The Jersey Broadcaster

NEWSLETTER OF THE NEW JERSEY ANTIQUE RADIO CLUB

July 2024 Volume 30 Issue 7

The *Jersey Broadcaster* is distributed to members of the New Jersey Antique Radio Club via email as a PDF file. Back issues of many our our newsletters are available on the club's website: www.njarc.org/broadcaster/

Meeting Notice

Our July meeting will take place on Friday, 7/12 at Bowen Hall, Princeton. The topic will be "RCA and the Sarnoff Museum" by NJARC member and Sarnoff Collection volunteer Jonathan Allen.

We plan to also livestream the meeting on our YouTube channel which can be found at https://www.youtube.com/user/NJARC

Meeting Review

At our June meeting, various members brought interesting items from their collections for the "Show and Tell" portion of the meeting.

Mike Littman showed an HP oscilloscope that could play Tetris. John Ruccolo showed a homebrew ham receiver from the 1940s. Jon Butz Fiscina displayed an AK 545 he recently obtained at Kutztown as well as a 1942-vintage aircraft receiver, Mario Volpe brought in a 2015 vintage kit regenerative receiver as featured in Nuts and Volts magazine. Bob Bennett showed a collection of N.I.B. 45 RPM records in colored vinyl. Darren Hoffman brought in his new Amplitrex tube tester to show off. Nevell Greenough closed with a presentation about his '1943 spy radio set' that he built (in a nice 'wooden' case, just like the original!)

Bob Bennett also offered a "Hint" on how to use an infrared thermometer to help diagnose heat-related faults. Walt Heskes showed how empty tissue boxes can be used to hold parts removed while servicing a radio. Tim Walker showed how he used a piece of vinyl tubing to help mount a replacement cartridge in old portable phonographs.

Nevell also gave information about the upcoming amateur radio field day to be held at InfoAge. If you missed the meeting, a recording of the presentation is available on our the club's YouTube channel at https://bit.ly/3XkkojC.

The archived webcast can be seen here: https://bit.ly/3xSYxFM Recordings of many of our meetings are on YouTube. https://bit.ly/3yZ5yoR

Calendar of Events

July 14: NJARC monthly meeting, Princeton
July 21: HARPS monthly meeting, Suffern NY
July 12: NJARC monthly meeting, Princeton
July 19: HARPS monthly meeting, Suffern NY
July 27: NJARC Summer Hamfest/Swapmeet, InfoAge

From the President's Workbench

Greetings Fellow Enthusiasts!

On the weekend of June 21st through the 23rd, the Amateur Radio contingent of the NJARC participated in the Annual ARRL Field Day event on the grounds of InfoAge.

Due to the impending rain, high temperature and humidity, radio station W2RTM was moved inside to building 9032a. Unfortunately, The temperature and humidity within the building was higher than outside because of the non- functioning AC system!

But our intrepid radio operators: Ted, Nevell, John, Gus, Al & Darren "pushed on." More Field Day news inside…

– Richard Lee, President, NJARC

More field day photos inside.

THE JERSEY BROADCASTER is the newsletter of the New Jersey Antique Radio Club (NJARC) which is dedicated to preserving the history and enhancing the knowledge of radio and related disciplines. Dues are $25 per year and meetings are held on the second Friday of each month either at InfoAge or at Princeton University. Neither the editor nor NJARC is liable for any other use of the contents of this publication other than for information.

Field Day 2024

By Nevell Greenough, N2GX

It's that time of the year again! It's hot, steamy and just right for ham radio Field Day! For those not yet introduced to ham radio, Field Day is an annual radio event that simulates radio communications under "SHTF" emergency conditions (I'll be nice and not spell out those words). As in the ham's motto, "When All Else Fails," Field Day encourages us to grab our radio gear and head out into the great wild. Well, at least into the great wild fields of Camp Evans. Armed with portable antennas, poles, radios, batteries, generators and plenty of potables we attempt to communicate with as many other stations as possible over the 24-hour-or-so period starting 2PM Saturday June 22.

