

The Jersey Broadcaster

NEWSLETTER OF THE NEW JERSEY ANTIQUE RADIO CLUB

October 2019

Volume 25 Issue 10



MEETING/ ACTIVITY NOTES

Reported by
Marv Beeferman

The ON-LINE Broadcaster
The *Jersey Broadcaster* is now on-line. Over 160 of your fellow NJARC members have already subscribed, saving the club a significant amount of money and your editor extra work. Interested? Send your e-mail address to mbeeferman@verizon.net. Be sure to include your full name.

At the September meeting, the club had the pleasure to entertain a talk by Ria Jairam (N2RJ), the ARRL's Hudson Division Director. Ria said that she learned of amateur radio in her native Trinidad and Tobago through her father who was an avid shortwave listener. In the early 1990s, she met a local secondary school teacher who was the first to demonstrate amateur radio to her and showed her how to become licensed. In 1997, Ria passed the UK City and Guilds Radio Amateur Exam which included a 12WPM Morse Code exam.

Miss Jairam became an avid kit builder and homebrewer. Her first HF transceiver was an IARU kit on which she made many contacts on 20 meter CW. After arriving in the USA, a gifted Transoceanic Y-600 (including an "unobtainable" 1L6) spurred an interest in collecting and restoring vintage gear with a concentration in Transoceanics.

Ria emigrated to the USA at the end of 2000. After joining the ARRL, she rose through the ranks of amateur radio as a marathon communicator with service that included disaster relief, charitable events, mile posts and assisting foreign language interpreters.

In November 2018, Ria was elected Director of the ARRL Hudson Division and has taken on such diverse projects as IT modernization, reducing license and upgrade award times and homeowner association antenna restrictions.



MEETING NOTICE

The next NJARC meeting will take place on Friday, October 11th, at 7:30 PM at Princeton's Computer Science Hall (35 Olden Ave.). Directions may be found at the club's website (<http://www.njarc.org>) with a map showing the location of the Science Hall in relation to Bowen Hall. This month's topic will be presented by member Mike Molnar and is titled "A History of Radio and Television Manufacturing by the Westinghouse Corporation."

As a "thank you," president Richard Lee presented Miss Jairam with "some stuff I found in my basement concerning in-house ARRL publications from the 1940s and 50s" and a brand new 1L6 for her Transoceanic restorations.



To get an early start on planning for our Holiday Party on December 14th, a reservation response form is included in this month's *Broadcaster*. It cannot be stressed enough that you reply as early as possible since seating may be limited. It might also be a good time to start considering your radio-related entry (\$25 value suggested) in our Mystery Grab Bag game instead of wrapping up, at the last minute, whatever is lying around.

Also at the September meeting, member Robert Forte told us about a very nice donation to the club's Radio Technology Museum (RTM):

"I took my relatives (wife's brother Pete, his wife, and their daughter and two boys, age 7 and 9) to the museum on a dreary Wednesday about a month ago. We spent two hours there (I was the docent) and they loved it! They were amazed how they could talk to their mother on the pedestal desk phone into her cell phone while she was standing right next to them. They loved the "hands-on room" including the Theremin, plasma globes, chicken-farmer puzzle

and the battery demonstrator."

"On the way back to my house, Pete mentioned how great our museum was and he wanted to make a donation from his foundation. I thought it would be about \$25 or \$50 and was shocked at the amount - \$1000!"

Thanks to Bob Bennett for again capturing a "17 minute snippet" of the events of the September Kutztown swapmeet. I had a bunch of pictures from my attendance on Friday but room prevented me from posting them in the *Broadcaster*. We'll probably talk about the event at the October meeting, but for now:

<https://www.youtube.com/watch?v=ic4dD0A0ogY>

Ludwell Sibley reminds us that *Tube Lore II* is now "out for real" and can be found at the following locations for \$34.95: Electric Radio (www.er.com), Vacuum Tubes Inc. (www.vacuumtubesinc.com) Antique Radio Classified (www.antique-radio.com), Antique Electronic Supply (www.tubesandmore.com), Exiled Records (www.exiledrecords.com) and the Pavlek Museum store.

