

superOS-101

Owner's Manual

COMBINED EDITION V0.2 · CUSTOM FIRMWARE FOR THE ROLAND SH-101
DROP-IN CPU REPLACEMENT

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PRECAUTIONS

Firmware installation and any modification of your instrument are performed entirely at your own risk. superOS-101 is alpha firmware for a CPU board that is still in bring-up. We are not responsible for damage to your instrument, loss of data, or any reduction in the value of vintage hardware resulting from installation, modification, or use of this firmware.

INTRODUCTION

1 ABOUT SUPEROS-101

superOS-101 is custom firmware for a drop-in replacement of the Roland SH-101's original CPU, a Toshiba TMP80C49. Unlike the TB-303, TR-606, and TR-808, which share the NEC μ PD650 and therefore share one replacement board, the SH-101 needs its own CPU board and its own firmware, designed from a clean sheet.

The firmware reproduces the original CPU's electrical behavior exactly: the DAC and multiplexer protocol that generates every control voltage in the synth, the keyboard and panel scan, and the gate, clock-reset, and portamento signals. On top of that foundation it re-implements the SH-101's musical features, keyboard, arpeggiator, and 100-step sequencer, against the fully disassembled original ROM as reference.

The **Combined Edition** holds two complete operating systems in one chip: superOS-101 and **80C49 mode**, an emulation of the original SH-101 CPU running the genuine Roland mask ROM. You can switch between them from the panel at any time. See the Combined Edition chapter.

2 HOW TO USE THIS MANUAL

A. PANEL NAMES

Controls are written as they appear on the panel: the function buttons **LOAD** **PLAY** **DOWN** **UP&DOWN** **UP** **HOLD** **KEY TRANSPOSE**, the **RANGE** switch (16' / 8' / 4' / 2'), the **TRANSPOSE** switch (octave down / middle / up), and the envelope **TRIG** switch (GATE / GATE+TRIG / LFO). The keyboard has 32 keys, F to high C.

A combination such as **HOLD** + **KEY TRANSPOSE** means: hold both controls at the same time.

NOTE

The sequencer and arpeggiator are clocked by the LFO or the EXT CLK jack, exactly as on the original, or by MIDI clock when sync is on. Where this manual says "each clock," it means whichever of these is active.

PLAYING

1 THE KEYBOARD

The keyboard plays monophonically over its 32-key range, with the pitch CV following the original's confirmed 1 V/octave numeric model, so tuning and scaling match a stock SH-101 exactly.

A. NOTE PRIORITY

When more than one key is held, the envelope TRIG switch selects which note sounds, as on the original:

- **GATE** or **LFO**: lowest-note priority. The lowest held key sounds.
- **GATE+TRIG**: last-note priority. The most recently pressed key sounds; releasing it falls back to the lowest key still held.

In the **LFO** position the LFO is restarted on each new key press, so an LFO-triggered envelope always starts its cycle in step with your playing.

2 PANEL SWITCHES

SWITCH	FUNCTION
RANGE 16' / 8' / 4' / 2'	VCO octave. Sets the range CV in exact 1-octave steps, matching the original's values to the bit.
TRANPOSE down / middle / up	Shifts the whole keyboard one octave down or up. While a sequence plays it picks the row of the performance keys instead (see Performance Modes).
TRIG GATE / GATE+TRIG / LFO	Envelope trigger mode; also selects note priority (see The Keyboard) and, in LFO, restarts the LFO on new keys.

3 THE ARPEGGIATOR

Press **UP**, **DOWN**, or **UP&DOWN** to turn the arpeggiator on in that direction; press the same button again to return to normal keyboard play. Hold any group of keys and the arpeggiator steps through them, one note per clock (the LFO, the EXT CLK input, or MIDI clock when sync is on).

- **UP**: lowest to highest, then wraps to the lowest.
- **DOWN**: highest to lowest, then wraps to the highest.
- **UP&DOWN**: bounces between the lowest and highest held keys.
- **RANDOM**: press **DOWN** and **UP&DOWN** together (the UP&DOWN LED blinks). A random held key each step, never the same note twice in a row. Press both together again to turn it off.