And so it happened. Preparations started on Friday with erecting a bunch of antennas for 2 stations. Station 1 got our offcenter-fed dipole and an end-fed half-wave vertical. Station 2 got an open-wire-fed 100' dipole and a short vertical.

Saturday morning started with a pleasant visit by Bob Buus, W2OD, ARRL North New Jersey Section Manager. It was fun to hear some of his stories. Then the weather started to intervene. Saturday and Sunday were forecast to be the hottest days of the year so far. We decided to forgo the outdoor canopies of previous years and move the radios and us into the big room of supposedly air-conditioned 9032A. Yep, Murphy struck again. The air conditioner had failed. Darren Hoffman and Richard Lee valiantly tried to get it going but to no avail. Someone had re-wired the 120V panels and missed the airco. Oh well, such is Field Day. Adds to the emergency simulation. At least the pizza lunch kindly provided by President Richard Lee made the situation better.

At 2PM, the heat of the contest and in 9032A began. Station 1 started up on 20 meter SSB but the band wasn't cooperating. A quick switch to 40 meter SSB started to yield some contacts. Station 2 was a bit more successful on 20 meter SSB. 40 meters continued to be the big scoring band for most of the contest. Given that we are near the peak of the sunspot Cycle 25 I expected that 20 meters would be better. Ol' Murphy struck again. The sun had sneezed up some special unpleasantness for the weekend.

Dinnertime arrived at around the 200-contact point with a chili on rice and salad dinner concocted by Nevell and Al. Topped off by Richard Lee's famous brownies and wine. The contest pressed on and 20 meters improved for Station 2 until the band fizzled out around 9PM. Station 1 kept going on 40M yielding several hundred more SSB contacts. Station 2 came back up around 11PM on 20M CW and made a couple of dozen contacts. Station 1 also ran 40M CW and did more. In the wee hours of the morning, Station 1 had some success on 80M CW while Station 2 continued on 40

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Field Day 2024
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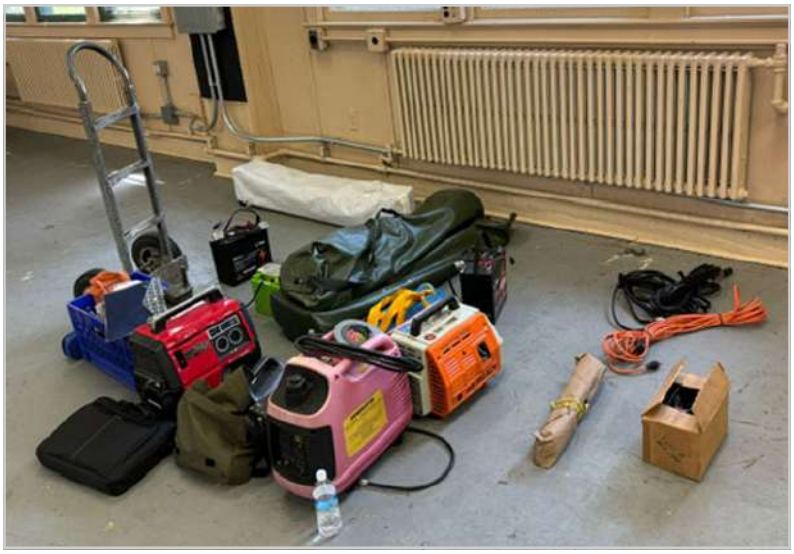
meters SSB. As the sun started to peek up over Shark Inlet, both stations took a couple of hours break. Station 1 resumed on 20M CW around 8:30AM and had a good run up to about 690 total contacts. Station 2 joined in at 10AM on 20 SSB and finished out the contest for us at 1PM. It was heating up rapidly so antenna packup started. The final tally- around 700 contacts with about 124 of those on CW.

I've not yet tallied up the final score but should be somewhere north of 1650 points plus some extras. It was a fun event and I'm looking forward to doing it again next year.

