

“What are the Wild Waves Saying”

Have you ever wondered what those old crystal sets back in the 1920's and 30's really sounded like?

Have you ever thought about our lads in the German POW camps during the 40's with their “Foxhole radios” made from the most basic of components - a pair of scrounged headphones, capacitor made from a cigarette packet foil, a coil made by unwinding one of the headphones and the detector made from a rusty razor blade and a safety pin? Did these simple old radios really work, and how loud were they?

It all started one rainy afternoon when I was having a cup of tea at work with another electrical engineer. He was telling me how his son was getting interested in electronics and he thought it would be nice to get him started building some simple electronics projects. In true radio ham style I suggested he might like to build a crystal set. A quick search of EBay produced a “buy it now” kit for a fiver. I explained how I had made crystal sets with my father in the early 60's and listened to Radio Luxemburg on 208 metres on the medium wave.

After a short time the kit arrived and my colleague and his lad spent a happy evening building the set. Next morning I asked if the radio worked and the reply was “nothing from it at all”. I enquired about the aerial and the reply was “That's fine, they gave us five foot of wire, so no problem there”. By now it was Friday afternoon and after a quick explanation of frequency and wavelength my colleague was dispatched with a reel of PVC equipment wire and told to get the aerial as long and as high as possible.

That evening after work whilst tuning round on 80 metres I noticed my old ATU in the corner of the shack and began thinking about crystal sets. A quick search of the junk box produced an OA47 germanium diode and a nice 500 – 500 pf variable capacitor; brand new and still in the original wax paper wrapping. I had collected a few of these from a previous university Cybernetics Department clearout thinking they would be useful someday. I needed a coil, so I wound 50 turns of PVC equipment wire on to a toilet roll – perfect, now I had all the parts I needed except headphones. I remember my old dad saying they must be high impedance (lots of ohms) and as I only had walkman types I settled for a small Piezo crystal earpiece left over from a previous project.

Fifteen minutes later I had a bird's nest that was to be the radio. An earth connection to the radiator in the shack and one leg of the G5RV connected to the top of the coil proved the design was good, however the sound was barely audible, but the radio did tune a couple of stations, namely 210 Classic Gold on 1430 kHz and Virgin Radio on 1233 kHz.

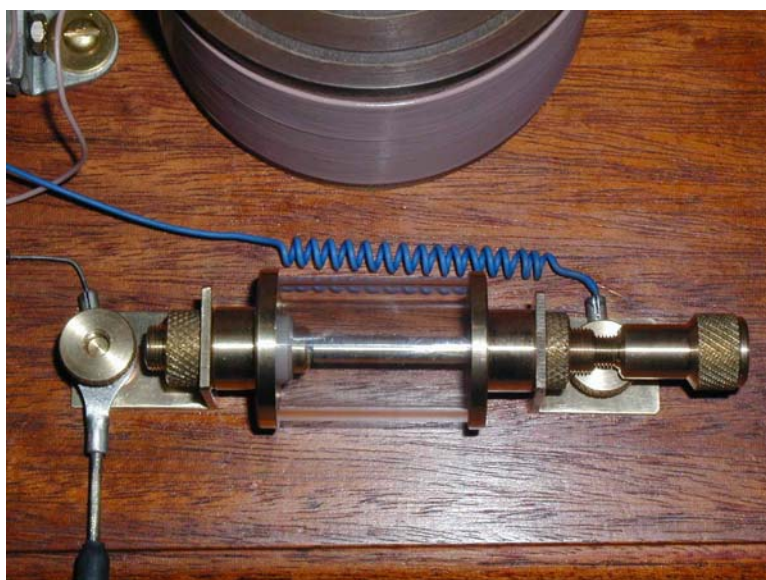
Further tweaking showed the radio worked best with the coil tapped at 27 turns from earth and the antenna connected to this tap instead of the top of the coil. A 47k resistor across the earpiece improved the audio no end by adding a bit of loading to the crystal.

The whole thing was tidied up and screwed to a nice mahogany base cut from old, rescued, HV substation floor boards, prepared and edged by Tom G0VQR and

originally destined for a steam engine project. It reminded me of one of the original 1920's radios and to complete the look I turned up some 2BA knurled brass thumb screws for the terminals.



