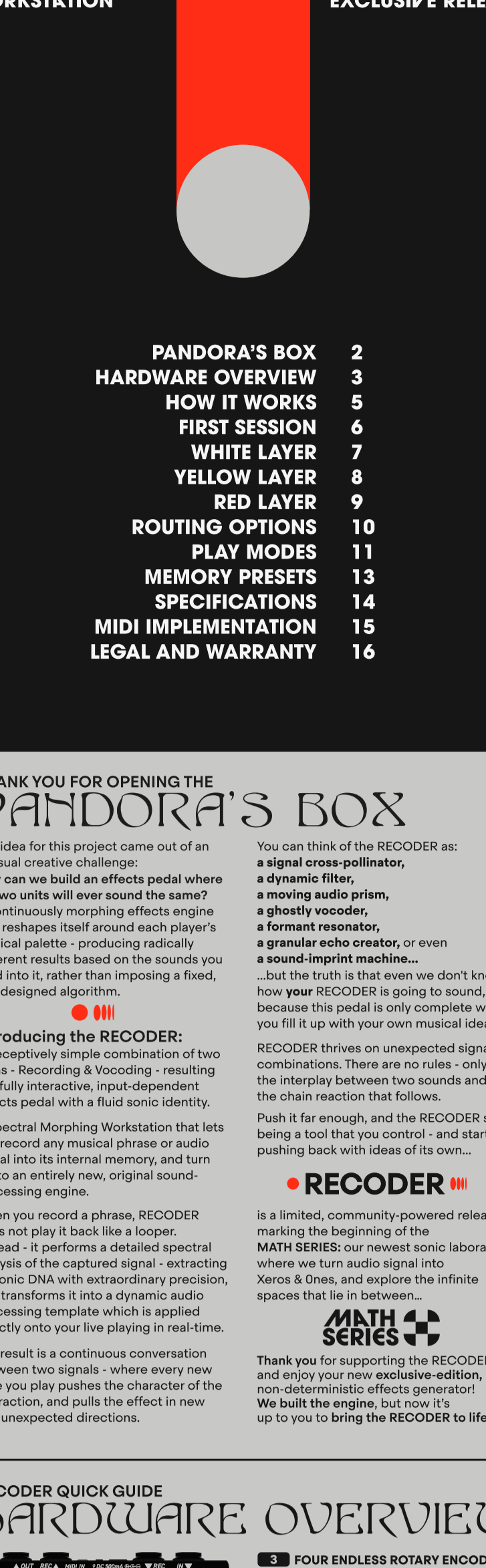


RECORDER USER MANUAL



SPECTRAL MORPHING WORKSTATION **MATH SERIES**
EXCLUSIVE RELEASE

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THANK YOU FOR OPENING THE PANDORA'S BOX

The idea for this project came out of an unusual creative challenge: how can we build an effects pedal where no two units will ever sound the same? A continuously morphing effects engine that reshapes itself around each player's musical palette - producing radically different results based on the sounds you feed into it, rather than imposing a fixed, pre-designed algorithm.

Introducing the RECODER: A deceptively simple combination of two ideas - Recording & Vocoding - resulting in a fully interactive, input-dependent effects pedal with a fluid sonic identity.

A Spectral Morphing Workstation that lets you record any musical phrase or audio signal into its internal memory, and turn it into an entirely new, original sound-processing engine.

When you record a phrase, RECODER does not play it back like a looper. Instead - it performs a detailed spectral analysis of the captured signal - extracting its sonic DNA with extraordinary precision, and transforms it into a dynamic audio processing template which is applied directly onto your live playing in real-time.

The result is a continuous conversation between two signals - where every new note you play pushes the character of the interaction, and pulls the effect in new and unexpected directions.

You can think of the RECODER as: a **signal cross-pollinator**, a **dynamic filter**, a **moving audio prism**, a **glitchy vocoder**, a **warped resonator**, a **granular echo creator**, or even a **sound-impro machine**...

