

Glow

An 8-voice additive synthesizer that morphs between two drawn spectra over the life of every note.

A Lab plug-in. The Lab is where new GFX plug-ins are built in the open: they may change sound or controls between versions.



Overview

Glow builds every sound from harmonic partials. You draw the level of each partial on a green phosphor screen, and the synth turns that drawing into a waveform. It is modelled on the early home-computer digital synths, where a pair of oscillator cards sat inside the computer and you drew the sound on the monitor.

In this Lab version every oscillator has two screens, START and END, and the sound moves from one to the other while a note plays: each partial glides from its START

level to its END level. The move can run once over a set time, go back and forth, follow the note's envelope, or be swept by an LFO, and how hard you play can decide how far it goes. With every MORPH section set to OFF, Glow sounds as the Stable Glow.

Each voice has two paths, A and B. A path is an additive oscillator (16, 32 or 64 partials) plus a noise generator, with its own envelope, level and pan. The two oscillators can modulate each other (X-MOD), two LFOs add movement, and a stereo dual delay finishes the sound.

Each oscillator can run MODERN - clean and band-limited, with no aliasing - or VINTAGE, which recreates the old card: an 8-bit, 256-byte wavetable read with no smoothing, an 8-bit volume stage that makes the tails step down, and a 31.25 kHz output clock. VINTAGE aliases at the top on purpose; that grit is the sound.

Reach for it for

- Glassy, bell-like and chime sounds built partial by partial
- Lo-fi 8-bit basses, leads and arcade percussion (VINTAGE with LFSR noise)
- Organ, string, flute and choir-like tones from drawn spectra
- Slow-moving pads and drones with stereo LFO panning and the dual delay
- Sounds that change as they play: a pluck that darkens as it dies, a pad that opens into a glassy formant, a voice that moves from "ah" to "ee"
- Velocity that changes the tone, not just the level: soft notes dark, hard notes bright
- Quick sound design: RANDOM makes a new, usable partial set in one click

Playing it

Glow is an instrument: it has no audio input and makes its sound from MIDI.

1. Insert Glow on a track (as the first plug-in, or after a MIDI effect).
2. Arm the track for recording and set its input to your MIDI keyboard (or draw notes in a MIDI item).
3. Play. The MIDI light in the header flashes on each note, and the bar under each MORPH display shows where the newest note is between START and END.
4. If you use a multi-channel MIDI setup, set CHANNEL in the MASTER section to the channel you want; OMNI listens to all of them.

Glow responds to pitch bend (range set by BEND), the mod wheel (CC1 adds to LFO 1's amount, up to 100%), the sustain pedal (CC64) and all-notes-off (CC120 and CC123). Incoming MIDI is passed on down the chain.

Controls

The header

PRESETS, arrows and display	PRESETS (or a click on the display) opens the list of patches; the arrow keys step through them. A patch sets every sound control, all four partial sets (START and END on each oscillator) and both MORPH sections; the MIDI channel, DRIFT, VOLUME, the STEREO controls and the output stage are left as they are. Changing patch while notes sound fades them out over a few milliseconds, so it never clicks. The patches can also be chosen from REAPER's parameter list (Preset), for screen-reader users.
MIDI	Lights when a note arrives.
S / M / L	Panel size: small, medium or large. The panel also scales to fit the plugin window.
?	Opens a pop-up with the design credit, the GFX website address and the address of this manual. Click anywhere to close it.
PANIC	Stops every sounding note at once. Changing the voice mode does the same.

Oscillator A and Oscillator B

Each oscillator has a screen showing its partials as bars, from the fundamental (1) on the left upwards. It shows one of the oscillator's two partial sets, chosen with the START and END keys in its MORPH section: START is drawn in green, END in amber, and the other set shows faintly behind as outlines, so you can see where each partial is heading. The small window at the top right of the screen shows the single wave cycle the shown set makes.



