The SPARC NEWSLETTER
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A publication of the Southern PA Amateur Radio Club

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Merry Christmas! Happy Holidays! Peace!

Travel Log

by

Harry N3FMO

Do you know where NovaScotia is? Halifax? Yeah, in Canada. Well, if you ever are there, make a stop at the Maritime Museum of the Atlantic. Of course, there is a ham station in the Museum. Just find the wireless room. The station is VA1MMA. Bring your license. Maybe best go alone, so you can have a seat and operate for awhile, and not be hurried out the door by the XYL.

If you want to get your card on the wall there, you will need to work the station from another ship. It seems that it has to be a commercial or military one, though, so the party barge or bass boat won't do it. Check out these cards!

Don’t know how to work shipborne gear? No problem. There is also more recent stuff on the table to get you on the air. Here’s a picture of the station, complete with mill to pound out any urgent CW traffic that may need to get sent up to the captain and a radio watch clock to keep you aware of checking 500 kc on time.

Half the fun would be to operate the old gear, though. If you plan to go, pick a Monday or a Thursday during the cruise ship season, into October, so one of the volunteers can get you on the air. Better call 902-424-7491 before you show up, just to be safe. Even if you don’t know CW, you can get on phone or one of the digi-flavors, and at least learn

how to send your name in CW. They will give you a certificate if you do.

Whazzat? – Part Two
by
W3IHM

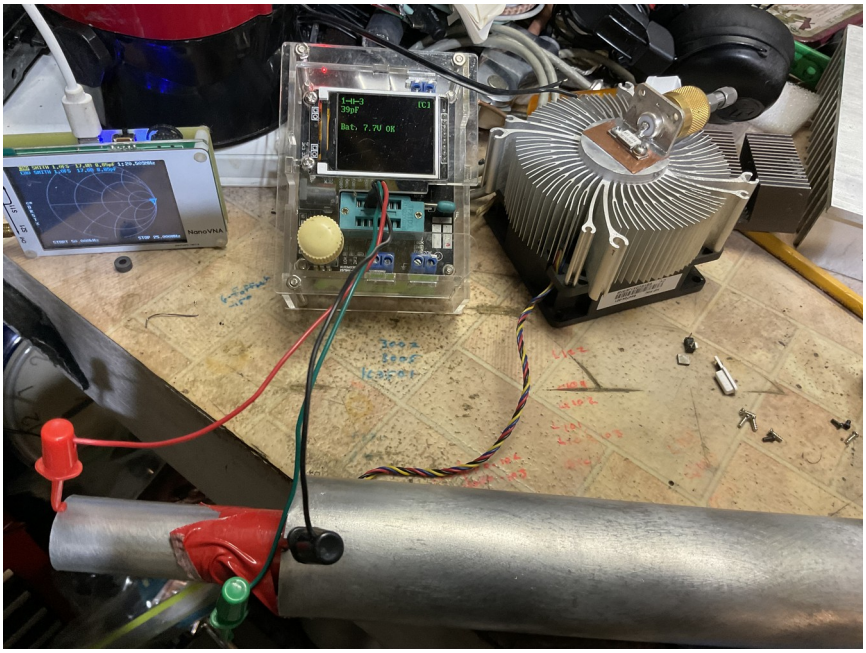
Picking up from where we left off:

“In part two, I will tell you how to accurately measure the resonant frequency of traps. “

