

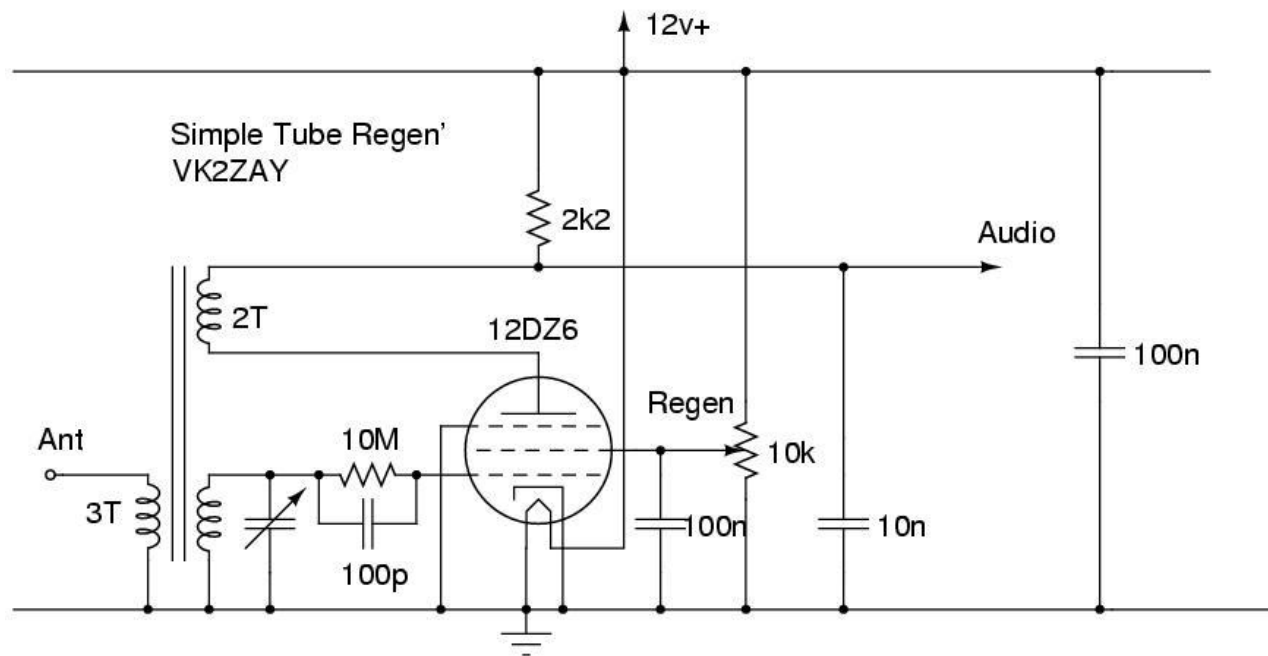
Tube Regenerative Receiver

Inspired by an old movie I saw one late night, I thought I'd have a crack at building something with tubes (this was my first tube project). I was a bit turned off at the thought of having to build a 90-250V DC supply (or lots of 9v batteries) just to experiment, so I took a look at the tube data available online. After a bit of digging, I found a range of fairly modern tubes that are designed to run very starved, just the ticket I thought, so I ordered 4 12DZ6 units and matching bases from [The Tube Store](#)

I ordered them on a Sunday night (local time), and they arrived on the same Friday. I was pretty impressed, as I had requested the cheaper shipping that is ment to be rather slow. They arrived nicely packed and in good shape.

That Saturday, I had some spare time to burn, so I set a tube up in its socket with lots of alligator clips, playing around with it, I was surprised how FET like it was, just like a JFET only more forgiving, more legs and gates, and much bigger and hotter.

Using a fairly conventional BRF981 style regen design, I 'ported' it to the tube.



The unlabelled tank is a tuning gang and coil determined experimentally for the bandsread required.



I built the prototype on a chunk of single sided unetched board (my favourite construction technique, a cross between ugly-bug and Manhattan). The coil was just a random bunch of turns on a film canister, it just happened to have holes in it from a previous project that were perfect for the tickler and tank winding lengths.

The antenna coupling coil is just some turns wrapped around the resulting structure and soldered to the ground plane. The ferrite rods you can see are some random ones I picked up at DSE for \$1 each. I have no idea what material they are, physically they are hard enough to blunt my hacksaw blades, and quite resistant to shattering, even when notched (they are like tungsten carbide or something, but more elastic. The only way I could cut them for a later coil was to clamp them in a vice and beat on them with a hammer until they shattered, hopefully at the right length). Whatever the designation of this ferrite, it is unlike any I have seen before, I must try to measure its properties some day.

