MULTITIMBRAL WAVETABLE SYNTHESIZER

Kosen

光線

光線 a beam of light

Kosen is an eight-part wavetable synthesizer in the spirit of the eighties' wavetable machines: glassy, metallic, dark, and stepped like the early converters.



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Kosen, from the first sound to the last setting.

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Eight parts, sixty-four tables, one screaming filter.

Welcome

Kosen is an eight-part wavetable synthesizer: glassy, metallic, dark, and stepped like the early converters. Each part plays its own sound on its own MIDI channel, so one instance can be a layered keyboard sound, a split, or a whole kit for a sequencer.

A wavetable is a row of 64 waves. Each oscillator reads one wave from its table, and the **Position** chooses which: sweep it, and the sound morphs from one wave to the next. Kosen has 64 factory tables in eight families, and eight more you build yourself. An oscillator plays its table Clean, smooth and free of aliasing, or Vintage, at four to sixteen bits, stepping from wave to wave with the grain of an early converter.

Two oscillators and noise go through a 24 dB resonant low-pass filter that sings by itself at high resonance, then an amp. Three envelopes, two LFOs and an eight-slot matrix move it all, and a multi-stage wave envelope walks the table in rhythms of its own. A part's notes can pass through its own chord generator and arpeggiator first. The eight parts share a chorus, a delay and a reverb, and each can have an output of its own.

The whole instrument at once, its eight parts and its effects, is a **multi**. Kosen ships with twelve multis and the 23 sounds they play, and opens on the first multi, Subterranean Chasm, the Denki Digital signature sound.

Five minutes with Kosen

1. Put Kosen on an instrument track, hold a low note and let it rise. Subterranean Chasm layers three parts on channel 1: the same machine hum left, centre and right, a few cents apart, opening slowly into a long reverb.
2. Click the arrows at the top of the program window to step through the multis, or click the multi's name for the list by kind.
3. Click a row in the **Parts** column to edit that part. The display shows its first oscillator's table as a landscape, with the wave playing now bright in front.
4. Turn the big **Position** knob and watch the bright wave travel through the table. On the Osc page, switch **Character** between Clean and Vintage, and in Vintage lower the **Bits**.
5. Turn **Cutoff** down and **Resonance** up. Past about 87 % the filter starts to sing on its own.
6. Click the second line of the program window, PART 1 and its sound's name, to load any of the 23 sounds into the part you are editing.

> TIP
>
> Every factory multi puts its parts on channel 1, for one keyboard. For a sequencer, give each part its own channel on the Part page: part 1 on channel 1, part 2 on channel 2 and so on, one MIDI track a part.

The panel



Kosen on Subterranean Chasm, editing part 1 on the Osc page.

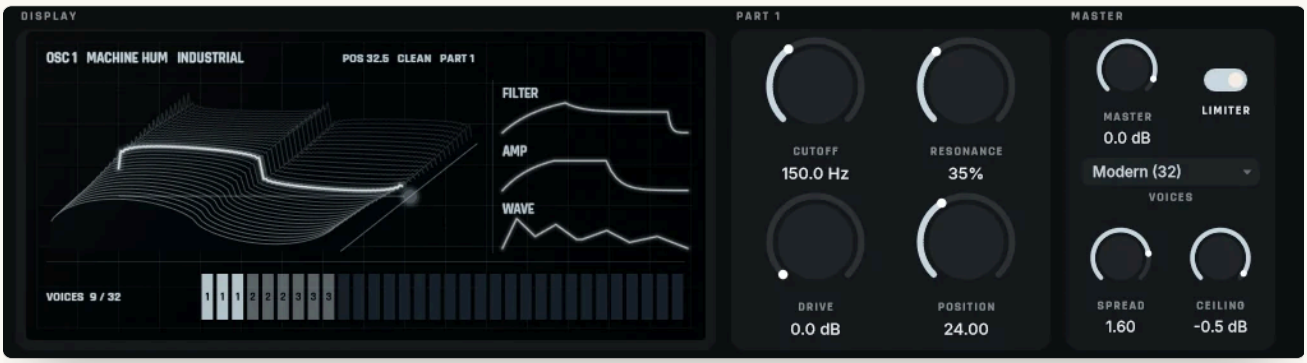
1	**Program window**	The top line names the multi or your preset, with arrows to step through them and, at the right, its kind and number (SHOWCASE 01/13). Click the name for the program menu. The second line names the part you are editing and its sound: click it to load a sound into that part. At its right, the voice mode and how many voices are sounding.
2	**Parts** Parts 1 to 8	A row for each part: its number, its MIDI channel (or OMNI), its first oscillator's table, a light for each voice it is sounding, and its **M** (mute) and **S** (solo) buttons. Click a row to edit that part.
3	**Display**	The edited part's table as a landscape, its three envelopes, and the voice pool. See The display, below.
4	**Part knobs** Cutoff, Resonance, Drive, Position	The four controls you reach for most, for the part being edited. Position is the first oscillator's.
5	**Master**	**Master** volume, the **Limiter**, the voice mode (**Voices**), stereo **Spread** and the limiter's **Ceiling**. These are for the whole instrument.
6	**Tabs** Twelve pages	Osc, Osc Mod, Filter / Amp, Envelopes, Wave Env, LFOs, Matrix, Arp, Part, FX, Tables and Tuning.

7 **Page**	The page chosen by the tabs, for the part being edited. FX, Tables and Tuning are shared by all parts.
8 **Keys** Five octaves and a top C	Play the part being edited, on its MIDI channel (an Omni part on channel 1). The arrows at each end move the keys an octave; where they sit is kept with the project.
9 **Keys glyph**	Hides or shows the keys.
10 **Key and size**	The licence key, and below it the window size.

Handling the controls

Drag a knob up or down to turn it; hold Shift for fine steps. The mouse wheel steps it, and a double-click returns it to its default. A box with a small arrow is a list: click it for every choice, or drag up and down or use the wheel to step through them. Click a switch to turn it on or off; its light shows when it is on. The matrix's amounts are bars: drag across them, Shift for fine, and double-click for zero. Every value is shown under its control.

The display



The display, the part knobs and the master section, with a bass note just struck: the waves its attack has swept are lit in the landscape.

The display follows the part you are editing. Its left side draws the oscillator's table as a landscape, its 64 waves from back to front, and the wave playing now bright in front of it, with a marker on the rail where it stands. The position shown is the one the part's newest voice is reading, modulation and all; with nothing sounding, it is the Position control's. The waves a voice has swept across light up in the landscape for a moment, so even a fast sweep shows. Vintage waves are drawn as the stairs they are, at their bits; clean ones are smooth.

The title names the oscillator, its table and the table's family. Click it to see the other oscillator. To its right, POS is the position, then the character (CLEAN, or the bits and LINE), then the part.

Beside the landscape, the part's FILTER, AMP and WAVE envelopes are drawn as their controls set them. Below, the voice pool has a cell for each voice, lit with the number of the part playing it. In Vintage mode, the 24 voices beyond the first eight are shuttered.

The part knobs

Cutoff 20 Hz to 20 kHz	The filter's cutoff. Default 8 kHz.
Resonance 0 to 100 %	The filter's resonance. It thins the bass as it rises, and past about 87 % the filter oscillates on its own, at the cutoff.
Drive 0 to 36 dB	How hard the drive stage in front of the filter is pushed. It does nothing while **Drive Type**, on the Filter / Amp page, is Off.
Position 0 to 63	Oscillator 1's place in its table, from the first wave to the last.