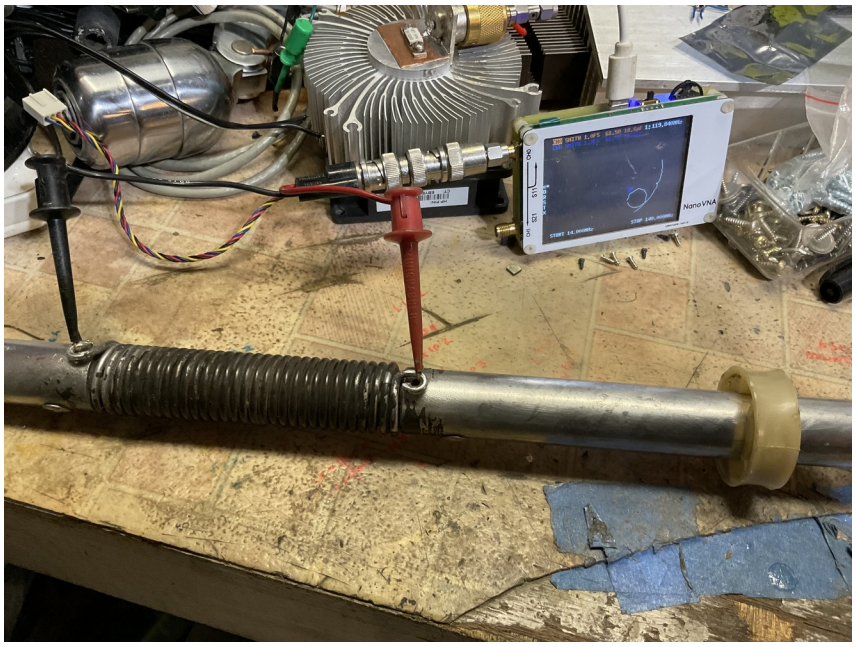
Well, I am good to my word. Having an LC tuned circuit will have a resonant frequency. How hard can it be to measure the resonant frequency? We could measure the capacitor and inductor values and use some sort of magic formula to calculate the resonant frequency, right? Sure! Let’s try that.

To measure the capacitor on the trap, we need to isolate it electrically from the inductor. That was done with a piece of duct tape.

After I did that, I took my little capacitor tester dude and made a measurement:



OK, 39 pF. How about the inductor? I tried the little tester above, and it would not go that low in value to measure the inductance. So I used my VNA to get a number:



The inductor has a self-resonant frequency of about 120 MHz, but down at HF, it looks like maybe 10’ish microhenries? It depends on frequency. Huh? Why would an inductor’s inductance change with frequency? It has to do with self-resonance and Q. What’s that? OK…. Here we go.

RABBIT HOLE ALERT!

Self resonance? What is that? Funny you asked. Here. Let me do a bit of rabbit hole'ing. Don't know what a rabbit hole is? Read Alice in Wonderland. You remember. She fell down one. Weird things happened.

OK. Let's talk about wire, dude.

A coil of wire actually has capacitance, too. Because of this parasitic capacitance and intended inductance, real world physical inductors have this annoying self-resonance property. Their coils actually also look like plates of capacitors, and as you go up in frequency, charge can get stuck between their turns, just like taffy gets stuck between your teeth.

Look, here's a picture from the 1980 ARRL handbook that as a high schooler, I remember seeing. It shows what I am trying to describe in words.

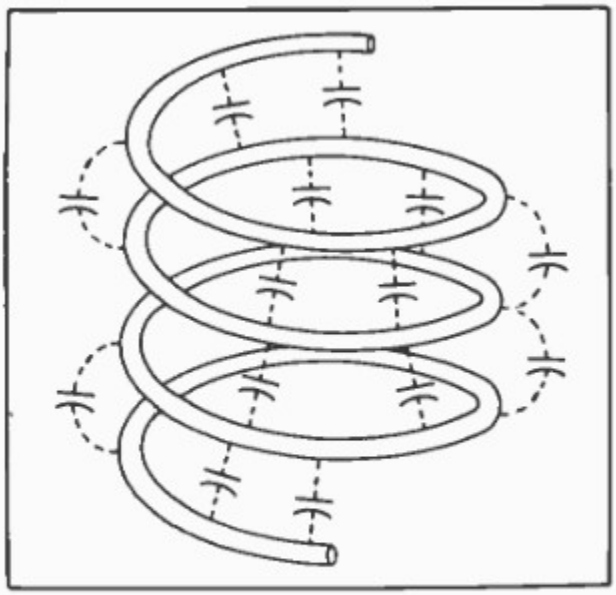
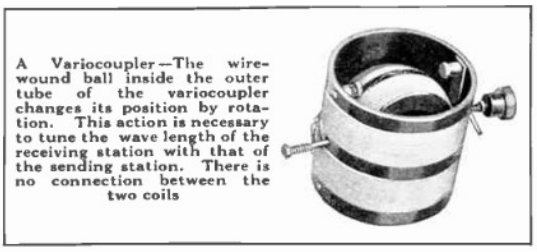


