

The Jersey Broadcaster

NEWSLETTER OF THE NEW JERSEY ANTIQUE RADIO CLUB

March 2014

Volume 20 Issue 3



MEETING/ ACTIVITY NOTES

Reported by
Marv Beeferman

The ON-LINE Broadcaster

The New Jersey Broadcaster is now on -line. To date, over 120 of your fellow NJARC members have subscribed, saving the club and your editor a significant amount of money and work. Interested? Send your e-mail address to mbeeferman@verizon.net. Be sure to include your full name.

Most of us are familiar with the technical aspects of RCA's history but thanks to Dr. Alex Magoun's talk at the February meeting, we were made aware of the series of decisions, some successful and some not, that RCA's leaders had to make during its 67 years in business. As "Dr. Alex" noted: "From 1919 to 1986, presidents and CEOs weighed choices over how to justify its existence, protect its intellectual assets, focus its business, make a profit, and prepare for the future in the face of constant questions, disputes, options, competition, and uncertainty."

Some nice pieces (and prices) were hammered down at the Heyteis auction. Included was a TV 10A/U tube tester for \$250, a AN/USM-425 Tektronix scope for \$60, an R-392 military receiver for \$115 and a SW R-390A receiver for over \$400. Your editor picked up a very nice JDR 3500 oscilloscope in perfect working condition for only \$15.

Three days before the auction, president Richard Lee had to "dig out" the estate auction items, knowing that an impending snow storm was coming. As with most collectors, Richard had not one cubic foot of space left in his garage to store them so he was forced to use the backyard shed of his 89 year-old mother. That was before winter storms filled her driveway



MEETING NOTICE

The next NJARC meeting will take place on Friday, March 14 at 7:30 PM at Princeton's Bowen Hall (70 Prospect Ave.). Directions may be found at the club's website (<http://www.njarc.org>). This month's program will feature Nobel prize winner professor Joe Taylor who will talk about his moon bounce experiments. An invitation has also been extended to AMARC members to attend the lecture. We'll also have a continuation of the Hetzeis auction from last month.

with 18" of snow! Then the question became how does one navigate an 80 lb., R-390 and military R-392 receiver through a snow-filled driveway with a 30 degree slope? Well, as the following photo shows, necessity is the mother of invention:



Included in the upcoming March auction are a military R-392, box lots of radio books, assorted table-top radios, test gear, classic stereo receivers, box lots of vacuum tubes and box lots of parts.

Ray Chase reports that three members of the 9th Division WWII Historical Preservation Society visited the museum and were given the grand tour. The society is located in South Jersey and its members, who are WWII reenactors, are very interested in working with InfoAge.

Steve Tetorka posted an interesting Christies auction item from 2012, a Jean Dunand 1930 radio cabinet with a realized price of \$338,500! The cabinet was described as a "detailed and masterful interpretation of the modern and energetic spirit that defined the kinship that existed between Paris and New York during the late 1920s and 1930s." More importantly, Steve asks "wonder what radio went inside?"



Finally, don't forget to get your table reservations in for our upcoming Parsippany swapmeet on March 22nd. Also, note that the cutoff date for 2014 dues is March 31st!

Upcoming Events

- March 22nd - Spring swapmeet at Parsippany PAL
- April 11th - Monthly meeting at Princeton's Bowen Hall; Al Klase "History of Short Wave"
- May 2nd - Monthly meeting at InfoAge building 9032A; homebrew and "basket case" contest judging (Note date change to avoid Kutztown conflict.)
- May 8 to 10th - Kutztown radio swapmeet
- June 13th - Monthly meeting at Princeton's Bowen Hall; Show & Tell
- June 21st - Spring Repair Clinic at InfoAge building 9032A
- July 11th - Monthly meeting at Princeton's Bowen Hall (program TBA)
- July 26th - Annual tailgate swapmeet at InfoAge

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 the second Friday of each month. The Editor or NJARC is not liable for any other use of the contents of this publication.

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TO RESTORE... OR NOT TO RESTORE

By
Marv Beeferman

While thumbing through a 1948 Hallicrafters catalog, my memory was jogged by a full-page spread on the Model T-54 television. I remember obtaining what I thought was one of these TV's some 15 years ago and storing it in a location that was easily accessible. (Most of you probably understand what I mean by the "accessibility" criteria for getting your hands on long-lost acquisitions.) A quick survey of the exterior of the TV showed it to be actually a model T-505 in quite good condition and I began to wonder if it would make a good candidate for restoration. Introduced in 1948, the T-505 was a typical set of the time, with a number of miniature tubes and a 7-inch electrostatic deflection tube. With a chassis the same as the T-54, the T-505 was carried in an attractive, mahogany-colored wooden cabinet with a slightly flared trim in the front. Raymond Loewy, the famous Machine Age designer, is credited with its design.

