velocity, ratchet, chance and nudge belong to the step and affect its hits.

8. Live and step recording

Mode	Preparation	Record / stop
Live	PLAY > REC	Play keys/pads; REC ends recording, PLAY stops
Arm while stopped	REC	First note starts recording; REC then PLAY can use count-in
ANALOG step entry	PLAY stopped; REC off; SEQ > STEPS	Play note/chord; release all keys to advance
DRUM-X grid	SEQ > DRUM; REC off	K1 chooses lane; pads toggle hits in 16 steps

K6 selects the recording track. Length 0 disables the track; use TRACKS K3 to give it a length (initially 16). Recording quantize is per part: TRACKS K4 = OFF, 1/32, 1/16, 1/8 or 1/4. Live recording can retain microtiming; step entry resets the rewritten step’s nudge.

1. To create an ANALOG example, choose an empty slot and part A.

2. Open SEQ > TRACKS and set LENGTH to 16.

3. Go to STEPS with REC off. Play a chord, release, repeat.

4. For a rest, leave the step empty and advance K1. PARA clears the step.

5. For a long note, hold the keys and advance K1 to tie into the next step.

6. Press PLAY to listen. Stop, enter Patterns and hold the slot to save.

Recording accounts for physical patch octaves and Split/Layer octaves. In Split/Layer, only notes routed to the K6-selected part are recorded. With ARP enabled, recording captures the arpeggiator output rather than its input chord.

Automation: with PLAY/REC active and the track on, turning an eligible parameter knob records its value at the playing step. Up to four parameters per track. Shared effect parameters, faders and navigation are not recorded through this path. Automation is saved with the pattern; holding REC to clear a track also clears its automation.

To clear an entire track, select it with K6 and hold REC over 1.2 s. This command has no second confirmation. PARA + OCT- undoes and PARA + OCT+ redoes the available edit (one level).

9. Sequencer: views and controls



	K1	K2	K3	K4
TRACKS	CUTOFF / MORPH	LEVEL	LENGTH	QUANT
STEPS	STEP	NOTE	GATE	VELO
STEP+	STEP	RATCHET	CHANCE	ON/OFF
TRACK	LENGTH	DIV	SWING	TRANSP
PATTERNS	SLOT	-	GO: turn +	Use pads
TRANSPOSE	KEYS	VALUE	RESET	ANALOG: display
DRUM	SOUND	STEP	VELO	RATCHET
DRUM+	SOUND	CHANCE	NUDGE	ON/OFF

Tap SEQ to cycle views. ANALOG: TRACKS > STEPS > TRACK > PATTERNS > TRANSPOSE. Hold SCALE in STEPS for STEP+. DRUM-X: DRUM > DRUM+ > TRACK > TRACKS > PATTERNS > TRANSPOSE.

In STEPS/DRUM, K5 moves by 16 steps; arrows < > change pad pages. In other SEQ views, K5 selects pattern. K6 always selects part; K7 changes its preset; K8 master. A track supports up to 256 steps in 16 pages; its DIV is independent. SWING ranges from 50 to 75%; per-track TRANSP from -24 to +24 semitones.

RATCHET: 1x-4x; CHANCE: 0-100% in 5% increments; ON/OFF disables without deleting notes. GATE reaches TIE. NOTE shifts the step chord. In the DRUM grid, K1 selects the lane and each pad toggles a hit in that lane; this is not the Drum Pads bank.

10. Transpose and held commands

	K1	K2	K3	K4
SEQ TRANSPOSE	Capture ON/OFF	Offset -48..+79	Zero offset	ANALOG
SEQ held	Input note	DIV	SWING	LENGTH
Held step	NOTE	LEVEL	RATCHET	GATE
PARA held	SHIFT	Length x2 / half	TRANSPOSE	-
FX held	CHO MIX	DLY MIX	REV MIX	DLY TIME