Hats off to the following operators who gave their time and talent to the event: Ted, N2KPS; Al, N3FRQ; Nev, N2GX; Gus, WX2M; Richard, KD2ZQV; Darren, KE2BWG; John R, K2TPP; Rob, K2RGM, to name a few. Apologies to anyone I left out. 73s until next year. — Nev,

Watch a video of sending code on YouTube: https://bit.ly/4czZEJH



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Field Day 2024
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Repairing IF Transformers with Silver Mica Disease (or, How I Stopped Worrying and Learned to Love SMD)

By Joe Divito

Repairing IF Transformers with Silver Mica Disease, or How | Stopped Worrying and Learned to Love SMD By Joseph Divito, all pictures taken by me except where noted in this article It's been called many things. Silver Mica Disease, Silver Migration Disease, and often there's a "dreaded" in front of the term. I've often heard many collectors say they will not collect any radio made from the era where the radios are prone to this problem (from after WWII to the end of the tube radio era in the mid-1960s). Some are very passionate about this problem, and call them cheesy slug tuned junk. Often, it's considered a terminal problem. However, with a little planning, a steady hand, and the right tools, |I have found it's no worse than any other array of maladies that affect tube radios that we all love and collect. In fact, all radios from every era have their respective strengths and weaknesses. For example, radios made in the mid to late 1930s often come with wiring insulated by natural rubber, which by now has become rock hard and crumbles easily. One could spend as much or more time painstakingly snaking heat shrink tubing over multiple wires in a Philco Transitone. In many ways, repairing a diseased IF transformer can be easier and often faster if care is taken. So, let's learn more about what we popularly call Silver Mica Disease actually is, how we can know we have this condition, and what can be done to fix it. With some practice, I've come to enjoy the repair process, as there is something satisfying about repairing what many consider a terminal problem. In time, you too may stop worrying about it and come to love Silver Mica Disease!

What are IF transformers?

If you are well versed with the theory behind AM radio and how it works, you may want to skip ahead to the next section. For those who may not know exactly what these transformers do, here is a quick explanation. In most AM radios, a special circuit generates a frequency that's typically 455 Kilohertz away from the incoming radio frequency the listener wishes to tune in. In the radio, the whole spectrum of received radio frequencies is mixed with this local oscillator frequency to produce what is called the intermediate frequency. This is done to simplify radio reception and amplification, and was developed in the late 1920s. It was simpler to produce a single frequency that could be amplified and reject anything else not at this chosen intermediate frequency. Think about ripples in a pond when you throw two stones next to each other — the waves that are at the right frequency will reinforce each other, and cancel out when not at the right frequency. This is essentially what your radio is doing, only at radio frequencies of Kilohertz (abbreviated KHz). For the era of radios we see this silver mica disease, the most common intermediate frequencies (IF) are 455KHz or 262KHz for car radios. Older pre-war radios often used different values, but by the time the flawed IF transformers came out, these were typically the values you will encounter.

To keep things simple, whenever you mix two waves, you will get the strongest reinforcement at the right frequency, but will also have some harmonics that are close but not what you want. This is where the intermediate frequency transformer comes in. Its job is twofold: one, select only the chosen intermediate frequency, and reject any harmonics that fall off that 455 Kilohertz value; two, reinforce that target frequency to help the vacuum tubes out with the amplification process. For those who want to learn more about the IF transformer and its role in a tube radio circuit, there are videos on YouTube that cover those subjects. They explain what an IF transformer is and how it's used in a tube radio. The Emerson that the video talks about is older, and doesn't use the type of IF transformer prone to silver mica disease. However, the concept is exactly the same for the era of radios with IF transformers prone to silver mica disease. The goal is to produce a resonance in the transformer to match the targeted IF, and the role of the coils and capacitors are key to this.

What is Silver Mica Disease?