A. OCTAVE RANGE

In any arp mode, hold **KEY TRANSPOSE** and press **UP** for one more octave or **DOWN** for one fewer (1 to 3 octaves). UP climbs through the held keys octave by octave, DOWN starts in the top octave, UP&DOWN bounces across the whole span, and RANDOM picks an octave too. The range is remembered across power-off.

B. ARPEGGIO AND HOLD

Press **HOLD** while an arpeggio plays and it keeps running after you let go of the keys; a new chord replaces it. A HOLD pedal works the same way (unless it is routed to KEY TRANSPOSE, see below).

4 KEY TRANSPOSE, TUNE AND THE PEDAL

A. KEY TRANSPOSE (AS THE ORIGINAL)

Hold **KEY TRANSPOSE** and press a key: everything that plays (keyboard, arpeggio and sequence) is transposed by the distance from the **lowest C** (the 8th key, C4). A key below it transposes down, above it up. The transposition **stays** after you let go, with the KEY TRANSPOSE LED lit. To return to normal, hold **KEY TRANSPOSE** and press the lowest C. While a MIDI clock drives the SH-101 (sync on), the KEY TRANSPOSE LED blinks on the beat instead: lit for the first half of each quarter note, starting on the host's Start. It shows transpose mode's fast blink while you are in it. The LFO LED cannot do this: it is the analog LFO's own LED, and its speed comes from the RATE slider.

Unlike the original, the transposition also reaches the CV OUT jack and MIDI OUT, so external gear follows it.

B. TRANSPOSE MODE (DOUBLE TAP)

Double-tap **KEY TRANSPOSE** to enter transpose mode (the LED blinks). While the sequencer plays, or while a HOLD-latched arpeggio runs, a plain key press transposes, with no button held: play the key you want the line in. Double-tap again to leave transpose mode; the transposition itself stays until you set it back to the lowest C.

C. TUNE

From normal keyboard play, hold **KEY TRANSPOSE** and press **LOAD**. The SH-101 holds an **A** with the gate open (the LOAD LED blinks): 440 Hz with RANGE at 8' and TRANSPOSE in the middle, and MIDI OUT sends note 69 at the same time for a tuner. Set the TUNE knob, then press any function button to leave.

D. THE HOLD PEDAL AS KEY TRANSPOSE

In the Config Menu, key 19 routes the HOLD pedal jack to act as the KEY TRANSPOSE button: hold the pedal and press a key to transpose, double-tap it for transpose mode, and while recording it enters rests. Key 19 again returns the pedal to HOLD. The choice is remembered.

THE SEQUENCER

1

RECORDING A SEQUENCE

Press **LOAD** while stopped to record a new pattern into the current slot (the LOAD LED lights; the slot is cleared). Every key you press is added as the next step, up to 128 steps. The keyboard sounds while you record, and notes arriving over MIDI record too.

CONTROL	WRITES
Keyboard key	A note step at that pitch (TRANPOSE applies as played).
KEY TRANPOSE	A rest step.
Hold HOLD + key	A legato step: the note starts without the gate dropping, so the envelope does not retrigger and, with PORTAMENTO on AUTO, it glides.
UP	Cycles the last step's ratchet: 1, 2 or 3 hits inside the step.
DOWN	Takes back the last step.
LOAD again	Ends recording; the pattern is saved automatically.

A. CORRECTING AND ADDING (AS THE ORIGINAL)

Press **LOAD** while the sequence plays and recording continues from the step after the one sounding: the steps you enter replace the old ones from there, and anything after them stays and still plays. Press **LOAD** again to finish.

B. REAL-TIME RECORDING

While the sequence plays, hold **PLAY** and press **LOAD** (the PLAY and LOAD LEDs alternate). Now play along: each key lands on the step it was pressed in, or on the next step once the current one is half over. A key still held at the half-step ties into the next step (legato). **KEY TRANPOSE** writes a rest. An empty pattern becomes 16 rests to play into. Hold **PLAY** and press **LOAD** again to stop recording; the edits are saved when playback stops.