I decided to take the radio to work on Monday to show my colleague and was pleased to hear the extra 60 feet of wire had done the trick. He was impressed with my radio and suggested that it should have a real looking cat's whisker detector to complete the project. That evening I set about making a replacement replica crystal holder and tuning unit from brass in my workshop. The germanium crystal was hidden in the end of the threaded part of the holder and the whole thing was mounted on the baseboard. It looked good and when the screw was adjusted it touched the end of the diode just like a real cat's whisker detector.



To complete the radio a small brass plate was added to give the radio a name. I settled on the "Cat's Whiskers", a play on the name, because it really looks the part, a true 1920's replica crystal radio.

Lunchtimes at the university are often spent surfing the net looking for bargains on EBay. One such lunchtime produced a pair of Brandes Superior BBC 2000 ohms

headphones, circa 1920, in good condition, and I got them for £15. Ideal for crystal sets and some of the best made at the time. A couple of days later they arrived and the results were outstanding. Both the audio level and quality had improved dramatically, so this was how radio sounded in the 1920's - not bad at all.

By now I was beginning to read the vast amount of information on the web relating to crystal radios. It seems that there is even a DX club that receives distant signals from all over the world.

I came across one site that had a JPEG image of a 1920 Quaker Oats tube label that could be downloaded, laser printed and stuck onto a 3 inch diameter cardboard tube, making a very original looking coil former. So a second radio was constructed to make use of this coil, the same amount of turns (50) again centre tapped at 27 from earth.



Rusty bolt effect

I started reading about the "Fox Hole" radios made by the GI's and prisoners during the Second World War. It seems they used a rusty Gillette Blue razor blade, a safety pin and a piece of pencil lead. Could these simple detectors work? Fuelled with enthusiasm I set to work to try to recreate my own razor blade detectors. Friday night is unfortunately ASDA night in the JTN household. Whilst carrying out this arduous task I managed to find some Wilkinson sword platinum edged old style blades and a pack was purchased along with large safety pins and an HB pencil. The detector was assembled onto a small teak baseboard and connected up to the crystal set. Results were frankly disappointing but the detector could be made to work of a fashion when touching the edge of the blade. More research was obviously needed so back to the internet for more reading about the way the GI's did it. The answer then came to me - the blades the GI's had were carbon steel and they had to be rusty. Modern blades are

stainless steel and as such will not work as well. Right, so I needed old blades from the 40's/50's era, so my next challenge was where to find some of those.

Sunday lunch with the family produced the next piece of the jigsaw. Whilst talking about the radio to my mother she said she thought there were some of my dad's old razor blades in the kitchen drawer. There were and not only that, they were Gillette Blue and still in the original blue paper wrapping. Quickly the detector was assembled with the new blade; again the results were not good. I had forgotten they had to be rusty...

I boiled the blades in salt water and dried them in a flame over the gas cooker to accelerate the rusting process. Unfortunately I slightly burnt one of the edges with the flame but thought it would be OK anyway. The new blade worked quite well on the rusty areas, but just by chance the pencil stylus touched the burnt blue area and the signal improved two fold. Back to the gas flame with another blade and soon I had a nice heat treated blade to try. The improvement in output was amazing and signals from Classic FM and Virgin were very easy to listen to. I then made another detector assembly to fit on the "Oatcake Radio". Further tests showed Stanley blades and hard backed paint scraping blades could all be made to work if they were blued in the flame first.



More radios

The "Oatcake radio" prompted me to see if I could build the whole radio into the inside of the tube. The capacitor was made to fit by grinding the corners off to allow it to slip inside the tube. Two ends were turned up from Paxolin sheet, and brass terminals were fitted along with a brass tuning knob to finish the job.



