E2.05 - FuzzBreaker Stompbox

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Project Overview

Analog circuits still play a vital role in providing real time processing and high fidelity signals. Our guitar pedal, FuzzBreaker, is designed to provide musicians with a high-quality, versatile distortion effect. We utilized two analog solid-state circuits to create a hard-clipping fuzz and soft-clipping overdrive that are fed into an equalizer inside a shielded enclosure.
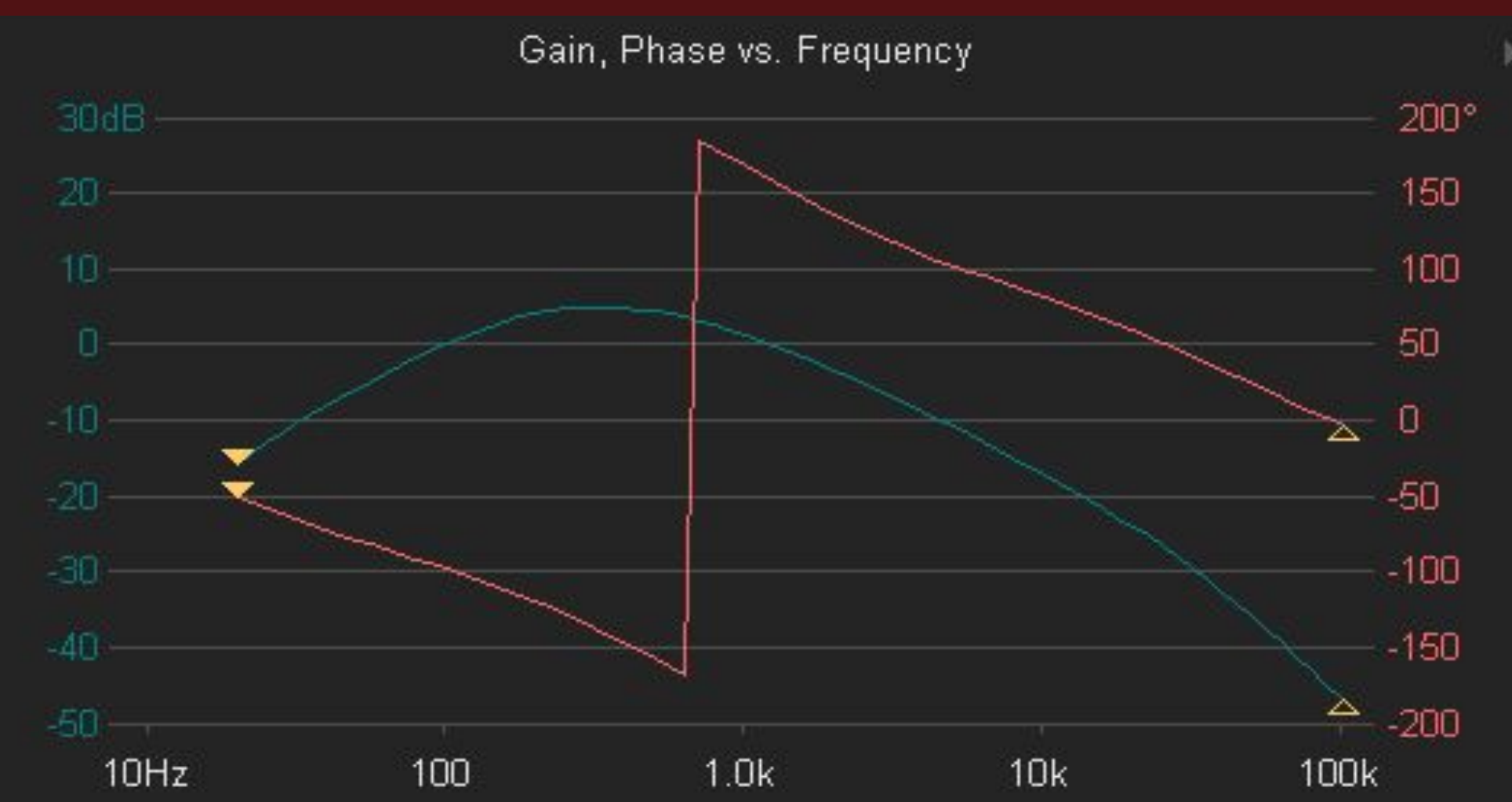
Requirements