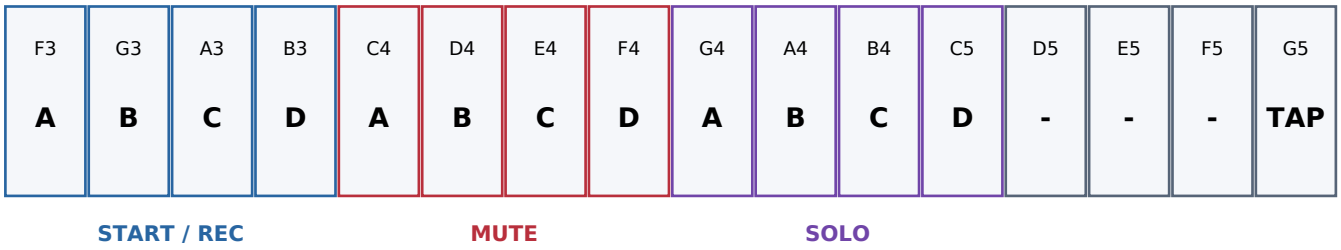
In SEQ > TRANSPOSE, K1 enables keyboard capture. The offset affects ANALOG sequences, not the fixed drum map. It remains active after leaving the screen or changing pad banks. Performance K4 KEY TR disables capture; the current offset remains until K3 RESET on TRANSPOSE.

Hold SEQ with REC off: 16 white keys F3-G5 control steps; black keys F#3-A#4 select the first eight pages. OCT-/+ also changes pages. An empty step receives the last note/chord; tapping and releasing a filled step clears it. Hold to edit with knobs; hold one step and tap a later one for a long note.

Hold PARA: keys erase that note from track steps. K1 rotates the sequence; K2 doubles/halves length; K3 transposes ANALOG notes. In DRUM-X, K3 reports DRUM MAP FIXED. OCT- undoes and OCT+ redoes.

Hold SEQ/PARA/GLOBE/FX and tap PATCH to latch the command without continuing to hold. Tap the same button to unlatch. This temporary command layer is different from the two-part LAYER mode.

Hold GLOBE; physical key reference without octave shift.



Hold GLOBE: F3/G3/A3/B3 start/stop tracks A-D on the bar (with REC active, select recording); C4/D4/E4/F4 toggle mute; G4/A4/B4/C5 toggle solo; G5 is tap tempo. Pads retain their chosen bank.

11. ANALOG: oscillators, filter and envelopes

PARA cycles OSC 1, OSC 2, OSC MOD, FILTER and FILTER +. CHORD alternates FILTER ENV and AMP ENV. Four knobs follow the columns below; pads retain the manual bank and faders retain Bank A/B.

	K1	K2	K3	K4
OSC 1	WAVE	PW	LEVEL	NOISE
OSC 2	WAVE	PW	LEVEL	SEMI
OSC MOD	SYNC	X-MOD	ENV>O2	FINE
FILTER	RESO	ENV AMT	KEY TRK	TYPE
FILTER +	DRIVE	VEL>FLT	VEL>AMP	MORPH
FILTER ENV	ATTACK	DECAY	SUSTAIN	RELEASE
AMP ENV	ATTACK	DECAY	SUSTAIN	RELEASE

Group	Use
OSC 1/2	WAVE: OFF, SAW, PULSE or SAW+PLS; PW controls pulse width. LEVEL mixes each oscillator; NOISE adds noise. SEMI tunes OSC2 from -24 to +24 semitones; FINE is fine tuning.
OSC MOD	SYNC synchronizes oscillators; X-MOD controls cross modulation; ENV>O2 applies envelope to OSC2 pitch (bipolar).
FILTER	CUTOFF is on Performance/fader A1; RESO emphasizes cutoff. ENV AMT is bipolar. KEY TRK follows pitch. TYPE: LP12, HP12, BP12, NOTCH, LP24, SEM; MORPH changes SEM.
ENVELOPES	ATTACK: onset; DECAY: fall to SUSTAIN; RELEASE: tail after release. FILTER ENV shapes filtering; AMP ENV shapes amplitude. VEL>FLT/VEL>AMP set velocity response.

Parameters without a physical unit use the internal 0-127 scale. Displayed times and frequencies are firmware conversions; one raw increment does not always equal a fixed ms/Hz increment.