2

PLAYING A SEQUENCE

Press **PLAY** to start the sequencer; press it again to stop. Steps advance one per clock: note steps retrigger the gate at their pitch, rest steps close the gate, legato steps change pitch with the gate held. At the end of the pattern playback wraps around.

A. DIRECTION

While the sequence plays: **UP** = forward, **DOWN** = backward, **UP&DOWN** = ping-pong, **DOWN** and **UP&DOWN** together = random. The direction is remembered across power-off (Config Menu keys 15 to 18 set it too).

B. LOOP LENGTH, LIVE

While playing, hold the **HOLD** button and press a key: the sequence loops only its first steps, one step per key counting from the lowest key (the 4th key = 4 steps, the 16th = 16 steps). The pattern itself is untouched. Press the same key again for the full length.

C. SHIFT

While playing, hold **KEY TRANSPOSE** and press **UP** to play the next step now, or **DOWN** to play the previous one. This moves the sequence against the clock, to line it up with other gear or for variation.

D. NUDGE

While playing, hold the **HOLD** button and press **UP** to move every note one step right (later), or **DOWN** to move them one step left (earlier). Ratchets move with their notes and the pattern wraps around. Unlike Shift, the timing does not move: the playhead and the clock stay where they are and only the notes change places.

The move lands at the next half-step, after the sounding note has started and before the next note is chosen, so nothing is cut, doubled or retriggered and you never hear it happen. The web editor has the same as ◀ Nudge / Nudge ▶ (Shift + arrow keys), with Undo.

E. RESYNC

The editor's **Resync** button puts the sequence back on the one: on the host's beat under MIDI clock, otherwise where it would be counting from PLAY. It also undoes a Shift. Changing direction, loop length, pattern or clock division never moves the sequence off the beat in the first place: its position is always worked out from the steps played since the start. Ping-pong plays its end steps twice, so a round trip stays on the bar.

NOTE

The keyboard transpose (see Key Transpose) applies to the sequence as it plays. The TRANSPOSE switch does not: a pattern keeps the octave it was recorded in, and while it plays the switch picks the performance row (see Performance Modes).

3 PATTERNS AND SONGS

There are sixteen pattern slots of up to 128 steps each, and saving is automatic. The sixteen lowest keys (F3 to G#4) are patterns 1 to 16.

TO	DO
Hold PLAY , press a key 1...16	Stopped: selects that pattern and starts it when you release PLAY . Playing: the new pattern follows at the end of the current pass, so the change lands on the bar.
Hold PLAY , press several keys in order	A song : the patterns play one after another in that order (up to 16 entries, repeats allowed), looping.
Key 1...16 alone while playing, SuperOS mode	Switches to pattern 1...16 at the next step, keeping the position (in sync when the pattern lengths are multiples of each other). In performance mode, row 1 keys 25...31 switch patterns 1...7 the same way.
MIDI Program Change 0...15	Selects pattern 1...16 (at the end of the pass while playing).
Save	Nothing to press: about half a second after an edit (or when playback stops), the pattern is written to permanent memory.
Back up / edit on a computer	The web editor (USB-C or DIN MIDI) reads and writes all sixteen slots, ratchets included, and saves them as a file.

Patterns survive power-off with no battery. Slot selection is ignored while recording, so finish with **LOAD** first. Firmware updates never touch the pattern memory.

4 RANDOMIZE AND SCALE

Hold **PLAY** and press **UP&DOWN** for a new random pattern (rhythm and pitch), **UP** for new pitches on the same rhythm, or **DOWN** to mutate it (two to four small changes). It works stopped or playing and never starts play. The editor adds rhythm-only, octave and legato randomizers, a density setting and a repeatable seed.

A. SCALE

Each pattern can have a scale (the 35 scales of the superOS-303). Hold **PLAY** and **KEY TRANSPOSE** and press a key: that note becomes the root, in Major; the same key again steps to the next scale. Hold **PLAY** and tap **KEY TRANSPOSE** alone to turn the scale on or off. The scale never changes the stored notes: the output snaps each note to the nearest note of the scale (the lower one on a tie), before any transpose. Randomized notes are written in the scale.