- Bass and Treble control
- Custom PCB
- ¼'' TRS Jack Input/Output
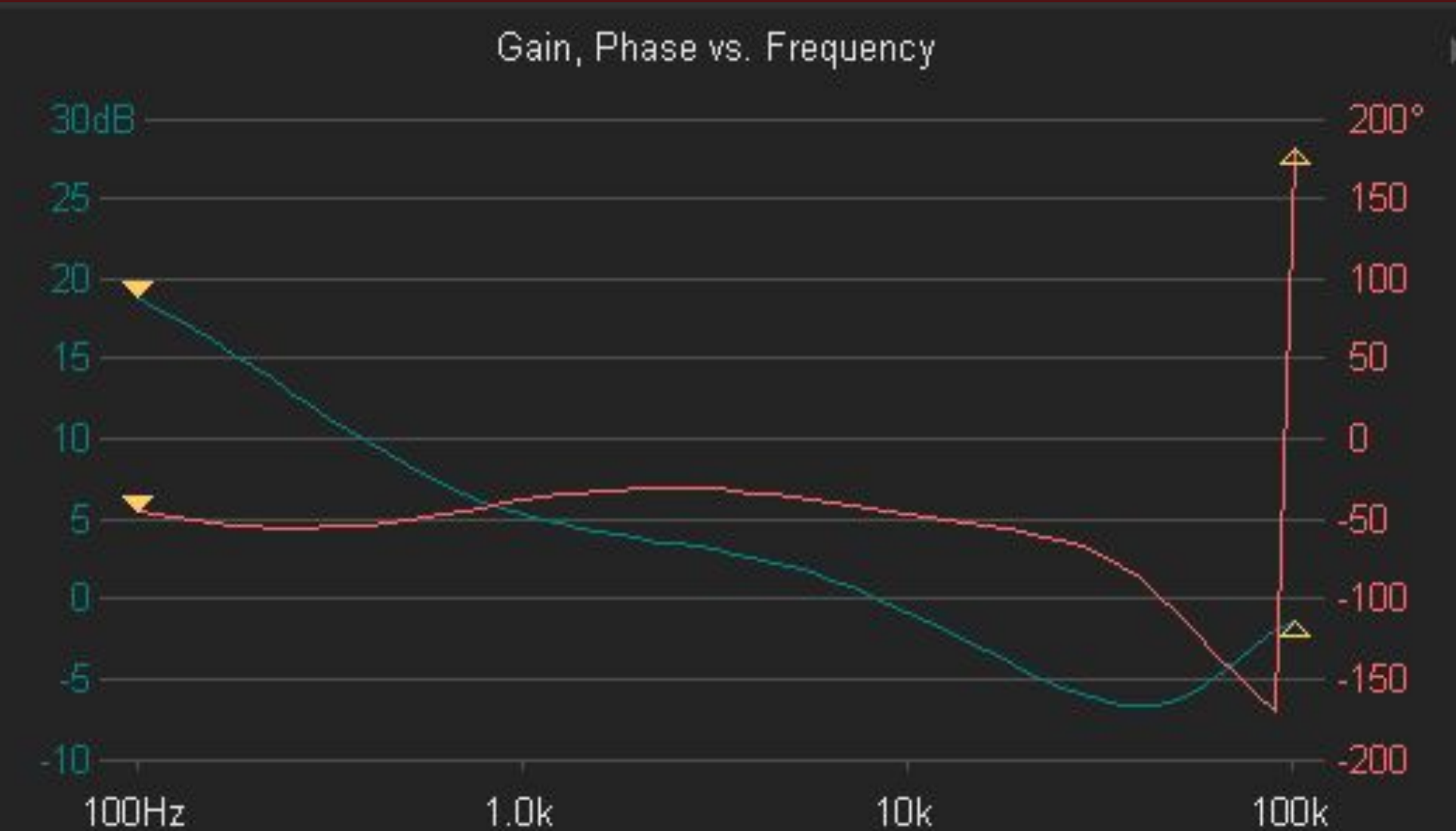- 