12. LFO, arpeggiator, polyphony and output

	K1	K2	K3	K4
LFO	SHAPE	RATE	DELAY	PHASE
LFO DEST	PITCH	PWM	FILTER	AMP
LFO +	PITCH>	PWM>	-	-
ARP	ARP	DIV	OCTAVES	GATE
POLYPHONY	MODE	VOICES	DETUNE	GLIDE
OUTPUT	VINTAGE	SPREAD	BEND	VOLUME
PART SETUP	ENGINE	KIT	MODE	GLIDE

NOTE REPEAT cycles LFO / LFO DEST / LFO +. SHAPE: TRI, SAW, RAMP, SQUARE, S&H, RANDOM. PHASE: SYNC, FREE, SPREAD. PITCH/PWM targets select OSC1, OSC2 or BOTH. PITCH, PWM, FILTER and AMP depths are independent.

ARP opens its page. Modes OFF, UP, DOWN, UP/DN, RANDOM and PLAYED. DIV: 1/4, 1/8, 1/8T, 1/16, 1/16T, 1/32, 1/32T. OCTAVES ranges from 0 to 4 on the firmware scale. GATE controls duration. Tap ARP again to toggle part HOLD, keeping notes after release. Disable HOLD/ARP to end.

GLOBE cycles GLOBAL, POLYPHONY, OUTPUT and PART SETUP. ANALOG: MODE selects POLY, DUAL, UNISON or MONO. VOICES and DETUNE configure unison; GLIDE controls portamento. Eight ANALOG voices are shared among parts; unison consumes more voices per note.

ANALOG OUTPUT: VINTAGE adds variation, SPREAD stereo distribution, BEND pitch range in semitones (0-24), VOLUME patch level. PART SETUP: K1 chooses engine; K2 only selects KIT in DRUM-X. In DRUM-X, POLYPHONY becomes MORPH/TONE/DECAY/FOLD macros; OUTPUT uses K1 VOLUME and K2 TUNE, with no K3/K4.

13. Effects and mixer

A / ANALOG	**F1** CUTOFF	**F2** RESO	**F3** ENV AMT	**F4** RELEASE
A / DRUM-X	**F1** MORPH	**F2** TONE	**F3** DECAY	**F4** FOLD
B	**F1** CHO SEND	**F2** DLY SEND	**F3** REV SEND	**F4** MASTER

	K1	K2	K3	K4
CHORUS	RATE	DEPTH	MIX	-
DELAY	TIME	FEEDBK	TONE	MIX
REVERB	SIZE	DAMP	PRE-DLY	MIX
DRIVE	TYPE	DRIVE	TONE	MIX
Mixer: LEVEL/PAN/SEND	A	B	C	D
Mixer: MASTER	VOL	DJ FLT	DRIVE	COMP

FX cycles four effect pages. Effects are shared: MIX sets the global return; send controls how much each part feeds the effect. To change one part’s amount, use Bank B F1/F2/F3 or the Mixer SEND row. A zero MIX return can make an effect inaudible even with a high send.

DELAY TIME uses synced divisions: 1/16, 1/8T, 1/8, dotted 1/8, 1/4, dotted 1/4 and 1/2. FEEDBK sets repeats; TONE darkens/brightens them. REVERB: SIZE room size, DAMP damping, PRE-DLY initial delay. CHORUS: RATE speed, DEPTH intensity.

From Performance, tap PATCH to open Mixer. Further taps cycle LEVEL > PAN > SEND CHORUS > SEND DELAY > SEND REVERB > SEND DRIVE > MASTER. K1-K4 adjust A-D on the first six rows. On MASTER, VOL/DJ FLT/DRIVE/COMP are global mixer controls. K5 selects pattern; hold PATCH to leave.

Per-part mute and solo: hold GLOBE and use the corresponding keys. The Mixer displays their states. Bank B F4 and K8 are physical output volume, not four individual part volumes.

14. GLOBAL and MIDI

	K1	K2	K3	K4
GLOBAL	TEMPO	CLICK	MIDI CH	TUNE

TEMPO: 40-240 BPM. CLICK: OFF, REC, ON or COUNT-IN. With COUNT-IN, arm REC while stopped and use PLAY for the count. MIDI CH: OMNI or base channel 1-16. TUNE: -50 to +50 cents. On GLOBAL, SCALE toggles SYNC AUTO / INTERNAL.