In many cases, collectors make restoration decisions without giving any thought to what roadblocks, time and cost may be involved...they just dig right in. This might be the right course for collectors with many years of time and experience. But since I am not a television collector (love those battery sets) and have limited experience with their restoration, I decided to take a more structured approach in making my decision...to either display the TV as is, or first restore it. In other words, with apologies to Hamlet's indecisiveness, "to restore or not to restore."

Before we go into the details, let's look at a few of the general considerations that collectors might take into account when they decide to perform a top-to-bottom restoration, even though the item looks perfectly acceptable on the outside. Of course, we'll skip the obvious intent to either a) trade the item or, b) sell it to make a nice profit, rather than maintaining it in one's collection for the long

term.

Because of its great exterior condition, I could very easily leave my TV on the shelf as a display item, avoiding questions like "does it work" with a quick explanation of the move to digital TV and the setup required to get a signal to a 1948 set. But I'm quite familiar with a few collectors who I have met over the years (NJARC club member Mark Mittleman being one) who insist that the majority of their collection be in a completely restored and working condition. In these cases, the ability to show off a collection and actually operate the majority of its radios, TV's or record players is not necessarily the main criteria (i.e., how many battery radios can you fire up at one viewing?). It is associated more with the joy and the challenge of the restoration process itself ("a labor of love") and a sense of personal satisfaction to hear KDKA on a set that had been silent for close to one hundred years. But even a more important measure seems to be the ability to answer the question "Does it work?" with "Almost as good as it did when new," even if the set will never be energized or demonstrated again.

Another strong force that inspires restoration is typified by the columns of Peter J. Bertini found in the magazine *Popular Communications*. Bertini identifies this force as that associated with reliving past memories, nostalgia for the relics of our youth or the yearning for the radios that started us off on a lifetime of radio adventures. Collectors are now able to obtain and afford the equipment that only dreamed of owning in their younger years. Typical examples in this category that Bertini has restored include a Knight-Kit "Space Scanner" (June 2011) and a Radio Shack "Jetstream" AM/Police/Aircraft radio (October 2010). These are not high-end, scarce radios; Bertini had another inspiration in mind as he notes: "I purchased my Jetstream while in high school in Windsor Locks, a small mill town in north central Connecticut that was home to what is now Bradley International Airport. As a youth I spent many hours both at the airfield and at home listening to the pilot and to the tower chatter."

Finally, many collectors are inspired by the ability to preserve the history of radio artifacts and their related electronic products and the pride of maintaining the skills that keep them functional. In most

museums not specifically dedicated to the "radio art," there are only limited, non-operational examples of industrial history and most are associated with the early, experimental years before they went public. I would hazard a guess that the majority of "working" examples of the numerous technical advances in radio design can be found in the homes of dedicated collectors, saved from their ultimate extinction in the town dump.

The first step in making my restoration decision was to gather as much information as I could find on the Internet that has been posted by those individuals who have already restored a Hallicrafters T-54 television. (As stated, other than its mahogany case, my T-505 is electronically equivalent to the T-54.). I highly recommend this as a start for any restoration project, even for those that on the surface appear to be a simple effort; you'll be amazed at all the shortcuts and tips that others have already discovered that can help you avoid reinventing the wheel and will result in real savings in time and money! With this information in hand and the results of my examination of the T-505 chassis, here's what I found that I was up against:

1. The exterior and interior of the chassis was extremely clean with no dust or corrosion... a good start. All controls turned easily and smoothly without binding.
2. The mechanism that contained the row of pushbuttons for selecting Channels 1 through 13 worked perfectly. However, what appeared to be brown, fiber "necks" that surrounded each pushbutton shaft had completely deteriorated and the pieces could be found on the bottom of the cabinet. These "necks" seemed to have no mechanical or insulating function other than keeping the pushbutton shafts centered. I decided to write to a restorer I found on the Internet to get further information that I am still awaiting.
3. The television uses 22 tubes including a 7JP4 picture tube. It appears that the previous owner had already tested some of the tubes since I found "weak" written in pencil next to a few of the tubes. But the tube compliment is nothing special (6AG5, 6C4, 6AU6, 6H6, 12SN7GT, 6AL5, 25L6GT, 1B3GT, 25Z6GT, 6X5GT) and should not involve a major investment.
4. The 7JP4 picture tube is a different story. This was a popular 7" diameter