The master section

Master −60 dB to +6 dB	The volume of the whole instrument, on every output.
Limiter On or off	A limiter on the main output that never lets it pass the ceiling. It looks 1.5 ms ahead, so it meets each peak as it arrives. On as Kosen starts.
Voices Vintage (8), Modern (32)	The voice pool all eight parts share: eight voices, as the old machines had, or up to 32. Kosen starts in Modern.
Spread 0 to 2	Stereo width: 0 is mono, 1 as it is, 2 twice as wide.
Ceiling −12 dB to 0 dB	The level the limiter holds the main output under. Default −0.5 dB.

Parts and multis

Kosen is eight synthesizers in one, sharing one pool of voices and one set of effects. Each part has a sound, what it plays, and its own performance settings: how it is played.

Channels, splits and layers

Each part listens on one MIDI channel, or on all of them (Omni). Part 1 starts on channel 1, part 2 on channel 2, and so on. Parts on the same channel play together: that is a layer. Give them key ranges that meet, and it is a split. Give them velocity windows that meet, and a soft note plays one part and a hard one another. The Part page sets all of this; see The Part page, below.

To build a layer, put two parts on one channel, load a sound into each, and pan them apart. To build a kit for a sequencer, leave each part on its own channel, and give each MIDI track in your host the channel of the part it should play.

Editing a part

Click a part's row in the Parts column. Its number lights, the display shows its tables, and the knobs and every page except FX, Tables and Tuning now work on it. **M** mutes a part; **S** solos it, and with any part soloed only soloed parts play. A muted part, or one left out of a solo, takes no new notes, and what it was playing fades out.

Sounds and multis

The program window's top line holds the multi: the whole instrument, every part's sound and settings and the effects. Its second line loads one sound into the part you are editing, from a menu of the 64 factory sounds by category: Bass, Lead, Stab, Arp, Pad, Keys, Pluck and Texture. Loading a sound changes what the part plays and leaves how it is played (its channel, ranges, volume and output) as it was.

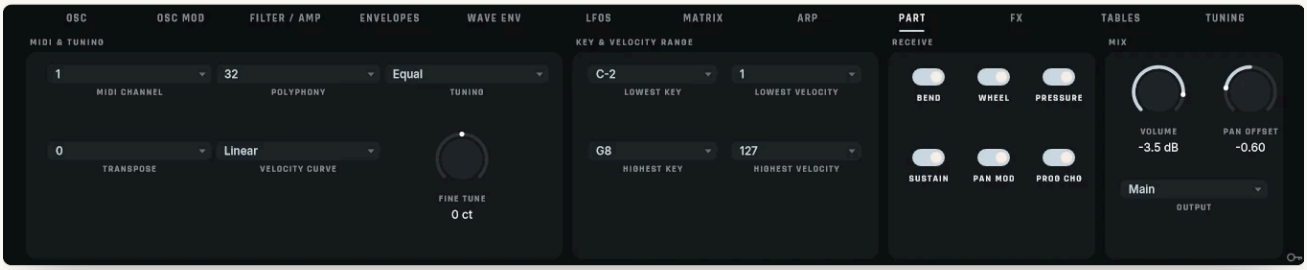
When a part is given a new sound or multi, it lets go of what it was playing: its voices fade out over 3 ms, and its held keys, chords and arpeggiator start afresh, so no note is left hanging.

The voice pool

The parts share one pool of voices: 8 in Vintage mode, 32 in Modern. Each takes voices as its notes need them, up to its own **Polyphony**. When a part reaches its polyphony, or the pool is full, a voice is given up, a released one first, then the oldest, and fades out over 3 ms before the new note starts on it, so nothing clicks. A key played again while it still sounds plays on its own voice again.

> VOICES
>
> In Vintage mode, eight voices between eight parts go quickly, as they did on the old machines. Give a bass part a polyphony of 1 and a pad 4, and the pad's chords will never steal the bass's note.

The Part page



The Part page.

MIDI Channel
Omni, 1 to 16

The channel the part listens on. Part n starts on channel n.

Polyphony
1 to 32

The most voices the part may use at once. Default 32.

Tuning
Equal, Random 1, Random 2, Inverted, Table 1 to 4

Random 1 detunes each note by up to 6 cents either way, at random; Random 2 by up to 18. Inverted turns the keyboard upside down about middle C: play up, and the part plays down. Table 1 to Table 4 play through a tuning table (see Tables and tunings).

Transpose
−24 to +24 semitones

Moves the part's notes.

Velocity Curve
Linear, Soft, Hard, Fixed, Inverted, Fade In, Fade Out, Table 1 to 4

How the velocity you play becomes the velocity the part hears. Soft makes gentle playing louder, Hard asks for more. Fixed plays every note at 80 %. Inverted makes soft notes loud. Fade In and Fade Out are a pair for crossfading two parts by velocity: one fades in as the other fades out, and together they follow your playing. Table 1 to Table 4 use a velocity table.

Fine Tune
−100 to +100 cents

Tunes the part.

Lowest Key, Highest Key
C-2 to G8

The keys the part answers, for splits. Kosen names the keys as Ableton Live does: C3 is middle C.

Lowest Velocity, Highest Velocity
1 to 127

The velocity window. Notes softer or harder than it pass the part by, before its arpeggiator. The window reads the velocity as you played it, before the curve.

Receive
Bend, Wheel, Pressure, Sustain, Pan Mod, Prog Chg

Which MIDI the part takes: pitch bend, the mod wheel, channel pressure, the sustain pedal and program changes. **Pan Mod** lets the sound's matrix move its pan. All on as Kosen starts.

Volume
−60 dB to +6 dB

The part's level in the mix.

Pan Offset Left to right	Moves the part's sound left or right, on top of its own pan.
Output Main, Out 2 to Out 8	The stereo output the part plays through. See Outputs in Effects, MIDI and the host.

The key range and velocity window read each note as it arrives, before the part's transpose, tuning and arpeggiator. A part's Tuning, Transpose and Fine Tune change the pitch it plays; its key range, key tracking and keyboard-following modulation still follow the key you pressed.

The arpeggiator and chords



The Arp page: the part's own arpeggiator and chord generator.

Every part has its own arpeggiator, and before it a chord generator. A part's keys go through the chords, then the arpeggiator, then to its voices, each in time with your host.

The **Preset** box loads one of the arpeggiator's presets, listed by category: a pattern with its settings. It sets everything on the page except the chord key. Each part keeps its own.

THE ARPEGGIATOR

Arp On or off	Turns the part's arpeggiator on.
Mode Up, Down, Up-Down, Played, Random, Chord, Converge, Thumb, Walk	The order the held notes play in. Played keeps the order you pressed them; Chord plays them all at once; Converge plays from the outside in; Thumb returns to the lowest note between each of the others; Walk takes a random step up or down the list each time.
Rate 1/4 to 1/32	The length of a step: 1/4, 1/8., 1/8, 1/8T, 1/16, 1/16T or 1/32.
Octaves 1 to 4	How many octaves the pattern climbs through.
Swing 50 to 75 %	Pushes every second step late.

Chance 0 to 100 %	Each step plays only with this chance, otherwise it rests. The pattern's first step always plays, to hold the groove to the bar.
Loose 0 to 100 %	Lets every hit fall a little late and a little softer, at random.
Hold On or off	Keeps the pattern going after you let go, until you play again.

THE PATTERN

Sixteen steps. Each has a velocity bar (drag across the bars to draw; a click at the very bottom, or a right-click, rests the step); a NOTE (Auto, the mode's next note, or chord tone 1 to 8 of the held notes, in pitch order: click to step up, right-click down); an OCT shift of up to two octaves either way; a GATE (click to cycle Short, Half, Long and Tie, which holds the note into the next step); and an RPT, a ratchet of one to four hits in the step. Click a step's number to set the pattern's length. The step playing lights.