5 PERFORMANCE MODES

While a sequence plays, the 32 keys become a performance surface, laid out as the overlay strip above them. The **TRANSPOSE** switch picks the row: **L** = 1 Global, **M** = 2 Pitch, **H** = 3 Time. Keys are counted from the lowest F (key 1) to the top C (key 32).

Performance mode or SuperOS mode: hold **HOLD** and press **LOAD** to switch (not while recording; the choice is saved). In performance mode the **HOLD LED stays lit** while a sequence plays and the keys are the

overlay; the LED flashes three times when you switch it on. In SuperOS mode the HOLD LED is off (one flash when you switch) and the keys switch patterns 1...16 while playing. Gestures with a held function button (randomize and mutate, nudge, shift, loop length, ratchet recording, scales) work in both modes. Performance choices keep playing in SuperOS mode until you reset them.

Nothing here is written into the pattern unless you ask (Write, below): every change acts on what you hear, and the stored notes stay as recorded. Every choice takes effect on the **next step**, never on the note already sounding. A choice stays on (latched) until you press the same key again, or reset it. The overlay is active only while the sequencer plays and no function button is held, so **HOLD** + key (loop length), **PLAY** + key (patterns and songs), **KEY TRANSPOSE** + key and transpose mode work as before. Stopped, in LOAD, in real-time record and with the arpeggiator, the keys play notes and the TRANSPOSE switch shifts the octave.

A. ROW 1: GLOBAL (TRANSPOSE ON L)

KEYS	FUNCTION
1...12	Transpose by the distance from the lowest C (key 8 = none), from the next step on.
13...19	Octave variations 1...7: each step lifts or drops an octave by a stored pattern (2nd steps up, 4th steps up, 2nd steps down, up and down, pairs up, second half up); 7 picks a random octave on every step.
20...24	LFO/S&H clock sync 1/16, 1/8, 1/4, 1/2, 1/1: the LFO (and the random S&H it clocks) restarts on that grid. The same key again stops the restart.
25...31	Stored patterns 1...7, switched at the next step at the same position.
32	Reset (see below).

B. ROW 2: PITCH (TRANSPOSE ON M)

KEYS	FUNCTION
1...7	Reorder notes , rests stay where they are: as written, reverse, cycle even (2nd, 4th ... notes first), cycle odd, prime order (a prime stride through the notes), one forward and one back, which move one note further on every loop pass.
8...19	Root key C...B of the quantizer. The same key again turns the scale off, and on again, keeping the root and type.
20...26	Quantization key type : major, minor, dorian, harmonic minor, lydian, phrygian, locrian. A root alone uses major, a type alone uses C. Overrides the pattern's own scale while on. The quantizer acts after reorder, combine and octave variation, so the combined notes are scaled too.
27	Cycle the partner : each press picks the next saved pattern to combine the pitches with (never the playing one).
28...31	Combine with the partner : add, subtract, divide, difference. The intervals of the partner pattern (above its first note) are combined with this pattern's (above its first note), step by step, then folded back by octaves into range. A rest in the other pattern leaves the note alone.
32	Reset (see below).

C. ROW 3: TIME (TRANPOSE ON H)

KEYS	FUNCTION
1...7	Shift time: a quarter note right, left; an eighth right, left; a sixteenth right, left; three sixteenths right. Right = later.
8...12	Skip time: skip every 4th, every 8th, even, odd, every 5th clock. A skipped clock is silent and the pattern waits for the next one.
13...17	Add / delete time, the grid clock: 1/4, 1/8, 1/16, 1/4 triplets, 1/16 triplets.
18...21	Add / delete time, the logic: NOR, OR, AND, XOR. The step clock and the grid clock go through the gate; each rising edge of the result plays a step. OR adds steps on the grid, AND keeps only the steps on it. A grid alone uses OR, a logic alone uses 1/4.
22...26	Ratchet, only while held: 1/32, 1/16, 1/16 triplets, 3 and 7 times a step. From the next step its note repeats; the pattern runs on underneath and continues in place when you let go.
27	Cycle the partner for the rhythm, as in row 2 (each row has its own).
28...31	Combine with the partner: AND, OR, NOR, XOR of this pattern's rhythm with the partner's. A step the logic fills plays the partner's note (NOR: the last note).
32	Reset (see below).