The screen	Left-drag to draw partial levels on the set being shown; drag across the screen to draw a whole curve in one go. Right-drag to erase. All four partial sets are saved with the project.
MODERN / VINTAGE	MODERN: a clean oscillator that leaves out any partials that would go past the top of the audio range, so it never aliases. VINTAGE: the old 8-bit card - a 256-byte wavetable with no smoothing, pitch steps from the old 16-bit counter, an 8-bit volume stage after the envelope (stepped tails) and a 31.25 kHz output clock. It aliases at the top, and the screen shows levels in 16 steps, like the old monitor.
16 / 32 / 64	How many partials the oscillator uses (START and END alike). Fewer partials give a softer, simpler sound and wider bars to draw on.
RANDOM	Makes a new partial set for the screen being shown that is still musical: a falling harmonic series with a little variation, odd partials only, random spikes over a fundamental, one to three formant bumps, or a saw with every few partials missing.
SHAPES	A menu of starting points for the screen being shown: Sine, Saw, Square, Triangle, Odd emphasis, Soft decay, Formant, Organ (drawbar-style), Even emphasis, Bright tine, and Clear (all partials off).

Morph A and Morph B

Each oscillator's MORPH section sets how it moves from its START set to its END set during a note. Every partial glides from its START level to its END level, so halfway through a morph each partial sits halfway between the two. Every new note starts again from START. MODERN oscillators morph smoothly. VINTAGE oscillators rewrite their 8-bit table between wave cycles, as the old card would have, so their morph moves in 32 fine steps.

START / END	Which of the two sets the screen shows and you draw on. They only change the screen, not the sound.
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COPY	Copies the set being shown into the other one. Draw a START, COPY it to END, then change only a few partials on END for a subtle move.
SWAP	Exchanges START and END, so the morph runs the other way.
MODE	Click the display for the menu. OFF: the oscillator plays its START set only (the other knobs are greyed). ONCE: from START to END over TIME, then it stays on END; the release carries on from wherever it has got to. LOOP: from START to END and back again, TIME each way, for as long as the note sounds. ENVELOPE: follows the path's own envelope: silence is START and the top of the envelope is END, so the tone rises and falls with the attack, decay, sustain and release.
Position bar	Under the MODE display: where the newest note is between START (S, left) and END (E, right).
TIME	How long ONCE takes to reach END, or LOOP each way, 10 ms to 20 s. Not used by ENVELOPE.
CURVE	The shape of the move, -100 to +100. 0 is even all the way; positive values move quickly at first and slow down near END; negative values start slowly and speed up.
DEPTH	How far towards END the morph goes, 0 - 100%. At 50% it stops halfway.
VELOCITY	How much softer notes hold back, 0 - 100%. At 0 every note goes the full DEPTH; at 100% a soft note barely leaves START and only the hardest notes reach END, so playing harder changes the tone.

A change of MODE, a stolen voice or a new note on a sounding voice glides to its new place over about 3 ms, so the morph never clicks. Changing START or END while notes sound changes them at once, as drawing always has.

Path A and Path B

TRANSCOPE	The oscillator's pitch in semitones, -36 to +36.
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FINE	Fine tuning, -100 to +100 cents. Opposite settings on A and B give a detuned, chorused width.
PITCH ENV	How far the path's own envelope bends its oscillator's pitch, -48 to +48 semitones at the top of the envelope. Use it with a short decay for thumps, drops and zaps.
LEVEL	The path's volume, 0 - 100%. Path A starts at 80%, Path B at 0%, so a fresh patch only plays A.
PAN	Where the path sits in the stereo field, from L 100 to R 100.
NOISE	Blends from the oscillator to the noise generator: 0% is all oscillator, 100% all noise.
TONE	The brightness of the noise, from about 200 Hz up past the top of the audio range. With WHITE it is a low-pass filter; with LFSR it is the clock rate of the noise.
WHITE / LFSR	WHITE: smooth hiss. LFSR: a 15-bit shift-register noise, the gritty, metallic noise of 80s digital chips - good for snares, hats and arcade effects.

Envelope A and Envelope B

Each path has its own ADSR envelope, which shapes its level and its PITCH ENV. The small screen to the right sketches the envelope's shape.

ATTACK	Time to rise to full level, 0.5 ms to 10 s.
DECAY	Time to fall to the sustain level, 1 ms to 20 s.
SUSTAIN	The level held while the key is down, 0 - 100%.
RELEASE	Time to die away after the key is let go, 1 ms to 20 s.
A CURVE / D CURVE / R CURVE	The shape of each stage, -100 to +100. 0 is a straight line; positive values are exponential and snappy; negative values start slowly. D and R start at +50.

