Install & recover

Start with the exact SDKC originals. Helical uses its Daisy Seed and SD card. CUH has its own powered USB update procedure.

Before modifying either unit

SDKC excludes unauthorized firmware modifications from its manufacturer warranty and warns that custom Daisy firmware may damage Helical and void the warranty. Back up the entire working SD card, especially calibration.txt. Keep both original images for recovery. The firmware changes have been tested over repeated sessions on Helical and CUH hardware. Both patchers also verify the original and patched files to reduce the risk of flashing the wrong image. The firmware is provided as-is. Installing it on either module is at your own risk.

Prepare the files

Choose SDKC's helical_firmware_v2.10.bin in the Helical patcher. For CUH, unzip SDKC's Cuh_firmware_v1.00.zip and choose Cuh_v1.00.uf2. Each patcher checks the exact original and resulting file with SHA-256 in your browser.

Helical · SD and Daisy

Power the rack off. Copy HELI.BIN to the SD root with that exact name. Keep stock scales, wavetables, settings and calibration. Connect the rear Daisy Seed micro-USB data port to the computer. Hold BOOT, press and release RESET, then release BOOT.

Write Helical

In desktop Chrome or Edge choose the Daisy DFU device in the on-site flasher, then Write and verify. Wait for completed readback before restarting. The official Daisy Programmer File Upload tab also accepts your patched .bin. Disconnect USB and boot with the prepared SD card.

CUH · case power required

With the rack off, disconnect CUH's rear USB-A link to Helical and leave the Eurorack power ribbon attached. Connect a USB data cable from CUH's front USB-C port to the computer, then power on the case. Hold BOOT, press and release RESET, then release BOOT.

Copy the UF2

Wait for RPI-RP2. If needed, check INFO_UF2.TXT for Board-ID RPI-RP2. Copy CUH_1.00-c1.uf2 onto that drive. Wait for copying to finish and the drive to eject automatically. Power off before restoring the rear Helical link with the supplied cable.

Recover stock

Use Daisy Programmer File Upload with the original Helical binary. Restore your backed-up card. To restore CUH, repeat the powered RPI-RP2 procedure with the original CUH UF2. If Helical starts with stock-like controls, first check the card-root HELI.BIN and its spelling.

Play a locked phrase

Each group has eight voice lanes. Raise Poly enough to hear both groups when monitoring the split outputs.

Normal play

Turn Scale to choose. Click once to recall the readout. The left cloud gives the bank and the right counts 1–5 after a 250 ms pause: blue 1–5, yellow 6–10, green 11–15, amber 16–20, red 21–25. Amber + 2 is slot 17.

Transport

Tap both reloads together for global Stop/Start. Steady dim red means fully stopped. Hold both for 2 seconds in custom normal or MPE for MIDI-only stop/resume. Pulsing red means MIDI stopped. A legacy boot with startup 2 also enables resume.

Master transpose

Hold left reload and turn unpressed Scale for octaves. Use right reload for semitones. A plain reload tap regenerates its group on release. The master offset spans –24 to +24 semitones.

Enter Ranges

Hold Scale for the one-second cyan cue and release before two seconds. Tap left or right reload to select Arc or Orbit. Turn Scale for the lower register. Push-turn for width. Addition Cutoff and Res duplicate these controls and use soft pickup.

Group transpose

In Ranges hold one reload and turn unpressed Scale. Left changes Arc, right changes Orbit, one semitone per detent. Green means up, blue down, steady white zero. Count one long pulse per octave and one short pulse per remaining semitone.

Save and audition

Hold both reloads for half a second to enable or bypass ranges. Click Scale to exit and save the range windows. Transposes reset to zero on boot. New targets take effect on each voice’s next attack, including a locked repeat.

First listening test

Lock a recognizable phrase. Set all three transpose CCs to 64. Send Arc 71 and Orbit 52. You should hear Arc a fifth up and Orbit an octave down. Send master 66 to lift both another two semitones.

Clock, Root & clouds

Choose the timing source in HPERF.CFG and reboot. Then use Timing/Root to set how often each group plays.

