

Southeastern Antique Radio Society

Newsletter
www.sarsradio.com

Winter 2016-2017



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Presidents Message

JIM POWEL

Greetings Fellow Members and Guests. Can you believe springtime is almost here? Where has the time gone? If you are like me, busy, busy!

First off the holidays came, (too early) suddenly another year clicked off and it was 2017. Time to reload.

Our first activity of the year was a great post-holiday party at the new home of Jim and Mary DelPrincipe in Dahlonga. A spectacular view, good food, and good friends, it just doesn't get any better.

Next on the agenda was "Dinner at the Diner", our annual foray to Marietta Diner on the eve of our Winter Swap Meet. The food was awesome, and a good time was had by all.

Then the Winter Swap Meet. First and foremost, I want to thank everyone who helped make this a success, from setup to cleanup. Sales were brisk, and the auction was well attended.

Hopefully, everyone found treasures to take home and were able to sell their items. Paul Hart's presentation concerning tubes and tube testers was well constructed and very informative. Kudos to Paul and his daughter Kathy for bringing this to us. So now with all this behind us, it's time to look ahead to springtime and our next opportunities.

Keep an eye on the website for our late Spring Swap Meet, possibly early June. And also if we can twist someone's arm (hint hint) maybe a home visit can be scheduled, those are so much fun.

Meanwhile, don't forget the monthly meetings. See you there.

"Spring Swap Meet, possibly early June"

Join SARS Now:



Go to our Website at www.sarsradio.com for complete information on how to:

- Become a member
- Have fun at monthly dinner meeting
- Attend triannual swap meets for great deals – buy, sell, trade

In This Newsletter

- Our worldwide roving reporter, Jim Milholland, tells about radio news from the big apple, New York City!
- Finally – How to recreate that AA5 loop antenna
- Favorite Radios or Manufacturers – Watch for this in our Summer Issue