Here is a close-up of the prototype in a largely finished state, note the ugly 200p cap just dangling there in mid-air. I took the picture while I was finding out just where on the band it was working. The choke wound on the bolt is to prevent my PSU from oscillating. It has been playing up lately when connected to capacitive loads, I must fix it.

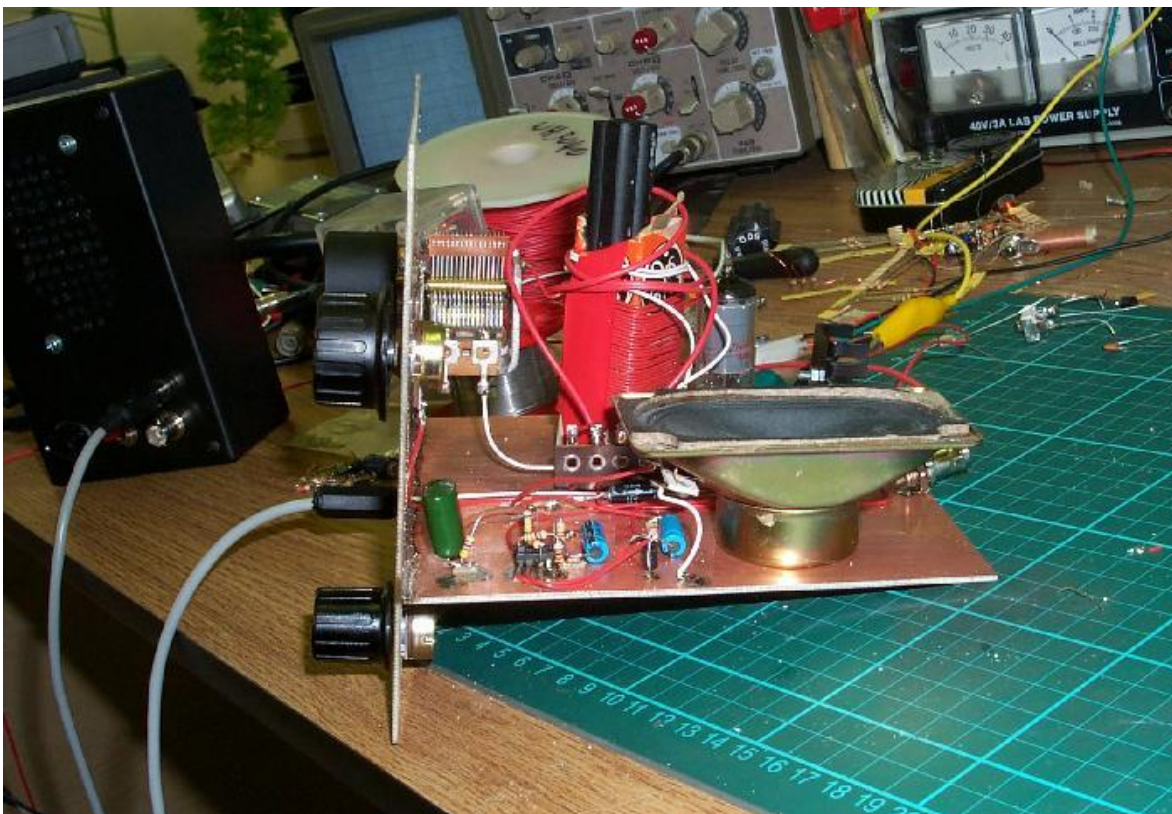
Also note the little black things with three legs littering the board (well there is only two of them). I ran out of room to use another tube for the AF stage, so I resorted to transistors, and built around the tuning cap (it was an after-thought really). The amp stages are identical, fairly conventional AF designs with a gain of around 10dB each, I

have not included a circuit for them as they don't appear in the final version and you can replace them with you favourite building-block AF pre-amp. The just visible black thing that the AF lead heads off to is a small desktop amplified speaker. This arrangement provided enough gain to listen to DX stations while I built its daughter (the slightly better designed and more attractive version)



This image comes from about half-way through the construction, the surfaces are unetched single-side PCB material with a solder fillet holding them together. I was concerned about its mechanical strength, but it is more than capable. The front panel has a largish knob for the tuning gang (a ~315p unit I purchased in a lot 20 from [Antique Electronic Supply](#), another rapid shipment and very reasonable prices). There is also a smaller but still quite large knob for the regen control pot, and a medium knob for the AF gain pot. There is also a 3.5mm mono headphone jack, headphones being the main target output device, although the desk amp works well, and the internal speaker is OK for local stations, if a bit tinny because it has no resonant cavity.