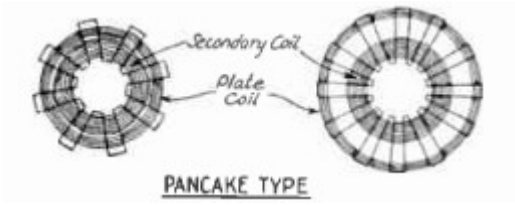
Fig. 5 — Distributed capacitance (indicated by dashed lines) affects the operation of a coil at high frequencies.

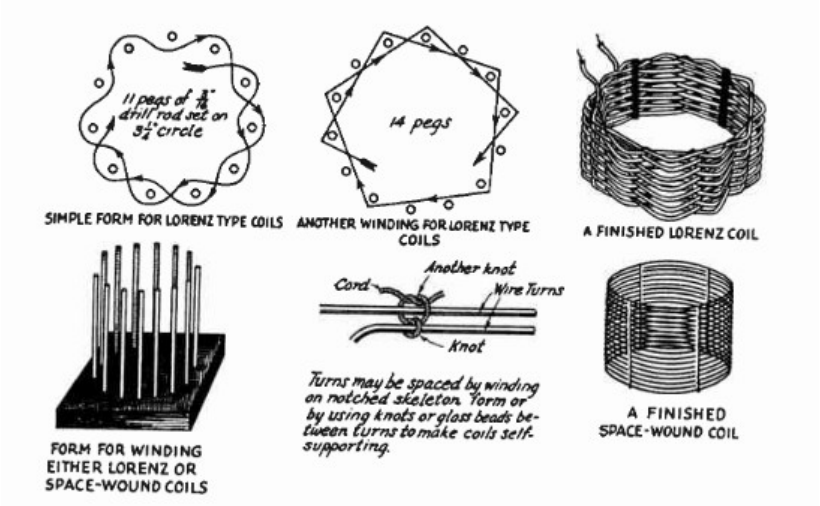
Like plates of a capacitor,each single coil turn makes a kind of capacitor between the opposing turns. So the loops of wire looks like an inductor at low frequencies, where these small capacitances are negligible, but as you go up in frequency, they start to become non-negligible. So given any simple coil of wire, this coil starts to look like a tank circuit as we go up in frequency, and at some frequency, we hit resonance of this

little LC circuit. Keep going up in frequecy, and now our inductor looks more like a capacitor.

But gee, can’t we just spread the coil turns out and lower this capacitance? Sure, but that also lowers the inductance. Our wise Elmer forefathers came up with all sorts of types of funky cool weaves in coils to reduce this inter-coil capacitance effect, such as basket weave, and taper weave coils.







But wait.. Can’t we just straighten out the wire, and have no turns at all? Sure, but you also loose all the inductance you wanted in the first place. Taking this to the extreme, we can just straighten the wire out, and use longer and longer hunks of wire, thus minimizing capacitance in our inductor. But now, we are getting into an antenna, or for pairs of wire, a transmission line.

And even if we completely straighten a wire out in absolute free space, with nothing never-ever around it, it still exhibits a capacitance and inductance, and a resonance. That’s kinda because of that pesky Einstein speed of light is a thing, and other stuff, but

this rabbit hole is quite deep, so let's back away from that one. The piece of wire becomes a radiating element. Ask me sometime, if you want to know.

And yes, capacitors also have a self-resonant frequency, too. It's just usually way much higher than the ones in inductors.

Our Elmers also "leaned into" this self-resonant property and designed it into their circuits. These are future rabbit holes I have been down before, but this blurb is already too long...