While your host plays, the steps sit on its grid. Stopped, the pattern runs at the host's tempo from the first key you press; in the standalone application, at 120 BPM.

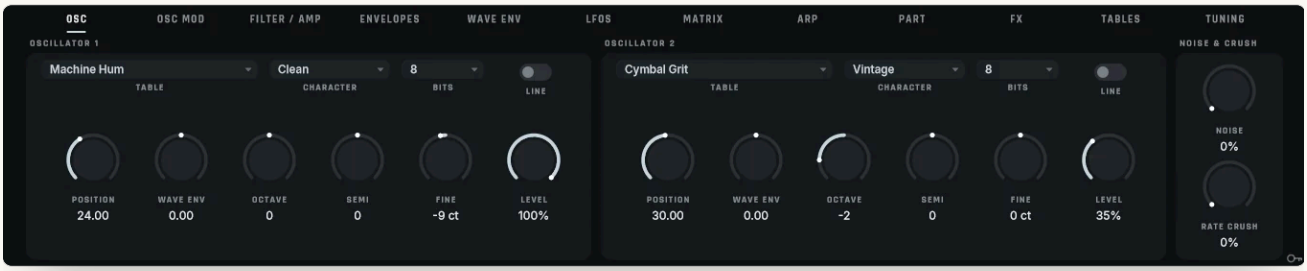
CHORDS

Chord Off, Chord, Scale	Chord plays one chord type on every key. Scale plays the chord that belongs to the key in a chosen key and scale: in C major, D plays D minor and G plays G major. A key outside the scale plays the chord of the degree below it.
Type 20 chord types	In Chord mode: Major, Minor, Sus2, Sus4, Maj7, Min7, Dom7, Maj9, Min9, Add9, Power, Dim, Aug, Min11, 6/9, Quartal, Maj7#11, 7sus4, Min Add9, Cluster.
Size Triad, Seventh, Ninth	In Scale mode, in place of Type: how far each chord is stacked.
Key, Scale C to B; 18 scales	In Scale mode: the major and minor scales and the church modes, the pentatonics, blues, whole tone, Hirajoshi, In Sen and others. On a five-note scale the chords come out in fourths and fifths.
Voicing Close, Open, Wide	Open raises every second note an octave; Wide adds the root an octave below.
Inv 0 to 3	Lifts the chord's lowest notes an octave.

Oscillators, filter and amp

Two oscillators, each reading one wave at a time from a table of 64. Where it reads, and how that moves, is most of Kosen's sound.

The Osc page



The Osc page: both oscillators, the noise and the rate crush.

Table 64 factory tables, User 1 to 8	The oscillator's wavetable, from a menu of the eight families. Your own tables, from the Table Builder, are at the end.
Character Clean, Vintage	Clean plays the waves band-limited and smooth, blending continuously between them as the position moves. Vintage plays each wave as 128 samples, steps from whole wave to whole wave, and lets the stairs, the zipper of a sweep and the aliasing of high notes through, as the early converters did. Default Vintage.
Bits 4 to 16	In Vintage, the depth each sample is kept at. 8 is as the waves are stored; lower is rougher. Clean ignores it.
Line On or off	In Vintage, joins each sample to the next with a straight line instead of a step: smoother, still with the vintage grain.
Position 0 to 63	Which wave of the table plays. Modulation moves it from here.
Wave Env −1.00 to +1.00	How far the wave envelope moves the position. At +1 the envelope sweeps the whole table forwards; negative values sweep it backwards.
Octave −3 to +3	The oscillator's octave.
Semi −12 to +12	Semitones.

Fine −100 to +100 cents	Fine tuning. A few cents between the two oscillators thickens the sound.
Level 0 to 100 %	The oscillator's level. Oscillator 1 starts at 100 %, oscillator 2 at 0.
Noise 0 to 100 %	White noise, mixed with the oscillators before the filter.
Rate Crush 0 to 100 %	Lowers the sample rate of the oscillators and noise before the filter, from the full rate down to about 375 Hz: the grit of a slow converter, then the crunch of a broken one.

Every table is levelled as it is built, so a sparse table such as Piston plays at much the same volume as a full one such as Square Bass. A table with a spiky wave still sounds a little quieter: trim it with the oscillator's Level.

The position is the sum of everything that moves it: the Position control, the wave envelope (with its velocity depth), the wave keytrack and the matrix. It stops at the first and last waves.

The tables

Each table is a few key waves, written by hand, with the waves between them blended, so sweeping the position morphs one key wave into the next. The waves are Kosen's own, made from spectra and drawn shapes.

FAMILY	TABLES
CLASSIC	Resonance Sweep, Sync Sweep, Pulse Width, Organ Stops, Saw to Square, Filter Sweep, Twin Resonance, Wah Sweep
VOICES	Vowel Robot, Male Choir, Soprano Vowels, Talking Bass, Overtone Drone, Glottal Pulse, Vocoder Choir, Robot Speech
BELLS	Bell Tines, Glass Harmonics, Chimes, Celesta, Crystal, Tubular, Gamelan, Music Box
METALLIC	Metal Comb, Anvil, Steel Plate, Gong Sweep, Rusty Wire, Spring Clang, Cymbal Grit, Iron Organ
DIGITAL	Stepped Sine, Crushed Saw, Decimated, Walsh, Fold Sweep, Bit Patterns, Random Steps, Phase Distort
INDUSTRIAL	Machine Hum, Grinder, Turbine, Piston, Rust Drone, Factory Noise, Hydraulic, Motor Whine
GLASS	Glass Pad, Air Choir, Shimmer, Soft Strings, Warm Hollow, Sine Stack, Ethereal, Cloud

FAMILY	TABLES
SYNTHETIC	Sub Bass, Reso Bass, FM Bass, FM Bells, FM Keys, Pluck, Square Bass, Formant Bass

Where a table uses chance, as the metal, noise and random tables do, it is built from a fixed seed, so it is the same on every computer.

The Osc Mod page



The Osc Mod page: each oscillator's wave and pitch extras, and the controllers W to Z.

Bend Range Sound, 0 to 24 semitones	The oscillator's own pitch-bend range. Sound uses the sound's Bend Range, on the Filter / Amp page. Give one oscillator 0 and only the other bends.
Fixed Pitch On or off	The oscillator plays middle C whatever key you press (its octave, semitone and fine still apply): for a struck sound that stays put under a melody.
Free Phase On or off	Each note from silence starts the oscillator's cycle somewhere new, at random. Start Phase dims while it is on.
Env Velocity −1.00 to +1.00	Adds to Wave Env by how hard you play: hard notes throw the envelope further through the table. Together with Wave Env it is never more than full.
Wave Keytrack −1.00 to +1.00	Moves the position with the key, about middle C. At +1, each semitone up is one wave further; negative values go the other way.
Start Phase 0 to 100 %	Where in its cycle the oscillator starts a note from silence. A note played while the voice still sounds keeps its phase, so it never clicks.
Control W, X, Y, Z MIDI controllers 0 to 120	The four controllers the matrix's Control W to Control Z sources follow, for every part. Defaults 16, 17, 18 and 19.

> TIP
>
> Two oscillators on the same table and position, with Start Phase half a cycle apart, cancel some harmonics and keep others: a new wave neither has alone. Phase Pluck is built that way.

The Filter / Amp page



The Filter / Amp page.

A 24 dB-an-octave resonant low-pass, with a drive in front of it. Cutoff and Resonance are the big knobs in the Part section; the rest is here.

The filter runs at twice the sample rate, so neither its drive nor its resonance folds harmonics back into the sound. As the resonance rises the low end thins, as it does in a real ladder filter; at full resonance the bass sits about 6 dB down. Past about 87 % it oscillates by itself at the cutoff, steady, clipping harder on one side: a scream with even harmonics in it.