In simple terms, Silver Mica Disease is a popular phrase for a design flaw with the tube radio IF transformers made after World War I, when engineers were tasked with improving the performance and efficiency of these transformers and at the same time, make them smaller and less expensive to build. As we talked about in the previous section, an IF transformer uses a coil and capacitor in order to produce a resonance that accepts the desired intermediate frequency and rejects any other frequencies. The original design used simple compression mica capacitors without any conductive silver in them. Later, as competition drove the need for smaller, more efficient and less expensive designs, engineers discovered it was possible to make IF transformers with a fixed capacitor consisting of a flat mica sheet doped with a layer of conductive silver. Fine tuning of the resonance was achieved by moving ferrite cores (also called slugs) into or out of the wire coils to vary the inductance. In simple terms, inductance for our purposes can be described as the magnetic force induced in a wire coil by the moving electrical current. The magnetism of the ferrite cores interacts with the transformer's coils to effectively vary this inductance. The end result is a more efficient, smaller design that needed smaller coils, was more stable with temperature changes, and simpler to manufacture.

Unfortunately, there is a flaw to this design. The fixed capacitors made from that mica sheet are all together on the one mica wafer, relying on the compression of contact pads from the terminals where the coil wires are connected to. All of this is exposed to the open air, with all of its humidity, air pollution, and dust. When the radio is playing, the capacitor on one side of the sheet sees essentially B+ voltage (95 or more volts) while the other sits at ground potential (low or even negative voltage). Over the years, as contaminants accumulate on the exposed mica sheet, conditions become right to allow some electricity to leak from the one side to the other. Just like the process that electroplates a gold finish on a piece of jewelry, the silver on the one side is dragged by this current away from where it's supposed to be, and gradually migrates away. As this continues over the years, eventually enough conductive silver migrates to where a short circuit happens. It should be pointed out here that the old pre-war design (which carried on for a few years into the late 1940s as the new design was phased in) never suffers silver mica disease as there is no silver on their capacitors. It only

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Repairing IF Transformers with Silver Mica Disease
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happens with the post-war design using fixed capacitors with ferrite slugs being used to vary the inductance.

Here is a picture of a mica sheet showing the migration first hand. The white areas are the two silvered areas on the mica sheet, and the black areas are the migrated, tarnished silver. You can see where the short happened at the bottom of the picture:

Since the migrated silver is so fine, it can't handle the current and immediately opens up, causing a crackle like the static you hear from a thunderstorm on your radio. Over time, as more silver migrates, this happens more often, until you hear nonstop static, sometimes with the radio still playing, often not. A popular YouTuber who goes by the handle of Shango066 captured the mayhem with night vision goggles here: https://bit.ly/3Lh9sw6. It's quite impressive!

Other problems can arise from poor electrical contact between those terminal contacts pressing against the mica sheets, which can manifest itself as a seemingly deaf or non-playing radio that randomly "wakes up" as the tubes warm things up. Often hard to diagnose (as bad tube to socket contacts can cause similar problems), it can be maddening if you aren't familiar with the problem. However, there are ways to identify the problem. One method illustrated here, is to use a signal tracer (if you have access to one) to listen for the static originating from the transformers: https://bit.ly/4cBDxT6.

Also, it's often possible to alter the static (temporarily) or induce a quiet radio to play by tapping the suspected IF transformers with a screwdriver handle. A good tap (be careful to not hit them too hard, we don't want to break them) should alter the static pattern or jostle the terminal contacts on the mica capacitors enough to get things going.

Finally, if you are familiar with the radio's circuitry, you can directly measure for voltage leaking from one side of the IF transformer to the other with a good volt meter. Refer to this simplified schematic on the following page (taken from a 1960s industry newsletter article.)

Measure the voltages on the AVC line at the two test points noted above as TP1 and TP2. In a normally working radio, the voltage at TP1 should be between -0.5V when no station is received to as much as -5 for a strong radio signal. At TP2, the voltage will normally vary between slightly negative with no station received, rising to about the same as TP1 when a station is tuned in. If there is silver mica present on the 2nd IF, TP2 will have B+ leaking onto it, and will see a positive voltage. If TP2 rises above +5V, you will not receive any stations, and hear the hallmark static sparking noises typical of silver mica disease.