-...-

OK. We have a capacitance and inductance, let's use our magic formula and find the resonant frequency of this trap. Here's a 1973 ARRL handbook's formula:

$$f = \frac{1}{2\pi\sqrt{LC}}$$

where f = Frequency in cycles per second
L = Inductance in henrys
C = Capacitance in farads
π = 3.14

These units are inconveniently large for radio-frequency circuits. A formula using more appropriate units is

$$f = \frac{10^6}{2\pi\sqrt{LC}}$$

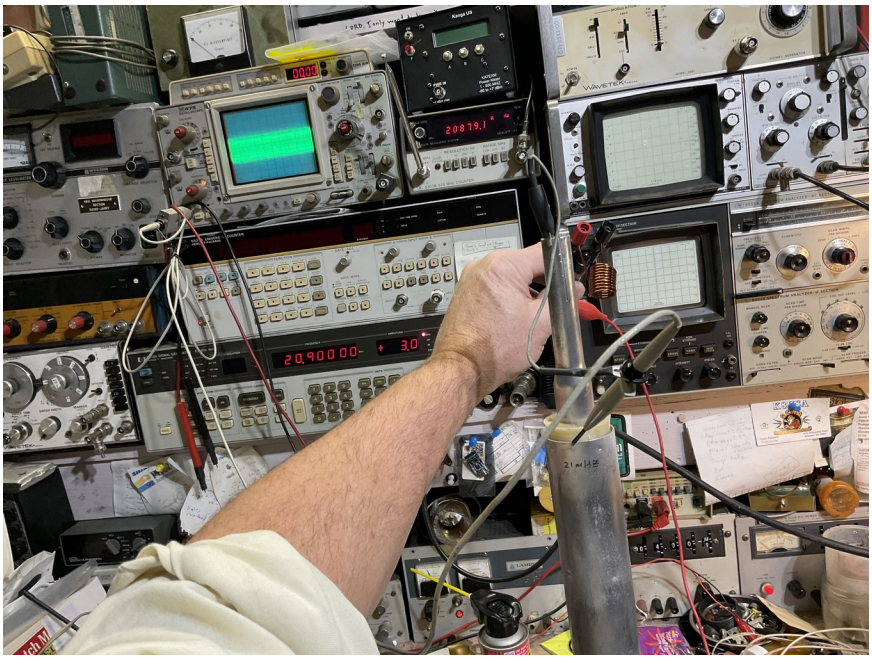
where f = Frequency in kilohertz (kHz)
L = Inductance in microhenrys (μH)
C = Capacitance in picofarads (pF)
π = 3.14

So using our handy calculator, for 39 pF and 10 uH, we get 8.063 MHz! That don't make sense. This is a 10-15-20 meter tri-band yagi, with elements way shorter than 40 meters. The traps are supposed to be for 21 and 28 MHz, not 7 MHz! What gives?

OK, so maybe there are errors in our measurement techniques, eh? What could possibly go wrong with what we did? Well, a trap has to have resonance in free air, with no test instruments attached and wires dangling off hither and thither. I am sure the capacitance meter we used has some loading capacitance of at least 10-30 pF, that would move the resonant frequency down.

Also, the VNA has an input impedance of 50 ohms, and depending on how you hook the inevitable impedance mashup, can throw off the inductance measurement, too. That's even if we set it to read around the trap's frequency, which we don't know, by the way.

So we have to come up with another way to measure the resonant frequency. Couldn't we just hook a scope probe up to the trap somehow, and inject a bit of RF from a signal generator by some unobtrusive means? I mean, scope probes are invisible, electrically, right? We could then tune the generator to find a peak of voltage measured by the scope probe.