round type (the T-505 uses a mask to give the illusion of a rectangular screen) used in the late 1940s for low cost and small table model televisions. Unlike later electromagnetically deflected TV tubes, the 7JP4 is electrostatically deflected like an oscilloscope tube. Because the tube was obsolete by the mid-1950s, most CRT testers will not test it. However, NJARC member John Tyminski does have the test set needed to check out this model tube and he has offered his services. With NOS 7JP4's going for close to \$300 and used ones selling in the area of \$150, this presents an excellent option for determining my restoration decision. (John told me that rebuild was out of the question based on the type of glass and welding techniques used in building these tubes.)

There is no indication that the CRT in my T-505 is necessarily bad. Visually, the tube is clear with no blackening. Most restorers find the brightness of the CRT found in old sets quite acceptable with the culprit being the high voltage power supply (more on this later). I did find that the previous owner had lifted and then re-soldered the power leads going to the high voltage power supply capacitors that added to my confidence that I might be dealing with a good CRT. However, one of my other options is my ownership of two Motorola junker VT-71's that used the same tube.

5. I counted some 35 paper capacitors that would need replacement, some showing the typical signs of deterioration (i.e., melted wax on their ends). These included two huge, almost soda-can sized capacitors that couple the vertical output to the CRT. For most, the cost basis would be reasonable but the ones with a 6000 voltage rating, although obtainable, would probably run somewhat more. I'm estimating at least \$75 of replacement capacitor costs.

Most of the capacitors will be easy to replace, but the ones enclosed in the high voltage cage will take a little extra work. To remove the high-voltage cage, you must carefully unsolder several leads that run through holes in the chassis to a phenolic board underneath.

To ensure a neat, accurate and professional job, the entire process will probably take at least two days of more or less continuous work. (By the way, this TV has no power transformer. Like other 7-inch televisions and countless inexpen-

sive radios, it has an "AC/DC" type design, with the tube filaments connected directly to the AC line.)

6. The high-voltage cage contains a 6C4 HV oscillator tube, a 1B3GT HV rectifier, the HV coil and a few other components. Unlike modern sets that use the horizontal sweep for the input to the HV section, this set has an air core transformer and separate oscillator that runs at a much higher frequency. The complex construction of the HV coil with its stacked windings makes it nearly impossible to replicate. Fortunately, all components within the HV cage were found to be clean and free from any carbon tracks. Although a tricky procedure, the capacitors under the HV cage would require replacement for reliable operation of the circuit.

The high voltage output should run from 5-6 kilovolts at a frequency of about 200 KHz. Lower values give a dim picture that might inaccurately suggest that the CRT is bad. Therefore, it is important that the HV supply is operating within specifications. However, it has been found by some restorers that the HV supply in Hallicrafters TVs (and similar Philco 7-inch sets) may present problems. In many cases, merely restoring components to original values doesn't necessarily produce the required HV.

The culprit is the HV r-f transformer coil that appears, in some (but not all) Hallicrafters T-54 and T-505 sets, to lose its "oomph" over time, perhaps because it absorbs moisture or suffers some other unknown failure mode. Collectors have tried various remedies, such as baking the coil and recoating it, modifying circuitry to boost the drive voltage, or even installing a substitute HV supply. One restorer installed a little muffin fan in the HV cage and lifted the lid a bit to improve ventilation but the fix is only temporary. Another collector, after discovering a leaking HV coil, found one with the same diameter and number of turns on the secondary. So he cut both coils in half and combined the old primary with the new secondary, gluing them together with silicone and insulating them with Krylon.

The bottom line is that even if a perfect restoration is obtained, design problems with the HV power supply may limit the operation of the set to only a few hours as the HV r-f transformer coil could reabsorb moisture or suffer some other failure mode.

7. The selenium rectifier in the low-

voltage power supply will require replacement by solid-state devices. (The negative and positive low-voltage power supplies are transformerless, and one side of the power line is grounded to the chassis. For this reason, precautions must be taken such as verifying the integrity of the insulation of the hold-down brackets from the chassis.)

