

Dead-Bug Hornet

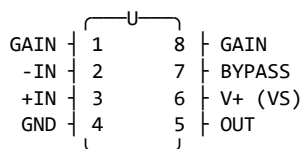
A ONE-CHIP LM386 SPEAKER AMP, POINT-TO-POINT // DEAD-BUG BUILD WORKSHEET // MESS O' PEDALS

Build a loud little LM386 speaker amplifier dead-bug, with no breadboard and no PCB. Parts list, pinout, a pin-by-pin netlist, gain options, and the stability network that keeps it from howling - the amp that makes every other noise box audible.

Parts

	1× LM386 (LM386N-1, -3, or -4) low-voltage audio power amp, 8-pin DIP - spot it: LM386 printed on top; a notch or dot marks pin 1. The -4 suffix takes the highest supply and gives the most output.
	1× 10K audio-taper pot for volume. Spot it: pots marked A = audio/log taper (use this for a natural-feeling volume knob); 10K or 103 for the value.
	1× 0.1 μ F ceramic - input coupling (printed 104). Blocks DC from whatever you plug in.
	1× 10 μ F electrolytic - the gain cap across pins 1-8. Spot it: the stripe marks the minus leg; the + goes to pin 1 . Leave this out and the amp runs at gain 20 (quieter, cleaner).
	1× 10 μ F electrolytic - the bypass cap on pin 7 to ground (+ to pin 7). Optional; it knocks down supply hum.
	1× 220 μ F electrolytic - the output coupling cap . Big can; the + goes to pin 5 (the output), minus to the speaker.
	1× 10 ohms resistor + 1× 0.047 μ F cap (printed 473) - the Zobel network , wired in series from pin 5 to ground. This is the anti-howl part; don't skip it.
	1× 100 μ F electrolytic + 1× 0.1 μ F ceramic - supply decoupling across V+ and ground, close to the chip.
	1× 8 ohms speaker (0.5W or more). A 4 ohms speaker is louder but works the chip harder; 8 ohms is the safe default.
	1× SPST toggle for on/off - a 2-lug switch.
	1× Power source - two or three vape cells in series (7.4-11.1V), or a 9V battery .
	1× LED + a series resistor (~ 1K-10K) as a power indicator. Spot it: the longer leg is + (anode).
	Solid-core hookup wire, soldering iron, cutters, multimeter.

The chip, from above



Notch marks pin 1. Keep the chip label-up and this map reads exactly as you see it. Signal in the +IN (pin 3) , out the OUT (pin 5) , and the two GAIN pins (1 & 8) are how loud it gets.

Build

STEP 1 - PRESOLDER EVERYTHING, THEN MOUNT THE PANEL PARTS

Same discipline as the rest of the series: tin every leg and every wire end at the bench before the chip comes out.

STEP 2 - FLATTEN THE LEGS - AND LEAVE IT LABEL-UP

Bend all eight legs out flat so they splay sideways.

STEP 3 - POWER AND DECOUPLING

Hook up the two power pins and drop the decoupling caps right across the chip.

Power & decoupling

	CONNECT	TO	WHY
	Pin 6	V+	Supply positive (VS)

	Pin 4	Ground	Supply negative
	100 μ F (+ to pin 6)	Pin 6 -> Pin 4	Bulk decoupling
	0.1 μ F	Pin 6 -> Pin 4	High-frequency decoupling

STEP 4 - INPUT AND VOLUME

Signal comes in through the volume pot and a coupling cap into the + input (pin 3) .

Input stage

	CONNECT	TO	PART
	Signal in	Volume pot (outer lug)	10K audio taper
	Other outer lug	Ground	-
	Pot wiper	Pin 3 (+IN)	via 0.1 μ F coupling cap
	Pin 2 (-IN)	Ground	-

STEP 5 - SET THE GAIN

This one decision is how loud it gets.

Gain options

	YOU WANT	WIRE	RESULT
	Loud (default here)	10 μ F across pins 1-8, + to pin 1	Gain 200
	Cleaner / quieter	Leave pins 1 & 8 open	Gain 20
	Somewhere between	10 μ F + a resistor in series across 1-8	Gain 20-200
	Less hum	Pin 7 -> 10 μ F -> ground (+ to pin 7)	Bypass cap (optional)

STEP 6 - OUTPUT, SPEAKER, AND THE ANTI-HOWL NETWORK

The output on pin 5 sits at about half the supply voltage, so it needs a coupling cap to keep that DC out of the speaker: a big 220 μ F , plus leg to pin 5, minus to the speaker, and the speaker's other side to ground.

Output stage

	CONNECT	TO	PART
	Pin 5 (OUT)	Speaker (+ side)	via 220 μ F, + to pin 5
	Speaker (other side)	Ground	8 ohms
	Pin 5 (OUT)	Ground	10 ohms + 0.047 μ F in series (Zobel)

STEP 7 - POWER UP

Wire your SPST toggle in the V+ line.

STEP 8 - IF IT WON'T BEHAVE

- Loud squeal or supersonic howl? The Zobel network is missing or mis-wired. 10 ohms in series with 0.047 μ F, from pin 5 to ground. Also keep the input wires away from the output/speaker wires.
- Hum or buzz? Add or reseal the decoupling caps at pins 6/4, and add the 10 μ F bypass cap on pin 7. Star-ground everything back to one point.
- Quiet even at full volume? Check the gain cap across pins 1-8 (+ to pin 1) - without it you're stuck at gain 20.
- No sound at all? Confirm pin 6 at V+ and pin 4 at ground, the signal actually reaches pin 3 , and pin 2 is grounded.
- Distorted and hot? Supply too high, speaker impedance too low, or the output cap in backwards. Check the 220 μ F polarity - + to pin 5.