If the 1st IF has silver mica disease, the voltage at TP1 will become more negative than normal. TP2 will be anywhere from several volts less negative than TP1 or even positive compared to TP1 depending on the leakage on the 1st IF. In fact, if the leakage is great enough to produce a positive voltage at TP2, this will even kill the local oscillator outright. If the leakage is small enough for the 1st IF that there is still a negative voltage at TP2, the radio may still play, but seem "hard of hearing" as far as reception goes.

Oh, great, I have Silver Mica Disease! How can I fix it?

We have a few options for fixing the problem. The solution back in "the good old days" when service shops had a whole catalog of parts to choose from was to look up the compatible replacement part from the aftermarket and remove & replace the offending transformer. Companies such as Miller, Merit, Meissner, Workman, even radio manufacturers themselves all carried catalogs of IF transformers meant to be dropped right in and get the radio playing. If you are patient, know what part numbers to search for (say from your SAMs photofact for the radio), they still turn up on eBay from time to time. Make sure what you buy truly is new old stock as I have been occasionally burned by a repairman who used the new part and put the defective one back in the box. Over the years, the box is rediscovered (usually by the guy's heirs) who sell it on eBay without realizing what's inside isn't the new part, but the defective one. Besides this risk, there is the fact that the aftermarket parts are usually made with the same design flaw, so in time they too will eventually fail. I had a couple of Westinghouse radios I repaired with new old stock Meissner parts both have their Meissner transformers fail with silver mica disease after only five years of use!

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Repairing IF Transformers with Silver Mica Disease

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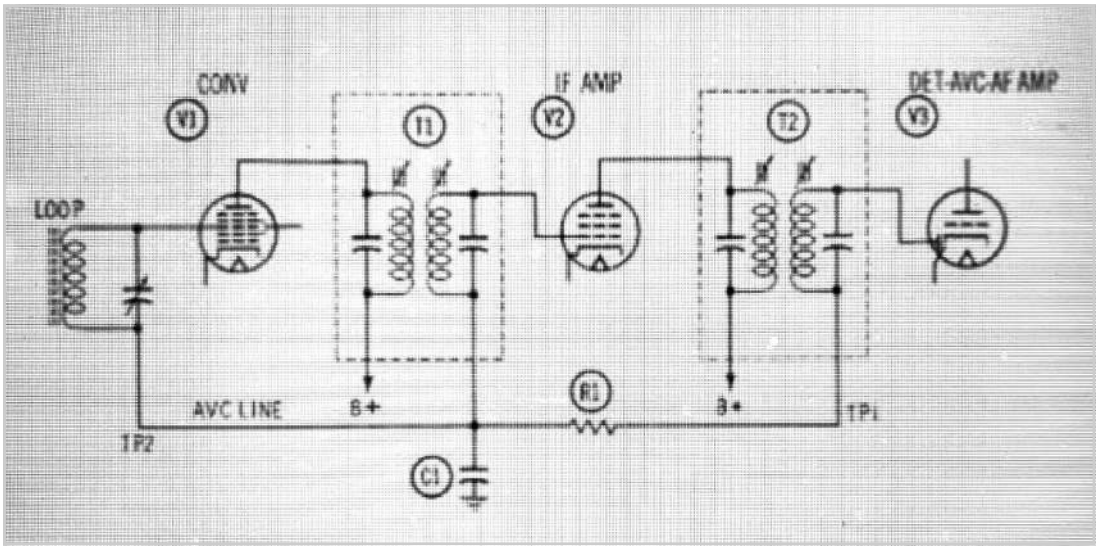

Voltage checks at TP1 and TP2 help reveal silver-migration leakage

If you are lucky, you can sometimes find better quality aftermarket parts that did have real capacitors inside, not the flawed mica sheets. Here is an example of a Merit part that had tiny little tubular ceramic capacitors inside (if you find these, you hit the jackpot): If you aren't so lucky to win the jackpot with a quality Merit part, or were burned with a diseased used IF transformer inside that box that you thought held a brand new part, no worries. We can still take these apart to fix the problem!