9V Battery Supply
- Foot-switch for true bypass of guitar effects
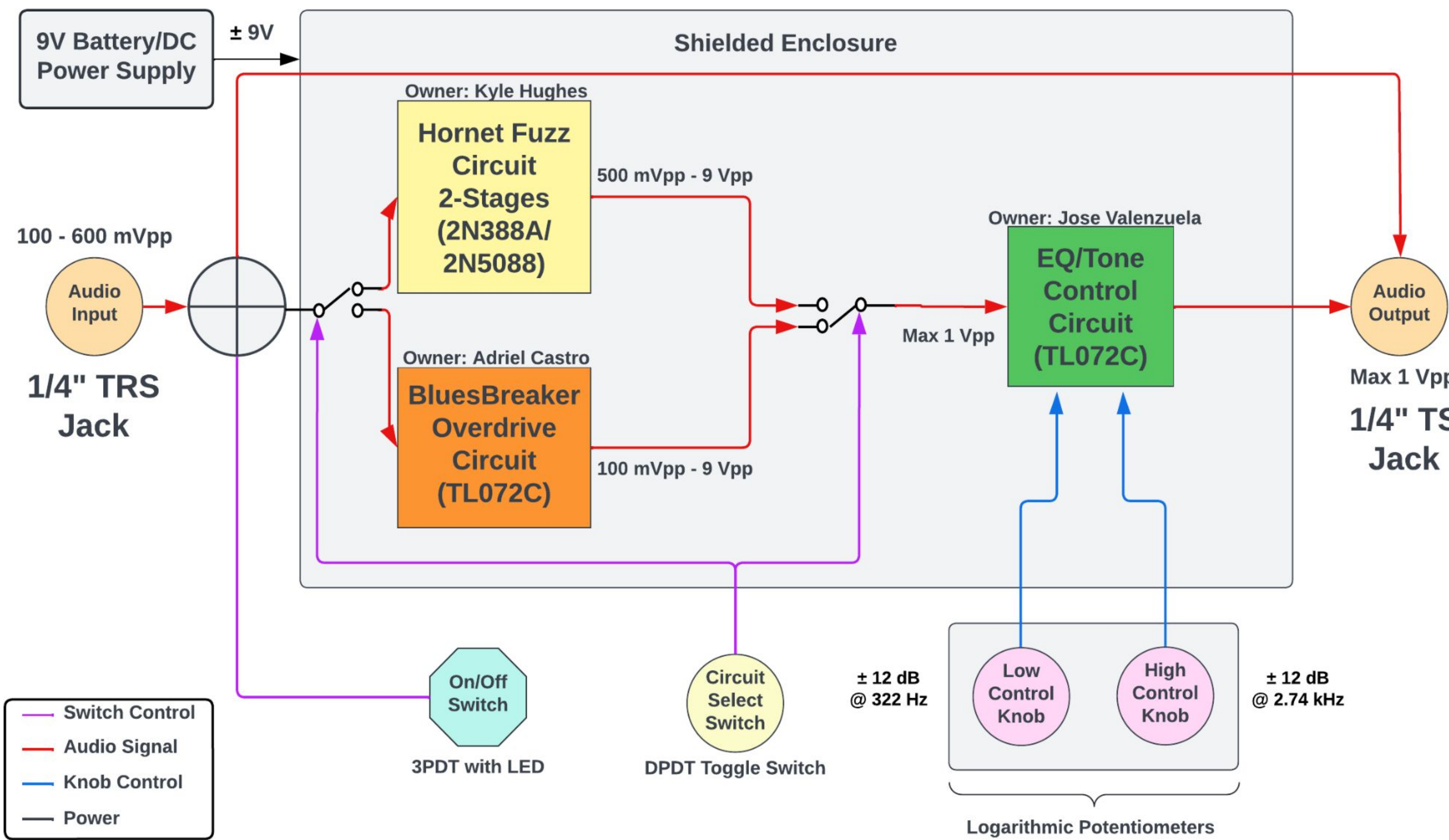
Frequency Response
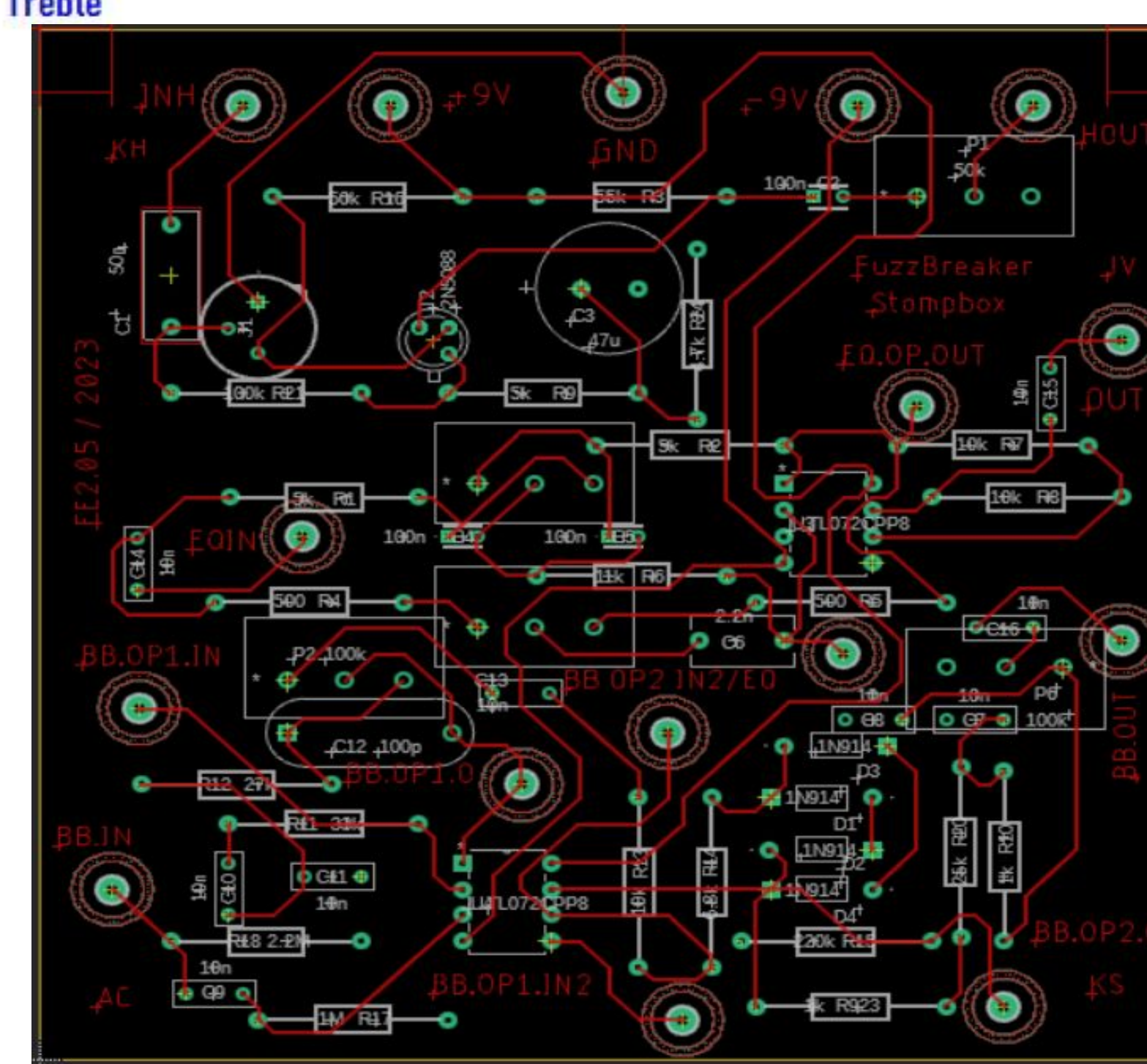### Hornet