FILTER

Drive Type Off, Soft, Hard, Diode	The drive stage's character: Soft rounds the peaks, Hard clips them, Diode clips one side harder than the other. Off bypasses it.
Drive 0 to 36 dB	How hard the drive is pushed (the same control as the big Drive knob). It is levelled, so full drive is not much louder than none.
Key Track 0 to 100 %	How far the cutoff follows the keys, about middle C. At 100 % it moves an octave for every octave you play.
Env Amount −1.00 to +1.00	How far the filter envelope moves the cutoff: at +1, up to eight octaves up; negative values move it down.
Velocity 0 to 100 %	Lowers the cutoff for softer notes: at 100 %, by up to four octaves. A hard note plays at the cutoff you set.

AMP

Level 0 to 100 %	The sound's level. Default 80 %.
Velocity 0 to 100 %	How much quieter soft notes are. At 0 every note is equally loud; at 100 % the level follows your playing all the way. Default 50 %.
Pan Left to right	The sound's place in the stereo field.

Gain −24 dB to +24 dB	A trim on the sound's level. The factory sounds use it to sit at a common loudness.
Delay Send 0 to 100 %	How much of the sound goes to the shared delay.
Reverb Send 0 to 100 %	How much goes to the shared reverb.

VOICE

Mono On or off	One note at a time, played legato: a new key while another is held glides from it, and letting go returns to a key still held.
Bend Range 0 to 24 semitones	How far pitch bend moves the sound. Default 2. Each oscillator can have its own, on the Osc Mod page.
Glide 0 to 5 s	How long the pitch takes to slide to a new note. It works for polyphonic sounds too, from the part's last note.

The sustain pedal holds notes you let go of, for parts that take it.

Envelopes, LFOs and the matrix

Each voice has three envelopes: one for the filter, one for the amp, and one that moves through the wavetable. The third can also be a multi-stage envelope, with loops.

The Envelopes page



The Envelopes page: each envelope drawn above its controls.

Attack 0.5 ms to 20 s	The rise from where the envelope stands to the top. It is fast at first and slows towards the top, as an analogue envelope does, and reaches it in the time set.
Decay 0.5 ms to 20 s	The fall to the sustain level; it is within 1 % of it in the time set.
Sustain 0 to 100 %	The level held while the key is down.
Release 0.5 ms to 20 s	The fall once the key is let go: 60 dB down in the time set.

The **Filter Envelope** moves the cutoff by the filter's Env Amount. The **Amp Envelope** shapes every note's level. The **Wave Envelope** moves each oscillator's position by its Wave Env amount, while the Wave Env page's mode is ADSR. All three can also be sources in the matrix. A note played again while its envelope is still moving starts from where it is, so it never steps.

The Wave Env page



The Wave Env page, in Multi-Stage, looping between its third and fourth levels while the key is held.

In Multi-Stage mode, the wave envelope is eight segments, each a straight line from where the envelope stands to its level in its time. The **Key Off** point divides them: the segments up to it play while the key is held, the rest once it is let go, at once, from wherever the envelope is. With the **Loop** on:

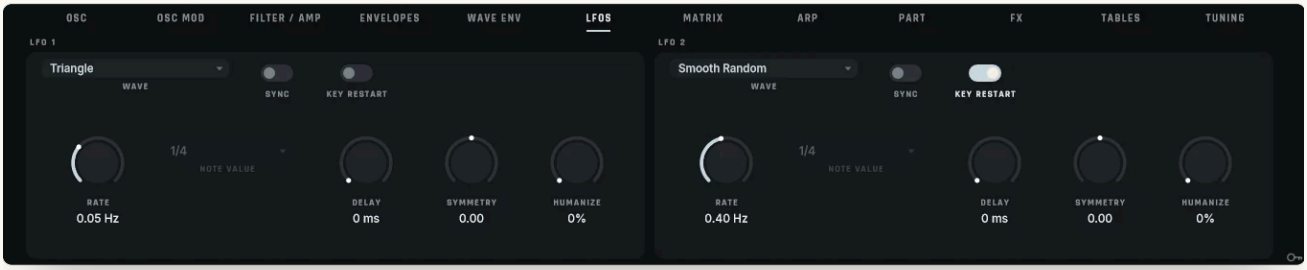
LOOP START BEFORE KEY OFF	Once the key-off level is reached, the envelope goes back to the loop start's segment, round and round while the key is held. The graph marks it LOOP WHILE HELD.
LOOP START AT KEY OFF	No loop: it holds the key-off level while the key is held.
LOOP START AFTER KEY OFF	The release loops, from the segment after the key-off point to the loop start's, round and round. The graph marks it RELEASE LOOP.

Without the loop, it holds the key-off level while the key is held, and after the last segment stays at its level. Since the envelope moves the position, a loop is a rhythm made of waves: Step Scanner plays a four-wave sequence with it, and Echo Scan loops its release into an echo.

Mode ADSR, Multi-Stage	ADSR uses the Envelopes page's Wave Envelope. The graph dims, and reads ADSR IN USE.
Key Off 1 to 8	The last segment played while the key is held. Default 4.
Loop Start 1 to 8	The first segment of the loop. Default 3.
Loop On or off	Turns the loop on.
Time 1 to 8 0.5 ms to 20 s	Each segment's length.
Level 1 to 8 0 to 100 %	The level each segment ends at.

The graph draws the envelope as it will run: the held segments bright, the released ones dimmer, the key-off point marked, and the loop's arc when it loops. The matrix's Wave Env Time and Wave Env Level scale its times and levels as it runs, so breath or a controller can speed a loop up.

The LFOs page

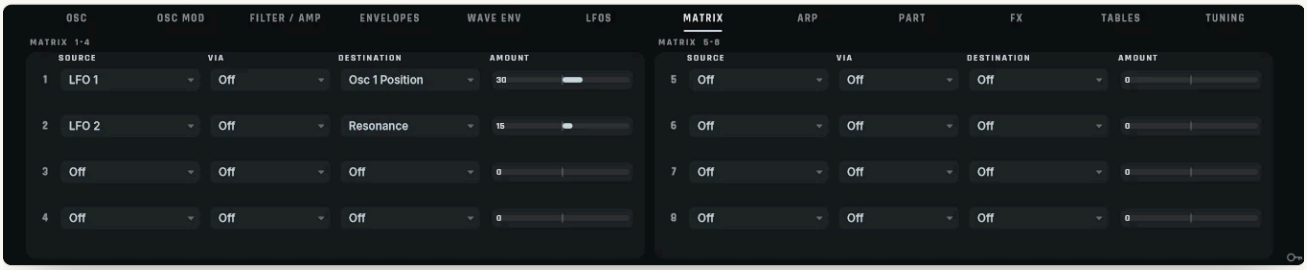


The LFOs page.

Each voice has two LFOs. They do nothing until the matrix sends them somewhere; the first slot of the matrix starts as LFO 1 on pitch, brought in by the mod wheel: vibrato.

Wave Triangle, Saw Up, Saw Down, Pulse, Sample & Hold, Smooth Random	The LFO's shape. Sample & Hold jumps to a new random level each cycle; Smooth Random glides between them.
Sync On or off	On, the LFO runs at a note value of your host's tempo, and follows its position while it plays. Off, at the Rate in hertz. The control not in use dims.
Key Restart On or off	On, each note starts the LFO from the beginning of its cycle. Off, the part's LFO runs on, and every note joins it where it is. On as Kosen starts.
Rate 0.01 Hz to 50 Hz	The speed, when not synced. LFO 1 starts at 5 Hz, LFO 2 at 0.5 Hz.
Note Value 8 Bars to 1/64	The cycle's length, when synced: bars, dotted and triplet values. Default 1/4.
Delay 0 to 10 s	Fades the LFO in over this time from the start of each note: vibrato that arrives as a note is held.
Symmetry −1.00 to +1.00	Moves the middle of the cycle earlier or later: a triangle leans towards a saw, a pulse grows narrower or wider.
Humanize 0 to 100 %	Varies the rate at random, cycle by cycle, by up to half as much again either way, so the movement never quite repeats.