Ludwell notes that the line in his book's biography about being licensed to own a skunk is no joke - he slept under the bed!

Upcoming Events

- November 2 - Fall NJARC Swapmeet-Hamfest at Parsippany PAL
- November 8 - Monthly meeting at InfoAge building 9032A; homebrew contest and display.
- November 16 - Fall Repair Clinic at InfoAge (building TBA)
- December 4 - E-Board meeting
- December 14 - Annual Holiday Party at West Lake Golf & Country Club

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 at InfoAge or Princeton University. The Editor or NJARC is not liable for any other use of the contents of this publication other than information.

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REPAIRING AN EMERSON BF-204 CABINET

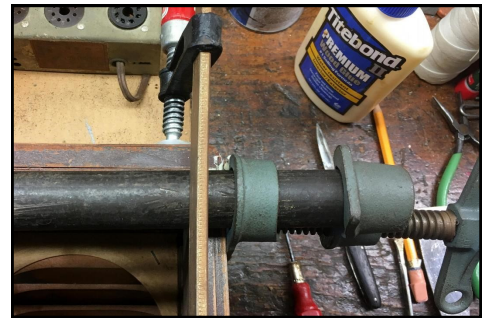
By
 Ray Chase

As often happens when the RTM is open, someone will randomly come in with a radio to donate. Several months ago, a woman came in with a small table radio she wished to donate as she was cleaning out prior to moving. The docent on duty reluctantly took the donation as it was in pretty poor condition. After she left, the docent felt that the radio was not worth anything and should be tossed. It was a 1938 vintage Emerson model BF-204, 5 tube plus ballast, AC/DC set in an Ingraham cabinet. It receives both broadcast and short wave with a tube complement of 6A7, 6D6, 6Q7, 25L6 and 25Z5.

The following Wednesday, member Bruce Ingraham spotted it in the office, gave it a careful inspection and declared that despite its poor condition, he could repair it. Bruce had an additional incentive as he has an affinity for radios with Ingraham cases because they share his last name. Some weeks later he returned the radio looking almost like new as the pictures show.

The center knob is not original. Bruce tested the tubes but did no other electrical restoration. The line cord needs to be replaced and the ballast tube is missing.

Bruce currently works steadily creating organization to our chaotic tube storage building and is currently sorting out some of our stock of ballasts, so finding a replacement should not be a problem. The attached pictures show the before and after condition as well as some of the work as it was in process. I do not think that there is a "basket case" wood cabinet that Bruce could not return to pristine condition.



NJARC's founder and first president Tony Flanagan was a big Ingraham fan. He collected some interesting material on the company's history and I hope to provide some of it in upcoming articles...Ed

A VISIT TO THE AWA MUSEUM

By
Robert Forte

As part of my attendance at the annual AWA (Antique Wireless Association) Convention in August, I was able to visit the AWA's new museum. Located on Route 20, east of Bloomfield, N.Y., the experience was well worth it.

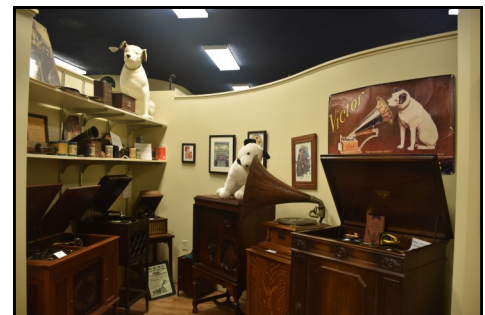
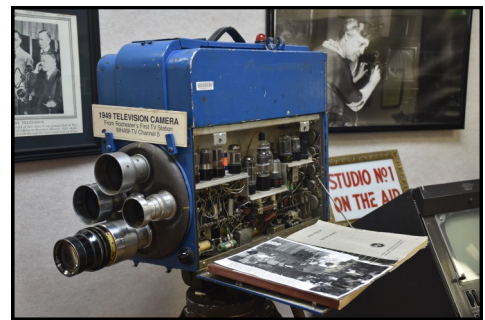
Upon entering, a room to the right highlights all the radio pioneers of yesterday with their pictures and contributions. Towards the rear is a realistic telegraph office with an operators station, period office and furniture. Beyond is a room totally devoted to teletype machines. A large, actual Voice of America control console is located farther back.