...but the truth is that even we don't know how your RECODER is going to sound, because this pedal is only complete when you fill it up with your own musical ideas...

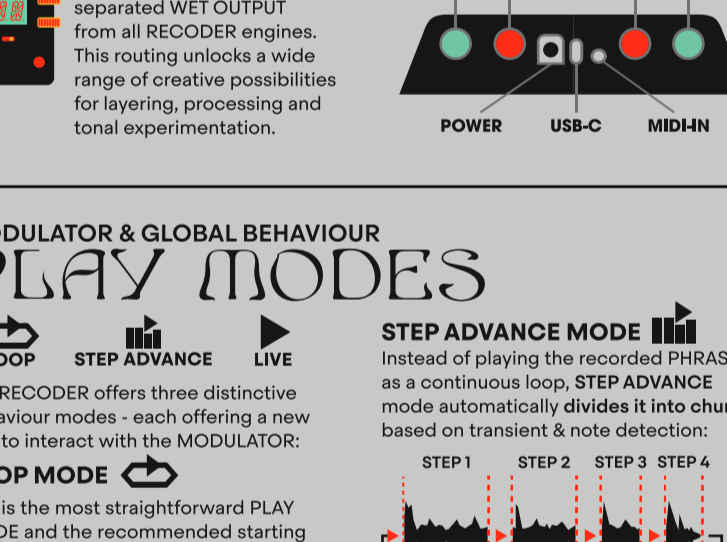
RECODER thrives on unexpected signal combinations. There are no rules - only the interplay between two sounds and the chain reaction that follows.

Push it far enough, and the RECODER stops being a tool that you control - and starts pushing back with ideas of its own...

RECORDER is a limited, community-powered release, marking the beginning of the **MATH SERIES**: our newest sonic laboratory where we turn audio signal into Xeros & Ones, and explore the infinite spaces that lie in between...

Thank you for supporting the RECODER, and enjoy your new exclusive-edition, non-deterministic effects generator! We built the engine, but now it's up to you to bring the RECODER to life...

RECODER QUICK GUIDE



- ENGAGE FOOTSWITCH WITH LED:** Dual state - ON or OFF (buffered bypass). Press & Hold to activate RETIME function; RETIME behaviour changes across three PLAY MODES (see pages 11 & 12);
- REC FOOTSWITCH WITH LED:** Press & Hold to start recording PHRASE instantly; Release REC to stop. Recorded PHRASEs can be either extremely short: 0.1 seconds (snapshot) or very long - up to 10 minutes.

- ENGAGE TO PLAY PHRASE:** This will add the RECORDED PHRASE through the MAIN OUTPUT: played back from memory with all RED LAYER adjustments active.
- SEGMENTED LED DISPLAY:** SHOWS PARAMETER VALUES w. polarity, PRESET SLOT identifiers (A1-Z9), REC & playback cursor position, effect intensity & other indications.

- VALUE POLARITY MARKERS:** MOST PARAMETERS have an active bipolar range between -99 and +99; DOT indicators show LIVE POLARITY: ⊕ Right Digit = value is positive ⊖ Left Digit = value is negative
- CLEAR VAL / SAVE BUTTON:** Hold Button & touch any encoder to RESET corresponding parameter to zero. Hold Button & press ENGAGE Footswitch to CLEAR ALL settings on the pedal. Press together with LOAD to enter MEMORY Menu for saving PRESETS.

- PRESET VAL / LOAD BUTTON:** Hold Button & touch any encoder to restore parameter to PRESET value. Press together with SAVE to enter MEMORY Menu for loading presets.