Example of IF transformer with ceramic capacitors inside

Automatic IF transformer

I can't give you detailed instructions for every possible transformer design, as I've seen over the years that radio manufacturers used IF transformers from multiple suppliers, and each one built them a little differently. Having said that, the most prolific supplier to manufacturers during the 1950s was a company named Automatic, and those will have the number 119 stamped on top, two plastic tabs projecting up through the top, and usually (though not always) the words Automatic or Automatic Manufacturing stamped on top as well.

On the bottom will be a metal rivet that needs to be cut out to take it apart to get at the mica sheet. I personally like to use a dremel grindstone to gently grind away this rivet until there's enough metal removed to gently cut out the remainder with a small set of flush cut snips. Once you have the rivet cut free, there is a plastic top cap that needs to come off to get access to the mica sheet.

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Repairing IF Transformers with Silver Mica Disease

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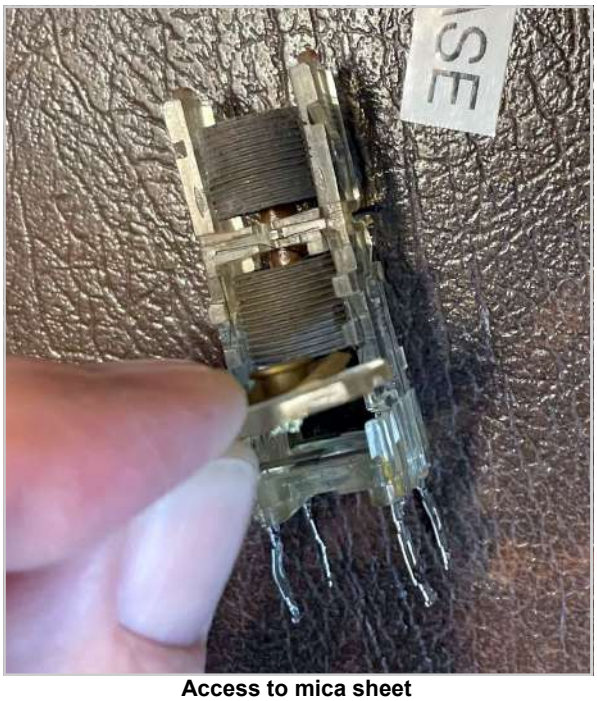

Access to mica sheet

Through most of the 1950s, Zenith built IF transformers in-house using their own design. These are super-easy to get apart since there is a nut and threaded stud that holds the "guts" together, so it's a simple matter of unscrewing the retaining nut, and very carefully taking it apart and removing the mica sheet.

Here is a Zenith part# 95-1101 IF transformer totally disassembled so you can see how it comes apart. Since I took this picture, I stopped doing it this way, instead backing out that retaining nut just enough to get the flush cut snips and my tweezers in there to take out the mica sheet in sections rather than risking those hair thin wires. Although those wires can be spliced back together, trust me it takes the steady hands of a surgeon to do it!

Once the mica sheet is out, those contacts need to be insulated or cut out enough to not make electrical contact. You will be using modern mica or C0G/NP0 ceramic capacitors to replace that diseased mica sheet, so you don't want to short out your new capacitors (you'll be installing them underneath, outside the can). On the next page I show some examples of how I put the Zenith and Automatic IF transformers back together. For Automatic, you'll need a gentle adhesive to hold everything back together. I personally use a small amount of liquid electric tape, applied using a dental pick. It's designed for insulating electric wires, so it provides a strong bond without emitting fumes during curing that could damage those delicate copper wires.

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Repairing IF Transformers with Silver Mica Disease
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Zenith reassembled. (I used a little heat shrink tubing to insulate those mica sheet contacts.)

Here is an IF transformer made by Automatic reassembled after removal of the mica sheet.

