

813 fever

By Vic Rosenthal, K2VCO

There are two things that say “ham radio” to me more than anything else. They are CW (of course) and home-made equipment. My first transmitter in 1956 was the well-known single 6L6 crystal oscillator, and it was a few years before I had a store-bought rig, a Heathkit of course. But almost nothing is more fun than building amplifiers.

I built my first one in the 1960's, a single 813. It produced about 275 watts, but made a huge difference compared to the 45 watts or so I was getting from my DX-60.

Some years later, when my daughter was 2 years old (she's 36 now, something I have a hard time believing), I built another, a pair of 811A's. Mollie came down to the basement and announced that she too wanted to build an amplifier. So I collected a bunch of 'parts' (mostly little pieces of wood and aluminum) and made her a little work bench, a 'drill' and a 'soldering iron', and every evening before her bedtime we worked on our amplifiers together. Even then she could read the colors on resistors better than I could, so she was no small help.

Since then there's only been one scratch-built amplifier project, a pair of 3-500Z's that was never completely finished – it was too big and inconvenient.

Now I have a perfectly good SB-1000, which works on all the HF bands and is good for about 750 watts. But I can't stop thinking about 813's. I like the way they look. They don't require loud blowers like ceramic tubes. They warm up quickly. They are still cheap and available, and ones made in the 1940's keep their vacuum. Did I say that they are cool looking?

So it occurred to me: why not build something with 813's? You are probably waiting for the connection to CW, so here it is: an amplifier used only for CW doesn't have to be linear. It can be class C, for example, as long as you take steps to ensure that the high bias doesn't sharpen up the keyed envelope and produce clicks. My first 813 amplifier used a clamp tube circuit to accomplish this, but there are other ways. And a class C amplifier can easily exceed 75% efficiency, which means that a pair of 813's can loaf at 750 watts of CW output.

I am starting to plan, collect parts and even clean up my workshop. I have some sockets, a couple of tubes, a filament transformer, meters, lots of coils and capacitors, etc. Naturally the goal is to do this at as close to zero cost as possible. What I am thinking of is a class-C version of the G2DAF circuit, in which the screen voltage and operating bias are derived from the drive power. That will kill a lot of birds with one stone: the screen supply, key-up protection, envelope shape preservation, etc. There are lots of details to work out, but that's ham radio!

I have no idea what I'll do with it when it's done. Will it replace my SB-1000? Who knows? It's not so easy to build an amplifier that works smoothly on all the HF bands. Just the plate RF choke can be a challenge, although I've made one that looks pretty good on the bench (yes, I know you can buy one from RF Parts. But what fun is that?)

Luckily, I have a collection of ARRL and Bill Orr handbooks going back to 1938. There's lots of good information there about tube amplifiers and 813's. The new ones aren't much use; lately it seems that the ARRL is afraid to encourage us to build anything that requires more than 12 volts.

The only problem that I can't solve so easily is that Mollie lives 9,000 miles from here and is busy enough with her own baby that she won't be able to help me with mine!