Enter Timing/Root

Hold Scale straight through the one-second cue. Release at the two-second magenta cue. Tap a reload to select a group. Turn Scale for ÷1–÷8. Push-turn clockwise enables snapped Root, counterclockwise disables it. Click Scale to exit.

Play with the Poly knob · divisionSource 1

For a busy Orbit and sparse Arc, set Orbit to ÷1 and Arc to ÷8. Each Arc voice plays its full envelope, then rests for seven more periods of that note’s length. Swap the divisions for a busier Arc. Lower Poly to silence, then raise it to bring eligible voices back.

Patch a clock to Poly CV · divisionSource 0

Turn Poly fully counterclockwise. Both groups count the incoming rising edges. At ÷8, ready voices can start on pulses 1, 9, 17 and so on. A held gate gives each ready divided voice one attack. ÷1 uses ordinary timing.

If a divided group goes quiet after raising Poly

The knob and Poly CV share one input. In clock mode, lowering and raising the knob can count as one gate. Holding it steady supplies no further edges. For knob-only play, set divisionSource 1 in HPERF.CFG and reboot. Omitting the setting selects clock mode.

Play a scale

Root knob and Root CV share one input. With snapping on, Root chooses scale degrees relative to C. Group and master transpose remain chromatic. Set a startup division or rootQuantize in HPERF.CFG to recall it at power-up.

Read the clouds

Ranges: cyan counts lower register (one pulse = 0); yellow counts width in octaves. Magenta on knob movement means pickup. Two green flashes enable ranges, two white bypass. Green on exit confirms save, three red flashes indicate a save error.

At power-up

Two cyan flashes indicate active saved ranges. Two magenta flashes indicate MPE, two blue custom normal MIDI. Three amber flashes during the MIDI cue indicate a rejected MIDI configuration and fallback to legacy.

Scale slots 17–25

Defaults: harmonic minor, melodic minor ascending, Hungarian minor, Hirajoshi, half-whole diminished, Hijazkar, Hamsadhwani, Ritsu and Ryukyu. With a 16-row stock file the encoder reaches all 25. CUH scale CV and stock CC1 retain their 1–16 selection.

MIDI & expression

Choose the profile for your sound engine. A channel-preserving MIDI route makes the member-channel envelopes and bends audible.

Connect CUH

For MIDI output use CUH TRS Type A to DIN IN, or connect its front USB-C to a computer or USB host. Use one route to the target. For inbound CC, route the computer or DROP through the USB host to CUH.

Osmose

Choose the Osmose profile (mode 2, bendRange 96). Set DIN mode to dsp in for the internal sound engine. Preserve channels and Channel Pressure through mioXL. Try voicesArc 1 with a sustained preset, then set 8 and reboot Helical.

Iridium Desktop

Enable MPE on the receiving instrument and match bendRange (the example uses 24). Choose a patch that maps per-note pressure to amplitude or a clearly audible parameter. Start with Glide low, raise it, then lengthen Env to hear overlapping voices.

Independent expression

Manager channel 1 and members 2–9 carry eight lanes of one group. Env drives 7-bit Channel Pressure and Glide drives 14-bit Pitch Bend. Modes 1/2 suppress legacy knob CC output. Internal audio still plays both groups.

DROP on channel 16

Use absolute CC21 (master), CC102 (Arc), CC103 (Orbit). 40 = –24, 52 = –12, 64 = unison, 71 = +7, 76 = +12, 88 = +24. Offsets add. Pitch wheel bends both groups including sounding notes. Stock CC1 still selects stock scales.

Normal MIDI and recovery

With mode 1, force a split or follow the Orbit jack; set group gates, channels and voice caps. In MPE or custom normal, hold both reloads for two seconds to send active releases and pause MIDI. Hold again to resume new notes.

SD settings / performance

Use plain ASCII and a space between each key and value. Comments start with #. Change these optional files with power off, then reboot.

HPERF.CFG / Performance at power-up · up to 1,024 ASCII bytes

version · 1

File format. Required.

startup · 0 / 1 / 2

0 plays, 1 stops audio and MIDI, 2 stops only MIDI. Default 0.

rootQuantize · 0 / 1

0 uses the usual Root response, 1 snaps Root knob and CV to the selected scale. Default 0.

divisionSource · 0 / 1

0 or omitted counts Poly CV clock edges. 1 times each voice from its own notes. The example file selects 1. Read at boot.

divisionArc, divisionOrbit · 1–8 each

One divisor per group. Both default to 1 for ordinary timing. Panel edits last until reboot.