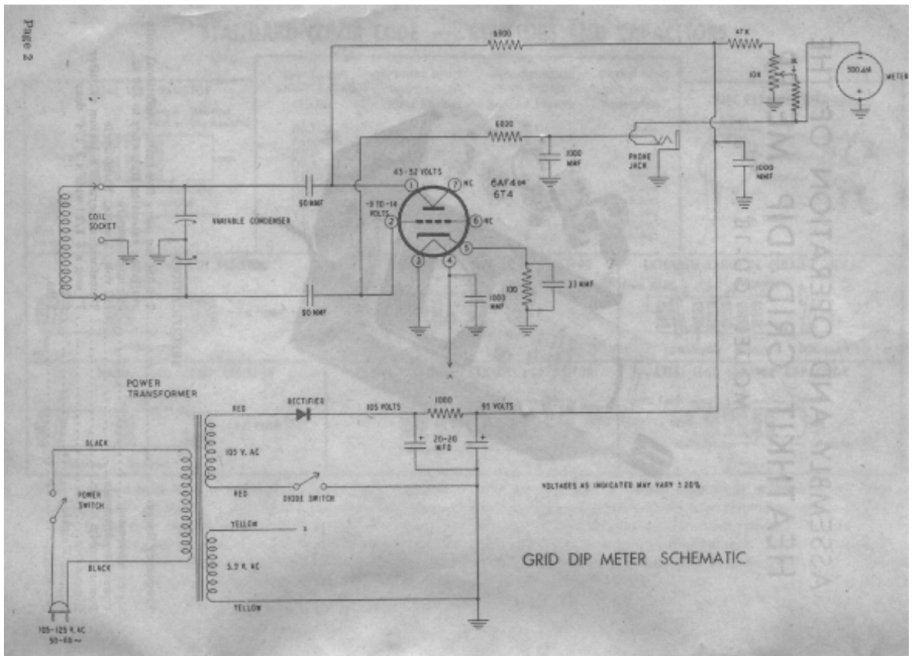
I tried this. It was still not good. The scope probe has a load capacitance of approximately 5-10 pF, so that would bump the resonant frequency down. It says right on it. See? Dang.

Anything that will load down the tuned circuit will also affect the resonant frequency. I have a swell HP active 500 MHz probe, designed to have minimum loading capacitance and highest resistances, but it's way-way up on the high-high shelf, and I am too lazy to get it down. It's evil up there. So, there must be an easier way to unloadedly measure the resonant frequency of an LC circuit.

What about the grid dip meter? There's one right here, in my brown toolbox. I don't even have to get off my bench stool to get it. Come to think of it, one of my Elmers used his grid dipper for just about everything. He said that understanding and knowing how to use one instrument well, will beat using 100's of computer-controlled digital NBS traceable instruments that are understood poorly and used by a knucklehead.

His point was to goad me into learning how to really use simple instruments to their fullest before getting anything fancy. He would bang out his pipe on his shoe heel, and say: "...what's yer hurry, kid?" Face it. A simple VOM is usually good enough to diagnose and repair many problems, but gets ignored. So I remembered his lesson, and pulled out my old nicotine-stained Heathkit GD-1 dipper, complete with unsafe crumbly line cord, and missing coils.

It is one little triode tube oscillator in a metal box, with a meter and a pot to adjust. Here's how it works. Anything that messes with the oscillator current shows up on the meter. NO magic. Here's the circuit.



Of course, mine was missing some coils, but I could make them and fidget with them to match the paper dial. The meter just looks at grid current to ground. There is a control that sets the feedback level. You can tweak this to get just about any coil you plug in to oscillate, up to a few hundred MHz, with a loop of wire. There's a lot of stuff this simple thing can tell you. Like, for instance, seeing how much feedback you need to get a coil to oscillate gives you an idea of that coil's Q. But that's just one thing.

What makes this thing shine for us will be how you can very-very lightly load it to a tuned circuit. Let's try it out! See, here's a trap….

I didn’t even have to place it close, just on top of my tea, to get a dip. I must say, this thing is very sensitive! I can get a dip pretty easily. It also showed a very sharp dip. I had to tune slowly or I would miss it. This tells me these traps are high Q dudes. I did have to make a large coil for it to get a good coupling, though. The small one I made first, required me to have to hold it close to the end of the trap, and I couldn’t hold my dang Ipad and take a photo this way, so I fussed around and made a larger coil that would match one of my little dipper’s paper scales.

Another thing I noticed is that while my scope probe was hanging around, it would pick up the radiated signal at resonance quite well! This short hunk of trap metal pipe was radiating quite a bit of RF at resonance. Check this out!