The World of Radio at the Cooper Hewitt – New York City

Jim Milholnd

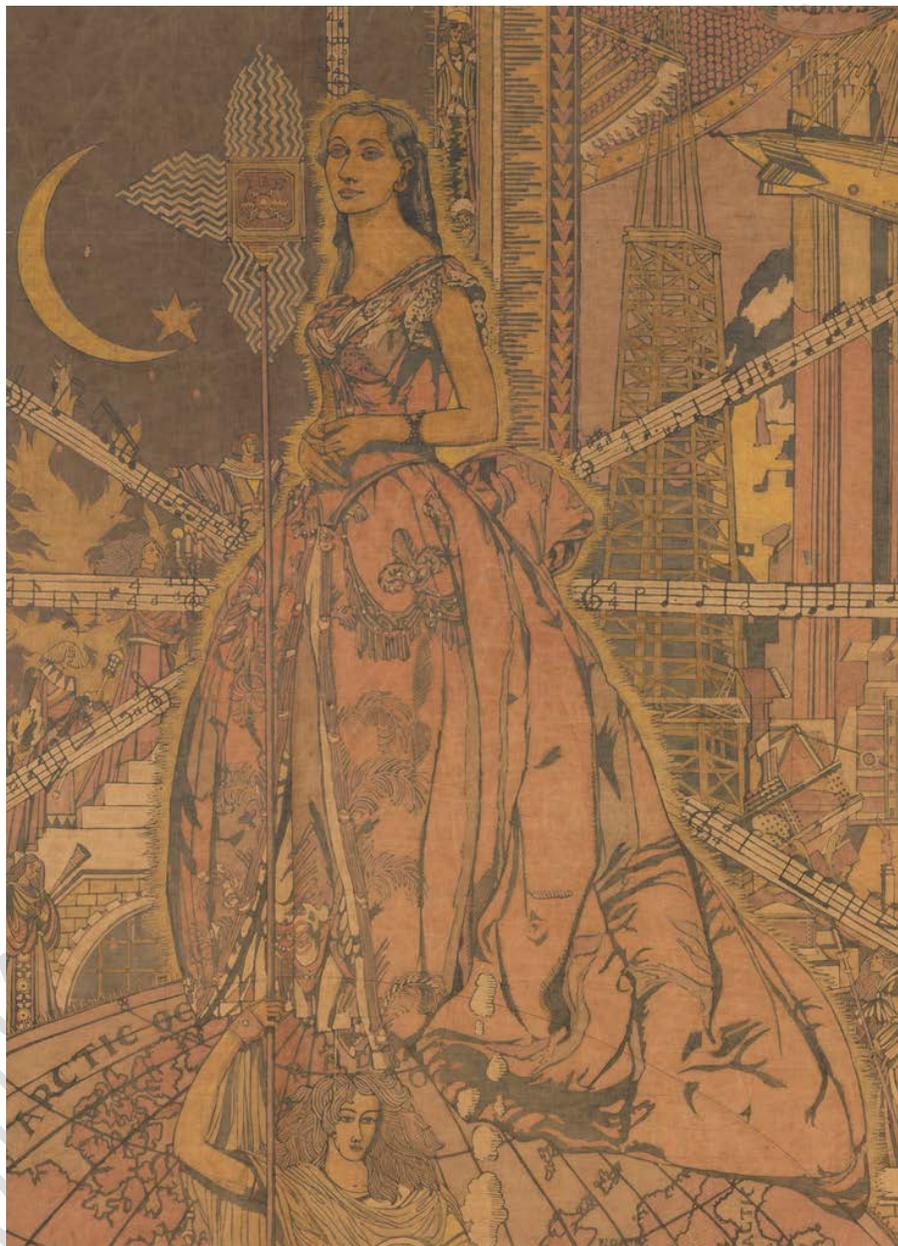
If you are in New York between now and September 24, 2017, you may want to plan a visit to the Cooper Hewitt. The Cooper Hewitt is a design museum just a few short blocks north of the Metropolitan Museums on Fifth Avenue. It has an exhibition on *The World of Radio* that includes a number of radios, about 30, on display. What's more, near to this exhibition there are a couple of radios on permanent display. My wife and I stopped in when we were in New York visiting our sons.

The centerpiece of the exhibition is not radios. Rather it is a large mural celebrating the career of an entertainer from the early days of radio.



The mural measures 8' high by 16' wide. It is done on cotton fabric using the batik method, which is a technique developed in Java that dyes selective areas of fabric by covering areas not to be dyed with wax. It is intentionally monochromatic. The figure in the center of the mural is Jessica Dragonette, who was a singer on radio in the 1930s. When asked why she became a radio star (instead of stage or film) she explained that she was young when radio was young and it seems a natural medium for her. Although I can't say that I have ever heard of her, she is reputed to have been very popular. During WWII she entertained troops and promoted war bonds.

Here is a detail of the mural that allows you to better view her likeness. She is standing by a radio microphone of the era.



Below is another detail that shows a radio. It is found along the bottom of the mural near the center. Most of the mural is allegorical figures representing the likes of music and drama. You have to look hard to find the connections to radio technology.



The radios in the exhibition represented a good mix. One featured radio is the Air King Skyscraper radio from 1935. These radios can sell for more than \$10,000. That's a price that I can't fathom.



At the other end of the spectrum is the German Volksemfaenger from 1933. It has a bakelite case. The only indicators on the radio dial are for stations in German and Austria that at that time broadcast Nazi propaganda. Emfaenger is German for receiver. So a Volksemfaenger is a people's radio, just as a Volkswagen is a people's car.



There were some familiar radios too, like this RCA Sunburst radio from 1948. It was designed by Henry Dreyfus, whose desire was to elevate and democratize taste through commercially accessible consumer goods.



There were a number of others, mostly radios with good design features. It is a design museum after all. There was no indications if the radios function at all.