Voice

POLY / MONO / RETRIG	POLY: up to 8 notes at once. MONO: one note, legato - when you play a new note while holding another, the pitch glides and the envelopes carry on. RETRIG: one note, and every note restarts the envelopes.
GLIDE	How long the pitch takes to slide to a new note, 0 - 2000 ms. In POLY each voice glides from the last note it played.
BEND	Pitch-bend range, 0 - 24 semitones.
VELOCITY	How much playing harder makes the sound louder, 0 - 100%. At 0% every note plays at full level.

X-MOD

A > B	Oscillator A modulates the phase of oscillator B (frequency modulation in the FM-synth manner), 0 - 100%. Adds bright, bell-like and metallic overtones to B. A is used as a modulator even if its LEVEL is at 0.
B > A	The other way round: B modulates A.

LFO 1 and LFO 2

WAVE	SINE, TRI, SQUARE or S&H (random steps).
RATE	LFO speed, 0.02 - 30 Hz.
SKEW	Shifts the shape. On SINE and TRI it moves the peak earlier or later; on SQUARE it sets the pulse width. On S&H, settings above 50% make the steps glide into each other.
DEST	What the LFO moves: OFF, PITCH (both paths), PITCH A, PITCH B, PAN (A one way, B the other), LEVEL (tremolo), X-MOD (the depth of both X-MOD knobs), NOISE (the noise blend) or MORPH (moves both oscillators between START and END, on top of their MODE - it works with MODE set to OFF too).
AMOUNT	How much it moves, 0 - 100%. On pitch the range grows towards the top of the knob, up to 12 semitones at 100%,

	so small settings give fine vibrato. The mod wheel adds to LFO 1's amount.
POLY / GLOBAL	<p>POLY: every note has its own LFO, restarted when the note starts - each note gets the same vibrato or sweep.</p> <p>GLOBAL: one LFO for all notes, running freely. LFO 1 starts on POLY, LFO 2 on GLOBAL.</p>

Dual delay

ON	Switches the delay in.
PING	Ping-pong: the sound goes into the left side only (summed to mono), and CROSS bounces it across to the right. Off: stereo in, stereo out.
SYNC L / SYNC R	The delay time of each side as a note value of the project tempo, from 1/32 to 1/1 (with triplet and dotted values), or OFF (ms) to set it in milliseconds.
TIME L / TIME R	The delay time in milliseconds, 1 - 2000 ms, used when that side's SYNC is OFF. The label is shown in brackets while the side is synced.
FEEDBACK	How much of each side repeats into itself, 0 - 95%.
CROSS	Cross-feedback: how much of each side repeats into the other, 0 - 95%. FEEDBACK and CROSS together are held below the point where the repeats would build up, so the delay always dies away.
LP / HP	Filters inside the feedback loop: LP (500 Hz - 20 kHz) darkens each repeat, HP (20 Hz - 2 kHz) thins it. The repeats get darker or thinner as they go.
MIX	How loud the delay is, 0 - 100%. The dry sound stays at full level.

Drift

A slow random wander, like an old clock that never quite keeps time. DRIFT sets how much (0 - 100%, starting at 20%). It moves the pitch of the whole instrument (up to

20 cents either way at 100%), lets oscillator B wander against A by up to 0.15 semitones, and gives each new note a slightly different tuning (up to 6 cents). It also gives each note's morph a slightly different speed (up to 15% faster or slower at 100%), and makes the morph position breathe a little while a MODE is on. At 0 nothing moves.

Master

DRIFT	See above.
VOLUME	Output level, -24 to +6 dB.
CHANNEL	The MIDI channel Glow listens to: OMNI (all) or CH 1 to CH 16.
Meters	Output level, left and right.

IN / OUT strip

The slim strip along the bottom of the panel.

SAT	Band saturation on the way out: only the lows and highs are saturated (the mids stay clean), with a soft curve that loosens as the level rises.
OUTPUT CLIP	A soft clipper on the output (always on) catches overs at the ceiling.
MONO	Makes everything below this frequency mono, from 20 to 500 Hz (fully left = OFF). Keeps the low end centred when paths are panned apart or the delay is wide.
WIDTH	Widens the stereo image above the MONO frequency, up to +100% (twice the side signal).