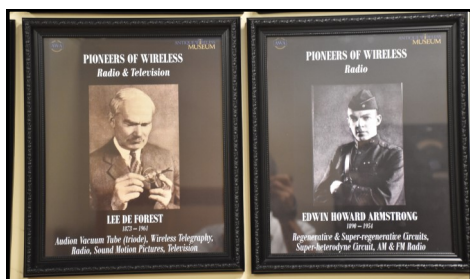
On the left side of the building are rows of neatly stacked radios of all sizes, periods and countries. They are beautiful to behold and easy to touch - eye candy for those of us who enjoy old radios but can't own them all; communication receivers, portables, RDF's and more. There is a store at the front of the building where one can buy old electronic gear, shirts, books and souvenirs.

In comparison to the NJARC's Radio Technology Museum (RTM), a good word would be "complementary" - not better nor worse - just different. We seem to have more interactive displays for the younger set - the AWA museum has none of that. It seems that the RTM shows more variation, especially when you include the military and ECM sections. Being a part of the InfoAge complex with displays of military vehicles, vintage computers, etc. also adds an historical relationship and context to the radio museum.

From a personal standpoint, I found it questionable while the museum's Mark II B2 spy set was kept in a vault. In the original AWA museum, it was openly on display and prompted my interest in spy radio history - to the point that I eventually purchased a B2 for my own collection. Our AR-11 set is openly displayed at the RTM. I was told the AWA museum was still trying to find a location for displaying their B2.

I'm not sure if it's worth the trip to Bloomfield just to visit the museum. However, if you are in the Rochester area for other reasons or attending the AWA Convention, you'll enjoy what you'll see. Attached are some photos to prove my point.





Extra Credit

In his travels, Robert also toured the Glenn H. Curtiss Museum in Hammond-sport, NY. It is among the most notable aviation museums in the United States due to its focus on the accomplishments of Glenn H. Curtiss, aviation pioneer and early motorcycle manufacturer. Robert asked that I include a photo of one of the earliest spark transmitters to be flown with Curtiss in one of his 1915 planes.



AUDIO INTERSTAGE AND OUTPUT TRANSFORMER SUBSTITUTIONS

**By
Jim Whartenby**

A while back on the club reflector, there was a discussion about a replacement interstage audio transformer to drive push-pull 45 triodes. I had a similar issue a dozen years or so ago with a Majestic Model 90 TRF receiver which had a bad interstage audio transformer, a missing power supply chassis and some very minor cabinet issues. I used a small 350 volt B+ power transformer which had an approximate turns ratio of about 3:1 which gives the standard 9:1 impedance ratio needed to drive a pair of 45 triodes. What is happening here?

Turns Ratio = 3:1

Impedance Ratio = 9:1

I chose the substitution route instead of buying a new replacement audio interstage transformer since I have been saving salvaged power transformers for several years and now have an overabundance! Besides, it is fun to experiment. It would cost nothing to try, and the substitute might easily fit into the old transformer's case.

For the replacement power supply transformer I used a salvaged Tektronix O'scope power transformer. I wired it for 234 volts operation on the primary, with an additional power resistor in series with both primary windings selected to give about 2.5 volts instead of the expected 3.14 volts on the secondary filament windings. A few high voltage secondaries were then series connected, rectified and filtered to provide a B+ of about 250 VDC on the 45's plate. Once everything was wired up and the radio aligned and neutralized, I rechecked the filament voltage to be sure that it was still about 2.5 volts. After all of this work, the radio worked quite well. Love that TRF sound!