The images in this article come from the Cooper Hewitt website. When you visit, you are given a wand, a device that lets you indicate which things you would like to record on the web for future reference. You touch the wand to the indicated symbol on the descriptive label, and the image and some information go into a website page that you can access later from your computer. You can download the information, and you are allowed to use it for noncommercial purposes, like this article.

Photos of all of the radios and details on the mural can be found on the Cooper Hewitt website at <https://www.cooperhewitt.org>

AA5 Loop Antenna Re-creation

Lloyd Tate

Ebaying, what a fine hunting activity for us collectors of old radios. Of course the radios I hunt for are those in unusually nasty shape. In fact, I expect them to arrive in multiple pieces and missing key parts. If they arrive in better shape than expected, I'm actually a little disappointed. And when I open that just arrived box and start pulling out broken sections of historical radio artifacts from the first half of the last century, the best thing of course are those odd sideways looks from my wife and daughter – priceless!

Speaking of missing parts, this article will talk about how to reverse engineer that missing All American 5 (AA5) loop antenna from that soon to be radio masterpiece that is currently – well, not in one piece. After spending many late nights scouring every dusty corner of the world wide web, not a single site was uncovered that talked explicitly about how to recreate that missing original loop antenna from scratch. Oh sure, there are tons of sites discussing how to create loop antennas for crystal radios. Who knew crystal radios were such a big thing - hmm, maybe a future hobby, who knows. And there are many sites that talk about creating big ole standalone loop antennas for old transformer type radios that came with antenna coils and required long lengths of wire, most of us have a couple of those hanging around as well, I'm sure. One site called Dave's Homemade Radios does talk about the AA5 loop and even shows something he put together, but again no real background about how to size it and calculate what is needed for the radio at hand, or how to connect it to the AA5.

So to address the gap in our world, many bits and pieces of information from many different sources have been consolidated to come up with the following phases and steps for AA5 loop antenna re-creation. This has just been successfully applied in the restoration of two Crosley AA5's: one E15 dashboard model and a 56TN wooden cabinet style. Both were missing the complete back cover, the loop antenna and all the wires from the radio that would connect to the antenna. Where to start?

Items you might want to purchase if you don't have them already:

1. 100 feet of 24 or 22 gauge magnet wire (Fry's is a good brick and mortar store for this – Radio Shack is an option as well, but the selection is weak in terms of length and gauge)
2. An inductance meter - (Inductance meter should have range enough to go down to the

microhenry range in three digits – found the following one at Amazon on sale and works great: UNI-T model UT58D. It displays in millihenries, but you just move the decimal point three spaces to the right for micro)

3. Capacitance meter (The meter above is a capacitance meter as well, but the range is not wide enough and, let's face it, you can never have too many meters). You need one with range that goes down to picofarad and up to at least several micro-farads. Radio Shack model 2200075 True RMS multimeter is actually quite nice
4. Alligator clips for your test leads - you will absolutely need alligator clips to get accurate capacitance and inductance readings
5. Material to fabricate a rear cover from. Home Depot or Lowes sells hardboard (pegboard without the holes), it is smooth on one side, rough on the other. If you can find smooth on both sides, then get that. 1/16 inch should be fine, and even 1/8 may be OK as well.

Phase 1:

The restorer first needs to decide what they want to re-create. In this case it was decided that both Crosley's would need the following:

1. Rear cover
2. Loop antenna
3. Wires that connect the loop antenna to the radio (Included the wires as a separate component to recreate because these Crosley's were completely missing and required dedicated research time to figure out where they connected to in the radio)

Phase 2:

Get your schematics, there are many sites:

- Nostalgia Air is free
- A payable site that I use often for clear and best to read schematics is Steve Johnson's Schematic Man website. You can pay and download many of them from his website, while some he still needs to email to you. He has SAMS as well as Riders, and some Beitmans perhaps. I prefer the SAMs or the original factory if I can get them.