D. RESET

In every row the top key (32) is Reset. Tap it alone to clear the whole row. Hold it and press a key to turn that one function off. Hold it for one second to clear all three rows.

E. WRITE

Hold **KEY TRANSPOSE** and press **LOAD** while playing: one pass of what plays (reorder, quantizer, combine pitch and rhythm, octave variation, shift and transpose) is written into the pattern, and those settings are cleared, so it sounds the same and becomes the new baseline. An active scale moves with the transpose and is kept as the pattern's own. The LFO/S&H sync, skip and add / delete time stay on; they are timing, not notes.

NOTE

Until you cycle it, the partner is the next pattern (pattern 16 pairs with pattern 1). Times count one step as a sixteenth. The add / delete grid follows the MIDI clock when it drives the SH-101; otherwise it is worked out from the step clock's own speed, so with a rhythmic EXT CLK it follows that rhythm. LFO/S&H sync with the MIDI clock sets the LFO hard-sync division until you turn it off; without it, the LFO restarts every 1, 2, 4, 8 or 16 steps.

HOLD + **LOAD** (or **Performance modes** in the web editor's Performance panel) gives the keys back their SuperOS roles while playing. The setting is kept across power-off.

MIDI

1 MIDI CLOCK SYNC

With MIDI clock sync on (Config Menu), incoming MIDI clock becomes the instrument's clock, divided to the rhythm you choose, and the SH-101 becomes a strict transport slave:

- **Start** starts the sequencer, and the first step sounds on the first clock after Start (the downbeat). **Stop** stops it.
- Only the incoming clock moves the machine: with no clock arriving it stays silent, and pressing **PLAY** just arms it to start when the clock arrives.
- Timing is smoothed the same way as on the superOS-303 and 808 (uClock): each clock byte is placed on a steady timebase, so USB and MIDI delivery jitter does not reach the sound, and no clock is ever dropped or doubled.
- The LFO can be hard-synced to the clock (Config Menu key 14) and the random S&H steps once per division.

A. DIVISIONS

Ten divisions, exact at 24 pulses per quarter (no drift): 1/4, 1/4 dotted, 1/4 triplet, 1/8, 1/8 dotted, 1/8 triplet, 1/16, 1/16 dotted, 1/16 triplet, 1/32. Choose them in the Config Menu.

B. SYNC DELAY

Config Menu keys 20 to 31 set a sync delay of 0, 2, 4, 6, 8, 10, 12, 15, 18, 21, 25 or 30 ms: the whole slaved machine plays that much later than the clock, to line it up with slower gear or a slower listening path. It can only delay (a note cannot play before its clock arrives).

NOTE

A master that compensates latency itself (for example a drum machine that sends clock early and measures its inputs) will cancel a sync delay that makes the SH-101 its latest input; leave the delay at 0 there.

COMBINED EDITION

1 TWO FIRMWARES IN ONE CHIP

Like the superOS-303 Combined Edition, one image carries two complete firmwares, with one active per boot:

- **superOS-101**: the firmware described in this manual.
- **80C49 mode**: an emulation of the original SH-101 CPU running the genuine Roland mask ROM, for a bone-stock instrument.

The selection is remembered across power-off; the unit always boots into whichever firmware you last chose. Switching is done from the Config Menu and takes effect immediately; USB stays connected.

2 THE CONFIG MENU

Hold **HOLD** + **KEY TRANSPOSE** for 2 seconds, in either firmware, while playing or idle. You can also hold the combination while switching the power on. In the menu the HOLD LED lights, the gate is forced off, and the function LED shows which firmware is currently running: **LOAD** lit = 80C49 mode, **PLAY** lit = superOS-101.

