My First Distortion

Classic Electra distortion circuit

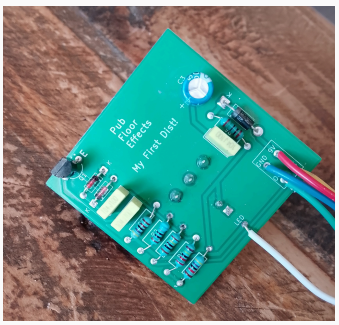


Figure 1: *Completed Pedal Overview*

Overview

An Electra Distortion is one of the most iconic, historically significant circuits in DIY guitar pedal history. Originally released by Univox in the 1970s as a module inside guitars and later built into standalone stompboxes (like the Craig Anderton Tube Sound Fuzz), it is famous for producing rich, asymmetric tube-like distortion out of a single active transistor stage.

Here is a complete technical and functional overview of your custom-configured Electra distortion circuit:

Core Circuit Architecture

Unlike complex multi-stage overdrives, the Electra distortion relies on a single silicon transistor configured for high gain, combined with passive diode clipping to shape the distortion character.

- Single-Transistor Gain Stage: The BC549 acts as the primary gain element. Because it is a low-noise, high-gain NPN transistor, it responds dynamically to your guitar's volume knob and picking attack, cleaning up nicely when you roll back your guitar's volume.
- Asymmetric Diode Clipping: The pair of 1N4148 diodes are arranged for asymmetric clipping (often referencing ground or across the feedback loop depending on the exact topology variant). Asymmetric clipping introduces even-order harmonics, which mimic the warm, pleasing saturation of a single-ended tube amplifier rather than harsh, buzzy square-wave clipping.

On-Board Features & Layout

Your layout packs modern builder conveniences directly onto the printed circuit board, streamlining assembly and eliminating messy off-board wiring headaches:

- On-Board Power Filtering: Includes dedicated power supply filtering (typically a decoupling capacitor and reverse-polarity protection diode) right at the DC jack entry point. This suppresses 50Hz/60Hz mains hum and switching noise before it can contaminate the audio path.

- Integrated LED: The indicator LED wiring pads are placed directly on the PCB, making status-light integration clean and straightforward.
- Board-Mounted Potentiometer: Utilizing a right-angle, PCB-mounted potentiometer (for output Volume) cuts down on flying lead wires, reducing potential RF interference and making final enclosure mounting mechanically rigid.

Recommended Specifications & Controls

- Enclosure Size: Comfortably fits in a 1590B enclosure.
- Power Supply: Standard 9V DC Center-Negative (Boss-style standard).

Tools & Workshop Accessories

Building guitar pedals cleanly and reliably requires a standard set of electronics workbench tools. Having the right accessories on hand prevents damaged PCB traces and cold solder joints.

Essential Soldering Gear

Tool / Equipment	Specification & Purpose
Soldering Station	Temperature-controlled iron (set to 350°C / 660°F) with a chisel or conical tip.
Solder Wire	63/37 Tin/Lead rosin-core solder (0.8mm diameter recommended for through-hole work).
Solder Sucker / Wick	Desoldering pump or braided copper wick for cleaning up solder bridges or mistakes.
Flux Pen	Rosin flux pen to improve solder flow on stubborn component pads and ground planes.

Hand Tools & Hardware Assembly

Tool / Equipment	Specification & Purpose
Flush Cutters	Precision diagonal cutters for trimming component leads close to the PCB solder joints.
Needle-Nose Pliers	For bending component leads, holding parts, and tightening pot/jack nuts.
Wire Strippers	For stripping 24 AWG hook-up wire for off-board wiring connections.
Digital Multimeter	Essential for checking resistor values, continuity, and measuring power supply voltages before testing.

Enclosure & Mechanical Work

Tool / Equipment	Specification & Purpose
Step Drill Bit	Titanium-coated step bit (or 3mm, 1/4″, 3/8″, 1/2″ twist bits) for drilling aluminum enclosures.
Center Punch	Spring-loaded punch to mark drill locations on enclosures so drill bits do not slip.

PCB Stencil & Mask Reference

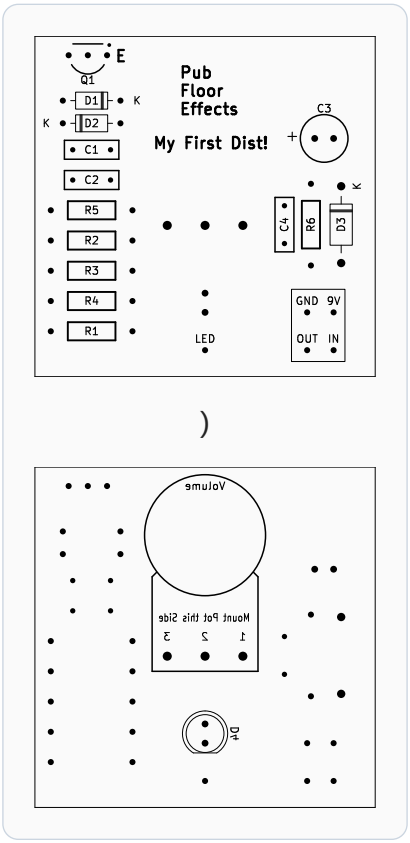


Figure 2: *PCB Stencil and Top Mask Reference View.*

Bill of Materials (BOM)