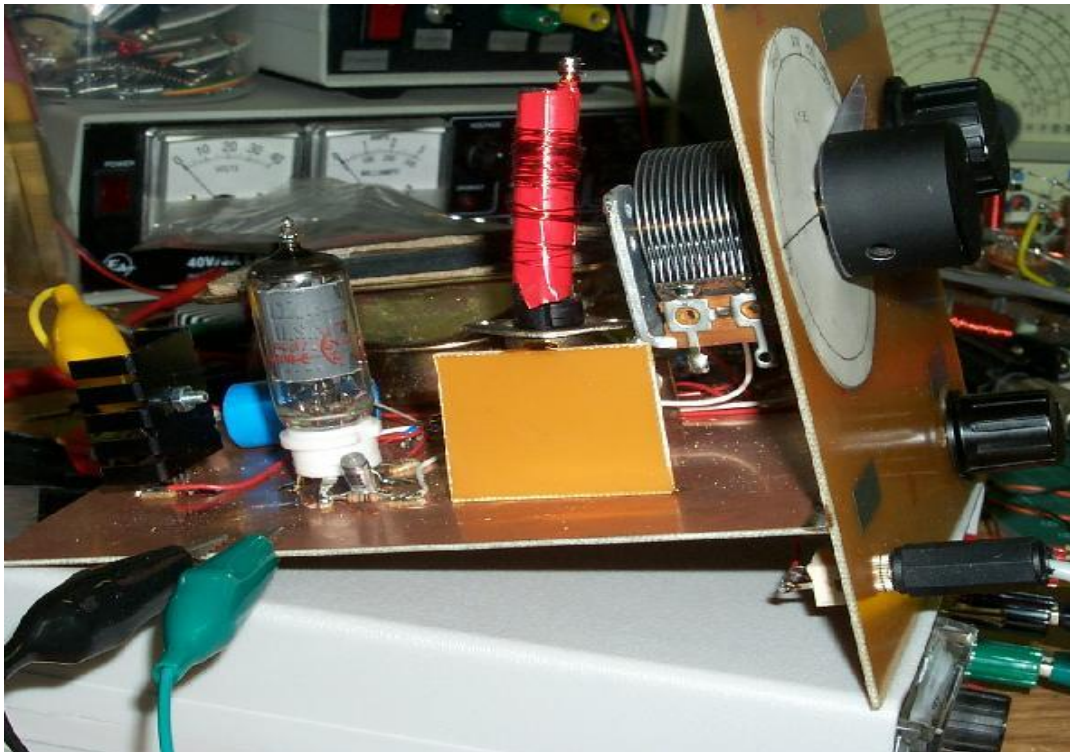
Just behind and to the left of the unit, the prototype is cluttering up my workspace, as I listen to some DX broadcast station (it is about 3 AM by now). It IDs as 'Radio 16 NTC' and I can hear other copies of its content elsewhere on the band, it plays country music. I am told this is a new network of country channels...



Here is the almost complete unit. There is no finishing touches to the face plate yet, and the coil is still a temp' one I wound on the tube box. The AF amp in this unit is almost identical to the one in the [desktop amp](#) the unit is plugged into, except it uses a cheaper (and nastier) LM1458 rather than an LF353, and the preamp stage has been given more gain and a different frequency response.

Note that I've added a 3 terminal regulator (the thing with the heatsink behind the speaker) so I can run the thing straight off my 15V PSU without reducing the heater life.

You can probably see the tinning on the board near the big green-cap, I originally built the unit with a three-stage direct coupled AF amp (100dB design gain) but the rest of the circuit is too microphonic for that. The transistors I used in it were labelled BC549C, but they were pathetic, quite noisy and low gain. I used carbon resistors too, which only made things worse. Maybe some day I'll rebuild the amp using metal film resistors and good quality BC550Cs.



The finished product. The coil is socketed with a 5 pin DIN connector, allowing bandswitching. The tuning knob has a clear plastic needle overlay, and some 'dynamo' style labels have been added to the other front panel features.

I haven't ripped the prototype apart either. It is a workable radio in its own right. I may recoil it for WWVH and build a rather power-hungry stratum-0 clock receiver for the local network.

Source: <http://www.vk2zay.net/article/40>