CONTROL	ACTION
LOAD	Switch to 80C49 mode (the original ROM).
PLAY	Switch to superOS-101.
UP&DOWN	MIDI clock sync on / off. KEY TRANSPOSE LED lit = on.
UP / DOWN	Next / previous clock division.
Keys 1...10	Clock division: 1/4, 1/4d, 1/4t, 1/8, 1/8d, 1/8t, 1/16, 1/16d, 1/16t, 1/32.
Keys 11 / 12	Accent model MC-202 / TB-303 (CV board).
Key 13	MIDI filter cutoff on / off (CV board).
Key 14	LFO hard-sync to MIDI clock on / off.
Keys 15...18	Sequencer direction: forward, backward, ping-pong, random.
Key 19	HOLD pedal route: HOLD / KEY TRANSPOSE.
Keys 20...31	Sync delay 0, 2, 4, 6, 8, 10, 12, 15, 18, 21, 25, 30 ms.
KEY TRANSPOSE	Exit the menu and resume.

NOTE

If no mask ROM is installed in the build, **LOAD** does nothing and the unit always boots superOS-101. See 80C49 Mode below.

3 80C49 MODE

In 80C49 mode the unit runs the original SH-101 program, byte for byte. The emulated CPU's ports are wired straight through to the synth, so the original's own scan patterns, DAC writes, and timing loops drive the analog board unchanged: every behavior of a 1982 unit is reproduced, including its quirks. For the workflow in this mode, the original Roland SH-101 owner's manual is the manual.

- The keyboard, arpeggiator, sequencer, hold, and key transpose all behave exactly as stock.
- The original service **Test Mode** works: hold **LOAD** + **KEY TRANSPOSE** while switching the power on (see the Roland service manual for the test procedures).
- The superOS Config Menu combo (**HOLD** + **KEY TRANSPOSE**, 2 s) still works, so you can always switch back.
- MIDI clock sync works here too: with sync on, the divided MIDI clock is fed to the original program in place of the LFO / EXT CLK, so even the stock arpeggiator and sequencer run DAW-locked at the chosen division.
- MIDI notes work here too: notes 53...84 (F3...C6, the SH-101's own keys) are pressed into the emulated key matrix, so the original program sees them as keys and they arpeggiate, record and transpose like keys. Notes outside that range have no key and are ignored. Whatever the original program plays is echoed on MIDI OUT.

A. SEQUENCE MEMORY IN 80C49 MODE

The original CPU kept its sequence in battery-backed internal RAM. In 80C49 mode that RAM region (the 100 sequencer steps) is mirrored to the CPU's permanent memory: about a second after you finish recording it is saved, and it is restored before the original program starts, so the sequence survives power-off with no battery, exactly as a healthy stock unit would keep it. superOS-101's own sixteen patterns are separate and unaffected.

B. THE MASK ROM

The original ROM is Roland's copyrighted code and is **never distributed** with superOS-101. It is embedded at build time from your own dump of an SH-101's 2 KB ROM. A build made without a dump still works fully as superOS-101; only 80C49 mode is unavailable.

NOTE

The emulator is paced to the original's 6 MHz clock. On the current CPU board the emulated program may run somewhat below full speed; pitch CVs and clock-driven tempo are unaffected (the arpeggiator and sequencer follow the LFO / EXT CLK), but key-scan response can be slightly slower than a stock unit. This is being measured during board bring-up.

REFERENCE

2 QUICK REFERENCE

■ PLAYING

UP / DOWN / UP&DOWN	Arpeggiator on in that direction / off
DOWN + UP&DOWN together	Random arpeggio on / off
Arp: KEY TRANSPOSE + UP / DOWN	Arp octave range 1...3
KEY TRANSPOSE + key	Transpose from the lowest C (stays; + lowest C = off)
Double-tap KEY TRANSPOSE	Transpose mode: plain keys transpose while playing
KEY TRANSPOSE + LOAD	Tune: hold A 440
TRIG switch GATE+TRIG	Last-note priority (else lowest-note)