Message	Behaviour
Notes / velocity	Base channel routes to A; next three channels to B-D. OMNI uses the selected part. For four complete channels, choose base 1-13.
Program Change	0-98 select programs 1-99. In OMNI affects the selected part; with defined channels, the addressed part.
CC 7 / CC 64	MIDI volume / sustain (64 or above = pedal on).
CC 120 / 123	Panic / stop notes.
Pitch Bend / CC 1	MIDI pitch and modulation depth; physical wheels follow the selected part.
Clock / Start / Continue / Stop	AUTO accepts incoming MIDI clock/transport; INTERNAL ignores those messages.

Incoming MIDI notes are absolute: do not treat them as local keys receiving the SMK physical octave. Keyboard MIDI output uses the physical octave and selected part channel (OMNI: channel 1). Do not assume the instrument transmits clock or all tracks as an external MIDI sequencer.

The appendix lists ANALOG parameter CCs. DRUM-X reuses several internal addresses for macros/lanes; use the DRUM interface for editing and the section 7 note map for triggering drums.

15. Saving, installation and backup

What to save	Command	Contents
Preset	BT / SAVE	One sound/program; not the four-part sequence
Favourite	Hold F1-F8 pad	Part snapshot and sends
Pattern/scene	Hold P1-P16	Sequences, sounds, mix, two Split/Layer rows
Full backup	Web tool	Saved bank: presets, favourites, patterns/scenes and globals

Saving is manual: an on-screen edit is not a flash write. Stop transport, release notes/sustain and wait for completion. Pending pattern/preset saves block conflicting operations. Export only after saving on the instrument.

1. For first installation, start from official M-VAVE SMK-37 Pro V016, identity SMK-37 Pro_016. Use official M-UPGRADE to return to that version.

2. Export your .smksynth before returning to stock. First installation initializes/replaces the bank.

3. Use Chrome/Edge on a computer, HTTPS, a USB data cable and stable power. Close other MIDI applications.

4. In the web installer, connect, check source/target and confirm. Wait for SMK-37 Pro_19618.

5. If interrupted, resume in the same browser/site using the same package. Do not change installer midway.

Backup: stop PLAY/REC, release controls/notes and connect the tool. Export the current bank in this session before restoring. Choose the file, review and type RESTAURAR (also in the English interface). Restoration replaces the whole bank; it does not merge. On completion, reboot and check your sounds.

RESTORE PENDING: resume with the same file; the instrument remains locked until completion. Official firmware cannot import .smksynth. After reinstalling SMKSYNTH, restore your bank through the browser. Marcus confirmed physical installation on hardware; automated logs document the other tests.

16. Simulator, troubleshooting and reference

The simulator runs audio/interface code in WebAssembly. Click Start; on HTTPS this gesture activates audio. Use mouse/touch, drag knobs vertically and adjust velocity. Computer keys A W S E D F T G Y H U J K O L P ; play notes.

Memory is local to the browser/domain. Panel SAVE writes to that memory. Export session saves a simulator JSON file; Import session replaces that memory. This JSON is not a physical .smksynth backup. Restart does not erase the session; Replay boot reruns startup.

Symptom	Check
No sound	K8/master, part/Mixer level, mute/solo, engine and Split routing. In simulator: Start, browser audio and Mute.
Pads do not play drums	Select a DRUM-X part, then Drum Pads using KNOB BANK. Kit selection does not change the bank.
Send fader does not respond	Bank B and correct part; cross stored value for pickup. Check effect MIX return.
Keys only transpose	KEY TRANS enabled; disable via SEQ > TRANSPOSE K1 or Performance K4 KEY TR. Zero offset with K3 RESET if needed.
Notes do not record	Nonzero LENGTH, K6 on correct part, Split routing and correct REC/step entry mode.
Save does not finish	Stop PLAY/REC, release notes/sustain and wait for silence. Do not power off during writing.
Export session expired	Stop everything, wait for saves, reboot and reconnect before exporting again. An incomplete file is not a valid backup.
Installer rejects firmware	First installation requires exactly SMK-37 Pro_016; other sources are blocked.

Independent project. ANALOG synthesis: OberVave/zvenson; DRUM-X: JIANT; SMKSYNTH direction and hardware tests: Marcus Padrini; technical solutions, adaptation code and documentation with ChatGPT (OpenAI), under his direction. See repository CREDITS.md and LICENSING.md for all attributions.
GPL-3.0-only.