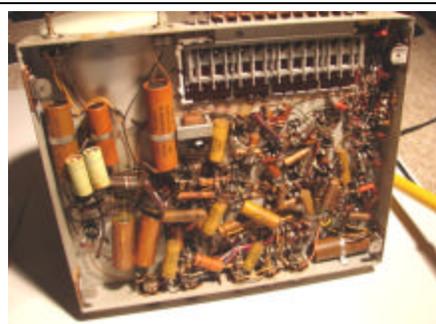
8. Some carbon resistors show signs of overheating and will have to be replaced. All resistors need to be checked for tolerance drift and replaced if necessary.

As you can see, the restoration of my Hallicrafters T-505 doesn't appear to be a walk in the park and the decision to restore or not to restore is apparently not that straightforward. Actually, I am still considering both options. But by doing some up-front work, I at least have a course of action where I can stop at any time without making too major of a commitment of time and money. Here's my plan:

1. Determine the status of the 7JP4 picture tube. If still in good condition, continue with the restoration. If not, try to find a replacement at a reasonable price.
2. Determine the status of all tubes; replace as required and continue with the restoration.
3. Restore the low-voltage and high-voltage power supplies. Determine if the HV supply will stay in specification over a reasonable amount of time without breaking down. If so, continue with the restoration; if not, attempt to resolve the HV power supply problem before continuing.
4. If the HV power supply works well or its problems are resolved, replace all remaining capacitors, correct minor cabinet scratches and hopefully own a nice, working T-505 for years to come.



My T-505: The cabinet is in excellent condition with just a few scratches.



I counted some 35 paper capacitors that would need replacement.



"...what appear to be brown, fiber 'necks' that surrounded each pushbutton shaft had completely deteriorated."



The selenium rectifier in the low voltage power supply would require replacement with solid state devices.



The high voltage power supply will present a unique restoration challenge.

A VERY PRODUCTIVE REPAIR CLINIC

By
Marv Beeferman

There was a lot of activity and a few pleasant surprises at our February Repair Clinic at InfoAge. For your editor, the day was especially satisfying.

Club member Robert Reifenhiser asked for help with his Radiola 18 and I was "volunteered" by president Richard Lee. My first take was somewhat disappointing; the cabinet (missing its dial light hood, of course) wasn't in too bad a shape but the power supply section was covered with rust and the rest of the radio with grime. All the jumpers between the radio and its power supply had been disconnected, perhaps indicating that previous repairs had been abandoned. However, the volume control and tuning condenser rotated freely and the rest of the radio looked to be in pretty good shape. Luckily (we thought at first), Robert also had brought its matching 100A speaker.

We removed the power supply and radio sections from the case while Ray Chase tested the speaker; of course, the speaker leads were open. But just by chance, Ray had brought a working 100A speaker to the clinic. The rectifier tube tested good so we (with help from Tom Cawley) fired up the unloaded power supply and to my disbelief, all voltages appeared within specification. Both Ray and Al Klase said they weren't surprised; the Radiola 18 was a real workhorse and Al said that the materials used in the filter capacitors were heads above the "garbage" that was used in later years.

We tested the rest of the tubes and found them to give values above minimum requirements. Then it was time to meld the two sections and see if the power supply held up under load - surprisingly, it did. The speaker was connected and with Ray acting as a "human antenna," stations came in loud and clear.

For a radio that I felt didn't have a chance, my day was made. However, you could read the absolute joy in Robert's eyes in being able to take home a working Radiola 18.

Here's a summary of the rest of the activities:

- Bill Zukowski repaired a Motorola 56W1 AM table radio owned by Bob Chis. He replaced its filter capacitor and a coupling capacitor. Bill also worked on a Newcomb RS-20 record player that needed a replacement capacitor.

- Dave Sica worked on his neighbor's GE A-70, using signal tracing to locate the bad stages...still a work in progress.

- Walt Heskes worked on Dr. Sheldon Greenspan's Zenith Royal 500 transistor radio that was inherited from his father-in-law. It needed electrolytics, including a 50 mfd/6 volt unit which we didn't stock. Walt also worked on a Philco 112, a beautiful wood cabinet console radio from the late 1920's. Not much could be done since it needed total restoration. Another radio that Walt looked at was a 1935 GE M65 that had been in Thomas Schorr's family since new, again needing total restoration.

- Richard Hurff and Aaron Hunter worked on yet another Majestic, this time a model 25. After replacing electrolytics and paper capacitors, it came alive. Aaron repaired a 4-tube Jewel mini radio and supplied schematics for members.