- MAIN INPUT (1/4" MONO JACK):** Connect your main instrument here. This is the main signal that will be used and affected by the RECODER.
- MAIN OUTPUT (1/4" MONO JACK):** Connect to your amplifier, interface, mixer or next device in the signal chain.
- REC INPUT (1/4" MONO JACK):** REC input for recording phrases from a separate source - routed parallel to your main signal (when connected).
- REC OUTPUT (1/4" MONO JACK):** Buffered pass-through of the REC input signal - useful for advanced routing. (see routing ideas on page 10);
- POWER SUPPLY INPUT:** Standard 9VDC center-negative power supply with 500mA of current or more.
- USB-C INPUT:** For MIDI over USB & firmware updates.
- MIDI INPUT (3.5MM TO B-TYPE DIN):** CC & PC control for all PARAMETERS; PRESET navigation (MIDI map on page 15)

FAST & FOURIEROUS

The RECODER operates through the interplay between two signals: the Live input from your instrument (INPUT), and a secondary MODULATOR signal - which can be any recorded PHRASE or a live MODULATOR input (REC INPUT).

Internally, RECODER runs a real-time, high-resolution Fast Fourier Transform (FFT) spectral analysis engine - measuring the energy distribution of both signals across 1024 isolated frequency bands.

The pedal's RESOLUTION control adjusts how often these "spectral snapshots" are refreshed - from rapid 5ms intervals to slower, stepped windows (40ms, 80ms).

Once the spectral profiles of both signals are measured, RECODER can apply precise, band-specific adjustments to morph the INPUT signal to mimic the MODULATOR's AMPLITUDE or TIMBRE.

The RECODER can also isolate and extract the overlapping spectral content between both signals - generating entirely new sonic structures - SLICES & RESONANCES.

This FFT-driven system gives the RECODER an incredible range: from vocoding and spectral filtering to cross-synthesis, and hybrid behaviours that go beyond traditional FX categories.

All RECODER sound engines are controlled via 4 shared endless encoders across three color-coded control LAYERS: WHITE, YELLOW, and RED.

Each control LAYER gives the encoders a different set of functions, letting you access 3 distinct processing domains:

INPUT MODIFICATION & FEEL: Apply the spectral & dynamic profile of the MODULATOR onto your INPUT; Adjust how the RECODER responds to your playing dynamics & signal level.

GENERATIVE & SPATIAL FX: Extract new harmonic structures from overlapping frequencies between MODULATOR & main INPUT. Then push them through time - creating unique variations of melodic feedback, echoes, delays and reverbs.

RESHAPING THE MODULATOR: Transform the MODULATOR before it drives the RECODER engines to redefine all interactions that follow: Adjust the MODULATOR'S TONE, ADIVE, apply PITCH & Time STRETCHING.

WIR FAHREN FAHREN FAHREN AUF DER... FIRST SESSION

1. BASIC SETUP: Plug your instrument into the MAIN INPUT and route the MAIN OUT to amp/mixer.

2. CLEAR ALL PARAMETERS: Hold the CLEAR VAL button and press the ENGAGE footswitch - to CLEAR all parameter values to zero - effectively loading a blank slate on the pedal:

3. RECORD A PHRASE: Press & Hold the REC Footswitch to start recording instantly. Play something simple, such as a pattern, strumming a muted, a short melody, etc.

4. TURN KNOBS: Use ENCODERS to adjust 12 values across 3 LAYERS; Use the LAYER switch to move between layers. Play your instrument to interact with the PHRASE.

5. TRY THE BUILT-IN MICROPHONE: Change the INPUT to the built-in MIC! Hold REC & say the word "AUTOBAHN" preferably with a strong German accent; then release the REC FSW.

6. SAVE PRESET: Press the SAVE and LOAD buttons together to enter the MEMORY Menu. Select a BANK and SLOT using the two encoders on the left side (A-Z; 1-9)

234 SLOTS: Press the SAVE button! This will permanently store the current PHRASE values as a PRESET.

INPUT MODIFICATION WHITE LAYER

AMPLITUDE: Tracks the MODULATOR's main amplitude peaks in real-time and applies them to the INPUT, creating frequency-specific boost and cut zones. You can use a recorded PHRASE or a secondary live REC INPUT.

MODULATOR PEAKS: Adjusts the amplitude of the MODULATOR signal.

LIVE INPUT ZONES: Adjusts the amplitude of the live INPUT signal.

