source ..... alm busy circuits
rev 2026.10

akemie's castle

_travelers guide
_for fortifying your sonic barriers

4	6	16
operators	algorithms	chords on osc A

› then noon = 12 o'clock tags = the panel drawing

dual vco · four-operator fm from a real yamaha opl3 chip · six algorithms · eight waves · up to five-voice chords

01 what it is

ac_01

dual vco	two oscillators, A and B, each with its own v/oct, tuning and output
the engine	a new-old-stock yamaha ymf262 (opl3) chip · 4 operators, 6 algorithms, 8 waves
sounds like	yamaha dx100 · dx21 · tx81z territory
the catch	a real chip: some steppiness, small clicks, aliasing when pushed

02 algorithms

ac_02 · the blue button · fig.01

[alg]	press to step through the 6 · an LED marks the one in use
first two	two separate 2-operator vcos · one pair fm'd (1 → 2), the other mixed (3 + 4) · the second swaps them
last four	one 4-operator voice on both A and B · same tone, separate pitch, feedback and output
rule of thumb	more operators and more → arrows = a more complex sound
chords	oscillator A can play chords in every algorithm

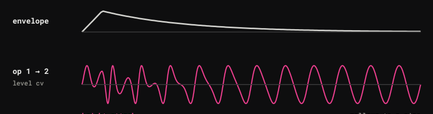
10 first flight

ac_10 · from sine to fm

1. press [alg] to the top-left LED: A = 1 → 2
2. all wave, multiplier, feedback and chord knobs fully left
3. op 1 level down, op 2 level up · a plain sine from A out
4. raise op 1 level · the sine gets brighter (that's fm)
5. turn op 1 multiplier · new harmonic colours
6. then try op 1's wave, and feedback

_fig.08 : brightness over time

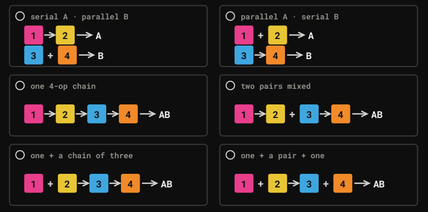
patch 4



envelope into the modulator's level cv · the carrier keeps the volume steady

_fig.01 : the six algorithms

panel order · blue button



colours = operators 1 · 2 · 3 · 4 · → modulates · + mixed · AB = both outputs

03 operators 1 – 4

ac_03 · fig.02

wave	8 shapes · sine, half-sine, abs sine, pulse sine, even sine, camel sine, square, log saw
mult	multiplier 1 – 15 × the v/oct pitch
level	0 – 63 · how loud that operator is
modulator	an operator that feeds an arrow · its level = brightness, not volume
carrier	the last in a chain or a mixed one · its level = volume

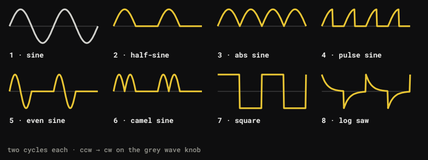
_fig.02 : modulator vs carrier

algorithm 1, osc A



_fig.04 : the eight waves

grey wave knob



two cycles each · ccw → cw on the grey wave knob

_fig.05 : multiplier

harmonic number



on a modulator: higher = brighter, more distant overtones
on a carrier: the note itself jumps up that harmonic

04 the knobs explained

ac_04 · white · grey · small

white knob	the setting itself · cv is added on top of it
small knob	below each white knob · cv amount (–|+ = attenuverter, | = attenuator)
grey wave knob	nothing patched: picks the wave · cv patched: becomes the cv amount
no amount	v/oct fb (osc B) inv · straight in
cv range	0 – 5 V · chord and v/oct take about 0 – 10 V

_fig.06 : white · small · grey

knob anatomy



no amount knob: v/oct · fb (osc B) · inv = straight in

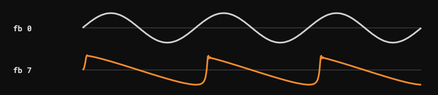
05 feedback · chords

ac_05 · osc A section

fb feedback	0 – 7 · the first operator in each chain modulates itself · coarser, noisier
osc B	uses A's feedback until something is patched into B's fb jack
ch chord	16 chords on osc A: 5th, octaves ×3, maj, min, sus, aug, dim, dom7, maj7, min7, 9th, detuned ×3
inv	more voltage = more inversion · an lfo here plays arpeggio-like melodies
louder!	chords add voices · turn the last operator levels down

_fig.07 : feedback

fb 0 – 7



the first operator in each chain modulates itself · sine → saw-like, noisy
feedback also shifts tuning a little

06 why does it do that?

ac_06 · the chip's character

clicks	sweeping a level clicks, most in its top quarter
never silent	a level near zero can still bleed through
out of tune	feedback shifts tuning · non-sine waves add inharmonics
slow modulation	cv works up to low audio rates only
noise wall	heavy feedback + high levels can alias and distort · back off

08 four patches

ac_08 · manual + fm basics

pure sine — alg 1 or 2
wave, multiplier, feedback, chord fully left · only the carrier level up · tune and calibrate here

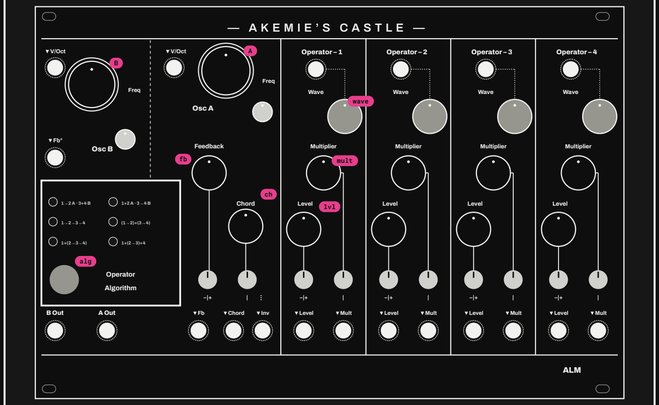
chord melodies — any + chord
pick a chord, a slow lfo into inv for pseudo-sequenced lines

fm drums — 4-op · chord max
snappy envelope into osc A v/oct and a vca after A out · mult it to other inputs · ride feedback

brighten with an envelope — serial alg
envelope into a modulator's level cv · the attack gets bright, then mellows

_fig.03 : the panel

numbers match the legend



- A · B freq · big = coarse · small = fine · ▾ v/oct jacks
- alg algorithm · blue button · 6 · see fig.01
- fb feedback · 0–7 · B uses A's unless B fb patched
- ch chord · osc A · 16 chords · ▾ inv inverts
- wave wave · grey = cv amount once patched
- mult multiplier · 1–15 × pitch
- lvl level · 0–63 · modulator = brightness
- out A out · B out · the only outputs · all else are cv in

09 specs

ac_09

range	about 0.05 Hz to just over 6 kHz · 1 V/oct over ~5 octaves
cv in	0 – 5 V · chord + v/oct about 0 – 10 V
size	38 hp · 32 mm deep
power	120 mA +12 V · 60 mA –12 V
tune	rear trimmer per vco: 1 V → C1, 3 V → C3

design homage to the house of x / powers of x data pages — designed by tom muller with jonathan hickman · panel drawing after the alm011 manual panel diagram
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