Now, if the Majestic audio output power transformer had been defective, the same technique could be used to substitute a relative large filament transformer for the audio output transformer. A pair of 45 triodes wants to "see" a load resistance of approximately 5000 ohms and can deliver a whopping 12 watts of audio at 5% distortion. Assuming a speaker voice coil impedance of 4 ohms, then:

$$\text{Impedance Ratio} = (5000/4) = 1250/1$$

$$\text{Turns Ratio} = \text{square root of } 1250/1 = 35.4:1$$

Now we need a transformer that has a 35.4:1 voltage ratio. Dividing 117 volts by 35.4 gives us the needed secondary of 3.3 volts. A power transformer with a dual primary and a 6.3 volt secondary will work. Just series connect the two primary windings and the 6.3 volt secondary becomes 3.15 volts which should be close enough to do the job.

What do I mean by close enough? Well, speaker impedance varies noticeably with frequency and no two tubes have an exactly equal load impedance. Everything varies around an average in our non-perfect world. Quite a few of the components in our beloved old radios have a 20% or so tolerance so a few percent off here and there doesn't really have a big effect on performance.

Now if your Junk Box is not fortunate enough to have a variety of power trans-

formers, perhaps you do have a few of the "constant voltage" type of audio line transformers?

For those not familiar with them, these transformers provide for custom sound levels, where needed, in a Public Address system. This allows a single audio power amplifier to fill a large room or even a stadium.. This is done by simply selecting the appropriate wattage tap on the primary of the line transformer. Then when the primary winding has the full 70.7 volts of audio applied, the speaker will dissipate that selected wattage.

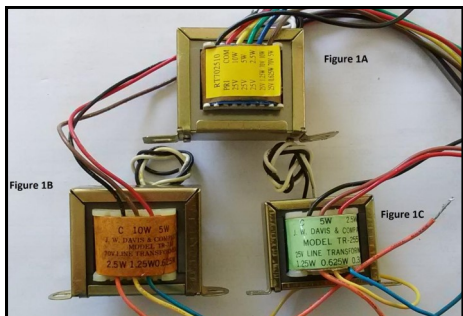
We all know that power is the product of current times voltage. It doesn't matter if the voltage is 100 volts and the current is 1 amp or the voltage is 10 volts and the current is 10 amps; power is power. Power losses in a system are the product of the current carried by the wire and the voltage loss due to the wire's resistance. For any particular electrical system transferring a constant power, if you raise the voltage you will lower the current through a wire and the power losses due to the wire's resistance will be lower. This process works well for both public address audio systems and your local electric power company.

There are three popular "constant voltage systems" in play: 25, 70.7 and 100 volts. The most common, appears to be the 70.7 volt (aka 70 volt) line transformer. The 70 volt transformer has existed for audio distribution systems since the Great Depression of the late 1920's. This system was later adopted by various standards organizations such as the American Radio Manufacturers Association in 1949 and later by the EIA and the NEC (National Electric Code).

Figure 1 is a photo of three different audio line transformers from my Junk Box. 1A is a multi-tap transformer with 8 taps on the primary. Each tap is marked for a unique power level at either 25 volts or 70 volts line voltage. Maximum power delivered to the speaker voice coil is 10 watts. Figure 1B is similar but has 5 taps on the primary and is used on 70 volt line systems only. Maximum power delivered to the speaker voice coil is also 10 watts. Figure 1C also has a 5 tap primary but is for a 25 volt line only. The maximum power delivered to the speaker voice coil is 5 watts.

Figure 2 is a schematic of each of the three above transformers with the transformer primary lead color identified with it's stated full power level. Also, each lead is marked with an impedance that an 8 ohm speaker will be translated to if a primary lead is connected to a single-ended tube amplifier plate and the com-

mon primary lead connected to B+. Note that different transformer manufacturers use different colored wires to identify the wattage taps!