Side-Chained Boost: Boosts frequency bands where the MODULATOR signal is strongest. At max AMPLITUDE values, the dominant bands are pushed into overdrive.

Side-Chained Cut: Dips the frequency bands where the MODULATOR's signal is strongest - producing a moving side-chain cut or a variety of tremolo effects.

ENVELOPE: Shapes the attack & transient behaviour between the INPUT and the MODULATOR across all RECODER modes & engines:

Rising Envelope: introduces a blooming response and a slower, more gradual exchange between signals.

Transient Shaping: emphasizes the MODULATOR's attacks, producing sharper more percussive interactions.

TIMBRE: FFT analysis tracks the energy distribution of both INPUT & MODULATOR in real-time: The INPUT is then rebalanced across the full frequency spectrum to mirror and mimic the MODULATOR's tonal profile.

RESHAPED INPUT: Just like a vocoder: TIMBRE Transfer lets you alter the INPUT tone, while keeping your playing in tune!

TIMBRE Transfer: Makes the INPUT mimic the sound of the MODULATOR - think of it as a vocoder, operating at a 1024-band FFT resolution. Inactive or silent MODULATOR bands do not produce dips in the INPUT signal.

Inverted TIMBRE Transfer: Flips the TIMBRE mapping so the frequency relationships are inverted. MODULATOR's high-end energy is applied to the low end of the INPUT & vice versa.

SENSITIVITY: Controls how reactive RECODER is to the INPUT signal, and your playing dynamics: At 0, all RECODER engines are calibrated to a normalised INPUT level.

Increased Responsivity: to INPUT: consistent output at all playing volumes.

Reduced Sensivity: needs louder playing to produce a fully WET output.

GENERATED SIGNAL & TIME PROCESSING YELLOW LAYER

SLICES: Extracts small audio fragments from the MODULATOR - triggered by matching or coinciding frequencies in the INPUT. The AMOUNT & behaviour of the SLICES will always depend on each unique signal combination; SLICES always stay in tune.

SLICES Volumes: Adjust the output level of the SLICES extracted from the MODULATOR signal. White layer SENSITIVITY control sets SLICE density & trigger activity.

Inverted SLICES: Matching lower frequencies will extract matching SLICES from the MODULATOR's high frequency range & vice versa.

REPEATS & DISTANCE: A flexible TIME & REGENERATION engine that processes both YELLOW Layer signals SLICES & RESONANCES simultaneously.

REPEATS: controls the direction and amount of regeneration;

DISTANCE: controls the spacing or diffusion between REPEATS.

Together these controls allow you to create four distinct regeneration effects: Delay, Reverse Delay, Reverb & Feedback

REVERSE REGENERATION: REPEATS FORWARD REGENERATION

with REPEATS at 0: ALL regeneration is DISABLED

REVERB CLOUDS: DELAY TIME (UP TO 1600MS) DISTANCE: REPEATS will become FEEDBACK

with DISTANCE at 0: REPEATS will become FEEDBACK

SHAPING THE MODULATOR RED LAYER

TONE: Applies a powerful tilt EQ onto the MODULATOR, affecting all interactions. In subtractive modes, such as AMPLITUDE CUT, a darker MODULATOR will yield brighter results (and vice versa). With TIMBRE, SLICES & RESONANCES, the MODULATOR's tone is directly transferred.

DAMAGE: A dual distortion engine designed to increase the harmonic complexity of the MODULATOR, thus producing a richer and more intricate interaction between the two signals in all RECODER modes.

Digital Drive: Enhances the MODULATOR harmonics & boosts volume.

Sample-Rate Reduction: Degrades the MODULATOR signal, producing aliasing, grit & lo-fi textures.

PITCH: Shifts the MODULATOR's pitch UP/DOWN by up to 4 OCTAVES with changing the MODULATOR's playback speed;

PITCH UP: by up to 4 octaves (+48 max); changing the MODULATOR's sound and introducing new harmonics.

PITCH DOWN: by up to 4 octaves (-48 min); pushing the MODULATOR into lower frequency bands, and generating additional subharmonic content.