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Repairing IF Transformers with Silver Mica Disease
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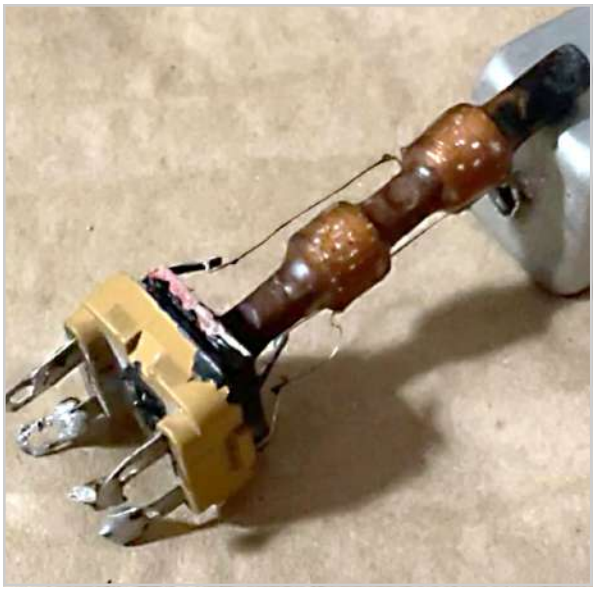
Here's an example of using liquid electric tape to hold everything back together for an RCA IF transformer (you can see you don't need much.)



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Museum Musings
By Ray Chase

It has been a long time since I reported on the Radio Technology Museum (RTM). Not that there was nothing to say, but, by gosh we have been busy. We even skipped our 20th anniversary in April this year. Our first meeting regarding establishing a museum took place in April 2004 when Fred Carl asked NJARC to be part of the InfoAge dream. Fred's vision was a parking lot full of yellow school buses bringing youngsters to learn about history and technology. It took some time but now those yellow school buses are regular visitors, and at times we are overwhelmed with students as well as other visitors. Those of you who are "old timers" will remember Tony Flanagan, our founders' dream of having a radio museum. It is a shame that he never saw it to fruition.

It is exciting that we can take our shared hobby and build it out as an educational and entertaining attraction. While there are other radio museums around, who else has an address on "Marconi Road" and where we can spread the word on the development of wireless/radio communication on the site where much of it actually took place. As our museum has grown, so has our mission. It is not enough to just exhibit radios and talk about them when in the modern world radio, as we knew it has become a smaller percentage of the communication environment. We have added other forms of technical communications to our displays and the broader coverage has been well received. Can you believe that presenting a working typewriter was a novelty and engendered a lot of interest and experimentation thereon?

As with most museums, we must upgrade our displays and create new ones periodically to stay current with changes in modern lifestyles. This year we took on projects to make some major changes such as explaining "digital audio". All while still serving the guests and students who regularly come through. We must also address wear and tear with regular maintenance. To that point, our combined office/break room was getting very scuzzy. Thanks to donations from Paul Hart and family, plus lots of volunteer man hours, it has been freshened up with new carpeting, window blinds and painting.

However, the most important element to our operation is our cadre of volunteers. Both to serve as museum guides or workers for building displays and general maintenance. Museum guides are often called docents, but that word does not have wide understanding to the public, so we call our volunteers Historians since our mission is both to explain communication technology and cover the history of electronic communications as well as the history of what significant events took place at this location.

We take pride in believing that RTM is the best and most visited museum on the InfoAge campus. This is not just our hubris but is verified by guest feedback and visitation attendance. But I sometimes wonder why there are some local club members who maybe have never visited RTM. Come see the gem that has matured over the last 20 years. When our monthly club meetings are held at InfoAge , come early when we have the museum open and you can avoid the InfoAge admittance fee. Maybe you will find enough interest to decide to join our group of volunteers. Or, come during normal InfoAge hours. There are eight separate museums and other displays on site. You might be astonished at what other interesting exhibits InfoAge has to offer. Hope to see you.

New Jersey Antique Radio Club's

Summer Tailgate Swap Meet and Ham Fest

Infoage Science History
Learning Center and Museum
2201 Marconi Road
Wall, New Jersey 07719

Saturday, July 27, 2024

Refreshments Available

40 spaces available
$25.00 for members
$30.00 for non members
Bring your own tables

Open to the Public
8am to 12 noon
Vendor setup at 7:15 AM
$5.00 Entrance Fee
Club Donation

For Directions
Visit our website: www.njarc.org
or Mapquest
2201 Marconi Road, Wall NJ 07719

Vendors Make Your Reservations Now!

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