

Fender Chimp-amp

Aka Magilla Gorilla

Bill Paine

Prof Steve Errede

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The Fender Champ amp was one of Fender's first student level guitar amps. As a student model, it has a simple design, coupled with reasonable dependability. The first model of the Fender champ was offered in 1948 as a 4 watt amp with an 8" speaker. The class A amp had three tubes, 6SJ7 for the preamp, 6v6 power tube and the 5y3 rectifier tube. This design was continued into the Champ 600 in 1949 using the same chassis and circuit, but housed in a different looking cabinet with a 6" speaker. Later, the wide panel box was offered with the 600 and was covered with the classic tweed cover offered by Fender. Starting in 1955, the design was modified again to offer the standard Fender chassis and circuit board with the controls moved to the top. The 6SJ7 was replaced by a 12AX7 preamp tube. The 5E1 was designed to have a choke and a negative feedback loop. However, the next model, which my amp was modeled after, was produced without the choke.

In making my amp, I started out with an entry level Gorilla practice amp bought off of ebay. The amp sounded really hollow to begin with and had a "TubeStack TM" which didn't distort the amp at all. I proceeded to gut the chassis which I would mount the new components. First the circuit was laid out as shown in the schematic. I began to work on the circuit board first and mounted all of the components in a basic breadboard. The one thing I watched for in mounting these components was to keep the resistors away from the caps to keep the circuit relatively cool.

A few modifications were made to the circuit board from the start. First, the 25mfd caps off of the rectifier 6v6 filament and 25mfd cap off of the cathode resistor of the preamp were intentionally left out. These caps raise the gain on the amp, where it would be easier to distort the amp. At the end of the day I wanted to design an amp that

sounded clean at low levels, but if cranked, could distort moderately. In addition to the gain, I found no need and no space in my circuit to have two jacks in the front of the chassis. The two resistors on the input to the preamp were replaced with one 33k resistor to handle one jack. This resistor and the volume cap were moved to the back of the circuit to make room for the input jacks and the volume pot. The resistors off of the filter caps or any other high voltage locations were designated to be one watt resistors to handle the heavier load required. Otherwise, the circuit was laid out the same as on the original champ. However, there is one big difference between my circuit and the original champ circuit. The original champ circuit was point to point wired, where the components were only attached with solder and staples to a cardboard base. My components were mounted in a breadboard, which is more secure for the components and discourages short circuiting between the different circuits.

The most difficult part of building this amp was the chassis limitations. The chassis was not punched or drilled to the specifications needed to create a champ amp. For some reason, the engineers at Gorilla did not figure on me creating a custom hack job out of their amp. The chassis had to be drilled, punched and sawed to mount the various hardware required, such as the tube sockets, transformers and breadboard.

After the circuit board was shoehorned into the chassis along with the transformers and tube sockets, I began to wire connect the rest of the components to the breadboard. Several modifications were made in this step. The schematic and layout diagram show several grounding terminals for the components. All of the grounds were connected together at one common ground. One reason that they were connected like that was A) it was easier than drilling five more holes for grounding screws, and B) it reduced

the hum in the amp. In addition to help with hum, the heater wire from the rectifier 6v6 was grounded to the chassis.

There are a few pitfalls that should be advised to anyone attempting to build an amp. I always like to learn from other people's mistakes, so this is the chance to learn from mine.

1. The number one problem in my amp is that I tried to cram too much into a small amount of space. While the resistors do need space to breathe so the rest of the circuit does not get hot, they probably do not need as much space as I had given them. The circuit board is an extremely tight fit after installing the tube sockets behind the board and the transformer to the left of it.
2. In retrospect, the components should have been wired and soldered on the top of the circuit board. Originally I had soldered them all on the bottom of the board, so that the circuit would be aesthetically pleasing. However, if I want to alter the circuit in any way, unsoldering is twice as tough with most of the connections being underneath the board.
3. Third, in any custom hack job to a chassis, make sure to know the size of hole that you are drilling or that you need. I drilled several holes too small and had to go back and ream them out by hand. Also, make sure you have all of your holes drilled before mounting the board. It makes things so much easier and you don't have to worry about the vibration induced on the soldering joints on your board.
4. In choosing a cabinet for your amp, find one that has a lot of room in the chassis and enough room underneath to mount transformers and tubes. I had

to shave about a quarter of an inch out of the inside of the cabinet to make the power transformer fit into the cabinet.

Performance of the Amp

This champ amp has a very round tone to it. A round and easily distorted tone is common to the champ amps of the '50s and '60's. This amp has a great sustain to it, and good response. The low and high ends are both emphasized, volume-wise. The amp starts to distort around 6, and you can achieve almost a full distortion around 8 on the volume knob. However, this is almost at the point where the speaker maxes out its travel. The amp does sound very dirty, but it is extremely hard on the speaker with all that hard buzzing. However, this was expected since the stock speaker remained in the cabinet. An impedance of 4 ohms will just not cut it with this amp. I was extremely happy with the results achieved with this amp. I had no problems with bad connections, or loose wires in the very beginning. And also what's good about this amp is that there is absolutely no 60 cycle hum to it. It is a very clean sounding amp, but can get dirty when the player wants to have a distorted sound.

In looking at the data for the voltages in this amp, I was trying to find why this amp sounded the way it did. All of the voltages across the board read higher than an actual champ amp. This could be because of various reasons. Firstly, my power transformer read 18 volts higher than an actual champ. This would tend to drive the rest of the voltages up also. However, there was one discrepancy that the cathode voltage on the rectifier tube 6v6 was lower than the standard champ by 1 volt DC. This is probably resulting from omitting the 25 mfd capacitor from the circuit. That capacitor would tend to bump up the voltage in the circuit and increase the gain.

I have a lot of plans for this amp when I find the free time to tinker with it. The first thing that I would like to do is swap out the speaker in the amp with a higher quality speaker. That would enable me to get a little more distortion out of the amp. I would also like to add the two capacitors on a switch so I could switch back and forth and notice the difference they make to the amp. It may also function well as a distortion switch at higher volumes. One last minor thing that I would like to add is a jewel light to give it that nostalgic look. A tweed covering might look good on that amp to give it a classic look that it deserves, not just an entry level practice amp.

Finally, I would like to thank Prof. Steve Errede for his help on this project.