

Dead-Bug Grub

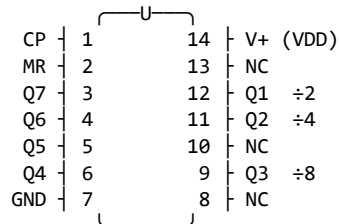
A CD4024 SUB-OCTAVE DIVIDER & PATTERN BOX, POINT-TO-POINT // DEAD-BUG BUILD WORKSHEET // MESS O' PEDALS

Turn a CD4024 7-stage binary counter into an octave divider and stepped-pattern box, built dead-bug with no breadboard and no PCB. Pinout, a pin-by-pin netlist, sub-octaves, a binary-weighted mixer, and reset tricks.

Parts

	1× CD4024 (CD4024B / HEF4024) 7-stage ripple counter, 14-pin DIP - spot it: CD4024 printed on top, notch marks pin 1
	A clock source - this build needs a square-wave input. Your CD4046 VCO or a CD40106 voice is perfect; a 555 works too
	1× 0.1 µF ceramic - supply decoupling (a non-polar disc printed 104)
	Mixing resistors - a handful of 10K for a grungy stack, or a binary-weighted set (10K / 22K / 47K / 100K / 220K / 470K / 1M) for a cleaner sawtooth (Step 5). Spot it: read the color bands or meter each one; non-polar
	1× volume pot (10K-100K, B = linear taper)
	1× 10 µF electrolytic - output DC-blocker. Spot it: a little can; the stripe marks the minus leg , longer leg is +
	Optional: a rotary switch or toggles to select which Q outputs you tap
	1× SPST toggle for on/off - a 2-lug switch
	Output: a jack to an amp, or an LM386 (8-pin DIP) + speaker
	A power source - at least two vape cells in series (7.4V; three gives you 11.1V), or a 9V battery
	Solid-core hookup wire, enclosure, soldering iron, cutters, multimeter

The chip, from above



CP = clock in, MR = reset, Q1-Q7 = the divided outputs. Notch marks pin 1. Dead-bug (legs up) mirrors the map left-to-right.

Build

STEP 1 - PIN THE BUG DOWN

Back to a 14-pin chip after the 4046's sixteen.

STEP 2 - POWER - AND GROUND THE RESET

Hook up the power pins - red V+ lead, black ground lead, soldered straight on - and decouple at the chip.

Power & housekeeping

	CONNECT	TO	WHY
	Pin 14	V+	Supply positive (VDD)
	Pin 7	Ground	Supply negative (VSS)
	0.1 µF	Pin 14 -> Pin 7	Decoupling, right at the chip
	Pin 2	Ground	Reset held low = counter runs. Floating = glitch

STEP 3 - FEED IT A CLOCK

The 4024 is deaf until you give it something to count.

Clock source -> pin 1

	FROM	TO	RESULT
	CD4046 pin 4 (VCO OUT)	Pin 1	Octaves that track your pitch knob - the money patch
	CD40106 voice output	Pin 1	Octaves below a hand-tuned drone
	Any 0-V+ square (555, etc.)	Pin 1	Whatever you've got that ticks

STEP 4 - TAP YOUR SUB-OCTAVES

Now the payoff.

The seven outputs

	OUTPUT	PIN	DIVIDES BY	BELOW THE INPUT
	Q1	12	÷2	1 octave
	Q2	11	÷4	2 octaves
	Q3	9	÷8	3 octaves
	Q4	6	÷16	4 octaves
	Q5	5	÷32	5 octaves
	Q6	4	÷64	6 octaves
	Q7	3	÷128	7 octaves

STEP 5 - MIX THEM - STACK OR STAIRCASE

How you combine the outputs decides the sound.

Mixer

	GOAL	HOW	SOUND
	Octave stack	Each Q -> equal 10K -> mix bus	Fat, buzzy organ - the octaves piled up rough
	Sawtooth / "melody"	Binary-weight it: Q7->10K, Q6->22K, Q5->47K, Q4->100K, Q3->220K, Q2->470K, Q1->1M	A stepped ramp - a gritty descending sawtooth, the classic counter-DAC tone

STEP 6 - TAKE THE OUTPUT

Standard exit: block the DC, through the volume pot, out to an amp or jack.

Output stage - the volume pot uses all three lugs

	CONNECT	TO	PART
	Mix bus	Volume pot, one outer lug	Signal in
	Volume pot, other outer lug	Ground	The leg that makes it a divider
	Volume wiper (middle lug)	10 μ F -> 1K -> jack / LM386 in	+ toward the pot; sleeve to ground

STEP 7 - POWER UP

Feed it a clock, toggle on, and sweep the source oscillator.

STEP 8 - IF IT WON'T DIVIDE

- Nothing on any output? Check pin 2 is at ground. A floating reset is the number-one 4024 problem - it holds the counter cleared.
- Still nothing? Is a clock actually reaching pin 1 ? Probe the source at pin 1 - no clock in, no counting out. Confirm shared ground with the clock source.
- Outputs on the wrong pins? Easy to mis-map - Q1 and Q2 are on the right side (pins 12, 11) while Q4-Q7 are on the left (pins 6-3). Double-check against the table.

- Weird stuttering / it resets on its own? Noise on the reset line, or you've accidentally tied a Q back to pin 2. Fine if intentional (see below); otherwise clean it up.
- Thin, buzzy octave stack? That's square waves piling up - expected. The binary-weighted mix (Step 5) smooths it toward a sawtooth.