The Matrix page



The Matrix page: Chasm, LFO 1 slowly moving oscillator 1's position and LFO 2 wandering the resonance.

Eight slots. In each, a **Source** moves a **Destination** by the **Amount**, from −100 to +100. A **Via** source scales it on the way: LFO 1 via Mod Wheel is vibrato that comes in as you push the wheel. With Via at Off, the source goes through as it is. Slots with the same destination add together.

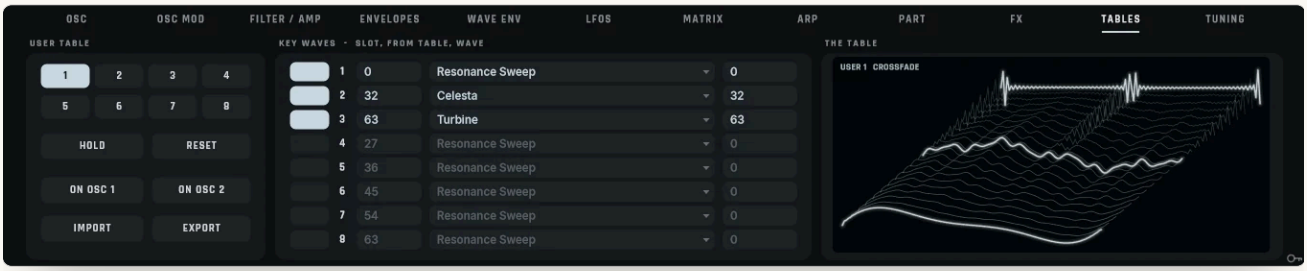
SOURCE	WHAT IT IS
VELOCITY, RELEASE VELOCITY	How hard the key went down; how fast it came up
KEY	The note, from −1 five octaves below middle C to +1 five above
MOD WHEEL, AFTERTOUCH, PITCH BEND, BREATH	The wheel, channel pressure, the bend (either way), and breath (controller 2)
FILTER ENV, AMP ENV, WAVE ENV	The envelopes (Wave Env as the Wave Env page sets it)
LFO 1, LFO 2	The LFOs, either side of zero
RANDOM	A new random value for each note, either side of zero
CONSTANT	Always full: the amount alone
CONTROL W TO Z	The four controllers set on the Osc Mod page
SUSTAIN	The sustain pedal, off or on

DESTINATION	AT AN AMOUNT OF 100, WITH THE SOURCE FULL
PITCH, OSC 1 PITCH, OSC 2 PITCH	Up to 24 semitones either way
POSITION, OSC 1 POSITION, OSC 2 POSITION	Up to the whole table, 63 waves, either way
OSC 1 LEVEL, OSC 2 LEVEL, AMP	From silence to twice the level
NOISE	Adds noise, up to full
CUTOFF	Up to 6 octaves either way
RESONANCE	Up to the full range either way
DRIVE	Up to 36 dB either way (with a Drive Type chosen)
PAN	Fully left to fully right, if the part's Pan Mod is on
LFO 1 RATE, LFO 2 RATE	Up to 16 times faster or slower
WAVE ENV TIME, AMP ATTACK, AMP RELEASE, FILTER ENV TIME	Up to 16 times longer (+100) or shorter (−100)
WAVE ENV LEVEL	Up to twice as high, or down to nothing

> TIP
>
> The default vibrato is LFO 1 at 5 Hz, via the mod wheel, to Pitch at an amount of 2: about half a semitone with the wheel all the way up. Change the amount to change its depth.

Tables and tunings

The Table Builder



The Tables page: a user table of three key waves, crossfaded.

Eight tables of your own, built from any waves of the factory tables, or imported from a wavetable file. They are the instance's own and are kept with your project, and with your presets.

1. **Choose a table** with the buttons 1 to 8.
2. **Give it key waves.** Each row is one: light its button to use it, then set its slot in the new table (0 to 63), the factory table to take it from, and which wave of that table (0 to 63). Drag a box up or down, or use the wheel; click the table's name for a menu. Up to eight keys.
3. **Choose how they join.** With **Hold** off, the waves between two keys crossfade from one to the next, as the factory tables do. With it on, each key holds until the next, and the change comes in one wave.
4. **Play it. On Osc 1** or **On Osc 2** puts the table on the part you are editing (On Osc 2 brings oscillator 2's level up to 80 % if it was silent). Or choose User 1 to User 8 at the end of any oscillator's table menu.

The table rebuilds a moment after each change settles, and a note already sounding takes the new table at once. The picture on the right draws its 64 waves as Vintage plays them, the keys lit, with HOLD or CROSSFADE beside its name. **Reset** returns the table to the one it started as: three keys from three families. A table needs one key at least, and two keys in one slot keep the lower row's.

Importing and exporting wavetables

Import fills the chosen table from a wavetable file instead: a WAV, AIFF or FLAC of single-cycle waves end to end, 2048 samples each as most wavetable synths write them, or a single cycle of any length. Click **Import**, or drop the file on the page, and it goes straight onto oscillator 1 of the part you're editing, ready to play: turn **Position** to move through it. (**On Osc 2** puts it on oscillator 2 as well.) Kosen takes up to 64 of its waves, evenly from the first to the last, spreads them along the table's 64 slots and blends between them. Clean and Vintage both play it, and **Hold** holds each wave until the next. Each wave keeps its first 511 harmonics, as the factory tables do.

The middle of the page names the file in place of the key rows, and so does the picture. An imported table is kept with your project and inside your presets, so it travels with them to another computer. **Reset** goes back to key waves.

Export saves the chosen table, imported or built, as a WAV of 64 waves of 2048 samples, as Kosen's Clean mode plays it, for other wavetable synths to load. Both start in `Documents/Denki Digital/Kosen/Wavetables`.

Tuning tables



The Tuning page: tuning tables on the left, velocity tables on the right.

Four tuning tables, each giving every key the pitch it plays. A part plays through one when its **Tuning**, on the Part page, is Table 1 to Table 4; its transpose and fine tune still apply on top. Choose the table with its button, then fill it:

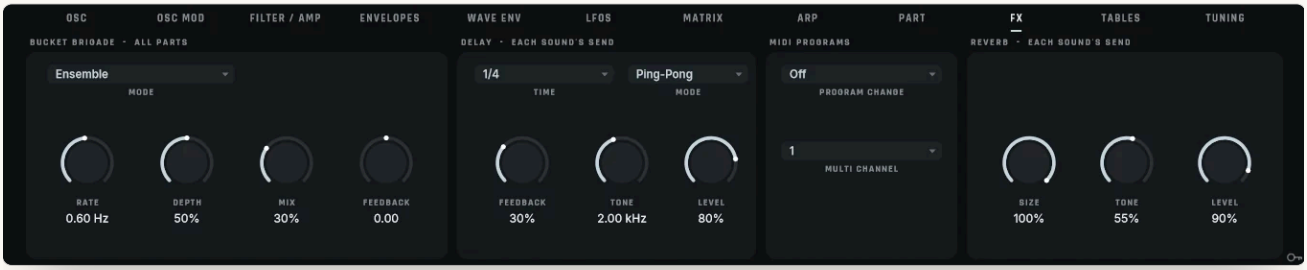
Temperament and Root, Apply	Sets the table from a temperament on a root. Just (5-limit), Pythagorean, Quarter-Comma Meantone, Werckmeister III and Kirnberger III tune the twelve notes from the root, the root at its usual pitch, the same in every octave. Stretched Octaves makes each octave 3 cents wide. The equal divisions, Quarter Tones, 19 Equal, 31 Equal, 5 Equal, 7 Equal and Bohlen-Pierce (13 steps to a twelfth), give each key one step, with the root's key in the middle octave at its usual pitch. Equal resets the table.
Scala...	Loads a Scala scale file (`.scl`), its degrees in cents or ratios. The Root's key in the middle octave keeps its pitch, each key up or down is one degree, and the last degree is the octave (or whatever the scale repeats at).
Key, Plays, Fine	One key at a time: choose a Key, then the note it Plays and a Fine adjustment of up to 50 cents either way. A pitch beyond the note names is shown in semitones, and can't be changed here.
Graph C0 to C7	Every key's pitch against equal temperament, up to a semitone either way. Click a key to choose it.