■ SEQUENCER

LOAD (stopped)	Record a new pattern
Key / KEY TRANSPOSE / HOLD + key	Write note / rest / legato
Recording: UP / DOWN	Ratchet of last step / delete last step
LOAD (recording)	Finish (auto-saved)
LOAD (playing)	Correct and add from the next step
PLAY	Start / stop
Playing: UP / DOWN / UP&DOWN / DOWN + UP&DOWN	Forward / backward / ping-pong / random
Playing: HOLD + key n	Loop the first n steps (same key = full)
Playing: KEY TRANSPOSE + UP / DOWN	Shift: next / previous step now
Playing: HOLD + UP / DOWN	Nudge the notes a step right / left
PLAY + UP&DOWN / UP / DOWN	Random pattern / new pitches / mutate
PLAY + KEY TRANSPOSE + key / KEY TRANSPOSE tap	Scale root (again = next scale) / scale on-off
PLAY + key 1...16	Select pattern (stopped: start; playing: at the end of the pass)
PLAY + several keys	Song
Playing, TRANSPOSE L: key 25...32	Switch to pattern 1...8 now (overlay off: keys 1...16)
Playing: PLAY + LOAD	Real-time record on / off

■ PERFORMANCE MODES (WHILE PLAYING)

HOLD + LOAD	Performance mode (HOLD LED lit while playing) / SuperOS mode
TRANPOSE L / M / H	Row 1 Global / 2 Pitch / 3 Time
Row 1: keys 1...12 / 13...19 / 20...24 / 25...31	Transpose / octave variations / LFO sync / patterns 1...7
Row 2: keys 1...7 / 8...19 / 20...26 / 27 / 28...31	Reorder / root / scale type / partner / combine pitch
Row 3: keys 1...7 / 8...12	Shift time / skip time
Row 3: keys 13...17 + 18...21	Add / delete time: grid + NOR OR AND XOR
Row 3: keys 22...26 held / 27 / 28...31	Ratchet / partner / combine rhythm
Key 32 / key 32 + key / key 32 held 1 s	Reset the row / that function / every row
KEY TRANPOSE + LOAD	Write what plays into the pattern
Same key again	That choice off

■ CONFIG MENU

Hold HOLD + KEY TRANPOSE 2 s	Config Menu
Menu: LOAD / PLAY	80C49 mode / superOS-101
Menu: UP&DOWN	MIDI clock sync on / off
Menu: UP / DOWN , keys 1...10	Clock division
Menu: keys 15...18 / 19 / 20...31	Direction / pedal route / sync delay
Menu: KEY TRANPOSE	Exit

3 SPECIFICATIONS

■ CPU

AT90USB1286 (run at 4 MHz to keep the pitch rail quiet) on a drop-in board for the SH-101's 40-pin 80C49 socket. USB-C MIDI and DIN MIDI; firmware updates over MIDI SysEx.

■ CV ENGINE

Bit-faithful reproduction of the original DAC/multiplexer protocol: 6-bit pitch, range, and random CVs into the original sample/holds, with the original's scan-safety guarantees. Confirmed 1 V/octave numeric model.

■ KEYBOARD

32 keys, monophonic, lowest- or last-note priority (TRIG-switch selected), octave TRANSPOSE, RANGE 16'-2'.

■ ARPEGGIATOR

Up, down, up&down and random over held keys, 1 to 3 octaves; clocked by LFO, EXT CLK or MIDI clock.

■ SEQUENCER

16 patterns of up to 128 steps of note / rest / legato with 1x/2x/3x ratchets; forward, backward, ping-pong, random; nudge; randomize and 35 scales; songs of up to 16 patterns; step and real-time recording; saved automatically to permanent on-chip memory (no battery).

■ MIDI CLOCK SYNC

24-ppqn realtime clock, strict transport slave, uClock jitter smoothing, 0 to 60 ms sync delay; ten drift-free divisions (1/4 ... 1/32 with dotted and triplet); clocks the arp/sequencer, hard-syncs the analog LFO via CLOCK RESET, and steps the random S&H; works in both firmwares (injected on the emulated T1 in 80C49 mode). Settings retained across power-off.

■ 80C49 MODE

Full-ISA MCS-48 emulation of the original CPU running the genuine mask ROM (user-supplied, never distributed), ports passed 1:1 to the synth, paced to the original 6 MHz clock.

■ FIRMWARE SELECT

Panel Config Menu (HOLD + KEY TRANSPOSE, 2 s or at power-on); choice retained across power-off.

SUPEROS-101 FIRMWARE OWNER'S MANUAL · COMBINED EDITION V0.2.

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