Here is how that impedance was calculated: Using Ohm's Law for power, aka Joule's Law, $Power = I \times E$. Replacing current with Ohm's Law solved for current (E/R), we get $Power = E^2 / R$. For a 70 volt line transformer: $Power = (70.7 \times 70.7) / Impedance = 5000 / Impedance$

Here we are making a distinction between DC resistance and AC Impedance. When you measure the DC resistance of the transformer windings with an Ohmmeter, it will read much lower than the winding impedance at audio frequencies. An exception to this is a speaker's voice coil. Here the resistance and impedance are pretty close to each other in value since a speaker works by aiding and opposing a magnetic field, not by using an iron core to translate the power applied to mechanical motion.

Using the power shown for the blue to black leads of the transformer primary in Figure 2A, and solving the equation for impedance, results in 500 ohms.

This is quite close to some military and commercial radio receiver output impedances of 600 ohms. Some Hallicrafter radios use 5000 ohms of output impedance in addition to 500 ohms. The optional and now hard to find speaker cabinet for these radios contained both a speaker and a 5000 ohm to voice coil transformer.

One point to keep in mind is that 70 volt line matching transformers were not designed for operation with a DC current in addition to the audio current in the primary winding. This DC plate current is what is controlled by the audio output tube's grid. So the transformer's usable power level must be adjusted down to compensate for the DC current in the primary. So lets determine the maximum transformer current allowed in normal transformer operation.

Solving Joule's Law for current we find: $I = 141 \text{ mA}$. Allowing for a 50%

safety margin, the maximum safe tube plate current is approximately 70 mA before transformer saturation might occur. Saturation is the point where a further increase of current in a primary winding does not produce any additional magnetic flux. At this point, magnetic induction stops and the transformer no longer transforms power from the primary to the secondary. The secondary voltage collapses and no secondary current flows. The only limit for the current in the primary winding is the resistance of the primary winding itself and any other series circuit resistance.

Quite a few single ended audio output power amplifiers tubes have a plate current much lower than 70 mA; therefore, saturation is of little concern for single-ended amplifiers at the 5 watt power level and below. Single-ended amplifiers using the type 45 have a plate current below 40 mA; the 6V6 is below 50 mA.

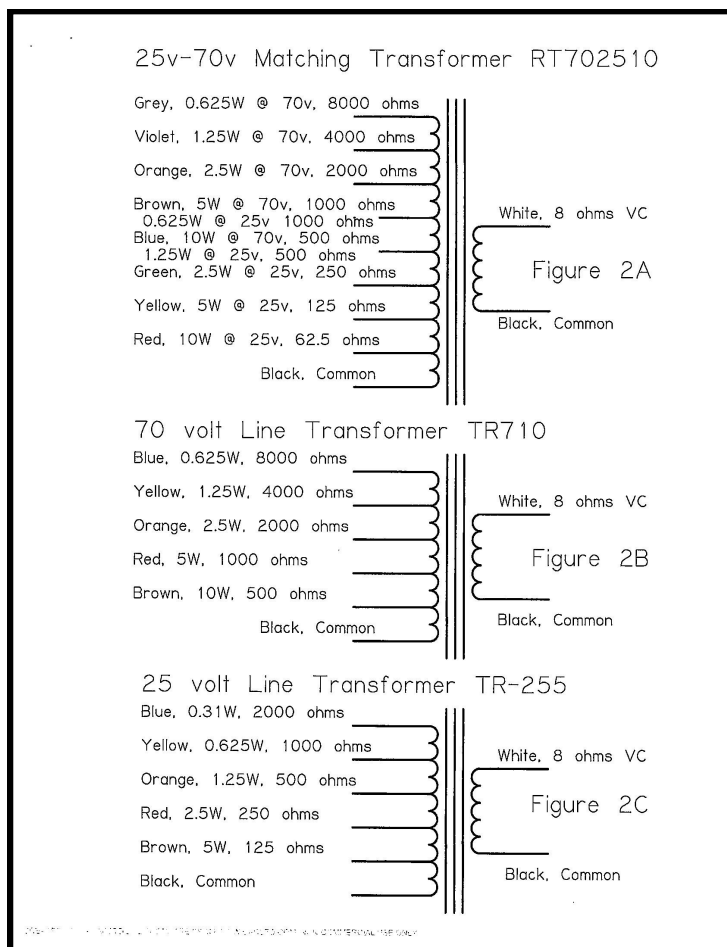
What about push-pull output amplifiers? Well, saturation is not as much of a concern since during half of each audio cycle, current flows in one direction and then in the opposite direction for the second half cycle because the primary is center tapped. Saturation might be a