HROOT.CFG / Incoming performance control · up to 1,024 ASCII bytes

version, input · 1 / input 0–1

Require version 1 and input. 1 enables the performance mappings. Default 0.

channel · 1–16

Input channel for master, Arc and Orbit transpose and pitch wheel. Default 16.

transposeCC · 0–119

Master transpose CC, default 21. Fixed CC102 controls Arc, CC103 Orbit. Keep the master distinct to access all three.

bendRange · 1–24 semitones

Incoming global wheel range in each direction. Default 2. Wheel center is 8192.

HSCAL.CFG / Custom scale rows · up to 2,048 ASCII bytes

Arc RGB, Orbit RGB · 6 values, 0–255

First six integers in each row define the two scale colors.

Octave flag, note offsets · 0 or 1, then notes

0 repeats an ascending octave (0–11). With 1, give the low octave (0–11) and the repeating octave (12–23). Start at 0.

Number of rows · 5 or 9

Five fills 17–21 and keeps built-ins 22–25. Nine fills 17–25. Use a 16-row stock scale.txt. An invalid bank falls back to built-ins.

SD settings / MIDI

Keep a single profile named HMIDI.CFG at the root. The output bend range here and the incoming wheel range in HROOT.CFG are independent.

HMIDI.CFG / Outgoing MIDI · up to 1,024 ASCII bytes

version, mode · 1 / mode 0–2

Require version 1 and mode. Mode 0 uses stock midiSettings.txt. Mode 1 is custom normal, mode 2 is MPE. Default is legacy.

mpeGroup · 0 / 1

In MPE, send Arc (0) or Orbit (1) on member channels 2–9. Default Arc.

routing · 0 / 1

Normal mode follows the Orbit jack (0) or always splits the two groups (1). Default 0.

channelArc, channelOrbit · 1–16

Normal-mode output channels. Defaults 1 and 2. Orbit channel applies when split.

gateArc, gateOrbit · 1–100%

Normal-mode gates as a percentage of each voice’s envelope length. Both default to 50%. MPE follows the full envelope.

voicesArc, voicesOrbit · 0–8

Modes 1 and 2 use the first N lanes of each group. 0 mutes, 1 uses one lane. Defaults 8 each. Local audio remains available.

bendRange · 1–96 semitones

Outgoing MPE pitch-bend range in each direction. Default 48. Match the receiver.

Rack files

HELI.BIN is required for the extensions. Back up your card before changing a saved RANGE0.CFG or RANGE1.CFG. Copy example files individually so your existing preferences and calibrations are preserved.

Scales & release notes

Use the scale library to change the pitch material without replacing the factory scales. Each download has the required card filename HSCAL.CFG.

Mixed sampler

Hijaz, Homayun, Hamsadhwani, Hindolam and Ryukyu.

Arabic & Persian

Five equal-tempered arrangements, including Hijazkar and Nikriz.

Indian · Carnatic

Hamsadhwani, Amritavarshini, Hindolam, Charukesi and Vachaspati.

Japanese & Okinawan

Five pitch collections for comparing registers and intervals.

Nine built-in scales

Editable definitions for all nine extension slots.

Receiver microtunings

Copy the five-row microtonal bank to Helical. On a compatible receiver use Neutral.scl for slots 17–19 and Ratios.scl for 20–21. ConcertC.kbm anchors middle C where supported. Start at Root C with zero transpose. Helical’s own pitch table remains semitone-based.

Helical beta fixes

The 2.10 beta wavetable loader now checks transfer lengths. Calibration commits only after all 24 endpoints validate. Malformed settings and MIDI-settings lines are handled before numeric conversion.

CUH fixes

The DIN transmitter now sends the proper length for Channel Pressure and Program Change, removing the extra zero that cut MPE pressure short. USB waits for Helical’s descriptors before announcing itself, fixing the observed mioXL reconnect failure after rack power cycling.