- Ray Ayling and Phil Vourtsis teamed up to work on a 1957 RCA "Orthophonic" high fidelity phono which required a complete cleaning and lubrication. They also fixed a stalled motor and cleaned the controls of a Motorola solid state console phono.

- Ray Chase did some troubleshooting on a Miller 570 high fidelity tuner from about 1936. This TRF wide band tuner was meant to feed an amplifier.

- Nevell Greenough, after adding a filter capacitor and cleaning the dial mechanism on a Stromberg Carlson console, found that it worked fine. He also helped your editor locate the point where the lead from a failed capacitor on a AK 145 had been removed at our last repair session. Its connection point to a wafer switch wasn't obvious on the schematic, again reemphasizing the importance of documenting one's work! (The remaining portion of the lead on the failed capacitor had curled and was hidden in the back of the switch contact.)

- Chuck Paci and Tom Cawley worked on an RCA 6HF5 phono, finding both 50C5 output tubes shorted. After replacing a broken needle provided by Phil Vourtsis, the unit "worked great."



ARMSTRONG DAY AT INFOAGE

By
Marv Beeferman

After reviewing the very positive stat-counter data for the website postings for Armstrong Days, NJARC Technical Co-ordinator Al Klase exclaimed "we must be doing something right!" After attending the celebration on Sunday, February 9th, I can report that Al was absolutely right.

Armstrong Days celebrated the 100th anniversary of the historic Armstrong-Sarnoff meeting at the Marconi Station at Belmar (i.e., InfoAge) where, on the night of January 30, 1914, Armstrong (accompanied by Professor Morecroft from Columbia University) demonstrated his regenerative receiver to David Sarnoff and Roy Weagant of the American Marconi Company. Most historians consider the validation of regeneration as a major "inflection point" in the history of communication. The details have been well-documented in various sources and previous *Broadcasters*, so we won't go into them now.

One of the highlights of my day was Al's mock-up of Armstrong's original circuit, receiving simulated spark radio-telegraph transmissions from Clifden, the Poulsen stations at San Francisco and Honolulu and the Salby-Arco alternator in Nauen, Germany. Al describes his simulation as the Radio Technology Museum's "way-back machine" which "has the ability to fold space so we can hear the same signals Armstrong and Sarnoff heard 100 years ago." For those of you who are technically motivated, here's Al's description of the details of how he produced his virtual ether:

"A 120 hertz square wave was used to excite a parallel tuned circuit at about 800 kHz. This produced trains of damped waves with a "spark rate" of 240 hertz, the reported sound of Cape Cod (MCC). Out put was about a microwatt, which represents a pretty strong signal when applied directly to the antenna terminal of even a primitive receiver. The transmitter was keyed by a Morse signal generated by a personal computer to make the original recording."

To read a complete version of Al's article on his "Virtual Ether," click on or go to the following link:

<http://www.skywaves.ar88.net/>

In addition to Al's mock-up was a display of vintage receivers to give people a feel for receivers involved in the 1914 demonstration, including a Wireless Specialty Apparatus IP-501 similar to a Marconi 101. Also included was a self-guided computer display describing many aspects of Armstrong's life, the development of regeneration and other topics relating to wireless at the time. A nice display of photos and descriptive material helped visitors understand some of the finer points and the significance of Armstrong's work.

A special treat was provided by Eugene Hertz (W2HX) who loaned a homebrew "audion-based" receiver to the displays. With the help of Steve Goulart, a long wire antenna was set up and we had a lot of fun trying to log in as many stations as possible. Nevell Greenough showed a trick he learned from QST in getting the most out of one these types of receivers; it involved a lot of hand manipulations.

Al's afternoon lecture filled in a lot of the details for our visitor's. He talked about the state of the wireless art in 1912, damped-wave transmission and reception, CW telegraphy and Armstrong's early experiments with regeneration where he noticed beat notes on CW signals and tones in place of buzzes. An interesting point was that in the Fall of 1913, when Armstrong demonstrated his circuit to DeForest, he hid his receiver in a box located in a different room.

Our thanks go out to Al for all the work involved in setting up this great celebration. Articles are planned for *Monitoring Times*, *The AWA Journal* and perhaps *Antique Radio Classified*.



Al Klase adjusts his virtual receiver.



Your editor takes his turn.



DX'ing with a spherical audion receiver.