BluesBreaker

EQ (Bass Boosted, Treble Cut)
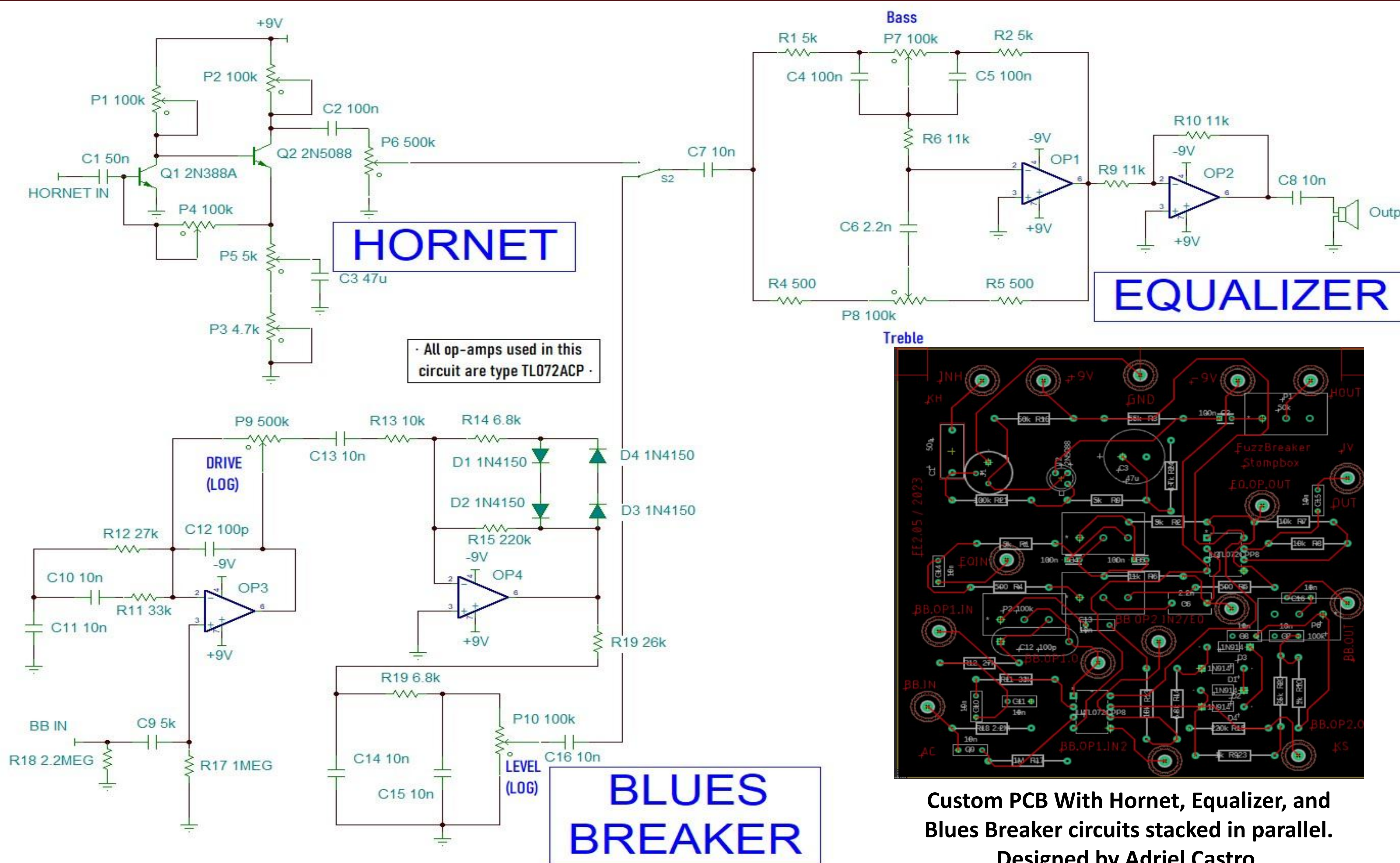

Hornet Circuit derived from: https://www.diystompboxes.com/pedals/hornet.jpg
Blues Breaker derived from: http://www.generalguitargadgets.com/pdf/ggg_mbb_orig_sc.pdf
EQ design derived from: https://www.homemade-circuits.com/simple-tone-control-circuits/

Top Level Block Diagram

FuzzBreaker Stompbox Schematic

Custom PCB With Hornet, Equalizer, and Blues Breaker circuits stacked in parallel. Designed by Adriel Castro.

FuzzBreaker Team

Kyle Hughes   Adriel Castro   Kevin Seets   Jose Valenzuela

Characterization Results

Characterizations	Circuit	Expected	Actual
Current Draw	Hornet	5.9mA	2.9 mA
	BluesBreaker	10.1 mA	4.6 mA
	Equalizer	2.6 mA	1.2 mA
Input Impedance	Hornet	3.2 kΩ	11.1 kΩ
	BluesBreaker	680 kΩ	687.6 kΩ
	Equalizer	4.14 kΩ	4.5 kΩ
Slew Rate	Hornet	n/a	1.9 V/μs
	BluesBreaker	n/a	0.003 V/μs
	Equalizer	n/a	0.004 V/μs
Output Impedance	Hornet	34.9 kΩ	14.7 kΩ
	BluesBreaker	13.8 kΩ	26.9 kΩ
	Equalizer	671 Ω	3.39 kΩ
Distribution of Even/Odd Harmonics	Hornet	Even: 1% Odd: 99%	Even:.1% Odd:99.9%
	BluesBreaker	Even: 2% Odd: 98%	Even:.5% Odd:99.5%
	Equalizer	n/a	n/a
Frequency Response		Refer to the Frequency Response graphs in the left section	
Signal to Noise Ratio	Hornet	> 30 dBv	39.6 dBV
	BluesBreaker	> 30 dBv	45.5 dBV
	Equalizer	> 30 dBv	68.9 dBV

Green values are acceptable and Red values would represent unacceptable results.
All testing was done at 1 kHz with 50 mv peak-peak Hi-Z sine wave. All level/gain controls were set at 100%.

Acknowledgements