MIDI appendix / 1

Incoming CC values are 0-127 and scaled to the parameter maximum. This table describes the ANALOG engine. Identifiers retain source names to distinguish oscillators/envelopes.

ID	CC	Display	Raw maximum
O1_WAVE	20	WAVE	3
O1_PW	21	PW	127
O1_LVL	22	LEVEL	127
NOISE	23	NOISE	127
O2_WAVE	24	WAVE	3
O2_PW	25	PW	127
O2_LVL	26	LEVEL	127
O2_SEMI	27	SEMI	48
SYNC	28	SYNC	1
XMOD	29	X-MOD	127
ENV_O2	30	ENV>O2	127
O2_FINE	31	FINE	127
CUTOFF	74	CUTOFF	127
RESO	71	RESO	127
FENV_AMT	32	ENV AMT	127
KEYTRK	33	KEY TRK	127
FTYPE	34	TYPE	NFTYPE - 1
DRIVE	35	DRIVE	127
VEL_FLT	36	VEL>FLT	127
VEL_AMP	37	VEL>AMP	127
FA	38	ATTACK	127
FD	39	DECAY	127
FS	40	SUSTAIN	127
FR	41	RELEASE	127

Constants: NFTYPE-1 = 5; NDDIV-1 = 6. WAVE 0-3; MODE 0-3; SHAPE 0-5. For pages and four-knob assignments, see sections 11-14. Effect CCs are shared; they are not Bank B per-part sends.

MIDI appendix / 2

Incoming CC values are 0-127 and scaled to the parameter maximum. This table describes the ANALOG engine. Identifiers retain source names to distinguish oscillators/envelopes.

ID	CC	Display	Raw maximum
AA	73	ATTACK	127
AD	42	DECAY	127
AS	43	SUSTAIN	127
AR	72	RELEASE	127
LFO_SHAPE	44	SHAPE	5
LFO_RATE	45	RATE	127
LFO_DELAY	46	DELAY	127
LFO_PHASE	47	PHASE	2
LFO_PITCH	48	PITCH	127
LFO_PWM	49	PWM	127
LFO_FLT	50	FILTER	127
LFO_AMP	51	AMP	127
LFO_PITCH_TO	52	PITCH>	2
LFO_PWM_TO	53	PWM>	2
MODE	54	MODE	3
UNI_N	55	VOICES	8
UNI_DET	56	DETUNE	127
GLIDE	5	GLIDE	127
VINTAGE	57	VINTAGE	127
SPREAD	58	SPREAD	127
BEND	59	BEND	24
VOLUME	60	VOLUME	127
MOD_DEPTH	1	MOD DPT	127
ARP_MODE	61	ARP	5

Constants: NFTYPE-1 = 5; NDDIV-1 = 6. WAVE 0-3; MODE 0-3; SHAPE 0-5. For pages and four-knob assignments, see sections 11-14. Effect CCs are shared; they are not Bank B per-part sends.

MIDI appendix / 3

Incoming CC values are 0-127 and scaled to the parameter maximum. This table describes the ANALOG engine. Identifiers retain source names to distinguish oscillators/envelopes.

ID	CC	Display	Raw maximum
ARP_DIV	62	DIV	6
ARP_OCT	63	OCTAVES	4
ARP_GATE	65	GATE	127
FMORPH	66	MORPH	127
CHO_RATE	67	RATE	127
CHO_DEPTH	68	DEPTH	127
CHO_MIX	69	MIX	127
DLY_TIME	70	TIME	NDDIV - 1
DLY_FB	75	FEEDBK	127
DLY_TONE	76	TONE	127
DLY_MIX	77	MIX	127
REV_SIZE	78	SIZE	127
REV_DAMP	79	DAMP	127
REV_PRE	80	PRE-DLY	127
REV_MIX	81	MIX	127

Constants: NFTYPE-1 = 5; NDDIV-1 = 6. WAVE 0-3; MODE 0-3; SHAPE 0-5. For pages and four-knob assignments, see sections 11-14. Effect CCs are shared; they are not Bank B per-part sends.

Tools: https://4t59m4f784-creator.github.io/SMKSYNTH/