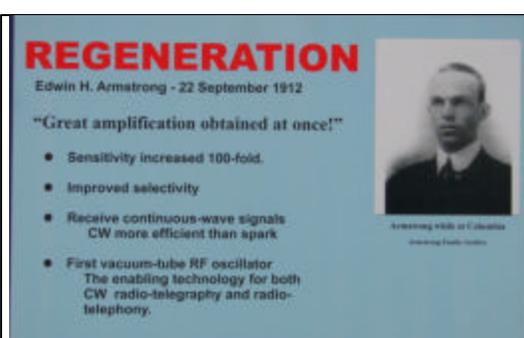
Al explains a fine point to some of our visitors.



Columbia University Visitors (L to R) - Charles Zukowski and Alan Crosswell of the Armstrong Memorial Foundation, Aaron Burger of Columbia, Al Klase and Edward Miller, Columbia Ph.D candidate. (Photo courtesy of Fred Carl/InfoAge.)



David looks on approvingly of the day's activities.



One of the many informational items on the display board.

AM RADIO SIGNALS:

HAZARDOUS TO YOUR HEALTH?

By Ray Chase

Ray said that he wasn't able to identify the call letters of the two stations noted in the following article, but they might be worth chasing in our DX contest...Ed

Because I was at a microwave conference a few years ago, I still receive *High Frequency Electronics*, a monthly magazine. I have not worked in the microwave electronics field for over 25 years, and there have been so many advances in technology that I do not understand much of what is written. However, a recent issue had a unique article relating to AM radio that caught my eye. What follows is a summary.

The location is Rio de Janeiro where a new pier was being constructed. Two cranes were brought in, one truck mounted and one on caterpillar tracks. As soon as work was started, problems developed. Workers received moderate to severe shocks causing skin burns which became more severe as the booms were extended. One crane's electronic controls became inoperative. The induced voltages were so severe that the greased pulleys on the top of one crane caught fire and caused significant damage. Construction was halted due to the clear risk to operator safety and reliability of equipment.

The source of the problem was quickly

identified as two AM transmitting antennas located about a fifth of a mile from the construction site. The stations operated at 1280 and 900 kHz with 100 Kw of power during the day (50 Kw at night) feeding single mast antennas.

Grounding the cranes with chains did no good. Searching the literature, it was found that while the problem of electromagnetic induction was known, studies were limited and most were for much higher frequencies. Little information was available for induction at AM frequencies.

On-site analysis was complicated by limited access and a large number of crane positions and boom extensions. For this reason, computer analysis was employed. At these frequencies, the length of the booms was about 1/4 wavelength and since they were clearly in the far field, they were treated as a resonant structure.

Reducing the mechanical length of the booms would solve the problem, but since this was not possible, it might be possible to make them electrically smaller and resonate at a higher frequency.

The first added element to be investigated was a capacitor. By measuring current on the boom, this actually showed to increase the circulating current. The next evaluation considered the dangling hook as a loop. The presence of a loop creates resonance and by adding inductance, resonance in the AM frequency band can be inhibited.

The actual chosen method was to wind 275 feet of #13 gauge wire around the hydraulic jack of the crane that acted like a ferrite core. One end of the coil was connected to the hook and the other end to a suitable ground.

In operation, the wire between the hook and the coil forms a catenary, whose length can be controlled by the operators on the ground.

Non-conductive boots and gloves were issued to crane operators and load handlers to further mitigate shock hazards. Worker exposure to the direct radiation of non-ionizing RF energy potentially causing heating of body tissue was also considered in the safety review. At FM radio frequencies, the dimensions of the human body acts as a good antenna but at lower AM radio frequencies, the heating effect is negligible since the wavelength is so much larger than the body size. Additional measures had to be taken to protect electronic control systems from EMI. With all these fixes in place, construction of the piers could safely proceed.

So beware of nearby AM radio masts when raising your boom...it may be hazardous to your health!

Reference: *High Frequency Electronics*, January 2014, "Resolving Safety-Critical EMI Problems Between AM Transmitters and Cranes Using a 3D Field Solver," Marcelo Bender Perotoni & Robert Menna Barreto





New Jersey Antique Radio Club's **Spring Swap Meet**



**Parsippany PAL Building
Smith Field**

**Route 46 @ 33 Baldwin Road
Parsippany, NJ 07054**



Saturday March 22nd, 2014



Refreshments Available

(70) 8 Foot Tables

\$25.00 for members

\$30.00 for non-members

Reserve Additional Tables \$20.00

At the Door \$25.00

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

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