RESONANCE: Creates new sine-wave components from the strongest over-lapping frequency peaks between INPUT & MODULATOR - creating responsive, melodic resonances that evolve with your playing.

RESONANCE Amount: Sets the volume & decay length of the melodic resonators. Raising SENSITIVITY increases the density of the resonators, and makes them easier to trigger.

Inverted RESONANCES: Combines opposite frequency peaks to produce unpredictable, and sometimes inharmonic resonances.

STRETCH: Adjusts the MODULATOR's playback speed, without changing it's PITCH. Knob range is ±99; putting up to 10x STRETCH in both directions.

Small STRETCH adjustments can be useful for correcting the timing of a PHRASE. Extreme STRETCH values will produce a variety of glitches and artifacts.

Speed Up: Increases recorded PHRASE playback speed by up to 10x.

STRETCH: Slows down recorded PHRASE playback speed by up to 1/10th.

STRETCH is Disabled in LIVE PLAY MODE

PLAY ADVANCE FUNCTION: In LOOP or STEP ADVANCE mode - press both footswitches simultaneously to audition the MODULATOR with all the RED LAYER adjustments via MAIN OUTPUT.

PHRASE Playback: is momentary - only active while both footswitches are pressed and held; auditioned PHRASE will always restart from the beginning. Release footswitches to stop playback.

During the PHRASE audition, your DRY SIGNAL (INPUT) will remain active, but the WET OUTPUT (RECODER FSW) will be muted.

MANY WAYS TO SET UP ROUTING OPTIONS

BASIC SETUP: The simplest configuration where your instrument is both the MAIN INPUT and the LIVE INPUT used for processing. Pressing REC allows you to capture PHRASES from MAIN INPUT, and you can use LIVE MODE to achieve real-time RECODER effects.

BUILT-IN MICROPHONE: The internal mono condenser capsule overrides all inputs as the recording source. Capture vocals, spoken word, or acoustic instruments, or various sound FX without the need for extra cables. Automatically disabled in LIVE INPUT MODE.

SEPARATE MODULATOR SOURCE: Record a PHRASE from a separate source in parallel to your main instrument. LIVE MODE Enables unique cross-spectral workflows - allowing you to process your MAIN INPUT through the MODULATOR, while keeping it clean and independently routing, or processing.

WET & DRY OUTPUTS: When nothing is connected to the REC INPUT, the REC OUTPUT Jack offers a fully separated WET OUTPUT from all RECODER engines. This routing unlocks a wide range of creative possibilities for layering, processing and total experimentation.

FULL DUAL ROUTING: REC OUT offers a clean buffered though-output for the REC-IN signal. This allows you to use a new instrument or sound source as the MODULATOR, while keeping it clean and independently routing, or processing.

MODULATOR & GLOBAL BEHAVIOUR PLAY MODES

The RECODER offers three distinctive behaviour modes - each offering a new way to interact with the MODULATOR:

LOOP MODE: This is the most straightforward PLAY MODE and the recommended starting point for exploring the RECODER: Use the RECORD footswitch to capture a looping phrase, which is then played back continuously and used as MODULATOR.

Reshape the MODULATOR in the RED LAYER, and adjust its playback speed using either the STRETCH encoder or the RETIME footswitch:

RETIME FUNCTION: ARM: Press and hold the RETIME FSW - DISPLAY will start blinking to indicate; START: Play a single event (e.g. a strum) to start the RETIME, and keep holding the footswitch for the desired duration.

RELEASE: this completes the RETIME. Hold duration sets the new loop length. **RETIME:** directly scales STRETCH value. For example - a 2-sec PHRASE RETIME to 6-sec results in a 3x length increase - changing the STRETCH value to +30.

STEP ADVANCE MODE: Instead of playing the recorded PHRASE as a continuous loop, STEP ADVANCE mode automatically divides it into chunks based on sensitive & note detection:

You can now move through the STEPS with your playing (e.g. strums or plucks) - essentially turning any recorded PHRASE into a spectral sequence.