Velocity tables

Four velocity tables, each turning the velocity you play into the velocity the part hears. A part uses one when its **Velocity Curve** is Table 1 to Table 4; its velocity window still reads the velocity as you played it. Choose a table, then choose a **Shape** and click **Apply**: Linear, Soft, Hard, S-Curve, Compress (50 to 110), Expand, Fixed 100, Two Steps (40 or 110) or Inverted. Or draw it: drag across the curve, velocity in along the bottom, out up the side.

The tuning and velocity tables are the instance's own, kept with your project. They are not host parameters, so they can't be automated; a preset carries the ones its parts use.

Effects, MIDI and the host



The FX page, shared by all parts.

After the eight parts are mixed, the main output passes a bucket-brigade chorus, then the delay and reverb returns, the stereo spread and the limiter. Each sound sends to the delay and reverb by its own amounts, on the Filter / Amp page; these controls set what comes back.

Bucket Brigade

Mode Off, Chorus, Ensemble, Flanger	Chorus: one delay a side, the sides moving in opposite directions, wide and moving. Ensemble: three delays a side and a faster shimmer on top, the string-machine sound. Flanger: a short delay swept further and fed back. The wet sound is softened and darkened a little, as a bucket brigade's was.
Rate 0.05 Hz to 10 Hz	The speed of the sweep.
Depth 0 to 100 %	How far it sweeps.
Mix 0 to 100 %	The balance of the effect against the dry sound.
Feedback −1.00 to +1.00	The flanger's resonance, either polarity.

Delay

Time 8 Bars to 1/64	The echo's time as a note value of your host's tempo, up to four seconds. A change of time glides, rather than clicking. Default 1/8.

Mode Stereo, Ping-Pong	Ping-Pong starts the echo on the left and bounces it across; Stereo repeats each side on itself.
Feedback 0 to 95 %	How much of each echo comes round again. The repeats darken and saturate softly as they go, so they never run away.
Tone 500 Hz to 16 kHz	The brightness of the repeats. The lowest frequencies are thinned too, so the echoes stay clear of the bass.
Level 0 to 100 %	The echoes' level.

MIDI Programs

Program Change and **Multi Channel** set what MIDI program changes do; see Program changes, below. A multi never changes them: they are yours.

Reverb

Size 0 to 100 %	The length of the tail, from 0.4 s to 10 s.
Tone 0 to 100 %	Dark to bright.
Level 0 to 100 %	The reverb's level.

Notes and controllers

Each note goes to every part that hears it: on its channel, in its key range and velocity window, not muted, and soloed if anything is. A note's release goes to the parts its note reached, even if one has moved to another channel since. Everything lands on the sample it arrives on.

MESSAGE	WHAT IT DOES
PITCH BEND	To the parts on its channel that receive bend, by each sound's (or oscillator's) bend range
MOD WHEEL (CC 1)	To the parts that receive the wheel: the matrix's Mod Wheel
BREATH (CC 2)	The matrix's Breath
SUSTAIN (CC 64)	Holds released notes, for parts that receive sustain; also the matrix's Sustain

MESSAGE	WHAT IT DOES
CHANNEL PRESSURE	To the parts that receive pressure: the matrix's Aftertouch
CC 16 TO 19	The matrix's Control W to Z, as set on the Osc Mod page
ALL NOTES OFF, ALL SOUND OFF	Every part on the channel, or still holding a key from it, lets go at once
RELEASE VELOCITY	The matrix's Release Velocity

Kosen takes no SysEx. Its arpeggiators and synced LFOs follow your host's tempo and position, and its delay follows the tempo.

Program changes

Program changes do nothing until you ask them to, on the FX page under MIDI Programs:

Off	Program changes are ignored. As Kosen starts.
Sounds	Program n loads factory sound n into every part on that channel whose **Prog Chg** is on (Part page).
Multis	Program n on the **Multi Channel** loads factory multi n; on other channels, nothing.
Both	The multi channel changes the multi; every other channel changes its parts' sounds.

The sound and multi menus show each one's number, PC 1 for the first. A number past the last sound or multi is ignored. A program change takes effect at the start of the block it arrives in, so a note sent with it, or just after, plays the new sound.

Outputs

Kosen has eight stereo outputs. The main pair carries the effects. Out 2 to Out 8 are off until your host switches them on; then a part whose **Output** names one plays through it, dry, to be mixed and processed in your host. A part's delay and reverb sends still feed the effects on the main pair, as a mixer's aux sends do, and the Master level applies to every output. A part sent to an output the host has not switched on plays through the main pair. The extra outputs are delayed to line up with the main pair to the sample.

How to switch on a plugin's extra outputs differs from host to host: in Ableton Live, for instance, each of Kosen's outputs can be chosen as the input of an audio track. Your host's manual has the details.

Automation

Every setting of every part is a host parameter, named for its part (P1 Cutoff, P3 MIDI Channel), as are the master section and each part's arpeggiator and chords. Map a controller to any of them in your host, or learn it on the panel (MIDI learn, below). The user, tuning and velocity tables are not: they are kept with the project instead. Kosen reports 102 samples of latency at 48 kHz, from the filter's oversampling and the limiter's look-ahead, and your host makes up for it.

Saved with the project

Your host saves everything: every part, the effects, the eight user tables, the tuning and velocity tables, each part's arpeggiator preset, the MIDI controllers learned, the window's size, whether the keys show, and the part and page you were on.

MIDI learn

The knobs, keys and menus on Kosen's panel can be moved by a knob or fader on your MIDI controller. Right-click it (Control-click on a Mac), choose Learn MIDI control, and move the hardware. While Kosen waits, a thin outline breathes round the control (on a knob, its value reads MOVE A CONTROL); once learned, the controller's number shows there for a moment.

Learn MIDI control	Waits for the next controller (CC) to arrive, on any channel. While it waits, the menu reads Waiting for a MIDI control… (click to stop).
Forget CC 74	Shown when the control has one: lets that controller go.
Knob	Shown when the control has one: what kind of knob it is, as learning found it (ticked). Choose another if it guessed wrong: Ordinary knob, or one of three kinds of Endless knob.
Use these for every new Kosen	Keeps the controllers learned now as the starting set for every Kosen you add from now on. Projects keep their own. Choose it with none learned to start new ones with none again.
Forget every MIDI control	Lets every learned controller go, on every control.

A controller moves one control, and a control answers one controller: learning a controller already in use moves it to the new control. Its whole travel, 0 to 127, sweeps the control's whole travel, as the mouse does; a switch turns on from the middle up, and a choice steps evenly through its choices. The moves reach your host as the mouse's do, so it writes them as automation and undo takes them back.

