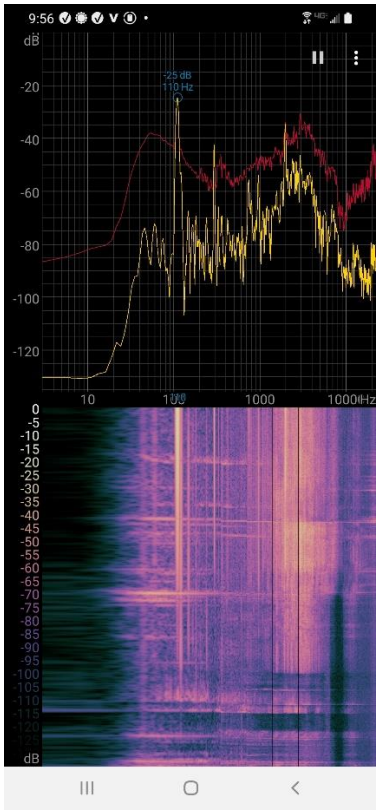
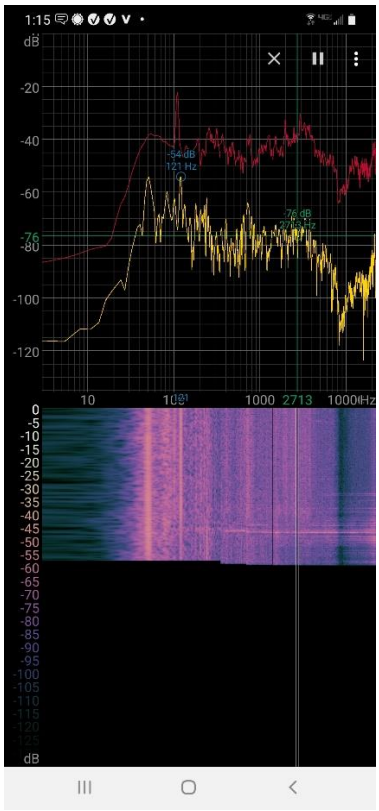
Plastic Pedal Noise Reduction System

A Behringer TO800 and CS400 guitar pedal were modified to reduce noise and hum. The technique was two fold based on limited space inside the pedal cavity. Method one was to add a high and low frequency filter capacitor across the input power supply. A 1000 uf / 35V electrolytic capacitor and a 0.01 uf polypropylene capacitor were shoe horned into the power supply input circuit on top of the PCB as shown below. Method two was to implement a Faraday shield around all of the electronics and utilize a star ground system for the shield so that erroneous electromagnetic induced currents would not flow in the ground system of the pedal's electronics resulting in noise, hiss and hum. Some basic measurements showed about a 30 dB decrease in 120Hz AC ripple noise as shown below in the second figure.





The tricky parts were 1) using a mounting hole to run wires to the new filter caps to solder to the back side of the board's input power jack connections 2) Using electrical tape to isolate the grounding pad and mounting screw from the shield and metal bottom plate. Note the metal plate is simply there to add weight so the cheap pedal doesn't "feel" cheap. 3) Making sure the whole entire case is wrapped in copper foil for the Faraday shield 4) And most important a wire was soldered to the shield and the closest input jack ground connection point on the PCB. This provides the necessary star ground for the noise suppression system. It should be noted there are still places where RF can sneak in, like under the foot switch where there are holes for the switch plunger and battery cable, nothing is perfect.

Below are pictures of the process and a diagram showing the layout of the components, original ground plane isolation, copper foil shielding and single point star ground connection for the Faraday shield to connect right at the guitar input signal ground (ring of the ¼” plug).

Noise Reduction System Wiring and Shield Mods