As you play - each new note will advance the MODULATOR to the next STEP, wrapping back around after the final STEP.

STRETCH in STEP ADVANCE: Just as in LOOP MODE - the STRETCH encoder adjusts the playback speed of individual STEPS without affecting PITCH.

Positive STRETCH values: will move the playback faster, while negative STRETCH values will extend the segments. Playback always advances to next STEP when new note or transient is detected.

SENSITIVITY in STEP ADVANCE: Use the WHITE LAYER SENSITIVITY knob to adjust how easily your playing triggers the next step in STEP ADVANCE MODE.

RETIME FUNCTION in STEP ADVANCE MODE: The RETIME FSW allows you to place STEP markers manually - via triggers from your instrument or by tapping the REC FSW - thus overriding the automatically assigned STEP markers throughout the PHRASE.

RESET Markers: hold the CLEAR VAL button & tap the REC Footswitch - to CLEAR ALL, manually-placed markers and reset back to auto-generated STEPS.

LIVE INPUT MODE: Besides working with recorded PHRASES, RECODER is also designed to use any live audio signal as a real-time MODULATOR.

When both MAIN IN & REC IN are connected, LIVE MODE begins to operate like a highly expanded vocoder: continuously merging two signals through TIMBRE transfer, creating side-chain effects with AMPLITUDE modulation, generating SLICES, RESONANCES, and various new HARMONIC interactions wherever the frequency content overlaps.

When no additional REC IN is connected, LIVE MODE will use the MAIN INPUT as both the SOURCE and the MODULATOR: creating a deep self-modulating effect full of movement and surprising textures. See page 10 for routing ideas and info!

You can still capture PHRASES while in LIVE MODE by holding the REC FSW - as if momentarily switching to LOOP MODE. Tap REC again to disable the PHRASE and return to the live MODULATOR (REC IN). Built-in MICROPHONE is disabled in LIVE MODE to avoid loud audio feedback!

234 SLOTS FOR STORING PHRASES & PARAMETERS MEMORY + PRESETS

PRESET ARCHITECTURE: RECODER has 234 PRESET SLOTS (A1-Z9), arranged across 26 letter BANKS (A-Z), with 9 numeric SLOTS each (1-9). Each PRESET is a complete snapshot, storing the recorded PHRASE at full fidelity together with 12 parameter values across the WHITE, YELLOW & RED LAYERS + RESOLUTION & PLAY MODE settings.

Any recorded PHRASE is stored as part of the PRESET, and you can SAVE multiple variations of the same recording with different parameter settings - each becoming its own distinct PRESET.

SAVING & LOADING PRESETS: PRESS SAVE + LOAD simultaneously to enter MEMORY Mode - indicated by the DISPLAY and blinking encoders. Use the LEFT encoder to navigate to a SAVE slot, or the RIGHT encoders to select a PRESET slot to LOAD.

When navigating PRESET SLOTS: upper encoder selects the letter (A-Z); lower encoder selects the number (1-9). Press SAVE again to confirm saving, or PRESS LOAD to confirm loading. Only filled PRESET SLOTS can be loaded!

Slot overwrite Warning: When attempting to SAVE over an already populated SLOT - the RECODER will show an OVERWRITE Warning on the DISPLAY. Tap the SAVE button a second time to confirm & overwrite on the chosen SLOT.

CLEARING VALUES: Hold the CLEAR VAL button and touch individual ENCODERS to instantly reset their value to zero. Use the LAYERS toggle to navigate between the three layers.

QUICK Wipe ALL VALUES: Hold the CLEAR VAL button and press the ENGAGE footswitch. This will reset all PARAMETERS VALUES in all pages to zero.

STEP ADVANCE MODE: CLEAR STEPS: Hold the CLEAR VAL button and press the REC Footswitch to remove all manually entered STEPS and restore the automatically generated STEPS.

RELOADING PRESET VALUES: Hold the PRESET VAL button and touch any encoder to RESTORE that parameter back to the value of the LOADED PRESET. No action if no PRESET is loaded & active.