Controls never jump. An ordinary knob sends where it is, so when it and the control disagree (a project just opened, a new program, the mouse moved the control) the control waits until the knob reaches it, then follows; meanwhile its value reads TURN UP or TURN DOWN, with a steady outline round it. An endless knob, one that turns round and round, sends only a little up or a little down, so the control moves on from wherever it is. Learning tells the two apart from the first few turns, so turn the knob a little way after it is learned before you judge it.

The controllers learned are kept with the project; a project saved before Kosen had MIDI learn opens with none. A learned controller still reaches Kosen as before: learn the mod wheel (CC1) onto a knob and it turns the knob and goes on being the mod wheel. Notes, pitch bend, aftertouch, bank select and the like are never learned.

The starting set is a small file, `%APPDATA%\Denki Digital\Kosen\midi-map.json` on Windows and `~/Library/Application Support/Denki Digital/Kosen/midi-map.json` on a Mac.

A part's control (the four large knobs, and the pages but FX) learns that part's own setting: learn Cutoff while part 3 is edited and the controller moves part 3's Cutoff, whichever part you edit after. To play the same setting on two parts, learn it on each with a controller of its own. The master section, the FX page, Control W to Z and each part's M and S are the same whichever part is edited.

The Arp page's knobs, menus and switches learn too, each part's own like the rest; its step pattern does not. Nor do the Tables and Tuning pages, which are kept with the project rather than as host parameters.

> HOSTS
>
> The controller reaches Kosen only as notes do: in Logic Pro, on the track selected or armed; in Live, on a track armed or monitoring. A knob your host has kept for itself (Logic's Controller Assignments, Live's MIDI Map) stays your host's: free it there, or learn another.

Factory sounds and multis

Twelve multis, chosen by ear, and the 23 sounds they play. Subterranean Chasm, the Denki Digital signature sound, opens the bank; the rest are glass and iron, string machines, a sequence and a singing lead. Every multi puts its parts on channel 1, so each plays from one keyboard, and each has its own chorus, delay and reverb. The numbers are each one's program change.

Multis

1 Subterranean Chasm

Showcase. The Denki Digital signature sound: Chasm three times, left, centre and right, detuned, spread wide into the longest reverb. Hold a low chord.

2 Iron Lattice

Showcase. An iron-organ pad beside a folding table scanned slowly, two layers drifting apart in stereo, a quiet sub underneath. Hold chords.

3 Phase Ensemble

Showcase. A string machine: soft strings, with a filter-sweep table scanning slowly beside them so they phase, through a deep ensemble.

4 Sweep Horizon

Showcase. Two detuned saws through a resonant filter that opens over about three seconds and settles back, a glass table scanning the other way in each layer. Give it time.

5 Turbine Choir

Showcase. A vocoder choir over an airy table scanning slowly, a turbine hum underneath, vibrato arriving late. The wheel moves the choir through its table.

6 Cold Cathedral

Showcase. Choir and strings when you play softly; tubular bells and a gong sweep come in as you play harder, in a very large reverb.

7 Northern Signal

Showcase. A glassy, evolving pad, with random six-bit bleeps scattered over it like a far-off transmission. Hold a chord with your host running.

8 Hydraulic Breath

Showcase. A hydraulic table looping through its wave envelope with breath noise, a slow flanger, a motor hum below.

9 Rust and Rain

Showcase. A rusted drone, its table wandering, with music-box notes falling at random on the notes you hold. Hold a chord with your host running.

10 Matrix Run

Performance. Hold one key: a sixteen-step sequence of root, octave, fifth and third through a resonant filter, the cutoff swept over eight bars, a dotted-eighth echo, and a phasing string chord holding underneath.

11 Steel Harp

Performance. Hold one key: a minor ninth plucked up and down three octaves on steel and pluck tables, over a soft sine bed.

12 Distant Lead

Performance. A singing mono lead: a pulse-width table and a detuned saw, gliding between notes, vibrato after 0.6 of a second, a long echo. Play it legato.

13 Init

Every part a plain starting sound, on its own channel.

Sounds

Each part of the multis is a sound of its own, to load into any part from the program window's second line. Most move their tables; a few are a multi's supporting bed and hold still.

1 Deep Floor

Bass. A clean sub an octave down: Iron Lattice's floor.

2 Distant Lead

Lead. Distant Lead's singing mono line.

3 Signal Bleeps

Arp. Six-bit bit patterns jumping through their table, at random in sixteenths: Northern Signal's transmission.

4 Music Box Rain

Arp. Music-box notes falling at random on the held notes: Rust and Rain's rain.

5 Matrix Run

Arp. The sixteen-step sequence of root, octave, fifth and third, the cutoff swept over eight bars.

6 Steel Harp

Arp. A minor ninth plucked up and down three octaves on steel.

7 Iron Fold

Pad. Iron organ beside a folding table, looping through its wave envelope.

8 Iron Fold II

Pad. Its partner, set a little differently, for the other side.

9 Phase Strings

Pad. Soft strings and a slowly scanned filter-sweep table, phasing.

10 Phase Strings II

Pad. Its partner, scanning the other way.

11 Horizon Sweep

Pad. A saw through a resonant filter that opens over three seconds, glass scanning beside it.

12 Horizon Sweep II

Pad. Its partner, detuned the other way.

13 Vocoder Air

Pad. A vocoder choir over an airy scanned table, vibrato arriving late.

14 Choir Strings

Pad. Air choir and soft strings: Cold Cathedral's soft side.

15 Glass Ether

Pad. Ethereal and glass tables, scanning slowly.

16 Phase Chord

Pad. A phasing string chord from one key: Matrix Run's bed.

17 Sine Bed

Pad. A soft sine an octave down.

18 Tubular Gong

Keys. Tubular bells and a gong sweep, struck: Cold Cathedral's hard side.

19 Chasm

Texture. Machine Hum and Cymbal Grit an octave down, opening slowly: Subterranean Chasm's voice.

20 Turbine Hum

Texture. A turbine table an octave down, scanned very slowly.

21 Hydraulic Breath

Texture. A hydraulic table looping through its wave envelope, with breath noise.

22 Motor Floor

Texture. A motor whine an octave down, closed right down.

23 Rust Drone

Texture. A rusted ten-bit drone, its table wandering, with a little noise.

Ways to start

PADS	Iron Lattice, Phase Ensemble or Sweep Horizon: hold chords and give them time.

TEXTURES	Hydraulic Breath, Rust and Rain or Subterranean Chasm, held low.
TOUCH	Cold Cathedral: play softly for the choir, harder for the bells.
SEQUENCES	Matrix Run or Steel Harp: one key, your host running.
A MELODY	Distant Lead, legato, so it glides.
A SEQUENCER	Give each part its own channel on the Part page, and each part its own output to mix them in your host.
MOVING TABLES	Set Wave Env on an oscillator, then shape the wave envelope; or route an LFO to Position in the matrix.
THE OLD GRAIN	Vintage at 6 bits or fewer, a little Rate Crush, Voices at Vintage (8).

Multis and your presets

Kosen keeps two kinds of multi: the factory multis it ships with, which never change, and your own presets, which are plain text files you can keep, copy and share. A preset is a whole multi: the master section and all eight parts, each with its sound, its performance settings and its arpeggiator, and any user, tuning or velocity tables its parts play. To keep one part's sound, save the multi it is in.

Click the multi's name, the top line of the program window, to open the program menu. The arrows beside it step through the factory multis, then your own presets, then any designer banks; at either end they stop.