Phase 3:

OK, now warm up your computer again and get back to the WWW to try to find pictures of your radio, specifically pictures of the rear cover, the antenna and the wiring if possible.

1. Just search on the manufacturer and model number, something usually comes up.
2. Get as many angle shots as you can find,
3. Save them to your document folder where you created that special radio sub-folder where you created that even more special sub – sub-folder for the particular radio you are working on – too organized perhaps, let's just move on.

NOTE: If you can't find pictures, don't fret, this will still work, just may not be what the manufacturer intended it to look like.

Phase 4:

Once you know the shape of the original rear cover and have identified the original loop antenna shape – round, oval, oblong, rectangle – you can begin the real reverse engineering phase of this project. You are going to measure capacitance range of your variable (tuning) capacitor/condenser (this is the big tuning device, with all the plates in it that mesh together when you turn the station tuning knob)



1. To perform this measurement, connect one alligator clip to the metal body of the tuning capacitor – BE VERY CAREFUL not to block the rotor plates from turning and BE VERY CAREFUL not to bend them – just don't touch them.
2. Connect the second alligator clip to one of the terminals at the bottom of the tuning capacitor – there will most likely be a wire soldered to one or more of these.
3. Now start turning the station dial from one end of the scale to the other. You should see the capacitance changing. The range will probably be something like 20 picofarads (unmeshed) up to about 450 (fully meshed) picofarads – your mileage will vary
4. Write that down and mission complete

Phase 5:

Now you will need to figure out the best inductance specification for your new loop antenna. The idea here is to match the resonance of the antenna with the tuning capacitor. There are many websites that explain the theory behind this, so no need to discuss here.

1. Go to Professor Coyle's website www.crystalradio.net and find the Spiderweb Coil Calculator page

Professor Coyle's Spiderweb Coil Calculator

PLEASE ENTER THESE PARAMETERS:

(FORM INSIDE DIAMETER)	I.D. =	2.00
(NUMBER OF TURNS)	N =	34
(WIRE DIAMETER)	W =	0.018

RESULTS:

(INDUCTANCE)	L(uH) =	114.8 uH
COIL O.D. =		3.224 inches
FORM O.D. =		3.724 inches
AMOUNT OF WIRE NEEDED =		23.2 feet

(COIL SPREAD) b = 0.612
(MEAN RADIUS) r = 1.306

RESONANCE CALCULATOR

The result is a theoretical value. The actual will be slightly different.

With an inductance of **114.8** microhenries,
and a capacitance of **750** picofarads,
your tuned circuit will resonate at **0.542** megahertz.

The reactance (both Xc & Xl) at **0.54** megahertz is **391** ohms.
Note: Closewound coils will resonate at a slightly lower frequency.

WIRE TABLE:

GAUGE	W =
10	0.107
12	0.086
14	0.069
16	0.056
18	0.040
20	0.035
22	0.029
24	0.022
26	0.018
28	0.014
30	0.011

W7OIL

2. Go to the Resonance Calculator at the bottom of the page and type in the highest picofarad range that you measured (this equates to the lowest frequency station on your radio)
3. Experiment by typing in different inductance measures in microhenries. Target to achieve a resonant frequency of about 520 kilo-hertz. You now know your first piece of critical design information for your loop antenna.
4. Jot that down, we'll come back to it later, mission accomplished.

Instructions for Professor Coyle:

Professor Coyle is intended to be a mathematical aid in determining the inductance of a coil and the resonant frequency of a coil-capacitor tuned circuit.

Spiderweb calculator:

The original Spiderweb calculator was designed by Charlie Cotterman and artwork added by Dan Petersen. To use the calculator, enter the required information in the indicated area in the red number area. The calculator will give you the results indicated by the blue text in the results column. Looking at the representation of the spiderweb form, you will note that the dimensions you need are in the dimension lines.