LOAD ALL PRESET VALUES: Hold the PRESET VAL button and press the ENGAGE footswitch. This will RESET all PARAMETERS in all pages to the saved PRESET VALUES - without loading the saved PHRASES.

RECODER does NOT auto-save PHRASES: Unsaved PHRASES are permanently lost when you POWER OFF the unit, or if you LOAD a new PRESET without saving first!

FILES ARE NOT USB-ACCESSIBLE: Currently the RECODER does not support access to the internal memory; USB-C port is for FW updates & MIDI only

TECHNICAL SPECIFICATIONS

| PARAMETER | VALUE |
|---------------------|--|
| ENGINE | Spectral processing engine Maximum frequency bins RESOLUTION positions Max INPUT latency |
| AUDIO | Signal path Bypass type Built-in microphone |
| MEMORY | Total internal storage Preset slots Maximum PHRASE length Recording fidelity PHRASE storage quality File access via USB |
| CONNECTIVITY | Instrument input Main Output REC Input REC Output MIDI In USB-C Power |

| AMPLITUDE | TIMBRE | ENVELOPE | SENSITIVITY | SLICES | RESONANCE | REPEATS | DISTANCE | REVERSE REGENERATION | FORWARD REGENERATION | REPEATS | REVERSE CLOUDS | STRETCH | RETIME | LOAD PRESET |
|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|---------|----------------|---------|--------|-------------|
| CC01(MSB), CC02(LSB) | CC01(MSB), CC04(LSB) | CC02(MSB), CC04(LSB) | CC03(MSB), CC04(LSB) | CC04(MSB), CC04(LSB) | CC05(MSB), CC07(LSB) | CC06(MSB), CC04(LSB) | CC07(MSB), CC09(LSB) | CC07 | CC08 | CC08 | CC07 | CC07 | CC07 | PC 82 |
| CC06 | CC65 | CC66 | CC67 | CC68 | CC69 | CC70 | CC71 | CC72 | CC73 | CC74 | CC75 | CC76 | CC77 | PC 83 |
| CC67 | CC68 | CC69 | CC70 | CC71 | CC72 | CC73 | CC74 | CC75 | CC76 | CC77 | CC78 | CC79 | CC80 | PC 84 |
| CC68 | CC69 | CC70 | CC71 | CC72 | CC73 | CC74 | CC75 | CC76 | CC77 | CC78 | CC79 | CC80 | CC81 | PC 85 |
| CC69 | CC70 | CC71 | CC72 | CC73 | CC74 | CC75 | CC76 | CC77 | CC78 | CC79 | CC80 | CC81 | CC82 | PC 86 |
| CC70 | CC71 | CC72 | CC73 | CC74 | CC75 | CC76 | CC77 | CC78 | CC79 | CC80 | CC81 | CC82 | CC83 | PC 87 |
| CC71 | CC72 | CC73 | CC74 | CC75 | CC76 | CC77 | CC78 | CC79 | CC80 | CC81 | CC82 | CC83 | CC84 | PC 88 |
| CC72 | CC73 | CC74 | CC75 | CC76 | CC77 | CC78 | CC79 | CC80 | CC81 | CC82 | CC83 | CC84 | CC85 | PC 89 |
| CC73 | CC74 | CC75 | CC76 | CC77 | CC78 | CC79 | CC80 | CC81 | CC82 | CC83 | CC84 | CC85 | CC86 | PC 90 |
| CC74 | CC75 | CC76 | CC77 | CC78 | CC79 | CC80 | CC81 | CC82 | CC83 | CC84 | CC85 | CC86 | CC87 | PC 91 |
| CC75 | CC76 | CC77 | CC78 | CC79 | CC80 | CC81 | CC82 | CC83 | CC84 | CC85 | CC86 | CC87 | CC88 | PC 92 |
| CC76 | CC77 | CC78 | CC79 | CC80 | CC81 | CC82 | CC8 | | | | | | | |