Guitar Speaker Amplifier and Equalizer Combo
By Benjamin Martin & Samuel Rainer

Goal
Design the electronics for an amplifier speaker cabinet suitable for practising with a band at a small venue.

Specifications
● 46dB (200) Maximum gain
● No audible distortion / THD < 0.3%
● 3 Band equalizer with 10dB cut and boost
● 30 watt 8 ohm speaker

Amplifier
● Differential Output of 21.8 Volts
● Class AB Amplifier Output Stages
● Crossover Distortion < -50dB
● Low Noise Op Amps
● Total Harmonic Distortion 0.00672%

Equalizer
● Active Graphic Equalizer
● Frequency Bands - 82Hz, 980Hz, and 11.8kHz
● Quality Factor of 0.3
● Max Boost: 11dB, Max Cut: -14dB

Power Supply
● 4 amps current from each +15V & -15V
● Power Supply Rejection Ratio of 75.0dB
● Load Regulation of 1.96%

PCB
● 4 Layers
● Traces on Front and Back
● Conductor planes reduce voltage variation
● Power and ground in centre

Conclusion
Our design provides excellent audio amplification and high quality filters.

Future Work
● Build prototype then validate design
● Add additional features such as reverb
● Research production cost estimates

Illustration 1: Rendering of PCB design
Illustration 2: Amplifier Schematic
Illustration 3: Mid Band cut -14dB
Illustration 4: Traces and Components of PCB