Presets

The patches are levelled to the GFX calibration: a held chord plays at about -21 dBFS, the percussive patches peak around -9 dBFS. The first fourteen are the Stable Glow patches; five of them now morph.

1981 Micro Chime	Both oscillators VINTAGE with 16 partials, B an octave up; a chime that mellows to a softer, triangle-like tone as it rings (ONCE), a touch of vibrato and a ping-pong delay.
Lo-Fi Bit Bass	MONO legato with a short glide; a VINTAGE bass made from the first four partials, a little LFSR noise and a sine an octave below on B.
Spectral Ambient Pad	MODERN with 64 partials, detuned 7 cents either way; A's formant drifts up and back over 6 s and B moves between a soft and an even-partial set over 9 s (LOOP), with slow panning and a long delay.
E.Piano Tine	A bright tine on A that settles to a near sine within a second (ONCE; softer notes settle less), over a warm sine body on B.
Digital Sci-Fi Drone	Heavy A > B modulation with S&H on the X-MOD depth, slow panning and a dark, long-feedback delay.
8-Bit Arcade Percussion	A VINTAGE thump that drops in pitch (PITCH ENV) and an LFSR noise snap on B.
Dual-Timbral Poly	A saw on A hard left and a square on B hard right, slightly detuned, with a short delay.
8-Bit Arcade Snare	A short pitched thump on A and a bright LFSR noise body on B.
Glass Organ	VINTAGE drawbar-style partials on A, even partials an octave up on B, organ envelopes and a light vibrato; velocity off.
Vintage Strings	Two detuned VINTAGE saws with a slow swell, per-note vibrato and slow panning.
Hollow Flute	Odd partials an octave up with a little breath noise, per-note vibrato and a short delay.
Bell Tower	A spread, bell-like strike on A that dies down to its low hum over 5 s (ONCE), a high, detuned strike on B and a long delay.

Choir Formant	Two 64-partial formant sets; A moves from "ah" to "ee" and back (LOOP, 4.2 s each way), with vibrato and slow panning.
Square Sync Lead	MONO legato with glide; a bright square on A, modulated by B ($B > A$), with vibrato and delay.
Glass Sweep	A dark pad that opens into a high, glassy formant over 3.5 s (ONCE, slow start), with an octave sine on B and a wide delay.
Vowel Lead	MONO legato lead; the vowel opens with the envelope's swell and closes a little to the sustain (ENVELOPE), with LFO 2 slowly moving the vowel and a touch of vibrato.
Morph Pluck	Bright saw at the strike, turning dark as the note dies (ENVELOPE); soft notes start darker. A sub an octave down and a ping-pong delay.
Organ to Choir	Drawbar organ partials that slowly turn into a voice-like formant over 6 s (ONCE, slow start).
Bit Shimmer	VINTAGE: the old card flickering between an odd-partial set and a bright high cluster (LOOP, 0.7 s), in fine 8-bit steps, with a ping-pong delay.
Tidal Pad	Both oscillators rolling between two sets at their own pace (LOOP, 7 s and 11 s), detuned and spread wide, with a long delay.
Velocity Brass	Dark when played softly, the full saw when hit hard, opening with each note's envelope (ENVELOPE with VELOCITY 80%) on both oscillators, with vibrato.
Init	A plain starting point: one MODERN saw on A, Path B silent, no LFOs, no delay, MORPH off.

Tips

- Start from SHAPES, then draw on top: pull a few partials up or down and listen to how the tone changes.

- For a first morph: draw START, press COPY, switch to END and lower the top half of the partials. Set MODE to ONCE and TIME to a second or two: every note now darkens as it plays.
- ENVELOPE mode with a plucky envelope (no sustain) gives the classic bright-to-dark pluck; with a slow attack it gives a sound that opens as it swells.
- Raise VELOCITY in a MORPH section to make the tone follow your playing: soft notes stay near START.
- An LFO set to MORPH with a slow RATE gives a slowly evolving pad from any two sets, even with MODE on OFF.
- For a classic 80s digital sound, set both oscillators to VINTAGE and use 16 partials; for a clean, hi-fi version of the same drawing, switch back to MODERN.
- If the delay or panned paths make the low end wander, raise MONO in the IN / OUT strip to 100 - 150 Hz.

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