To Use the Resonance Calculator:

Enter the known inductance and capacitance into the calculator section at the top of the page. The resonant frequency and the reactance of the L-C circuit will be given in blue immediately below. Example: You have a 40-400pF variable capacitor and a 240uH inductor and you want to find the tuning range. Enter the inductor value, press <enter>, and the highest variable capacitor value into the calculator and press <enter>. You should see a resonance of .514 MHz. Left-click on the capacitance value and now enter 40. You should now see a resonance of 1.624 MHz. In this example would be perfect for tuning the AM broadcast band. The result is a theoretical value. The actual frequency will differ slightly due to distributed capacitance and measurement tolerances.

Phase 6:

For this phase you will be determining the inside diameter of your loop antenna in order to plug that information into Professor Coyle's antenna inductance calculator (it is based on a circle, but that really doesn't matter – probably not anyway). Here's what you will need to do to come up with a diameter.

1. Decide on the shape of your loop antenna – you will already know this if you are going for the original look. If you don't know what the original looked like, then you can choose whatever you like, it really doesn't matter for these small radios (probably not). Base the shape on the rear cover design and ensure that your antenna loop design allows enough ventilation via the multiple cutout openings that you will be making when you fabricate the rear cover.
2. Once you know the inside shape of your antenna, draw out the inside of it to the exact dimensions. Now you will want to derive the circumference – shape does not matter, the distance does though. If it is square or rectangle just add up the four sides and that will be your circumference – I know, I know, it's not a circle.
3. If it is oval or oblong, just use a piece of rigid wire to shape it to your drawing of the inside diameter – now measure from start to end, this will be your circumference. (There are formulas for all this, but I found this to be simple and quick.
4. Now just simply calculate the diameter as follows:
 1. $\text{radius} = \text{circumference} / 2 \times \pi$
 2. Multiply the radius by 2 and you have your diameter – mission accomplished

Phase 7:

1. Type the just calculated inside diameter (ID) into Professor Coyle's Spiderweb Coil Calculator
2. Type in the wire diameter based on gauge you will be using (use reference chart right next to calculator)
3. Experiment by typing in various figures for 'number of turns' until you see your previously calculated target inductance specification in the results box below the calculator
4. You now know the number of turns required for your antenna and the length of wire you will need – mission accomplished

Phase 8:

Fabricating the actual antenna can be done several ways, but I have found using a spiderweb form to be the easiest to work with in terms of the wire not moving around and crisscrossing. Some radios were actually made this way while others have the antenna glued flat directly to the back cover:

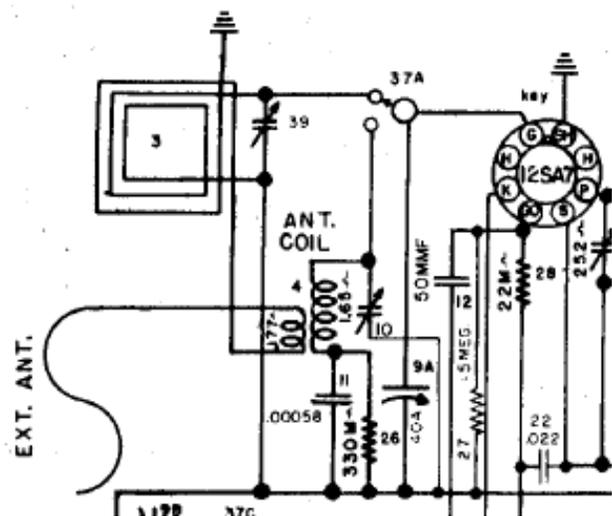
1. Based on your antenna shape design, create a spiderweb form out of some stable paper material such as cardboard or painting matting material. The shape of the form should match your anticipated antenna shape