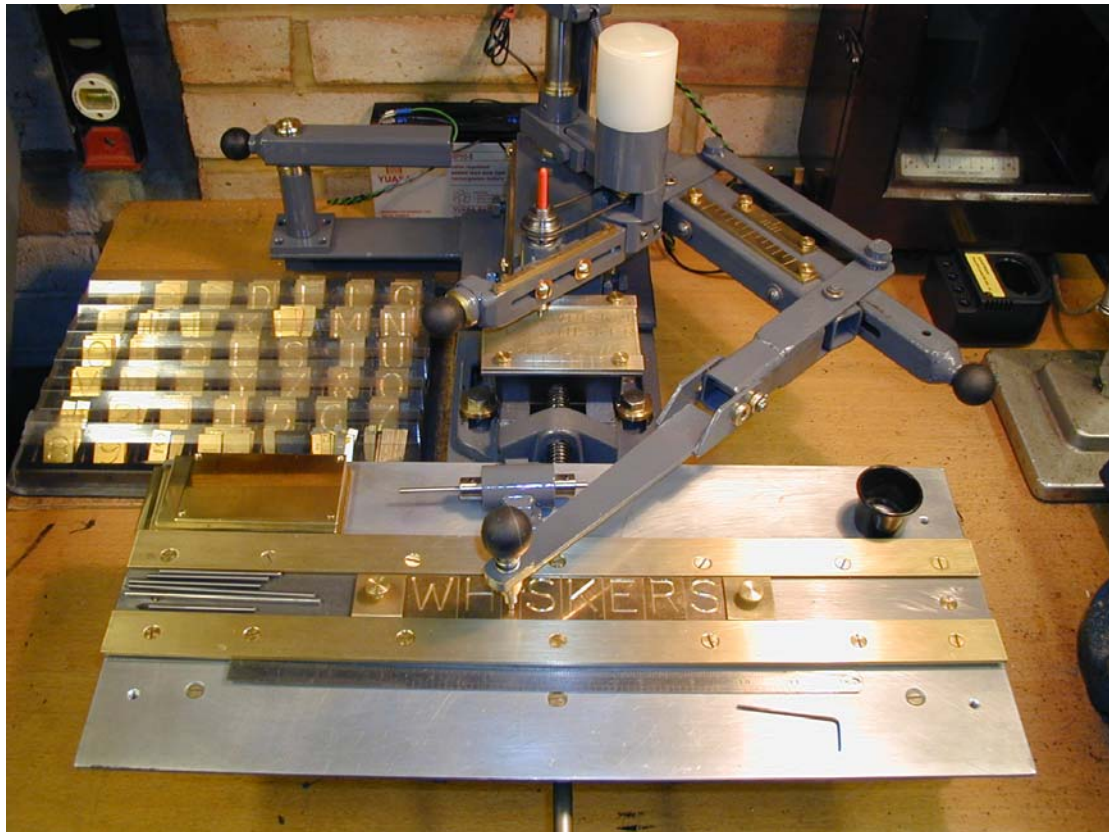
Finally, the last radio came from Pete G4JNU, during a discussion about the razor blade detectors. Pete said he had an original cat's whisker including the Galena crystals and I could have it to fit on one of the radios. However when Pete brought it along to the next club meeting I felt it was too good to destroy a complete 1920's crystal radio for just the crystal so the unit was duly restored to original condition.



I can only say that I have been thoroughly amused finding out about the history and learning how well these old radios can be made to work. I can only recommend you try to make one and in most cases parts are still in most ham's junk boxes. Who needs DAB when you can make a radio with 3 components: a coil, capacitor and a diode? By the way you can still pick up a good pair of 1920 – 30's headphones for under £10 on EBay and if the original cotton covered cords are in a poor condition replacements are also still available from a supplier in the US for \$15.

What project next?

Well you remember the small brass plate? The engravers at ASDA wanted £12 to engrave it for me so I decided that the JTN workshop needed it's own engraver and set about building a copy of a Gravograff pantograph engraving machine. I have included a photo so you can see the result.



By the way, you're right, I didn't pay the ASDA price - I did the engraving myself as the picture shows.

If anyone would like any further information on building these simple little radios just catch up with me at one of the club meetings and I will always be willing to help.

Where did the title for this article come from? It was the advertisement on a 1920 crystal radio plug in coil that came with the radio Pete gave me.

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