My scope's vertical output is plugged into a frequency counter, so I can measure the frequencies of things the scope shows. With the trap clamped into the little bench vise, and the scope probe just hanging nearby, the scope picks up enough radiated field that shows a nice resonance at around 21.15 MHz, according to the frequency counter. This measurement makes sense.

Another observation I made is that moving the dip meter up and down the body of the trap showed the maximum dip depth right around the open end of the capacitor section. That makes sense, as the rest of the trap body forms most of a Faraday cage, except for the open end. This end is covered by a plastic cap thingie, that probably will be the point where the trap will arc over. Remember that there is an inductor inside the thing, and the magnetic fields will form some eddy currents on the outside body of the trap, that will re-radiate. So the dip was still visible, even as I moved down the metal body of the trap.

So, in summary, after cleaning the trap out, and putting some new stainless hardware into it, this trap is a nice, high-Q 15 meter trap. There. That's how I will measure the

resonant trap frequency from now on. Learn anything? I did. If not, here is a picture of a Renault Dauphine. Now, at least, you know this.

Meeting Night

Like most clubs, there sets in a sort of monthly pattern of meetings, etc. Like, for SPARC, the usual average monthly general membership meeting is held the fourth Tuesday of the month, June the 24th at 7:00 PM, at the Clubhouse. Sometimes these things change, especially in the winter. Why are you looking at this newsletter for such information? Go to K3IR.org and check the calendar tab.

License Test Sessions

Want to upgrade your license? How about get a license? You will need one to be a ham operator. There IS a test. You are required to know something. It's not just a $$$ thing. Demonstrating that you indeed know something is another matter altogether.

So you will need to study some materials. There is plenty of on-line information to help you get your license. Ask us. We are here to serve. Go to k3ir.org and ask for help.

Usually, testing is conducted at the SPARC site on the first Tuesday of every month. The fee to take the exam is usually $14.00 payable on the K3IR website or in person, cash or check only. Go to K3IR.org and check the calendar tab to make sure.

If you do not already have one, go to fcc.gov and register for a FRN (Federal Registration Number). You will need this to interact with the FCC.

You can also pre-register to take the technician test, or upgrade, at Hamstudy.org. There is also a link on the K3IR web site to follow. Check the k3ir.org website for the latest in fashionable ham test news.

Upcoming Hamfests

Not quite a hamfest, but...

27’th annual Ham Radio University
Long Island Campus
Brookville, NY
Saturday 10 Jan 2026
9AM-4PM
hamradiouniversity.org

The season is in winter hibernation. So if there’s any indoor fests, let me know.

Volunteer – If someone drove by, would they know the place is inhabited?

SPARC currently has 131 “active” members on the roster. We have a lot to offer to our members. At this time we have a dedicated group of hardworking volunteers who keep the site running. Some say this is typical with most organizations. I don't think SPARC should be “typical” We need more real active members. Jobs range from the highly technical to the mundane but ALL are important. Please look at the list below and see if there is a place for you.

IT Team

Tower climbers and ground help

Operating building maintenance and cleaning

Operating building equipment maintenance and improvement

Porta Potty cleaning (not Pumping!)

Adopt a Highway crew

Elmers and Elm’ettes

Hamfest help, planning, etc.

Meeting programs and talks

Antennas! ...always more, bigger, higher.

Someone to take the trash home and pitch it when it’s full.

Someone else to either eat or toss the old stuff in the fridge.

Someone to put the 6 meter beam up on a rotor.

Solar power wizard experts.

Fiscally rigorous scrupulous bean counters.

Esoteric Trivia:

This is an interesting question that I found when rabbit-holing. You can probably do an internet search and find the answer, but that is doing yourself a great disservice in understanding from whence we came. Anyway, we all are probably remotely familiar with Ohm’s law, that is:

$$E = I \times R$$

Where E is in Volts (...short for a guy named Volta), I is Amps (...short for a guy named Ampere), and R is Ohms.

So, what is “Ohm” short for? (...no, as opposed to what Wiki says, not quite a guy’s name, right away, but it was shortened to ohm afterwards.)

Answer next issue.