2. Draw a shape in the middle of the form that represents the exact inside measurements of your soon to be antenna
3. Next, cut an odd amount of small slots around the periphery of the inside area (see the example on Professor Coyle's website. It is important for the number of slots cut to be of an odd number, rather than even number in order for the winding process to work correctly (yes, made that mistake)
4. Begin your winding, by weaving in and out of each slot. Leave enough wire hanging out to attach to the radio.
5. Continue winding until you reach the magic number of turns estimated by Professor Coyle's calculator.
6. Now measure the inductance of the antenna. To do this you will need to strip the enamel off some of the wire so that your alligator clip makes contact at both sides. Adjust number of winds and lock it down with a piece of tape for now. (Do not cut the wire yet, measure first, adjust, THEN cut. Yes, this does mean that you can make the inductance reading even though the remainder of the wire spool is still connected)
7. If you know the radio wiring connections, you can actually test out the antenna now and make further adjustments through the radios alignment process, if required. If not, we will come back to this in Phase 10. Mission accomplished for now.

Phase 9:

At some point you will need to figure out where the missing wires go in the radio. This assumes that the antenna is just for broadcast AM band. Some radios have an extra loop wound around the antenna for an external antenna or for SW listening. That makes it a bit more involved to get the wires right, but still possible if you use your schematic and are able to leverage any actual pictures.

1. Typically one wire will be soldered in some fashion to the body of the tuning capacitor. This will go to one end of the antenna.
2. The other wire is the trickier one to figure out and is why the schematic is required along with actual pictures of the radio. This will either go to the AGC section of the radio or perhaps to one of the terminals on the bottom of the tuning capacitor.
3. If your original antenna has the extra loop, one end of that will probably go to chassis ground or to a shortwave antenna coil. The schematic is very important here. If you cannot find a picture of your exact radio, try to find one with similar features.



Phase 10:

This phase assumes that you made your rear cover, perhaps this can be discussed in a future article on its own.

1. If your antenna mounts to the rear cover, then you can cut the spider form in order to release the antenna from it. The goal here is to maintain the antenna's shape and wire alignment.
2. You can leave the slats from the form in the wire of the antenna if you like, this will help to maintain the spider form or remove the slats and glue it flat. Recheck the inductance if you change it to flat design. Supposedly the Q of the antenna is improved if you leave the spider slats intact as it helps to reduce impact of self-capacitance of the antenna.
3. Now glue the antenna down to the rear cover using your glue of choice. White carpenters glue is fine, or a gel type super glue works as well.
4. If your loop antenna was not part of the back cover, then mount it like the original

In closing, this article did not discuss the potential benefits of using litz wire as opposed to magnet wire because it may not make a significant difference in these old sets. Perhaps someone would like to conduct that experiment and share the results in a future article.

If you are looking to restore the original look of the old antenna, cotton covered litz wire may be the only choice. Not sure how much resale value would be gained by going that route, but certainly possible if that is your goal.

Remember safety first. AA5's without transformers are potentially hot chassis, do not connect your antenna directly to the chassis without a safety capacitor in between, if it is a true hot chassis. Go to www.justradios.com for further info on AA5 safety. I hope this was of some value, you should be able to take it from here, best of luck with your project.

Summary:

1. **Measure the upper and lower range capacitance of your radios variable tuning capacitor**
2. **Figure out the best inductance using the high range measure in Professor Coyle's site**
3. **Figure out your antenna shape and size it out exactly based on rear cover dimensions**
4. **Measure inside diameter, or derive through methods above if not a circle**
5. **Calculate number of turns and length of wire needed for antenna using Professor Coyle's inductance calculator**
6. **Cut out you loop antenna form for winding**
7. **Wind antenna based on results from Professor Coyle's calculator, measure with inductance meter**
8. **Figure out wiring using schematic and pictures if available**
9. **Fabricate rear cover**
10. **Wire it up – you can use terminal blocks to do this, it prevents wear and tear on the antenna magnet wire.**
11. **Mount antenna if standalone in cabinet, otherwise glue to rear cover. You can leave antenna on form or remove it. If leaving form in place, then cut out form areas that would block ventilation.**

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