The program menu

Showcase, Performance	The factory multis, by kind, each with its program change number; Init below them. Choosing one replaces the whole instrument. It leaves your program change settings, and your user, tuning and velocity tables, as they were.
My Presets	Your own presets, grouped by the category you gave them.
Designer Banks	Banks of presets from other sound designers, if you have added any. They load like your own, but can't be overwritten: save a changed one under a new name.
Save	Saves the current multi over your own preset of the same name. Only offered while one of your own is loaded.
Save As...	Saves the current multi as a new preset, with a name, a category and an author. If you already have one of that name, Kosen asks before replacing it.
Rename...	Renames your own preset, and its file with it.
Delete...	Deletes your own preset. Its file goes, so this can't be undone.
Import Preset...	Adds a preset file someone has sent you to your own, and loads it.
Export Preset...	Saves a copy of the loaded preset wherever you choose, ready to send.
Open Preset Folder	Shows the folder in File Explorer, or in the Finder on a Mac.

A note such as Saved Night Shift shows in the name's place for a few seconds. Loading a preset loads the user, tuning and velocity tables it carries too; tables it doesn't carry are left as they are. A preset from a later version of Kosen loads what this version knows, and says how many settings it skipped.

Where they live

Your presets are in `Documents/Denki Digital/Kosen/Presets`, one `.txt` file each. Designer banks go beside them, in `Documents/Denki Digital/Kosen/Banks`, one folder per bank. The files are readable text, so a preset can be sent in an email as easily as attached. Back the folder up with your music.

Your host saves the whole instrument with every project as well, so a project always opens as you left it, whether or not the preset is still in the folder.

Installing and unlocking

Installing on Windows

1. **Close your music software.** Windows can't replace a plugin that is in use.
2. Run `Kosen-1.0.0-Windows.exe`. Windows asks whether to allow it to make changes; the publisher should read Denki Digital Limited. If it says Unknown publisher, don't run it, and write to **hello@denkidigital.com**.
3. **If Windows shows "Windows protected your PC",** choose More info, check the publisher, then Run anyway. Windows says this about new releases while it learns to recognise them.
4. **Choose what to install.** The VST3 plugin always installs; the standalone application is ticked too.
5. **Open your music software.** Kosen is under Denki Digital, listed as Kosen Synth. If it isn't there, ask your host to rescan its plugins.

PLUGIN	`C:\Program Files\Common Files\VST3\Kosen.vst3`
STANDALONE	`C:\Program Files\Denki Digital\Kosen`, and in the Start menu under Denki Digital
THIS MANUAL	`Kosen Manual.pdf` beside the standalone, and in the Start menu under Denki Digital Manuals
YOUR PRESETS	`Documents/Denki Digital/Kosen`
LICENCES	`Documents/Denki Digital/Licences`

Installing on a Mac

Kosen runs on macOS 12 or later, Apple silicon or Intel.

1. **Close your music software.**
2. Open `Kosen-1.0.0-Mac.pkg`. It is signed by Denki Digital Limited and notarised by Apple, so it opens without a warning. If your Mac says it can't check it for malicious software, don't open it, and write to **hello@denkidigital.com**.
3. **Agree to the licence, and choose what to install.** The VST3 plugin, the Audio Unit and the standalone application are all ticked; Customise leaves any out. Your Mac asks for your password, as it does for any plugin installed for everyone on the computer.
4. **Open your music software.** Kosen is under Denki Digital, listed as Kosen Synth: Logic Pro and GarageBand find the Audio Unit as they start, and other hosts may need to rescan their plugins.

VST3 PLUGIN	`/Library/Audio/Plug-Ins/VST3/Kosen.vst3`
AUDIO UNIT	`/Library/Audio/Plug-Ins/Components/Kosen.component`
STANDALONE	`/Applications/Denki Digital/Kosen/Kosen.app`
THIS MANUAL	`Kosen Manual.pdf` beside the standalone, whichever parts you install, and on www.denkidigital.com, from Kosen's page
YOUR PRESETS	`Documents/Denki Digital/Kosen`
LICENCES	`Documents/Denki Digital/Licences`

Unlocking

Your licence comes with your order, in the email and on the order page: a few lines of text that begin Denki Digital licence and end with a signature. It carries your name, and nothing in it needs the internet: no account and no activation, now or later.

1. **Copy all of it,** from Denki Digital licence to the end of the signature line. Then click the small key at the panel's right-hand edge, just above the window-size control and choose Paste licence from the clipboard.
2. **Or keep it as a file:** paste it into a plain text file (ending `.txt` or `.denkilicence`) and drop that onto the panel, or choose Load licence file... from the same key.
3. **That's all.** The key's menu now reads Licensed to your name, and every instrument the licence covers unlocks at once, in every open project.

Before it is unlocked, Kosen works fully, with no time limit, and rests for two seconds once a minute: the sound fades out and back. A small Demo notice on the panel says so, with Buy and Load licence; its cross closes it until the panel is next opened. The key's menu also shows the licences folder, and the notices for the fonts and code inside.

The window

The window-size control, the small square of corner marks at the panel's bottom right-hand corner, sets the window's size, from 60 % to 160 % of its natural size, with Fit to screen for the largest that fits. You can also drag the window's corner. The size is kept with your project, and the window never opens bigger than the screen it is on. In the standalone application, Full screen in the same menu, or the F11 key (Control-Cmd-F on a Mac), fills the whole screen with the panel; the same key or Esc brings the window back.

The small keyboard glyph at the bottom left-hand corner hides the on-screen keys, and the panel grows shorter to match; click it again to bring them back. Kosen keeps with each project whether the keys show, which part you were editing and which page was open.

On a Mac: where this manual says Ctrl, press Cmd; where it says Alt, press Option; and a right-click is a Control-click, or a two-finger click on a trackpad.

Ableton Live on Windows: if the window looks soft, right-click the title of Kosen's device in Live's Device View, untick Auto-Scale Plug-In Window, then open the window again. Kosen scales itself to your screen and stays sharp at any size; Live's auto-scaling stretches a smaller picture instead.

Updating and moving

Run a newer installer over the old one; your presets, licence and projects are left as they are. On a new computer, Windows or Mac, install, then copy `Documents/Denki Digital` across: your licences and presets come with it. To uninstall on Windows, open Windows Settings, then Apps, then Installed apps, and choose Kosen. On a Mac, drag the plugin files and the standalone's folder, where the table above shows them, to the Bin. Either way, your files in Documents stay where they are.

The full guide, with each host's rescan menu, is at **www.denkidigital.com/support/install**.

Technical

PARTS	8, each on its own channel or omni
VOICES	Vintage: 8. Modern: up to 32
OSCILLATORS	2 wavetable oscillators and noise per voice; Clean or Vintage
WAVETABLES	64 factory tables of 64 waves; 8 user tables; WAV wavetable import and export
FILTER	24 dB resonant ladder low-pass, 2x oversampled; Soft, Hard, Diode drive
MODULATION	3 envelopes (one multi-stage), 2 LFOs, 8-slot matrix per part
TUNING	4 tuning tables, 4 velocity tables, Scala import
FACTORY CONTENT	12 multis, chosen by ear, plus Init; the 23 sounds they play
OUTPUTS	8 stereo
CPU	2.1% of one core (Vintage, 8 voices); 8.3% (Modern, 32 voices)
LATENCY	102 samples at 48 kHz
PANEL	1360 × 704, scalable from 60 to 160%
MIDI	Every channel, each part on its own or omni (Notes and controllers); MIDI learn on the panel's controls
PROGRAM CHANGES	A part's sound, the multi, or both, on the sample they arrive
FORMAT	VST3 plugin and standalone application; on a Mac also an Audio Unit
SYSTEM	Windows 10 or 11, 64-bit; or macOS 12 or later, Apple silicon or Intel
VERSION	1.0.0

Notices

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光線

電 DENKI DIGITAL

Inspired by Tokyo. Built in Aberdeen.

東京に着想を得て、アバディーンで作る。

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