concern if the stage is over-driven and the 10 watt power handling ability of the line transformer is exceeded.

The last problem to solve is determining the center tap point for the push-pull output transformer. If you recall, the difference between turns ratio and impedance ratio is that the impedance ratio is the turns ratio squared. To determine the halfway point of the primary, multiply the primary impedance calculated above by the square of $1/2$ which is $1/4$.

If you need an 8k plate-to-plate transformer, $8K \text{ times } 1/4 = 2k$ which will be the center tap of the audio output transformer primary. The other plate lead is the black common lead of the primary. Just ignore, and either tape off or cut the unused leads of the primary. If the needed transformer impedance is 4k plate-to-plate, multiply 4k by $1/4$ and the center tap of the primary is now the 1k lead and the other plate lead is still the black common lead.

The above procedure applies to any audio line transformer you may have in your Junk Box So now you can add to your repair stock a universal audio output transformer that is inexpensive and readily available!



MEET THE MOSQUITO NETWORK

Part I

By
Mark Durenberger

The following article appeared in a September "Radio World." Mark Durenberger is a technology consultant with the Minnesota Twins and has six decades of broadcast and satellite experience...Ed

We can't fully appreciate the importance of "news from home" to those who served in World War II. In the Pacific campaigns, G.I.s, sailors and Marines fought bloody island-hopping battles; as each island was cleared, garrison troops and hospitals moved in and carried on their own war against mosquitoes, isolation and boredom. The island fighters were fortunate if dated mail caught up with them before they moved on to the next target. Timely personal-level communications were pretty much absent.



Possibly the earliest military station in World War II - this one located in the Panama Canal Zone.

Radio programming from America was available but only on shortwave. And shortwave radios were not generally available. The fortunate few had been issued "Buddy Kits" that included a radio, a small PA system and a record player for discs sent by mail. But for most there was no way to receive short-lived information such as news and sports. They were left with enemy radio propaganda such as

Japan's "Orphan Ann/Annie" (aka one of several Tokyo Roses) and the "Zero Hour" program.

No wonder that the idea of having a local island radio station doing "Live from home" was so fiercely supported. Enlightened commanders saw the idea as a terrific morale-builder. The only problem was how to pull it off.

A solution, not uniquely, came from within the ranks. It started with the work of some bored but talented soldiers in the Panama Canal Zone who in 1940 built a couple of 50 watt transmitters and put them on the air without authorization, labeling them "PCAN" and "PCAC." In Alaska, 7,500 miles northwest of Panama City, what started as programming through a loudspeaker system became a bootleg radio operation at Kodiak. Coming on the air in January 1942 and calling itself "KODK," it delivered a whopping 15 watts to the troops. Sources with hindsight later said that the Armed Forces Radio Service ("AFRS") was born here, when one of its progenitors visited the Alaska operations and "came up with the idea."



GIs listen to a radio, possibly one of the AFRS broadcasts.

There were similar stations in Hawaii and the Philippines, including the ill-fated island of Corregidor, where a station called "The Voice of Freedom" was an AM repeater for shortwave broadcasts from the U.S.