Components

Ref	Qty	Value	Comment
C1, C2, C4	3	100n	FILM
C3	1	100u	ELEC_100UF_25v
D1, D2	2	1N914	
D3	1	1N5817	
D4	1	LED	RED LED 5.0mm
Q1	1	BC549c	check pin out
R1	1	47k	1_4W
R2	1	680r	1_4W
R3	1	1M	1_4W
R4	1	2.2M	1_4W
R5	1	4.7k	1_4W
R6	1	100r	1_4W
RV1	1	100K	A (Log)
Switch	1	3PDT	

Ref	Qty	Value	Comment
jack	2	1/4″	
Power	1	2.1mm barrel	
Hook up Wire	5	22AWG	

Component Placement & Assembly Sequence

Assemble components in order of physical height to simplify soldering:

1. **Diodes & Resistors:** Lay flat to board. Double-check cathode bands for D1, D2, and D3.
2. **Transistor (Q1):**Match the pinout of the TO-92 package to the silkscreen outline. Seat it slightly off the board or bend leads carefully if needed, and double-check orientation before soldering.
3. **Box & Ceramic Capacitors:** Seat flush to PCB.
4. **Electrolytic Capacitors:** Ensure long leg (+) goes into the square pad (indicated by + on silkscreen).
5. **Off-Board Wiring Leads:** Pre-tin pads for IN, OUT, LED, 9V, and GND.
6. **Potentiometers (Lug-Type):**Mount panel-style pots directly to the enclosure, tighten the mounting nuts, and wire the solder lugs to the corresponding PCB pads using short lengths of hook-up wire.

Circuit Schematic

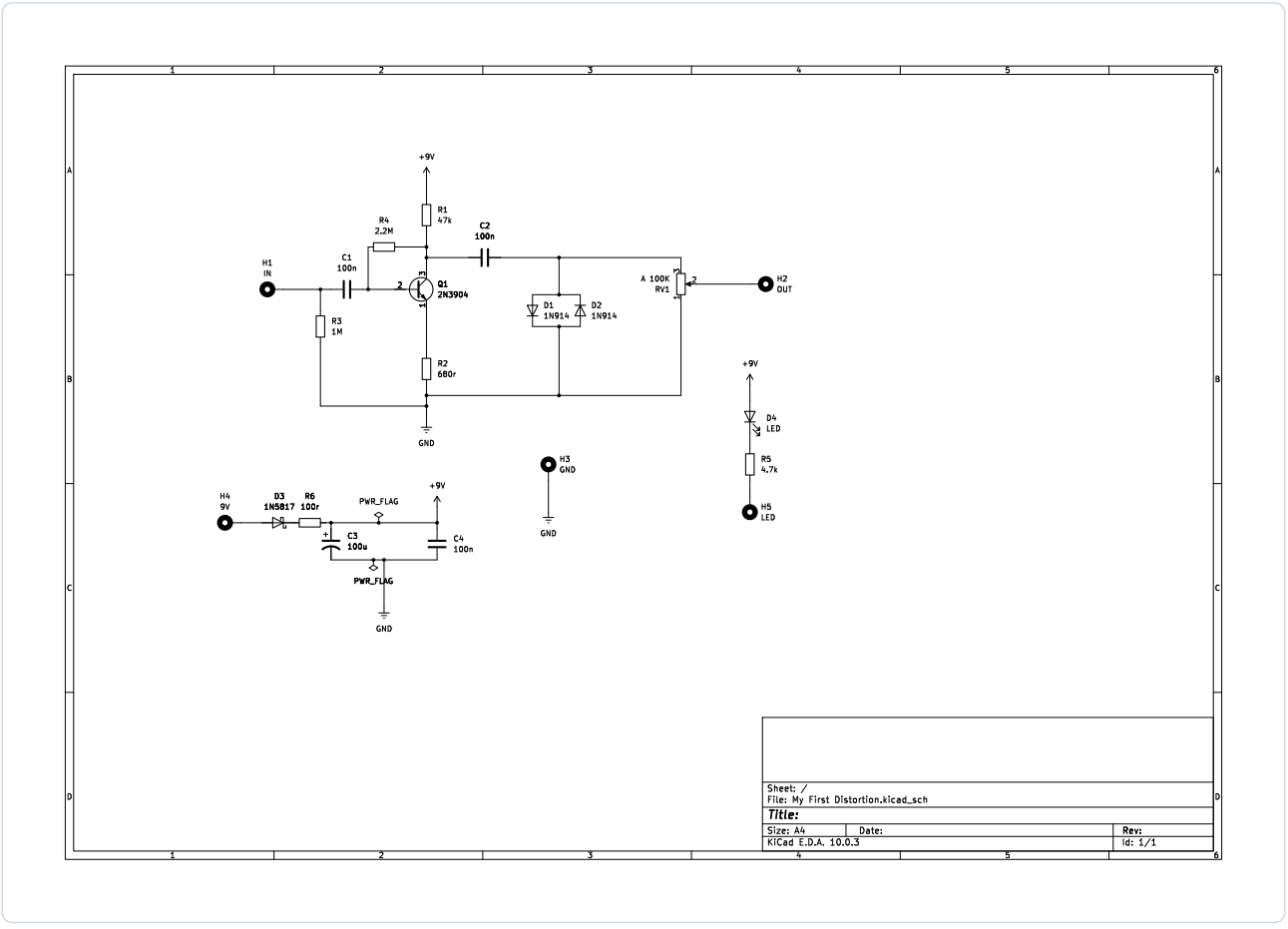


Figure 1: My First Fuzz Complete Circuit Diagram