As troop build up began in the South Pacific, joint Allied radio operations were established, notably in New Zealand and Australia. These stations were popular with Americans but they also kindled an appetite for "real radio from the States."

Meanwhile, things were happening in Washington. The government's "Morale Service Division" had been created in 1940, though its mandate hadn't focused on radio. But as cumbersome as government can be, soldier's demands for American radio content eventually reached the right people. Increased priority was given to the recording and distribution of network radio programs by electrical transcription. But that still wasn't live broadcasting. The Morale Services Division was renamed the "Special Services

Division" (SSD) and tasked with live broadcasting. The broadcasting division of the SSD would become the fabled Armed Forces Radio Service (AFRS).

AFRS began to place "local/relay stations" among the troops. In the Eastern theaters, such stations often used existing facilities, but in the Pacific they had to build from the ground up. To facilitate the effort, AFRS created a "station in a box" package that included a transmitter, long-wire antenna and recording and reproducing equipment. Installation teams boated from island to island to plant these mini-stations. Most of them came alive in 1944 and 1945 and, as the island-hopping campaign moved toward Japan, many were soon abandoned, some after only a few month's operation.

"Stations in a box" were first unpacked in Noumea, New Guinea; then it was on to new Caledonia where AFRS hatched the first of the "Mosquito Network" stations. As WVUS it was among the first such to be given an FCC license. Most of the Pacific's licensed-station calls would then begin with "WV."

Guadalcanal was the next priority for AFRS. Space precludes station-by-station descriptions, so I'll use Guadalcanal as a definitive example. The "studios" were in a wooden shack humorously called "Radio City." The first antenna was a 60-foot-high longwire stretched between two palm trees (climbed by the more dexterous of the youthful assembly gang). Somehow, the wire was "tuned" to work on 730 kHz. Later, the antenna was raised to 90 feet and the frequency lowered to 690 kHz. "AES-Guadalcanal" would be licensed as WVOQ.



Soldiers in the field listen to a broadcast.

Stay tuned to the November *Broadcaster* for the remainder of this article. Additional information may be found in Associate Professor Martin Hadlow's article "The Mosquito Network: American Military Broadcasting in the South-West Pacific During WWII."

archive.org/stream/TheMosquitoNetwork/TheMosquitoNetwork_djvu.txt

NJARC Annual Holiday Party

Date: Saturday, December 14th, 2019
Time: 5:00 PM – Cocktail Hour/6:15 PM - Dinner
Place: West Lake Golf & Country Club
1 Pine Lake Circle, Jackson NJ 08527

Members **\$25 each**
Non-Member Adults and Children over 12: **\$25 each**
Children under 12: **\$5 each**

Cocktail Hour, Dinner Buffet, Mystery Grab Bag, Surprises
*******RESERVATIONS REQUIRED*******

If you plan to attend, please fill out the attached coupon, detach it and mail it with a check to:

Marvin Beeferman
2265 Emerald Park Drive
Forked River, NJ 08731
609-693-9430/mbeeferman@verizon.net

by December 7th. **Everyone who plans to attend must send back a response form with the full name(s) of attendees.** Reservations must be made via the form below; please refrain from telephone or email reservations unless absolutely necessary! Payment must accompany the form. Please indicate member (M), non-member (NM) or child (C).

-----Please Cut Here -----

Name(s): _____

Telephone or email: _____

Number of **Members**: _____ X \$25 = \$ _____
Number of **Children** under 12: _____ X \$5 = \$ _____
Number of **Non-Members**: _____ X \$25 = \$ _____

TOTAL: \$ _____

Make checks out to **NJARC**, enclose with this form and **mail before 12/07/19.**



New Jersey Antique Radio Club's Fall Swap Meet and Hamfest



Parsippany PAL Building
33 Baldwin Road
Parsippany, NJ 07054
Just off Route 46,
Adjacent to Smith Field



Saturday November 2nd, 2019

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

33 Baldwin Rd Parsippany NJ 07054

Vendors Make Your Reservations Now!

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